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## African Continental Free Trade Area (AfCFTA): Potential Welfare Effects and Impacts on Nigerian Farmers

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### Abstract

The African Continental Free Trade Area (AfCFTA) is a platform created to increase intra-trade and ease movement of persons and goods across borders within Africa as well as promote economic welfare and wellbeing of member states. Nigeria being a signatory, faces the question of what is the first step to be taken in order to enhance farmers income and promote positive welfare and impact. Based on the optimisation of the multi-sector 2012 Social Accounting Matrix (SAM) using dynamic computable general equilibrium (CGE), Nigeria is not a self-sufficient economy and the deficit to meet subsistence demands for goods and services is about NGN251T (USD69B) with the following sectors being the most deficient, namely, bananas and plantains, sorghum and millet, education, maize and pulses. The sectors that have exerted the greatest pull on the economy in terms of intermediate demand for goods and services are clothing, fruit and vegetable processing, petroleum products, dairy and textiles. However, coal and lignite, animal feed, sugarcane, wheat and barley, tobacco sectors have the most capacity to push the economy towards self-sufficiency. The results further revealed that there was welfare (equivalent variation) loss of about 5.02 utility levels below the optimum while the compensating variation, the income households are compensated with for changes in income to maintain the same level of welfare is -NGN3.8T (-USD10.5B), indicating that households, particularly farmers, are subsidising the economy rather than being compensated for changes in prices. Therefore, the first step in the wake of the AfCFTA should be more emphasis on production and processing of goods and services for domestic consumption, which reduces import bills put at NGN12T. It is recommended that emphasis should be to build the infrastructure and increased agricultural processing capacities about two-fold above the present rate thereby increasing the income accruing to farm and rural families by about 35% from the present NGN22B (USD63M).

**Keywords:** Computable General Equilibrium (CGE), African Continental Free Trade Area (AfCFTA), Social Accounting Matrix (SAM), RStats, Nigeria.



## Introduction

Nigeria, on attaining independence in 1960, was solidly agriculture-based economy as the contribution to GDP was more than 50% (Nwankpa, 2017). The commodities that boosted the GDP at the time were regional-based like groundnuts, shea nuts and cotton in the North, cocoa and coffee in the West as well as oil palm and rubber in the South. The agricultural produce were mainly exported in the raw forms to Europe and the Americas for exchange with imported consumption goods and services. To support the evacuation of these regional-based agricultural produce as raw materials to foreign markets, state-controlled Marketing Boards (MBs) were established. The various agricultural sectors absorbed more that 70% of the labour force and the economy was booming (Edo and Ikelegbe, 2014).

The national currency at independence was the Pound but was converted to the Naira in 1973. The currency, hence the exchange rate was very strong making imported goods, which Nigeria could not manufacture of course, to be very cheap. This situation made Nigeria to be an exporter of cheap agricultural raw materials and importer of exorbitant (but cheap locally because of strong currency) finished goods and services to the detriment of developing the local capacity to convert the raw materials into higher quality industrial goods through value chain development (Obadan, 2006).

The agriculture-based nature of the Nigerian economy started changing with the discovery of crude oil and natural gas in commercial quantities just before independence. The annual production of major cash crops (cocoa, rubber, cotton, and groundnut) decreased by 42%, 29%, 65% and 64%, respectively, between 1970 and 1985 (Osaka *et al.*, 2003). Once Nigeria started extracting and exporting the crude without even developing internal capacity to refine, the labour force started migrating to the new sector as marginal return to labour in agriculture was low. With this, agriculture started losing prominence and subsequently, even neglect in terms of

targeted policies and capital investment. The situation worsened such that by early 1970s, Nigeria started experiencing food shortages. Subsequently, other challenges, like rising poverty rates, high level of food insecurity, high level of involuntary unemployment, among others, compounded the weak internal nature of the economy (Gaddis, 2019). With the dwindling fortunes of agriculture, Nigeria's response was to initiate and establish series of intervention projects, programmes and policies starting with the five-year development programme and the National Accelerated Food Production Programme (NAFPP). As at 2019, the following interventions and policies have been tried on Nigerian agriculture (Nmadu, 1998; Okoye and Okpala, 2001; Daneji, 2011; Iwuchukwu and Igbokwe, 2012; Yusuf, and Tenon, 2019):

- National Accelerated Food Production Programme (NAFPP) 1972-1973
- Nigerian Agricultural and Co-operative Bank (later Nigerian Agricultural Co-operative and Rural Development Bank and now Bank of Agriculture\*\* (NACB/BOA) 1972
- Agricultural Development Programmes\*\* (ADPs) 1975-
- River Basin Development Authorities\*\* (RBDA) 1976
- Agricultural Credit Guarantee Scheme Fund\*\* (ACGSF) 1978
- Operation Feed the Nation (OFN) 1976-1980
- Green Revolution Programme (GRP) 1980-1983
- Back to Land Programme 1983-1985
- Structural Adjustment Programme (SAP) 1986
- National Directorate of Employment\*\* (NDE) 1986
- Directorate of Social Mobilization (MAMSER) now National Orientation Agency\*\* (NOA), 1987
- Nigerian Agricultural Insurance Company\*\* (NAIC) 1987
- Directorate of Food, Road and Rural Infrastructure (DFRRI) 1987
- Better Life Programme (BLP) For Rural Women 1987
- Rural Banking Programme (1977)/ Peoples Bank of Nigeria



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- (1989)/Community Banks (1990) (now coalesced into Microfinance Banks\*\*)
- National Agricultural Land Development Authority (NALDA) 1991
- National Fadama Development Project\*\* (NFDLP) 1990
- Family Support Programme (FSP) 1994
- Family Economic Advancement Programme (FEAP) 1996
- National Economic Empowerment and Development Strategy (NEEDS) 1999
- National Special Programme on Food Security (NSPFS) 2002
- Root and Tuber Expansion Programme (RTEP) 2003
- Seven-Point Agenda. (SPA) 2007
- Commercial Agriculture Development Programme (CADP)/ Commercial Agriculture Credit Scheme (CACS) 2009
- Agricultural Transformation Agenda (ATA) 2011
- Agricultural Transformation Agenda Support Program\*\* (ATASP) 2013
- International Fund for Agricultural Development's Value Chain Development Programme\*\* (IFAD-VCDP) 2015
- Anchor Borrowers Programme\*\* (ABP) 2015
- The Green Alternative: Agriculture Promotion Policy (2016-2020)
- Economic Recovery and Growth Plan (ERGP) 2017 – 2020

\*\*those still existing, though may not be as functional as originally planned.

The above interventions, that is an average of one in two years and probably the highest number globally, tend to suggest that overlapping and reversals did not provide the needed environment that could engender maturity of the investments thereby improvement agriculture in Nigeria. A major turning point in Nigerian agriculture was in 1986 when the sector was liberalised and the state-controlled MBs were abolished. This came as part of the general programmes of structural adjustment programme (SAP), which had commenced with the liberalisation of the foreign exchange market to allow for equilibrium determination of the rate of

exchange based on market supply and demand conditions. This saw the rate falling from about NGN.8/USD in 1985 to the rate of NGN360/USD in 2020, a whopping 450% fall. With the falling exchange rate, purchasing power reduced, inflation remained high, price of imported goods and services skyrocketed leading to negative trade balance, mainly because Nigeria exports far less than her import.

Although, Africa and African countries are endowed with huge natural and social capital, the rate of intra-trade within has remained dismal. All countries tend to have parallel trade relationship as they meet only at the European and American markets rather than having a domestic African market for exchange of goods and services. Part of the problems is the lack of technology to create value from the vast natural and agricultural resources. In addition, there is a lot of dislocation and political instability in most of the countries as well as high level of inefficiency and sharp practices in providing enabling environment for small and medium enterprises to thrive. Particularly, there is high level of cross-border smuggling because of differential prices across borders. Given this scenario, a school of thought is of the opinion that providing 'soft' border between countries can open up the business environment, promote legitimate trade and reduce smuggling activities across borders. Moreover, it would create the largest common market globally. Therefore, the African Union, proposed and passed a resolution to establish the African Continental Free trade Area (AfCFTA). The agreement to establish the area has been ratified by majority of the countries, including Nigeria, and the area has come into force. In view of this, pertinent questions are necessary with regards to Nigeria's participation in the common market. The major question is 'What is the first step to be taken by Nigeria in order to ensure that Nigerian farmers benefit positively from the common market and Nigerian domestic market does not become dumping ground for cheap and probably substandard goods from other countries?' Other pertinent questions include 'What are the agricultural sectors that have



the potential to promote positive impacts of Nigerian farmers in AfCFTA? In view of these questions, the goal of this research is to determine the readiness of the Nigerian economy to participate fully in the AfCFTA with a view to enhance citizens income and welfare. The objectives are to calibrate and optimise the 2012 benchmark Nigeria SAM and determine the key agricultural sectors that should be targeted by Nigerian government to enhance welfare, improve export incomes and prevent loss of income by Nigerian farmers because of a wider border proposed by the AfCFTA.

Computable general equilibrium (CGE) also sometimes called applied general equilibrium (AGE) models are a class of economic models which utilise actual economic data to calibrate and optimise the economic systems and provide basis to study how such economic systems react to changes/shocks in prices, policy, technology or other external factors. It provides both ex-ante and ex-post approach to simultaneously evaluate the economy as a whole using the various micro and macroeconomic functions (Omoju *et al.*, 2020; Kontny, 2017; Mgeni *et al.*, 2019; Deldoost, 2020). CGE is superior to non-CGE models in the sense that it does not use single indicators like GDP, disposable income and other parameters to evaluate the impacts of a change on the economic system (Solaymani, & Yusoff, 2018; Omoju *et al.*, 2020). It is a versatile tool which is employed in this study to isolate sectors that could be used to promote positive impacts on Nigerian farmers in the wake of AfCFTA. The main data required to estimate a CGE is the Social Accounting Matrix (SAM) which is the encapsulation of the input-output (IO) tables. SAM is a very comprehensive data system about an economic system depicting the economic activities and the inter-relationship between various factors of production and the agents or institutions involved in the production and distribution systems (Nmadu *et al.*, 2019; Pratt, 2009; Deldoost, 2020).

### Methods

The research is a study about Nigeria, one of the largest economies in Africa and a top

player in the world economy and political affairs, like in the United Nations (UN), African Union (AU), Economic Community of West African States (ECOWAS), among others. The research utilise the 2012 multi-sectoral, open economy Nigerian SAM data developed by a team of researchers from IFPRI (lead by Thurlow, J., 2018, personal communication). The SAM data is disaggregated into 80 sectors of productive activities as well as commodities. Furthermore, the SAM is also disaggregated into 13 factors (land, four types of capital and 8 disaggregated labour supply units), 15 households (five quantiles each of rural farming, rural non-farming and urban), 5 taxes and 6 other accounts. For the purpose of the analysis, the commodities were aggregated into five sectors viz: agriculture, machinery and equipment, industrial processing, services, public services. The labour supply was aggregated into rural and urban at no-schooling, primary, secondary and tertiary levels while the households were aggregated rural farming, rural non-farm and urban in terms of demand for commodities and services. In addition, the economy is open with four active agents: the government, firms, households, and the rest of the world (ROW). The agents are aggregated into institutions as follows: non-government (enterprises and households), domestic (enterprises, households and government) and all (enterprises, households, government and ROW). All the values in the SAM data are in millions of Nigerian Naira (NGN).

In order to obtain optimum values of the SAM, some exogenous data for calibration, including income, trade, and substitution elasticities are required. This helps to reproduce the base year economic situation of the economy before any intervention is introduced. Therefore, in line with Kontny (2017) and Mgeni *et al.*, (2019), households' nested-extended linear expenditure system (ELES), Armington's constant elasticity of transformation (CES), Cobb-Douglas' constant elasticity of substitution (CES) and Leontief's CET aggregator functions as well as their distributions and efficiency parameters were calibrated along with the SAM. A simplified example of CGE nested production systems is

presented in Fig. 1 while the systems and actual flows between activities/commodities, factors, agents and institutions are shown in Fig. 2.

The CGE model codes used in this research is adapted from Bayar (2000). The model was enlarged and enhanced to promote effectiveness. The enhancements are:

- i. The structure was expanded from the two-sectors, two-factors to accommodate any number of sectors and factors.
- ii. The data entry module was improved such that entry can be either directly through the codes or through a datafile. The entry through a datafile has greater advantage since any data can easily be used. Based on this improvement, the current model is capable of analysing any Country's SAM with minimum change to codes.
- iii. The Frisch parameter is determined from the data rather than being supplied exogenously.
- iv. Tax rates are determined from the data rather than being supplied exogenously.
- v. The outputs are written directly to Excel files for easy reference and further processing.
- vi. Modules for estimating compensating income, equivalent variation, backward (power of the economy) index and forward (sensitivity of the economy) index and technical coefficients are included.
- vii. Modules for simulation of changes and impacts have been added to the model.
- viii. The simulation module can as well simulated changes and impacts

over a number of periods (for example, years).

- ix. In all the previous CGE models, land as a factor of production is excluded, in this enhanced model, land is included.

(See Robichaud, 2001; Arora, 2013; García & Giraldo, 2018 for further insights)

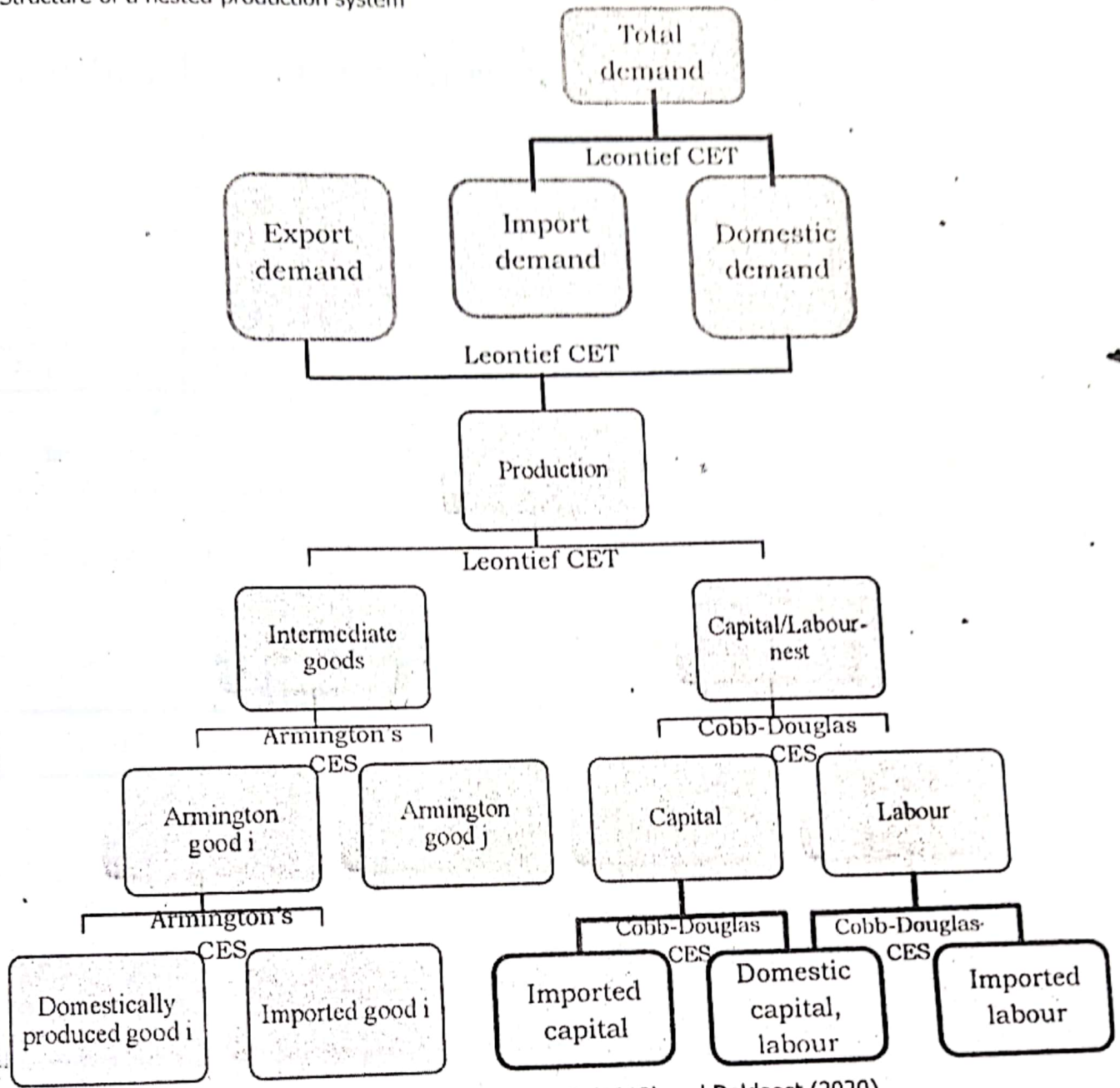
The specification of equations used in the codes as well as the sets, parameters and closures in the model which follow the patterns as adapted from Bayer (2000), are well discussed by the works of Kontny (2017), Bhattarai *et al.*, (2019) and particularly, Mgeni *et al.*, (2019). The codes were calibrated and optimised with the SAM using GAMS (2018). The key sectors were isolated with RStats (R Core Team, 2019) using ggplot2 package (Wickham, 2016).

### Results and Discussion

The optimised total demands for goods and services in the various sectors as well as the subsistence levels and the supply gaps are presented in Table 1 while Fig. 3 is the top ten and top bottom of sectors of demand, subsistence and supply deficit. In addition, Fig. 4 – 12 shows the top and bottom ten of various optimised values in the benchmark Nigerian SAM. The various values used to obtain the top and bottom ten sectors are presented in the Appendix Tables A – G.

The results in Table 1 and Fig. 3 as well as Fig. 4 shows that the subsistence level of consumption demand for agricultural commodities are far above the level of supply by more than **NGN251T**. Based on the results, only 'other fruits and foods' sectors are the agriculture-related in the top ten whereas all the bottom ten are all agriculture-related except coal and lignite sector.

Fig. 1 Structure of a nested-production system



Source: Adapted from Kontny (2017), Solaymani, & Yusoff, (2018) and Deldoost (2020)

# Circular Flow of Income

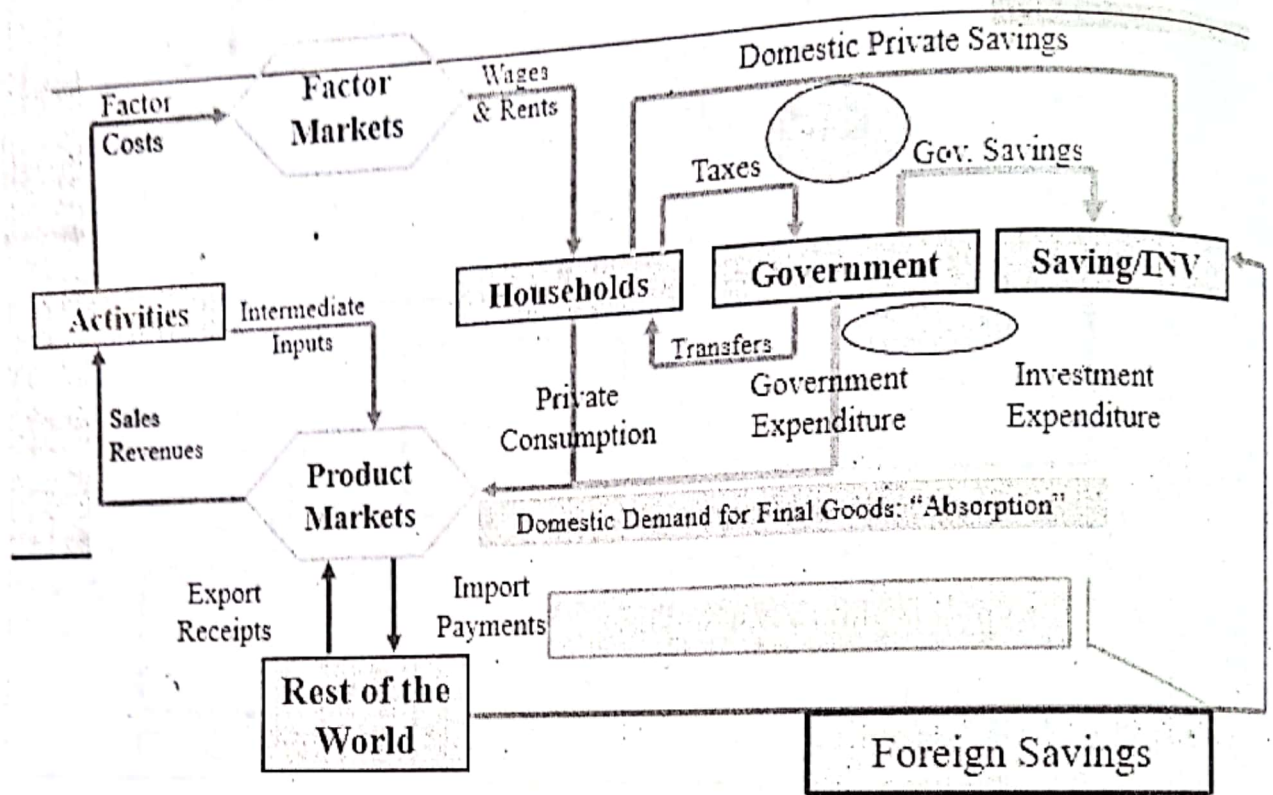


Fig.2 Interconnectivity and flow within an economic system.  
Source: Nmadu *et al.*, (2019) as adapted.

### Top ten Sectors

Sector	subsistence level	total demand	deficit supply
Vehicle and transport equipment	272.60	4259.16	4531.74
Transportation Bot storage	4700.27	4119.1	8864.37
Real estate activities	100.13	3537.68	3897.8
Polymers, plastics	1.40	2453.06	2454.54
Other foods	11443772.04	2540.04	114440262.88
Other foods	3300.64	3541.15	6847.69
Information and communication	0.12	8379.58	9011.69
Electrical equipment	1730.63	2970.32	4709.15
Crude oil & gas	0	18060.12	18060.12
Construction	0	6529.12	6529.12

Fig. 3a: Demand and deficit supply from sectors

### Bottom ten Sectors

Sector	subsistence level	total demand	deficit supply
Wheat and barley	0	0.15	0.15
Tobacco	0	9.92	9.92
Other oilseeds	0	2.89	2.89
Other grain milling	306.1	6.43	312.53
Other cereals	0	0.04	0.04
Meal processing	6.64	12.5	18.14
Cut flowers	0	7.38	7.38
Coffee processing	1.31	3.28	4.59
Coal and lignite	0	0.84	0.84
Animal feed	0	5.42	5.42

Fig. 3b: Demand and deficit supply from sectors



### Top ten Sectors

	public	export	investment	import	Rural non-farm	Rural farming	Urban
Vehicles and transport equipment -	0	297.82	1260.1	1020.7	90.47	180.34	601.73
Transportation and storage -	0	0.33	0	1390.78	377.98	896.96	1450.05
Real estate activities -	0	0	946.78	0	345.09	789.48	1456.32
Petroleum products -	0	1783.61	0	142.58	64.95	163.17	298.75
Other fruits -	0	19.95	0	11.92	312.54	966.06	1229.56
Other foods -	0	0.13	0	195.96	420.01	1423.72	1501.33
Information and communication -	0	0	43.53	0	1011.84	3087.65	4256.56
Electrical equipment -	0	0	1187.62	1232.7	70	139.66	340.34
Crude oil & gas -	0	18059.96	0	0.16	0	0	0
Construction -	0	0	6515.89	13.23	0	0	0

Fig. 4a: Demand for goods and services

### Bottom ten Sectors

	investment	public	Rural farming	Rural non-farm	Urban	export	import
Wheat and barley -	0	0	0	0	0	0.01	0.14
Tobacco -	0	0	0	0	0	0.33	9.59
Other oilseeds -	0	0	0	0	0	0.1	2.79
Other grain milling -	0	0	2.25	0.49	3.06	0	0.63
Other cereals -	0	0	0	0	0	0	0.04
Meat processing -	0	0	3.16	0.62	4.17	3.18	1.37
Cut flowers -	0	0	0	0	0	7.38	0
Coffee processing -	0	0	0.56	0.37	2.35	0	0
Coal and lignite -	0	0	0	0	0	0	0.84
Animal feed -	0	0	0	0	0	0	5.42

Fig. 4b: Demand for goods and services

### Top ten Sectors

Sector	capital	consumption	exports	labour	land	import
Wholesale and retail trade -	0	0	0	0	0	350303.57
Restaurants and food services -	0	0.01	0	0	0	87662.60
Raw milk -	0	0	0	0	0	76.13
Leafy vegetables -	0	0	107.16	0	0	1.69
Information and communication -	0	0.02	0	0	0	85306.15
Health and social work -	0	0	0	0	0	11244.05
Education -	0	0	0	0	0	673464.2
Crude oil & gas -	0	0.07	0	0	0	551.49
Cattle -	0	0	642.93	0	0	0.06
Aquaculture -	0	0	0	0	0	22771

Fig. 5a: Taxes on goods and services

### Bottom ten Sectors

Sector	import	capital	consumption	exports	labour	land
Sweet potatoes -	-1312.98	0	0	0	0	0
Sugarcane -	-452.24	0	0.07	0.04	0	0
Sorghum and millet -	-241.35	0	0	0.35	0	0
Other vegetables -	-9.7	0	0	0	0	0
Other roots -	-8150.8	0	0	0.04	0	0
Irish potatoes -	-0.57	0	0	0	0	0
Groundnuts -	-250184.8	0	0	0	0	0
Cotton and fibres -	-0.73	0	0.07	0	0	0
Cassava -	-993.92	0	0	0.03	0	0
Bananas and plantains -	-3.64	0	0	0	0	0

Fig. 5b: Taxes on goods and services



### Top ten Sectors

Sector	land	labour	capital
Wholesale and retail trade	0	702.57	0796.51
Food processing	0	110.00	1301.61
Real estate activities	0	395.70	5422.92
Public administration	0	2034.03	251.16
Other services	0	397.05	862.58
Manufacturing and construction	0	1192.83	0042.09
Finance and insurance	0	1705.1	301.23
Trade and repair	0	6148.8	7507.59
Construction	0	540.59	1634.83
Business services	0	802.13	1000.24

Fig. 6a: Factors of production of goods and services

### Bottom ten Sectors

Sector	land	labour	capital
Wheat and barley milling	0	0.46	1.87
Tobacco	0	0.54	0.37
Other grain milling	0	0.10	0.63
Other cereals	0	1.46	1.7
Meat processing	0	0.46	2.17
Electrical equipment	0	0.77	3.82
Dairies	0	0.20	2.15
Coff power	0.01	2.58	1.05
Coffee processing	0	0.87	1.97
Animal feed	0	0.83	2.12

Fig. 6b: Factors of production of goods and services

### Top ten Sectors

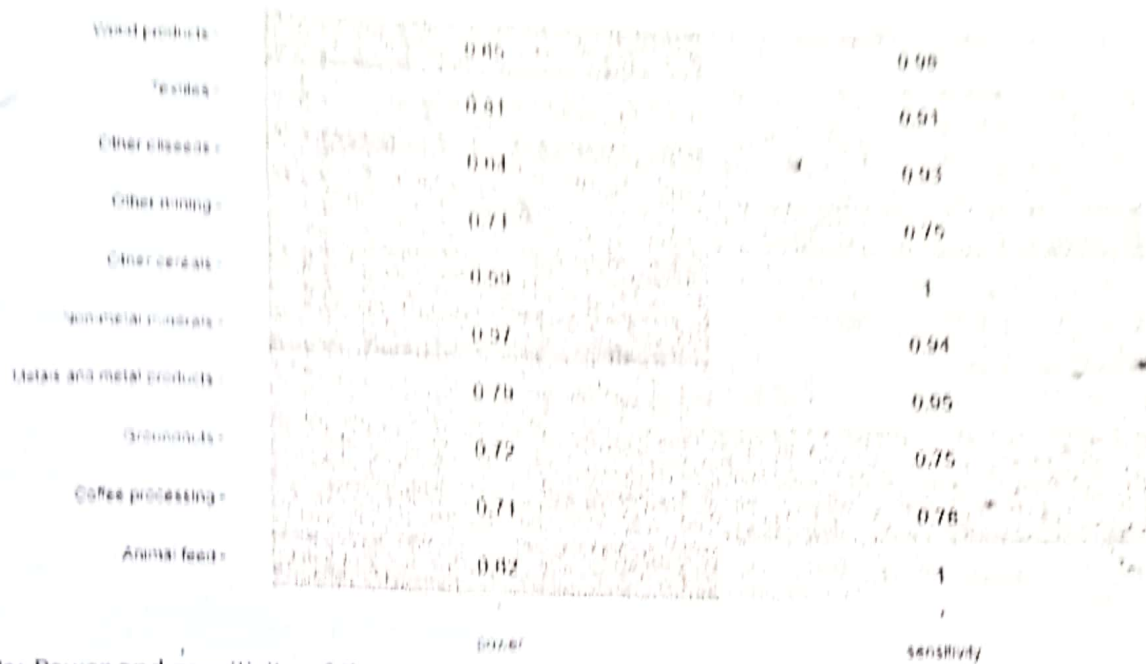


Fig. 7a: Power and sensitivity of the economy

### Bottom ten Sectors

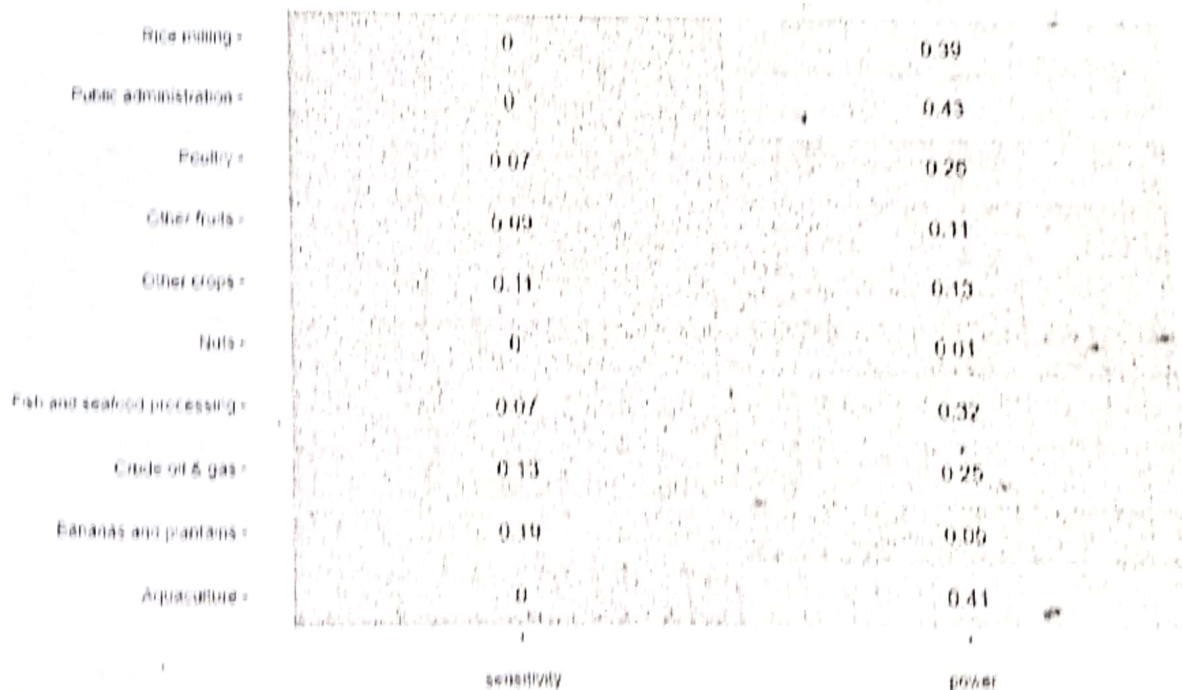


Fig. 7b: Power and sensitivity of the economy

### Top ten Sectors

	Urban	Rural
Wholesale and retail trade	1583.23	1219.36
Trade & Administration	469.46	1569.39
Cross trade	25.06	548.69
Information and communication	340.14	882.89
Finance and insurance	390.04	1315.09
Education	247.13	336.04
Crude oil & gas	3150.24	1998.55
Construction	469.34	55.25
Business services	816.91	85.22
Bananas and plantains	178.82	442.57

Fig. 8a: Labour supply to the sectors

### Bottom ten Sectors

	Urban	Rural
Wheat and barley milling	0.18	0.28
Tobacco	0	0.54
Other grain milling	0.07	0.09
Meat processing	0.2	0.24
Fruit and vegetable processing	0.32	0.44
Fats and oils	0.17	0.23
Electrical equipment	0.49	0.28
Dairy	0.12	0.14
Coffee processing	0.34	0.54
Animal feed	0.32	0.51

Fig. 8b: Labour supply to the sectors

### Top ten Sectors

Wholesale and retail trade -	0	0	0	0	15371.69
Transportation and storage -	0	0	0	0	6718.31
Real estate activities -	0	0	0	0	6512.18
Public administration -	0	0	0	3896.84	1.75
Petroleum products -	0	2658.25	0	0	0
Other foods -	3010.9	0	0	0	0
Information and communication -	0	0	0	0	15226.51
Finance and insurance -	0	0	0	0.11	3424.17
Construction -	0	0	6252.61	0	0
Business services -	0	0	0	0	3007.14
	Agriculture	Industrial processing machinery and equipment	public services	services	

Fig. 9a: Sectoral intermediate demand for goods and services

### Bottom ten Sectors

Wheat and barley milling -	0	0	0	0	9.94
Tobacco -	0	0	0	0	1.21
Other mining -	0	0	0	0	0
Other grain milling -	0	0	0	0	3.16
Other cereals -	0	0	0	0	10.15
Meat processing -	0	0	0	0	9.62
Crude oil & gas -	0	0	0	0	0
Coffee processing -	0	0	0	0	9.09
Coal and lignite -	0	0	0	0	0
Animal feed -	0	0	0	0	8.32
	Industrial processing machinery and equipment	public services	services	Agriculture	

Fig. 9b: Sectoral intermediate demand for goods and services

### Top ten Sectors

	non-government	domestic	all
Transportation and storage -	2725	2725	6133.31
Real estate activities -	2590.9	2590.9	7727.9
Public administration -	1.1	3997.12	6745.67
Other roots -	2053.18	2953.18	2953.18
Other fruits -	2508.16	2508.16	2508.16
Other foods -	3345.06	3345.06	3345.06
Information and communication -	8336.05	8336.05	8336.05
Finance and insurance -	2060.39	2060.39	2060.39
Crude oil & gas -	0	0	16046.2
Bananas and plantains -	2239.07	2239.07	2239.07

Fig. 10a: Institutional intermediate demand for goods and services  
Bottom ten Sectors

	domestic	non-government	all
Tobacco -	0	0	0.28
Sugarcane -	0	0	0.55
Other grain milling -	5.8	5.8	6.25
Other cereals -	0	0	0.12
Cut flowers -	0	0	6.86
Cotton and fibres -	0	0	19.79
Construction -	0	0	12.9
Coffee processing -	3.27	3.27	3.27
Coal and lignite -	0	0	0.15
Animal feed -	0	0	4.46

Fig. 10b: Institutional intermediate demand for goods and services

### Top ten Sectors

Wholesale and retail trade	175.67	403.97	370.0	676.65	245.35	386.07	208.25	399.15
Public administration	1.22	21.04	24.57	149.53	285.45	393.44	889.03	233.66
Other trade	4.49	8.76	104.03	6.75	63.65	76.42	183.55	6.47
Information and communication	113.25	11.50	245.53	151.75	265.48	183.37	195.29	32.85
Finance and insurance	1.02	17.03	20.50	125.3	222.35	329.69	742.46	246.08
Education	4.52	6.07	1.54	106.50	139.58	181.97	5.95	130.39
Crude oil & gas	40.11	2121.33	245.20	514.55	499.77	781.03	472.47	456.25
Construction	17.83	123.01	0.92	80.08	14.76	6.23	27.95	264.42
Business services	8.09	33.02	10.92	206.11	31.16	28.41	14.73	488.99
Minerals and quarries	31.19	80.75	157.26	39.93	75.56	61.65	148.11	44.95

Urban no school Urban PRI Rural no school Urban SEC Rural SEC Rural tertiary Rural PRI Urban tertiary

Fig. 11a: Categories of labour

### Bottom ten Sectors

Wheat and barley milling	0.01	0.02	0.02	0.03	0.05	0.05	0.07	0.21
Tobacco	0.12	0.03	0	0	0	0.12	0	0.27
Other grain milling	0	0.01	0.01	0.01	0.02	0.01	0.03	0.06
Meat processing	0.01	0.02	0.03	0.04	0.06	0.04	0.08	0.18
Fruit and vegetable processing	0.01	0.03	0.04	0.06	0.09	0.08	0.13	0.32
Fats and oils	0.01	0.02	0.02	0.03	0.05	0.04	0.07	0.17
Electrical equipment	0.01	0.15	0.04	0.23	0.12	0.07	0.1	0.05
Dairy	0	0.01	0.02	0.02	0.03	0.02	0.05	0.11
Coffee processing	0.01	0.04	0.05	0.06	0.09	0.09	0.14	0.39
Animal feed	0.01	0.04	0.04	0.06	0.09	0.09	0.13	0.37

Rural tertiary Rural SEC Urban no school Urban SEC Urban PRI Rural PRI Urban tertiary Rural no school

Fig. 11b: Categories of labour



### Top ten Sectors

	No schooling	Primary	Secondary	Tertiary
Wholesale and retail trade -	549.77	612.22	922	698.62
Public administration -	25.8	907.07	414.88	687.11
Other fruits -	199.42	192.33	99.4	82.89
Information and communication -	328.78	230.57	417.23	216.24
Finance and insurance -	21.62	760.09	347.65	575.77
Education -	13.05	12.62	245.17	312.33
Crude oil & gas -	293.39	2593.79	1014.32	1247.29
Construction -	24.15	150.97	94.85	270.62
Business services -	18.91	48.55	316.28	517.39
Bananas and plantains -	138.45	208.86	115.48	106.6

Fig. 12a: Education and labour

### Bottom ten Sectors

	Secondary	Tertiary	Primary	No schooling
Wheat and barley milling -	0.05	0.08	0.1	0.23
Tobacco -	0.03	0.12	0.12	0.27
Other grain milling -	0.02	0.03	0.03	0.07
Meat processing -	0.06	0.09	0.1	0.21
Fruit and vegetable processing -	0.09	0.14	0.17	0.37
Fats and oils -	0.05	0.07	0.09	0.19
Electrical equipment -	0.38	0.11	0.19	0.08
Dairy -	0.03	0.05	0.06	0.12
Coffee processing -	0.1	0.15	0.13	0.44
Animal feed -	0.1	0.14	0.18	0.42

Fig. 12b: Education and labour

It could be observed that the most important agriculture sectors like maize, rice, soybean,

cowpea, cassava, cocoa, rubber, oil palm and yams, which forms the bulk of all agricultural

policies, are not in the top ten contrary to the findings of Mgeni *et al.*, (2019) on the CGE analysis of Tanzania. Secondly, in most cases, Nigerian agricultural policies are always export-oriented meant to generate revenue for running the bureaucracies. A typical example, is the attempt of Nigerian government to start export yams to Europe and the Americas, whereas, domestic consumption demand is in excess of supply. This probably explains the undue pressure on the lean foreign earnings by the widespread importation of primary agricultural products, like rice, for which the country should strive to attain self-sufficiency. One of the potential impacts of the AfCFTA is that the supply deficit would be a huge market for other more self-sufficient economies in the block to take advantage of, thereby further depriving Nigeria of full allocation of her natural, social and capital resources. It could also be observed in Fig. 4 that the combined demands of rural households (who are mostly farmers) far outweigh that of urban households. Therefore, it is expected that by raising agricultural productivity, the level of subsistence would increase, hence, reduce rural-urban migration, reduce supply deficit and enhance income. The enhanced income would reduce poverty and bring Nigeria out of the recent acclaim of being the poverty capital of the world.

In terms of tax revenues (Fig. 5), of the top ten sectors, only two agriculture sectors (cattle and leafy vegetables) earned export tax revenues, whereas, Nigeria is paying heavily to import education and other service-related sectors contrary to the findings of Bhattarai *et al.*, (2019) on the CGE analysis of the Vietnamese economy which indicated that all sectors attracted positive and high tax revenues. At the bottom ten, all the sectors are primary agricultural sectors and Nigeria is subsidising their importation. The service-related sectors are high technology-dependent and Nigeria does not have the technical know-how to compete in these areas. It is therefore evident that if farmers are to reap the full benefit of Nigeria's participation in AfCFTA, then there must be deliberate attempt to reduce education and educational-related importation and increase capital expenditure

and funding of research and development (R&D) activities. The increase in R&D would stimulate local development of the needed robust technology to support increased and sustainable agricultural production and thereby raising the level of supply and reduce the supply gap. On the other hand, subsidies on primary agricultural produce should be discouraged as much as practicable while key industrial agricultural goods which are critical to stimulate and bring about sustainable local production can be subsidised.

Payment to factors of production (Fig. 6) shows that sugar refining is the only agribusiness activity in the top ten sectors even though Price Water Coopers (PWC, 2016) reported that it was among the top 3 agricultural imports in Nigeria in 2016. All the sectors in the bottom ten, except electrical equipment sector, are agribusiness sectors and value-added activities. This is in line with PWC (2016) who noted that Nigerian's agricultural sector is underdeveloped because the main focus is on production rather than promoting value addition across the segment (PWC, 2016). It is also noted that almost all sectors are not paying for using land as a factor. This is partly due to the fact that there are still problems with ascertaining exact ownership on land resources in Nigeria. The bigger problem is that land and land-related resources market are poorly developed and land-related transactions are in the hands of very few land dealers and grabbers. In addition, most of the lands in Nigeria are in poor conditions and they have undergone degradation, erosion and are poorly managed leading to very poor incentivizing to the owners and the need to adapt better techniques and management (Liverpool *et al.*, 2009). Meanwhile, the majority of land owners are the rural dwellers who could reap tremendous positive and beneficial impacts if these sectors are well developed. Opening up Nigeria's land market to wider participation of the AfCFTA might lead to a situation where due to poor remuneration, the farmers are further pulverized and thus increasing the level of poverty, hunger and inequality. Therefore, there is urgent need for Nigeria to reform the land market before opening it to

African participation. The payment to labour in Fig. 8 shows similar pattern and quite disturbing, because, more labour is supplied to agriculture (anything between 60 and 80% of Nigerian population are participants in agricultural production either on fulltime basis or as part-time) but much of payment to labour is from the crude oil and gas sectors. So, in order for farmers to reap positive impacts in the African market, agricultural labour must be remunerative enough to attract younger generations to agriculture. R&D efforts must be to developed socially acceptable agricultural technologies that will remove the drudgery presently persistent in agriculture and agribusiness in Nigeria.

The power (otherwise called backward index) is indicative of the intensity of demand for intermediate goods and services by a sector whereas sensitivity is the supply of intermediate goods and services to other sectors (Burfisher, 2011). Based on the results in Fig. 7, only groundnuts, coffee processing and animal feed are the agriculture sectors in the top ten providing intermediate goods and services to other sectors of the economy. On the other hand, apart from public administration as well as crude oil and gas

sectors, all the bottom ten sectors are agriculture and agribusiness sectors. It therefore becomes imperative, that in order for Nigerian farmers to reap the benefits of the African markets, public and private institutions must be able to step up agribusiness value chain development in Nigeria, first to supply and feed the domestic market thereby improving self-sufficiency before targeting export earnings. This done, will reduce import bills, which presently is put at about NGN12T (USD35B), and, further strengthen the internal capacity of Nigeria to withstand external pressures arising from global economic crisis from time to time as well as stabilising the NGN against devaluation and inflation. This will also improve Nigeria's external reserves and reduce the negative trade balance, presently put at NGN3.3T, between Nigeria and her trading partners.

The results in Fig. 9-12 further reinforce the other findings. It is also important to note that while the services sub-sector is in the top ten, agriculture sub-sector is in the bottom ten in terms of sub-sectoral demand as presented in Fig. 9. In terms of institutions, agriculture does not play any dominating role.

**Table 1 Sectoral demand and subsistence levels in the Nigerian Economy**

Sector	total demand	subsistence level	deficit supply
Maize	467.89	-3,852,994.62	3,853,462.51
Sorghum and millet	1,032.58	-9,697,797.57	9,698,830.15
Rice	428.09	-1,347,772.44	1,348,200.53
Wheat and barley	0.15	0.00	0.15
Other cereals	0.04	0.00	0.04
Pulses	434.91	-3,393,320.32	3,393,755.23
Groundnuts	117.53	-124,067.84	124,185.37
Other oilseeds	2.89	0.00	2.89
Cassava	404.49	-1,487,716.79	1,488,121.28
Irish potatoes	58.09	-57,146.84	57,204.93
Sweet potatoes	90.74	-149,774.60	149,865.34
Other roots	2,053.74	-38,342,644.86	38,344,698.60
Leafy vegetables	482.50	-2,117,424.19	2,117,906.69
Other vegetables	1,029.60	-9,640,625.26	9,641,654.86
Sugarcane	20.94	0.00	20.94
Tobacco	9.92	0.00	9.92

Sector	total demand	subsistence level	deficit supply
Cotton and fibres	22.33	0.00	22.33
Nuts	353.64	-1,516,180.15	1,516,533.79
Bananas and plantains	2,239.09	-45,599,583.21	45,601,822.30
Other fruits	2,540.04	-114,437,722.84	114,440,262.88
Cut flowers	7.38	0.00	7.38
Rubber	1,024.51	0.00	1,024.51
Other crops	511.03	-28.29	539.32
Cattle	424.67	-716,717.76	717,142.43
Raw milk	76.23	-211,413.06	211,489.29
Poultry	428.95	-3,346,666.70	3,347,095.65
Eggs	79.05	-56,489.66	56,568.71
Small ruminants	282.33	-994,657.10	994,939.43
Other livestock	75.76	-36,849.28	36,925.04
Forestry	163.40	-31.80	195.20
Aquaculture	203.02	-307.25	510.27
Capture fisheries	363.32	-1,190,852.10	1,191,215.42
Coal and lignite	0.84	0.00	0.84
Crude oil & gas	18,060.12	0.00	18,060.12
Other mining	122.17	0.00	122.17
Meat processing	12.50	-5.64	18.14
Fish and seafood processing	663.05	-729.17	1,392.22
Dairy	318.43	-94.19	412.62
Fruit and vegetable processing	247.13	-97.45	344.58
Fats and oils	116.40	-1.46	117.86
Maize milling	254.47	-1,171,453.35	1,171,707.82
Rice milling	919.01	-2,661,366.47	2,662,285.48
Wheat and barley milling	14.36	-1,851.67	1,866.03
Other grain milling	6.43	-306.10	312.53
Sugar refining	315.11	-19.30	334.41
Coffee processing	3.28	-1.31	4.59
Other foods	3,541.15	-3,306.54	6,847.69
Animal feed	5.42	0.00	5.42
Beverages	1,013.37	-9.41	1,022.78
Tobacco processing	47.02	-0.19	47.21
Cotton yarn	64.45	0.00	64.45
Textiles	320.10	-75.21	395.31
Clothing	272.06	-11.21	283.27
Leather and footwear	464.03	-4.90	468.93
Wood products	29.16	-51.58	80.74
Paper products and publishing	317.03	-79.43	396.46
Petroleum products	2,453.06	-1.48	2,454.54
Fertilizers and herbicides	1,675.53	-56.03	1,731.56

Sector	total demand	subsistence level	deficit supply
Other chemicals	1,216.37	-27.81	1,244.18
Non-metal minerals	315.35	-56.30	371.65
Metals and metal products	435.52	-2.65	438.17
Machinery and other equipment	2,118.24	-131.16	2,249.40
Electrical equipment	2,970.32	-1,738.83	4,709.15
Vehicles and transport equipment	4,259.16	-272.58	4,531.74
Other manufacturing	533.81	-34.16	567.97
Electricity, gas and steam	151.19	-28.05	179.24
Water supply and sewage	23.95	-20,860.59	20,884.54
Construction	6,529.12	0.00	6,529.12
Wholesale and retail trade	338.91	-148.20	487.11
Transportation and storage	4,116.10	-4,748.27	8,864.37
Accommodation	1,978.49	-5,082.94	7,061.43
Restaurants and food services	411.92	-65.46	477.38
Information and communication	8,379.58	-632.11	9,011.69
Finance and insurance	2,252.94	-18,614.86	20,867.80
Real estate activities	3,537.68	-360.12	3,897.80
Business services	1,803.74	-1,440.41	3,244.15
Public administration	1,490.66	-43.71	1,534.37
Education	2,092.79	-8,962,767.96	8,964,860.75
Health and social work	903.55	-128.57	1,032.12
Other services	768.03	-747.18	1,515.21
<b>Total</b>	<b>93,311.95</b>	<b>-251,176,238.54</b>	<b>251,269,550.49</b>

### Conclusion and Recommendations

The introduction of an African wide market to promote trade among and between African countries through the AfCFTA is a very big opportunity for Nigeria to expand her economic frontiers and enhance export earnings, potentially. However, Nigeria's economic base is agriculture in terms of nutrition and food security but the major export earning potential is the crude oil and gas sector which absorbs less than 10% of labour supply in Nigeria. Other sectors that tend to attract labour supply are the finance, banking and services sectors. That notwithstanding, agriculture still absorb more than 50% of the labour force, howbeit, with low remunerative power. Probably, that has accounted for the high involuntary unemployment in Nigeria put at more than 20% (see example in Omoju *et al.*, 2020).

Based on latest figures, 53% of Nigerians are said to be earning less than USD2/day. Therefore, being in the low-technology ladder, primary production and enhanced secondary value addition still stands the greater candidate for poverty reduction.

Based on the analysis carried out on the 2012 multi-sectoral SAM, Nigeria needs about NGN251T expansion in production and processing to become self-sufficient. The agricultural sectors which seems to be more responsive to changes and which can be used to stimulate local production and consumption include sugarcane and sugar refining, rice milling, bananas and plantains, animal feed, coffee processing, meat processing, cotton and fibres, groundnuts sectors. It was particularly noted that there is urgent need to reduce import of education and educational

materials in favour of enhanced R&D which should focus on developing robust technologies for industrial take-off. All these are meant to prevent a situation where Nigeria becomes a dumping ground for cheap technologies, the cheap land resources are hijacked by open opportunities given to other African countries where land markets are well-developed and land is appropriately priced. In order to promote greater confidence in the Nigerian economy, the government should deal with the border neighbours and the larger trade area with respect and transparency and should avoid the type of experience of 2019 when the neighbours just come to realise that the borders have being closed, even though argument are that the goals of closing the borders are not achieved and this raises doubts if the free trade area will not eventually heat the rock (Kassa, 2020). Therefore, it is recommended that the first, second and third steps of Nigeria into AfCFTA is boosting agricultural production to enhance domestic consumption, reduce supply gap and enhance farmers welfare.

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Appendix A Demand for goods and services

Sector	Rural farming households	Rural non-farm households	Urban households	export	import	Investment	public
Maize	314.01	66.85	79.36	0.00	7.67	0.00	0.00
Sorghum and millet	846.02	49.55	137.01	0.00	0.00	0.00	0.00
Rice	274.10	28.96	81.88	0.00	43.14	0.00	0.00
Wheat and barley	0.00	0.00	0.00	0.01	0.14	0.00	0.00
Other cereals	0.00	0.00	0.00	0.00	0.04	0.00	0.00
Pulses	248.30	43.47	140.12	0.00	3.00	0.00	0.00
Groundnuts	82.88	10.79	23.12	0.73	0.00	0.00	0.00
Other oilseeds	0.00	0.00	0.00	0.10	2.79	0.00	0.00
Cassava	364.83	26.53	13.07	0.00	0.06	0.00	0.00
Irish potatoes	30.27	6.34	19.44	0.16	1.88	0.00	0.00
Sweet potatoes	56.80	5.98	27.96	0.00	0.00	0.00	0.00
Other roots	1,054.43	255.05	743.71	0.00	0.55	0.00	0.00
Leafy vegetables	292.38	57.72	132.39	0.00	0.01	0.00	0.00
Other vegetables	515.08	117.50	396.94	0.02	0.06	0.00	0.00
Sugarcane	0.00	0.00	0.00	0.00	20.93	0.00	0.00
Tobacco	0.00	0.00	0.00	0.33	9.59	0.00	0.00
Cotton and fibres	0.00	0.00	0.00	21.79	0.54	0.00	0.00
Nuts	160.73	43.64	84.34	62.97	1.97	0.00	0.00
Bananas and plantains	917.96	345.96	975.15	0.00	0.03	0.00	0.00
Other fruits	966.06	312.54	1,229.56	19.95	11.92	0.00	0.00
Cut flowers	0.00	0.00	0.00	7.38	0.00	0.00	0.00
Rubber	0.00	0.00	0.00	1,024.20	0.30	0.00	0.00
Other crops	0.77	0.24	0.76	506.11	3.16	0.00	0.00
Cattle	115.05	35.03	130.63	0.00	0.14	143.82	0.00
Raw milk	60.51	2.20	13.52	0.00	0.00	0.00	0.00
Poultry	184.83	42.27	201.82	0.00	0.03	0.00	0.00





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Sector	Rural farming households	Rural non-farm households	Urban households	export	import	investment	public
	21.61	8.63	48.57	0.00	0.24	0.00	0.00
Eggs	153.05	27.56	53.23	0.00	0.00	48.50	0.00
Small ruminants	48.55	5.87	9.23	6.35	1.65	4.10	0.00
Other livestock	109.06	18.82	34.94	0.14	0.43	0.00	0.00
Forestry	73.13	29.44	100.45	0.00	0.00	0.00	0.00
Aquaculture	137.77	52.74	171.33	0.45	1.03	0.00	0.00
Capture fisheries	0.00	0.00	0.00	0.00	0.84	0.00	0.00
Coal and lignite	0.00	0.00	0.00	18,059.96	0.16	0.00	0.00
Crude oil & gas	0.00	0.00	0.00	81.23	40.94	0.00	0.00
Other mining	3.16	0.62	4.17	3.18	1.37	0.00	0.00
Meat processing							
Fish and seafood processing	141.72	41.62	96.14	50.91	332.66	0.00	0.00
Dairy	25.81	11.37	41.83	127.21	112.20	0.00	0.00
Fruit and vegetable processing	83.60	27.08	85.78	2.81	47.87	0.00	0.00
Fats and oils	26.86	5.15	16.50	31.10	36.80	0.00	0.00
Maize milling	178.22	22.22	53.32	0.00	0.71	0.00	0.00
Rice milling	164.65	68.62	307.65	0.00	378.09	0.00	0.00
Wheat and barley milling	3.22	1.48	9.58	0.00	0.09	0.00	0.00
Other grain milling	2.25	0.49	3.06	0.00	0.63	0.00	0.00
Sugar refining	41.90	18.83	25.11	0.02	229.25	0.00	0.00
Coffee processing	0.56	0.37	2.35	0.00	0.00	0.00	0.00
Other foods	1,423.72	420.01	1,501.33	0.13	195.96	0.00	0.00
Animal feed	0.00	0.00	0.00	0.00	5.42	0.00	0.00
Beverages	358.36	108.34	464.35	7.06	75.26	0.00	0.00
Tobacco processing	9.63	3.07	5.10	24.32	4.89	0.00	0.00
Cotton yarn	0.00	0.00	0.00	36.05	28.40	0.00	0.00
Textiles	96.93	34.88	126.98	11.66	49.65	0.00	0.00
Clothing	113.79	27.34	116.13	0.30	14.50	0.00	0.00
Leather and footwear	43.02	10.41	41.08	351.63	17.88	0.00	0.00
Wood products	1.12	0.03	0.05	3.12	19.05	5.80	0.00
Paper products and publishing	37.69	16.58	80.92	1.56	180.28	0.00	0.00
Petroleum products	163.17	64.95	298.75	1,783.61	142.58	0.00	0.00
Fertilizers and herbicides	180.85	49.19	171.18	57.52	1,216.77	0.02	0.00
Other chemicals	180.85	49.19	171.18	168.44	646.68	0.02	0.00
Non-metal minerals	20.16	5.59	52.15	4.62	232.62	0.04	0.17
Metals and metal products	6.75	1.32	6.95	35.85	371.56	13.10	0.00
Machinery and other equipment	5.05	1.18	8.35	17.33	1,044.77	1,041.55	0.00

Sector	Rural farming households	Rural non-farm households	Urban households	export	import	investment	public
Electrical equipment	139.66	70.00	340.34	0.00	1,232.70	1,187.62	0.00
Vehicles and transport equipment	188.34	90.47	601.73	297.82	1,820.70	1,260.10	0.00
Other manufacturing	113.76	32.62	108.83	24.41	37.27	216.91	0.00
Electricity, gas and steam	28.01	16.15	107.01	0.00	0.01	0.02	0.00
Water supply and sewage	3.71	2.54	17.69	0.00	0.00	0.00	0.00
Construction	0.00	0.00	0.00	0.00	13.23	6,515.89	0.00
Wholesale and retail trade	102.14	32.77	204.00	0.00	0.00	0.00	0.00
Transportation and storage	896.96	377.98	1,450.05	0.33	1,390.78	0.00	0.00
Accommodation	120.36	319.76	416.47	58.52	1,063.38	0.00	0.00
Restaurants and food services	148.02	48.53	215.36	0.00	0.00	0.00	0.00
Information and communication	3,067.65	1,011.84	4,256.56	0.00	0.00	43.53	0.00
Finance and insurance	643.31	107.61	1,309.47	1.39	191.16	0.00	0.00
Real estate activities	789.48	345.09	1,456.32	0.00	0.00	946.78	0.00
Business services	329.45	30.11	764.97	23.37	627.27	28.58	0.00
Public administration	0.19	0.10	0.80	0.08	684.80	0.00	804.69
Education	231.69	80.66	389.57	0.00	0.00	0.00	1,390.86
Health and social work	127.45	53.77	103.83	0.00	0.00	0.00	618.51
Other services	244.26	158.96	349.95	0.00	8.49	1.00	5.36
<b>Total</b>	<b>17,515.69</b>	<b>5,362.57</b>	<b>20,631.51</b>	<b>22,916.27</b>	<b>12,608.91</b>	<b>11,457.39</b>	<b>2,819.60</b>

Sector	sectors					In
	consumption	Capital	labour	exports	Import	
Maize	0.000000	0.002073	0.000001	0.069808	*0.101154	0.000
Sorghum and millet	0.000000	0.000001	0.000001	0.353842	-241.35	0.000
Rice	0.000000	0.003798	0.000001	1.000000	-0.015091	0.000
Wheat and barley	0.066667	4.427147	0.000056	0.020778	-0.000027	0.000
Other cereals	0.066667	0.000394	0.000069	1.000000	-0.205946	0.000
Pulses	0.000000	0.000412	0.000001	0.024916	-0.253215	0.000
Groundnuts	0.000001	0.000000	0.000002	0.000108	250,184.80	0.0000
Other oilseeds	0.066667	0.000329	0.000001	0.000001	-0.288739	0.0000
Cassava	0.000000	0.000001	0.000000	0.025795	-993.92	0.0000
Irish potatoes	0.000002	0.001749	0.000003	0.000495	-0.569537	0.0000
Sweet potatoes	0.000001	0.000001	0.000003	1.000000	-1,312.98	0.0000
Other roots	0.000000	0.000000	0.000000	0.037044	-8,150.80	0.0000
Leafy vegetables	0.000000	0.000207	0.000001	107.155	-1.885521	0.0000
Other vegetables	0.000000	0.000027	0.000000	0.004586	-9.702477	0.0000
Sugarcane	0.066667	0.000002	0.000002	0.035924	-452.24	0.0000
Tobacco	0.066667	0.736831	0.000185	0.000350	-0.000068	0.0006
Cotton and fibres	0.066667	0.000119	0.000006	0.000005	-0.725745	0.0000
Nuts	0.000000	0.000068	0.000001	0.000001	-0.091866	0.0000
Bananas and plantains	0.000000	0.000037	0.000000	1.000000	-3.638149	0.0000
Other fruits	0.000000	0.000488	0.000000	0.000004	-0.358210	0.0000
Cut flowers	0.066667	0.000262	0.000039	0.000022	0.003241	0.0000
Rubber	0.066667	0.000167	0.000001	0.000000	0.000162	0.0000
Other crops	0.000057	0.002404	0.000001	0.000000	-0.016720	0.0000
Cattle	0.000000	0.000055	0.000001	642.93	0.064284	0.0000
Raw milk	0.000001	0.000001	0.000001	1.000000	78.138334	0.0000
Poultry	0.000000	0.000006	0.000001	0.059295	0.294969	0.0000
Eggs	0.000001	0.000394	0.000008	1.000000	0.005435	0.0000
Small ruminants	0.000000	0.000000	0.000001	1.000000	17.180400	0.0000
Other livestock	0.000002	0.002836	0.000004	0.000012	0.001746	0.0000
Forestry	0.009213	0.000049	0.000002	0.001093	0.008178	0.0000
Aquaculture	0.001201	0.000001	0.000006	1.000000	22.765739	0.0000
Capture fisheries	0.000000	0.000204	0.000002	0.000167	0.007975	0.0000
Coal and lignite	0.066667	0.187787	0.000022	1.000000	0.002622	0.0000
Crude oil & gas	0.066667	0.000000	0.000000	0.000000	551.486663	0.0000
Other mining	0.066667	0.032837	0.000012	0.000001	0.017718	0.0000
Meat processing	0.002558	0.024622	0.000223	0.000030	0.000118	0.0000
Fish and seafood processing	0.000348	10.334586	0.000074	0.000002	0.000648	0.0000
Dairy	0.001522	1.362330	0.000379	0.000001	0.000577	0.0000
Fruit and vegetable processing	0.001833	0.480917	0.000131	0.000034	0.004333	0.0000
Fats and oils	0.053957	0.308810	0.000248	0.000004	0.003419	0.0000
Maize milling	0.000000	0.001636	0.000005	1.000000	4.169698	0.0000



Sector	consumption	Capital	labour	exports	import	land
Rice milling	0.000000	1.197301	0.000007	1.000000	0.018534	0.000000
Wheat and barley milling	0.000007	0.010317	0.000218	1.000000	1.029291	0.000000
Other grain milling	0.000017	0.145454	0.000639	0.092871	0.064802	0.000000
Sugar refining	0.016375	0.018945	0.000001	0.000190	0.396036	0.000000
Coffee processing	0.004513	0.000051	0.000115	1.000000	1.000000	0.000000
Other foods	0.000919	0.017761	0.000001	0.000001	0.103143	0.000000
Animal feed	0.066667	0.160703	0.000121	1.549230	0.006981	0.000000
Beverages	0.089166	0.028603	0.000002	0.000027	0.028655	0.000000
Tobacco processing	0.176715	0.036202	0.000064	0.000004	0.041112	0.000000
Cotton yarn	0.066667	0.149217	0.000012	0.000003	0.010037	0.000000
Textiles	0.003129	0.004223	0.000000	0.000011	0.017989	0.000000
Clothing	0.017490	0.276520	0.000022	0.000485	0.001977	0.000000
Leather and footwear	0.017502	0.003589	0.000003	0.000000	0.060622	0.000000
Wood products	0.000084	0.008698	0.000003	0.000025	0.076836	0.000000
Paper products and publishing	0.003101	0.513341	0.000009	0.000079	0.006441	0.000000
Petroleum products	0.312887	0.020888	0.000004	0.000000	0.000052	0.000000
Fertilizers and herbicides	0.013103	2.753939	0.000012	0.000002	0.001317	0.000000
Other chemicals	0.013103	0.214436	0.000004	0.000002	0.008599	0.000000
Non-metal minerals	0.002520	0.017975	0.000001	0.000006	0.027119	0.000000
Metals and metal products	0.015615	0.363086	0.000003	0.000003	0.001643	0.000000
Machinery and other equipment	0.000394	1.529193	0.000009	0.000006	0.000030	0.000000
Electrical equipment	0.000575	6.632013	0.000130	0.000023	0.000340	0.000000
Vehicles and transport equipment	0.002937	2.273032	0.000010	0.000000	0.002024	0.000000
Other manufacturing	0.006631	0.019674	0.000002	0.000006	0.219775	0.000000
Electricity, gas and steam	0.004858	0.000001	0.000001	1.000000	0.029462	0.000000
Water supply and sewage	0.000004	0.000003	0.000005	1.000000	1.000000	0.000000
Construction	0.066667	0.000000	0.000000	1.000000	0.658000	0.000000
Wholesale and retail trade	0.002073	0.000000	0.000000	1.000000	359,393.57	0.000000
Transportation and storage	0.001043	0.000000	0.000000	0.000000	0.012239	0.000000
Accommodation	0.000153	0.000001	0.000004	0.000001	0.025560	0.000000
Restaurants and food services	0.011343	0.000001	0.000007	1.000000	85,662.89	0.000000
Information and communication	0.024251	0.000000	0.000000	1.000000	85,308.15	0.000000
Finance and insurance	0.000090	0.000000	0.000000	0.000033	0.000001	0.000000
Real estate activities	0.006417	0.000000	0.000000	1.000000	1.000000	0.000000
Business services	0.000665	0.000000	0.000000	0.000004	0.065536	0.000000



Nwajiuba

Sector	consumption	Capital	labour	exports	import	land
Public administration	0.000091	0.000000	0.000000	0.000001	0.000001	0.000000
Education	0.000000	0.000000	0.000000	1.000000	673,464.20	0.000000
Health and social work	0.002016	0.000000	0.000001	1.000000	11,244.05	0.000000
Other services	0.001827	0.000000	0.000000	1.000000	9.101721	0.000000

Appendix C Aggregate commodities demands from sectors

Sectors	Agriculture	machinery and equipment	industrial processing	services	public services
Maize	1,120.9543	0.0007	0.0010	0.0008	0.0004
Sorghum and millet	1,048.1335	0.0007	0.0010	0.0008	0.0004
Rice	971.5329	0.0007	0.0010	0.0008	0.0004
Wheat and barley	10.9174	0.0007	0.0010	0.0008	0.0004
Other cereals	10.1578	0.0007	0.0010	0.0008	0.0004
Pulses	976.4805	0.0007	0.0010	0.0008	0.0004
Groundnuts	403.4419	0.0007	0.0010	0.0008	0.0004
Other oilseeds	1,075.1484	0.0007	0.0010	0.0008	0.0004
Cassava	756.3754	0.0007	0.0010	0.0008	0.0004
Irish potatoes	106.8231	0.0007	0.0010	0.0008	0.0004
Sweet potatoes	130.4026	0.0007	0.0010	0.0008	0.0004
Other roots	1,922.6066	0.0007	0.0010	0.0008	0.0004
Leafy vegetables	760.7668	0.0007	0.0010	0.0008	0.0004
Other vegetables	2,056.9977	0.0007	0.0010	0.0008	0.0004
Sugarcane	219.8416	0.0007	0.0010	0.0008	0.0004
Tobacco	1.2132	0.0007	0.0010	0.0008	0.0004
Cotton and fibres	33.7768	0.0007	0.0010	0.0008	0.0004
Nuts	279.7933	0.0007	0.0010	0.0008	0.0004
Bananas and plantains	2,022.4859	0.0007	0.0010	0.0008	0.0004
Other fruits	2,085.2161	0.0007	0.0010	0.0008	0.0004
Cut flowers	16.6368	0.0007	0.0010	0.0008	0.0004
Rubber	456.1337	0.0007	0.0010	0.0008	0.0004
Other crops	310.1228	0.0007	0.0010	0.0008	0.0004
Cattle	407.9189	0.0007	0.0010	0.0008	0.0004
Raw milk	262.8907	0.0007	0.0010	0.0008	0.0004
Poultry	376.7133	0.0007	0.0010	0.0008	0.0004
Eggs	61.8666	0.0007	0.0010	0.0008	0.0004
Small ruminants	389.9148	0.0007	0.0010	0.0008	0.0004
Other livestock	94.5460	0.0007	0.0010	0.0008	0.0004
Forestry	301.3913	0.0007	0.0010	0.0008	0.0004
Aquaculture	150.5414	0.0007	0.0010	0.0008	0.0004
Capture fisheries	374.3073	0.0007	0.0010	0.0008	0.0004
Coal and lignite	0.0048	0.0007	0.0010	0.0008	0.0004



Sectors	Agriculture	machinery and equipment	industrial processing	services	public services
Crude oil & gas	0.0048	0.0007	0.0010	0.0008	0.0004
Other mining	0.0048	0.0007	0.0010	0.0008	0.0004
Meat processing	9.6172	0.0007	0.0010	0.0008	0.0004
Fish and seafood processing	29.0652	0.0007	0.0010	0.0008	0.0004
Dairy	47.5798	0.0007	0.0010	0.0008	0.0004
Fruit and vegetable processing	139.7470	0.0007	0.0010	0.0008	0.0004
Fats and oils	17.7265	0.0007	0.0010	0.0008	0.0004
Maize milling	348.3407	0.0007	0.0010	0.0008	0.0004
Rice milling	155.3903	0.0007	0.0010	0.0008	0.0004
Wheat and barley milling	9.9432	0.0007	0.0010	0.0008	0.0004
Other grain milling	3.1555	0.0007	0.0010	0.0008	0.0004
Sugar refining	2,187.1788	0.0007	0.0010	0.0008	0.0004
Coffee processing	9.0884	0.0007	0.0010	0.0008	0.0004
Other foods	3,010.9016	0.0007	0.0010	0.0008	0.0004
Animal feed	8.3187	0.0007	0.0010	0.0008	0.0004
Beverages	678.8340	0.0007	0.0010	0.0008	0.0004
Tobacco processing	25.3045	0.0007	0.0010	0.0008	0.0004
Cotton yarn	41.6963	0.0007	0.0010	0.0008	0.0004
Textiles	0.0048	0.0007	2,546.4978	0.0008	0.0004
Clothing	0.0048	0.0007	185.4503	0.0008	0.0004
Leather and footwear	0.0048	0.0007	479.9971	0.0008	0.0004
Wood products	0.0048	0.0007	345.2977	0.0008	0.0004
Paper products and publishing	0.0048	0.0007	82.0287	0.0008	0.0004
Petroleum products	0.0048	0.0007	2,658.2516	0.0008	0.0004
Fertilizers and herbicides	0.6457	23.0493	468.8334	0.0008	0.0004
Other chemicals	0.6457	23.0493	468.8334	0.0008	0.0004
Non-metal minerals	0.0048	0.0007	930.3603	0.0008	0.0004
Metals and metal products	0.0048	50.8078	571.7530	0.0008	0.0004
Machinery and other equipment	0.0048	53.3535	0.0010	0.0008	0.0004
Electrical equipment	0.0048	47.0230	0.0010	437.0843	0.0004
Vehicles and transport equipment	0.0048	120.5450	0.0010	0.0008	0.0004
Other manufacturing	0.0048	481.8065	124.0093	0.0008	0.0004
Electricity, gas and steam	0.0048	647.3145	0.0010	0.0008	0.0004
Water supply and sewage	0.0048	90.6858	0.0010	0.0008	0.0004
Construction	0.0048	6,252.6147	0.0010	0.0008	0.0004
Wholesale and retail trade	0.0048	0.0007	0.0010	15,327.6868	0.0004
Transportation and storage	0.0048	0.0007	0.0010	6,278.3113	0.0004
Accommodation	0.0048	0.0007	0.0010	433.3941	0.0004
Restaurants and food services	0.0048	0.0007	0.0010	508.3228	0.0004

Sectors	Agriculture	machinery and equipment	industrial processing	services	public services
Information and communication	0.0048	0.0007	0.0010	15,226.5141	0.0004
Finance and insurance	0.0048	0.0007	0.0010	3,424.1710	0.1129
Real estate activities	0.0048	0.0007	0.0010	6,512.1780	0.0004
Business services	0.0048	0.0007	0.0010	5,009.1404	0.0004
Public administration	0.0048	0.0007	0.0010	0.7505	3,896.8444
Education	0.0048	0.0007	0.0010	0.0008	2,129.8718
Health and social work	0.0048	0.0007	0.0010	0.0008	805.6334
Other services	0.0048	0.0007	0.0010	0.0008	2,097.9522

Appendix D Welfare effects from sectors

Sector	compensating income	equivalent variation
Maize	-34,751.6223	-0.2052
Sorghum and millet	51,175.4698	-0.3970
Rice	-125,596.8780	-0.0776
Wheat and barley	3,595.5110	-0.0033
Other cereals	3,595.5090	-0.0033
Pulses	-19,822.4673	-0.1861
Groundnuts	3,372.7528	-0.0115
Other oilseeds	3,595.5079	-0.0033
Cassava	-7,238.3707	-0.0927
Irish potatoes	2,099.8919	-0.0070
Sweet potatoes	3,631.0831	-0.0132
Other roots	-107,269.7421	-0.7179
Leafy vegetables	38,153.2461	-0.1288
Other vegetables	172,031.1629	-0.4006
Sugarcane	3,595.5096	-0.0033
Tobacco	3,595.5108	-0.0033
Cotton and fibres	3,595.5095	-0.0033
Nuts	-67,604.5020	-0.0906
Bananas and plantains	811,357.6089	-0.7674
Other fruits	-2,317,173.5744	-0.8652
Cut flowers	3,595.5085	-0.0033
Rubber	3,595.5099	-0.0033
Other crops	3,590.3916	-0.0033
Cattle	-1,291.4701	-0.0485
Raw milk	2,568.2487	-0.0171
Poultry	-17,121.1470	-0.1842
Eggs	3,261.5830	-0.0071
Small ruminants	-1,055.6206	-0.0651
Other livestock	2,596.8765	-0.0057

Sector	compensating Income	equivalent variation
Forestry	3,735.8517	-0.0033
Aquaculture	3,554.1008	-0.0034
Capture fisheries	-6,152.5345	-0.0761
Coal and lignite	3,595.5095	-0.0033
Crude oil & gas	3,595.5087	-0.0033
Other mining	3,595.5106	-0.0033
Meat processing	3,596.4549	-0.0033
Fish and seafood processing	3,569.3207	-0.0034
Dairy	3,604.0355	-0.0033
Fruit and vegetable processing	3,591.7113	-0.0033
Fats and oils	3,596.6003	-0.0033
Maize milling	10,567.8220	-0.0761
Rice milling	-2,503,286.7845	-0.0069
Wheat and barley milling	3,587.0521	-0.0035
Other grain milling	3,600.7252	-0.0034
Sugar refining	2,986.1741	-0.0033
Coffee processing	3,597.2446	-0.0033
Other foods	3,390.4372	-0.0036
Animal feed	3,595.5082	-0.0033
Beverages	4,092.6669	-0.0033
Tobacco processing	3,603.2024	-0.0033
Cotton yarn	3,595.5098	-0.0033
Textiles	3,650.0986	-0.0033
Clothing	3,675.4464	-0.0033
Leather and footwear	3,609.5908	-0.0033
Wood products	3,599.5841	-0.0033
Paper products and publishing	3,670.9661	-0.0033
Petroleum products	3,734.8035	-0.0033
Fertilizers and herbicides	5,391.4506	-0.0033
Other chemicals	4,022.9519	-0.0033
Non-metal minerals	3,580.5874	-0.0033
Metals and metal products	3,605.0940	-0.0033
Machinery and other equipment	3,587.4978	-0.0033
Electrical equipment	3,635.2792	-0.0035
Vehicles and transport equipment	3,743.6985	-0.0033
Other manufacturing	3,548.4238	-0.0033
Electricity, gas and steam	3,570.2011	-0.0033
Water supply and sewage	3,504.1595	-0.0047
Construction	3,595.4978	-0.0033
Wholesale and retail trade	3,580.0017	-0.0033
Transportation and storage	19,134.0382	-0.0034
Accommodation	3,504.8212	-0.0037
Restaurants and food services	3,547.4141	-0.0033



Sector	Compensating Income	Equivalent Variation
Information and communication	7,599,2773	-0.0734
Finance and insurance	3,319,4205	-0.0745
Real estate activities	4,160,7838	-0.0734
Business services	3,582,0199	-0.0734
Public administration	11,909,1017	-0.0779
Education	-28,560,9054	-0.3751
Health and social work	3,831,6481	-0.0733
Other services	3,289,2929	-0.0734
Total	-3,994,492,1714	-5.0135

Appendix E Responsiveness of sectors to changes

Sector	Power	sensitivity	GDP
Maize	0.645158	0.644796	809.8624
Sorghum and millet	0.477184	0.193383	538.9776
Rice	0.017249	0.680943	645.3461
Wheat and barley	0.225311	1.000016	37.72406
Other cereals	0.587622	1.000643	7.327415
Pulses	0.742727	0.623245	830.0441
Groundnuts	0.72111	0.745323	346.4243
Other oilseeds	0.639906	0.934868	602.2979
Cassava	0.422091	0.544509	494.9531
Irish potatoes	0.506025	0.593645	68.42072
Sweet potatoes	0.627902	0.401128	99.1125
Other roots	0.368161	0.149873	1003.592
Leafy vegetables	0.576747	0.441064	584.6759
Other vegetables	0.403399	0.599872	1291.563
Sugarcane	0.374591	1.000017	185.748
Tobacco	0.108171	0.977678	1.573627
Cotton and fibres	0.06767	0.459382	32.50491
Nuts	0.013213	0.004374	241.4413
Bananas and plantains	0.053947	0.190734	1077.874
Other fruits	0.112098	0.088095	1044.526
Cut flowers	0.544905	0.845626	9.956394
Rubber	0.412519	0.025115	281.53
Other crops	0.12747	0.112265	154.7221
Cattle	0.195539	0.28832	397.0811
Raw milk	0.327121	0.75577	252.4143
Poultry	0.263276	0.067952	367.8524
Eggs	0.380755	0.165872	58.30484
Small ruminants	0.422819	0.472808	381.0332
Other livestock	0.396779	0.389787	91.41178
Forestry	0.510775	0.567225	445.1397
Aquaculture	0.412099	0.000165	100.2305



Sector	Power	sensitivity	GDP
Capture fisheries	0.346507	0.278226	361.2954
Coal and lignite	0.43203	1.000545	9.489427
Crude oil & gas	0.247697	0.128484	18925.08
Other mining	0.708436	0.746101	243.7184
Meat processing	0.710519	0.088987	9.798202
Fish and seafood processing	0.324044	0.065486	73.47873
Dairy	0.894129	0.178826	58.12827
Fruit and vegetable processing	0.931317	0.020425	157.7691
Fats and oils	0.461808	0.472074	25.23868
Maize milling	0.681902	0.509593	346.9533
Rice milling	0.393671	0.002875	201.2684
Wheat and barley milling	0.763149	0.360229	8.974961
Other grain milling	0.727105	0.004388	3.295969
Sugar refining	0.294047	0.972141	1587.213
Coffee processing	0.706194	0.780417	12.17609
Other foods	0.653858	0.148556	8.567328
Animal feed	0.619062	1.000491	6.02476
Beverages	0.424087	0.300691	1052.784
Tobacco processing	0.561515	0.000193	27.20639
Cotton yarn	0.320193	0.634669	47.06438
Textiles	0.807554	0.911315	3015.318
Clothing	0.934341	0.026999	257.6275
Leather and footwear	0.725091	0.201778	562.0131
Wood products	0.645914	0.976208	467.8955
Paper products and publishing	0.642109	0.67325	140.8349
Petroleum products	0.900104	0.364056	2736.462
Fertilizers and herbicides	0.313844	0.806934	72.68453
Other chemicals	0.632312	0.806934	1232.84
Non-metal minerals	0.571716	0.937936	706.7282
Metals and metal products	0.791629	0.949745	773.3955
Machinery and other equipment	0.430754	0.224421	58.94305
Electrical equipment	0.793926	0.119394	0.14581
Vehicles and transport equipment	0.563286	0.083882	242.0995
Other manufacturing	0.607132	0.409541	619.2988
Electricity, gas and steam	0.510832	0.794957	516.4449
Water supply and sewage	0.412882	0.794467	89.11089
Construction	0.666553	0.005262	6798.304
Wholesale and retail trade	0.400945	0.03944	19227.72
Transportation and storage	0.626953	0.602245	5.984949
Accommodation	0.4914	0.102015	360.578
Restaurants and food services	0.77785	0.197042	549.1493
Information and communication	0.543467	0.458265	19370.95
Finance and insurance	0.414262	0.420059	3244.492

Account	Proved	Estimated	Total
Sector	0.15373	0.400706	1.374746
Real estate activities	0.404015	0.789993	5.664897
Business services	0.444993	3.1806	8.660977
Public administration	0.527402	0.004514	1.266974
Education	0.400001	0.001903	1.144974
Health and social work	0.39034	0.659994	2.259974
Other services			

Appendix F Labour supply to the sectors

Sector	Rural	Urban
Maize	172,8874	14,17859
Sorghum and millet	150,0005	14,156
Rice	176,4102	22,94369
Wheat and barley	1,78969	0.0004
Other cereals	1,455089	0.0004
Pulses	117,6223	11,71544
Groundnuts	51,55701	3,968319
Other oilseeds	173,3361	13,2733
Cassava	182,7385	30,81747
Irish potatoes	28,74995	0.0004
Sweet potatoes	28,92398	0.0004
Other roots	338,5891	38,67296
Leafy vegetables	112,0318	20,47859
Other vegetables	401,2796	79,14475
Sugarcane	61,61847	0.0004
Tobacco	0,538802	0.0004
Cotton and fibres	16,66646	0.0004
Nuts	119,244	18,2771
Bananas and plantains	442,5735	176,8211
Other fruits	548,5867	25,45526
Cut flowers	2,561134	0.0004
Rubber	80,98438	0.0004
Other crops	57,56441	11,23556
Cattle	75,15524	3,286677
Raw milk	74,94001	3,276666
Poultry	57,78571	13,88461
Eggs	10,08478	2,42298
Small ruminants	61,65944	5,354558
Other livestock	21,57374	1,015418
Forestry	41,14715	0.0004
Aquaculture	13,47336	2,208541
Capture fisheries	21,79377	19,99473
Coal and lignite	1,779079	2,804297
Crude oil & gas	1998,551	3150,242
Other mining	3,178469	5,010103
Meat processing	0,244515	0,203529



	Rural	Urban
	717016	0.643233
	0.143863	0.119748
	0.443528	0.322269
	0.233587	0.169721
	13.17347	8.565861
	8.182987	5.431226
	0.281698	0.176014
	0.986823	0.069672
	73.77096	46.09444
	0.536901	0.335473
	92.74212	84.78687
	0.509599	0.318414
	28.46432	33.50498
	0.768209	0.806546
	3.280597	5.377821
	76.27391	125.0344
	1.524901	3.061289
	15.6153	17.2729
	15.18196	17.59708
	5.242486	6.076452
	8.672797	15.63703
	2.861633	5.189501
	8.834137	16.02028
	17.6041	62.41054
	6.439056	23.98063
	3.933106	6.800743
	0.26096	0.485808
	3.669987	6.471485
	17.31421	26.17783
	11.53281	173.502
	2.390014	17.48739
	95.24995	485.3441
	1219.370	1363.228
	91.24754	220.3555
	11.76665	15.19845
	6.105477	7.886171
	802.6779	330.1419
	1315.094	390.0374
	142.9493	252.8052
	85.22498	816.9113
	1569.397	465.4583
	336.9472	247.1300
	196.343	74.75000



Sector	Rural	Urban
Other services	67.44005	330.2143

Appendix G Factors demand by sectors

Sectors	capital	Labour	land
Maize	101.81	187.06	0.30367
Sorghum and millet	117.41	164.20	0.51010
Rice	439.21	199.35	0.31993
Wheat and barley	2.85	1.79	0.00126
Other cereals	1.70	1.46	0.00251
Pulses	85.84	129.34	0.14072
Groundnuts	41.11	55.52	0.05653
Other oilseeds	130.81	186.60	0.19393
Cassava	71.43	213.55	0.26256
Irish potatoes	5.09	28.75	0.03841
Sweet potatoes	7.95	28.92	0.03139
Other roots	261.83	376.66	0.91141
Leafy vegetables	115.16	132.51	0.17524
Other vegetables	290.92	480.42	0.76259
Sugarcane	54.32	61.62	0.03280
Tobacco	0.37	0.54	0.00017
Cotton and fibres	10.77	16.67	0.00432
Nuts	94.85	137.52	0.04243
Bananas and plantains	401.28	619.39	0.94140
Other fruits	355.85	574.04	1.03917
Cut flowers	1.95	2.56	0.00750
Rubber	60.85	80.99	0.23675
Other crops	47.16	68.80	0.13989
Cattle	250.87	78.44	0.00000
Raw milk	99.31	78.22	0.00000
Poultry	206.10	71.67	0.00000
Eggs	25.88	12.51	0.00000
Small ruminants	158.42	67.05	0.00000
Other livestock	34.57	22.59	0.00000
Forestry	125.49	41.15	0.00000
Aquaculture	72.82	15.68	0.00000
Capture fisheries	202.80	41.79	0.00000
Coal and lignite	0.22	4.58	0.00000
Crude oil & gas	7,507.59	5,148.80	0.00009
Other mining	54.26	8.19	0.00000
Meat processing	2.17	0.45	0.00000
Fish and seafood processing	4.19	1.36	0.00000
Dairy	2.15	0.26	0.00000
Fruit and vegetable processing	6.10	0.77	0.00000
Fats and oils	8.15	0.40	0.00000
Maize milling	88.34	21.74	0.00000

Sectors	capital	Labour	land
Rice milling	53.85	13.61	0.00000
Wheat and barley milling	1.87	0.46	0.00000
Other grain milling	0.63	0.16	0.00000
Sugar refining	1,381.61	119.86	0.00000
Coffee processing	1.97	0.87	0.00000
Other foods	857.96	177.51	0.00000
Animal feed	2.12	0.83	0.00000
Beverages	328.25	61.97	0.00000
Tobacco processing	9.29	1.57	0.00000
Cotton yarn	18.67	8.66	0.00000
Textiles	298.16	201.31	0.00001
Clothing	6.10	4.59	0.00000
Leather and footwear	106.39	32.89	0.00000
Wood products	141.95	32.78	0.00000
Paper products and publishing	21.50	11.32	0.00000
Petroleum products	236.85	24.26	0.00000
Fertilizers and herbicides	10.82	8.05	0.00000
Other chemicals	138.96	24.86	0.00000
Non-metal minerals	363.08	80.01	0.00000
Metals and metal products	84.66	30.42	0.00000
Machinery and other equipment	7.46	10.73	0.00000
Electrical equipment	3.82	0.77	0.00000
Vehicles and transport equipment	25.99	10.16	0.00000
Other manufacturing	146.97	43.49	0.00000
Electricity, gas and steam	142.00	185.09	0.00000
Water supply and sewage	36.86	19.88	0.00000
Construction	1,634.83	540.59	0.00001
Wholesale and retail trade	8,796.51	2,782.57	0.00005
Transportation and storage	592.41	311.57	0.00001
Accommodation	188.69	26.96	0.00000
Restaurants and food services	97.06	13.99	0.00000
Information and communication	6,042.09	1,192.83	0.00003
Finance and insurance	301.23	1,705.10	0.00004
Real estate activities	5,122.92	395.76	0.00001
Business services	1,680.24	902.13	0.00002
Public administration	251.16	2,034.63	0.00005
Education	530.79	583.16	0.00001
Health and social work	260.45	181.10	0.00000
Other services	862.58	397.65	0.00001