An Escalating Analysis of the Role, Impact and Ramification of Investment in the Nigerian Economy and Outlook to Year 2035

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ABSTRACT

The economic transformation agenda, otherwise known as Nigeria Vision 20: 2020 set the direction for the industrialization policy in Nigeria which aimed at achieving greater global competitiveness in production of processed and manufactured goods by linking industrial activity with primary sector activity, domestic and foreign trade and service activity. The main objective of the vision was to improve the well-being of Nigerians, with the aim of reducing the problems of hunger, poverty, poor healthcare, inadequate housing, low quality human capital, gender imbalance, low productivity and poor basic facilities by 2020. In the above connection, Nigerian industrial revolution plan defined clear goals, governance structures, monitoring frameworks and implementation strategies. These policies have proved abortive due to a myriad of challenges, ranging from incessant power outages, lack of finance/capital, multiple government taxation and insecurity among others. Indeed, Economists and Practitioners worldwide are of the opinion that investment promotes growth and development and that investment propagates itself. Indeed, investment is very crucial for any nation to develop. Extant administrations have not done very well to improve investment and thereby industrialization in Nigeria. Therefore, an escalating analysis of the role of investment in Nigeria using Total differential systems modeling approach with Markov Chains Analysis will help to foster more understanding of the issues involved and ginger up government to its responsibilities. From the results of this study, it was found that the major channels through which investment and consequently industry can be promoted in Nigeria are non-oil exports and personal wealth, with investment probability of 0.9371 followed by personal wealth with a probability of 0.9063. The study recommends that Government should adopt policies which will facilitate and promote non-oil exports in Nigeria, address the issue of lopsided income distribution in the country, build more factories and industries especially in the rural areas of Nigeria, continue to fight corruption, indiscipline and greed in the society in

whatever guise it takes, rise up to its responsibility of ensuring the security of life and property in Nigeria, and ensure good governance devoid of greed and corruption in all its ramifications.

Key Words: *Investment, Industrialization, Total differential systems modeling approach, Markov Chains Analysis, Non-oil Exports, Per capita savings, Growth and Development*

INTRODUCTION

Investment has been defined variously to include money or asset set aside, that is put to work with the aim of earning profit, interest (money) or returns in the future. In this connection, investment would include factories and/or industries built to bring about growth and development either in the short-term or in the long run.

The Nigeria Vision 20: 2020 was initiated because it was considered that Nigeria, as a developing country, was over dependent on the oil and gas sector which dominated the gross domestic product, accounting for over 95% of export earnings and 85% of government revenue between 2011 and 2012. The industrial sector accounted for 6% of domestic activity while the manufacturing sector contributed only 4% to GDP in 2011. The economic transformation agenda, otherwise known as Nigeria Vision 20: 2020 set the direction for the industrialization policy in Nigeria which aimed at achieving greater global competitiveness in production of processed and manufactured goods by linking industrial activity with primary sector activity, domestic and foreign trade and service activity.

During the vision period, the economy was expected to grow at a rate of 13.8% per annum. The main objective of the vision was to improve the well-being of Nigerians, with the aim of reducing the problems of hunger, poverty, poor healthcare, inadequate housing, low quality human capital, gender imbalance, low productivity and poor basic facility by 2020. In the above connection, Nigeria industrial revolution plan defined clear goals, governance structures, monitoring frameworks and implementation strategies. These policies have proved abortive due to a myriad of challenges, ranging from incessant power outages, lack of finance/capital, multiple government taxation and insecurity among others.

According to Arinze (2003), industrialization is a major factor in economic growth and development of any nation. In her opinion, the availability of essential goods and services, improved standard of living, stimulation of other sectors of the economy, poverty reduction, job creation, development of skilled manpower are all elements of any national level of industrialization. Indeed, Economists and Practitioners worldwide are of the opinion that investment promotes growth and development and that investment propagates itself. Indeed, investment is very crucial for any nation to develop. In most of our recent studies, (see Aruofor, 2017; Aruofor and Ogbeide, 2022, 2023a, 2023b and 2024), a clarion call had been made on government to rise to its responsibility and invest more in Nigeria in order to create employment, reduce poverty and promote growth and development in the country. It will seem that this has fallen into deaf ears because Nigeria's investment data in 2021 was negative. May be an escalating analysis of the role of investment in Nigeria will help to foster more understanding of the issues involved and ginger up government to its responsibilities.

First we present, analyze and interpret the structural relationship between investment and the rest of the Nigerian economy as well as analyze the impact of investment on the rest of the economy arising from the total differential systems modeling approach (ecostatometrics). This it is believed will give us some insight as to the behavior of investment and some of the factors which promote or hinder it in Nigeria. This also should help us validate or infirm some of the economic theories concerning investment in the Nigerian case.

Finally we examine the nature and ramification of investment in Nigeria especially to determine and analyze the variables and channels through which investment is promoted in Nigeria. This should help sensitize the Government on how to plan investment and on which sectors to concentrate efforts.

The objectives of this paper are as follows:

1. To carry out an escalating analysis of investment in Nigeria in order to aid our understanding of the issues involved.
2. In particular, to build a comprehensive, complete and ultimate model of the Nigerian economy in order to analyze the structural relationships as well as the impact of investment on the rest of the Nigeria economy a'la the total differential systems modeling approach (ecostatometrics)
3. To estimate and reveal the transition matrix of the Nigeria economy using Markov Chains analysis, in order to analyze the role and nature of investment in Nigeria,
4. To test a composite non-oil export promotion policy on the Nigeria economy and examine the outlook from 2024 to 2035, and
5. Draw conclusion and make some recommendations.

The article is therefore divided into five parts. Part I is the introduction and states the objectives of the study. Part II is the literature review; while Part III is the methodology. In Part IV, the results of the analyses are presented and discussed and Part V concludes the study and makes some recommendations.

LITERATURE REVIEW AND THEORETICAL FRAMEWORK

Many scholars have written on the role and impact of investment on the Nigerian economy but some gap still exists in that this paper seeks to have an outlook to year 2035.
Michael, Acha and Essien (2017) for instance, examines the Nigerian investment environment and its impact on economic growth and development of the whole nation. They proffer among other things, that governmental spending in unproductive sectors would need to be rightly channeled.
This is better understood when the concept of impact investment is considered. This entails deployment of funds in selected investments to generate beneficial social impact as well as financial return.
Unfortunately, a major challenge to impact investment is lack of data to measure the social/environmental impact of investments in the country.

Investment is a key factor which determines economic progress in systems and Nigeria requires a substantial quantum of this to guarantee better living conditions.
Increasing investments can create jobs, yield higher national income, increase total consumption and more would also be saved and further invested (Arinze, 2003).

Critical influencers of the level of investment include amongst others, the educational level of the labour force, access to infrastructure, access to finance and size of the industry.
To effectively analyse the role and impact of investment in the economy, the use of the paired construct, political economy, is essential.

As a concept, political economy concerns the study of the economies of states, polities

in terms of wealth accumulation and just distribution of same in society, for public services.

This constitutes the main focus of classical economists like Adam Smith, David Ricardo etc

It emphasises the inter-relationship of Politics and Economics.

It stresses the Economic base which constitutes the sub structure of society, otherwise known as *Unterbau*, indicating the prevalent mode of production.

Additionally, it highlights the Political base which constitutes the Super structure of society, otherwise known as *Oberbau* which always reflects and reinforces the nature of prevailing laws.

This then justifies the relevance of the Political Economy Theory to this work. This examines the relationship of government and citizens arising from enunciated public policies. It portrays how economic theories function in the real world.

There is the micro-base arm of the theory which focusses on individual consumer decision and relationship with institutions as well as the macro-based arm which focusses on development, growth and unemployment and linkage with the political system and its institutions.

The two major contemporary politico-economic ideologies of Capitalism (with classical and neo-classical perspectives) and Socialism (with Socialist and Marxist perspectives) are relevant for use.

Classical political economy:

  - focuses on production, distribution, exchange and consumption

  - it is mainly descriptive/prescriptive

  - related more to Scholars like Smith, Ricardo etc

  - otherwise known as bourgeois political economic perspective

  - emphasizes free market economy, commercialization, privatization, globalization.

Neo-classical pol econ:

  - disagrees with Classical political economic perspective

  - these are essentially Keynesian scholars

  - favours state intervention, to correct perceived anomalies

- evolved out of the Great Depression of 1920s/30s

- introduced concept of public corporations

Socialist political economy:

  - favours state ownership of means of production (to satisfy human needs)

  - emphasizes collective ownership

  - seeks welfare of the populace

  - people should engage in labour to satisfy needs

  - adopts the principle of "from each according to ability" to "each according to work".

Marxist political economy:

  - engages in the science of understanding the whole society

  - based on historical and dialectical materialism

  - emphasizes existence of contradictions in society which propel change

  - stresses the society's prevalent mode of production

  - sees production as encouraging citizens to develop and exert capacities.

It is worthy of note that not minding the perspective of escalating analysis adopted, the critical role and impact of investment on the development of an economy cannot be discountenanced and as rightly opined by Keynes, healthy economies invest more than save.

METHODOLOGY
THE TOTAL DIFFERENTIAL MODELING APPROACH
The approach used in this study is divided into two sections. The first is termed the total differential modeling approach (see Aruofor, 2001, 2017, 2019, and 2020), Aruofor and Okungbowa (2018), Aruofor and Ogbeide (2019), and Aruofor and Ogbeide (2022). It assumes and rightly so, that in the real world situation, every economic variable or subsystem depends on and is depended upon by other variables or subsystems.

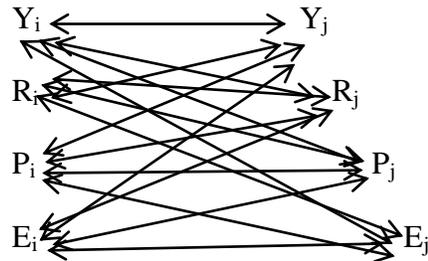A schematic representation of the above theory is presented in Fig. 1.

Fig: 1: The True Socio – Economic Causal Chain

$$Y = \text{Production variables;}$$
$$R = \text{Primary Factors;}$$
$$P = \text{Policy instruments;}$$
$$E = \text{Environmental variables.}$$

This theory was first mooted by Walras as early as 1874 even though it was not developed beyond the conceptual stage. The true practical empirical systems total differential modeling approach (Ecostatometrics), was achieved by Aruofor (2017) and relies on statistically significant multiple simple linear regression coefficients as opposed to multiple linear regression parameters. It is a blend between the traditional Input Output Analysis and Econometrics and assumes the structure of programming models. The theory behind it is that an economy is not truly dynamic but only dynamically static. It is the change that occurs in an economy in the current year(t) that determines where the economy (the endogenous variables) will be at the end of the current year (t) and not in the next year(t+1). This model is a departure from the normal econometric approach, where the structure of the economy is determined by combinations of economic theories. The true structure of an economy is so complex that economic theory will be self defeating (see Duesenberry et al , 1965 and Gordon, 1968). ***Indeed, Adeyoju (1975) had rightly noted that " the unstable nature of population and its growth, national income and its distribution, investment capacity, employment opportunities, balance of payments and raw material base often lead to conflicting theories of economic development".*** Thus, we do not need any elaborate theories to explain the working of an economy.

If we can estimate all the independent relationships among the variables of the economy taken two at a time, (depending on whether they are statistically significant) and classify the significant coefficients into a matrix ***B***, according to whether they are endogenous or exogenous, then we would have in matrix notation,

$$Y = BY + CX + A + U$$

$$\therefore [I - B]Y = CX + A + U$$

$$Y = [I - B]^{-1} CX + [I - B]^{-1} A + [I - B]^{-1} U$$

$$\frac{dY}{dX} = [I - B]^{-1} C$$

$$\therefore dY = [I - B]^{-1} CdX$$

$$\text{i.e } \Delta Y = [I - B]^{-1} C\Delta X$$

$$\therefore Y_t = [I - B]^{-1} CX_t - [I - B]^{-1} CX_{t-1} + Y_{t-1}$$

Where, Y=endogenous and X=exogenous variables. The fact that the relationships are not estimated by multiple linear regressions means that the issue of simultaneous equation bias is by-passed and all the estimation difficulties, including multi-collinearity associated with econometric multiple linear regression, which renders it inconsistent and therefore non-operational, are also by-passed. Moreover, no complicated econometric and economic theories are needed to proceed. It is then possible to view the whole economy at a glance and the structure of the economy is determined automatically.

Thus, given a simple linear regression between two variables, X and Y, we proceed as follows and state the equation as below:

$$Y = a + bX + u$$

Where Y = the dependent variable

X = the independent variable

$a \& b$ = parameters

u = error term.

The estimate of the parameters $a \& b$, is achieved by the application of least squares to the data on the variables, with a view to minimize the sum of squared deviations around the regression line (Koutsoyiannis, 1977, Aruofor, 2001, Aruofor, 2017 and Aruofor, 2020).

The parameters can be estimated by solving the following normal equations:

$$a\sum 1 + b\sum X = \sum Y \qquad (1)$$
$$a\sum X + b\sum X^2 = \sum XY \qquad (2)$$

This was the basic procedure adopted and the coefficients were estimated by means of a computer software, ESM-Lab 4.4, that tested for statistical significance at the 5% level of significance using the asymptotic t-ratios. It was designed jointly by the author and Microcraft Nigeria Limited. The procedure is to determine the important variables required for the solution of the problem, classify them into endogenous and exogenous variables before feeding them to ESM-Lab 4.4. The model is then estimated, and the statistically significant coefficients are automatically classified into a

matrix B and the structural relationship of the economy is automatically specified. Further analysis can then be performed. (The computer software can be downloaded as esmlab.ng.com from the internet and ran as administrator). For this study, the data were assembled from the Central Bank Statistical Bulletin (CBN, 2017, 2018, 2019 and 2021) and Aruofor, (2017) and Aruofor and Ogbeide (2019). The time series ranged from 1981 to 2021. The list of variables consists of one hundred and ten variables, made up of one hundred and nine (109) endogenous variables followed by one (1) exogenous variable (see fig 2).

THE CONSTRUCTION OF THE COMPOSIT MODEL OF NIGERIA ECONOMY.

The Nigeria model consists of the primary sectors comprising of the agricultural sector, the manufacturing sector, industry, construction, transport, services, education and health; and other real sectors including national income, consumption and investment, population, labor and employment, foreign sector, economic indicators and policy instruments. Together, they comprise the endogenous variables of the model, while the exogenous variable consist of investment.

THE POPULATION MODEL AND DERIVATION OF VARIABLES

Extant models of the Nigerian economy lacked data on total active work force, employment, etc. These are major defects and according to Stolper, (1966), the development planner cannot afford to assume his facts; he must find them as best as he can. We therefore proceeded as follows:
The population of Nigeria is growing at approximately 3% per year. Given this fact, we back cast the population at 3% discount rate to 1901 and projected it to 2021 assuming that the population has been adjusted for deaths.

1) Going by international standard, children are those people of ages Sixteen (16) years and below and was derived as:
   Children = Pop_t - Pop_{t-16}

2) Population of people eighty years and below was derived as:
   Pop_t – Pop_{t-80}

3) Estimated potential active work force (EPAWF) = Pop_t – Pop_{t-80} – Children.

4) Population of old people equals the residual.

5) Unemployed work force = EPAWF x Unemployment rate.

6) Employed work force (EMPWF) = EPAWF - Unemployed work force.

7) Employment = $\Delta EMPWF$

8) Average wage rate = $Labor \quad Force \quad Compensation/EMPWF$

9) National Productivity = NGDP/Labor force compensation

10) Labor Productivity = NGDP/ EMPWF

11) Demand for Employment = $\Delta EMPWF_{-1}$

12) Demand Pressure for Employment = ($\Delta EMPWF_{-1}$)/Unemployed Work Force

13) Demand for Health care = $\Delta HGDP_{-1}$

14) Demand Pressure for Health care = $\Delta HGDP_{-1}/Pop$

15) Demand for Education = $\Delta EdGDP_{-1}$

16) Demand Pressure for Education = $\Delta EdGDP_{-1} / Pop$

17) Demand for Imports = $\Delta IMPOTS_{-1}$

18) Penchant for Imports = $\Delta IMPOTS_{-1}/Pop$

19) Import Dependence = $IMPOTS/NGDP$

20) Slavery = EXTDEBT/Pop

Some other variables were derived from existing data as follows:

- $GROWT \quad RATE \quad = \quad ((\Delta GDP)/GDP_t)*100)$
- $DINCOM \quad = \quad GDP - TAX$
- $COLIVN \quad = \quad (CONS_{t-1}((1+(INFRT_t/100))))$
- $POOR \quad = \quad POP/((RGDP/EXCHRT)*\$720)$
- $ABPOOR \quad = \quad POP/((RGDP/EXCHRT)*\$360)$
- $RICH \quad = POP \quad - \quad (POOR + ABPOOR)$
- $RPOVRT \quad = \quad (1-((RGDP/EXCHRT)/RGDP)*100)$
- $DDMONY \quad = \quad (\Delta MONYSS)_{-1}$
- $DDMOPR \quad = \quad ((\Delta MONYSS)_{-1}/POP)$
- $IMPDD \quad = \quad (\Delta IMPORT)_{-1}$
- $IMPDDPR \quad = \quad ((\Delta IMPORT)_{-1}/POP)$
- $XPOTDD \quad = \quad (\Delta XPORT)_{-1}$
- $DBTBDN \quad = \quad (EXDBT/(GDP/EXCHRT))$
- $INVEDU \quad = (INVSTNENT/NGDP)*EDUGDP$
- $INVIND \quad = (INVSTNENT/NGDP)*INDGDP$

However the 2001 and 2006 census of the Nigerian economy by the National Bureau of Statistics was used to adapt the population of male and female, as well as urban and rural populations in Nigeria according to their shares.

MARKOV CHAINS ANALYSIS

The second section is Markov Chains analysis. An economy and indeed the world consists of variables interacting in a dynamic fashion. These variables include people (i.e. children, the work force, employed and unemployed, old people), businesses, vocations, sectors, governments etc interacting and changing in space and time. Even the policies they implement and the policy instrument they use also change in time and space and the ability to manage these changes tend to depend on our ability not only to understand them but to be able to analyze and interpret them.

Markov Chains Analysis provides us with such a tool for analyzing and understanding these changes and ecostatometrics alias total differential modeling approach provides the enabling

mechanisms for capturing the changes. Markov Chains Analyses can be approached in terms of flows which is the original concept but also can be approached in terms of change or a combination of both which is a new concept. However, the concept is versatile and depends on how we define our variables in the Markov Chains, especially in the estimation and interpretation of the transition matrix, which is vital to the procedure.

Fig 2: LEGEND OF VARIABLES NIGERIA ECONOMY COMPREHENSIVE

S/no.	ACRONYM	ACTIVITY	
1	INVST(t)	Investment	N million
2	AGRSEC(t)	1. Agriculture	N million
3	INDUST(t)	2. Industry	N million
4	MANUFC(t	(c) Manufacturing	N million
5	OILREFIN	Oil Refining	N million
6	ELECTSS(t)	3. Electricity,Gas,Steam & Air conditioner	N million
7	WATER(t)	4. Water supply, sewage, waste Mang.	N million
8	CONSTN(t)	5. Construction	N million
9	SERVCS(t)	C. SERVICES	N million
10	TRADE(t)	1. Trade	N million
11	ACCOFOOD	2. Accomadation and Food Services	N million
12	TRASPOT(t	3. Transportation and Storage	N million
13	TRANSEV(t	e. Transport Services	N million
14	POSTCUR(t	f. Post and Courier Services	N million
15	INFOCOM(	4. Information and Communication	N million
16	TELECOM(t	a. Telecommunications and Information Services	N million
17	PUBLSHN(t	b. Publishing,	N million
18	MPIC&SND	c. Motion Pictures, Sound recording and Music production	N million
19	BRODCST(t	d. Broadcasting	N million
20	ARTRECRTI	5. Arts, Entertainment & Recreation	N million
21	FININSUR(t	6. Financial and Insurance	N million
22	FINANCE(t)	a. Financial Institutions	N million
23	INSURANS(	b. Insurance	N million
24	REALEST(t)	7. Real Estate	N million
25	PROFSERV(	8. Professional, Scientific & Technical Serv.	N million
26	ADMINSUF	9. Administrative and Support Services	N million
27	PUBADMN	10. Public Administration	N million
28	EDUCATN(	11. Education	N million
29	HLT&SOC	12. Human Health & Social Services	N million
30	OTHSERVS(	13. Other Services	N million
31	NGDP(t)	GDP at Current Basic Prices	N million
32	DISPINC(t)	Disposable Income	N million
33	REALINC(t)	Real Income	N million
34	REALGDP(t	Real GDP	N million
35	GROWTRT(	Growth rate	%
36	GROWTH(t	Growth	N million
37	CONS(t)	Consumption	N million
38	CAPITAL(t)	Capital accumulation	N million
39	FDI(t)	Foreign Direct Investment	N million
40	CPI(t)	Consumer Price Index	
41	INFLTD(t)	Inflation Dummy = 1 when CPI increases, otherwise = 0	
42	INFLATN(t)	Inflation = INFTD X CPI	
43	INFLTRT(t)	Inflation Rate	%
44	UNEMPL(t)	Unemployment Rate	%
45	LABCOMP	Labor Force Compensation	N million
46	MALE	Male Population	Million
47	FEMALE	Female Population	Million
48	URBAN	Urban Population	Million
49	RURAL	Rural Population	Million
50	CHLDRN	Children Population (16 years and below)	Million
51	CHDRNSS	Children Supply	Million
52	EPAWF	Estimated Potencial Active Work Force	Million
53	NADDWF	New Addition to Workforce	

Fig 2: LEGEND OF VARIABLES NIGERIA ECONOMY COMPREHENSIVE CONT'D

S/no.	ACRONYM	ACTIVITY	
54	POPOLD	Population of Old People (80 years and above)	Million
55	UNEMWF	Unemployed Work Force	Million
56	EMPWF	Employed Work Force	Million
57	EMPLMNT	Employment	Million
58	PRDTIVTY	Productivity	
59	LPROVITY	Labor Productivity	
60	AVWAGE	Average Wage Rate	Naira
61	DDEMENT	Demand for Employment	
62	EMDDPR	Employment Demand Pressure	
63	POOR(t)	Poor	Million
64	EXTPOOR(t)	Extremely (Absolute) Poor	Million
65	POVRT(t)	Poverty Rate	%
66	SLAVERY	Slavery	
67	SAVINGS(t)	Savings	N million
68	BOT(t)	Balance of trade	N million
69	BOP(t)	Balance of payments	N million
70	EXTRES(t)	External reserve	N million
71	DBTBDN(t)	Debt burden or Bondage	
72	OILREV(t)	Oil revenue	N million
73	NOILREV(t)	Non-oil revenue	N million
74	CORPTD(t)	Corruption Dummy = 1 when DDMOPR increases, otherwise = 0	
75	CORRPTN(t)	Corruption= CORPTD X DDMOPR.	
76	DDMONY(t)	Demand for money	N million
77	DDMOPR(t)	Demand for money pressure	
78	DEMOCY(t)	Dummy Variable 1.0 for New Democracy and 0 elsewhere.	
79	CORDEM(t)	Equals DEMOCY x CORRPTN	
80	PWLFARE	Personal Welfare (Per capita income)	Naira
81	STDOLIVN	Standard of Living	
82	PUPWER	Purchasing Power	
83	FODSRITY	Food Security	
84	HLTCARE	Health Care	
85	DDHCARE	Demand for Health Care	
86	HCRDDPR	Health Care Demand Pressure	
87	HRESDEV	Human Resource Development	
88	DDEDUC	Demand for Education	
89	EDUDDPR	Education Demand Pressure	
90	WEALTH	National Wealth	
91	PWEALTH	Personal Wealth	
92	IMPDPEN	Import Dependence	
93	DDIMP	Demand for Imports	
94	PENCIMP	Penchant for Imports	
95	TIME(t)	Time	
96	EXCHRTRP	Exchange rate (Relative poverty)	N million
97	POP(t)	Population	Million
98	IMPORT(t)	Imports	N million
99	XPOTOIL(t)	Oil export	N million
100	XPTNOIL(t)	Non-oil export	N million
101	DODBT(t)	Domestic debts	N million
102	EXTDBT	External debts	$ million
103	GEXPDN(t)	Government expenditure	N million
104	PRIMELR(t)	Primary lending rate	%
105	INTSAV(t)	Interest rate	%
106	MONYSS(t)	Money supply	N million
107	TAX(t)	Tax	N million
108	ACGSC	Agricultural Credit Guarantee Scheme	N million
109	DFUELP(t)	Domestic fuel price	N/Litre

In the above connection, our variables can be defined as the probability of being in one state in period ($t+1$), when another state changes in period (t); or just the probability that a variable will change in period ($t+1$) when another variable changes in period (t) or both. Given the above definitions, it is worthy of note that Markov Chains analysis deals only with probabilities which do not admit of negative values; but an economy interacts in both negative and positive numbers. This impasse can be overcome by reducing the system to conform (see Aruofor, 2003 and 2020). This was the methodology applied in this study.

It was found that that the Nigeria economy is an absorbing Markov chain with investment being an absorbing state.

ANALYSIS OF ABSORBING MARKOV CHAIN.

An absorbing state, is a state that once entered we do not leave. It is a state of having zero probability of being left once entered. Once the absorbing state is entered, the process stops abruptly or completely and is then initiated from another process. A Markov Chain can be said to be absorbing if the following conditions are satisfied:

1. It has at least one absorbing state.

2. It is possible to move from every non absorbing state to at least one absorbing state in finite number of steps.

The transition matrix for a typical absorbing Markov Chains with two absorbing states is as shown

below:
$$P = \begin{array}{c} \\ S_{1_t} \\ S_{2_t} \\ S_{3_t} \\ S_{4_t} \end{array} \begin{array}{cccc} S_{1(t+1)} & S_{2(t+1)} & S_{3(t+1)} & S_{4(t+1)} \\ \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0.2 & 0.1 & 0.4 & 0.1 \\ 0.3 & 0.2 & 0.3 & 0.5 \end{bmatrix} \end{array}$$

The probabilities P_{ij} may be defined in the usual manner as the probability of starting in state i in period t and moving to state j in period $t + 1$. There are four states S_1, S_2, S_3, S_4 so that there is a 0.3 probability of moving from state S_4 in period t to state S_1 in period $t + 1$. There are two absorbing states S_1 and state S_2. So that once we are in these states, we cannot leave them and the probability of moving to any other state is zero.

It is worthy of note that when we are confronted with Markov Chain having absorbing states, we cannot compute any steady states since the process must end up in one of the absorbing states.

However, several kinds of interesting information can be obtained from the analysis of the absorbing Markov Chains. It is possible to determine the following for example

1. The probability of absorption by any given absorbing state.

2. The expected numbers of steps before the process is absorbed.

3. The expected number of times the process is in any given non absorbing state.

To perform the analysis of absorbing Markov Chains, we start by rearranging the transition matrix into four sub matrices by partitioning it as follows:

$$P = \left[\begin{array}{c|c} I & O \\ \hline A & N \end{array}\right]$$

These sub matrices all contain probability elements but none of them is individually a transition matrix. If we assume that we have r absorbing states and q non-absorbing states, then $r + q = S$ where S is equal to the total, 4 in this example. The sub matrices are then of the following order:

I $=$ $r \, x \, r$ Identity matrix defining the probability of staying

within an absorbing state once it is reached

O $=$ $r \, x \, q$ null matrix indicating the probability of going from an

absorbing state to non-absorbing state.

A $=$ $q \, x \, r$ matrix containing the probability of going from a non –

absorbing to an absorbing state.

N $=$ $q \, x \, q$ matrix showing the probability of going from a non –

absorbing to a non-absorbing state in exactly one step.

Therefore we partition our transition matrix as follows.

$$P = \left[\begin{array}{cc|cc} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ \hline 0.2 & 0.1 & 0.4 & 0.1 \\ 0.3 & 0.2 & 0.3 & 0.5 \end{array}\right]$$

Using the sub matrix N from the subdivided Transition matrix we can obtain what is called the Fundamental matrix F by subtracting N from an identity matrix of same order as N, and inverting the resulting matrix.

$$F \quad = \quad (I - N)^{-1}$$

For a given starting state, a fundamental matrix F indicates the expected number of times a process is in each non absorbing state before it is absorbed. The non absorbing states is referred to as transient state.

The expected number of steps before absorbing is simply the sum of the times the process is in each of the non absorbing states.

Using the data in our illustrative model, the fundamental matrix can be computed as follows:

$$(\mathbf{I} - \mathbf{N}) = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} - \begin{bmatrix} 0.4 & 0.1 \\ 0.3 & 0.5 \end{bmatrix} = \begin{bmatrix} 0.6 & -0.1 \\ -0.3 & 0.5 \end{bmatrix}$$

$$\mathbf{F} = (\mathbf{I} - \mathbf{N})^{-1} = \begin{bmatrix} 1.8519 & 0.3704 \\ 1.1111 & 2.2222 \end{bmatrix}$$

For example, expected time before S_3 is absorbed is given by *1.8519 + 1.1111 = 2.9630* periods.

The probability of absorbtion by any of the absorbing state can be computed by employing the following relationship i.e.

Probability of absorbtion $=$ **FA**

$$\mathbf{FA} = \begin{bmatrix} \mathbf{I} & - & \mathbf{N} \end{bmatrix}^{-1} \mathbf{A}$$

$$= \begin{bmatrix} 1.8519 & 0.3704 \\ 1.1111 & 2.2222 \end{bmatrix} \begin{bmatrix} 0.2 & 0.1 \\ 0.3 & 0.2 \end{bmatrix}$$

$$\therefore \mathbf{FA} = \begin{bmatrix} 0.4815 & 0.2593 \\ 0.8889 & 0.5556 \end{bmatrix}$$

This absorbing probability matrix indicate that a unit in state S_3 will end up in State S_1 with a probability of 0.48149 and in state S_2 with a probability of 0.25926. A unit in state S_4 will similarly be absorbed into state S_1 with a probability of 0.88889 and into state S_2 with 0.55556 probability. So that if we assume that there were 80 units in state S_3 and 60 units in state S_4, by employing the absorption matrix we can determine how many of these units will be absorbed in the long run as follows:

$$\begin{bmatrix} S_3 & S_4 \\ 80 & 60 \end{bmatrix} \begin{bmatrix} 0.48149 & 0.25926 \\ 0.88889 & 0.55556 \end{bmatrix} = \begin{bmatrix} 91.8526 & 54.0744 \end{bmatrix}$$

Of the 140, 92 will be absorbed into state 1 while 54 will be absorbed into state 2.

A computer programme has been developed by the author, Professor Aruofor, Rex Oforitse and Mr. Omoruyi, Kingsley Igbinoba of Microcraft Nigeria Ltd and incorporated into ESM Lab and can be assessed on the Internet as esmlab.ng.com.

RESULTS AND DISCUSSION
STRUCTURAL ANALYSIS OF INVESTMENT IN NIGERIA

The structural relationship between investment and the rest of the Nigeria economy is presented in Table 1. As can be inferred from the Table,when investment increases by N1.0 million, it promotes or increases industry and manufacturing by N0.47 million and N0.32 million respectively. Even electricity supply, construction and the transport sectors increase by N0.016

million, N0.13 million and N0.05 million respectively. Education increases by N0.04 million, while health and social services increase by as much as N0.011 million.Investment also promotes real output to the tune of N1.3 million and also promotes growth rate, growth and consumption by 8.927E-07, 8.65E-08 and N1.51 million respectively. It also attracts foreign direct investment to the tune of N0.05 million. Investment shifts down inflation and reduces the unemployment rate structurally as well as increases the standard of living. The details are as shown in Table 1. These findings are in conformity with economic theory.

Table 1: ANALYSES OF INVESTMENT IN NIGERIA

| | STRUCTURAL | | IMPACT | | ABSORBING | | TIME B4 | | INVSTMT |
SECTORS	INVSTMT	SECTORS	INVSTMT	SECTORS	INVSTMT	SECTORS	INVESTMT	SECTORS	PROBATY
INVST(t)	1	INVST(t)	1.551115	INVST(t)	1				
AGRSEC(t)	0	AGRSEC(t)	-0.15696	AGRSEC(t)	0	AGRSEC(t)	31401.37	AGRSEC(t)	0.149615
INDUST(t)	0.467488674	INDUST(t)	-0.35064	INDUST(t)	0	INDUST(t)	21300.06	INDUST(t)	0.151124
MANUFC(t	0.318868751	MANUFC(t	-0.32086	MANUFC(t	0	MANUFC(t	4461.615	MANUFC(t	0.151738
OILREFIN	0	OILREFIN	-0.0061	OILREFIN	0	OILREFIN	24.2116	OILREFIN	0.155715
ELECTSS(t)	0.015874237	ELECTSS(t)	-0.00119	ELECTSS(t)	0	ELECTSS(t)	64.5397	ELECTSS(t)	0.14892
WATER(t)	0.003414861	WATER(t)	-0.00158	WATER(t)	0	WATER(t)	47.1698	WATER(t)	0.147627
CONSTN(t)	0.128465508	CONSTN(t)	-0.01063	CONSTN(t)	0	CONSTN(t)	3420.42	CONSTN(t)	0.148385
SERVCS(t)	0	SERVCS(t)	1.554075	SERVCS(t)	0	SERVCS(t)	91918.07	SERVCS(t)	0.149615
TRADE(t)	0	TRADE(t)	0.565865	TRADE(t)	0	TRADE(t)	30385.42	TRADE(t)	0.149605
ACCOFOOD	0.025272276	ACCOFOOD	0.012005	ACCOFOOD	0	ACCOFOOD	66.6569	ACCOFOOD	0.150205
TRASPOT(t	0.048323147	TRASPOT(t	-0.00574	TRASPOT(t	0	TRASPOT(t	124.1431	TRASPOT(t	0.149409
TRANSEV(t	0.001520444	TRANSEV(t	-0.00015	TRANSEV(t	0	TRANSEV(t	34.3643	TRANSEV(t	0.148974
POSTCUR(t	-0.00071321	POSTCUR(t	-0.00085	POSTCUR(t	0	POSTCUR(t	40.1606	POSTCUR(t	0.148401
INFOCOM(	0	INFOCOM(	0.255284	INFOCOM(	0	INFOCOM(	16706.95	INFOCOM(	0.150864
TELECOM(t	0	TELECOM(t	0.12534	TELECOM(t	0	TELECOM(t	12176.67	TELECOM(t	0.148994
PUBLSHN(t	0.000420303	PUBLSHN(t	-0.00031	PUBLSHN(t	0	PUBLSHN(t	41.1523	PUBLSHN(t	0.150195
MPIC&SND	0	MPIC&SND	0.033627	MPIC&SND	0	MPIC&SND	1398.735	MPIC&SND	0.147836
BRODCST(t	0	BRODCST(t	-0.01076	BRODCST(t	0	BRODCST(t	3263.088	BRODCST(t	0.149584
ARTRECRTI	0.004207273	ARTRECRTI	-0.00461	ARTRECRTI	0	ARTRECRTI	45.045	ARTRECRTI	0.146871
FININSUR(t	0	FININSUR(t	0.104136	FININSUR(t	0	FININSUR(t	6189.513	FININSUR(t	0.15022
FINANCE(t)	0	FINANCE(t)	0.090822	FINANCE(t)	0	FINANCE(t)	5481.713	FINANCE(t)	0.149615
INSURANS	0	INSURANS	0.013029	INSURANS	0	INSURANS	40.9731	INSURANS	0.150834
REALEST(t)	-0.18452762	REALEST(t)	-0.02722	REALEST(t)	0	REALEST(t)	15951.29	REALEST(t)	0.14961
PROFSERV(	0	PROFSERV(	0.102856	PROFSERV(	0	PROFSERV(	7004.699	PROFSERV(	0.148365
ADMINSUF	-0.00054608	ADMINSUF	7.17E-05	ADMINSUF	0	ADMINSUF	40.3226	ADMINSUF	0.149615
PUBADMN	-0.12390618	PUBADMN	-0.08492	PUBADMN	0	PUBADMN	6538.507	PUBADMN	0.149615
EDUCATN(	0.039033148	EDUCATN(	-0.04777	EDUCATN(	0	EDUCATN(	2817.456	EDUCATN(	0.149465
HLT&SOC	0.011415204	HLT&SOC	-0.00179	HLT&SOC	0	HLT&SOC	79.7268	HLT&SOC	0.149849
OTHSERVS	0.057252282	OTHSERVS	-0.00616	OTHSERVS	0	OTHSERVS	3613.748	OTHSERVS	0.148895
NGDP(t)	0	NGDP(t)	-2.37561	NGDP(t)	0	NGDP(t)	105959.3	NGDP(t)	0.14948
DISPINC(t)	0	DISPINC(t)	2.760083	DISPINC(t)	0	DISPINC(t)	142404.2	DISPINC(t)	0.14946
REALINC(t)	0	REALINC(t)	0.004111	REALINC(t)	0	REALINC(t)	124.7961	REALINC(t)	0.150289
REALGDP(t	1.307395704	REALGDP(t	-0.26059	REALGDP(t	0	REALGDP(t	100.6931	REALGDP(t	0.149225
GROWTRT(	8.92693E-07	GROWTRT(	1.34E-06	GROWTRT(	0	GROWTRT(	28.169	GROWTRT(	0.148001
GROWTH(t	8.64894E-08	GROWTH(t	-1.6E-07	GROWTH(t	0	GROWTH(t	104.1667	GROWTH(t	0.147844
CONS(t)	1.516734453	CONS(t)	-1.01149	CONS(t)	0	CONS(t)	83177.51	CONS(t)	0.150223
CAPITAL(t)	0.614758928	CAPITAL(t)	-0.26485	CAPITAL(t)	0	CAPITAL(t)	11288.16	CAPITAL(t)	0.149004
FDI(t)	0.054232814	FDI(t)	0.067545	FDI(t)	0	FDI(t)	2053.073	FDI(t)	0.14851
CPI(t)	0	CPI(t)	7.3E-06	CPI(t)	0	CPI(t)	38.9105	CPI(t)	0.14903
INFLTD(t)	-3.2498E-08	INFLTD(t)	2.26E-08	INFLTD(t)	0	INFLTD(t)	101.0101	INFLTD(t)	0.148246
INFLATN(t)	0	INFLATN(t)	5.88E-06	INFLATN(t)	0	INFLATN(t)	39.5257	INFLATN(t)	0.149025
INFLTRT(t)	2.04716E-06	INFLTRT(t)	3.24E-06	INFLTRT(t)	0	INFLTRT(t)	26.738	INFLTRT(t)	0.148495
UNEMPL(t)	-5.895E-07	UNEMPL(t)	-4.5E-07	UNEMPL(t)	0	UNEMPL(t)	45.4545	UNEMPL(t)	0.152845
LABCOMP	0	LABCOMP	0.285909	LABCOMP	0	LABCOMP	44000.33	LABCOMP	0.14961
MALE	0	MALE	9.64E-07	MALE	0	MALE	59.8802	MALE	0.146851
FEMALE	0	FEMALE	9.49E-07	FEMALE	0	FEMALE	59.8802	FEMALE	0.146851
URBAN	3.47438E-07	URBAN	1.16E-07	URBAN	0	URBAN	70.4225	URBAN	0.149234
RURAL	6.10158E-07	RURAL	2.05E-07	RURAL	0	RURAL	70.4225	RURAL	0.149234
CHLDRN	0	CHLDRN	-1.7E-07	CHLDRN	0.0002	CHLDRN	68.0272	CHLDRN	0.157263
CHDRNSS	-1.2094E-06	CHDRNSS	1.15E-06	CHDRNSS	0	CHDRNSS	45.2489	CHDRNSS	0.148431
EPAWF	0	EPAWF	-6.4E-07	EPAWF	0	EPAWF	56.8182	EPAWF	0.146996
NADDWF	0	NADDWF	1.41E-08	NADDWF	0	NADDWF	55.5556	NADDWF	0.146241

Table 1: ANALYSES OF INVESTMENT IN NIGERIA CONT'D

SECTORS	STRUCTURAL INVSTMT	SECTORS	IMPACT INVSTMT	SECTORS	ABSORBING INVSTMT	SECTORS	TIME B4 INVESTMT	SECTORS	INVSTMT PROBATY
POPOLD	0	POPOLD	-1.2E-07	POPOLD	0	POPOLD	56.1798	POPOLD	0.148709
UNEMWF	-8.5655E-07	UNEMWF	-3.6E-07	UNEMWF	0	UNEMWF	34.2466	UNEMWF	0.156703
EMPWF	1.00412E-06	EMPWF	4.1E-07	EMPWF	0	EMPWF	67.1141	EMPWF	0.150267
EMPLMNT	1.13457E-06	EMPLMNT	-3.9E-07	EMPLMNT	0	EMPLMNT	31.348	EMPLMNT	0.14879
PRDTIVTY	2.20771E-06	PRDTIVTY	-1.4E-06	PRDTIVTY	0	PRDTIVTY	12.1507	PRDTIVTY	0.22271
LPROVITY	-0.03818957	LPROVITY	-0.04381	LPROVITY	0	LPROVITY	3169.031	LPROVITY	0.14777
AVWAGE	0	AVWAGE	0.008005	AVWAGE	0	AVWAGE	40.9489	AVWAGE	0.150829
DDEMENT	-1.7103E-07	DDEMENT	-1.9E-07	DDEMENT	0.0341	DDEMENT	20.202	DDEMENT	0.740254
EMDDPR	6.59426E-08	EMDDPR	-3.1E-08	EMDDPR	0	EMDDPR	18.9753	EMDDPR	0.14861
POOR(t)	0	POOR(t)	1.37E-06	POOR(t)	0	POOR(t)	31.4465	POOR(t)	0.155324
EXTPOOR(t	0	EXTPOOR(t	-1.3E-06	EXTPOOR(t	0	EXTPOOR(t	11.3895	EXTPOOR(t	0.224031
POVRT(t)	-8.5169E-08	POVRT(t)	8.22E-08	POVRT(t)	0	POVRT(t)	57.4713	POVRT(t)	0.148937
SLAVERY	0.004546492	SLAVERY	-0.00261	SLAVERY	0	SLAVERY	27.3224	SLAVERY	0.14975
SAVINGS(t)	0	SAVINGS(t)	-0.25787	SAVINGS(t)	0	SAVINGS(t)	3959.922	SAVINGS(t)	0.154364
BOT(t)	-0.24392457	BOT(t)	-0.28834	BOT(t)	0	BOT(t)	9518.995	BOT(t)	0.151924
BOP(t)	-0.25699427	BOP(t)	0.06512	BOP(t)	0	BOP(t)	9570.577	BOP(t)	0.149751
EXTRES(t)	0	EXTRES(t)	0.001527	EXTRES(t)	0	EXTRES(t)	36.7647	EXTRES(t)	0.150599
DBTBDN(t)	0	DBTBDN(t)	-8E-09	DBTBDN(t)	0	DBTBDN(t)	13.6612	DBTBDN(t)	0.150075
OILREV(t)	0.22539151	OILREV(t)	0.222309	OILREV(t)	0	OILREV(t)	3365.054	OILREV(t)	0.182869
NOILREV(t)	0	NOILREV(t)	-0.07917	NOILREV(t)	0	NOILREV(t)	3212.97	NOILREV(t)	0.150215
CORPTD(t)	7.57741E-08	CORPTD(t)	-3.5E-08	CORPTD(t)	0	CORPTD(t)	27.1739	CORPTD(t)	0.148085
CORRPTN(t	0.00303485	CORRPTN(t	0.002475	CORRPTN(t	0	CORRPTN(t	94.3396	CORRPTN(t	0.149726
DDMONY(t	0	DDMONY(t	0.378907	DDMONY(t	0	DDMONY(t	17406.12	DDMONY(t	0.15022
DDMOPR(t	0.001339323	DDMOPR(t	0.001846	DDMOPR(t	0	DDMOPR(t	30.9598	DDMOPR(t	0.148999
DEMOCY(t)	4.5386E-08	DEMOCY(t)	-1.6E-08	DEMOCY(t)	0	DEMOCY(t)	212.766	DEMOCY(t)	0.140279
CORDEM(t	0.003047456	CORDEM(t	0.002488	CORDEM(t	0	CORDEM(t	95.2381	CORDEM(t	0.148301
PWLFARE	-0.01598258	PWLFARE	-0.00545	PWLFARE	0	PWLFARE	56.7263	PWLFARE	0.148406
STDOLIVN	0.016576611	STDOLIVN	0.017004	STDOLIVN	0	STDOLIVN	10.2557	STDOLIVN	0.15022
PUPWER	4.30039E-05	PUPWER	1.65E-05	PUPWER	0	PUPWER	107.5269	PUPWER	0.149734
FODSRITY	0	FODSRITY	0.003734	FODSRITY	0	FODSRITY	40.8163	FODSRITY	0.149615
HLTCARE	0	HLTCARE	3.75E-05	HLTCARE	0	HLTCARE	38.3142	HLTCARE	0.148885
DDHCARE	0.002217889	DDHCARE	-0.0015	DDHCARE	0	DDHCARE	55.5556	DDHCARE	0.146426
HCRDDPR	1.0425E-05	HCRDDPR	-2E-05	HCRDDPR	0	HCRDDPR	52.0833	HCRDDPR	0.14896
HRESDEV	0.000130507	HRESDEV	-0.00026	HRESDEV	0	HRESDEV	28.49	HRESDEV	0.149009
DDEDUC	0.008789191	DDEDUC	0.006158	DDEDUC	0	DDEDUC	133.4057	DDEDUC	0.192947
EDUDDPR	7.75166E-05	EDUDDPR	3.75E-05	EDUDDPR	0	EDUDDPR	5000	EDUDDPR	0.149564
WEALTH	4.70333E-09	WEALTH	-1.3E-09	WEALTH	0	WEALTH	23.6407	WEALTH	0.149729
PWEALTH	0.000984445	PWEALTH	0.001183	PWEALTH	0.0333	PWEALTH	38.2692	PWEALTH	0.906301
IMPDPEN	0	IMPDPEN	-3.8E-09	IMPDPEN	0	IMPDPEN	70.922	IMPDPEN	0.147657
DDIMP	0.216206021	DDIMP	0.206428	DDIMP	0	DDIMP	1011.389	DDIMP	0.150851
PENCIMP	0.001493075	PENCIMP	0.000557	PENCIMP	0	PENCIMP	38.4615	PENCIMP	0.147332
TIME(t)	0	TIME(t)	4.37E-07	TIME(t)	0	TIME(t)	45.6621	TIME(t)	0.147551
EXCHRTRP	0	EXCHRTRP	5.09E-07	EXCHRTRP	0	EXCHRTRP	38.3142	EXCHRTRP	0.148465
POP(t)	0	POP(t)	1.91E-06	POP(t)	0	POP(t)	59.8802	POP(t)	0.146851
IMPORT(t)	0.221224791	IMPORT(t)	-0.10818	IMPORT(t)	0	IMPORT(t)	8394.449	IMPORT(t)	0.150147
XPOTOIL(t)	0	XPOTOIL(t)	-0.34455	XPOTOIL(t)	0	XPOTOIL(t)	18415.76	XPOTOIL(t)	0.149045
XPTNOIL(t)	0.068262391	XPTNOIL(t)	0.04629	XPTNOIL(t)	0.0506	XPTNOIL(t)	329.354	XPTNOIL(t)	0.937058
DODBT(t)	0.183858101	DODBT(t)	-0.23262	DODBT(t)	0	DODBT(t)	9106.08	DODBT(t)	0.151689
EXTDBT	0.29611755	EXTDBT	-0.25262	EXTDBT	0	EXTDBT	30.0144	EXTDBT	0.14939
GEXPDN(t)	-0.10919669	GEXPDN(t)	-0.02781	GEXPDN(t)	0	GEXPDN(t)	9494.017	GEXPDN(t)	0.148991
PRIMELR(t)	-5.5853E-07	PRIMELR(t)	4.76E-07	PRIMELR(t)	0	PRIMELR(t)	88.4956	PRIMELR(t)	0.147141
INTSAV(t)	-5.9508E-07	INTSAV(t)	-2.5E-07	INTSAV(t)	0	INTSAV(t)	454.5455	INTSAV(t)	0.18534
MONYSS(t)	0.513638437	MONYSS(t)	0.277584	MONYSS(t)	0	MONYSS(t)	12033.7	MONYSS(t)	0.149404
TAX(t)	0	TAX(t)	-0.43556	TAX(t)	0	TAX(t)	4328.286	TAX(t)	0.262037
ACGSC	0.668582714	ACGSC	0.352082	ACGSC	0	ACGSC	238.8939	ACGSC	0.146226
DFUELP(t)	-4.8187E-06	DFUELP(t)	-5.6E-06	DFUELP(t)	0	DFUELP(t)	43.29	DFUELP(t)	0.148966

ANALYSIS OF THE IMPACT OF INVESTMENT ON THE NIGERIA ECONOMY

The impact of investment on the Nigeria economy can also be inferred from Table 1. Accordingly investment has a positive feedback and propagates itself to the tune of N1.55 million but regrettably the impact of investment in Nigeria is mostly negative as they apply to the primary sector. Even though the impact is mixed the net impact of investment in Nigeria is negative. This is not difficult to explain as the impact of N1.0 million invested in Nigeria, causes corruption to rise or increase by N0.002475 million and N0.002488 million in the new democracy. Indeed, corruption is the bane of development in Nigeria.

ANALYSIS OF THE TRANSITION MATRIX OF THE NIGERIA ECONOMY.

The transition matrix of the Nigeria economy is an absorbing Markov Chain with investment being the only absorbing state. The non-absorbing states comprise a matrix of dimension 108 by 108 with only 4 of them with probability of being absorbed into investment. These include the increase in the population of children (16 yearsand below), Demand for employment, Personal wealth (savings per capita) and non-oil exports. These appear to be the channels through which investment in Nigeria is carried out. The absorbing probabilities are presented in Table 1 above.

CHILDREN POPULATION

When children population increases in period (t) the probability or chance that investment will increase in period ($t+1$) is 0.0002. This indicates that investment made on behalf of children in the Nigeria economy has a probability of 0.0002 of being absorbed into investment.

Next we shall attempt to trace the sources and link sectors through which investments on children in Nigeria come about. From the transition matrix, it can be inferred that when the population of children increases in year (t), agricultural income increases with a probability of 0.0006 which represents the commitments of the parents and relatives working in the agricultural sector to invest in their children's welfare and education.The probabilities of thenon-absorbing states and their sources and links to investment are summarized in Table 2 (Transpose).

As far as children are concerned, it is possible to see the sectors that are linked to the investment in children and their respective probabilities from Table 2. The greatest singular link is disposable income with a probability of 0.0026.It can be seen that Government also invest in children with a probability of 0.0002. This must include scholarships and the like. However, the probability that the population of children will not change in period ($t+1$) is 0.9853.

DEMAND FOR EMPLOYMENT

Demand for employment is one of the channels through which investment occurs in Nigeria. Indeed, it can be seen from Table 2 that when the demand for employment increases in period (t) that investment increases in period ($t+1$) with a probability of 0.0341. The link with investment can be inferred from Table 2, with services, industry, agriculture, manufacturing and trade playing major roles. In addition, the singular variable through which investment in promoted when the demand for employment increases is through oil revenue with a probability of 0.0022. Other profoundsources and links through which investments are initiated when the demand for employment increases include nominal income, disposable income and labor compensation (salaries and wages), with probabilities of0.0021, 0.0021 and 0.0007 respectively.Indeed

Consumption also promotes investment (when the demand for employment increases), with a probability of 0.0012; this can only be achieved when personal wealth (per capita savings) is

Table 2 PROBABILITY OF ABSORBTION OF NON-ABSORBING STATES-SOURCES AND LINK WITH IMVESTMENT.				
	CHLDRN	DDEMENT	PWEALTH	XPTNOIL(t)
INVST(t)	0.0002	0.0341	0.0333	0.0506
AGRSEC(t)	0.0006	0.0005	0	0
INDUST(t)	0.0005	0.0006	0	0
MANUFC(	0.0001	0.0004	0	0
CONSTN(t	0.0001	0.0001	0	0
SERVCS(t)	0.0016	0.0013	0	0
TRADE(t)	0.0005	0.0004	0	0
INFOCOM	0.0003	0.0003	0	0
TELECOM(	0.0002	0.0002	0	0
FININSUR(	0.0001	0	0	0
FINANCE(	0.0001	0	0	0
REALEST(t	0.0003	0.0002	0	0
PROFSERV	0.0001	0.0001	0	0
PUBADMN	0.0001	0	0	0
OTHSERVS	0.0001	0.0001	0	0
NGDP(t)	0.0022	0.0021	0	0
DISPINC(t	0.0026	0.0021	0	0
CONS(t)	0.0017	0.0012	0	0
CAPITAL(t	0.0003	0.0003	0.0005	0.0007
LABCOMP	0.0007	0.0007	0	0
CHLDRN	0.9853	0	0	0
DDEMENT	0	0.9505	0	0
SAVINGS(	0.0001	0.0002	0	0
BOT(t)	0.0001	0.0002	0	0
BOP(t)	0.0001	0.0002	0	0
OILREV(t)	0	0.0022	0.0006	0.0005
NOILREV(	0.0001	0.0001	0	0
DDMONY(	0.0003	0	0	0
STDOLIVN	0	0.0003	0	0.0004
DDEDUC	0	0.0001	0	0
PWEALTH	0	0	0.9625	0
DDIMP	0	0	0.0012	0.0009
IMPORT(t)	0.0002	0.0003	0	0
XPOTOIL(	0.0003	0.0003	0	0
XPTNOIL(	0	0.0002	0	0.9453
DODBT(t)	0.0002	0.0002	0	0
GEXPDN(t	0.0002	0.0001	0	0
MONYSS(t	0.0003	0.0004	0	0
TAX(t)	0	0	0.0005	0.0004
ACGSC	0	0	0.0013	0.0011

high in an organized society but the most direct approach is for Government to invest in services, industry, manufacturing and agriculture with probity and accountability. However the probability that the demand for employment will persist in period (*t+1*) is 0.9505 indicating that very little is done to fight unemployment in Nigeria.

PERSONAL WEALTH OR PER CAPITA SAVINGS

This another channel through which investment is promoted in Nigeria. Indeed, the chance that investment will increase when personal wealth increase in Nigeria is 0.0333. The main sources and links to investment when personal wealth increase in Nigeria are increases in agricultural credit guarantee scheme, the demand for imports, oil revenue and capital with corresponding probabilities of 0.0013, 0.0012, 0.0006 and 0.0005 respectively. It should be noted that the probability that personal wealth will not change in period (*t+1*) is 0.9625 indicating that very little of savings is invested.

NON-OIL EXPORTS

Non-oil exports is the final channel through which investment occurs in Nigeria. Indeed, when non-oil exports increase in period (*t*) the chance that investment will increase in period (*t+1*) is 0.0506 which more profound. The two most profound links with investment are the demand for imports and increase in capital with corresponding probabilities of 0.0009 and 0.0007 respectively. The other details are shown in Table 2.

VARIABLES WHICH HINDER OR FOSTER THE CHANNELS OF INVESTMENT IN NIGERIA

They are as shown in Table 3. It is evident that if the personal wealth of the extremely poor in Nigeria is improved that investment will also improve. Non-Oil Exports has the highest chance

Table 3: VARIABLES WHICH PROMOTES PERSONAL WEALTH AND NON-OIL EXPORTS IN NIGERIA				
	CHLDRN	DDEMENT	PWEALTH	XPTNOIL(t
OILREFIN	0	0	0	0.0006
UNEMPL(t	0	0	0	0.0001
CHLDRN	0.9853	0	0	0
UNEMWF	0	0	0	0.0002
PRDTIVTY	0	0	0	0.0039
DDEMENT	0	0.9505	0	0.0002
EXTPOOR(	0	0	0.0002	0
SAVINGS(	0	0	0	0.0002
BOT(t)	0	0	0	0.0001
PWEALTH	0	0	0.9625	0
XPTNOIL(t	0	0	0	0.9453
INTSAV(t)	0	0	0	0.0001
TAX(t)	0	0	0.0001	0.0035

of promoting investment in Nigeria with a probability of 0.0506. From Table 3, it can be inferred that productivity and oil refining are both crucial to enhancing non-oil exports in Nigeria. The role of taxation is not very obvious but it is believed that high taxes will hinder production.

Table 1 also shows the time before investment as well as the probability of investment. It can be seen that non-oil exports has the highest investment probability of 0.9371 followed by personal wealth with a probability of 0.9063.

A TEST OF A COMPOSITE NON-OIL EXPORTS PROMOTION POLICY ON THE NIGERIA ECONOMY:DYNAMIC IMPACT AND OUTLOOK TO YEAR 2035.

A composite policy was derived on the basis that non-oil exports was the greatest means by which investment is promoted in Nigeria and the other variables which are linked to non-oil investment included Domestic debt, Government expenditure and Agricultural credit guarantee scheme. The instruments and assumed policy levels for 2024 were Non-oil exports, N2551282 million, Domestic debt, N5946766 million, Government expenditure, N11051528 million and Agricultural credit guarantee scheme, N2527057 million respectively. The outlook on the Nigeria economy for some selected variables are as shown in Figs 3 to 5 below.

FIG 3: COMPOSIT NON-OIL EXPORT PROMOTION POLICY ON REAL SECTORS
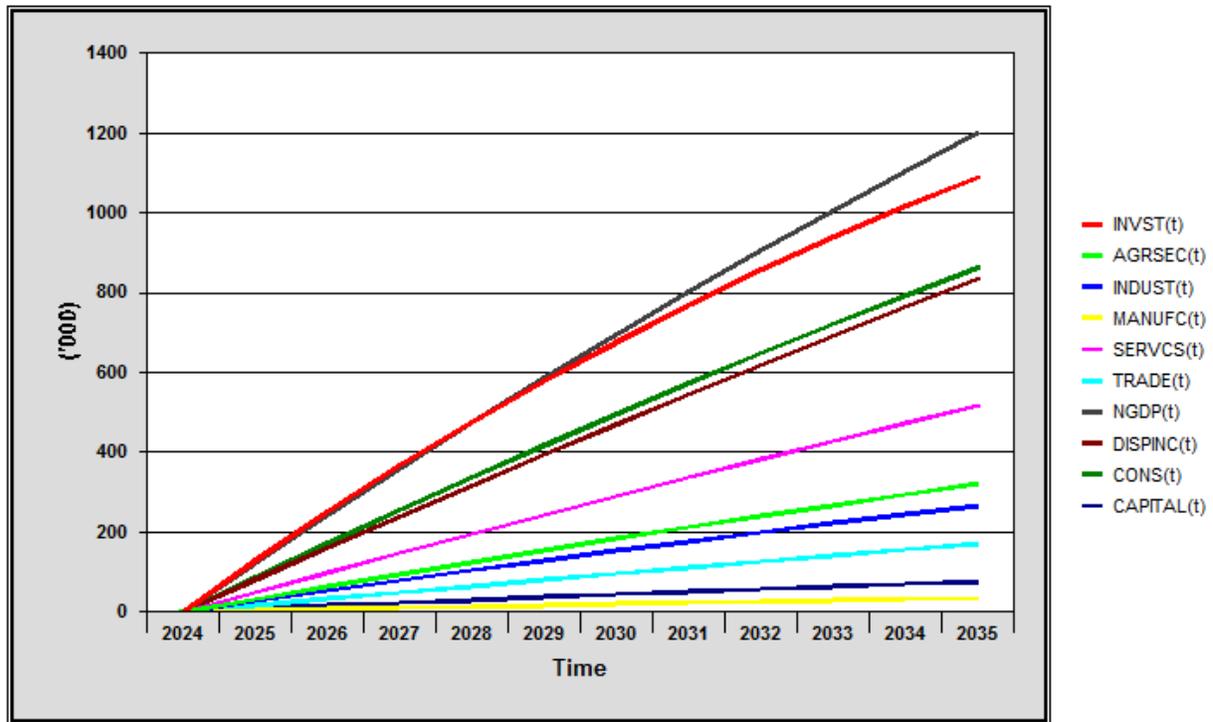
The dynamic impact and outlook to year 2035 of the selected real sectors are positive as can be seen from Fig 3. Indeed the whole economy fans out indicating the usefulness of the composite non-oil promotion policy.

FIG 4: COMPOSIT NON-OIL EXPORT PROMOTION POLICY ON GROWTH
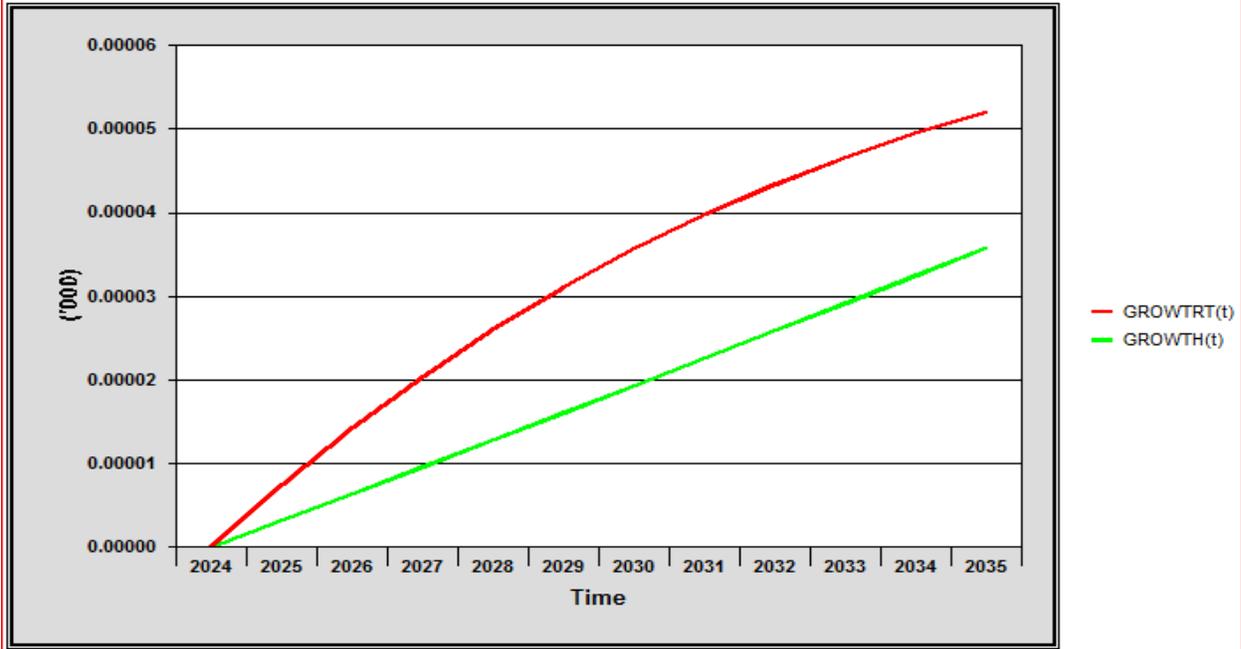
FIG 5: COMPOSIT NON-OIL EXPORT PROMOTION POLICY ON SOCIO-ECONOMIC INDICES
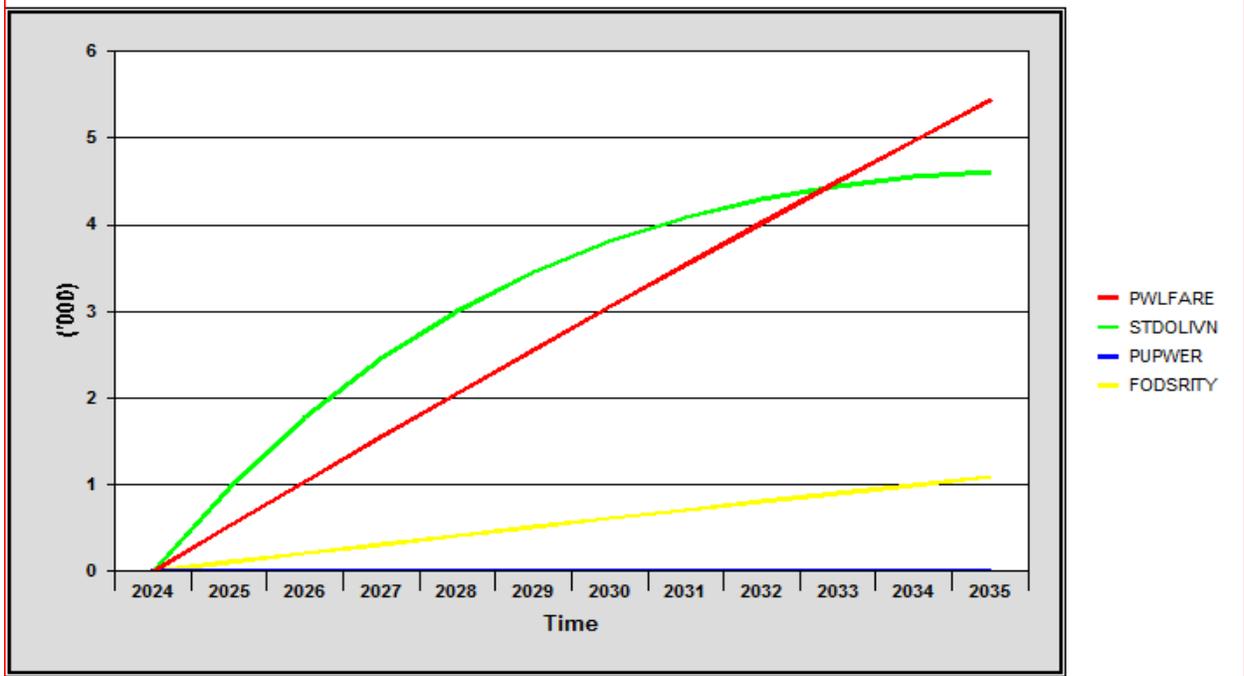
The economy also grows as can be seen from Fig 4 and general well-fare or well-being also improves as indicated by Fig 5. Investment will increase by over N1.0 trillion by 2035, with a corresponding increase in nominal and disposable incomes of N1.2 trillion and N800 billion respectively by 2035. Agriculture, Industry, Trade, Services and Manufacturing are all also going to increase as can be inferred from Fig. 3. Indeed, the economy will fan out. The composite policy alone will cause an increase in the growth rate of the Nigeria economy by over 5% by 2035, with the increase in growth reaching over N30,000.00 by 2035. Standard of living will increase and truncate by 2035 while Personal welfare will experience a linear growth. Food security will also improve.

CONCLUSION

To conclude this study, the recommendation of Arinze (2023) comes to the fore, "The study concludes that the creation of a business-enabling environment is required for the needed industrial base in order to diversify the economy. This study, therefore, recommends that government should formulate and adopt policies that would encourage trade performance, local manufacturing, self-reliance and entrepreneurship among citizens as well as industrial advancement to promote economic growth. Since industrialization facilitate economic growth through the innovative activities of entrepreneurs, the range of financing instruments available to SMEs and entrepreneurs should be expanded to enable them to continue their role in investment, growth, innovation, and employment." This is obvious from the findings in this article. The role that non-oil exports can play in promoting investment and thus industry in Nigeria cannot be overemphasized. It is obvious that the Nigeria economy will grow and well-being will improve with such a composite policy aimed at promoting non-oil exports. In addition, according to Aruofor and Ogbeide, (2024), "It is necessary to build more factories and industries in the rural areas and not just concentrate on agriculture alone. This also highlights the problem of insecurity in Nigeria (see Aruofor and Ogbeide, 2022b)."

From the results of this study, it is now apparent that the major channels through which investment and consequently industry can be promoted in Nigeria are non-oil exports and personal wealth, with investment probabilityof 0.9371 followed by personal wealth with a probability of 0.9063. What this means is that Government should adopt policies which will facilitate and promote non-oil exports in Nigeria as well as increase the Personal wealth or per capita savings of Nigerians. By implication this also implies that Government should ensure and implement an optimum redistribution of income in Nigeria. In the opinion of Aruofor and Ogbeide (2024), income distribution in Nigeria is lopsided and is skewed towards the poor in Nigeria. The redistribution of income in Nigeria must start with Political Office holders and requires them to make some concession to reduce their consumption. In particular, it demands that they cut down their salaries and allowances to the barest minimum to conform with the Civil Service of Nigeria as required by the exigencies of the time and society which they are part of. In fact, the cost of running government in Nigeria is too high and exorbitant to say the least. The following recommendations are made for the attention of Government.

RECOMMENDATIONS

1) Government should adopt policies which will facilitate and promote non-oil exports in Nigeria.
2) Address the issue of lopsided income distribution in the country.
3) Build more factories and industries especially in the rural areas of Nigeria.
4) Government must continue to fight corruption, indiscipline and greed in the society in whatever guise it takes.
5) Government must rise up to its responsibility of ensuring the security of life and property in Nigeria.
6) Ensure good governance devoid of greed and corruption in all its ramification, and
7) According to Arinze (2023),"Since industrialization facilitate economic growth through the innovative activities of entrepreneurs, the range of financing instruments available to SMEs and entrepreneurs should be expanded to enable them to continue their role in investment, growth, innovation, and employment."

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