

**ANALYSIS OF BUDGET DEFICIT AND NIGERIA'S ECONOMIC DEVELOPMENT
CHALLENGES WITHIN THE CONTEXT OF ECOWAS CONVERGENCE
CRITERIA**

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1. Introduction

In May 2009, the ECOWAS Convergence Council adopted the roadmap for the creation of ECOWAS single currency that put harmonization of macroeconomic policies at the central stage in the multilateral surveillance mechanism. The implementation of single currency programme anchored on diverse combination of exchange rate regimes, convergence programme deadlines, targets and convergence criteria. To speed up the attainment of the objective of ECOWAS single currency, the acceleration of the monetary integration process of countries with their currency becomes important. In 2000, Nigeria, Guinea, Ghana, Sierra Leone and Gambia decided to create a second currency area within ECOWAS known as “West African Monetary Zone (WAMZ). Liberia joined the zone in February, 2010. To facilitate the monetary integration process, the WAMZ convergence criteria are fundamentally similar to the ones of ECOWAS.

The WAMZ monetary zone is founded on the gradualist approach, whose precise assessment framework was defined through the adoption of convergence criteria at the 22nd session of the Conference of Heads of State and Government, held in Lomé in 1999. The primary criteria are the following: budget deficit (net of grants) / GDP (on commitment basis) ratio $\leq 4\%$; inflation rate: $\leq 5\%$; Central Bank financing of the budget deficit: $\leq 10\%$ of previous year's revenue; and gross external reserves should be above 6 (six) months of import cover. The secondary criteria are as follows: non-accumulation of domestic arrears and settlement of all outstanding arrears; tax revenue/GDP ratio $\geq 20\%$; wage bill/tax revenue $\leq 35\%$; internally funded public investment/tax revenue $\geq 20\%$; real exchange rate stability; and positive real interest rate. Performance in terms of fulfilling the convergence criteria is unequal and uneven overtime. No convergence programme obtained a “critical mass” of results (Lama 2011). This is because convergence criteria are somehow related to budgetary targets (budget revenue and expenditure, monetary aggregates), instruments (exchange rate, interest rate) and economic policy objectives (economic growth and development and price stability).

Under the ECOWAS and WAMZ, budget deficit/GDP (net of grants) is limited to 4%. Though, certain constraints were certainly taken into consideration in setting this target, it is closely related to the standard retained in other monetary integration organisations in Africa. The exercise of setting targets normally faces a double risk: if the target is too ambitious, it risks losing credibility and if the target is not ambitious enough, it may not sufficiently prevent the generation of huge deficits, which could undermine the cohesion of the zone or the maintenance of monetary stability. Infact, countries should be allowed to adapt their budget policy to asymmetrical economic shocks and their fundamental economic development challenges.

In all ECOWAS member states, high revenue mobilization and budget expenditure control are considered in all economic policy programmes. According to Talvi and Vegh (2005) the high contribution of primary products to GDP, weak and unstable economic growth and the commitments to poverty alleviation programmes strongly influence public finance management, and the justification to adopt procyclical budget policy. It is worthy to note that expansionist budget policy and its impact on inflation and interest rates are particularly targeted to ensure viability of the CFA franc's pegging to the Euro and the creation of a single currency for WAMZ and ECOWAS. In essence, the criterion of budget deficit is not implemented in isolation so also its viability, but in line with the overall convergence criteria. The fact that the convergence criteria are related to economic development calls for a reconsideration of yardsticks to use in the process of assessing the performance of country in

attaining this criterion. The expansionary nature of budget deficit may make the country to compromise its importance in maintaining currency stability in the monetary union.

In ECOWAS, a comparative analysis of convergence report of 2009 and 2010 clearly shows a fall-off of convergence criteria in terms of performance. In the case of macroeconomic convergence, the situation deteriorated in 2010 compared to average performance in the period of 2005 to 2009. In comparison, the status of convergence in 2010 which appreciated due to the number of countries achieving their targets, deteriorated with regard to criterion like budget deficit-GDP ratio. For example, in Nigeria, the number of convergence criteria attained in 2010 (3) was lower than that of 2009 (5). One of the unmet criteria was budget deficit-GDP ratio. The country did not attain this convergence criterion in 2010, as the ratio was 5.8% compared to maximum value of 4% allowed by the ECOWAS convergence criteria. The basic research question is why some ECOWAS member states find it difficult to attain the criterion of budget deficit-GDP ratio net of grant of less than or equal to 4%?. While there is a clamour for the need of member states to strengthen tax collection capacities in order to ensure adequate funding for public expenditure, special attention also needs to be devoted to pressure on public institutions to sustain socio-economic development. All these are issues that ECOWAS needs to put into consideration in its monetary integration process. As a way of addressing these issues, we focus on one of the convergence criteria (budget deficit (net of grants) / GDP (on commitment basis) ratio $\leq 4\%$ and one country in ECOWAS region called Nigeria. The choice of criterion of budget deficit/GDP ratio and Nigeria as the main focus of the study is necessitated by many factors. First, budget deficit/GDP ratio is an important convergence criterion to guarantee stability in a monetary union. A typical example is the crises in Euro-zone, where high budget deficit financed by huge public debt caused instability in the zone. Second, the budget deficit/GDP ratio is one of the criteria that many West African countries find very difficult to attain. Third, budget deficit is one of the policy variables considered in the initial version of PCM Nigeria T 21 model and also Nigeria is one of the pilot countries under the ECOWAS T 21 model. Lastly, Nigeria is chosen because it is biggest economy and most populous country in West Africa (see Olayiwola 2010). The institution of transformation agenda embedded in Vision 2020 in Nigeria makes the country to be important in the analysis of this type of critical issue.

In Nigeria, Vision 20:2020 (NV20:2020) an economic transformation blueprint was conceived to restore Nigeria back to the path of long term planning. The blueprint builds upon the key principles and thrusts of the Millennium Development Goals (MDGs) and the National Economic Empowerment and Development Strategy (NEEDS), thereby providing a common reference for efforts targeted at achieving Nigerian development objectives over the next ten (10) years. The vision statement is:

“By 2020, Nigeria will have a strong, diversified, sustainable and competitive economy that effectively harnesses the talents and energies of its people and responsibly exploits its natural endowments to guarantee a high standard of living and quality of life to its citizens”

The NV20:2020 is anchored on three pillars, namely: Guaranteeing the productivity and wellbeing of the people; optimizing the key sources of economic growth; and fostering sustainable social and economic development. The Vision is anchored on three (3) medium term national development plans also known as the National Implementation Plans (NIPS) – 1st NIP (2010 – 2013); 2nd NIP (2014 – 2017) 3rd NIP (2018 – 2020).

Given the enormous resources needed to implement Vision 2020, federal government of Nigeria resulted to deficit budgeting in 2010 and the value of budget deficit increased to 5.8% in 2010. The value may even continue to be higher than ECOWAS recommended value of 4% because of economic pressures and various socio-economic problems confronting the

country. The basic questions are as follows; would the process of attaining this convergence criterion not negate the achievement of socio-economic development as embedded in Nigerian Vision 2020, and what will be the implication of operating with ECOWAS convergence criteria on socio-economic development challenges of Nigeria?

The broad objective of this study is to analyse the implication of budget deficit on socio-economic development challenges of Nigeria within the context of ECOWAS convergence criteria. A system dynamic methodology is employed by using the Primary Country Model of Nigeria Threshold 21 to achieve the specific objectives stated as follows;

- 1) To test the applicability of T21 model in analysing ECOWAS convergence criteria;
- 2) analyse the implication of budget deficit on economic development of Nigeria; and
- 3) analyse the prospect of Nigerian economy in achieving the criteria of budget deficit / GDP ratio $\leq 4\%$;

The rest of the study is organised as follows. Section two provides the background to the study. Section 3 present brief literature review, while section 4 discusses the methodology. Section 5 presents the empirical findings and section 5 concludes the study

2. Background to the Study

The year 2010 was marked by continued world economic recovery following the economic and financial crisis of 2008. However, the extent of this recovery varies considerably from one region to another. Global economic production increased by 5% in 2010 compared to 0.5% in 2009, driven by emerging and developing economies, which recorded a 7.3% growth in 2010 compared to 2.7% the previous year. The performance of these countries was influenced primarily by Brazil, China and India, mainly as a result of the dynamic investment, exportation and private consumption (ECOWAS Convergence Report, 2010)

The economic situation of ECOWAS in 2010 led to a regional GDP growth of 6.8% compared to 5.6% in the previous year. The driven force of the growth was the recovery of the export sector and strong budgetary policies put in place for a decade. For example, In Nigeria, growth rate was 7.9% compared to 7% in 2009 due to the strong growth of the oil sub-sector, while in Sierra Leone, performance of the agricultural, mining and services sub-sectors contributed to a growth rate of 4.9% in 2010 compared to 4.4% in 2009. In UEMOA, GDP grew by 4.4% in 2010 compared to 2.8% in the previous year, due mainly to the good performance of the food producing sector, high level output by the mining sector and continued boom of the construction sector. In Cape Verde, real GDP grew by 5.6%, driven essentially by the development of the tertiary sector particularly as a result of recovery in tourism and money transfers.

The analysis of the economic and financial position of ECOWAS reveals macroeconomic difficulties that have impeded the attainment of the 7% minimum growth rate considered necessary in West Africa to reduce poverty. In addition, inflationary pressures rose in 2010 compared to the preceding year. In the area of public finance, budgetary deficits remained high in 2010, due to low tax revenues. Similarly, due to the deterioration of the current account balance in most countries, foreign exchange reserves declined in 2010 compared to the previous year's level.

In the case of Macroeconomic Convergence, the situation deteriorated in 2010 compared to the average over the five preceding years (2005-2009). Similarly, in comparison with 2009, the status of convergence in 2010, which improved due to the number of countries achieving their targets, deteriorated with regard to criteria on end-of-period inflation, monetary

financing of the budget deficit, wage bill/ tax revenue ratio, positive real interest rate, and stability of the effective exchange rate. For the other criteria, there was no change in the number of countries that achieved their targets.

Performance in terms of convergence was mixed given the number of convergence criteria met per country in 2010. Thus, some countries (Benin, Burkina Faso, Cape Verde, Guinea Bissau, Mali, Niger, Senegal and Togo) improved performance by increasing the number of convergence criteria satisfied in 2010. On the other hand, the number of convergence criteria satisfied by Cote d'Ivoire, Gambia, Ghana, Guinea, Nigeria and Sierra Leone reduced in 2010.

Table I. Changes in the number of countries that met each criterion 2005 - 2010

	Standard	2005	2006	2007	2008	2009	2010	2005-2009 Average
Primary criteria								
1. Budget deficit	≤ 4% GDP	4	6	8	8	4	5	6
2. Inflation (End of period)	≤ 5%	9	9	7	1	10	9	7
3. Deficit financing	≤ 10% TR n-1	15	13	15	13	13	12	14
4. External reserves	≥ 6 month	1	1	1	1	10	10	3
Secondary criteria								
1- Payment arrears		-	-	-	-	-	-	-
2-Tax revenues (TR)	≥ 20% GDP	2	2	2	2	2	2	2
3-Wage bill	≤ 35% TR	7	8	9	7	6	4	7
4 – Domestically financed investment/ TR	≥ 20% TR	6	5	6	7	8	8	6
9-Real interest rate	> 0	7	6	6	0	11	6	6
10-Stability in effective exchange rate level	± 5%	11	12	13	6	12	10	11

Source: ECOWAS Convergence Report, 2010

In 2010, countries experienced less difficulty in meeting the criteria on monetary financing of the budget deficit (12 performing countries), foreign exchange stability (10 performing countries), gross foreign reserves (10 performing countries) and inflation (9 performing countries). Conversely, it was difficult to meet other criteria, particularly on the tax ratio, wage bill ratio and budget deficit. This situation demonstrates the need to strengthen Member States' tax collection capacities in order to ensure adequate funding for public expenditure.

With respect to the criterion on budget deficit on commitment basis, excluding grants in percentage GDP, five (5) countries (Benin, Cote d'Ivoire, Guinea Bissau, Liberia and Togo) showed a credible performance in 2010 (see Table 2).

Table 2 Budget deficit GDP ratio excluding grants (commitment base) ($\leq 4\%$)

Countries	2005	2006	2007	2008	2009	2010	2005-2009 Average
Benin	4.6%	2.5%	1.4%	3.4%	7.4%	3.1%	3.9%
Burkina Faso	9.1%	11.3%	9.3%	11.5%	10.7%	10.1%	10.4%
Cape Verde	11.4%	10.4%	3.6%	6.5%	13.3%	19.0%	9.0%
Côte d'Ivoire	2.7%	1.5%	1.4%	2.2%	2.2%	2.3%	2.0%
Gambia	8.4%	2.7%	1.1%	3.8%	8.6%	8.5%	4.9%
Ghana	6.9%	12.9%	14.5%	19.5%	12.3%	8.2%	13.2%
Guinea	1.6%	2.0%	0.9%	1.5%	6.8%	14.4%	2.6%
Guinea Bissau	24.2%	19.9%	13.7%	11.3%	13.3%	1.4%	16.5%
Liberia	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Mali	7.3%	7.6%	7.9%	5.6%	1.6%	5.7%	6.0%
Niger	9.6%	6.8%	6.7%	5.4%	9.7%	6.9%	7.6%
Nigeria	1.3%	0.5%	0.6%	0.2%	3.3%	5.8%	1.2%
Senegal	4.7%	7.3%	7.1%	7.2%	7.9%	7.1%	6.8%
Sierra Leone	9.5%	8.5%	5.0%	0.0%	10.4%	14.1%	6.7%
Togo	4.1%	4.2%	2.3%	2.3%	4.9%	3.6%	3.6%
<i>Number of countries attaining the criterion</i>	4	6	8	8	5	5	6

Source : ECOWAS, WAMA and Member States

In the case of end-of-period inflation, 9 countries (UEMOA Member States and Cape Verde) complied with this criterion in 2010 compared to 10 countries the previous year (UEMOA countries, Cape Verde and Gambia) and 7 countries on the average over the five previous years. With regard to budget deficit financing by the central bank in relation to percentage of previous year's tax revenue, twelve countries met this criterion (all ECOWAS countries excluding Gambia, Guinea and Sierra Leone) against thirteen (13) Member States (all Member States excluding Guinea and Sierra Leone) in the previous year and an average of fourteen (14) during the preceding five years. In 2010, ten (10) countries (UEMOA Member States, Gambia and Nigeria) met the criterion on gross foreign reserves in months of import, just as in the previous year. The average performance for the last five years has been low because usually only Nigeria had been satisfying this criterion prior to 2009. The number of countries satisfying the tax revenue/nominal GDP ratio criterion remained two in 2010 (Cape Verde and Liberia in 2010, and Cape Verde and Ghana during the period 2005-2009).

Concerning the wage bill/tax revenue ratio, the performance deteriorated in 2010. Four countries (Mali, Niger, Senegal and Togo) met the criterion as against six (6) countries in 2009 (Gambia, Guinea, Mali, Niger, Nigeria and Senegal) and an average of 7 countries between 2005 and 2009. On the criterion of domestically-financed public investment/GDP ratio, eight (8) countries attained the target in 2010. Benin, Burkina Faso, Guinea, Mali, Niger, Nigeria and Senegal met the criterion in 2010 and 2009, while Cape Verde achieved it in 2009 and Liberia in 2010. Six (6) Member States (Burkina Faso, Cape Verde, Gambia, Mali, Niger and Togo) attained the real interest rate criterion in 2010 compared with eleven (11) countries the previous year (all Member States except, Ghana, Liberia, Nigeria and Sierra Leone). With regard to the criterion on effective exchange rate stability, ten (10) Member States (all countries except Côte d'Ivoire, Ghana, Guinea, Nigeria and Togo) met the target in 2010 compared with twelve (12) countries the previous year (all countries with the exception of Gambia, Guinea and Nigeria).

The number of countries that attained the targets in 2010 in relation to the average performance during the last five years dropped in respect of the criteria of budget deficit, budget deficit financing by the central bank, wage bill/tax revenue ratio, and effective exchange rate stability. However, significant improvements were observed in other criteria such as inflation, gross exchange reserves in months of imports, domestically financed public investment/GDP ratio. The positive effective interest rate and tax burden rate criteria maintained the status quo.

A comparative study of the 2010/2009 performance of the convergence criteria of each member country indicates that there was indeed a fall-off in convergence. It should be pointed out that in seven (7) countries (Cape Verde, Côte d'Ivoire, Gambia, Guinea, Mali, Nigeria and Senegal), the number of convergence criteria attained in 2010 was lower than the 2009 figure. Togo was the only country that improved its performance by increasing the number of convergence criteria attained.

Compared with the average performance in the past five years, the situation in 2010 produced three categories of countries. The first category includes countries with improved performance in 2010 against the 2005-2009 average, namely: Benin, Burkina Faso, Cape Verde, Guinea Bissau, Mali, Niger, Senegal and Togo). The second comprised two countries (Liberia and Sierra Leone) where no significant improvement was made in the number of criteria met in relation to the average performance in the last five years. The third category comprised Côte d'Ivoire, Gambia, Ghana, Guinea and Nigeria where there was a fall in the number of criteria met. In 2010, five of the fifteen Member States attained Budget deficit GDP ratio excluding grants (commitment base) ($\leq 4\%$) on nominal GDP against an average of six (6) countries during the 2005-2009 period. They are Benin (3.1%), Côte d'Ivoire (2.3%), Guinea Bissau (1.4%), Liberia (0.0%) and Togo (3.6%).

3. Review of Literature

The budget in the public sector is an important government policy document and a vital tool for achieving macroeconomic objectives (OECD, 2001). Budget deficit occurs when the expected government expenditure outweighs the anticipated government revenue within a fiscal year (Obadan, 2003; 2011). The budget is a platform for translating the promises of the government into policy practice by encapsulating the decisions on the country's macroeconomic strategies such as improving employment, curbing inflation, maintain favourable balance of payments and achieving better income distribution (Sharp, 2005). Budget deficit can occur as a resultant effect of fiscal indiscipline. It is also an expansionary fiscal policy instrument useful to boost economic development.

Fiscal deficit in Nigeria has been noted as one of the reasons for the continued pressure on the price level. It is usually financed by the Central Bank of Nigeria (CBN) and the proportion of the CBN's credit in the total deficit financing of the government has significantly more than double over the years. For instance, it increased from about 25.4% immediately after the implementation of Structural Adjustment Programmes (1987) to as high as 67.9% in 1994 (Emenuga, 1998; Tomori, Akano and Adebisi, 2005)). This stance has led to excess liquidity in the banking system and a substantial increase in domestic aggregate demand. Possible consequences of fiscal deficit can increase the cost of production, higher interest rates, high transportation costs, increase in the price level resulting from the depreciation of the foreign exchange rate and the excessive growth in domestic liquidity (CBN, 2002).

Budget discipline generally implies the extent to which a country can stay within the budget. It can be measured by the ratio of budgetary expenditure to actual expenditure. It is very similar to fiscal discipline which is captured by the ratio of budget deficit to the Gross Domestic Products (GDP) (Nazarovetes, 2001; Garba, 2011). Fiscal discipline is an attribute of efficient fiscal management which is a fundamental tool for economic performance of country. This has been noted to be one of the driving forces for the rapid economic transformation of the economies of South Korea and Botswana. Thus, fiscal discipline can promote economic development through reduction of wasteful public spending and corruption, which can improve the level of financial inflow in a country, as it has been noted for the case of South Africa (Schoeman, Robinson and De Wet, 2000). The budgetary processes in Nigeria is characterized by fiscal indiscipline and disrespect of budgetary procedures (Lienert and Sarraf, 2001; Garba, 2011; Obadan, 2011).

Within the context of budget deficit, the Keynesian school of thought opine that the aggregate demand of a country could be increased through increase spending and reduction of tax rate. While the neoclassical economists hold contrary view that budget deficits can have detrimental effects on economic development of a country. Another related theoretical maxim is the Ricardian Equivalence framework, which opines that budget/fiscal deficits have neutral effect on economic growth of country (Oluba, 2008; Yaya, 2010). From empirical point, scholars such as Landau (1983), Ariyo and Raheem (1991) subscribed to the orthodoxy of Keynesian view that fiscal deficit can be a tool for enhancing accelerated growth and development. While others held opposite view. Ogbuagu (2011) concludes that budget deficit do not significantly lead to economic growth in Nigeria for the period 1961-2009 using vector error correction method of analysis.

Lienert and Sarraf (2001) focusing on Anglophone African countries have found that budget indiscipline has been one of the factors that has contributed to the poor budgetary performance in Africa. They submitted that the existence of laxity in the application of required procedures for budget preparation and execution are bane of poor budget performance. On a related note, Yaya (2010) examined the causal relationship between budget deficits and economic growth for seven West African Countries that are members of WAEMU for a 26 year-period. They noted a mixed finding which suggests that budget deficit may be culpable for slow economic growth in some of the countries.

In Nigeria, the Fiscal Responsibility Act (FRA) was conceptualized as a measure that will oblige the government to spend its money in a more responsible manner. The FRA seeks to ensure that the federal government will not commit itself to spending money without ensuring that it has the necessary funds in place to begin with, among others (Garba, 2011). Onwioduokit (1996) investigates the causal relationship between inflation and fiscal deficit in Nigeria from 1970 to 1994 and confirmed that fiscal deficit can lead to inflation but there was no feedback between inflation and fiscal deficit. He recommends that government should not depend on fiscal deficits for its financing but it should strive to improve the absorptive capacity of the economy. In different framework, Adam and Bevan (2002) used a panel data involving 45 developing countries to examine the relationship between fiscal deficits and economic growth and found the existence of a threshold effect at a level of the deficit of about 1.5% of GDP. It was also established by the authors that interaction effects between deficits and debt stocks, with high debt stocks will aggravate the adverse consequences of high deficits.

In many monetary unions, budget deficit becomes one of the primary convergence criteria because of its importance in guaranteeing currency stability and domestic economic stability. Given the possible influence of budget deficit on economic growth and currency stability, ECOWAS came up with a rule that budget deficit should at most 4% of GDP as one of its

convergence criteria of monetary cooperation. This can be likened to the tenets of fiscal responsibility rules (FRL). The FRL entails statutory or constitutional restriction on fiscal policy that sets a specific limit on a fiscal indicator such as the budgetary balance, debt, or spending (Kennedy and Robbins, 2001; Crivelli and Shah, 2009). It has three measures, namely; numerical rules, procedural rules and transparency rules. The numerical fiscal rules set numerical restriction on certain fiscal indicators and limitation on contracting debt. On the other hand, procedural and transparency rules focus on enhancing transparency, accountability, and fiscal management. Over the years more attention has been on the adoption of FRL with a view to curtailing huge deficits and reduce public sector debts (Crivelli and Shah, 2009).

There are two opposing viewpoints of the conditions for creating a currency area, namely: the "economist" approach and the "monetarist" approach (Le Cacheux et al 1992). From the "economist viewpoint", the convergence of macroeconomic policies is a prerequisite to the creation of a currency union. The union would be viable only if the member countries succeed in achieving comparable inflation rates and sustainable budget deficits. This approach is referred to as "gradualism". According to the "monetarist" viewpoint which is based on the Lucas critique, it is the creation of a new currency, with a new independent central bank which should help to modify the price and salary determination mechanisms, inflationary trends as well as governments' budget policy performance. It is "shock therapy". This position prevailed, to a certain extent, in the monetary unification of Germany and to a lesser extent in the creation of the West African Monetary Union in 1960. However, trends in member economies that led to the devaluation of the CFA franc in 1994 and the transformation of WAEMU into an economic and monetary union clearly bear out the fact that even if countries have already adopted a single currency, they have to continue to comply with the convergence criteria as much as possible in order to limit any risk of slippages. The positive effects of a monetary union that is already founded on certain macroeconomic variables are well known. Alesina and Barro (2002), Alesina et al (2002), Debrun et al (2002)) rely on the Mundell model to show that a monetary union in transition may affect production, public finance, inflation and trade in the member countries of such union.

According to Talvi and Végh (2005), as a result of tax base instability, the budget authorities are subjected to socio-political pressure which forces them to increase their primary expenditure during periods of tax revenue expansion. This trend is prevalent in majority of ECOWAS countries. Hence, it is useful to assess the impact of these multilateral surveillance programmes with respect to the objectives of a monetary union. Guillaumont and Tapsoba (2010) conducted a study of WAEMU and CEMAC member states using the Talvi and Végh model, modified with the introduction of a multilateral surveillance constraint and a counterfactual of African countries which are not members of the two unions. They found that the creation of a monetary union will lead to the loss of control over monetary policy. This will prevent member countries from intervening fully in the stabilisation of economic cycles whose fluctuations could worsen in case of symmetrical shocks. However, in the case of ECOWAS, the predominance of raw materials in external trade and the limited intra-regional trade are major sources of vulnerability to external shocks. The impact of these shocks on economic policy targets in the economies of the sub-region has been analysed in many studies (Cashin and Patillo, 2000, and Olayiwola, 2000).

It has been demonstrated that if these shocks were identical for all the countries, they could form an Optimum Currency Area (OCA) and hence enjoy the benefits of a monetary union. Otherwise, the prospects of forming a monetary union would certainly not be bright. According to Lindert (1986), the impact of terms of trade shocks depends critically on the

nature of the shocks whose important role was highlighted recently as the source of economic cycles in two-country models (Backus et al 1993) or in a small open economy (Cardia (1991).

With respect to various methodologies useful to analyse convergence criteria, African Development Bank (2007) used a computable general equilibrium model framework. Their analysis shows that government relies on public debt to finance expenditures and this leads to a higher budget deficit and more consumption loss. Thus, budget deficit can be influenced by variations in public expenditures. Galí et al (2011) using Granger Causality econometric technique found the existence of a uni-directional causality that runs from budget deficit to inflation in Nigeria for the period 1970 to 2005. They also added that budget deficit leads to inflation through fluctuations in exchange rate in Nigeria and thus recommended the use of monetary to complement fiscal policy as well as more fiscal discipline at all levels of government.

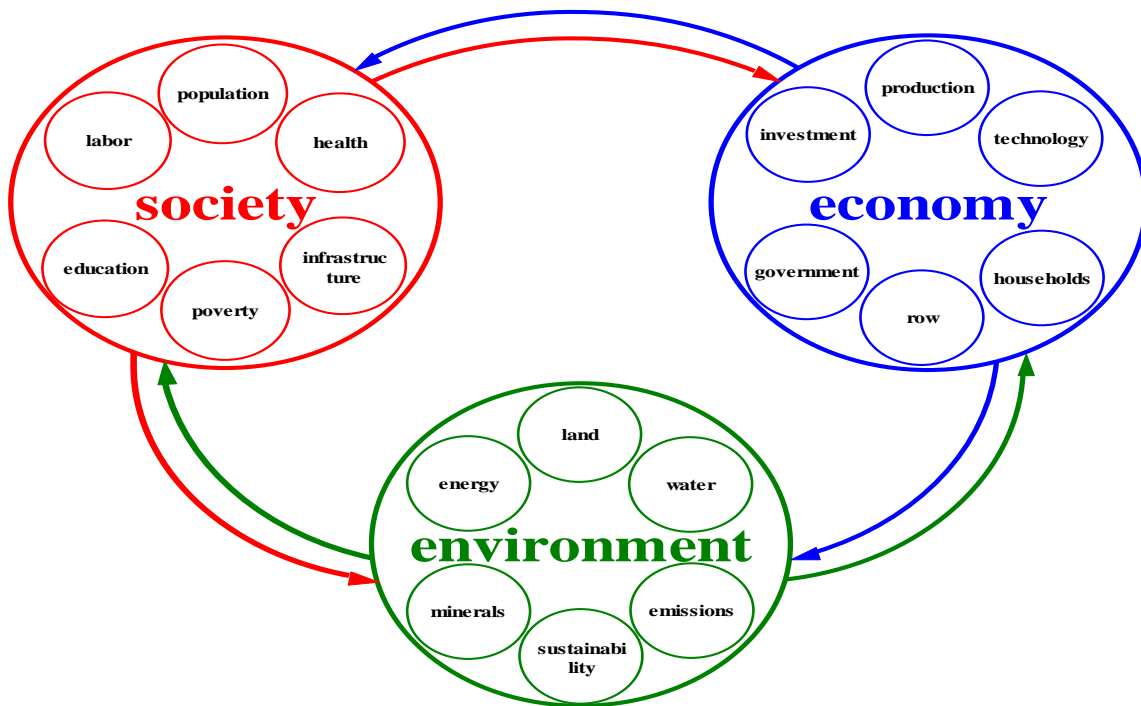
While many of these studies focused on the impact of convergence criteria on the economy, attempts have not been made to analyse the long-run impact of budget deficit on socio-economic development of West Africa. To address this issue, the system dynamics T21 model has the potential of providing empirical methodology. System dynamic T 21 model has been applied effectively in several countries like Jamaica, Ghana, Malawi, Mali, Indonesia and Cape Verde etc. In China, T 21 was customised in 2005 to examine the impact of rapid economic growth on resource demand and agriculture. The analysis showed that China being such a big player in the world economy, moderate shifts in import demand have the potential to have a huge impact on trade and demand on external resources. In Mali and Cape Verde, T21 was customised to support the development of the national poverty reduction strategy and in preparing a Poverty Reduction Strategic Paper. The model clearly determines the most effective use of aid and how to minimise the implementation costs.

4. Methodology

4.1 Threshold 21

The ECOWAS Threshold 21 (T21) model is developed by the Community Development Programme of ECOWAS Commission in collaboration of Millenium Institute, USA. The T21 is a comprehensive simulation model, and it is based on System Dynamics, a practical methodology to analyse complex systems (see Figure 1). It integrates economy, society and environment in a single framework. The model also shows the inter-sectoral linkages and interaction of these three development spheres.

Figure 1: Development Spheres of Threshold 21 Model



Source: Qu et al, 2011

It is very useful as it makes policy makers to understand the intricacies of independency of various world phenomena with cause- and effect- analysis. Hence, it also makes possible the manipulation of simulation models of alternative experimentation scenarios of various policy analyses. The T 21 model also represents a very good tool for understanding the implication of policy planning. It helps in analysing the cause and effect relationship that generates the outcomes of the simulation, so that the negative effects can be reduced while the positive ones can be amplified through the implementation of an optimized mix of policies

The Threshold 21 is a generic structure that represents development mechanisms and it covers a broad range of issues that countries all over the world face: from poverty to environmental degradation, from education to health, from economic growth to demographic expansions. In other words, T21 is designed to cover the most common long-term issues that countries encounter in the development process. As the model has very broad scope, it is particularly important to identify its boundaries, in order for any potential user to assess its suitability for analyzing the issues of interest. T21 is composed of 37 modules and these modules are grouped into 18 *sectors*: 6 social sectors, 6 economic sectors, and 6 environmental sectors. Sectors are groups of one or more modules based on their functional scope. For example, the water sector groups the water demand and water supply modules; and the education sector groups the primary education and secondary education modules (see Table 3).

Table 3: Modules, Sectors and Spheres of T21 SF

Society	Economy	Environment
Population Sector:	Production Sector:	Land Sector:
1. Population	14. Aggregate Production and Income	30. Land
2. Fertility	15. Agric.culture	Water Sector:
3. Mortality	16. Animal husbandry-fishery-forestry	31. Water demand
Education Sector:	17. Industry	32. Water supply
4. Primary Education	18. Services	Energy Sector:
5. Secondary Education	Technology Sector:	33. Energy demand
Health Sector:	19. Technology	34. Energy supply
6. Access to basic health care	Households Sector:	Minerals Sector:
7. HIV/AIDS	20. Households accounts	35. Fossil Fuel production
8. HIV children and orphans	Government Sector:	Emissions Sector:
9. Nutrition	21. Government revenue	36. Fossil Fuel and GHG emission
Infrastructure Sector:	22. Government expenditure	Sustainability Sector:
10. Roads	23. Public investment and consumption	37. Ecological footprint
Labor Sector:	24. Gov. balance and financing	
11. Employment	25. Government debt	
12. Labor Availability and Cost	ROW Sector:	
Poverty Sector:	26. International trade	
13. Income distribution	27. Balance of payments	
	Investment Sector:	
	28. Relative prices	
	29. Investment	

Source: compiled from T 21 Model

4.2 Method of Analysis

T 21 is highly flexible and can be easily adapted to address country specific issues during the model customization process. The customization is made possible because of training received and close collaboration with country and regional experts. In this study, in order to guarantee that the design of the model structure and calibration represent the local understanding of the socio-economic system, and therefore useful for simulation process, the analysis is carried out at two levels.

The first level involves the testing of the appropriateness of the T 21 model to replicate the historical data. The study carries out the analysis by checking the level of accuracy of the model in replicating the actual data in the period of 1992 to 2008. After the determination of the “degree of fit”, the study proceeds to second level that analyses the long term impact of budget deficit on selected economic development indicators stated in Vision 2020 and this is documented in Table 4.

Table 4: List of key indicators

S/No	Indicator	Justification
1.	Life expectancy	A life expectancy of not less than 70 years is the overarching objective of the social dimension of the NV20:2020 which is also in consonance with the MDGs
2.	Real GDP MP	Nigeria’s aspiration of being one of the top 20 economies by the year 2020 is by the size of its GDP (\$900 billion) and the per capita income (\$4000)
3.	Poverty	Poverty is key to the realization of the MDGS Goal 1 and the NV20:2020
4.	Unemployment Rate	Employment generation which is aimed at promoting greater output and reducing youth restiveness is one of the key tenets of the NV20:2020

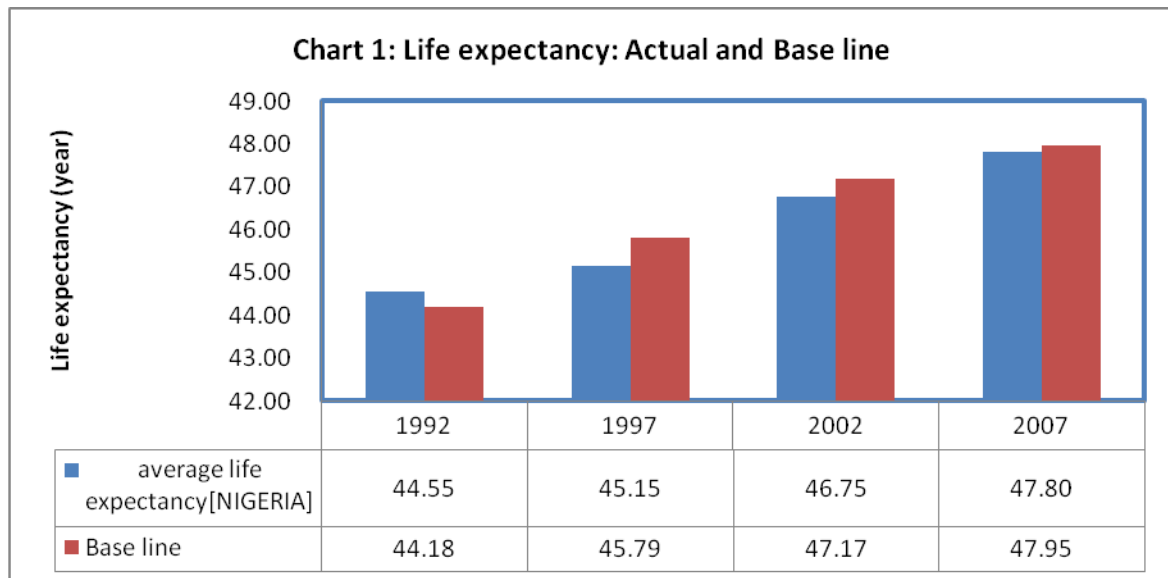
Following the approach of Qu and Barney (2002), the analysis is carried out by comparing the results for the baseline scenario and the result of alternative scenario. It is assumed that the past policy continues, and the scenario will show what is likely to happen till the year 2030 in Nigeria in areas like life expectancy, GDP, poverty and unemployment rate. The second is “results for alternative scenario”, which provide “what if” analysis for a number of alternative policy scenarios with specific emphasis on budget deficit/ GDP ratio.

5. Empirical Analysis

5.1 Analysis of Base Scenarios

In order to provide a reference for comparing alternative scenarios for meaningful analysis, the study first generate a Base scenario with T21. Data from the historical period of 1990 – 2008 are used to calibrate the model, adjust parameters, and modify the underlying structure to make sure that the real relations of history are tracked as closely as possible by the model’s structural relations. In doing this, results from the model may reveal data inconsistencies. By analysing the key factors in the Base scenario results of the model and the underlying historical data, it is possible to demonstrate the ability of the model to replicate the actual data. In this aspect of the analysis, we select variables like life expectancy, real GDP at market price, government revenue, poverty, total labour employment and adult literacy rate for the analysis.

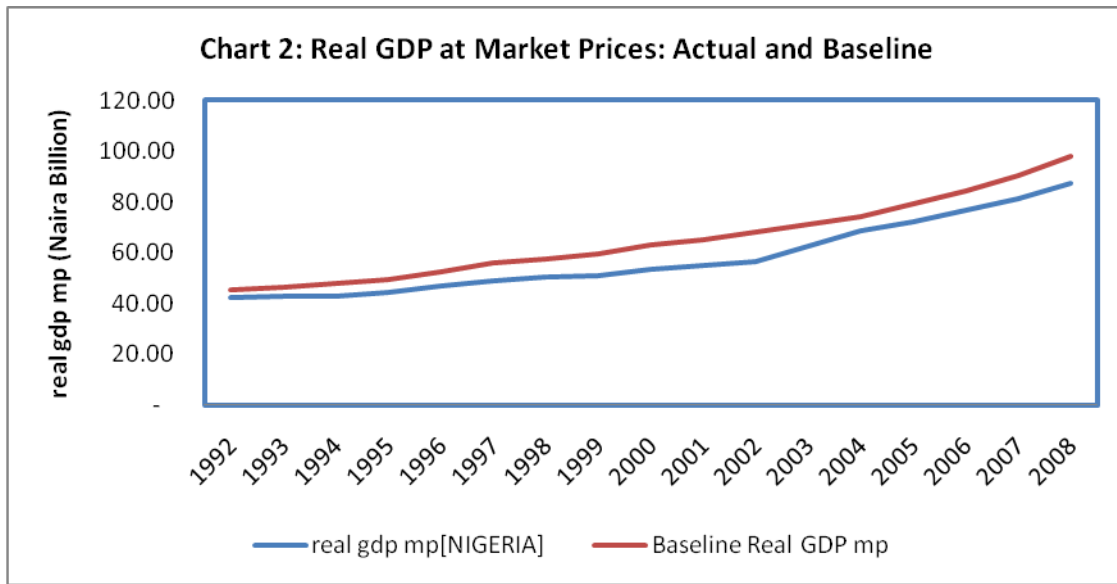
Figure 1b: Bar Graph of Actual and Baseline Data of Life Expectancy 1992 - 2007



Source: Computed by the author

The graph in Figure 1b shows the life expectancy for 1990 and 2008. The red bar represents historical data and blue represents the T21 model generated data. Comparing the historical data with the one generated by the model shows that the value generated by the model in was more than the actual data in 1992. The contrast was the case in the subsequent years. In the period of 2002 to 2007, the actual value of life expectancy was more than the one generated by the model.

Figure 2: Bar Graph of Actual and Baseline Data of Real GDP at Market Prices 1992 - 2007

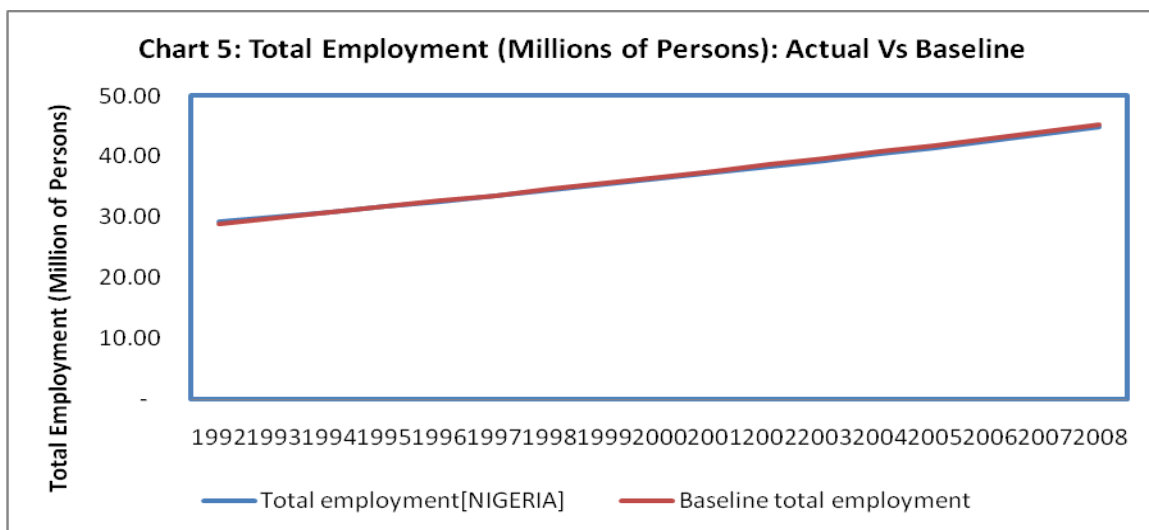


Source: Computed by the author

Figure 2 shows the trend of GDP at market price generated by the model and the actual data. The pattern is similar in terms of trend but there was a slight difference in terms of value. The gap between the two data was wide in the period of 2001 to 2003. Analyses of the slight mismatch between actual and baseline data set in Figure 3 revealed that the differences may be partly due to data inconsistency in Nigeria or the mis-specification of the structural equations of the model.

Among the variables considered, the data of total employment showed a perfect “fit”. Hardly can anyone notice the difference between the actual data and the one generated by the model as shown in Figure 3. One can categorically say that T21 model accurately generated the data of total employment in the period of 1992 to 2008

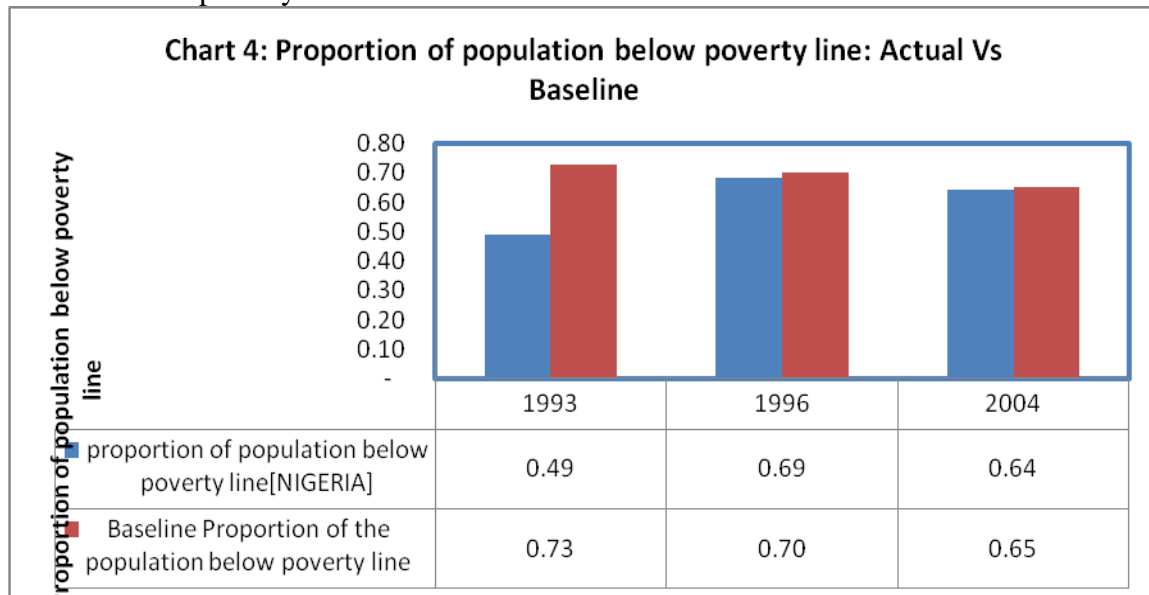
Figure 3: Bar Graph of Actual and Baseline Data of Total labour Employment 1992 - 2008



Source: Computed by the author

With respect to proportion of population below poverty line, there was a wide gap between the actual data and the one generated by the model in 1993. But in the years of 1996 and 2004, hardly can one notice any difference between the actual data and the one generated by the model as the two datasets were similar.

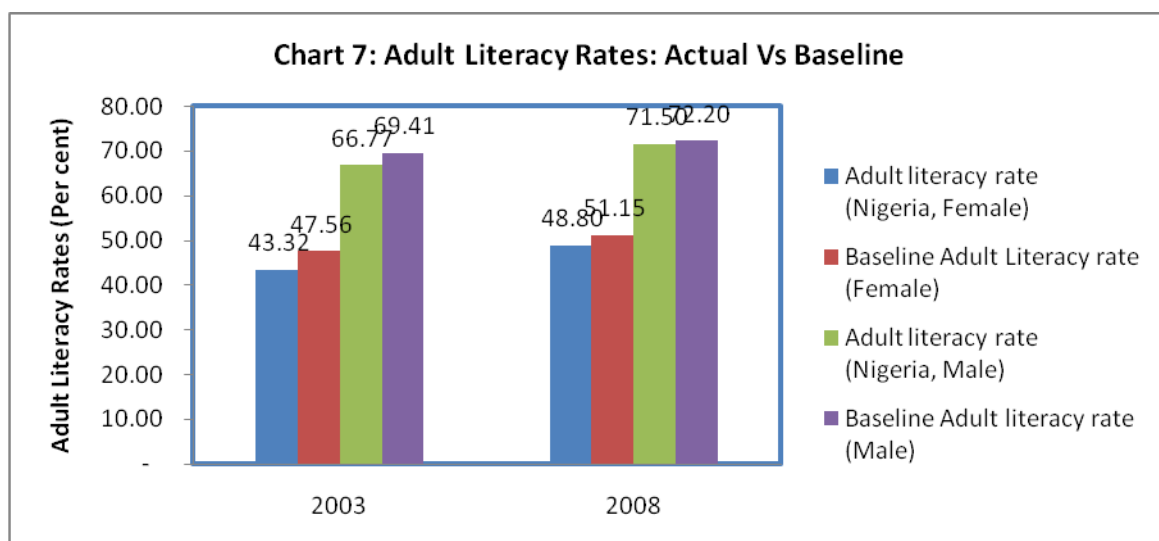
Figure 4 Bar Graph of Actual and Baseline Data of Proportion of People Living below poverty Line 1992 - 2008



Source: Computed by the Author

The data of adult literacy rate shows the same pattern like that of proportion of population living below the poverty line in terms of trend and values in the period of 1992 to 2008.

Figure 5: Bar Graph of Actual and Baseline Data of Adult Literacy Rate 1992 - 2008



Source: Computed by the author

This analysis clearly shows that while the T21 model performs very well in generating the data of some variables, and there is some divergence in the actual data and the value generated by the model for some variables. In essence, there is the need to take a critical look

at the data by checking the data consistency and accuracy in the process of customising T21 model in ECOWAS region.

5.2 Analysis of Budget Deficit and Economic Performance of Nigeria

This analysis illustrates how the model helps to identify direct and indirect effects of changes in policy variables. The analysis is based on comparative analysis of Fiscal Responsibility Act's budget deficit rate of less than 3% of GDP and ECOWAS convergence criteria that allows maximum rate of 4%. This analysis is also based on initial conditions and assumptions. Within the context of fiscal policy, it is assumed that domestic revenue as a percentage of GDP will be around 12.7% and government consumption as a percentage of government expenditure will be 52%. In terms of budget policy, budgetary allocation to education and health will be a constant of 19% and 22% respectively. The analysis expects budgetary allocation to infrastructure to be increasing from 23% in 2015 to 27% in year 2030. In terms of governance indicators, the study expect foreign investment as a percentage of GDP to be 28%, while the base Gini coefficient will be around 0.429 (see Table 5)

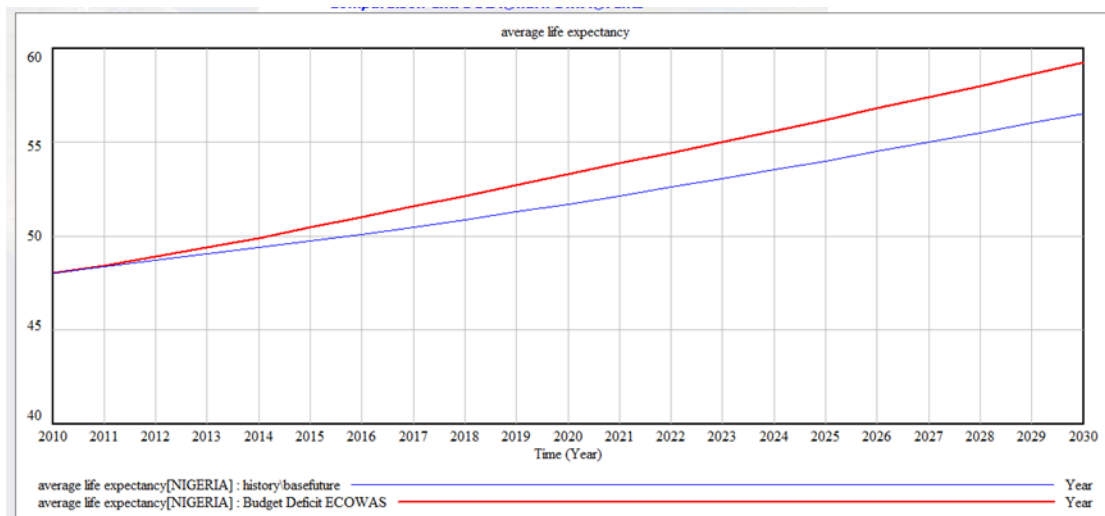
Table 5: Base run Data Used for the Analysis

	2011	2015	2020	2025	2030
Fiscal policy:					
• Domestic revenue as a fraction of GDP	0.13	0.13	0.13	0.13	0.13
• Government consumption as a fraction of Government purchases	0.51	0.54	0.52	0.52	0.52
Budget Policy:					
• Education expenditure as a fraction of social and economic services	0.19	0.19	0.19	0.19	0.19
• Health expenditure as a fraction of social and economic services	0.22	0.22	0.22	0.22	0.22
• Per capita admin expenditure	17	17	17	17	17
• Infrastructure as a fraction of social and economic services	0.18	0.23	0.24	0.27	0.27
Financing:					
• Overall fiscal deficit (-)/ surplus (+) FRA	0.02	0.03	0.03	0.03	0.03
• Overall fiscal deficit (-)/ surplus (+) ECOWAS	0.02	0.04	0.04	0.04	0.04
Governance:					
• Foreign investment as a fraction of GDP	0.028	0.027	0.027	0.027	0.026
• Base Gini coefficient	0.429	0.429	0.429	0.429	0.429

Source: Computed from the Nigerian Data

The first round of analysis deals with the impact of 3% budget deficit/GDP ratio on life expectancy. With baseline scenario, Figure 6 shows that life expectancy will increase from 48 years in 2010 to 56 years in year 2030. The result of alternative scenario of the increase in budget deficit/GDP ratio to 4 % will make the life expectancy to increase to 59 years. This improvement in life expectancy is traceable to possible increase in budgetary allocation to social services and infrastructure that follows increase in the ratio.

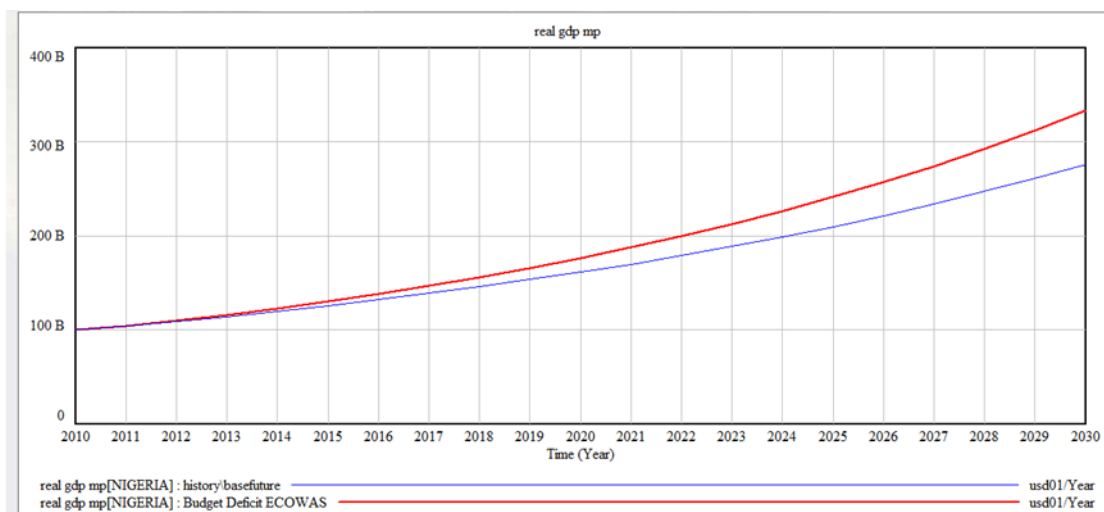
Figure 6: Line Graph of Baseline Data and Alternative Scenario Data of Life Expectancy 2010 - 2030



Source: Compiled from T 21 Results

The second analysis is on the impact of budget deficit/GDP ratio on real GDP at market price. In absolute terms, an increase in budget deficit/GDP ratio to 4% will make the GDP at market price to increase from N100 billion in 2010 to N192.66 billion in 2020 and further to N347.97 billion in 2030. The causal tracing analysis shows that the three sectors of the economy (Agriculture, services and industry) will witness a positive output growth thereby leading to increase in GDP. This increase in GDP is traceable to increase in industrial and services sector output that is more than that of agriculture. The causal tracing analysis shows that increased budgetary allocation to infrastructure will generate more output growth in industrial and services sectors compared to agriculture.

Figure 7: Line Graph of Baseline Data and Alternative Scenario Data of Real GDP at Market price 2010 - 2030

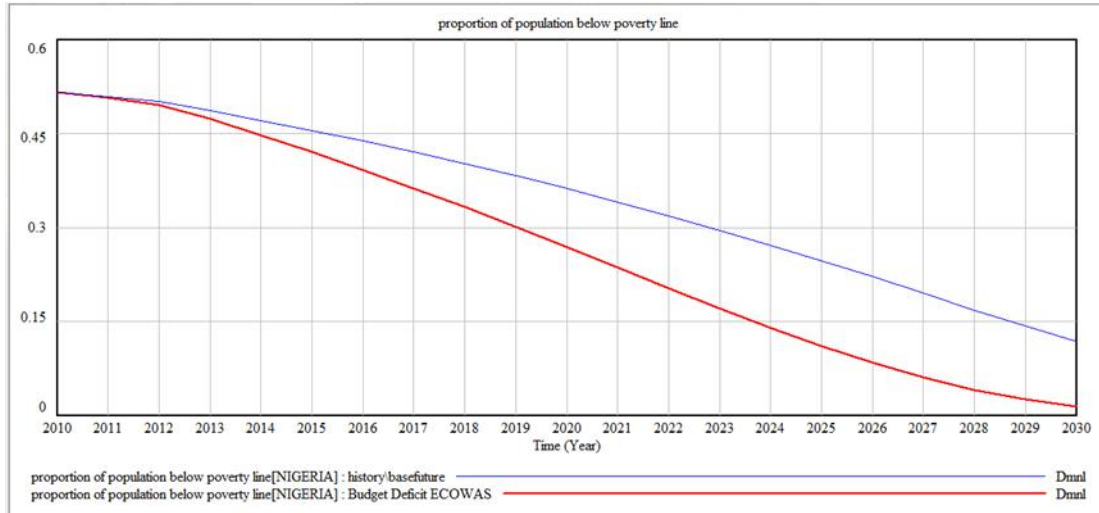


Source: Compiled from T 21 results

With the budget deficit/GDP ratio of 4%, the Nigerian economy is projected to grow at average rates of 5.78 % in 2011-2015, 6.27 % in 2016-2020, 6.19 % in 2021-2025 and 6.30

% in 2026-2030. These growth rates are below the double digit growth rate target for NV20:2020.

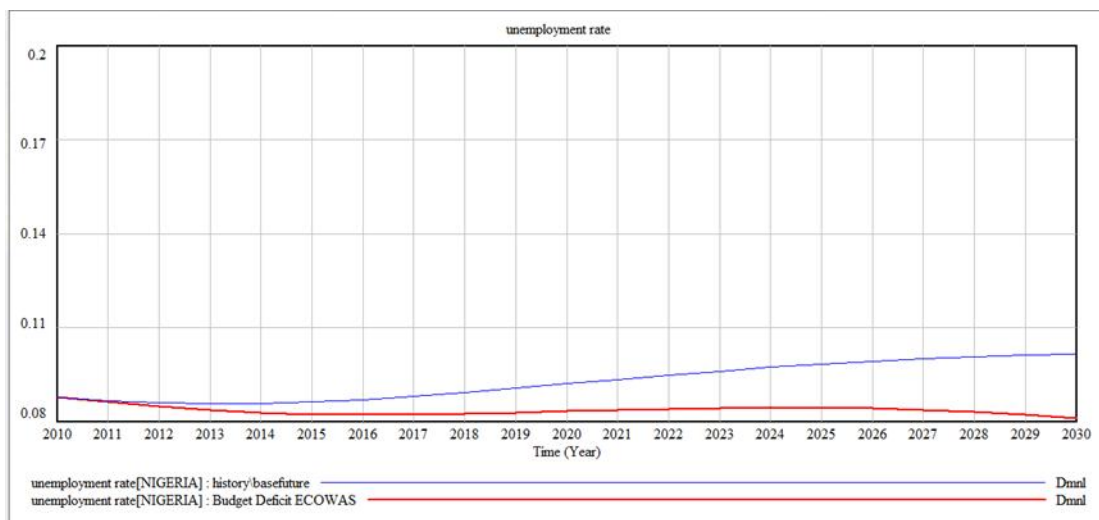
Figure 8: Line Graph of Baseline Data and Alternative Scenario Data of Proportion of population below Poverty Line 2010 - 2030



Source: Computed from T 21 result

One of the policy objectives of Vision 2020 is to reduce the poverty rate and unemployment rate in Nigeria. As shown in Figure 8, the increase in budget deficit to 4% will make the proportion of the population below poverty line to decline significantly from 37.08 % in 2015 to 27.85 % in 2020 and further to an insignificant level of 4% in year 2030. The causal tracer shows that the increase in the ratio enhances the disposable income of the people and this automatically translates to improved welfare.

Figure 9: Line Graph of Baseline Data and Alternative Scenario Data of Unemployment Rate 2010 - 2030



In Figure 9, the increase in budget deficit/GDP ratio to 4% will make the unemployment rate to fall to as low as 0.03% in 2030. The causal tracing analysis shows that more employment will be generated in services and agricultural sectors compared to that of industry.

5.3 Analysis of Alternative Budget Deficit Scenarios

The analysis involves an expansionary fiscal policy involving an increase in budget deficit/GDP ratio to 5.8% as happened in 2011 and it is assumed that the rate is maintained till year 2030. This rate becomes feasible because the achievement of Vision 2020 may force the country to go beyond ECOWAS convergence criteria level of 4%. This analysis will provide some insight into potential challenges facing the country in attaining this convergence criterion. This analysis is complimented by changing the structure of the economy and experiment with an increased expenditure on social services especially infrastructures. With the same indicators of economic development, we compare the impact of budget deficit-GDP ratio of 6% with that of base line scenario. As shown in Table 6, in 2011, the federal government spent 52% of social and economic services expenditure on infrastructure. The study also assumes that this share will increase to 65% in the period of 2015 to 2030 in line with Nigerian Vision 2020.

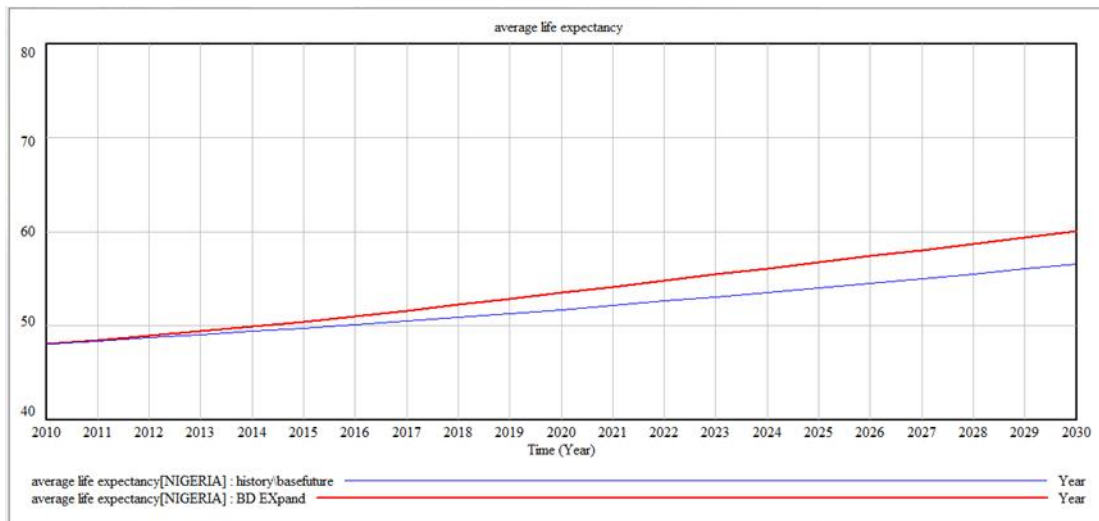
Table 6: Data used for Alternative scenarios

	2011	2015	2020	2025	2030
Fiscal policy:					
• Domestic revenue as a fraction of GDP	0.13	0.14	0.15	0.16	0.17
• Gov't consumption as a fraction of Gov't purchases	0.50	0.48	0.46	0.44	0.42
Budget Policy:					
• Education expenditure as a fraction of soc& econ services	0.21	0.23	0.25	0.27	0.29
• Health expenditure as a fraction of soc& econ services	0.24	0.20	0.20	0.20	0.20
• Per capita admin expenditure in US\$	16.99	16.98	16.97	16.96	16.96
• Infrastructure as a fraction of soc& econ serv	0.52	0.65	0.65	0.65	0.65
Financing:					
• Overall fiscal deficit (-)/ surplus (+)	0.03	0.04	0.04	0.04	0.04
•	0.03	0.06	0.06	0.06	0.06
Governance:					
• Foreign investment as a fraction of GDP	0.03	0.032	0.034	0.036	0.038

Source: Compiled from Nigeria Data

Though, the proportion of expenditures in all other areas will be reduced proportionally, but it will increase in absolute term. T21 will also take account of the construction delays and the added maintenance costs of the additional infrastructure in illustrating its impacts on various indicators of Nigeria's economic development. Infrastructure includes networks of transportation, communication, energy, and water. It is vital for economic development and quality of life, and it needs to be expanded in the right places to sustain more rapid growth. Infrastructure takes time to build, and once construction is completed, it needs maintenance.

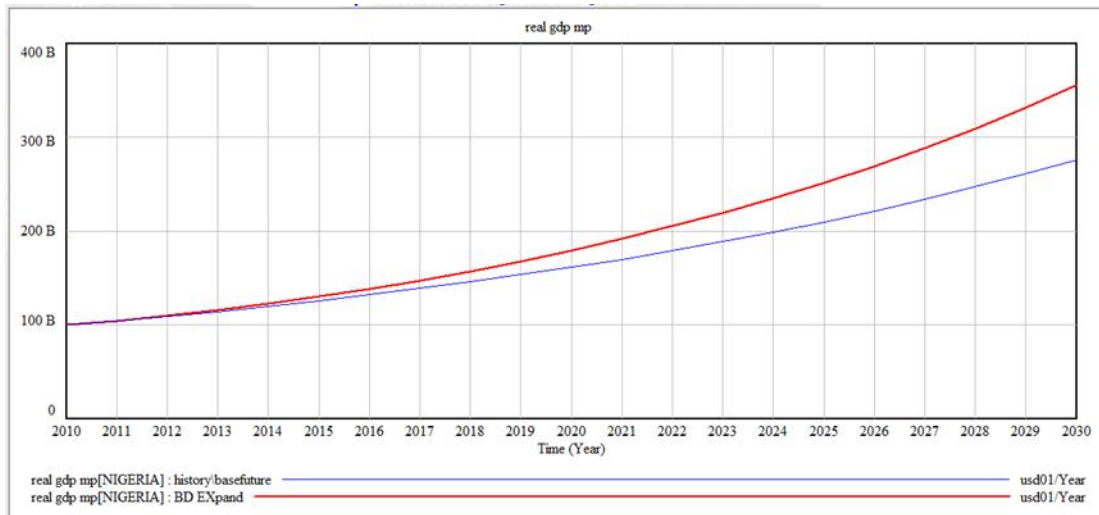
Figure 10: Line Graph of Baseline Data and Good Policy Scenario Data of Life Expectancy 2010 - 2030



Source: Computed from T 21

Figure 10 shows that despite an increase in budget/deficit ratio to 6% and significant increase in budgetary allocation to social services and reduction in government consumption, there will be a small increase in life expectancy to 60 year in year 2030. An increase in budget deficit/GDP ratio from 3% to 4% will generate an increase in life expectancy by additional 3 years in 2030. On the other hand, a further increase in the ratio to 5.8% will only lead to additional one year to life expectancy in the same year. The likely explanation that can be provided to this result is that high budget deficit tends to be inflationary instead of enhancing quality of life.

Figure 11 Line Graph of Baseline Data and Good Policy Scenario Data of Gross Domestic Product at Market Prices 2010 - 2030

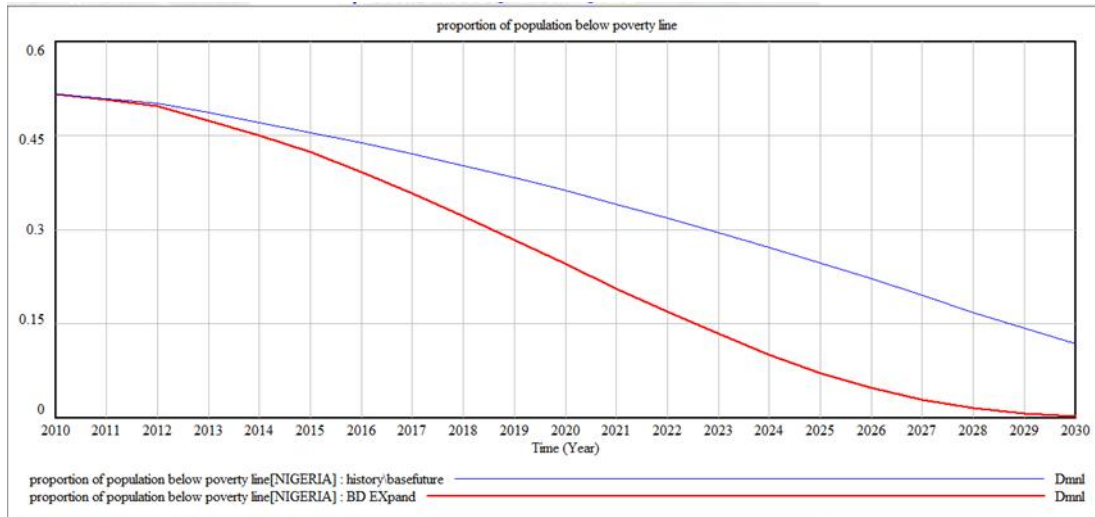


Source: Computed from T21

The trend in terms of GDP shows the same pattern as the economic growth will witness a small increase. Though, a double-digit GDP growth rate will be witnessed in the period of 2016 to 2030, but the growth rate is not as expected. Nigeria's GDP growth is projected to grow on annual average rates of by 6.22 % in 2011-2015 to 10.11 % in 2016-2020 and 10.25 % in 2026-2030. This increase is traceable to higher investments in infrastructure, human capital and domestic output

In terms of poverty, the proportion of population below poverty line is estimated to significantly reduce from 48.36 % in 2012 to 0.63 % in 2030. This may be due to increase in economic growth, foreign investment, expenditure in infrastructure and human capital development.

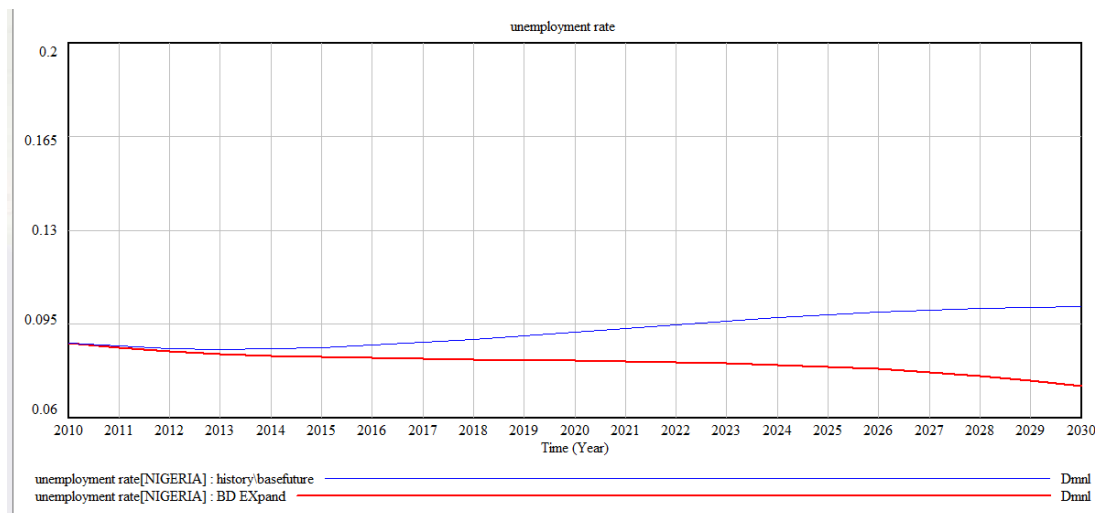
Figure 12: Line Graph of Baseline Data and Good Policy Scenario Data of proportion of population below Poverty Line 2010 - 2030



Source: computed from T 21

The Nigerian economy is projected to attain full employment with a total unemployment rate ranging between 3.84 % and 0.29 % in 2020 and 2030 respectively.

Figure 13: Line Graph of Baseline Data and Good Policy Scenario Data of Unemployment Rate 2010 - 2030



Source: computed from T 21 results

The analysis has clearly shown that increase in budget deficit/GDP ratio to 5.8% will generate a marginal increase in GDP and life expectancy but will have a significant impact on population living below poverty line as well as unemployment rate as the two indicators will fall drastically in year 2030.

6. Conclusion and Recommendation

The main focus of the study is the analysis of implication of budget deficit on socio-economic development challenges of Nigeria. Its main objectives are to test the applicability of T 21 model in analysing the convergence criteria of ECOWAS, and analyse the prospect of Nigeria in attaining the criterion of budget deficit/ GDP ratio of less or equal to 4%. To achieve these objectives, a system dynamic methodology using T 21 model of Nigeria is customised to carry out the calibration and the simulation exercises. The study finds that Nigeria PCM T 21 model performs fairly well in replicating the actual data in the year 1990 to 2008. It also shows that budget deficit is an expansionary fiscal policy instrument and it will lead to increase in real GDP. It can also be used to enhance socio-economic development as it will lead to increase in life expectancy as well as reduction in population living below poverty line and unemployment rate. As the major aim of Nigerian Vision 2020 is to achieve a sustainable socio-economic development, the policy choice of using higher budget deficit/GDP rate to enhance economic development may negate the principle of convergence criteria in achieving monetary union.

The study reveals that the T 21 model is a useful tool for strategy development and policy analysis. The model makes it possible to study mid- to- long term development issues from a comprehensive perspective. The T 21 model can be used to analyse the long-run potential impact of both primary and secondary convergence criteria on the development process of The study has shown that macroeconomic management is important and desirable for budget deficit to achieve the goal of single currency programme. Therefore, the peculiarities of member countries and development challenges of member states need to be put into consideration in the process of assessing their ability in achieving the convergence criteria. In Nigeria, the Fiscal Responsibility Act is a very good national policy because it complements the regional arrangement in terms of rate and objective. It will be a good policy advice if other member states can consider similar national policy.

This study is at a preliminary level because of technical and data deficiencies. The analysis is limited to issue of budget deficit due to inability to customise the model to capture other convergence criteria .The Nigerian version of T21 model needs review especially in the area of data. Particular attention should be paid to government revenue, so there will not be a mix-up between total federally collected revenue and retained revenue of the Federal Government. At the regional level, there may be the need to expand the monetary sector so that monetary variables can be included in the model.

In the process of customising T 21 for the analysis of convergence criteria, certain issues need to be considered. Looking at a typical example, it is highly likely that some would propose that the government should increase budget deficit to finance socio-economic sector. If we examine this proposal closely, there will be further issues, such as: What will be impact of this proposal on other convergence criteria. How would the deficit be financing?, is there a way of adjusting one criterion without affecting the others; and If budget deficit is increased, how can it be used to enhance economic development as well as fostering monetary stability?.

Each policy choice has its own benefits and costs, and all the issues are connected to one another, directly or indirectly, forming a complex web of results that evolve over time. Such a complex system could make constructive dialogues and compromise agreement among all stakeholders difficult, or even impossible. And it is similarly difficult for decision makers to make well informed and objective choices when faced with alternative approaches and

uncertainty about their outcomes. In the process of analysing all these complex issues, T 21 model is an appropriate methodology.

The T21 model should be considered as an integrated tool that helps stakeholders understand the full effects of their and others' suggestions because it demonstrates the results of different approaches across all sectors in a common and consistent framework. It provides direct comparison of overall consequences of the different proposals and thus enables more effective communication among the team members and compels them to think more broadly and in more depth. They not only propose their own ideas, but also have to think about all the possible side effects and feedback through other sectors. T21's transparency shows the results more broadly and encourages more thorough justification of proposals. It helps different stakeholders work out improved proposals that may reflect compromises to gain broader support.

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