

# Labour-Entrepreneurship Substitution Mechanism: Determining Growth, Employment and Wage in Nigeria

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**Abstract**— *Finding a recipe that unlocks rapid growth and job creation should be the priority of emerging economies. Several theories of growth, employment and wage determination were efficient for certain economies at different periods, but not for other emerging economies like Nigeria. This study presents the Labour-Entrepreneurship Substitution mechanism as an idealistic model of growth, employment and wage determination. It is uniquely designed to accumulate capital, substitute labour for entrepreneurship as prospective supply of labour grows beyond its initial level, boost employment and output via new investments. Error correction mechanism of Autoregressive least square technique was used to measure the influence of labour-entrepreneurship substitution rate on the 'new investment', and the t-statistics, adopting Benferron's multiple comparison adjusted probabilities was further used to measure the significance of the 'new investment' in determining gross domestic product in Nigeria. The labour-entrepreneurship substitution rate showed significant and positive impact on the new investment as the new investment also showed significant and positive impact on economic growth in Nigeria. Emerging and developed countries should develop the labour-entrepreneurship substitution as this will increase investment and output while creating full employment in the country.*

**Keywords**—*Employment, entrepreneurship, growth, labour, substitution, wage.*

## I. INTRODUCTION

Economic meltdown is usually characterized by decline in output, employment, standard of living and a rise in poverty level and hunger. This was evidenced in the great depression that followed the World War II, the global economic meltdown of 2008/2009 etc. Smart policy makers such as Lord Meynard Keynes, Rev. Thomas Malthus and others

worked hard to forestall such circumstances through the formulation of theories tailored to suit their economies. Unfortunately, this is not the case in Nigeria. The Nigerian economy has witnessed several recessions (SAP induced recession in 1986, Global economic meltdown in 2008/2009, and the current recession of the Muhamadu Buhari led Administration), yet its policy makers have not carefully articulated steps to model a pathway to sustained economic growth and development, and where smart policies, such as 'NEEDS' were developed, successive governments discontinue those policies for their selfish plans. On the contrary, according to BGL Research and Intelligence economic note (2011), when David Cameron admitted that the UK unemployment rate is disappointingly high, he indicated that his government desires to see faster growth in the economy. He maintained a certain level of continuity of his predecessor's policies. Although he took it for granted that when growth improves jobs are created, specific theories and policies should focus on output and employment generation. Similarly, leaders in developed and emerging economies have their eyes on the GDP growth figure as the leading indicator to decline in poverty incidence through reduced unemployment, increased household income and reduced inequality (BGL Research and Intelligence, 2011).

Despite the impressive economic growth over the last 10 years in Nigeria, unemployment and the incidence of poverty has worsened since the year 2004 (BGL Research and Intelligence, 2011). Nigerian economic statistics reveal a puzzling contrast between rapid economic growth and quite minimal welfare improvements for much of the population (World Bank, 2013). According to the bank, annual growth rates that average over 7% in official data during the last decade place Nigeria among the fastest growing economies in the world, while poverty reduction and job creation have not kept pace with population growth,

implying social distress for an increasing number of Nigerians.

Unemployment and underemployment has remained a major development challenge and an intractable problem facing most emerging economies, with ramifications for economic welfare, social stability and human dignity (Federal Ministry of Employment Labour and Productivity, 2003). According to the ministry, the employment and poverty challenges facing Nigeria are quite critical and there is an increasing awareness at all levels of Government, employer's and workers' organizations, of the urgent need for adequate responses and comprehensive approach to address the problems. World Bank (2013) strongly recommends that Nigeria finds a recipe to unlock rapid growth and job creation in a larger part of the country. Therefore, the objective of this study is to present the recipe that unlocks rapid growth and job creation (an Ideal pathway to boost output and employment) in emerging economies. The second section discusses the "Idealistic (mixed economy) theory of growth, employment and wage, section three, the methodology, section four discussion of findings, while the conclusion is presented in section five.

## II. AN IDEALISTIC THEORY OF OUTPUT AND EMPLOYMENT

### a. Assumptions:

- i. Labour mobility is controlled. Workers do not easily switch jobs. Therefore, there is no frictional unemployment.
- ii. Workers substitute labour for entrepreneurship ( $LE_s$ ).
- iii. Workers utilize some form of gratuity ( $kY$ ), wage-income savings ( $wY$ ), credits ( $c$ ), and tax incentives ( $t$ ) to raise capital ( $K$ ) for investments [Financial and real investments].
- iv. Workers increase earnings via financial investment ( $r$ ) or real investment ( $\pi$ ) or both ( $r, \pi$ ).
- v. Financial investors (FI) supply additional capital ( $K$ ) for real investments (RI).
- vi. Job matching is handled by an institution of government, controlling the activities of unions of labour and employers.
- vii. Unions exist but they lack independent power to match labour to suited jobs. However, they have full power to restrict job switch to relevant sectors for non members. They also provide suitable labour for job vacancies and vice versa.

- viii. Each category of labour belongs to a union of persons with peculiar skill and abilities.
- ix. Wage is determined by the interaction of labour supply and demand, and government (government determines the minimum wage, salaries of government policy makers and enforcers).
- x. Employers cannot easily lay off workers without paying some form of gratuity to laid off worker.
- xi. Technology complements labour. Technology here refers to the advancement in (or development of) capital intensive method of production (plants, machineries, computers, internets etc.) Government controls the technology-labour substitution rate.
- xii. Assumptions (i), (ii), (iii), (v), (vi), (x), and (xi) adjust to keep working population growth (labour supply) always lower than growth in investment.
- xiii. All agents are rationale (i.e. they all act in their individual best interest).
- xiv. There is no restriction to international trade and flow of capital ( $XcMc$ ). Real investors exploit international product market, while financial investors make international financial investments with relatively better credit rates. Firms' output and profit extends also to their ability to utilize internal market opportunities.
- xv. Government implements progressive tax system.
- xvi. Government utilizes tax revenues to compensate for changes in credit rates ( $iG$ ) for new entrepreneurs in the short-run, and for expansionary objectives ( $oG$ )
- xvii. This is a short-run model for period less than or equal to ten (10) years.
- xviii. Senior and more experienced workers leave employment before new workers. New workers take longer time to build capital from savings.
- xix. There is always a match (technology or labour) for every vacancy.
- xx. Government has perfect knowledge of vacancies and qualified persons. Therefore, no time is spent searching for job or qualified labour.
- xxi. Previous year investment income ( $IY_{t-1}$ ) influence current year's earnings ( $r_t, \pi_t$ ) via savings ( $s$ ).
- xxii. Government is an insignificant employer. The private sector absorbs the crux of the labour force.
- xxiii. Government imposes workers' welfare policies on employers.
- xxiv. Labour is highly specialized. Workers cannot switch to another kind of job or sector without

training/learning, which takes time (formally or informally). There is no on-the-job training.

- xxv. Entrepreneurship drives labour demand (Ld).
- xxvi. Population growth (g) drives labour supply (Ls).
- xxvii. Supply causes demand in the labour market.

### b. Earnings in the Labour-Entrepreneurship Substitution Mechanism

Here, we consider an ideal mixed economy model such as Nigeria, which is driven by the private sector and the government.

Therefore, earning on financial investment in the economy is modeled thus;

$$r = f[sY(k, w, I_{t-1}), t, \delta, XcMc] \quad (2.1)$$

Where,  $r$  = interest earning;  $s$  = savings;  $kY, wY$  = income from contract and wage respectively;  $t$  = tax incentive,  $\delta$  = depreciation [-ve] or appreciation [+ve] of money value (for financial investment,  $\delta$  could be -ve or +ve given the time value of money [inflation]),  $IY_{t-1}$  = previous year income, and  $XcMc$  = net international fund flows.

To make it linear,

$$r = skY + swY + sIY_{t-1} + t \pm \delta + XcMc \quad (2.1.1)$$

Earning from financial investment is determined by savings from contract income, wage income, previous year investment income, tax incentive to new financial investments (government decision to encourage new entrepreneurs by reducing or implementing a zero tax policy in the short-run), depreciation or appreciation of money value, and investment in international financial markets. The mechanism of adjusting the earning on financial investment in the labour-entrepreneurship substitution model is to increase savings on contract income, savings on wage income, savings on previous investment income, tax incentive on new financial investment, and increasing investment international financial markets. This is further explained in the equation below, using blue and red arrows;

$$r = skY(\uparrow) + swY(\uparrow) + sIY_{t-1}(\uparrow) + t(\uparrow) + XcMc(\uparrow) \pm \delta(\uparrow\downarrow) \quad (2.1.2)$$

Earning on real investment in is modeled thus;

$$\pi = f[sY(k, w, I_{t-1}), c, t, A, L, Ie, \delta, XcMc] \quad (2.2)$$

Where,  $\pi$  = profit;  $s$  = savings;  $kY, wY, c$  and  $t$  = same as in assumption (iii);  $IY_{t-1}$  = previous year income;  $A$  = technology (the use of machines, computers, robots etc.);  $L$  = labour;  $Ie$  = investment expenditure,  $\delta$  = depreciation of capital stock (for real investments),  $XcMc$  = international trade balance.

To make it linear,

$$\pi = sYk + sYw + sIY_{t-1} + c + A + L + XcMc - \delta - Ie \quad (2.2.2)$$

Earning from real investment derived from labour-entrepreneurship substitution is determined by capital accumulation savings from contract, wage, previous year investment income, credit from bank, technological input, labour, international real investment, depreciation of capital stock, investment expenditure (such as interest on loan, tax, expenses to acquire technology, and wage), and expenses incurred on international trade.

Therefore,

$$\pi = sYk + sYw + sIY_{t-1} + c + A + L + XcMc - \delta - e(A + L + t + Ii + XcMc) \quad (2.2.3)$$

Expanding the equation,, we have;

$$\pi = sYk + sYw + sIY_{t-1} + c + A + L + XcMc - \delta - eA - eL - et - eIi + eXcMc \quad (2.2.4)$$

Again this is a profit maximizing model for labour-entrepreneurship substitution. It replicates some features of classical model economy and Keynesian model economy. The mechanism of adjusting the earning on real investment in idealistic labour-entrepreneurship substitution model is explained in the model below;

$$\pi = p[sYk(\uparrow) + sYw(\uparrow) + sIY_{t-1}(\uparrow) + c(\uparrow) + A(\uparrow) + L(\uparrow) + XcMc(\uparrow)] - \delta(\downarrow) - e(A + L + t + Ii + XcMc)(\downarrow) \quad (2.2.5)$$

Where,

$$sYk + sYw + sIY_{t-1} \pm \delta = K \text{ (capital accumulation by financial investor)} \quad (2.2.6)$$

$$sYk + sYw + sIY_{t-1} + c - \delta = K \text{ (capital accumulation by real investor)} \quad (2.2.7)$$

Hence,  $Y = K + A + L$ , and  $R = pY$ . Where,  $Y$  is output, and  $p$  = price,

$$R = p(K + A + L + XcMc) \quad (2.3)$$

Therefore,

$$\pi = R - e \quad (2.4)$$

Where,  $R$  = Revenue;  $e$  = Expenditure/Cost; and  $\pi$  = Profit. In order to increase earning ( $\pi$ ) at full employment of factor inputs, the firm may increase price of goods or reduce cost of factor inputs or try to maintain an optimal balance between increased production and minimized cost, while market price of goods remain stable. Firms' revenue and profit also extends to their ability to utilize internal market opportunities.

### c. Output in the Labour-Entrepreneurship Substitution Mechanism

The idealistic economy model causes an increase in output, driven by the labour-entrepreneurship substitution. The theory explains that senior and more experienced workers retire to entrepreneurship, having accumulated capital from wage, contracts, credit from banks, and having favourable policies from government. Some retire to financial investments, supplying more capital for other workers who

retire to real investment. This will increase aggregate output and employment. The growth model below is a mixture of Solow's output model and Keynesian growth model. Particular attention is given to the accumulation of capital and specific government intervention in encouraging investment in the financial and real sectors of the economy. The model, which is effective in the short-run, explains private sector factor inputs, government intervention in private sector, government input in aggregate output, and the international sector. The model is derived below;

$$IY_{L-E} = f(K, A, L, G, XcMc) \quad (2.5)$$

To make it linear,

$$IY_{L-E} = K + A + L + G + XcMc \quad (2.5.1)$$

Where,  $IY_{L-E}$  = Output derived from labour-entrepreneurship substitution;  $K$  = capital accumulated;  $A$  = Technology (complements labour at a controlled rate);  $L$  = labour; and  $G$  = government intervention in private sector;  $XcMc$  = net international trade and capital flows. In (3.5), Investment income (output) derived from labour-entrepreneurship substitution depends on capital, technology, labour, and government intervention. Capital is accumulated from various income sources. The capital accumulation with government intervention is a modification of (2.2.6) and (2.2.7).

Therefore, government intervention modifies the model thus;

$$K = sY(k + w + I_{t-1}) + iG + t \pm \delta \quad (2.6.1)$$

$$K = sY(k + w + I_{t-1}) + c + iG - \delta \quad (2.6.2)$$

Furthermore, considering that a part of the international fund flow is illegal ( $Ilk$ ) and does not depend on world and local interest rates but generally, on the weakness of national security, and specifically, the financial sector security. When an increasing number of illegal businesses, such as drug businesses, human trafficking, money laundering etc emanate from a country, it could suggest a life style or value system of a people. While this is detrimental on the exploited nation, it forms capital accumulated for investment in the host nation. Therefore, capital accumulation includes the illegal funds, acquired from foreign countries and invested in host country.

$$K = sY(k + w + I_{t-1}) + Ilk + iG + t \pm \delta \quad (2.6.3)$$

$$K = sY(k + w + I_{t-1}) + c + Ilk + iG - \delta \quad (2.6.4)$$

Capital ( $K$ ) is derived from savings from contract, wage and previous year investment income, credit from bank and government compensation of the change in credit rate and depreciation of capital stock (for new real investments) and tax subsidies and depreciation/ appreciation of money value (for new financial investments). Equations (2.6.1) and (2.6.2) explains government tax subsidy to encourage new financial investment, and government compensation for change in credit rate to encourage new real investment.

$$G = f(iG, oG) \quad (2.7)$$

$$G = iG + oG \quad (2.7.1)$$

Where,  $iG$  = government compensation for the change (if any) in credit rate;  $oG$  = other government expenditures to achieve desired macro objectives. The model therefore becomes;

$$IY_{L-E} = sY(k + w + I_{t-1}) + c + iG + t + A + L + oG + XcMc \quad (2.5.2)$$

Imputing the short-run time factor into the model;

$$IY_{L-E} = sY(k_t + w_t + w_{t-n} + I_{t-1}) + c_t + c_{t-n} \pm \delta + i(G_t + G_{t-n} - c) + t_t + t_{t-n} + A_t + A_{t-n} + L_t + oG_t + XcMc_t \quad (2.5.3)$$

Where,  $n \leq 10$  years [short-run period].

#### d. Employment and Wage Determination in the Labour-Entrepreneurship Substitution Mechanism

The labour-entrepreneurship substitution mechanism is designed to create vacancy in existing firms for the increasing supply of labour as well as create new entrepreneurship to absorb more labour. The market is not saturated with competing entrepreneurs because investors take advantage of the opportunities in the international market to expand their coverage and sell their products. This substitution mechanism shifts labour demand curve outward, causing a shortfall in supply of labour. This shortfall is complemented by advancement in technology (which, according to assumption 'xi' is controlled by government). When there is an outward in the supply of working population, the mechanism works to bring the market to equilibrium or in favour of labour supply over demand. The mechanism gradually sets in as government anticipates growth in population (labour supply).

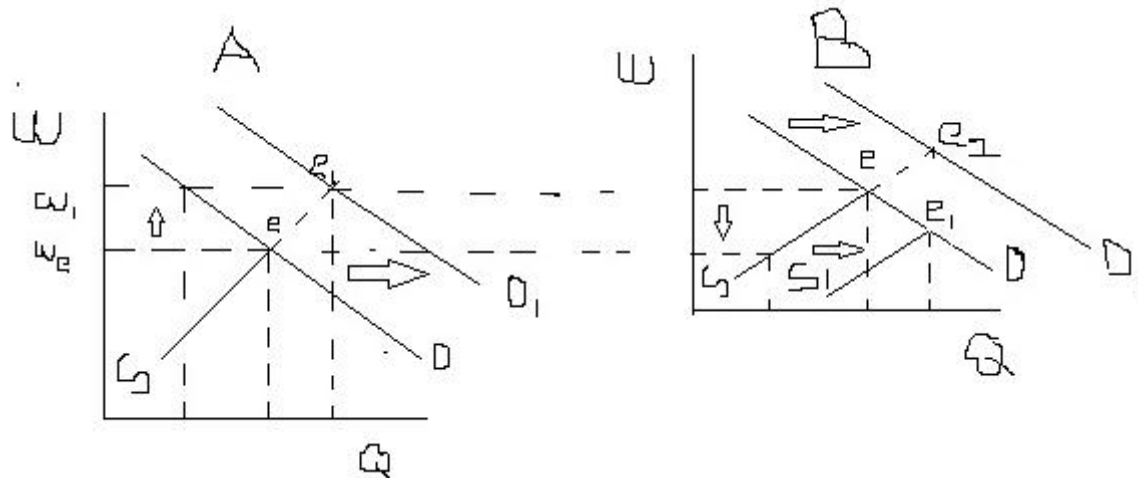


Fig. 1.

Fig. 1 shows wage determination and mobility of labour in example A & B. Wage is determined by the interplay of labour demand and supply. Notice that an outward shift in labour supply ( $S_1$ ) in example B caused wage to decline from initial equilibrium ( $e$ ) to the new equilibrium ( $e_1$ ). However, labour supply is less or equal to labour demand. This is achieved by the labour-entrepreneurship substitution mechanism. This decline in wage due to an outward shift in labour supply may cause workers in sector (B) to desire to move to sector (A), with higher wage ( $w_1$ ). Nevertheless, they remain in their current employment until the government institution matches them with suitable job vacancy in the sector (A). Secondly, given that jobs require specialization, requires training, which takes time, and the fact that workers would have to start at a lower level compared to his/her current position, discourages perfect mobility of labour

Furthermore an outward shift in demand in sectors A or B caused a shortfall in supply and a rise in wage level ( $w_1$ ). This was complemented by technology advancement until labour supply rose to ( $e_1$ ) in sector A and ( $e_2$ ) in sector B. Note that the rate of technology substitution for labour is influenced by government as priority is given to labour over technology in the mechanism. This is also explained in the model below;

$$E = f(g, I, LE_s, iG, A, c) \quad (2.8)$$

Employment in this mechanism is derived from population growth ( $g$ ), Investment ( $I$ ), labour-entrepreneurship substitution ( $LE_s$ ), government compensation for incremental change in credit rate ( $iG$ ), technological advancement ( $A$ ), and credit from bank ( $c$ ). Labour-Entrepreneurship substitution is further derived from interest earnings derived from financial investments and investment income derived

from real investments (respectively derived from labour-entrepreneurship substitution). This is shown below;

$$LE_s = rY_{L-E} + IY_{L-E} \quad (2.9)$$

Therefore, unemployment tends to zero if the following conditions are satisfied;

$$U \rightarrow 0 = g (\downarrow) + I (\uparrow) + LE_s (\downarrow) + iG (\downarrow) + A (\uparrow) + c (\downarrow) \quad (2.8.1)$$

or

$$U \rightarrow 0 = g (\uparrow) + I (\uparrow) + LE_s (\uparrow) + iG (\uparrow) + A (\downarrow) + c (\uparrow) \quad (2.8.2)$$

Furthermore, wage is determined in the model below, considering the assumption;

$$w = f[g, I, LE_s, iG, A] \quad (2.10)$$

The mechanism therefore is;

$$w (\uparrow) = g (\downarrow) + I (\uparrow) + LE_s (\downarrow) + iG (\downarrow) + A (\uparrow) \quad (2.10.1)$$

or

$$w (\downarrow) = g (\uparrow) + I (\downarrow) + LE_s (\uparrow) + iG (\uparrow) + A (\downarrow) \quad (2.10.2)$$

$LE_s + iG$  represent new investments. Population growth ( $g$ ) represents supply of labour; while investment level ( $I$ ) represents labour demand.

### III. METHODOLOGY

Ex-post facto research design was used to measure the impact of labour-entrepreneurship substitution rate on investment (boosted by the substitution rate) in Nigeria [i.e. the investment was derived as a function of interest rate and substitution rate]. Error correction mechanism of an Autoregressive least square technique was used to measure the influence of labour-entrepreneurship substitution rate on the 'new investment'. The 'new investment' value ( $IL-E.S$ ) was tested for its determinant of economic growth in Nigeria using the t-statistics, adopting Benferron's multiple

comparison adjusted probabilities and correlation analysis. Prior to the test, the labour-entrepreneurship substitution rate was determined by subtracting the growth rate of the gross domestic product from the growth rate of total labour force. The difference was added to the unemployment rate. **Therefore, the substitution rate is the rate at which investment must grow beyond that, which is determined by interest rate in order to clear unemployment and cause growth in output in the country via the labour-entrepreneurship substitution. This can also be considered as the rate at which employed labour must substitute for entrepreneurship/investment in order to create employment and increase output.**

Furthermore, the investment derived from labour-entrepreneurship substitution mechanism (using the substitution rate) was added to the original investment derived as a function of interest rate to arrive at the new investment scale (IL-E.S). The values of gross domestic product, total labour force, investment, unemployment rate, labour-entrepreneurship substitution rate and the new investment value (IL-E.S) are presented in the appendix. **The negative values of the L-E.S rate, less than zero, represent the rate at which technology must grow to complement the shortfall in labour input** (i.e. the rate at which effective labour must grow to maintain the growth in output), while the positive rates, greater than zero, represent the L-E.Sr (i.e. the rate at which labour must substitute for entrepreneurship). Data were sourced from various institutions. The gross domestic product, investment (which is the sum total of all credit to private sector and credit to all tiers of government) was sourced from the Central Bank of Nigeria (CBN) statistical bulletin, total labour force was sourced from United Nations Conference on Trade and Development (UNCTAD), and unemployment rate in Nigeria was sources from the International Labour Organization (ILO). The values of GDP growth rate and growth rate of total labour force were calculated using the growth rate formula.

$$(Y_2 - Y_1) / Y_1 \quad (3.1)$$

We hypothesize that boosted investment is not significantly influenced by labour-entrepreneurship substitution rate and previous year boosted investment.

The basic model which tested the impact of labour-entrepreneurship substitution rate on the new investment (IL-E.S) follows;

$$LNILES = b_0 + b_1 * LESR + b_2 * LNILES(-1) + b_3 * RESID(-1) + e \quad (3.2)$$

Where,

LNILES = Log of new investment boosted by LESR

LESR = Substitution rate

LNILES(-1) = lagged value of the dependent variable [AR(-1)]

RESID(-1) = lagged value of the residual (error correction term)

e = the residual of error term

b<sub>0</sub> = constant

b<sub>1</sub>, b<sub>2</sub>, b<sub>3</sub> = parameter estimates (variable coefficients)

#### IV. DISCUSSION

The ADF unit root test showed that the Nigerian gross domestic product at 2010 constant basic prices, as reported by the Central Bank of Nigeria in her 2014 Statistical bulletin was stationary at the second order of integration. Labour-Entrepreneurship substitution rate was stationary at the first order of integration. The new investment (ILES) was stationary at order of integration (1), while log of new investment (LNILES) was stationary at integration order (1) (see appendix 5). A cointegration test of the Johansen method confirmed that the variables were cointegrated (see appendix 6).

The result of the error correction model (see appendix 1) showed that the labour-entrepreneurship substitution rate (LESR) and the auto regressive function of the new investment (LNILES<sub>t-1</sub>) significantly determined the current new investment (LNILES). Furthermore, the variables had positive impact on the dependent variable. It is therefore evident that previous year's value of the new investment significantly influences current year's investment. Both variables individually and jointly influenced current value of the new investment. The result further implies that the substitution rate significantly creates sufficient investment that absolves the unemployed labour and grows the economy optimally. However, the adjustment in the residual to equilibrium was not significant in 28 years, given the 55% speed of adjustment and due to the autoregressive function. Serial correlation was not noticed in the result and the residual had a constant variance (see appendix 2 & 3). Therefore, the result can be relied for policy forecast.

The extent of determination of the new investment (ILES) on Nigeria's economic growth was measured using the t-statistics and correlation. It was discovered, using Bonferroni's multiple comparison adjusted probabilities of covariance analysis that the new investments significantly determined output (GDP) in Nigeria. The correlation showed that the new investment has 95.98% positive relationship with the gross domestic product in Nigeria and a coefficient of determination of 92.13%, holding other determinants constant (see appendix 4).

Following the findings of the study, we reject the null hypothesis and conclude that new (boosted) investment is significantly influenced by both the labour-entrepreneurship substitution rate and previous year boosted investment.

## V. CONCLUSION

This study tries to answer certain questions of output, employment and wage determination in a mixed economy such as Nigeria. Although idealistic, its assumptions are attainable and can be adopted to solve the problem of low output and employment. The central theme of the theory is the Labour-Entrepreneurship substitution mechanism. Specifically, the theory developed the capital accumulation model, short-run growth model, and wage and unemployment adjustment mechanisms. The theory utilized some form of gratuity payment as part of the capital accumulation model. The study is crucial in boosting output and employment in developing and developed nations as well as aid developing countries such as Nigeria to recover from recession and boom again. There is need for policy adjustments in order to implement the mechanism.

Given the findings, the study recommends that developing and developed countries build the labour-entrepreneurship substitution mechanism in their growth model as this will increase output as well as create employment that sufficiently absolve the unemployed in the country.

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