Charles Ng'iendo

GDP Growth & Poverty Reduction

Effects of economic growth on poverty prevalence

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1   Introduction

1.1   Background of the study

Research shows that in the United States in 1965 the top 1% controlled about 10% of the Nation's after tax income. That figure has grown to over 15%. The pay ratio (between a CEO and worker) was at 20:1 in 1965 to a shocking 312:1 in 2017 with nothing to show on middle-class real wage growth.[1] (Travers, 2019)

The above analysis does not mean that the United States' economic growth, measured by its *Gross Domestic Product* (GDP), has declined; in fact, the Country's economic growth has experienced a lot of improvements since 1965. But as the growth "takes off", a percentage of the population is often left behind. The gilded age, 1870 – 1910 was marked with the highest wealth inequalities and thus income inequalities. Wealth is viewed as the value of capital assets (which is cumulative over time) while income is the amount made within a certain period, as wealth grows so as the income from that wealth; a well invested income gradually turns into wealth.

The two main drivers of divergence are identified as labour and capital[2] (The Economist, 2014). Income from labour, rewards top managers - thus larger share of income. This might be as a result of market recognition of value. On the other hand, Capital focuses on returns from investments. If **R**eturns (from capital) are greater than **G**rowth (Economic growth; from salary, income from labour), automatically there will be income disparities; **r (**Returns**) > g (**Growth**).**

The World is marked with extreme inequalities. The effects of income differences are tremendous and are evident in every society of the World affecting people's daily lives, interactions, capabilities as well as empowerment. The effect is heavily felt by the population living in extreme poverty.

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[1] Mark Travers, 2019

[2] Thomas Piketty, Capital in the Twenty First Century (see Piketty 2014)

The claim that economic growth reduces poverty has been the narrative for a while in some quarters, while to some it is just a mere mythical statement. Though economic development is viewed as the way to solution, it is a very complicated concern as many economies have experienced progress economically but with less to show as far as poverty reduction goes. The question one might ask would be; *does economic growth reduce poverty?*

This Thesis intends to empirically look at the correlation between poverty and growth, from two existing approaches. The view that economic growth reduces poverty assumes that economic growth creates conducive conditions and opportunities for individuals to graduate out of poverty. The alternative attitude says NO, economic growth does not reduce poverty, this doesn't contest the impact of growth on poverty; it is just one of the variables within the complex equation.

Recent economic studies are pointing to three major concerns as causes of declining wages and rising inequality; trade, technology and institutions. The existence of various theories makes it difficult to name the actual causes of inequality. The inequalities within the labour market are as complex in understanding as their outcomes. Technology-and-education concern of the three causes of inequality is the most notable, as mentioned earlier on; market recognition of value focuses on rewarding workers with high levels of education and skills. The markets today are more knowledge and information based, more and more the world is moving off the capital-intensive era where more emphasis goes to these with skills required by various sectors of the economy.

"The World Bank remains committed to achieving the goal of ending extreme poverty, defined as living on less than $1.90 a day, by 2030. The share of the world's population living in extreme poverty fell to 10 percent in 2015, but the pace of extreme poverty reduction has slowed, the Bank warned on Sept. 19." (World Bank, 2018)

Poverty reduction is of great global concern, the policies and measures to be taken in order to attain equity is on top of almost every government's manifesto.

1.2   Research Question

Does economic growth reduce poverty?

1.3   Study Objectives

The objective of this study is to assess the relationships among the governance indicators, the economic growth and the poverty indicators. This Thesis shall therefore examine the relationship between economic growth and extreme poverty in a selected country.

It is of great concern when several countries experience a great rapid growth in per capita GDP with record high in huge levels of poverty. The goal of this paper is to empirically demonstrate whether economic growth has an impact on extreme poverty reduction. Several relevant theories shall be examined; the theory of Dual Economy – dual structures and human capital on any possible effect on the coexistence of growth and poverty prevalence. To explain the complexities in poverty reduction, the analysis will be demonstrated by the case of Indonesia. Indonesia has made progress in areas vital to growth and stability, such as political, structural and economic reforms.

1.4   Methodology

This thesis will investigate the correlation between economic growth and poverty reduction by comparing the economic development in a selected country from low-and-middle income countries globally over a period, 1998-2016 (the selection is specific on a country with enough data to support the investigation). Econometric cross-sectional regression analysis will be conducted. In the model, the dependent variable will consist of yearly percentage change in poverty, using the headcount ratio. The independent variables include economic growth, level of poverty, initial level of GDP per capita, mean years of schooling / education, employment in industry, and public spending on education. In order to empirically carry out the analysis, the World Bank, UNDP and PovcalNet[3] (World Bank, 2019) shall be the main source of the secondary data on which the analysis shall be based.

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[3] PovcalNet, 2019: PovcalNet is an online analysis tool developed by the World Bank

1.5   Scope of the Study

This thesis focuses on measurable, quantitative dimensions of poverty to facilitate comparison from regression. The paper shall only look at the absolute[4] poverty measures. Matters of income distribution and relative poverty would be of great importance but for the purpose of the study, absolute poverty would be the main concern.

The concern of this study is on the relationship between absolute poverty and GDP per capita growth. High income countries aren't part of this study as some variables are different in comparison and analysis. The aim of the empirical analysis is to explain the coexistence of poverty and growth, where the theory of dual economy is also raised. The focus will be on the flows of labour and output between the sectors within a Country. The next chapter comprises the case of the Republic of Indonesia followed by regression analysis.

1.6   Thesis Structure

Previous studies shall form part of the first section of the study related to the research question and available relevant theories. The theoretical part then forms the groundwork of this thesis.

Poverty, its meaning and measure are then explained in the following section followed by description of the theory of dual economy. A human capital model is also included forming a connection between poverty and growth. The case of Indonesia shall be more comprehensive in our analysis.

Afterwards, empirical analysis shall present the regression model through data and specification for the chosen variables followed by the results. The document shall then end up in a conclusion, after which is the list of references and relevant appendices.

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[4] Absolute Poverty- measures poverty in terms of money needed to meet basic needs

2   Relevant Studies

Nora Lustig started by asking very fundamental questions with regards to economic growth and poverty eradication; "But where should countries begin? Should they set their sights entirely on boosting per capita income and productivity, or focus on actions to improve conditions for the poor?" (Lustig, 2017)

"…In sum, economic growth is a crucial factor in poverty reduction, but the level of inequality and its evolution affect its impact on poverty. We now offer theoretical and empirical evidence suggesting that the causation runs in the opposite direction as well; that is, reducing poverty can help boost economic growth rates…" [5] (Lustig, 2017)

The author cites the importance of average growth in reducing poverty, showing concern on how pro-poor initiatives in turn can propel economic growth. There is also an indication that how quickly economic growth reduces poverty depends on the initial income distribution and how it evolves over time. An unequal distribution at an early stage translates into poverty at a later stage. An example of Latin America and the Caribbean demonstrates some of the World's widest income disparities.

The income distribution shifts as the economy grows also contributes to how efficiently growth can contribute to poverty reduction.". In Mexico, for example, per capita real income rose by 4.8 percent annually between 1996 and 1998, but there was virtually no change in extreme poverty. Yet in Costa Rica, where per capita real income edged up by barely 1 percent annually between 1990 and 1998, poverty was reduced significantly.…" (Williamson, 2009)

There are other factors of great importance but as per this study we shall focus more on one element – *Human Capital Development*: this in its broadest sense comprises people's educational attainment, their health and nutrition (calorific consumption). More schooling and better nutrition with higher income and enhanced productivity are of great importance in curbing poverty. Education is known for its positive externalities, where an educated mother can positively influence her children to acquire education thus improving human capital in the family.

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[5] Nora Lustig, UNU WIDER – Poverty Reduction and Economic Growth

The author of the material also mentions the aspect of Investment Capacity Constraints. Investment is identified as a critical component for growth, growth that would eventually allow an individual to escape out of poverty. The poor usually end up locked out of the lending market, with limited or no access to credit. The fact that they are unable to come up with their own capital to invest renders them incapable. The poor are also familiar with another component in the lending market, the sharply rising transaction costs and high interest rates that make credit a losing proposition.

"An analysis of various microfinance institutions showed that those that are financially sustainable have nominal interest rates ranging from 30 percent to 50 percent." (Lustig, 2017)

Any intended move for the development of financial institutions and services customized to serve the needs of the poor are effective contributors to economic growth in general. Subsidies have been considered major contributors to fixed cost reduction in capital acquisition.

"Poverty and Development" is the title of the issue published by the World Health Organization (WHO). The author highlights the importance of human development index in the fight towards poverty reduction. In his findings, he narrates that the existence of abject poverty in many parts of the world is associated with low human development, lowering the mean values of development measures. (Fosu, 2007)

Poverty headcount ratio remains the main indicator of income measuring the proportion of the population considered to earn an income less than the standard required for basic needs, a measure that varies from country to country over a period.

 "What policies are considered pro-poor or pro-development? Employment generation is a particularly salient linchpin between economic growth on the one hand, and poverty reduction and development on the other. Policies that augment the demand for labour are therefore likely to produce desirable social-impact outcomes for developing economies" (Fosu, 2007)

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Professor Augustin Kwasi Fosu in this article states the importance of sociopolitical elements in the fight against poverty eradication. He states that higher levels of inequality lower the effectiveness of growth in reducing poverty. [6]

3   Discussions; Poverty, Dual-Sector Economy and Growth

This section will explain the meaning of poverty, how it can be measured, and its impacts on societies. Dual economy shall also be discussed to explain the paradox of an existence of both economic growth and poverty. Human Capital and its impact on growth shall also be discussed.

3.1   Poverty

The term "poverty" is multifaceted. Poverty can be a condition of having little or no wealth or few material possessions, this can be on an individual or a household having none or limited wealth or material to meet their daily needs.

When someone has a life standard that is unacceptably low, this would fit the definition of absolute variables as survival and basic needs. Another aspect focuses on physical capacity, majorly on the intangibles; health, literacy, social relations, living, nutrition (calorific consumption) among other factors.

Several studies have been deployed into determining poverty either by experts or other concerned parties.

Poverty can be defined as being absolute or relative (Pettinger, 2017). *Absolute poverty* – measures poverty in terms of money needed to meet basic needs. *Relative poverty* – measures poverty in terms economic expectations or status as standardized by social measures. Both measures have been faulted for either lacking an element or of being too focused on an element, for instance; both absolute and relative are criticized for their over focus on *consumption* and *income*. Basically, absolute measure critics cite the focus on economic values with little attention to inequality. For the sake of simplicity and

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[6] Fosu A: (sociopolitical elements), Professor Augustin Kwasi Fosu is Professor of Economics at the University of Ghana (Ghana), and Extraordinary Professor at the Faculty of Economic and Management Sciences, University of Pretoria, South Africa.

accuracy, this thesis shall use the absolute measure of poverty in analyzing its rates and changes.

3.2 Measure of Poverty

Poverty has been a global issue for decades. A major interesting element remains the agreement on its measure. The World Bank mentions three major components from which a measure of poverty can be pegged on (Social Metrics Commission, 2019).

i) Relevant welfare

One monetary measure of poverty, a welfare measure dwells on consumption and income. Experts usually prefer consumption as it refers to an individual's wellbeing (they claim that income is just a mere capacity to consume). Income evaluation proves its complexity mostly when a larger population is in the informal sector or self-employed farmers (existence of dual economy).

ii) Selection and estimation of poverty lines

This is the threshold at which an individual or a household would have access to goods and services. Below the threshold, one is termed as poor. The threshold marks the minimum point at which economic participation is acceptable – this varies with time and place. This can be monetary – (consumption and income based) or non-monetary – for example; literacy based – absolute; measuring the costs of basic food needs, or relative where income distribution becomes a major concern. For the purpose of this thesis, our focus shall dwell on the absolute poverty line for clarity and understanding.

iii) Selection and estimation of poverty indicator

This compares the poverty line to create statistical functions as a poverty measure. The most commonly used indicators are; headcount ratio, the poverty gap and the squared poverty gap. The *Headcount ratio* (HCR) is the proportion of a population that exists, or lives, below a predetermined poverty line (in our case, $1.90 per day).

This measure is widely used with one major challenge, it does not actually quantify how low an individual / household falls below the income level poverty line. Nevertheless, headcount ration is the measure adopted for this thesis and is the simplest and most commonly used poverty index. It measures the proportion of the population considered

to be poor (denoted by P_o). The headcount index is given by the general form $P_o = \frac{N_P}{N}$, where N_P the number of poor people and N is the total population or the sample population. (Mathesen 2006)

This paper shall then briefly mention the two other measures of poverty; *poverty gap* – the omitted element in headcount ration, the poverty depth is handled in this measure. The poverty gap is the ratio by which the mean income of the poor falls below the poverty line. The poverty line is defined as half the median household income of the total population. The poverty gap helps refine the poverty rate by providing an indication of the poverty level in a country. This indicator is measured for the total population, as well as for people aged 18-65 years and people over 65. (OECD Poverty Gap, 2019) This is obtained by adding up all the shortfalls of the poor dividing it by the total population. *Squared poverty gap* – this measures the poverty intensity by adding other elements i.e. inequality into the equation.

3.2.1   Impact of Poverty

Poverty is correlated with lack of education and low levels of human capital. Families are usually large with many children and live mostly in rural areas, if a sample lives in an urban area their main source of income in most cases comes from the informal sector. Poor people lack ownership of productive assets, suffer malnutrition reducing muscular strength and resistance to disease, and they lack the capacity of doing productive work.

Another aspect is that the poor lack access to markets (markets to credits, insurance, land and labour) resulting from the absence of collateral, moral hazards, incomplete information (lack of access to first-hand information), imperfect access to labour market. Poverty paradigm; low levels of wealth prevent people from making productive educational choices as they can't fund their education by loans leading to lower work capacity. "The vicious cycles of poverty mentioned before mean that lifelong handicaps and troubles that are passed on from one generation to another. To name but just a few of these hereditary plagues: no school or education, child labour to help the parents, lack of basic hygiene, and transmission of diseases." (Poverty.org)

The above concerns are key to implications of unequal distributions of income and wealth, thus poverty prevalence.

3.3   The Dual Economy

Dual Economy is fundamental in our understanding of how poverty prevails. An economy is referred to as being "dual" with the existence of separate economic sectors within the same country divided by different levels of development, technology, and different patterns of demand marked by rural and urban coexistence, a very usual feature in low-and-middle-income countries with a section of the population living in rural areas resorting to farming or agriculture as their main economic activity.

The *rural sector,* usually termed as the 'countryside' or 'village', agriculture is the chief source of livelihood along with fishing, cottage industries, pottery among other activities generally referred to as traditional forms of economic development. In this sector, agriculture is the main economic activity associated with hardships, untaxed output making it a bit complex to implement safety net welfare and social security policies[7]. This is the sector where poverty is more rampant.

The *urban sector*, the region surrounding a city, associated with nonagricultural jobs, very developed with a density of human structures; houses, commercial buildings, roads, bridges, and railways. This sector is believed to be the driver of economic development, a description fitting the "formal sector". Besides the formal sector, there is another form of urban economic "sector", the *informal sector*. The informal sector[8] is usually secluded from the rules and regulations set by the state, county or government and even from the bargaining bodies such as labour unions.

Now, each sector has a specific factor of production (agriculture – has land, manufacturing – has capital) and labour which is mobile between these two sectors. These are common occurrences in low-and-middle-income countries. Based on the scenarios discussed above, there are always many movements of persons from regions believed to be poor to advanced sectors in search of better life often payment in exchange to their

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[7] Unemployment benefit, universal healthcare, right to healthcare, free education, right to housing, legal aid, victims' rights, mutual funds, superfund for pensioners and veterans, workers compensation, severance package, consumer protection, social credit, private electricity, homeless shelters

[8] Informal sector; grey economy – is neither taxed nor monitored by any form of government

labour. Labour is seen as one of the most vital elements of agricultural production (labour, capital, land and knowledge/technology). As a country moves from underdeveloped, to developing and to a developed country, labour starts moving from agricultural sector as opportunities increases in high productivity sectors thus agriculture is seen as the provider of labour to industries, on the other hand this is where much of food production happens. This dictates that agriculture must produce in surplus.

"The agricultural sector, for instance, must provide, in large measure, the factor supplies for industry; it must provide food for an urban industrial population, and it must contribute to the market for industrial goods if the demand for goods is to be sufficient to justify their production domestically. For the agricultural sector to release labour, to provide savings, to supply food and to contribute to the market for industrial goods, it must generate a steadily rising surplus of production in excess of subsistence needs. Since land is relatively fixed in supply, this requires rising agricultural productivity". (Thirlwall 1994, p.88)

Sir Arthur Lewis[9] was the first to identify the concept of a dualistic economy as the basis of his labour supply theory of rural-urban migration. It explains the growth of a developing economy in terms of a labour transition between two sectors, the rural / subsistence sector and the urban / capitalist sector. This further expanded to the *relationship between the two sectors* to the *surplus of labour and growth of the economy* and *capital accumulation* theories. (Economics Discussion, n.d.)

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[9] Sir Arthur Lewis - Economist known for his contributions in the field of economic development (Nobel Memorial Prize in Economic Sciences, 1979) - Saint Lucian and British citizenships
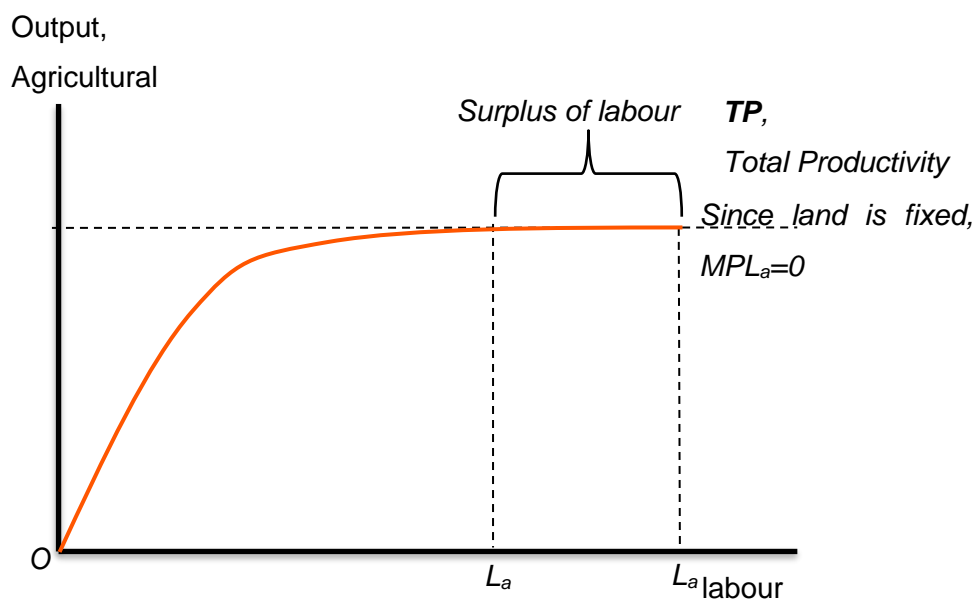
Output,
Agricultural

Figure 1, Surplus of Labour in Rural Sector

In his work, Lewis further mentions that the rural "agricultural" sector is linked to low wages (subsistence), an abundance of labour, has fixed land, (as illustrated in Figure 1), where marginal productivity of labour is zero (MPL_a), and there is low productivity through a labour-intensive production process.

In assumption, the rural (agricultural) sector adopts a simple Cobb Douglas production function[10] output as the rural sector production function;

$$Y_a = ALa^{\alpha}$$

Where Y_a is agricultural output, A is the technological parameter ($A>0$), La denoting labour force in agriculture, α (0<α<1) is the parameter.

Wage in agricultural sector is flexible and determined at the margin, the marginal productivity in agriculture is;

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[10] Cobb-Douglas - represents the relationship between two or more inputs - typically physical capital and labor - and the number of outputs that can be produced. Q (L, K) = A L^β K^α ; **Q** is the quantity of products, **L** is the quantity of labor, **K** is the quantity of capital, **A** is a positive constant, **β** and **α** are constants between **0** and **1**

$$\frac{\delta Y_a}{\delta La} = \alpha A La^{\alpha-1} \quad [11]$$

The agricultural wage is the marginal productivity multiplied by the price of agricultural good; let this be denoted by *P*. The agricultural wage then is,

$$W_a = \alpha A La^{\alpha-1} P$$

On the other hand, the urban sector is characterized with higher wage rates, higher marginal productivity, and a demand for more workers.
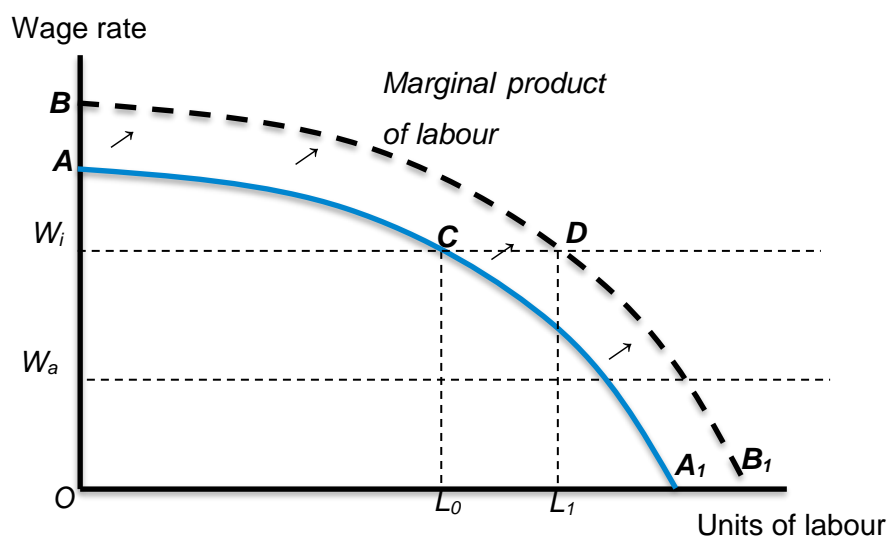
Figure 2, Marginal Product of Labour and wage rate

The Industrial sector is expansionary in nature (the industrial sector is ever growing), maximizes profit (charging a price higher than the wages), wage is fixed, and the wages are higher than those in the agricultural sector where, (Figure 2)

Total Productivity (TP) → $OACL_o$, OL_o → indicates the employed, Wage → OW_iCL_o, π (profit) → W_iAC.

The generated profit in the industrial sector will be in surplus, used as capital and reinvested in the industrial sector (capital formation). The expansion of the industrial sector is a result of the surplus generated, capital formation thus creating a higher productivity.

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[11] Derivative of a power function; $f(x) = x^n$ thus $\frac{d}{dx}x^n = nx^{n-1}$

The stimulus to invest in the industrial sector comes from the rate of returns that must increase the profit as long as the real wage remains constant in the urban sector (formal sector).

π (profit) → Surplus → Re-invest (capital formation)

Lewis states that the "Dual Sector Model" is a theory of development where surplus labour from traditional agricultural sector is transferred to the modern industrial sector whose growth over time absorbs the surplus labour, promotes industrialization and stimulates sustained development.

The π (profit) is maximized when marginal product of labour equals the wage rate, MP_L = wage rate at C.

Total Product (TP) increases as a result of; more capital (which allows the formal sector to employ more labour, L) and more capital, K increases the labour productivity.

This is demonstrated graphically in Figure 2 by the dotted arc (BB_1) with new values:

Total Productivity (TP) → $OBDL_1$, OL_1 → indicates the employed, Wage → OW_iDL_1, π (profit) → W_iBD.

The "surplus labour" in the agricultural sector will then opt for a better pay (higher wages than the agricultural wages)

The urban sector also adopts a simple Cobb Douglas production function;
$$Y_f = BLf^{\beta}$$
Where Y_f denotes urban sector output, B is the technological parameter in the urban sector ($B>0$), Lf denote the urban labour force, and β is production parameter ($0<\beta<1$)

The urban wage is determined at the margin; however, as per the Harris-Todaro model assumption, the wage in urban sector is imposed at a level above *market clearing*.[12] The marginal productivity in urban sector is (partial derivative with respect to labour- *Lf*),

$$\frac{\delta Y_f}{\delta Lf} = \beta BLf^{\beta-1}$$

The wage in the Harris-Todaro model is then given by,

$$W_f = \beta BLf^{\beta-1} \text{ such that } Lf \leq N_u$$

N_u is the total urban population, if $Lf < N_u$, then there is unemployment in the urban sector, if $Lf = N_u$, then there is full employment in the urban sector.

At this stage, given that the marginal productivity of labour is zero in the rural sector and a positive marginal productivity in the urban sector by default brings about an income gap between the two sectors, with surplus of labour, flexible wages in the rural sector and fixed higher wages in the urban sector thus an incentive to migrate to the urban sector.

This then brings us to another interesting development as indicated by *Harris-Todaro* in their model derived from *Migration, Unemployment and Development: A Two Sector Analysis* by the duo in 1970 – thus the base for rural-urban migration theory, believed that full employment equilibrium is attained by adjusting wages and prices. They focused attention on the massive urban unemployment in less developed countries.

3.4   Rural-Urban Migration – The Harris-Todaro, Sir William A. Lewis Models

The Harris-Todaro model takes most of Lewis models' assumptions for instance rural sector being characterized by subsistence agriculture, and the urban sector being characterized by modernized industries.

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[12] Market clearing - the price of a good or service at which quantity supplied is equal to quantity demanded, - the equilibrium price

Figure 3 shows a graphical explanation of the Harris-Todaro model; the demand for labour in manufacturing- *urban*, (MM_1) is superimposed onto the demand for labour in agriculture –*rural*, (AA_1). The curve AA_1 is the demand curve for rural labor (L_A) and the curve MM_1 is the demand curve for urban labor (L_M). These demand curves show the marginal productivity of labour on the vertical axis. The horizontal axis shows total labour force (O_AO_M).

O_MW_M is the fixed wage in manufacturing and the corresponding employment is given at L_MO_M

For simplicity purposes, suppose the formal (urban) sector and the rural (agricultural) sector were fully flexible (Figure 3), then wages would be equalized at equilibrium (at E^1E^1 through E_q) to make all workers indifferent to migrate.

The model takes a standard two sector model and imposes a higher wage in the urban sector (W_M) which is higher than the equilibrium clearing (as a result of labour unions, government policies on minimum wages and so on, firms also set their wages higher in an effort to entice productive workers), while wage in agriculture (W_A) is flexible. The wage difference ($W_M - W_A$) and wage flexibility in the rural sector acts as an incentive for workers to migrate from the rural (agricultural) sector to urban sector as already been mentioned in the previous chapter.

This is believed to bring in the role of economic incentives in decision making either to migrate or not from a low opportunity sector (rural) to higher opportunity sector (urban). The migrant workers moving from the rural sector to urban sector are not guaranteed of finding a job in the urban sector of which they might probably end up unemployed or in the informal sector.
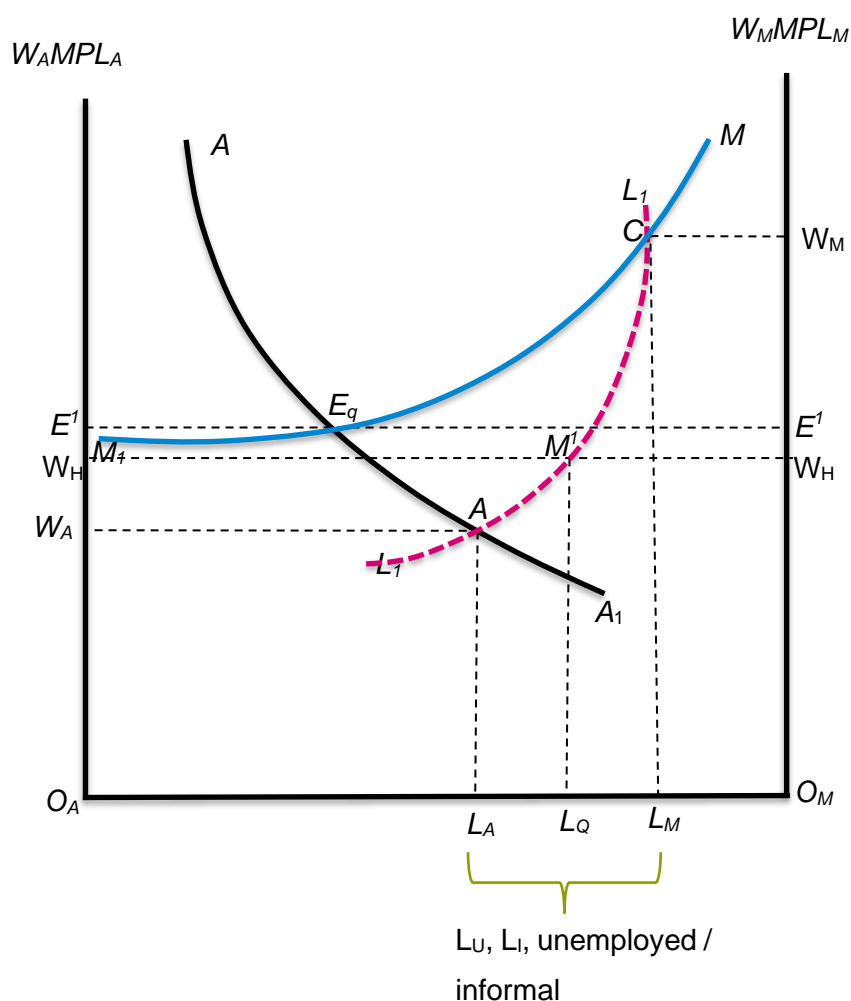
Figure 3, Harris-Todaro Equilibrium

In the Harris-Todaro model, the equilibrium condition $W_A = \left(\frac{L_M O_M}{L_A O_M}\right) W_M$ can actually generate a set of rural wage rates and rural/urban residence patterns that would make workers indifferent between being in the city or the rural sector. The locus of equilibrium points is represented by the $L_1 L_1$ intersecting AA_1 at A and MM_1 at C respectively. Agricultural wage would then be $O_A W_A$ and $O_A L_A$ becomes the employment. Along the locus, lower rural wages are compatible, in equilibrium, with more people crowding into the city and creating lower urban employment rates.

(For instance, it would have required a rural wage at W_H, to produce equilibrium (point M^1). But the rural sector cannot employ L_Q workers at wage W_H a day (or any point along the locus between points A and C with corresponding wages along the vertical axis, W_A), thus the equilibrium is not attainable. The point represented at A, where the equilibrium

locus intersects the demand curve for rural labour, is attainable: at this point the rural wage of W_A a day and the urban employment rate of 50% fulfill the equilibrium condition stated above; $W_A = \left(\frac{L_M O_M}{L_A O_M}\right) W_M$ **no further migration)*

$L_A L_M$ becomes the unemployment pool. The manufacturing wage-bill $L_M C W_M O_M$ is shared by the whole urban labour force, the expected urban wage then becomes $L_A A$ – average of the minimum wage $O_M W_M$ received by the employed and zero wage received by the unemployed. The expected urban wage ought to be equal to rural wage.

The equilibrium can be defined as;

$$W_A = \left(\frac{L_M}{L_M + L_I}\right) W_M + \left(\frac{L_I}{L_M + L_I}\right) W_I$$

Where

W_A wage in rural (agricultural) sector

W_M wage in urban formal (industry) sector

W_I wage in urban informal sector

L_M number of workers in the urban formal sector (labour in urban sector)

L_I the number of workers in the urban informal sector (labour in urban informal sector)

In the equation, agricultural wage is on the left side, W_A. The $(L_M + L_I)$ denotes the *formal sector* labour force plus *informal sector labour force* resulting to the entire labour force in the urban sector. Now, $\left(\frac{L_M}{L_M + L_I}\right)$ being the ratio of urban workers in the formal sector, this is exactly what the potential migrant sees as the probability of finding a job in the formal sector. On the other hand, this $\left(\frac{L_I}{L_M + L_I}\right)$ is what the potential migrant sees as the probability of ending up in the informal sector. The probabilities from each of the two urban sectors are then multiplied by their respective wages, resulting to the expected wage in the urban sector.

$$Expected\ wage\ in\ urban, W^e_M \ \ = \left(\frac{L_M}{L_M + L_I}\right) W_M + \left(\frac{L_I}{L_M + L_I}\right) W_I$$

Given the probability (chances) of getting the favored jobs as the ratio of employment in manufacturing, L_M, to the total urban labour pool L_U, then the expression

$$p = \frac{L_M}{L_M + L_I} = \frac{L_M}{L}$$

So, the expected urban wage is the actual urban wage times the probability of getting employment in the formal sector, $W^e_M = pW_M$ [13] (Harris and Todaro) p = employment rate.

The equilibrium agricultural wage is W_A the new urban-rural wage gap is W_M-W_A. O_AL_A workers are working in the agricultural sector instead of O_ML_M before migration. O_ML_M workers in the manufacturing urban sector are still employed at the institutional fixed wage W_M. But L_U= O_AL_A-O_ML_M migrants to the urban sector are engaged in low-wage jobs in the informal sector getting less than O_AW_A wage rate which they would have received in the rural sector.

So, the migration of individuals at any given time, t is then pegged on three main elements;

    a) the wage gap (urban-rural employment) $(W_M - W_A)$

    b) the employment rate (in urban) - the ratio of the employed to the working age population, p

    c) the labor force participation or responsiveness of potential migrants to the availing opportunities, h

Hence the migration equation;

$$M_t = (pW_M - W_A)h\alpha$$

M_t = migration in time period, t and h = the response rate of potential migrants, α = cost of migration. (Anushree, n.d.)

3.5 Dual Economy and Government Policy

In this thesis, the Harris-Todaro Basic Model mentions that the informal sector exists as a result of rural-urban migration. The informal sector, also known as the underground economy, black economy, shadow economy, or gray economy, which is often characterized with pollution, unplanned growth (slams), and high crime rates among other issues. It is in the best interest of every government to come up with policies on dual economy or on how to eradicate the informal sector.

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[13] The *p*, probability of getting a job in urban sector

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It is believed that the best alternative would be a policy meant to absorb labour in the formal sector by increasing demand for formal labour – offering investment incentives would be one of the ideal options.

Absorbing labour in the formal sector would by default reduce the informal sector, but there is always a common phenomenon; as a response to improved conditions from this policy there would be an increase of rural-urban migration thus enlarging the size of the informal sector. The size of the urban sector is said to be endogenous. This is known as the Todaro Paradox[14].

When the manufacturing sector is subsidized the output expands as a result of the subsidy. A new equilibrium is attained thus eating into agricultural (rural sector) labour and output.
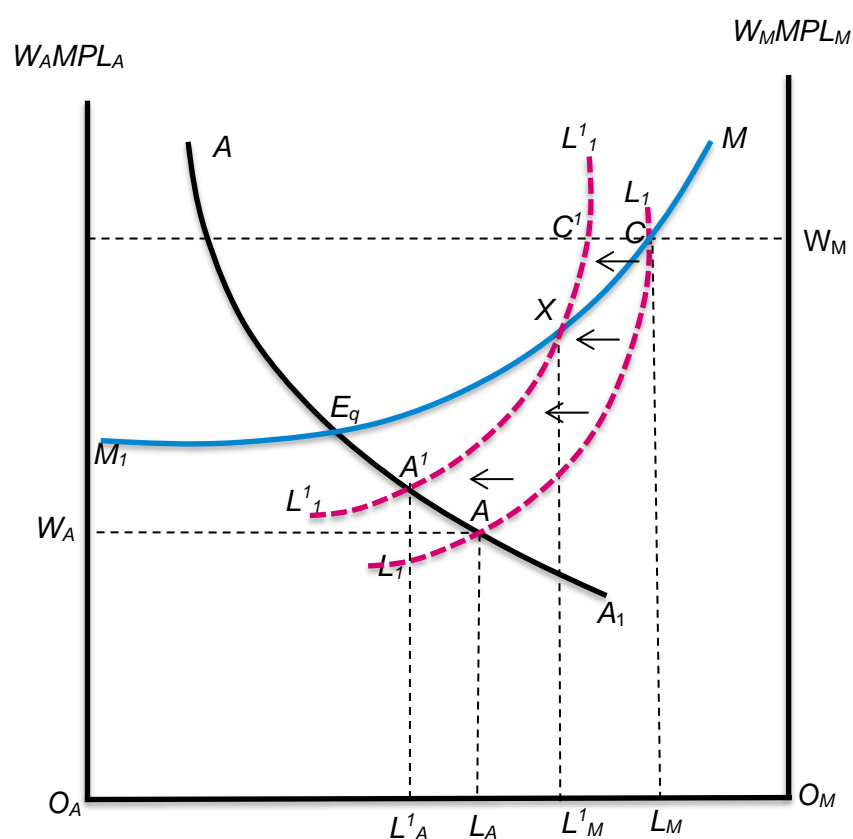
Figure 4, Subsidizing Production / Employment in Manufacturing

[14] The Todaro Paradox - policies aimed at reducing urban unemployment are bound to backfire: they will raise rather than reduce urban unemployment.

Subsidizing the manufacturing sector as shown (in Figure 4) by XC^1 per labourer the manufacturing experience an expanded output by $L^1_M L_M$. The $L^1_M XC L_M$ shows the value of extra output in manufacturing. Then we draw a new rectangular hyperbola L^1_1, and get the new equilibrium allocation. Labour in agriculture declines by $L^1_A L_A$ and the output also declines by $L^1_A A^1 A L_A$. In order to measure the effect of subsidy, the two areas are then compared $L^1_M XC L_M (\int_a^b f(x) dx)$[15] and $L^1_A A^1 A L_A$ $(\int_a^b f(x)\, dx)$ on the total output. This depends on the size of the unemployment pool; the flatter the slope of AA^1, steeper the slope of MM_1, the bigger the number of the unemployed and the lower the real output.

Now, subsidizing agriculture would reduce the wage differential, which in return employs some of the urban unemployed thus reducing the unemployment pool. But this would then lead to excessive movement of labour into the rural sector.

Figure 5, Subsidizing Agriculture

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[15] Area Under Curve- $\int_a^b f(x)\, dx$) where **a** and **b** represent labour points on respective sectors and f(x)dx represents each of the respective labour demand functions in each sector (the marginal product of labour function)

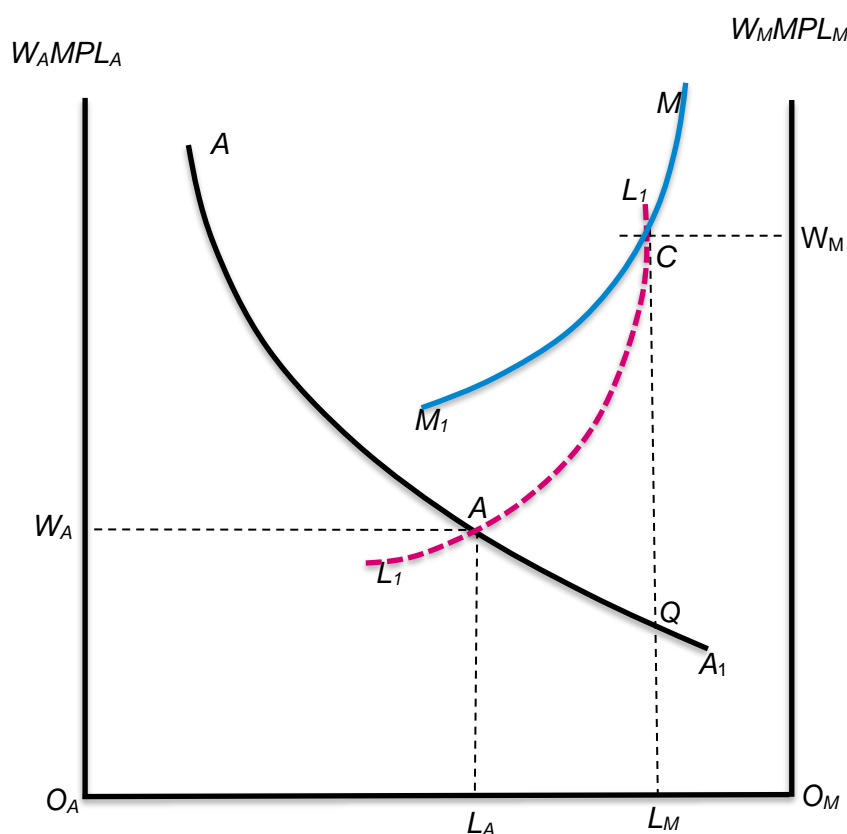Subsidizing agriculture would reduce the wage differential thus employing some of the urban unemployed and reducing the unemployment pool.

In Figure 5, QC indicates the wage subsidy in agriculture per man. Employment in manufacturing stays unchanged at $L_M O_M$, but employment in agriculture rises from $O_A L_A$ to $O_A L_M$ thus absorbing all the unemployed. The $L_A AQL_M$ is the extra agricultural output and pure gain.

In the case of an agricultural subsidy, there is no Todaro Paradox. An option worthy of adoption would be agricultural labour subsidy plus improvement of public infrastructure, which would keep the people in the rural sector.

The above-named subsidy would require a financing source. For the sake of simplicity, this thesis shall not investigate the funding problems in detail but it's worth mentioning the illusions matters with regards to funding the subsidy by taxing labour. Financing the subsidy by taxing labour in the urban sector lowers the after-tax real wage. With that illusion[16], the real disposable wage falls thus a lower wage differential which in turn reduces the unemployment.

Taxing manufacturing in absence of the tax illusion still leads to a rise of pre-tax wage thus reducing employment worsening the situation at the labor market. So, by creating employment opportunities, promoting agriculture, improving transport and communication, improving infrastructural development (schools, hospitals), providing and/or improving security to promote peace, land reforms on land ownership, rural-urban migration sensitization and provision of credit facilities (ease of access to finance) in the rural areas would reduce the mobility of labour thus poverty prevalence in the urban sectors.

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[16] Tax Illusion occurs to leading taxpayers due to the mistaken perception of living in a context where there was a reduction in the overall level of taxation or even an increase in expenditure on public goods provided without any increase in taxation.

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3.6 Human Capital and Economic Growth

Human capital is recognized as the cornerstone of economic growth through knowledge and peoples' skills or other intangible assets of individuals that can be used to create economic value (for the individuals, their employers, or their community).

Education and good health are two major components of human capital. Education is an investment in human capital that pays off in terms of higher productivity. Investing in human capital increases the general skills levels and creates returns to the individual; the decision to improve on a personal level is shaped by internal factors as well as external factors.

Education is the most important measure of human capital. The return to education has been a topic of considerable interest for economists'[17], public policy makers and analysts, and even individuals. Pegging a value on how much a specific education program or degree would yield is a major factor in an individual's decision making on whether to enroll in a program or another or join the labour market immediately. Returns to education can be termed as an increase in wages that an individual would receive by adding one more year of schooling. In practice, level of education maximizes earnings.

This brings us to Jacob Mincer's earnings function[18]

$$\ln \omega = f(s, x) = \ln \omega_0 + \rho s + \beta_1 x + \beta_2 x_2 + \dots + u^i \text{ (Belzil, 2007)}$$

Where; ω earnings, ω_0 (the intercept- earnings of someone with no education and no experience), S years of schooling, x - years of potential labour market experience. The parameters ρ, and β_1, β_2 can be interpreted as the returns to schooling and experience, respectively. Where u^i refers to ability (cognitive abilities), quality of education, family background and other factors influencing a person's wage.

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[17] Belzil (2007), "the return to education is one of the most investigated parameters in modern economics."

[18] Jacob Mincer (July 15, 1922 – August 20, 2006) was a father of modern labour economics. He was Joseph L. Buttenwieser Professor of Economics and Social Relations at Columbia University for most of his active life.

A common simplified econometric wage function taking up from the Mincer equation; Where wages are expressed as a function of education and work experience

$$Wage = f(Education, Experience)$$

Once differences in experience across workers are considered, an additional year of education has a much bigger payoff and the estimated return to education rises.

4   Case of Indonesia

The country is widely seen as a future economic giant. Indonesia is the seventh-largest economy by purchasing power parity (PPP).

"The Indonesian economy is growing at healthy rates, and a demographic dividend will further boost growth in the coming years," Mr. Gurría said. "The challenge going forward will be to create the conditions to ensure that future generations have the opportunities for a better life. Infrastructure, education, health and job quality still pose important challenges that must be addressed to ensure that Indonesia achieves sustainable and inclusive growth." (https://www.oecd.org/, 2019) . OECD Secretary-General Ángel Gurría comments positively on the economic steps made by the Indonesian Government but at the same time he shows concern on the sustainability and inclusivity of the growth.

Now, as much as it would be important to mention the effects of colonial rule and the cold war on the Indonesian economy, for the purpose of this thesis, we shall not investigate such matters in detail. But for the sake of knowing, Indonesia was colonized first by the Portuguese in the early 1500s, then came the Dutch, the British and the French. (The Globalist, 2017)

Like in other countries who were colonized, the effects of the long history of colonization are still felt both in good and bad ways. The outcome can be seen in language and art. The colonizers also depleted, stole and abused the natural resources.

Despite the past odds, Indonesian economy has expanded over recent decades notwithstanding the Asia financial crisis of 1997 – 1998. Over the years, the structure of Indonesia's economy has changed tremendously. In the past, the Indonesian economy was

a near agrarian. This was as a result of the state of development by then and the role that the government played in promoting agricultural self-sufficiency. A process of indus-trialization started in the late 1960s all through into 1980s. The falling oil prices forced the Government to diversify away from oil export to industrial / manufactured export, a move that made Indonesia a success case in oil exports diversification. [19] (IMF, 2014) . In the 1980s, trade barriers were reduced making the country's economy more inte-grated. Reduced output volatility has been instrumental in the Country's strong growth outcomes in comparison to other Asian markets since the Asian crisis. [20] (The Peterson Institute for International Economics, 1998)

Date	GDP per capita	GDP P.C. Annual Growth
2016	3,606$	7,1 %
2015	3,368$	-4,7 %
2014	3,534$	-4,1 %
2013	3,684$	-1,6 %
2012	3,745$	1,5 %
2011	3,689$	16,1 %
2010	3,178$	28,9 %
2009	2,465$	1,9 %
2008	2,418$	17,1 %
2007	2,064$	17,0 %
2006	1,765$	25,7 %
2005	1,404$	9,6 %
2004	1,281$	7,9 %
2003	1,187$	18,3 %
2002	1,003$	20,2 %
2001	834$	-4,1 %
2000	870$	4,9 %
1999	830$	45,0 %
1998	572$	-56,3 %

Table 1. GDP growth in Indonesia

 (Country Economy, 2016)

[19] IMF

[20] Asian Financial Crisis

The average GDP growth was 7,9% between 1998 to 2016. The GDP figure was $932,066 million, Indonesia was number 16 in the ranking of GDP out of the 196 countries that was published. The absolute value of GDP in Indonesia rose to $71,325 million with respect to the previous year, 2015. The GDP per capita of Indonesia was $3,606, a $238 higher than in 2015 ($3,368). (Country Economy, 2016).

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Rural Poverty	21.08	20.04	18.09	17.04	16.06	15.07	14.03	14.04	13.08	14.02	14.01
	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Urban Poverty	13.05	12.05	11.06	10.07	9.9	9.2	8.4	8.5	8.2	8.3	7.8

Table 2, % living below rural poverty line in Indonesia, Rural and Urban Poverty
(Indonesia Investments, 2017)
The above table with dataset between 2006 to 2016 shows remarkable reduction of poverty from 21,08% (2006) in the rural sector to 14,01% (2016) and 13,05% (2006) in the urban sector to 7,8% (2016) respectively.

"With its vast and abundant fertile soils Indonesia is a major global key producer of a wide variety of agricultural tropical products, and although agriculture's share of the country's gross domestic product (GDP) has declined markedly during the last five decades, it still provides income for the majority of Indonesian households today. In 2012 this sector employed around 49 million Indonesian individuals, which represents 41 percent of the total Indonesian labour force." [21] (Indonesia Investments)

Indonesia has a population estimated at 273.52 million in 2020, up from the 2015 estimate of 257 million. About 56.7% of Indonesia's population lives on Java, the most populous island. The population density of Indonesia is currently at 140.08 individuals per square kilometer. (Indonesia Area and Population Density, 2020)

The Indonesian population is relatively young. The median age in Indonesia is 29,7 (Median age of the population in Indonesia 2015, 2019) making it the third youngest in East Asia. The dependency ration (the number of children and the elderly relative to the

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[21] Indonesia Investments

working-age population is low), the working age population has also been on the rise over the recent years. Part of the economic boom can be pegged also on the demographics. Education mean years have also gone up; this is as a result of the Government investment in the human capital. This move is believed to be a vital tool that would boost production further shaping the DGP.

Indonesia has undergone a process of industrialization and urbanization over the past years. For instance, the manufacturing share of GDP increased to 19.86% (2018) while agriculture was 12.81%. (Statista, 2018). Industrialization of the Indonesian economy also saw investment expand at a rapid pace with Foreign Direct Investment (FDI) going up further after the Asian Economic crisis.

The population in the urban areas has grown while that of the rural areas reducing. This trend has also influenced food production thus increasing food imports. (Table 3) Now, despite industrialization over the past period, agriculture remains an important part of the economy accounting for 12.81% share of GDP (2018). Indonesia also has a vast resource sector relative to most countries within the region. Mining and quarrying output has 8.08% share of the GDP.

International trade (the sum of exports and imports of goods and services measured as a share of gross domestic product.) share of GDP 43.02%[22] (Trading Economics, 2018) It was predicted that as a result of a strong domestic demand, Indonesian economy would expand in 2019 and 2020. Household consumption also expended, a strong consumption growth also reflects rising incomes, with Indonesia moving out of poverty into lower **middle-income** class**.** An increase in income allows purchase patterns to expand to non-food.

The *Asian Development Outlook (ADO) 2019,* ADB's flagship annual economic publication, forecasts Indonesia's economy to grow at 5.2% this year and 5.3% in 2020. (ADB, Asian Development Bank, 2019)

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[22] Trading Economics- actual values, historical data, forecasts and projections were sourced from the World Bank in February 2020

Indonesia also has a relatively low debt burden. Government Debt to GDP in Indonesia averaged 38.49 percent from 2000 until 2018, reaching an all-time high of 87.43 percent in 2000 and a record low of 22.96 percent in 2012. (Trading Economics)
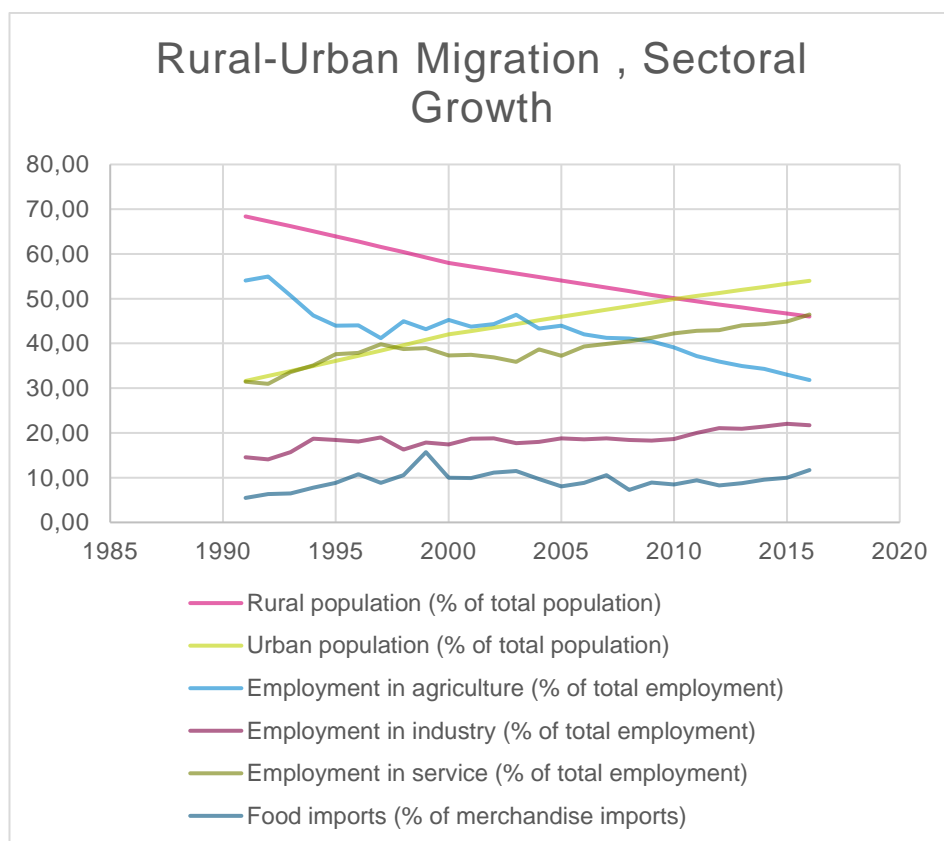
Table 3 Rural-Urban Migration and Sectoral Growth (dataset: table 10)

From the above table (Table 3), one can easily observe labour transition as individuals move from the rural areas (a continuous decline in rural population and an increase of urban population) to the urban areas in search of better opportunities in terms of pay in exchange for their labour. At the same time, an observation can be registered on the increased urban population from 58 million people in 1991 to 126 million people in 2016 (table 11, Appendix 1). This is as a result of increased demand for labour force in the urban sector to facilitate growth and production in the manufacturing industries as well as the service industries, a perceived higher wage in the urban areas also plays a role in the migration decision. This is a phenomenon observed by Lewis and later Harris-Todaro in their respective theories (covered in chapter 3, 3.4). The rural sector is considered to have surplus of labour with limited land as a resource. The perceived wage differential between the two sectors acts as an incentive to lure workers to move into the

cities for a better pay (Table 12 - Appendix 1, records minimum wages in major Provinces (2015)). Based on our previous studies on Harris-Todaro sectoral wage differential, it is evident that the urban sector wages are set higher than the rural wages on political grounds or by firms to lure a competitive labour force. As a result, individuals abandoned their rural jobs seeking the fast-growing industry thus an increase in the urban labour force as well as the informal sector within the urban centers, for instance in Jakarta region.

The employment rate in the urban areas will then act as the probability (p) of getting a job in the urban sector.

$$p = \frac{L_M}{L_M + L_I} = \frac{L_M}{L}$$

The fact that the manufacturing sector cannot absorb all the total urban labour pool, part of that population is absorbed in the informal sector thus becoming the unemployment pool and a sure prevalence of poverty. We can settle the argument that poverty reduction in Indonesia has been as a result of economic growth in both sectors (tables 18 and 19). Agricultural output growth is believed to be a vital factor in economic development stimulation outside the agricultural sector (in the industrial sector) leading to more jobs and growth creation. Increased productivity in the agricultural sector raises farm incomes, increases food supply, reduces food prices and provides employment opportunities in both rural and urban areas. The sector also plays a role of providing raw materials to the industrial sector for continued production.

	Absolute Poverty (millions)	Rural Poverty (%)	Urban Poverty (%)
2014	28	13.8	8.2
2013	29	14.4	8.5
2012	29	14.3	8.4
2011	30	15.7	9.2
2010	31	16.6	9.9
2009	33	17.4	10.7
2008	35	18.9	11.6
2007	37	20.4	12.5
2006	39	21.8	13.5

Table 4 Poverty Incidence 2006 – 2014: Source- (Poverty in Indonesia, 2017)

Usually, the manufacturing industries are in the urban areas and manufacturing growth directly benefits the urban sector by increasing employment and wages. On the other hand, the benefits can be felt in the rural sector as well though indirectly and gradually.

5 Empirical Analysis

The empirical analysis forming the basis of this thesis has in itself; regression model, detailed information on the data and variable specifications. The econometric regression shall be carried out using the *RStudio software*[23].

5.1 Regression Model

The regression analysis will be used to produce an equation that would predict a dependent variable using the independent variables. We shall use the logarithm form to accommodate the non-linear relationship that might exist between the variables.

$$Y = \alpha + \beta_1 x_1 + \beta_2 x_2 + \cdots \beta_n x_n + \varepsilon$$

where Y is the dependent variable we shall be trying to predict, x_1, x_2 and so on are the independent variables used to predict it β_1, β_2 and so on are the coefficients or multipliers

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[23] RStudio is a free and open-source integrated development environment (IDE) for R, a programming language for statistical computing and graphics.

that describe the size of the effect the independent variables are having on the dependent variable Y, and α (also known as the intercept/constant) is the value Y is predicted to have when all the independent variables are equal to zero.

Variable	Description	Source
$\Delta povt$	% change per year in poverty headcount at $1.90 a day	PovcaNet
$povt$	Poverty headcount ration, at $1.90, % of population	World Bank
gdp_growth	GDP per capita growth, %	PovcaNet
gdp_per_capita	GDP per capita level in base year	World Bank
edu_m_yrs	Education, mean years of schooling	UNDP, International Human Development Indicators
gov_exp_ede	Public spending on education as % of GDP	World Bank
$Ind.emp$	Employment in Industry, %	World Bank

Table 5: Regression variables and sources

Explanation of the variables

α – intercept, the y-intercept

gdp_growth – average GDP per capita growth

$povt$ – headcount ratio, level of poverty

gdp_per_capita - level of GDP per capita in the base year

edu_m_yrs – education, mean years of Schooling

gov_exp_edu – government spending on education (a percentage of government expenditure)

ind_emp – employment in industry (a percentage of total employment)

ε – error term

$$\Delta povt = \text{gdp\_}growth + \beta_2 gdp\_per\_capita + \beta_3 edu\_m\_yrs + \beta_4 gov\_\text{exp}\_ede + \beta_5 ind\_emp + \varepsilon$$

5.2 Data and Specifications for the Variables

i. Poverty – Poverty headcount ratio *(povt)*

As indicated earlier, the chosen poverty measure is the headcount ratio. This is the percent of an economy's aggregate population living in households with consumption or income below the *poverty line* - settled at less than $1.90 a day[24]

The population living on less than $1.90 a day is considered poor. PovcalNet is vital in obtaining these data. It is the online tool for poverty measurement developed by the World Bank Research Group. The data is based on socio-economic sample survey from different countries carried out by interviews of individuals.

ii. Percentage change in poverty (Δpovt)

The change in poverty (Δpovt) is the dependent variable

The percentage change in poverty (Δpovt) %

$$\Delta povt = 100 * \frac{povt(final) - povt(original)}{povt(original)} / 18$$

Reduced poverty defined as negative (decreased) value if the Δ*povt < 0,* and a positive value (increased) if Δ*povt > 0.* The calculations are based on an annual change at the extreme poverty line of $1.90

iii. Economic Growth in GDP per capita (gdp_growth) as a percent, %

Growth as a variable is one of the independent variables believed to be directly related to the correlation of economic growth and poverty. This is measured as economic growth in per capita gross domestic product, GDP. As stated, there are different views on whether growth in GDP reduces poverty or not.

iv. GDP per capita (gdp_per_capita)

This is from the base year (the start year of the investigated period), the World Bank offers the date we shall use in our analysis.

v. Education, mean years of Schooling (edu_m_yrs)

Education is one of the most vital tools for poverty and income inequality reduction thus economic growth. Increased mean years in education should have a positive impact on

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[24] World Bank; PovcalNet - online tool for poverty measurement, developed by the World Bank based on sample surveys globally

the economy over a period. Low mean years of schooling would translate unto difficulties in labour mobility within the markets as a result of lack of knowledge; this would prevent the industrial sector from growth and expansion.

vi.   Public spending on education - (gov_exp_edu)

It is believed that education is a means to reduce poverty, also a way to lighten the sectorial duality. Political incentives to set resources towards education attainment would be the right approach. Looking at the percentage a government spends on education in relation to its overall expenditure, the bigger the percentage spent on education the better the quality of education and in the long run this translates to poverty reduction.

vii.   Industry – employment in industry – (ind_emp)

Industrial employment as a percentage of total employment would factor in the dual economy aspect. The assumptions are made that big industrial sector creates benefits that bear positive impacts on workers. This variable is expected to have also have a negative sign in our regression.

5.3   Regression Results

This section represents the regression results on the relationship between poverty headcount (povt) and economic growth (gdp_growth) among other variables. Ordinary Least Squares (OLS) is chosen to estimate growth regression. The results are then presented in five different models. Variables have also been tested for multicollinearity in a Variance Inflation Factors test (VIF) which are presented in table 12, so far, no problem with collinearity. The resulting estimates of negative coefficients in gdp_growth suggests that a country with sound economic growth among other pro-poor practices is set to reduce poverty prevalence. RStudio software is used in the calculations.

The impact of other variables apart from gdp_growth and gdp_per_capita on poverty reduction, the main findings of the regression are as follows;

- There is a negative and significant correlation between poverty reduction and government expenditure on education (gov_exp_edu)
- There is a strong association between education mean years (edu_m_yrs), industrial employment (ind_emp) and poverty reduction

```
Residuals:
    Min      1Q  Median      3Q     Max
-4.4050 -2.2755  0.3524  1.4785  4.5789

Coefficients:
                Estimate Std. Error t value Pr(>|t|)
(Intercept)     90.081783  22.730166   3.963  0.00162 **
gdp_growth      -1.625896   0.310336  -5.239  0.00016 ***
gdp_per_capita  -0.001650   0.001421  -1.161  0.26657
edu_m_yrs       -0.665685   3.692683  -0.180  0.85972
gov_exp_edu     -1.640747   0.552550  -2.969  0.01086 *
ind_emp         -1.499526   1.032166  -1.453  0.16999
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 3.307 on 13 degrees of freedom
Multiple R-squared:  0.9639,    Adjusted R-squared:  0.95
F-statistic: 69.36 on 5 and 13 DF,  p-value: 6.533e-09
```

Table 6: Regression Results

5.4   Analysis

Time series[25] data between the years 1998-2016 (Appendix 1) is used in the econometric regression. The dataset was obtained from **World Bank** (**PovcalNet**), **UNDP**-International Human Development Indicators. From the observation, we can conclude that Indonesia reduced poverty prevalence by 16.443**%**[26] between the years 1998 to 2016.

The regression results (*table 6*) can be represented into two categories. The first category comprises of explanatory variables (explaining the factors responsible for change in poverty) – *gdp_growth* and *gdp_per_capita*, from the output it indicates that all the variables are of great significance with the right signs (gdp_growth is very significant with p value < 0.001). This in general shows that the variables are as per the theoretical explanation and do influence the dependent variable.

---

[25] Time series- a quantity obtained at successive times, often with equal intervals between them

[26] $\Delta povt = 100 * \frac{6.7-(-13.13)}{6.7} /18 \quad = 16.443\%$

GDP per capita impact on poverty change is small though with a negative coefficient. It can be interpreted as being not so significant with p value ≥ 0.05 an indication that high level of GDP per capita growth does benefit a percentage of the population if not whole causing poverty to reduce, the effect can be pegged on inequality (income distribution) issues within the economy illustrated by the Gini coefficient. From the output, we can now comfortably confirm that the estimation grants us an answer to our research question. Statistically we can confirm that economic growth (GDP Growth), does reduce poverty.

The impact of GDP growth on poverty reduction is shown in Figure 6, where change in poverty as a function of growth in a scatter graph based on the data set from the time series, 1998-2016 – Indonesia (Appendix 1).

The scatter graph shows an inverse relationship between the two variables. A trend line can be fitted from the top left to the bottom right. This further confirms that economic growth does have a positive effect on extreme poverty reduction.
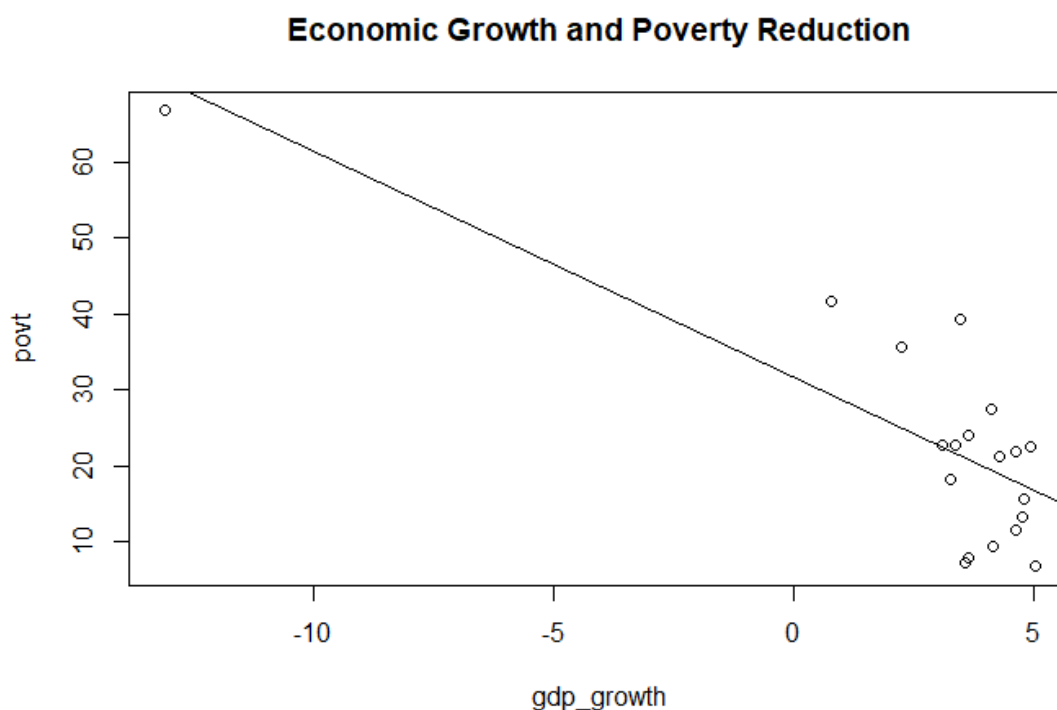
Figure 6 Effects of Economic Growth on Poverty Reduction

The other portion comprises variables education mean years, government expenditure on education and industrial employment. The variables relate to the theory of dual economy.

The outcome on the mean years of schooling have a negative coefficient thus a negative change in poverty reduction though not significant. This can be as a result of time-lagged effects[27] from education. The effects are also known to be indirect and can be felt through other variables.

Government (Public) spending on education is related to poverty reduction. It is significant with p value 0.01 to 0.05. The sample size can be said to have been small. But it seems education in Indonesia has been instrumental in lifting people out of poverty. Possibly due to quality issues.

Now, employment in industries has the correct sign as per the expectation, an indication that it contributes to the reduction of poverty prevalence. Employment in industries would go hand in hand with employability based on education.

In our sampling, it would be of concern to note that it is a biased sample, including the database (the selection was based on years with enough data in support of the theory of growth versus poverty prevalence), thus a risk of selection biased and distorted results. Nevertheless, the regression results are adequate to make a conclusive analysis.

6   Conclusions

The term "poverty" is multifaceted occurrence, the more it is investigated, the more it surfaces. Economic growth is seen to reduce a percentage of extreme poverty. This would be the conclusion from the regression; this in fact confirms the view of the fact that economic growth reduces extreme poverty. Though economic growth isn't enough in the fight against poverty reduction in cases where extreme poverty is "extreme".

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[27] A long interval of time between one event and another related event that happens after it

The theory of dual economy does contribute to the understanding of poverty and how it starts. The existence of rural (low productive sector) and urban sector is unique. The high productive sector is dependent on the other with totally different outputs and developments in comparison.

A consideration on Harris-Todaro model and human capital model demonstrate the importance of education, and how the lack of education contributes to the existence of two-sector labour markets; lack of education imposes a barrier preventing people from changing their occupation thus escaping from poverty. Whether to study or not is in the human capital model with focus on opportunity cost analysis. Due to lack of equal opportunities, the decision to acquire knowledge through education is a rare choice; in some countries, the cost of education is regressive deeply affecting those living in extreme poverty. Now, lack of qualifications renders people unfit in the labour market within the industrial sector. On the other hand, lack of adequate supply of productive labour force hinders the industrial sector from employing more workers further hindering growth rate.

On the Indonesian case, one way in the fight against poverty is by investing in quality education (an increase of government spending on education). The political will to improve the educational system by investing into it is not only of importance but also economic though not fully and not immediate.

From the regression output, it is evident that the country still has a lot to do in order to improve the quality of education, though looking at the trends in years of schooling since 1998, it has been improving from the average of 5.7 years to 8 years in 2016. It is still low by international standards though (Germany at 14.1 in 2018) (UNDP)

To further identify the pattern of growth that is most conducive in reducing poverty, we regress the rate of change in poverty on growth in both agricultural (growth_agri) and manufacturing sectors (growth_manuf). The econometric regression results are presented in table 7.

```
Residuals:
     Min      1Q   Median      3Q     Max
-14.3103  -5.2952   0.2935  5.4958  13.7216

Coefficients:
                Estimate Std. Error t value Pr(>|t|)
(Intercept)      52.5686     5.6656   9.279 4.59e-08 ***
growth_agri....  -8.9815     2.2310  -4.026 0.000877 ***
growth_manuf.... -0.3032     0.7849  -0.386 0.704028
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 8.261 on 17 degrees of freedom
Multiple R-squared:  0.7249,    Adjusted R-squared:  0.6925
F-statistic:  22.4 on 2 and 17 DF,  p-value: 1.721e-05
```

Table 7: Sectoral Growth and Poverty Incidence (Regression output)

The regression output indicates that both growth in agriculture and manufacturing are instrumental in poverty reduction. Growth in agricultural sector is of great significance though. On average, one percent increase in agricultural growth reduces absolute poverty by 8.98. Growth in manufacturing sector by one percent reduces absolute poverty by 0.03. This further confirms that agricultural income growth is the main factor behind poverty reduction in developing countries and Indonesia is not an exception.

In the case of urban poverty against urban growth and rural growth the industrial sector growth has a negative impact on poverty prevalence. At that point, an additional growth by a unit increases poverty by 0.09243 (data set 17 and output in tables 18 and 19 – appendix 2). This clearly confirms the Todaro paradox. The perception of higher wages due to increased growth in the urban sectors continues to attract the extra labour in the rural sector to a point where it is no longer sustainable. The disappointed job seekers then either settle into the informal sector (thus poverty prevalence) or eventually return to the rural areas.

In conclusion, the study provides evidence that growth has contributed significantly in reducing poverty. Though growth on its own isn't instrumental. In the case of Indonesia, growth in the agricultural sector is seen to be of great importance.

The poor participate more in agricultural production (in low-medium-income countries), this eventually results in large poverty reduction. From the tables (data set 17 and output

in tables 18 and 19 – appendix 2) it is established that on average growth in GDP originating in agriculture is of more benefit to the poor thus increasing their expenditure. This eventually allows them to graduate out of poverty.

This would mean that the government ought to adopt growth enhancing policies together with other policies geared towards poverty reduction to achieve maximum results that can easily channel the gains from growth to the poor households.

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Appendix 1

Year	povt	gdp_growth	gdp_per_capita	edu_m_yrs	gov_exp_edu	ind_emp
2016	6.50	5.03	3570.28	8.00	21.90	21.72
2015	7.20	3.56	3334.55	7.90	20.50	22.04
2014	7.90	3.64	3491.60	7.80	17.67	21.40
2013	9.40	4.15	3620.66	7.80	17.60	20.95
2012	11.60	4.61	3687.95	7.60	18.09	21.07
2011	13.30	4.75	3634.28	7.60	18.01	19.99
2010	15.70	4.81	3113.48	7.40	16.65	18.65
2009	18.20	3.25	2254.45	7.40	19.31	18.30
2008	21.80	4.62	2160.53	7.10	13.68	18.44
2007	22.40	4.95	1855.09	7.10	14.94	18.82
2006	27.40	4.11	1586.21	7.90	14.96	18.59
2005	21.10	4.29	1260.93	7.40	15.15	18.76
2004	23.90	3.63	1148.57	7.30	14.17	18.01
2003	22.60	3.38	1064.51	7.20	16.28	17.71
2002	22.80	3.09	899.56	7.00	14.37	18.76
2001	35.50	2.24	747.98	6.90	11.59	18.74
2000	39.30	3.48	780.09	6.70	10.86	17.43
1999	41.70	0.79	671.11	6.20	9.99	17.85
1998	66.70	-13.13	463.97	5.70	9.65	16.29

Table 4 Time Series Data, 1998-2016 (Indonesia)

Year	Food_imp (%)	Rural_pop	Urban_pop	Emp_agri	Emp_ind	Emp_serv (%)
2016	11.67	46.01	53.99	31.82	21.72	46.46
2015	10.01	46.69	53.31	33.04	22.04	44.92
2014	9.55	47.37	52.64	34.28	21.40	44.32
2013	8.78	48.05	51.96	34.98	20.95	44.07
2012	8.25	48.72	51.28	35.93	21.07	43.00
2011	9.43	49.41	50.60	37.19	19.99	42.82
2010	8.46	50.09	49.91	39.13	18.65	42.22
2009	8.92	50.87	49.13	40.45	18.30	41.25
2008	7.26	51.67	48.34	41.10	18.44	40.46
2007	10.55	52.47	47.54	41.26	18.82	39.92
2006	8.86	53.26	46.74	42.06	18.59	39.35
2005	8.08	54.06	45.94	44.00	18.76	37.24
2004	9.69	54.85	45.15	43.33	18.01	38.67
2003	11.50	55.64	44.36	46.38	17.71	35.91
2002	11.12	56.43	43.57	44.34	18.76	36.90
2001	9.92	57.22	42.78	43.77	18.74	37.49
2000	10.01	58.00	42.00	45.28	17.43	37.29
1999	15.70	59.21	40.79	43.21	17.85	38.95
1998	10.52	60.41	39.59	44.96	16.29	38.76
1997	8.82	61.59	38.41	41.18	19.00	39.81
1996	10.79	62.77	37.24	44.02	18.09	37.89
1995	8.84	63.92	36.08	43.98	18.41	37.60
1994	7.76	65.07	34.93	46.22	18.71	35.07
1993	6.47	66.19	33.81	50.69	15.71	33.61
1992	6.36	67.30	32.70	54.95	14.08	30.97
1991	5.48	68.39	31.61	54.02	14.56	31.42

Table 5 Migration and Sectoral Growth

Year	Population	Labour Force	Urban Population
2016	261,554,226.00	126,258,452.00	141,210,511.00
2015	258,383,256.00	124,899,081.00	137,751,865.00
2014	255,129,004.00	123,295,987.00	134,287,151.00
2013	251,806,402.00	121,556,116.00	130,826,016.00
2012	248,452,413.00	120,616,762.00	127,396,459.00
2011	245,116,206.00	117,623,211.00	124,016,544.00
2010	241,834,215.00	115,291,524.00	120,709,130.00
2009	238,620,563.00	112,743,612.00	117,243,827.00
2008	235,469,762.00	111,067,180.00	113,814,309.00
2007	232,374,245.00	108,776,342.00	110,459,097.00
2006	229,318,262.00	103,395,358.00	107,178,769.00
2005	226,289,470.00	101,395,729.00	103,961,908.00
2004	223,285,676.00	101,653,635.00	100,811,250.00
2003	220,309,469.00	99,962,187.00	97,720,468.00
2002	217,357,793.00	98,792,407.00	94,698,443.00
2001	214,427,417.00	98,970,132.00	91,738,482.00
2000	211,513,823.00	98,569,084.00	88,840,036.00
1999	208,615,169.00	97,235,541.00	85,098,300.00
1998	205,724,592.00	93,914,436.00	81,452,538.00
1997	202,826,446.00	90,509,645.00	77,897,525.00
1996	199,901,228.00	88,132,004.00	74,433,222.00
1995	196,934,260.00	85,843,561.00	71,046,004.00
1994	193,917,462.00	83,511,901.00	67,741,187.00
1993	190,851,175.00	81,252,835.00	64,522,965.00
1992	187,739,786.00	79,044,362.00	61,396,542.00
1991	184,591,903.00	75,992,436.00	58,355,038.00

Table 6 Labour Movement, (Poverty in Indonesia, 2017)

Province	Minimum wage IDR	wage growth	Minimum Decent living
Central Kalimantan	1,896,367	10.00	2,254,000
West Kalimantan	1,560,000	13.04	1,504,000
Jambi	1,710,000	13.83	1,708,174
Southeast Sulawesi	1,652,000	18.00	1,621,741
West Sumatra	1,615,000	8.39	1,474,227
Bangka Belitung	2,100,000	20.05	2,082,000
Papua	2,193,000	7.50	2,171,944
Bengkulu	1,500,000	11.11	1,499,826
Nusa Tenggara B.	1,330,000	9.92	1,430,064
Nusa Tenggara T.	1,250,000	8.60	1,652,137
Banten	1,600,000	20.75	1,403,556
South Kalimantan	1,870,000	15.43	1,691,000
DKI Jakarta	2,700,000	10.60	2,538,174
Riau	1,878,000	10.47	1,872,000
Riau Islands	1,954,000	0.58	1,902,598
Bali	1,621,172	5.09	1,612,818
North Sumatra	1,625,000	7.91	1,271,058
East Kalimantan	2,026,126	7.41	2,026,126
Aceh	1,900,000	8.57	1,732,413
Lampung	1,581,000	13.01	1,442,898
Central Sulawesi	1,500,000	20.00	1,499,791
Moluccas	1,650,000	16.61	2,197,450
North Moluccas	1,577,617	9.50	2,333,166
South Sumatra	1,974,346	8.15	1,974,346
Gorontalo	1,600,000	20.75	1,864,379
South Sulawesi	2,000,000	11.11	1,950,000
West Papua	2,015,000	7.75	2,255,000
North Sulawesi	2,150,000	13.16	1,641,969
West Sulawesi	1,655,500	18.25	1,981,507

Table 7 Minimum wage in major Provinces (2015) – Source: Indonesia Investment

Appendix 2

povt	gdp_growth	gdp_per_capita	edu_m_yrs	gov_exp_edu	ind_emp	Correlation
1.00000	-0.80894	-0.81546	-0.91750	-0.88340	-0.82497	povt
-0.80894	1.00000	0.45711	0.74560	0.53375	0.50061	gdp_growth
-0.81546	0.45711	1.00000	0.76033	0.83468	0.85480	gdp_per_capita
-0.91750	0.74560	0.76033	1.00000	0.86429	0.78918	edu_m_yrs
-0.88340	0.53375	0.83468	0.86429	1.00000	0.79696	gov_exp_edu
-0.82497	0.50061	0.85480	0.78918	0.79696	1.00000	ind_emp

Table 8 Correlation Matrix table

Variance	VIF
gdp_growth	2.56001
gdp_per_capita	4.91057
edu_m_yrs	7.93414
gov_exp_edu	5.94503
ind_emp	4.50179

Values > may indicate a collinearity problem

Table 9 Testing for Multicollinearity, Variance Inflation Factor (VIF)

```
Residuals:
    Min      1Q    Median     3Q      Max
-13.7644  -5.1810   0.4367   4.7815  18.0975

Coefficients:
            Estimate Std. Error t value Pr(>|t|)
(Intercept)  31.5599     2.5570  12.343 6.53e-10 ***
gdp_growth   -2.9763     0.5246  -5.673 2.75e-05 ***
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 8.945 on 17 degrees of freedom
Multiple R-squared:  0.6544,    Adjusted R-squared:  0.6341
F-statistic: 32.19 on 1 and 17 DF,  p-value: 2.748e-05
```

Table 10 Growth and Poverty

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	pov	growth_agri (%)	growth_manuf (%)
2017	5.70	3.88	4.293
2016	6.70	3.37	4.256
2015	7.20	3.76	4.329
2014	7.90	4.24	4.644
2013	9.40	4.20	4.369
2012	11.60	4.59	5.62
2011	13.30	3.95	6.259
2010	15.70	3.01	4.742
2009	18.20	3.96	2.212
2008	21.80	4.83	3.659
2007	22.40	3.47	4.665
2006	27.40	3.36	4.585
2005	21.10	2.72	4.598
2004	23.90	2.82	6.383
2003	22.60	3.79	5.333
2002	22.80	3.45	5.288
2001	35.50	3.26	3.3
2000	39.30	1.88	5.985
1999	41.70	2.16	3.921
1998	66.70	-1.33	-11.437

Table 11 Sectoral Growth and Poverty Incidence

	rural_povt	urban_growth	rural_growth	urban_povt	urban_growth	rural_growth
2016	14.10	4.26	3.37	7.80	4.26	3.37
2015	14.20	4.33	3.76	8.30	4.33	3.76
2014	13.80	4.24	4.64	8.20	4.24	4.64
2013	14.40	4.20	4.37	8.50	4.20	4.37
2012	14.30	4.59	5.62	8.40	4.59	5.62
2011	15.70	3.95	6.26	9.20	3.95	6.26
2010	16.60	3.01	4.74	9.90	3.01	4.74
2009	17.40	3.96	2.21	10.70	3.96	2.21
2008	18.90	4.83	3.66	11.60	4.83	3.66
2007	20.40	3.47	4.67	12.50	3.47	4.67
2006	21.80	3.36	4.59	13.50	3.36	4.59
2005	22.00	4.60	2.72	13.00	4.60	2.72
2004	24.00	6.38	2.82	13.00	6.38	2.82
2003	24.00	5.33	3.79	13.20	5.33	3.79
2002	24.00	5.29	3.45	14.50	5.29	3.45
2001	28.00	3.30	3.26	12.10	3.30	3.26
2000	26.00	5.99	1.88	14.50	5.99	1.88
1999	32.00	3.92	2.16	15.50	3.92	2.16
1998	38.00	-11.44	-1.33	16.00	-11.44	-1.33

Table 12 Sectoral poverty prevalence and growth (in depth)

```
Residuals:
    Min     1Q  Median     3Q     Max
-7.1963 -2.6544  0.0159  2.9078  7.2540

Coefficients:
            Estimate Std. Error t value Pr(>|t|)
(Intercept)  31.6997     2.5323  12.518 1.11e-09 ***
urban_growth -0.2219     0.3629  -0.611  0.54959
rural_growth -2.8167     0.8223  -3.425  0.00347 **
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 4.502 on 16 degrees of freedom
Multiple R-squared:  0.6005,   Adjusted R-squared:  0.5506
F-statistic: 12.03 on 2 and 16 DF,  p-value: 0.0006485
```

Table 13 Rural poverty ~ manufacturing growth, agricultural growth

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```
Residuals:
   Min     1Q Median     3Q     Max
-4.027 -1.472  0.233  1.283  3.190

Coefficients:
             Estimate Std. Error t value Pr(>|t|)
(Intercept)  15.39299    1.20915  12.730  8.7e-10 ***
urban_growth  0.09243    0.17330   0.533  0.60113
rural_growth -1.17515    0.39265  -2.993  0.00861 **
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 2.15 on 16 degrees of freedom
Multiple R-squared:  0.4256,    Adjusted R-squared:  0.3538
F-statistic: 5.927 on 2 and 16 DF,  p-value: 0.01185
```

Table 14 Urban poverty ~ manufacturing growth, agricultural growth