

CHAPTER 2

Related theories and Literature reviews

2.1 Related Economics Theory

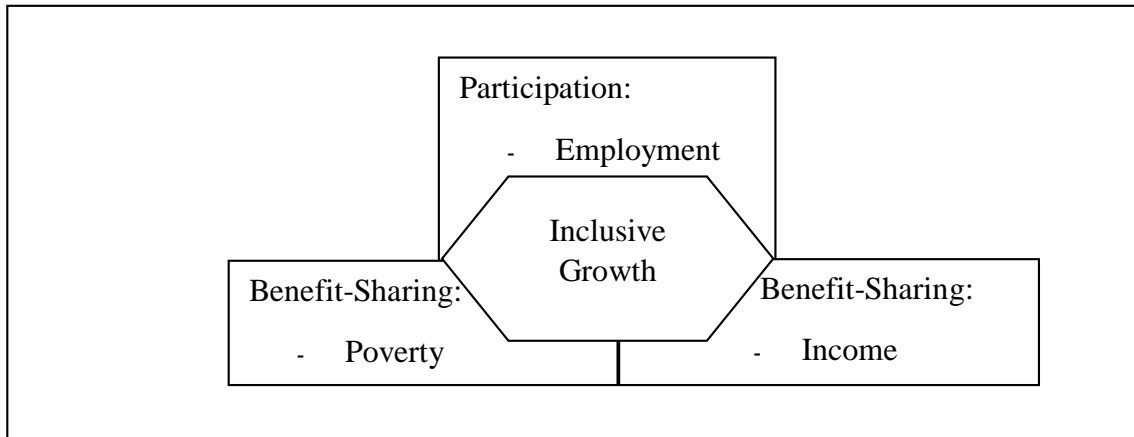
2.1.1 Measuring Growth

Growth could be referred to the growth in GDP in a measurement of goods and services produced in the economy within one year. The measurement shows some idea about the standard of living in the countries. GDP is used as a measurement of a nation's income or production. Therefore, when looking at the GDP growth rate, the statistics could show some idea of economic growth and the change in standard of living over time.

2.1.2 New Growth theory

The new growth theory has been developed in the last decade by a number of younger economists. The new growth theory shows the technical change by using external economies and externalities. The new growth theory operates on the basis of beneficial effects which higher level of education, poverty reduction, people participation, and so on have on the growth of the economy.

Inclusive is known as one of the sustainable growth aspect, since inclusive growth includes all parts of the economy, all factors in the process of growth could improve, for example, the reducing in income inequality, bottom of pyramid participation in growth, the growth rate and the equality of income per capita and the focus on the relationship between growth and poverty, etc. Figure 9 shows the dimensions and indicators which encourage inclusive growth.



Source: Ramos A. R., Ranieri R. and Lammens W. J. (2013)

Figure 2.1: Inclusive Growth: Dimensions and Indicators.

The benefit-sharing dimension discusses whether growth leads to a decrease in poverty and in income inequality rate. This part of the analysis considered the concept of ‘relative pro-poor growth’, considered the growth to be pro-poor when poor people’s income grows faster than that of richer people, resulting in a decrease in an inequality as stated by Ramos, Ranieri and Lammens (2013). The participation dimension is the idea that makes inclusive growth different from pro-poor growth. The participation dimension focus on how the society is included in the growth process, telling that inclusion is necessary for inducing social income and building of capacity, which are needed for sustainability inclusive growth. The participation process can be shown as employment of a country’s citizen. Defining Inclusive Growth, sustained poverty and inequalities reduction is required, as well as the higher rate of employment, and that allows people to benefit from the growth. Inclusive growth should be sustained in the long run, it should be broad-based across sectors, and flavor a large part of the country’s labor force stated Ramos, Ranieri and Lammens (2013).

2.1.3 Poverty, Income and Inequality

The circle of poverty, imagine about the children who live in slums with the poor family. Their parents have low education. Some of the young children are sent out to earn some money by selling roses, snacks, or garland on the street. They will earn little money because of the expense of attending school. In addition, the parents in the poor family have a limited ability of sending their children to school, and those parents with low education tend not to value education highly. Even if the tuition fees are low, the cost

of uniforms, transportation, and books are still quite high relative to their income level. These could lead to a lower opportunity of the poor children to gain high education. With low education, the children will grow up to be low skilled laborers, inefficient workers, and create low productivity so that they gain low income which traps them in the poor families. Moreover, low income and low living standards can only leads to lower growth because it limits the ability of individuals to reach their full potential. While in the rich families, the parents will have the opportunity to send their kids to school and could be able to have higher education. So, the children from a rich family will grow up to be highly skilled and knowledgeable workers, work more efficiently and have higher productivity, so they could achieve more income and become richer. This cycle shows that the poor family will receive poorer and poorer, while the rich will become richer and richer. Therefore, the gap between rich and poor becomes bigger and bigger. In development economics, poverty is defined as the inability to reach the resources and enjoy the standard of living. However, standard of living is varies from country to country, from individual to individual, because of the difference in culture, economy, and sociology. Hence, this definition is not very useful when measuring poverty and even less when making cross-country comparisons. To be more accurate, poverty can be defined in absolute terms. In standard measurement of poverty, the measurement would be conducted with the definition of “absolute poverty”.

According to Dowling and Valenzuela (2013), there are some basic measurement of poverty and inequality. In the case of poverty measurement, Headcount ratio (HCR) is the basic of poverty, the HCR defined as:

$$HCR = \frac{q}{n}$$

Where q is the number of citizens living under poverty line and n is the number of households in the population.

Another poverty indicator is poverty gap ratio (PGR), defined as:

$$PGR = \frac{\sum_{y_i < p} (p - y)}{nm}$$

Where n is the total population, m is the mean income and the denominator nm in this measure is the total income in the economy.

There is another related measure called: income gap ratio (IGR), defined as:

$$\text{IGR} = \frac{\sum_{y_i < p} (p - y)}{pq}$$

Where p is the poverty line and q is the total number of people in poverty and the denominator, p and q is the total income of the poor. However, measuring absolute poverty could provide some problems when compare cross countries result. The reason is that the nutrition, housing, and clothing requirements are different in the different areas, peoples' needs are different in different areas within a country, between countries, and between broad regions of the world. For example, individuals may feel poor in Australia if he or she do not own a car or color TV, but in Philippines neither of these things are necessary for living a good life.

For inequality, when economy achieves economic growth and development, the benefit will pouring on each individual. However, the benefit may not be filtered equally on each individual. There is still a vicious circle, when the rich become richer and the poor become poorer. Therefore, the measuring of an inequalities in each region or country is necessary. In the basic properties of equalities measure, there are three basic properties that inequality measure must be satisfy.

1. Mean or scale independence: This property will happen when all levels of income are increased or decreased by the same proportion.
2. Population size independence: When the population change does not affect the change in the inequality, the property will be hold.
3. Pigou-Dalton transfer sensitivity: This property will be hold if an income transfer from richer person to a poorer person does not make the poor become wealthier than the richer.

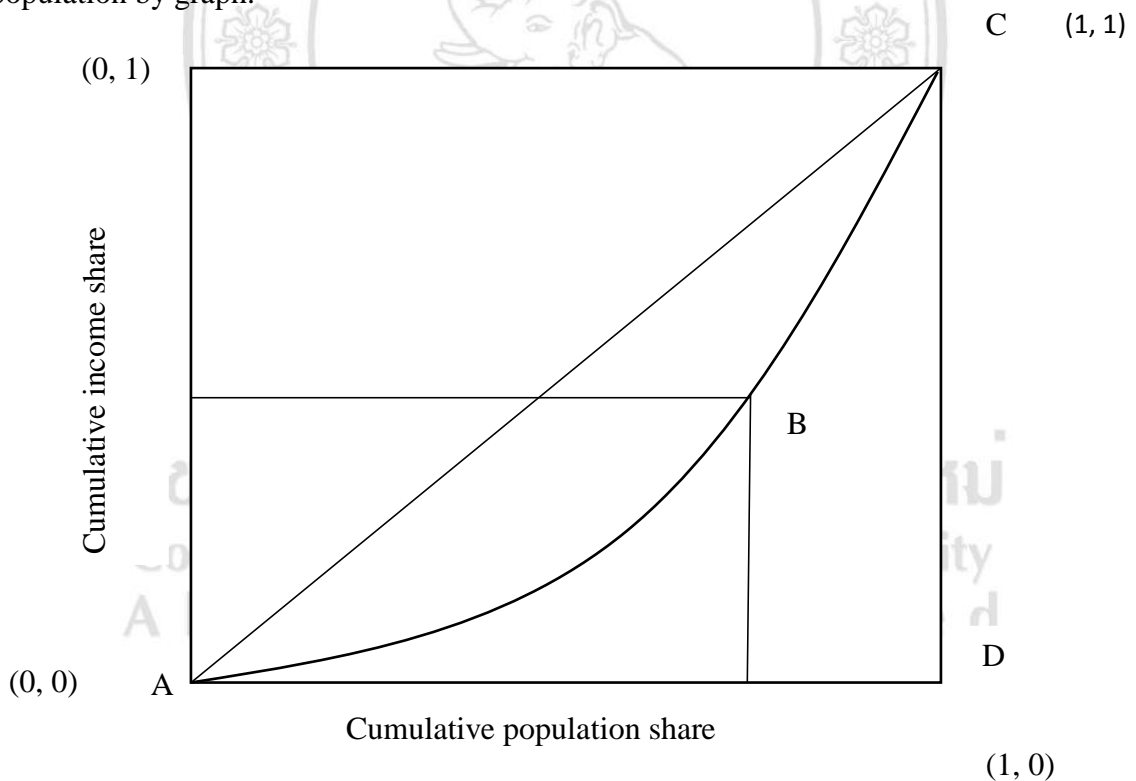
Simon Kuznets (1955) was the first to come up with the simple measure of inequality. The Kuznets income quintile ratio is the ratio of the income earned by the top 20 percent of the population that is received by the lowest 20 percent. The Kuznets income ratio is another popular way to analyze inequality in income distributions. This ideology considers the income shares of different income groups in the population. Specifically, households are grouped into income quintiles and no inequality occurs when each quintile group has 20 percent share of national income.

Of all inequality measurements (Dowling J.M. and Valenzuela Ma. R., P.235, 2010) the Gini coefficient and the Lorenz curve are the most widely used. Gini coefficient can be defined as:

$$G = \frac{1}{2n^2\mu} = \sum_{i=1}^n \sum_{k=1}^n |x_i - x_k|,$$

Which effectively sums up all possible pairs of incomes in the distribution, normalized by n^2 representing the number of all possible pairing multiplied by the mean income μ of the distribution $(x_1, x_2, x_3, \dots, x_n)$. The value of Gini index ranges from 0 to 1. A value of 0 implies that all incomes are shared equally among population, while the value of 1 means that all incomes are concentration with one person or household in the entire distribution representing imperfect inequality.

The Gini coefficient is often viewed in the relation in the Lorenz curve which represents the relationship between the cumulative shares of income and the cumulative shares of population by graph.



Source: Dowling J.M. and Valenzuela Ma. R., P.235 (2010)

Figure 2.2: Kuznets Curve.

The Gini coefficient G is easily derived from a Lorenz curve by noting that it is the ratio of the area bounded by the diagonal and the Lorenz curve to the total area in the lower triangle. That is:

$$G = \frac{\text{Area between } AC \text{ and } ABC}{\text{Total area in } ACD}$$

However, analyzing inequality and poverty requires the long run of the data, which based on group and long term data which represents the trend, so, nowadays the study of this topic is easier than in the past.

2.1.4 Human Capital

Human capital is divided into two major groups, education and health. Education and health reflect the quality of labor, the labor with high level of education and with good health would have high productivity, which could lead to a higher production and growth.

1.) Human Capital in form of Education

Education is one of the determinants of growth as education could induce productivity in the society; this idea was expressed by many economists. Education can be defined broadly in all forms of human learning, involving school attending, using textbooks and/or having lessons in the classroom. Moreover, education could be represented as an informal form such as children learning from parents, learning through school society, and/or learning by watching the older, mature skilled workers. However, education in most theory refers to the formal education, which is school attendance and having lessons in the classroom. Education is the basic objective of development. Education play the key role in the ability of a developing country to gain modern technology and to develop the capacity for self-sustaining growth and development, according to Todaro and Smith (2009). Improving education helps families escape the vicious cycle of poverty. Education levels are usually high in the high-income countries. With higher education, higher productivity and income are possible. Considering human capital approach, human capital is the term economists usually use for education, health, and other human capacities to increase productivity of the workers. Human capital could refer to the educated workers. Recall the production function pointed by Mankiw (2006):

$$Y = Af(L, K, H, N)$$

A= level of technology

L= Quantity of labor

K=Physical Capital

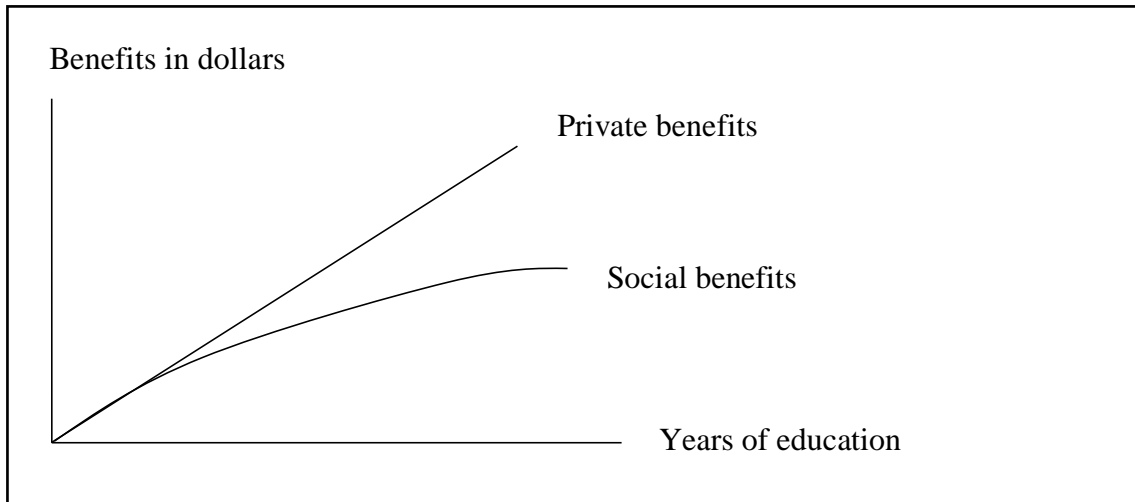
H= Human Capital

N=Natural Resources

Since, Human Capital is the knowledge and skill workers obtain from education, training, and experiences and it is contributed to countries' production. The production of countries will be increased as there is an increasing of human capital. An increasing in the production of the countries could be analyzed as the one's ability to produce, called productivity. There are three main ways that education could influence productivity.

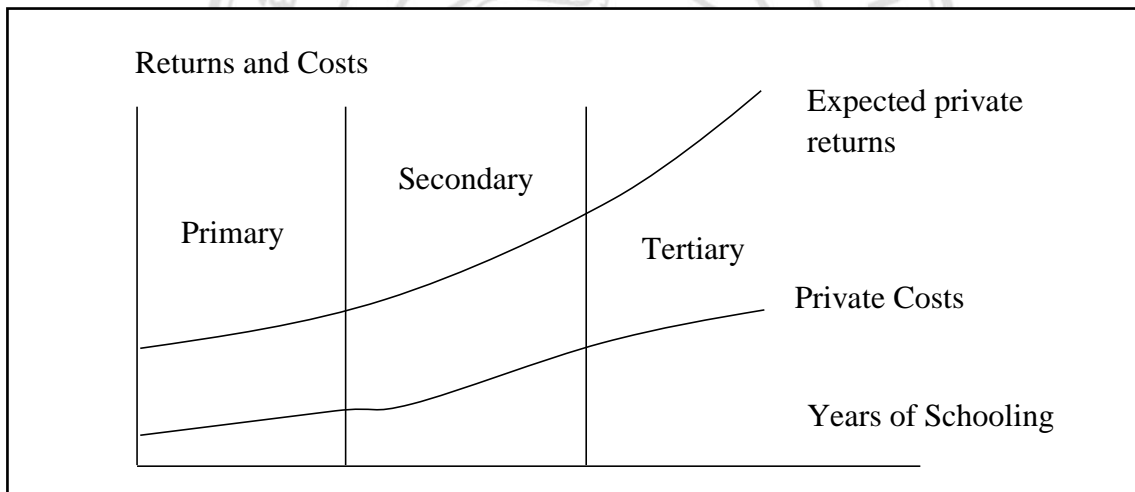
1. Increase in productivity.
2. The cost of adjustment inputs and outputs of production decrease.
3. Ability of workers to use new technology increase.

Since, the three main ways reveal that education results in higher productivity, lower cost of production adjustment, and higher ability to use new technology. All these factors make the worker become more attracting for the firm or the employee. Normally, a firm will hire people with knowledge and skill, so, education may result in the higher rate of employment. According to Drèze and Sneessens (1997) and Layard and Nickell (1999), they stated that except for Italy and Israel, unemployment rates decrease with education attainment in almost all the OECD countries. Moreover, Devine and Kiefer (1991) cited that workers with higher levels of formal education move into employment more quickly than workers with less education. In addition, the evidence from microeconomics study (Dowling J.M and Valenzuela Ma. R., 2010) suggests that there are high rates of return to investment in education for the individual. Since, education is considered to be public goods. There is a rationale for government subsidies. Society could benefit from the positive externalities created from the provision of education. Mainly at the primary and early secondary levels, for example, it is agreed that educated people are more law-abiding and hence, make better citizens. They can make more informed decisions in voting and be more responsible citizens. In addition, the additional burden on public resources is also substantially higher per pupil at the tertiary level (shown in figure 4).



Source: Dowling J.M. and Valenzuela Ma. R., P.266 (2010)

Figure 2.3: Private versus Social Benefits of Education



Source: Dowling J.M. and Valenzuela Ma. R., P.267 (2010)

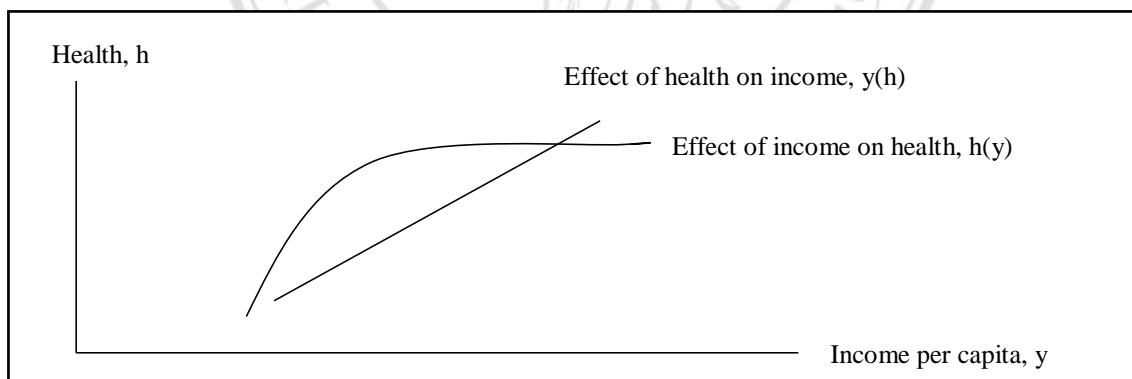
Figure 2.4: Private versus Social Benefits and costs of Education

2.) Human Capital in form of Health.

As the country's economics develop, health conditions of its population would be improved. The improvement of health in population results in a good quality of life. Considering health in the production side, healthier workers can work harder and longer than the unhealthy worker, and also can obtain more income. Therefore, the country with a better health will achieve high income and production. Becker (1993) and Schultz (1997) have stated that health and nutritional expenditures is a part of human capital investment. It is commonly believed that economic growth causes populations to

live better and have longer lives with good health. Economic growth means increasing per capita income, and increased income reflects higher consumption of higher quantity and better quality nutrients.

As the country develops, nutrition obtained by the population is improved. The improvement of nutrition allow workers to work more effectively and have contributed significantly to increase in income per capita. Better nutrition also results in higher income which allows the worker to afford healthier food. People who are rich can afford every input that can improve their health, such as vaccines, clean water, clean food, and safe working conditions. Among the Organization for Economic Co-operation and development (OECD), there are an average of 2.2 doctors per thousand people. In the developing world, the average is 0.8, and in sub-Saharan Africa, the average is only 0.3 as stated by United Nations Development Program (2000). Healthier people will be a better worker and better worker could generate higher incomes and have higher opportunities to be employed, so there is a relationship between health and income which could also reflect the relationship between health and poverty and inequality. The relationship between health and income could be shown in the graph below.



Source: Weil N. D., P.175 (2010)

Figure 2.5: Correlations of health and income

Figure 5 shows the correlations between health and income, both health and income are endogenous variable. The horizontal axis shows income per capita (y) and the vertical axis shows health of workers (h). Curve y (h) state the impact of health on the level of income per capita. For higher level of h, workers are able to produce more of output, so the curve is upward sloping. The curve h (y) shows the impact of income per capita on

health. The curve is also upward sloping, showing that higher income improves health, but notice that the curve have flattens with higher income. This shows that the benefits of income on health are more pronounced at lower level of income.

2.2 Econometrics theory

2.2.1 Panel unit root test: Panel unit root testing improved from time series unit root testing. The major difference to time series testing of unit roots is that we have to consider asymptotic behavior of the time-series dimension T and the cross-sectional dimension N.

1.) First Generation Panel unit root test

1.1) Levin-Lin-Chu Test: According to Levin et al. (2002), individual unit root tests have limited power. The power of a test is the probability of rejecting the null when it is false and the null hypothesis is unit root. Levin-Lin-Chu Test (LLC) suggest the following hypotheses

H_0 : Each time series contains a unit root

H_1 : Each time series is stationary

Where the lag order p is permitted to vary across individuals, the procedure works as follows:

First, run augmented Dickey-Fuller (ADF) for each cross-section on the equation:

$$\Delta y_{it} = \rho_i y_{i,t-1} + \sum_{L=1}^{\rho_i} \theta_{iL} \Delta y_{it-L} + \alpha_{mi} d_{mt} + \varepsilon_{it}$$

In the second step, run two auxiliary regressions:

1. Δy_{it} on Δy_{it-L} and d_{mt} to obtain the residuals $\hat{\varepsilon}_{it}$ and
2. $y_{i,t-1}$ on Δy_{it-L} and d_{mt} to get residuals $\hat{\nu}_{i,t-1}$.

The third step involves standardization of the residuals by performing

$$\tilde{\varepsilon}_{it} = \hat{\varepsilon}_{it} / \hat{\sigma}_{\varepsilon i}$$

$$\tilde{\nu}_{i,t-1} = \hat{\nu}_{i,t-1} / \hat{\sigma}_{\varepsilon i}$$

where $\sigma_{\varepsilon i}$ denotes the standard error from each ADF.

Finally, run the pooled OLS regression

$$\tilde{\varepsilon}_{it} = \rho \tilde{\nu}_{i,t-1} / \tilde{\varepsilon}_{it}$$

The null hypothesis is $\rho = 0$. Notice that the standard deviation for t-statistics has to be adjusted. The necessary condition for the Levin-Lin-Chu test is $\sqrt{N_T}/T \rightarrow 0$, while sufficient conditions would be $N_T/T \rightarrow 0$ and $N_T/T \rightarrow K$. (N_T means that the cross-sectional dimension N is a monotonic function of time dimension T .) Moreover, the null hypothesis that all cross sections have a unit root is very restrictive. That is, it does not allow the intermediate case, where some individuals are subject to a unit root and some are not. If T is very large, then Levin et al. (2002) suggest individual unit root time-series tests. If N is very large (or T very small) usual panel data procedures can be applied.

1.2) Im, Pesaran and Shin Test: The Im-Pesaran-Shin (IPS) test is not as restrictive as the Levin-Lin-Chu test, since it allows for heterogeneous coefficients. The null hypothesis is that all individuals follow a unit root process:

$$H_0: \rho_i = 0 \forall_i$$

The alternative hypothesis allows some (but not all) of the individuals to have unit roots:

$$H_1: \begin{cases} \rho_i < 0 \text{ for } i = 1, 2, \dots, N_1 \\ \rho_i = 0 \text{ for } i = N_1 + 1, \dots, N \end{cases}$$

When t_{ρ_i} is the individual t-statistic for testing the null hypothesis: $\rho_i = 0$ for all i , then the test is based on averaging individual unit root tests $\bar{t} = \frac{1}{N} \sum_{i=1}^N t_{\rho_i}$.

1.3) Breitung's Test: The procedure of the Breitung's test can be described as follows. The first step is same as in the Levin-Lin-Chu test, except that it does not include deterministic terms. Regress Δy_{it} on $\Delta y_{i,t-L}$ and obtain the residuals \hat{e}_{it} . Moreover, run y_{it-1} on $\Delta y_{i,t-L}$ and obtain the residuals \hat{v}_{it-1} . Then, apply forward orthogonalization transformation to the residuals \hat{e}_{it} and get e_{it}^* . Finally, run the pooled regression $e_{it}^* = \rho v_{i,t-1}^* + \varepsilon_{it}^*$, which is asymptotically $N(0,1)$ distributed

1.4) Combining p-Value Tests

1.4.1) Fisher-type Test: The Fisher-type test uses p-values from unit root tests for each cross-section i . The formula of the test looks as follows:

$$P = -2 \sum_{i=1}^N \ln p_i$$

The test is asymptotically chi-square distributed with N degrees of freedom ($T_i \rightarrow \infty$ for finite N). A big benefit is that the test can handle unbalanced panels.

1.4.2) Further Tests and Properties: There are many combining p-value tests, the inverse normal test Z (standard normal distribution), the logit test L (logistic distribution), and the modified Fisher-type test (when N is large). All of these tests share certain advantages:

- The number of cross-section observations N can be finite or infinite (except for the Fisher-type test).
- Each individual allows for different types of non-stochastic and stochastic components.
- The time dimension T can vary for each individual.
- The power is superior to both the Levin-Lin-Chu test and Im-Pesaran-Shin test (IPS has more power than LLC).

1.5) Residual-Based LM Test: Hadri (2000) proposes a test that builds on the Kwiatkowski-Phillips-Schmidt-Shin test (KPSS) from time series testing. KPSS tests are used for testing the null hypothesis that an observable time series is stationary around a deterministic trend. The Hadri test is based on OLS residuals obtained from regressing y_{it} on a constant (or a constant plus trend). The null hypothesis is that there is no unit root in any series (stationarity). The alternative hypothesis is that the panel has a unit root.

$$y_{it} = r_{it} + \varepsilon_{it}$$

$$r_{it} = r_{it-1} + u_{it}$$

$$H_0: \sigma_u^2 = 0$$

If variance u_{it} is zero, then r_{it} becomes a constant and thus y_{it} is stationary. The Hadri test allows for heteroskedasticity adjustments. Its empirical size is close to its nominal size if N and T are large.

2.) Second Generation Panel unit root test

2.1) The Pesaran Test: Pesaran (2007) has considered one-factor model with heterogeneous loading factors for residuals, the author apply standard Dickey-Fuller or augmented Dickey-Fuller regression with cross section average of lagged levels and first differences of the individual series. If the residual are not correlated, the regression used for the i^{th} country would defined as:

$$\Delta y_{i,t} = \alpha_i + \rho_i y_{i,t-1} + c_i \bar{y}_{t-1} + d_i \Delta \bar{y}_t + v_{i,t}$$

where $\bar{y}_{t-1} = (1/N) \sum_{i=1}^N y_{i,t-1}$ and $\Delta\bar{y}_t = (1/N) \sum_{i=1}^N y_{i,t}$. Denoted $t_i(N, T)$ the t -statistic of the OLS estimate of ρ_i . The Pesaran's test is based on these individual cross-sectionally augmented ADF statistic or so called CADF.

2.2.2 Simultaneous Equation Model

Simultaneous equation system is the systems of equations compose with many simultaneous equations including the value of all variables in the system. Some variables in the equations are correlated with in the equation system. Therefore, the left variable in simultaneous equation, which calls dependent variable, could be on the right of another equation or so called independent variables. These types of equation system are from economics concept, normally the variables in economics could always relate to others. The structural equations in economics will compose with many variables, separated in to two major groups, endogenous and exogenous variables. The example of economics equations could be shown as follows:

$$\text{Consumption: } C = \alpha_0 + \alpha_1 y_t + \alpha_2 c_{t-1} + \varepsilon_{t1} \quad (2.1)$$

$$\text{Investment: } I = \beta_0 + \beta_1 r_t + \beta_2 (y_t - y_{t-1}) + \varepsilon_{t2} \quad (2.2)$$

$$\text{Demand: } Y_t = C_t + i_t + g_t \quad (2.3)$$

While C was consumption, I was investment, Y was national income, g was government expenditure and β , α , and ε was coefficients. In this equation system, it is obviously shows that the equation will compose with many endogenous variables including C, I and Y, but will compose with only one exogenous variable, which was g.

1.) Simultaneous Equation Model with Panel Data

Simultaneous equations models can be used with panel data contexts. For example, imagine estimating consumption, investment or demand of a group of households, firm, or individuals over a given period of time. Moreover, to allow simultaneous determination of variables in each time period, we can allow for unobserved effects in each equation. In consumption function, it would be useful to allow an unobserved taste for goods and services that do not change over time. The basic approach to estimating SEMs with panel data involves two steps: (1) eliminate the unobserved effects from the equations of interest using the fixed effects transformation or first differencing; (2) find instrumental variables, which is change over time, for the

endogenous variables in the transformed equation. The equation below shows simultaneous equation model with panel data as follows:

Recall equation 2.1, 2.2 and, 2.3:

$$\text{Consumption: } C = \alpha_0 + \alpha_1 y_t + \alpha_2 c_{t-1} + \varepsilon_{t1} \quad (2.1)$$

$$\text{Investment: } I = \beta_0 + \beta_1 r_t + \beta_2 (y_t - y_{t-1}) + \varepsilon_{t2} \quad (2.2)$$

$$\text{Demand: } Y_t = C_t + i_t + g_t \quad (2.3)$$

Written as panel data simultaneous equations;

$$\text{Consumption: } C = \alpha_0 + \alpha_1 y_{it} + \alpha_2 c_{it-1} + \varepsilon_{it1} \quad (2.4)$$

$$\text{Investment: } I = \beta_0 + \beta_1 r_{it} + \beta_2 (y_{it} - y_{it-1}) + \varepsilon_{it2} \quad (2.5)$$

$$\text{Demand: } Y_{it} = C_{it} + i_{it} + g_{it} \quad (2.6)$$

where i denotes cross section and t denotes time period

2.) Two-stage least squares

According to Baltagi (2005), the method of two-stage least square is the most common method used for estimating simultaneous equation models. The two-stage least square (2SLS) method consists of using as the instrument for Y_j the predicted values in a regression of Y_j on all the xs in the system:

$$\hat{Y}_j = X[(X'X)^{-1}X'Y_j] = XP_j$$

It can be shown that no heteroscedasticity or autocorrelation produce the most efficient estimator. The 2SLS estimator is written as follows;

$$\hat{\delta}_{j,2SLS} = \begin{bmatrix} \hat{Y}'_j Y_j & \hat{Y}'_j X_j \\ X'_j Y_j & X'_j X_j \end{bmatrix}^{-1} \begin{bmatrix} \hat{Y}'_j Y_j \\ X'_j Y_j \end{bmatrix}$$

Before proceeding, it is important to emphasize the role of the identification condition in this result. In the matrix $[\hat{Y}'_j, X_j]$, which has $M_j + K_j$ column, all columns are linear functions of the K columns of X. if the equation is not identified, then $M_j + K_j$ is greater than K, and $[\hat{Y}'_j, X_j]$ will not have full column rank. In this case, the 2SLS estimator cannot be computed. If, however, the order condition but not the rank condition is met, then although the 2SLS estimator can be computed, it is not a consistent estimator. There were few useful simplification. First, since $X(X'X)^{-1}X' = (I - M)$ is idempotent, $\hat{Y}'_j Y_j = \hat{Y}'_j \hat{Y}_j$. Second, $X'_j X(X'X)^{-1}X' = X'_j$ implies that $X'_j Y_j = X'_j \hat{Y}_j$. Thus the previous form could be written as:

$$\hat{\delta}_{j,2SLS} = \begin{bmatrix} \hat{Y}'_j \hat{Y}_j & \hat{Y}'_j X_j \\ X'_j \hat{Y}_j & X'_j X_j \end{bmatrix}^{-1} \begin{bmatrix} \hat{Y}'_j Y_j \\ X'_j Y_j \end{bmatrix}$$

The 2SLS estimator is obtained by ordinary least squares regression of y_j on \hat{Y}_j and X_j . Thus, the name stems from the two regressions in the procedure:

1. Stage 1. Obtain the least squares predictions from the regression of Y_j on X .
2. Stage 2. Estimate δ_j by least squares regression of Y_j on \hat{Y}_j and X_j .

A direct proof of the consistency of the 2SLS estimator requires only that we establish that it is a valid estimator. Required:

$$plim \begin{bmatrix} \hat{Y}'_j Y_j / T & \hat{Y}'_j X_j / T \\ X'_j Y_j / T_j & X'_j X_j / T \end{bmatrix} = plim \begin{bmatrix} P'_j X' (XII_j + V_j) / T & P'_j X' X_j / T \\ X'_j (XII_j + V_j) / T & X'_j X_j / T \end{bmatrix}$$

To be a finite singular matrix. The Slutsky theorem allows us to substitute Π_j for P_j in the probability limit. That the parts converge to a finite matrix. It will be nonsingular if Π_j has full column rank, which, in turn, will be true if equation is identified. We required that

$$plim \frac{1}{T} \begin{bmatrix} \hat{Y}'_j \varepsilon_j \\ X'_j \varepsilon_j \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix}$$

The second part is assumed, for the first, by direct substitution,

$$plim \frac{1}{T} \hat{Y}'_j X (X' X)^{-1} X' \varepsilon_j = plim \left(\frac{Y'_j X}{T} \right) \left(\frac{X' X}{T} \right)^{-1} \left(\frac{X' \varepsilon_j}{T} \right).$$

The third part on the right converges to zero, whereas the other two converges to infinite matrices, which confirms the result. Since $\hat{\delta}_{j,2SLS}$ in an IV estimator, we can just invoke a theorem for the asymptotic distribution. A proof of asymptotic efficiency requires the establishment of the benchmark, which we shall do in the discussion of the MLE. As a final shortcut that is useful for programming purposes, we note that if X_j is regressed on X , then a perfect fit is obtained, so $\hat{X}_j = X_j$. Using idempotent matrix $(1-M)$, the equations becomes:

$$\hat{\delta}_{j,2SLS} = \begin{bmatrix} Y_j'(I - M)Y_j & Y_j'(I - M)X_j \\ X_j'(I - M)Y_j & X_j'(I - M)X_j \end{bmatrix}^{-1} \begin{bmatrix} Y_j'(I - M)y_j \\ X_j'(I - M)y_j \end{bmatrix}$$

Thus,

$$\begin{aligned} \hat{\delta}_{j,2SLS} &= [\hat{Z}_j' \hat{Z}_j]^{-1} \hat{Z}_j' y_j \\ &= [(Z_j' X)(X' X)^{-1}(X' Z_j)]^{-1} (Z_j' X)(X' X)^{-1} X' y_j \end{aligned}$$

Where all columns of \hat{Z}_j' are obtained as predictions in a regression of the corresponding column of Z_j on X . This equation also results in a useful simplification of estimated asymptotic covariance matrix,

$$Est. Asy. Var[\hat{\delta}_{j,2SLS}] = \hat{\sigma}_{jj} [\hat{Z}_j' \hat{Z}_j]^{-1}$$

It is important to note that $\hat{\sigma}_{jj}$ is estimated by

$$\hat{\sigma}_{jj} = \frac{(y_j - Z_j \hat{\delta}_j)'(y_j - Z_j \hat{\delta}_j)}{T}$$

using the original data, not \hat{Z}_j .

2.3 Literature Review

This study will focus on effect of education and employment, effect of tax revenue on poverty and inequality reduction and the effect of these factors on growth. Therefore, the literature review will be focus on these topics. There are many topics used to cite about economics growth, the important topics should be concerned is the determinant of growth and their relationships. The investigation in the literature was conducted in many ways, an uncomplicated way like ordinary least square method all over to the more complicate ways like cointegration test, many kind of method were used to test both short run and long run relationships, this paper will focus only on the long run relationships.

2.3.1 Inclusive Growth: The term 'inclusive' in the characterization of growth first came up by Kakwani and Pernia (2000). This word explains the nature of what is to be considered pro-poor growth. Pro-poor growth is determined as the situation that allows the poor to participate and significantly benefit from economic activity, as stated by Kakwani and Pernia (2000). This characteristic can be realized as "inclusive economic growth". Inclusive Growth is the growth which includes the growth in all parts of economy which could be sustainable in the long run. Inclusive growth is defined by many definitions. Grinspun (2004) discussed that inclusive growth includes both poverty and

inequality reduction. While Ali and Son (2007) state that inclusive growth compose with the available opportunity among the citizens and how they are shared among the population. Habito (2009) defined that inclusive growth is the growth of GDP that leads to significant poverty reduction. Rauniyar and Kanbur (2010) stated that it is the growth with the equal opportunities and is the growth which is accompanied by lower rate of income inequality. Moreover, McKinley (2010) cited that inclusive growth is the achievement of sustainable growth and the participation of people who could benefit from growth, while Klasen (2010) state that inclusive growth wants the benefit of growth to favor all stripes of society, including the poor, the near-poor, middle income groups, and even the rich in terms of outcome. Inclusive growth could be termed as the 'disadvantage reducing' growth. Finally, Ranieri R. and Ramos R. A. (2013) have reviewed and concluded in their paper about the definitions of inclusive growth. They stated that most of the economists believed poverty and inequalities reduction, productive employment, and the capabilities or empowerment are concerned as the determinants of inclusive growth. To summarize, inclusive growth could finally be defined as the complement of two major aspects: benefit sharing, which was about poverty and inequality, and participation, which was about employment rate. Moreover, there is evidence that manufacturing growth shows an effect on the inclusive growth, especially in Southeast Asia in recent years. Balakrishnan, Steinberg, and Syed (2013) used regression model to investigate whether the focus country growth was inclusive or not. The inclusive regression results pointed that the income of the bottom quintile rising slower than average income. Moreover, they illustrate significant differences across regions: growth has generally not been inclusive in China, the NIEs, and South Asia (excluding India), whereas it has been strongly so in Brazil.

Table 2.1: The conclusion of Inclusive growth definition

	Ravallion and Chen (2003)	Bhalla (2007)	Ianchovichina and Lundstrom (2009)	Habito (2009)	Kakwani and Perma (2000)	White and Anderson (2001)	Kakwani, Khandker and Son (2004)	Son and Kakwani (2008)	Kraay (2004)	Ali and Son (2007)	Grosse, Harttgen and Klasen (2008)	Klasen (2010)	Raunivar and Kanbur (2010)	McKinley (2011)
Poverty	x	x	x	x			x	x	x		x			x
Inequality					x	x	x	x	x	x	x	x	x	x
Growth			x				x	x					x	x
Productive Employment		x	x											x
Capabilities/ Empowerment		x			x						x		x	x
Gender Inequality														x
Access to Infrastructure														x
Social Protection													x	x
Participation													x	
Targeted policies				x										
Basic Social Services														x
Good governance														x
Opportunity										x		x	x	
Barriers for investment			x											
Benefits of Growth													x	

Source: Ranieri R. and Ramos R. A., Inclusive Growth: Building up a concept. (2013: 18)

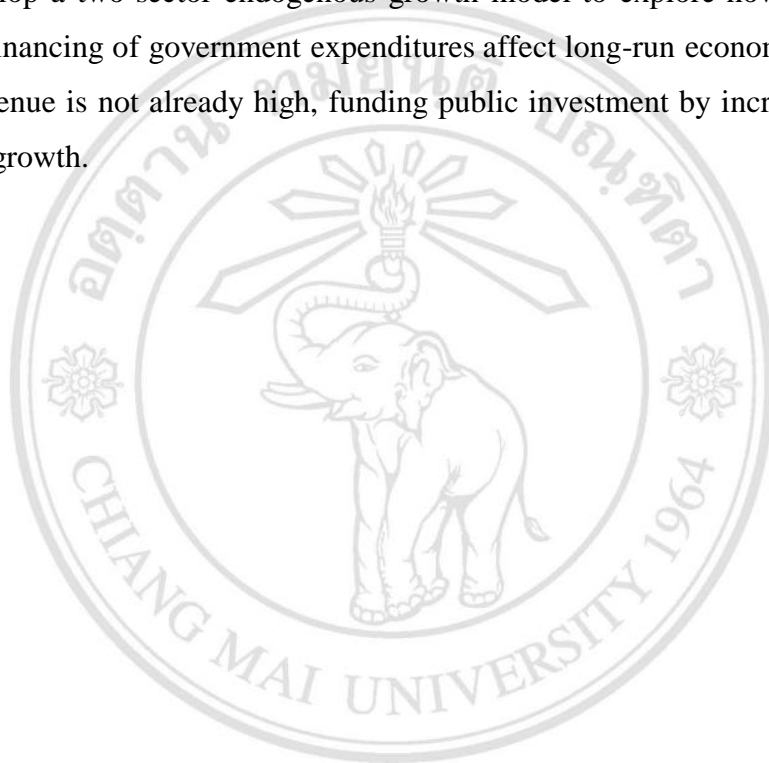
2.3.2 Employment: Many study suggest the positive short run relationship between employment and growth, such as Seyfried (N.D.), while there are many papers suggesting negative relationships. Yusof (2007) stated that high level of employment relate with lower level of productivity for most of OIC members case study, only Yemen found a positive relationship. However, there is a suggestion that long term employment productivity relationship is not supported. In addition, Sudrajat (2008) and Caporale and Skare (2011) also stated that employment growth causes output growth with a negative sign in the long run. However, Yasemin (2013) gives a different idea; the author states that there are long term relationships between unemployment and growth but only in female labor forces.

2.3.3 Poverty and Income Inequality: The results From the IMF Working Paper by Anand, Mishra, and Peiris and authorized for distribution by Cashin P. (2013) indicate that human capital, and structural changes are the ingredients for achieving inclusive growth. Foreign direct investment and trade openness cause from globalization could results in a greater inclusiveness of growth, while massive financial and technological change have no significant effect. Furthermore, Habito (2009) identified important key factors that could explain the inclusive economic growth, the author defined that gross domestic product (GDP) growth could leads to significant poverty reduction in Asia. Meanwhile, Winters (2014) found that both international trade and infrastructure make it more comfortable for people to exchange goods and services and increase income by country's specialization, economies of scale, variety product, etc. Considering the contribution of inclusive growth, poverty and income inequality was the first aspect that should be focus. Herzer and Vollmer (2011) used heterogeneous panel cointegration techniques to estimate the long-run effect of income inequality on per-capita income. They found that inequality has a negative long-run effect on income. This result was also confirmed by the OECD working paper conducted by Fosu (2010), the author stated that high initial levels of inequality limit growth effectiveness in reducing poverty, while hiking inequality decrease poverty directly for a given level of growth. Aigbokhan (2008) investigate the opposite effect and suggested that inequality seems to increase with growth, even when poverty seems to decrease with growth. In addition, in the real world poverty reduction could be succeed by the economic reform and higher growth rate stated by Fan, Zhang, and Zhang (2002).

2.3.4 Education and Health: Positive relationship between education and growth was confirmed by many papers. Afzal et al. (2010), Beskaya, Savas, Samiloglu (2010) and Khattak and Khan (2012) confirmed that there is a direct relationship between education and economic growth in Pakistan, in both short-run and long-run. While Permani (2009) noted that East Asian education systems have a close relationship with the stages of economic development and the higher the level of economic development results in the greater the demand for better education systems. Moreover, the relationship between education and income was also investigated; Hanushek and Woessmann (2012) stated that education could lead to the differentiation of income of one region and others. However, some paper gives different idea. Yusoff (2012) suggested that the exports, foreign direct investment and education expenditure could bring about economic growth with no feedback. In addition, many papers mention on the relationship between human capital and growth, which human capital could refer to the educated labor, those papers also found the positive relationship between the two variables. In the case of health care, Haldar and Mallik (N.D.) used cointegration test to examine the relationship between human capital and growth. They found that investment in education and health are very important and has a positive significant effect in long run on per capita gross national product growth. Moreover, the knowledge written by Research Analyst of DSAED state that good health is an important factor of country's development. Illness brings suffering and difficulty, so improved health could bring broader benefits, including enhanced economic development.

2.3.5. Tax revenue: This part of the literature will cite the literature that states the relationship between government expenditure and growth and how government expenditures were financed. First, government expenditure and growth literature includes Turnovsky and Fisher (1995), Feltenstein and Ha (1995), Devarajan, Swaroop, and Zou (1996), Agénor and Neanidis (2006), among others. Turnovsky and Fisher (1995) studied on how government consumption and infrastructure expenditure affect the economy. Feltenstein and Ha (1995) demonstrated that public infrastructure spending has diverse productivities in different sectors. Devarajan, Swaroop, and Zou (1996) show that the growth-maximizing allocation of public expenditure is achieved by equating the ratio of output elasticity with the ratio of initial shares of spending. Agénor and Neanidis (2006) study the optimal allocation of government spending among health, education and infrastructure, accounting for complementarities among three sectors. Since government expenditure could induce growth, tax correction could be the factor that financed government

expenditure. Turnovsky (1996) uses consumption and income taxes and debt as the factors of experiment; found that the optimal mix of massive financing on the level of infrastructure with respect to the social optimal and the degree of congestion is related. Chatterjee and Turnovsky (2005 and 2007) use a small open economy model to examine the effect of public financing on investment with foreign aid. Their results show that the effect on long-run growth varies depending on whether the aid is specifically tied to the activity of investment or not. In addition, Christie and Rioja (2012) develop a two-sector endogenous growth model to explore how variations in the composition and financing of government expenditures affect long-run economic growth. Found that, when tax revenue is not already high, funding public investment by increasing taxes may increase long-run growth.



ลิขสิทธิ์มหาวิทยาลัยเชียงใหม่
Copyright© by Chiang Mai University
All rights reserved

Table 2.2: Literature conclusion

Year	Authors	Title	Methodology	Variables	Results
(N.D.)	William Seyfried	Examining the Relationship Between Employment and Economic Growth in the Ten Largest States	<ul style="list-style-type: none"> - fixed-effects estimation technique for the pooled regression - SUR technique for state-specific models. 	<ul style="list-style-type: none"> - Real GDP - Output gap - Employment growth 	<ul style="list-style-type: none"> - Economic growth has a positive and significant impact on employment growth.
1999	Robert J. Barro	Inequality, Growth and Investment	Panel regression	<ul style="list-style-type: none"> - growth rate of per capita output - current level of per capita output - long-run or target level of per capita output - GINI coefficient - share of income accruing to the i^{th} quintile 	<ul style="list-style-type: none"> - The higher inequality tend to decrease growth in poor countries while, induce growth in the richer region. - For richer countries, active income redistribution appears to include a trade-off behaviour between the benefits of greater equality and a reduction in overall economic growth.

Table 2.2: (continued)

Year	Authors	Title	Methodology	Variables	Results
2004	Shenggen Fan, Xiaobo Zhang, and Neetha Rao	Public Expenditure, Growth, and Poverty Reduction in rural Uganda.	Benefit cost ratio	<ul style="list-style-type: none"> - Crop-production and land-use. - infrastructure variables - Poverty, income, employment, and wages rate - government spending - Total GDP 	<ul style="list-style-type: none"> - Investments in the northern region (a poor region) is the most effective way to reduce poverty. - Spending on infrastructure and education cause a significant effect and particularly high in poor region.
2007	Selmah, Abdullah Yusof	Employment and productivity link: A Study on OIC Member countries	Panel cointegration analysis	<ul style="list-style-type: none"> - Employment rate - Productivity growth rate 	<ul style="list-style-type: none"> - The results stated that high level of employment related with lower level of productivity for most of the case study of OIC members, while only Yemen, positive relationship was found but the long term relationship between employment and productivity is not supported

Table 2.2: (continued)

Year	Authors	Title	Methodology	Variables	Results
2008	Ben E. Aigbokhan	Growth, Inequality and Poverty in Nigeria	Simple regression	<ul style="list-style-type: none"> - total household expenditure - Education - Age of household head - Household size 	<ul style="list-style-type: none"> - poverty situation in Nigeria showed a declining rate since the 1990s in Nigeria, just as the economy coincide with impressive real growth rate based on prevailing level of inequalities in both income and non-income dimensions of welfare - poverty situation may be higher than the official estimates suggest, and more progress in poverty reduction

Table 2.2: (continued)

Year	Authors	Title	Methodology	Variables	Results
2009	Cielito F. Habito	Patterns of Inclusive Growth in Developing Asia: Insights from an Enhanced Growth-Poverty Elasticity Analysis	Multiple regression		<ul style="list-style-type: none"> - Higher contribution of manufacturing related with faster poverty reduction with an action to economic growth, particularly in the Southeast Asian countries. - The movement in the relative importance of agriculture and manufacturing is a basis of more inclusive growth. - Quality of governance create the strongest impact on inclusive growth. - Public expenditures in human development is important to inclusive growth.
2010	Ahmet Beskaya , Bilal Savas and Famil Şamiloglu	The impact of education on economic growth in Turkey	Autoregressive Distributed Lag (ARDL) approach to cointegration	<ul style="list-style-type: none"> - per capita real income - per capita school enrolment variables 	<ul style="list-style-type: none"> - long-run relationships are found between school enrolments and real income - Two-ways direction of long-run Granger causality is found between real income and school enrolments.

Table 2.2: (continued)

Year	Authors	Title	Methodology	Variables	Results
2010	Afzal et al.	Relationship Between School Education And Economic Growth in Pakistan	ARDL Bounds Testing Approach to Cointegration	<ul style="list-style-type: none"> - Real GDP - Fixed capital formation - School enrollment ratio (%) - Inflation rate - Head count index as a measure of absolute poverty 	<ul style="list-style-type: none"> - There is a direct relationship between school education and economic growth in Pakistan, both in the short-run and the long-run - Inflation prevent economic growth in both short-run and long-run, while it decrease school education only in the long-run.
2010	Augustin Kwasi FOSU	Growth, Inequality and Poverty Reduction in Developing Countries: Recent Global evidence	Recent global evidence analysis	Developing countries data of Growth Inequality and Poverty Reduction.	<ul style="list-style-type: none"> - Average income growth has been an important driving force for both the declines and increases in poverty - In most countries growth was an important factor behind the decreasing or increasing in poverty, inequality, and also played an important role in poverty behaviour in a many countries.

Table 2.2: (continued)

Year	Authors	Title	Methodology	Variables	Results
2011	Dierk Herzer and Sebastian Vollmer	Inequality and growth: evidence from panel cointegration	heterogeneous panel cointegration techniques	<ul style="list-style-type: none"> - real income per capita - percentage investment share of real GDP per capita - estimated household income inequality - Gini coefficient 	<ul style="list-style-type: none"> - Inequality create negative long-run effect on income, both in developed countries, developing countries, democracies, and non-democracies
2011	Guglielmo Maria Caporale and Marinko Škare	Short- and Long-Run Linkages Between Employment Growth, Inflation and Output Growth: Evidence From a Large Panel	panel cointegration and causality tests	<ul style="list-style-type: none"> - annual growth rate of real output - annual inflation rate - annual growth rate of employment 	<ul style="list-style-type: none"> - Growth in output create a growth in employment in the short run. - Growth in employment is negatively correlate with output growth in the long run.

Table 2.2: (continued)

Year	Authors	Title	Methodology	Variables	Results
2012	Eric A. Hanushek and Ludger Woessmann	Schooling, educational achievement, and the Latin American growth puzzle	Ordinary Least Squares (OLS) estimation	<ul style="list-style-type: none"> - Years of schooling - Physical capital - GDP per capita in relative teacher salary 	<ul style="list-style-type: none"> - the positive effect of educational achievement has a very high impact on the performance in the growth of the poor in Latin American countries - education could create the difference between income of one region and others
2012	Douglas H. Brooks and Eugenia C. Go	Trade, Employment and Inclusive Growth in Asia	Literature review and Qualitative analyzing		<ul style="list-style-type: none"> - Rapid structural transformation in Asia induces trade and employment. Including the region's massive informal sector.
2012	Naeem Ur Rehman Khattak and Jangraiz Khan	The Contribution of education to economic growth: evidence from Pakistan.	Ordinary Least Squares (OLS) and Johansen Cointegration test	<ul style="list-style-type: none"> - GDP Per Capita (Real) - Gross Fixed Capital Formation - School Enrolment (elementary and secondary education) - Labour force participation rate 	<ul style="list-style-type: none"> - The results from OLS, education at elementary and also secondary level affect economic growth. - Johansen Cointegration test results show that there is an existing long run relationship between education and economic growth.

Table 2.2: (continued)

Year	Authors	Title	Methodology	Variables	Results
2012	Tamoya A.L. Christie and Felix K. Rioja	Debt and Taxes: Financing Productive Government Expenditures	dynamic micro- foundations growth model	<ul style="list-style-type: none"> - average annual growth - rate of GDP per capita - rate of government spending to GDP - Government revenue from taxation and other sources - The average stock of debt per country 	<ul style="list-style-type: none"> - If tax rates are low at the beginning, funding public investment by increasing taxes may increase long-run growth. - If tax rates are high, public investment is only induce growth, if fund are provided by restructuring the composition of overall public spending. - In addition, public investment that is debt-financed can have adverse effects on long-run growth because of the results that increases in interest rates and debt-servicing costs
2013	Ozerkek Yasemin	Unemployment and Labour force participation: Panel Cointegration analysis for European Countries	Panel Cointegration analysis	<ul style="list-style-type: none"> - unemployment rate and labour-force participation rate for both females and males 	<ul style="list-style-type: none"> - There are long term relationships between unemployment and growth but only in female labor forces.

Table 2.2: (continued)

Year	Authors	Title	Methodology	Variables	Results
2013	Ravi Balakrishnan, Chad Steinberg, and Murtaza Syed	The Elusive Quest for Inclusive Growth: Growth, Poverty, and Inequality	Regression analysis	<ul style="list-style-type: none"> - poverty headcount below the \$2 line - per capita income - GINI coefficient 	<ul style="list-style-type: none"> - Inequality interacts with income, means that a higher level of inequality tends to reduce the effect of income growth on poverty reduction. - Income of the bottom quintile rising at a lower rate than average income.
2013	Rahul Anand, Saurabh Mishra, and Shanaka J. Peiris	Inclusive Growth: Measurement and Determinants	Panel regressions	<ul style="list-style-type: none"> - PPP GDP per capita - per capita income growth 	<ul style="list-style-type: none"> - Macroeconomic stability, human capital, and structural changes are the important factors for achieving inclusive growth.
2014	L. Alan Winters	Globalization, Infrastructure, and Inclusive Growth	Literature review and Qualitative analyzing		<ul style="list-style-type: none"> - Two of the key factors that affect economic growth is trade and infrastructure, these factors tend to create inequalities and reduce inclusive growth.

2.4 Conceptual Framework / Model

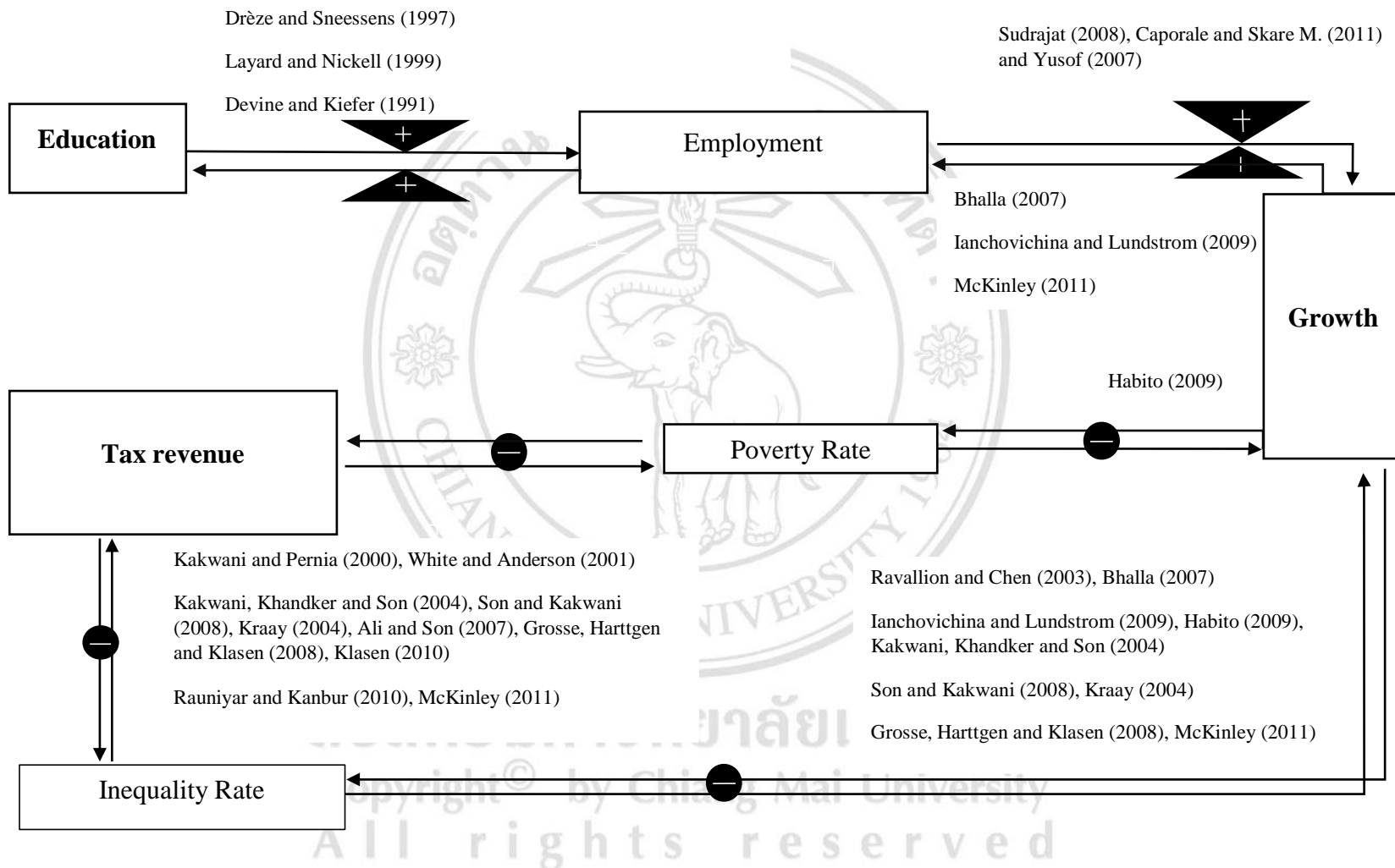


Figure 2.6 Conceptual Framework / Model