AUGMENTED MANKIW-ROMER-WEIL MODEL FOR THE IMPACT OF FOREIGN LABOUR ON AN ECONOMIC GROWTH

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To umi, walid and family,
Nazri and friends

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ABSTRACT

Economic growth is an increase in the level of national output. The economic factors that cause economic growth are an increase in capital stock consisting of physical capital and human capital. When one of the economic factors increases while the other decrease, the level of national output is a net decrease. Nowadays, the influx of foreign labour is becoming a serious issue around the world. This research is to see the impact of foreign labour on economic growth by augmenting the Mankiw-Romer-Weil model. A new variable of foreign labour is added as an input in human capital. Mankiw, Romer and Weil extended the Solow-Swan model to explain the role of human capital and physical capital in economic growth. Since 1992, the economists have found human capital as an important role that causes economic growth. Human capital is a stock of knowledge and skill that produces effective labour. Foreign labour only brings human capital and they are generally unskilled labour. A new model is developed by separating the human capital into two characteristics; unskilled labour from foreign labour and skilled labour from domestic labour. It is found that the foreign labour are helping in generating human capital, but their excessive presence will cause more negative effects on the production of human capital and physical capital. This means that the increase in employment of foreign labour can decrease the level of national output. Data from Malaysia is simulated in an existing model (Mankiw-Romer-Weil model) and the new model (Augmented Mankiw-Romer-Weil model) to make comparison. The result from this research clearly shows that foreign labour can affect national output and neglecting the role of foreign labour can affect the level of national economic growth.

ABSTRAK

Pertumbuhan ekonomi ialah peningkatan dalam tahap keluaran negara. Faktor-faktor ekonomi yang menyebabkan pertumbuhan ekonomi adalah peningkatan dalam saham modal yang terdiri daripada modal fizikal dan modal insan. Apabila salah satu daripada faktor-faktor ekonomi meningkat dan yang lain menurun, paras keluaran negara adalah penurunan bersih. Pada masa kini, kemasukan buruh asing menjadi satu isu yang serius di seluruh dunia. Kajian ini adalah untuk melihat kesan buruh asing ke atas pertumbuhan ekonomi dengan mengubah suai model Mankiw-Romer-Weil. Pembolehubah baharu buruh asing ditambah sebagai input dalam modal insan. Mankiw, Romer dan Weil melanjutkan model Solow-Swan untuk menjelaskan peranan modal insan dan modal fizikal dalam pertumbuhan ekonomi. Sejak tahun 1992, ahli-ahli ekonomi memperakui modal insan sebagai antara peranan penting yang menyebabkan pertumbuhan ekonomi. Modal insan adalah saham pengetahuan dan kemahiran yang menghasilkan tenaga kerja yang berkesan. Pekerja asing hanya membawa modal insan dan mereka secara umumnya buruh tidak mahir. Model baharu dibangunkan dengan mengasingkan modal insan kepada dua ciri; buruh tidak mahir daripada pekerja asing dan buruh mahir daripada pekerja dalam negeri. Ia didapati bahawa buruh asing itu membantu dalam menjana modal insan, tetapi kehadiran mereka yang berlebihan akan mengakibatkan kesan yang negatif kepada pengeluaran modal insan dan modal fizikal. Ini bermakna bahawa peningkatan dalam pekerjaan buruh asing boleh mengurangkan tahap keluaran negara. Data dari Malaysia adalah simulasi dalam model yang sedia ada (model Mankiw-Romer-Weil) dan model baharu (Augmented model Mankiw-Romer-Weil) untuk dibuat perbandingan. Hasil daripada kajian ini jelas menunjukkan bahawa pekerja asing boleh memberi kesan kepada keluaran negara dan mengabaikan peranan tenaga pekerja asing boleh memberi kesan kepada tahap pertumbuhan ekonomi negara.

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LIST OF ABBREVIATIONS

MRW	Mankiw-Romer-Weil
GDP	Gross Domestic Product
GDS	Gross Domestic Saving
GDK	Gross Domestic Capital
GDFC	Gross Domestic Fixed Capital
HDI	Human Development Index
TFP	Total Factor Productivity

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LIST OF SYMBOLS

$Y(t)$	Production function/ Output
$y(t)$	Production function/ Output per effective labour
$K(t)$	Physical capital
$\dot{K}(t)$	Accumulation of physical capital
$k(t)$	Physical capital per effective labour
$\dot{k}(t)$	Accumulation of physical capital per effective labour
$H(t)$	Human capital
$\dot{H}(t)$	Accumulation of human capital
$\dot{H}_{dw}(t)$	Accumulation of human capital for domestic labour
$\dot{H}_{fw}(t)$	Accumulation of human capital for foreign labour
$h(t)$	Human capital per effective labour
$\dot{h}(t)$	Accumulation of physical capital per effective labour
$\dot{h}_{dw}(t)$	Accumulation of physical capital per effective labour for domestic labour
$\dot{h}_{fw}(t)$	Accumulation of physical capital per effective labour for foreign labour
$L(t)$	Labour force
$L_{dw}(t)$	Labour for domestic labour
$L_{fw}(t)$	Labour for foreign labour
$L_{total}(t)$	Total of labour

$A(t)$	Level of technology/ Total factor productivity
s	Saving rate for physical capital
s_K	Saving rate for physical capital
s_H	Saving rate for human capital
m	Rate of population growth for domestic labour
n	Rate of population growth for foreign labour
g	Rate of technological progress
δ	Rate of depreciation of physical and human capital
α	Physical capital share
β	Human capital share

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CHAPTER 1

INTRODUCTION

1.1 Introduction

Economics is the social science that intends to analyse and describe the factors that determine the production, distribution and consumption of goods and services (Marshall and Mary, 1879). Economics focuses on the behaviour and interactions of households and firms and how the economies work. Consistent with this focus, there are two general fields of study in economics, which is microeconomics and macroeconomics.

Microeconomics studies the behaviour of individual agents, which are households and firms in making decisions on the allocation of limited resources (Blaug, 2007). Macroeconomics deals with the decision-making, structure, behaviour and performance of the entire economy and issues affecting it (Blaug, 2007). There are two significant research areas that explain macroeconomics; the endeavour to understand the causes and consequences of fluctuations in national income (business cycle) and the analysis of the determinants of economic growth (increase national income).

This study analyses the factors affecting long-term growth of national output. Economic growth is an increase in the level of national output of goods and services in the country (Carruthers and Babb, 2012). It occurs because of the increase in economic factors such as labour, capital stock and level of technology over a prolonged period. Economic growth is measured as the percentage of increase in real Gross Domestic Product (GDP), that is the annual monetary value of all goods and services produced. In this study, several terms are used to represent the level of national output. As mentioned earlier, economic growth is the increase in the level of national output. To determine the level of national output, the term production function is used.

There are several models and theories that explain the processes of economic growth. These are classical models, neoclassical growth theory, Salter cycle, endogenous growth theory, energy and energy efficiency theories, big push and Schumpeterian growth theory. The model to be studied in this research is based on the framework of the neoclassical growth theory, it is an economic theory that outlines how the proper amounts of the labor, capital stock and technology can accomplish a steady economic growth rate (Solow, 1956).

The neoclassical growth theory was developed by Harrod (1939), Domar (1946), Solow (1956), Swan (1956), Mankiw (1992), Romer (1992) and Weil (1992). The first growth model formed by using this theory is Harrod-Domar model. It is developed independently by Harrod (1939) and Domar (1946). This model states that the rate of economic growth is dependent on the level of saving and the productivity of capital. If the country has a high level of saving, it supplies funds for firms either to borrow or invest. Investment raises the capital and the production of goods and services that generate positive economic growth. They show that the ratio of capital output measures the investment of productivity. If ratio of capital output decreases, the economy will be more productive, because fewer inputs generated higher amounts of output, hence the higher economic growth.

In 1956, Solow and Swan separately built an economic model to explain the long term economic growth by looking at capital accumulation, growth of labour or population and technological progress. This model now known as Solow-Swan model, is an extension of the Harrod-Domar model, where Solow found that the assumption of fixed proportions of labour and capital is the cause of an economic equilibrium to be unstable and it is inefficient in dealing with long-term growth problem (Solow, 1956). Both of them used the neoclassical production function by varying the proportions of capital and labour input to determine economic equilibrium, as the new features of the said model.

Solow shows that by taking rates of saving and population growth as exogenous, these variables determine the steady state of national output. He predicts that for a country to be richer, it has to have higher saving rate. On the other hand, a country with a higher population growth rate will be poorer. This model explains that the economic growth is influenced by capital accumulation, population growth and technological progress over prolonged period of time.

Since the works of Solow and Swan in 1950s, more economists are attracted to study the processes of economic growth and it became a major research area (Boianovsky and Hoover, 2009). Koopmans (1965) and Cass (1965) extended the Solow-Swan model by using Ramsey (1928) model framework to show that an optimal saving rate is determined endogenously in which households can make decisions either to consume or invest. Mankiw, Romer and Weil (1992) also argued against Solow-Swan model and augmented the model by including the human capital as well as physical capital to improve the performance of the model which became known as the Mankiw-Romer-Weil model. In their paper, they showed that the inclusion of the human capital input provides a better explanation why some countries are poor and some are rich.

In recent years, economists generally accept that human capital is one of the important factors of economic growth. Many find that the investment in human capital, by increasing their skills, knowledge and health, increase economic growth. The new growth theory is known as the endogenous growth model. This new theory emphasises on the technological progress that gives a positive effect on economic growth (Mankiw *et al*., 1992). Investments in human capital, new knowledge and innovations are contributors to economic growth.

1.2 Background of the Study

In most economies today, there are significant involvement of foreign labour. Currently, more countries such as Switzerland, Canada, United State, including Malaysia and others countries provide more job opportunities in construction, manufacturing, plantation and other industries. This situation has attracted foreign labour to seek employment. There are pros and cons in hiring foreign labour in the economy. The influx of foreign labour is a common phenomenon, but when their involvement is unharnessed it will be a serious issue.

Malaysia is one of the countries where industrial, plantation and construction sectors are in need of labour and this has opened up opportunities for foreign labour to fill the jobs. One reason for hiring foreign labour is Malaysia experiences a critical shortage of certain types of labour (Wong, 2011). Most local people are not keen in working in an environment that requires them to use physical strength. Rather they prefer working in offices and abhor the 3D (dirty, dangerous and demeaning) jobs (The Star, 2011). Other than that, the salaries of foreign labour are lower than domestic labour even with the minimum salary act is practised in Malaysia now (Mydin *et al*., 2014).

This study is related with foreign labour and national output to get positive economic growth. One of the economic factors that help to raise the national output is the production of more labour force and human capital. Human capital also includes labour forces. The involvement of foreign labour which can help in generating human capital through increasing in labour force but they does not help in the producing of physical capital (Barro and Sala-i-Martin, 2004).

Human capital is the collective of knowledge, talents, skill and accumulated experiences for a population (OECD, 2007). The concept of human capital acknowledges that all labour is different and their labour quality can be raised by investing in them (Romer, 1990). Overall for those economies and employers, education, experiences, and abilities of an employee become an economic value for them.

The starting point of the research about the importance of human capital in economic growth is from Romer (1986) and Lucas (1988). Halder and Malik (2010) shown in their research that human capital is one of the factors causing economic growth. According to Koumparaoulis (2013), the long-term success of an economy is due to the factor of human capital.

In 1992, Mankiw, Romer and Wiel modified Solow-Swan models by including human capital as a factor of production function (Mankiw *et al*., 1992). In their paper, they showed the contribution of human capital in economic growth, where increases in human capital will increase the economic growth. From Mankiw-Romer-Weil model, the importance of human capital is the same as physical capital.

The inflow of foreign labour increases the volume of labour. Foreign labour is a contribution in human capital. This study extends the Mankiw-Romer-Weil model to assess the impact of foreign labour to level of national output. A detail analysis of Mankiw-Romer-Weil model found that this model does not describe in

detail the types of labour in a country. In reality, the type of labour consists of domestic labour and foreign labour. Mankiw-Romer-Weil model considered labour as an entity, with no distinction between their origin. It is important to take into account the effect of foreign labour to economic growth of a country. In this research, a comparison is made between the presence and the absence of foreign labour in capital stock accumulations and production function. This is to distinguish the differences between their skills, knowledge and experiences. These differences will affect economic growth in a country.

1.3 Motivation

A majority of researchers has concentrated on the issue of the impact of foreign labour on domestic labour and salaries. Nonetheless, almost no evaluation has been done on their contribution to economic growth. It is important to consider the influence of employing foreign labour to economic growth.

Foreign and domestic labours are known as human capital. There are three categories of workers based on the skills and their academic attainment. The lowest class is the unskilled labour, the middle class is the skilled labour and the highest class is the high skilled labour. In this research, foreign labour is assumed as unskilled labour because employers do not look at their education levels when hiring them. Domestic labour is assumed to be either as semi-skilled or skilled labour since they usually have education level at least at the secondary level in applying for jobs.

Labour is one of the input in production function in Mankiw-Romer-Weil model, and it is assumed that labor represents all types of labour in a country. There is however a difference between domestic labour and foreign labour. By modifying

the Mankiw-Romer-Weil model, the impact on the employment of foreign labour in economic growth can be identified.

1.4 Problem Statement

Researches have been made on the effect of foreign labour on domestic labour and wages. However, very little evaluation has been done on their contribution to economic growth. The aim of this thesis is to assess the impact of foreign labour to economic growth. The factors contributing to economic growth are capital stock accumulations (comprising physical capital and human capital), labour or population growth and technological progress. Though foreign labour has the potential in producing more human capital, they are, however, not exerting much impact on the volume of physical capital (Barro and Sala-i-Martin, 2004). Due to this reason, this research proposes a model with an involvement of foreign labour in human capital. A modified model is introduced by including foreign labour as a new variable in human capital.

1.5 Objective of the Study

The objectives of the research are:

i) to develop new model by adding the foreign labour element in human capital based on augmenting the Mankiw-Romer-Weil model,

ii) to ascertain the effect of foreign labour in economic growth by making a comparison in capital accumulations rate and production function rate in Malaysia.

1.6 Scope of the Study

This research was conducted to find the impact of the influx of foreign labour in the Malaysian economic growth. The study was carried out by isolating the foreign labour element in human capital by augmenting the Mankiw-Romer-Weil model. The aspects looked into were the types of labour, where domestic labour is skilled labour and foreign labour is unskilled labour. The difference of skill in the labour are based on their education attainment. The sources of data in this research are from Department of Statistics, Malaysia, The World Bank, The Conference Board, Freed Economic Data and United Nations Development Programme (UNDP) from 2005 to 2014.

1.7 Significance of the Study

This study aims to yield a new model, on economy development which looks at the contribution of foreign labour in an economy. This study identify the positive and negative impact of foreign labour to economic growth. By understanding the benefits of employing domestic labour, it will give a country an upper-hand in making an informed effective decision in relation with hiring foreign labour and national economy. Furthermore, the findings from this research can become an important effort in encouraging employers and government to motivate awareness in hiring domestic labour to sustain national wealth.

1.8 Thesis Outline

The thesis has six chapters. Chapter 1 is a brief discussion of the problem that gives motivation to the research. It introduces and highlights the importance of the study. Chapter 2 is the literature review of existing models and theories that give a framework to understand the process of economic growth and the effect of foreign labour to an economy.

Chapter 3 presents the overall research plan such as the operational framework and the theoretical framework. A new model is developed by augmenting the Mankiw-Romer-Weil model and preparing data for the parameters (the saving rate, the growth rate of labour, the technological progress rate and the depreciation rate of capital stock) and data for the variables (the rate of accumulation of physical capital and human capital) in Augmented MRW model in Chapter 4. In Chapter 5, a discussion on the results making a comparison between the presence and the absence of foreign labour variable in capital stock accumulation rate and level of production functions rate.

Finally, the summary, conclusion and some recommendation for future works are presented in Chapter 6.

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