

**QUALITATIVE AND QUANTITATIVE ANALYSES OF UNEMPLOYMENT
IN MALAYSIA**

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**A dissertation submitted to Othman Yeop Abdullah Graduate School of
Business in partial fulfillment of the requirements for Master of Finance, at
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ABSTRACT

This paper attempts to provide a overview of the determinants of unemployment in Malaysia. Unemployment's influencing factors are traditionally described as either micro- or macroeconomic to a nation. A qualitative investigation of the microeconomic variables for unemployment in Malaysia and a quantitative time series analysis of macroeconomic variables for unemployment in Malaysia are made. The shift of the secondary sector towards the tertiary sector and the use of high-tech production is held to be of importance for the unemployment rate in Malaysia. On a macroeconomic level, GDP per capita and the inflation rate, Okun's Law and the Phillips Curve, are analyzed. This study provides an overview of Malaysian unemployment in both a qualitative and quantitative sense. It forms the foundation of comparison of economical phases gone through by developed countries.

Keywords: Unemployment, Malaysia, GDP, Inflation, Okun's Law, Phillips Curve, Manufacturing, Service.

ABSTRAK

Kertas kerja ini cuba untuk memberi gambaran keseluruhan faktor-faktor penyumbang kepada pengangguran di Malaysia. Faktor yang mempengaruhi kadar pengangguran secara tradisionalnya digambarkan sebagai samaada dalaman atau luaran untuk negara. Satu kajian kualitatif pembolehubah dalaman untuk pengangguran di Malaysia dan analisis siri masa kuantitatif pembolehubah luaran untuk pengangguran di Malaysia dijalankan. Peralihan daripada ekonomi pembuatan kepada ekonomi berasaskan industri perkhidmatan dan penggunaan pengeluaran berteknologi tinggi didapati menjadi penting secara dalaman di Malaysia. Pada tahap keluaran dalam Negara kasar (KDNK) per kapita makroekonomi dan kadar inflasi, dengan itu Undang-undang Okun dan Keluk Phillips dianalisis. Kajian ini memberikan gambaran keseluruhan Malaysia dalam erti kata yang kualitatif dan kuantitatif. Ia membentuk asas perbandingan fasa ekonomi yang dilalui oleh negara-negara maju.

Kata Kunci: Pengangguran, Malaysia, KDNK, inflasi, Undang-undang Okun, Keluk Phillips, Pembuatan, Perkhidmatan.

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CHAPTER 1

INTRODUCTION

1.1 Background of the Study

Unemployment is associated with periods of time in which an individual actively seeks to find a job and mentally prepares him or herself to work at any level of wage in the market. This is referred to as a *strict* or *narrow* definition of unemployment, where the person actively seeks for work. The *broad* perspective includes those who are unemployed and not actively looking for a job. Another important type of unemployment is *cyclical unemployment* which is a factor of overall unemployment that relates to the cyclical trends in growth and production that occur within the business cycle.

Unemployment has been analyzed throughout the last and current century. A large share of the research has focused on the developed world. The studies have surpassed the structural economic phases which developing countries are currently going through. The current states of affair in developing countries are likely to show signs of similarities to economic phases of developed countries dating years back. As for developing countries, the trends of unemployment have been extensively analyzed. Effects of a variety of factors determining unemployment have been extensively investigated throughout the middle and end of the 20th century for developed countries. This analysis might prove to show similarities to developing countries. If we are to analyze the current state of affairs for specific developing countries, the future might be reflected in what happened to developed countries in the past decades.

1.2 Problem Statement

The trends of unemployment are important for the future well-being of developing countries. The analysis of what influences unemployment is therefore a crucial step in understanding future directions of unemployment. This generally applies to any developing country. This paper will address Malaysian unemployment. The question asked in this research is “what micro- and macroeconomic parameters have shaped Malaysian unemployment in the recent past?” The question will be answered by a qualitative analysis of microeconomic factors and a quantitative analysis of the macroeconomic factors.

1.3 Research Objectives

The main purpose of this research is a deductive and empirical examination of the determining factors of unemployment in Malaysia, investigating both micro- and macroeconomic factors. Microeconomic forces shaping unemployment are country specific, and will be analyzed in a qualitative fashion. Macroeconomic forces are those forces influencing unemployment on a macroeconomic level. They will be analyzed in a quantitative time series analysis.

1.4 Research Questions

The research objective is to explore specific microeconomic forces influencing unemployment in Malaysia by analyzing the literature on Malaysia’s economic sectors. The second goal is to find whether historically held determining macroeconomic forces are at play in shaping unemployment in Malaysia. A

combination of micro- and macroeconomic forces will give an overview of the height of current Malaysian unemployment rate, in order to attain a understanding thereof. The research questions are represented as follows:

1. What microeconomic factors influence unemployment rate in Malaysia?
2. Is there any evidence for Okun's Law in Malaysia?
3. Is there any evidence for the Phillip's Curve in Malaysia?

1.5 Significance of the Study

Although the question asked in this paper has been asked for a variety of countries throughout the years, their focus often lies either in the importance of microeconomic factors or macroeconomic factors shaping the unemployment rate. This paper addresses both these issues. Research has predominantly been carried out in the Western world. The theories at play are often described as simplistic or weak, and it is therefore important to test them. The lay-out of this research is an important template for future research across other developing countries.

1.6 Scope and Limitations of the Study

The intend of this paper is to fill the gap on Malaysian unemployment research, as to look for both microeconomic drivers, and secondly by investigating two macroeconomic theories, Okun's Law and the Phillip's Curve. As this paper focusses on a single country, Malaysia, it is limited in describing whether Okun's Law and the Phillip's Curve are existent or non-existent across countries. This does provide some indication for what might be happening to other countries sharing similar

characteristics with Malaysia. This cross-country comparison is beyond the scope of this study.

1.7 Structure of the Thesis

The remainder of this paper will be structured as follows. First, the theoretical background will be discussed regarding microeconomic and macroeconomic influencers of the unemployment rate. It then progresses to describe the Malaysian case in some detail. This will be done qualitatively in terms of the microeconomic forces at play in shaping Malaysian unemployment. Next, a literary review of the general macroeconomic forces determining the unemployment rate will be laid out. The implications of these for Malaysia are then explored.. The methodology describing the quantitative testing used, and therefore looks at macroeconomic factors exclusively. The data is described as a time series data, including illustrations in tables and figures. This will lead to the results section, which is used to draw conclusions on the determining factors of the unemployment rate in Malaysia. At the end, an overview describing the Malaysian case of unemployment will be given.

CHAPTER 2

LITERATURE REVIEW

2.1 Theoretical framework

The role of determinants in shaping unemployment has been extensively studied, but the evidence so far is contradictory and inconclusive (Boubtane et. al, 2013; Liu & Zeng, 2008; Maqbool et. al, 2013). Central to these studies is the partition of those who describe unemployment related to social and microeconomic factors and those who explain unemployment through the influence of macroeconomic policies and institutional changes related to fiscal and monetary policies. The intent of this paper is to study the importance of both microeconomic and macroeconomic factors on the unemployment rate in Malaysia. This chapter will first give an insight into the microeconomic factors influencing the Malaysian job market. This will be the qualitative side of the study. In the following chapters there will be a progression towards quantitative analysis of macroeconomic factors that influence unemployment. The basis for the quantitative analysis will also be laid down in later sections of this chapter.

Social and microeconomic influences vary greatly across countries and are therefore hard to quantitatively determine. It is important to understand the nature of these social and microeconomic influences, as their role should not be underestimated. It is important to look at other studies from the developing world, in order to find potential influences for the Malaysian case. Section 2.2 will be dedicated to finding the underlying microeconomic concepts related to the unemployment rate in Malaysia. To progress towards a quantitative analysis, section 2.3 is intended to

target macroeconomic variables. A selection of macroeconomic variables will be made that have previously been observed to affect unemployment across countries.

Before discussing the micro- and macroeconomic forces that shape the unemployment rate in Malaysia it is important to make a distinction between both analysisanalyses. Both the investigation of micro- and macroeconomic forces are historical analyses, meaning that it is necessary to look at years prior to this point in time to see which factors are actually influencing the rate of unemployment in the country. Microeconomic forces are typically country characteristics that can be observed. Macroeconomic forces are typically macroeconomic parameters that can be compared across nations easily. Both analyses hold some predictive power. The emphasis of this paper is primarily on the macroeconomic side, as they will be encompassed by empirical analysis. The literature in this chapter is mainly derived from case studies of other developing nations, as they are likely to be relevant to the Malaysian case.

2.2 Microeconomic forces

The role of microeconomic forces has been studied at length with a large variety of countries as case samples (Shackleton, 1985; Liu & Zeng, 2008). In terms of labour market fundamentals affecting labour supply and demand, variables that are presumably at play are the preferences of workers and trade unions, legislation, bargaining powers of employers and employees, technology and other market powers. These labour market conditions cause wage rigidity, which causes involuntary unemployment.

Social theory points towards age, educational, residential and gender differences within the population as predictive determinants for unemployment. The younger generation in a country is more likely to be unemployed compared to the older population group (Sackey & Osei, 1993). This can be a result of lower labour market skills of young people relative to their elders (Anyanwu, 2013). Unemployment is identified as an urban phenomenon (Dickens & Lang, 1995), although the challenges of measuring unemployment in the rural areas have to be taken into account, as well as *disguised unemployment* (Oye et. al, 2011). The effect of gender differences and educational background has been established before (Liu & Zeng, 2008).

2.2.1 Microeconomic forces in Malaysia

As has been mentioned in the previous section, microeconomic drivers for the unemployment rate vary greatly amongst countries. One might suggest that regional drivers could be held responsible, but this is questionable. Whereas Malaysia is located in what can be described as the center of South East Asia, they do not necessarily share characteristics with surrounding countries. Malaysia does not have the unimaginable large population size as neighboring Indonesia, nor does it have the number of foreign immigrants Thailand has. Even though Malaysia might share a number of characteristics with surrounding countries, looking at microeconomic driving forces for unemployment on a regional level will result in a general analysis, rather than being in-depth and specific.

It is important to establish the change in Malaysia's economic sectors in order to comprehend the movement of the unemployment rate. Although unemployment is often viewed as a mere statistic, analysis proves that the movement of the

unemployment rate is preceded by the movement of economic markets. Malaysia's economic structure is shifting. It has historically made a shift from an economy relying on the agricultural sector towards being focused on the manufacturing sector (Lim, 1987). The current economic trend is the shift from the manufacturing sector towards a larger emphasis on the tertiary sector, the services sector (Wadud, 2007). In the future, this trend is likely to progress, and a larger share of the GDP will be invested in technological markets which will bring forth automated processes in which human labor will be of less importance (Kincaid, 2004). This is held to be an important driving force of Malaysian unemployment, at current times, and in the future (Kamal & Azura, 2006).

It cannot be said that the shift from the agricultural sector towards the manufacturing sector in earlier times, or the current shift observed towards the service sector is an absolute driver for unemployment. The Malaysian unemployment rate has been rather steady throughout the years, lacking large fluctuations. However, this does not mean that there have not been any shifts in the unemployment rate. The share in the unemployment rate caused by the decrease in volume in the agricultural sector has largely been filled by new employment in the manufacturing economy. The same can hold for the current shift towards the service industry.

Besides the shift towards services, it has been observed that Malaysian manufacturing companies are more often utilizing high-tech machineries in order to produce more products to increase efficiency (Loganathan, et. al, 2012). High-tech machineries naturally lowers the need for manual labor, creating unemployment.

Microeconomic forces tend to be varying greatly amongst countries. There are a number of factors that seem to influence unemployment amongst many countries in

the world. However, each country needs to be looked at individually in order to fully comprehend the circumstances of unemployment. In the case of Malaysia, we have seen that a shift from the secondary sector towards a larger share of the tertiary sector is one of the main driving forces of the unemployment rate (Kamal & Azura, 2006). A second important issue is the increased use of high-tech technology which makes manual labour idle.

Besides the microeconomic factors looked at in this research, there may be various other microeconomic factors that are important in shaping the rate of unemployment in Malaysia. These are factors that were previously mentioned to play a role in various other countries. Therefore, the view this research takes on microeconomic factors is that there is a rather large set of parameters playing a role. These cannot all be described individually. Rather than attempting to do so, two specific microeconomic forces in Malaysia have been described. The argument that other countries deal with similar forces, those being the shift towards service industries and high/tech manufacturing, holds some power (Hill, 2014).

It is important to understand this shift in the structure of the sectorial economy. The economic state regarding unemployment that Malaysia currently finds itself in could be described as a phase. Other developing ASEAN countries are likely to have reached or will reach that phase in the future. Developed countries have reached this phase in the past, and thorough investigations of what happened afterwards have been made. These investigations therefore hold important lessons for Malaysia.

2.2.2 Financial crisis

The dataset which will be described in more detail in a later chapter of this paper comprises of a timeline in which two financial crisis occurred. In 1997 there was a financial crisis that gripped much of East Asia, and more specifically South East Asia (Cowdhry & Goyal, 2000). Malaysia is located in South East Asia, and we are therefore expected to notify this crisis in the dataset. The timespan of this study includes the subprime mortgage crisis that affected the entire world economy, which started at the end of 2007 (Brunnermeier, 2009). It is expected that this influence is observable in the data, although maybe not at the time the crisis started in the United States and Europe. It is logical to expect that the crisis hit Asia, thus Malaysia, afterwards.

2.3 Macroeconomic forces

The drawback of studying social and microeconomic forces of a nation influencing the unemployment rate to the extent of making a comparison across countries is the magnitude of their specific characteristics and differences in the level of depth of the information and their availability and reliability. This applies to a number of macroeconomic economic policies too, but to a lesser extent. If we are to view Malaysia's unemployment rate it is important to look not only at microeconomic forces, but as well to the macroeconomic forces.

A number of studies have been conducted to find macroeconomic variables that influence the circumstances of unemployment on a national level in general. Macroeconomic theory suggests that GDP, real investment, real consumption, inflation rates, real interests rates and the output gap may have predictive powers for

the unemployment rate (Li, 2006; Blanchard & Galí, 2005; Sögner, 2001; Burgen et al, 2012; and Oye *et al*, 2011).

Various studies have been carried out investigating the forces typical for a single country that determine the level of the unemployment rate. These studies differ in their level of depth, and cross comparisons are therefore rather scarce. Within Malaysia, research tends to either describe microeconomic forces or macroeconomic forces, even though this distinction is not always clearly made.

Previous studies on the macroeconomic determinants of unemployment have shown strong arguments for inflation and economic growth (Sögner, 2001; Liu & Zeng, 2008; Maqbool *et al*, 2013; Burgen *et al*, 2012; Valadkhani, 2003; Eita & Ashipala, 2010). The arguments for these variables as determinants of the unemployment rate will be discussed within this chapter.

In order to study the effects of the inflation rate and economic growth on the unemployment rate in Malaysia this paper addresses the literature surrounding the influential macroeconomic factors of the unemployment rate and selects those macroeconomic variables that were found to be significantly related in the long-term. To study those macroeconomic variables empirically and combining them with a deductive analysis of microeconomic forces will bring about a more comprehensive overview of the driving forces of the rate of Malaysian unemployment.

Most case studies address unemployment within a given country as to account for the specific national determinants of the unemployment rate. Within that framework it is admissible to include country-specific microeconomic variables. However, when approaching the unemployment determinants on a national level it is also important to observe macroeconomic factors that play a more overarching role. The intent of

this paper is not to make a cross comparison of countries, but nevertheless to set a basis for doing so in future research.

The discussion of existing literature on macroeconomic variables will be split into sections as to address each determinant specifically. This inevitably leads to a justification of the use of variables in the model adopted in this study.

2.3.1 Unemployment and gross domestic product (GDP)

Macroeconomic theory suggests that the real economic growth of a nation may have predictive powers for unemployment. Traditionally it is held that when economic output falls, as measured by GDP, the business cycle is low and *cyclical* unemployment will rise (Galuščýák, 2007). The relationship was stipulated by Okun (1962) who postulated an inverse relationship between unemployment rate changes and movement of the real GDP. In more recent observation of economic trends Okun's Law has been described as somewhat outdated. The response of employment to GDP growth is relatively slow in some case-examples (Baah-Boateng, 2013), whereas in other instances slow GDP growth with dramatically falling unemployment rate was reported (Burgen *et al*, 2012). As a result, it is suggested that economic growth can either decrease or increase unemployment, depending on the sources for economic growth (Eriksson, 1997; Falkinger & Zweimuller; 2000, Liu & Zeng, 2008). They hold that "it seems intuitive to think there is a natural, robust relationship between changes in unemployment and changes in output. However, what exact form it takes is a complicated problem that requires going beyond the simple rule of thumb given by Okun's law".

Sögner (2001) felt that, given the empirical evidences from the United States, he should test Okun's Law for the Austrian market. As Okun's law is expressed as the growth in GDP which should decrease the unemployment rate. His estimates verify that for unemployment to decrease by 1%, the above average growth in GDP should be 4.16%.

2.3.2 Unemployment and the inflation rate

The inflation rate is a weighted function of changes in the prices of tradable and non-tradable goods (Nguyen et. al, 2012). The inflation rate is reflected by the Consumer Price Index (CPI). The relation between the inflation rate and the unemployment rate was described at length by William Phillips (1958), who observed an inverse relationship between money wage changes and unemployment. Ostensibly, when unemployment was high, inflation was low, and vice versa. The graphical visualization accompanying this relationship was coined the 'Phillips Curve'. This Phillips Curve represents the trade-off between unemployment and inflation. During the 70's, *stagflation* was observed which implies high inflation coupled with high unemployment. This would imply that the Phillips Curve was too simplistic. Blanchard and Galí (2005) bridged the gap between old and new Phillips Curve literature empirically explaining inflation as a function of lagged and expected inflation, the unemployment rate and the change in the price of non-produced inputs. "A key difference lies in the relevance of a forward-looking component in the determination of inflation". This implies that there may very well be an Phillips Curve like trade off, even in the long-term. In that light, recent research which confirms finding a Phillip Curves trade-off in countries such as Pakistan (Maqbool *et*

al, 2013), Iran (Valadkhani, 2003), Namibia (Eita & Ashipala, 2010), is not very surprising. However, the Phillips Curve has often been analyzed within the framework of individual rather than a group of, nations.

Conjoining the variables we observe that for both the relationship between the GDP per capita and the unemployment rate, as well as for the inflation rate and the unemployment rate, there are historical theoretical frameworks in place. For the relationship between GDP per capita and unemployment there is “Okun’s Law”, describing an inverse relation between the two. For the relationship between the inflation rate and the unemployment rate there is the “Phillips Curve”, describing an inverse correlation as well. The two have in common that they are relatively old frameworks that have had both praise and criticism throughout the years. For many economists they are seen as either outdated or simplistic. This paper provides an excellent opportunity to re-investigate the current role of Okun’s Law and the Phillips Curve in the context of Malaysia. It will be interesting to note whether economists can still rely on those two frameworks or to discard them .

2.4 Non investigated determinants

Naturally, a large pool of macroeconomic parameters exists from which factors could be drawn for this study. This literary review is limited to an investigation into macroeconomic influences on the unemployment rate described by previous studies. A number of other macroeconomic factors have been described in several other studies. Verifying that no important variables were omitted from this study, there is a brief exploration of those macroeconomic factors.

Tang (2009) found evidence for a long term relationship between crime rates and the unemployment rate in Malaysia. However, his study of causality points towards inflation and unemployment to precede the crime rate. It is therefore deductively not logical to study the influence of crime rates on unemployment.

No evidence was found by Boubtane *et al*, (2013) to suggest that *immigration* influences either unemployment or per capita income. Not much research has been done on comparison of countries with smaller and larger populations, in relation to the unemployment rate. It could be argued that countries with a larger *population* have a larger number of unemployed people. No such evidence can be found, and neither have any attempts been made to describe the relationship between immigration and unemployment in detail. The GDP of each country has been adjusted for the population of that country, as the GDP per capita is the used variable in this study. From the literature, this seems to be sufficient adjusting for the population.

CHAPTER 3

METHODOLOGY

This chapter is dedicated to the research design, data collection and data analysis techniques used in this study. These empirical tests are performed in order to find whether the inflation rate or GDP per capita are determinants for the unemployment rate in Malaysia. The hypotheses are formulated, and the methodology, the research model with the relevant variables is explained.

3.1 Research design

The purpose of the quantitative side of this research is to find whether the inflation rate and GDP per capita determine the unemployment rate of Malaysia. It has been taken into account that there are various microeconomic factors governing the rate of unemployment in Malaysia. The second aim of this paper is to find whether there is any evidence for macroeconomic factors determining unemployment in Malaysia. This relationship is tested for a time series dataset comprising of figures from 1991 until 2013. Previous investigation of the used variables can be found in section 2.3 “The macroeconomic determinants of unemployment”. Ultimately, this paper examines the data of the unemployment rate, GDP per capita on a year to year basis, and the inflation rate of Malaysia during 23 years, starting from 1991.

3.2 Hypotheses development

Hypotheses will be formulated based upon a combination of available literature and deductive reasoning thereof as explained in Chapter 2. The components of these

hypotheses are the unemployment rate, GDP per capita and the inflation rate. The specific theorems are “Okun’s Law” and the “Phillips Curve”.

Okun’s Law postulates that an inverse relationship exists between the GDP and unemployment. This theorem has been developed in the mid-19th century and has received both criticism and praise. Modern day results vary across different researches. Typical for a research in this field is that its data set comprises the national data of a single country. The first intent of this paper is to analyze this relationship of GDP per capita and the unemployment rate within Malaysia. A slight modification to the earliest forms of Okun’s Law is the inclusion of the population size. The GDP has been adjusted for the population of the country throughout the years. GDP per capita will be measured on a year to year basis. The data represents the increase- or decrease of GDP per capita in each individual year, relative to the previous year. The reader should therefore note that it is possible to find a negative outcome for GDP. Unemployment will be measured as the unemployment rate, which adjusts for the work force, which is a function of the population.

Hypothesis 1: Changes in GDP per capita are inversely related to changes in the unemployment rate in Malaysia

The Phillips Curve suggests an inverse relationship between inflation rate and unemployment. Research on this topic has brought about various results. The second intent of this paper is to analyze this relationship of the inflation rate and the change in unemployment rate within Malaysia. As was the case in the formulation of Hypothesis 1.1, the unemployment rate will be used rather than actual unemployment, to adjust for the population size of each country.

Hypothesis 2: Changes in the inflation rate are inversely related to changes in the unemployment rate in Malaysia

A large amount of published research suggests that both Okun's Law and the Phillips Curve are likely to be present to some degree. The rejection of the null hypotheses would imply that there are relationships between the unemployment rate and GDP per capita and the unemployment rate and the inflation rate in Malaysia. The next step would be to further investigate these relationships. In case the null hypotheses of Hypothesis 1.1 and 1.2 are rejected, the next step would be to see if significant causal relationships exist between the variables. This would mean that either GDP per capita or the inflation rate is a determinant for the unemployment rate, or both are. Significance of the testing will result into accepting or rejecting the following hypotheses.

3.3 Data collection

To provide the reader with an overview of how the data has been retrieved to perform this research, the content of this section focusses on data collection. The method of collection of each variable is described in detail. The timespan chosen for this study is based on the availability of the data for each variable. 1991 is the furthest back in time where accurate figures of Malaysian unemployment were available. Other variables are therefore limited to the extent to which unemployment figures are available.

3.3.1 Unemployment

Unemployment in this research is simply an abbreviation for the unemployment rate. It is the percentage of the total labour force that is unemployed but actively seeking employment and is therefore willing to work. The Malaysian data was collected using Thomson Reuters Datastream. As noted previously, there is a subtle but important difference between unemployment and the unemployment rate. An argument could be made in favor of investigating the actual rate of unemployment. This argument would be made typically for a single country investigation. To be able to compare data across countries in further studies, unemployment has to be adjusted for the total population size. To exemplify; the actual unemployment of Indonesia is much larger than that of Malaysia. At first glance, one might assume that Indonesia has a greater unemployment problem. However, once we adjust for the total population of the country we may find that the average sample of 100 Malaysian individuals and 100 Indonesian individuals yields a larger number of unemployed Malaysians. In order to be able to use the results from this study in other studies, it is important to be able to use the same variables in other countries.

3.3.2 Gross Domestic Product

Gross Domestic Product (GDP) in this research is simply an abbreviation for GDP per capita. GDP per capita is the monetary value of all finished goods and services produced within a country on an annual basis, relative to the population of that country. The data for Malaysia was also collected using Thomson Reuters Datastream. As was the case with unemployment, GDP needs to be adjusted to the

population size of each country when cross national data is to be examined in further studies. This argument was brought forward in the previous section.

3.3.3 Inflation

Inflation in this research is simply an abbreviation for the inflation rate. The inflation rate is the rate at which the general level of prices for goods and services rises. A rising inflation indicates a decrease in purchasing power. The Malaysian inflation rate data was collected using Thomson Reuters Datastream.

3.4 Techniques for Data analysis

The data used for this research is a *times series* data set. Using econometric time series data poses a major challenge. Empirical work based on time series data assumes that the underlying time series is *stationary* (Gujarati & Porter, 2009). A time series is stationary if its mean and variance do not vary systematically over time. If a time series is not stationary it is called a *nonstationary time series*, meaning that the mean and/or variance vary across time. In practice, that means if a time series is nonstationary, it is only possible to draw conclusions about its behavior for the time period examined.

3.4.1 Augmented Dickey-Fuller test

Data concerning economic and financial time series often exhibit non-stationary behavior in the mean. Nonstationary data can be either a completely *random walk* or

a *random walk with drift*. It is held that parameters such as stock prices and exchange rates follow a random walk, as to cause capital markets to function efficiently. The equation for the random walk model without drift is $Y_t = Y_{t-1} + u_t$. The value of Y at time t is equal to its value at time $t-1$ plus a random shock. The equation of a random walk with drift introduces a *drift parameter* δ . The equation therefore becomes $Y_t = \delta + Y_{t-1} + u_t$. The drift parameter determines whether the drift is upward or downward, depending on whether δ is positive or negative. The random walk model is known in the literature as a *unit root process*, hence the conjoined term for tests of stationarity; *unit root tests*. This paper will utilize one of such unit root tests, the Augmented Dickey-Fuller test. The terms nonstationarity, unit root, random walk and *stochastic trend* can be treated as synonyms. A unit root is said to exist in the equation $Y_t = \rho Y_{t-1} + u_t$ when the absolute value of ρ is 1. If it can be determined that the absolute value of ρ is less than 1, Y_t is confirmed to be stationary.

An important econometric task is then to determine the most appropriate form of the trend in the data. A unit root test such as the Augmented Dickey-Fuller test can be used to determine if trending data should be first differenced or regressed on deterministic functions of time to render the data stationary. Economic theory often suggests the existence of long-run equilibrium relationships among nonstationary time series variables.

3.4.2 Autoregressive Distributed Lag test

Cointegration techniques can be used to model these long-run relations. Pre-testing for unit roots is often a first step in the cointegration modeling. Economically speaking, two variables will be cointegrated if they have a long-term or equilibrium

relationship between them. Provided that the residuals of the unit root test are stationary, the traditional regression methodology is applicable to the time series data involved (Gujarati & Porter, 2009).

A number of methods exist for testing cointegration. In this research the Autoregressive Distributed Lag test is employed. Distributed lags deal with the current and lagged effects of an independent variable on the dependent variable. That is $Y_t = \alpha + \beta_0 x_t + \beta_1 x_{t-1} + \beta_2 x_{t-2} + \dots + \varepsilon_t$. The effect of x on y is distributed over time. The immediate effect is β_0 and the long-run effect over all future periods $\sum \beta_1$, the summation of all betas.

3.4.3 Diagnostic tests

A number of diagnostic tests will be performed to check the feasibility of the model. First is a test of robustness, which tests for serial correlation, normality, heteroscedasticity, structural stability and the absence of misspecifications. Then, a critical bound test is performed to see whether the F values of cointegration fall within the critical boundaries necessary for cointegration. This will then lead to the long term relationship found in the cointegration, after which a stability test is performed which will give us figures of the cumulative sum of recursive residuals and the cumulative sum of recursive residuals.

CHAPTER 4

RESULTS

It essential to have a proper result structure showing the stepwise analysis for the data of Malaysia. The first section of this chapter is dedicated to descriptive analysis. Then, a unit root test will be performed, after which this chapter discusses the analysis of cointegration. Several diagnostic tests follow.

4.1. Descriptive statistics

The descriptive summary of the data will be analyzed for the used variables in Malaysia. The information provided concerns a number of parameters for each variable used for this research. For the unemployment rate, GDP per capita and the inflation rate, the mean, median, maximum, minimum and standard deviation statistics are provided. A graphical representation of the data is also given.

Table 4.1.1 shows the descriptive statistics. The results show that in the period of 1991 – 2013, the maximum value of the unemployment rate was 4.34 percent, change in GDP was 20.32 percent and the inflation rate 5.44 percent. Meanwhile, the minimum unemployment rate was 2.44 percent, GDP change was -30.41 percent at its lowest level and the lowest inflation rate recorded is 0.58 percent.

Table 4.1

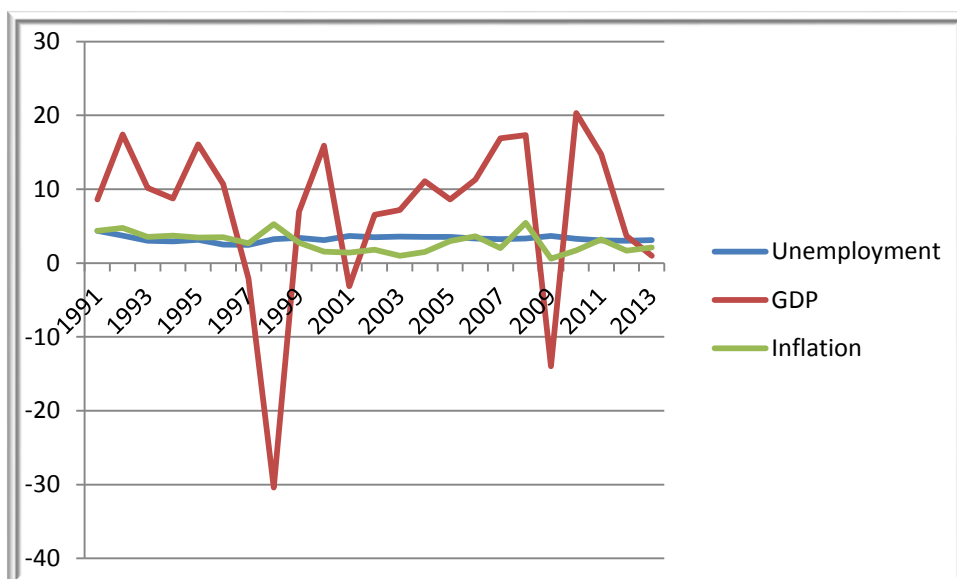
Descriptive Statistic of the Variables in Malaysia (1991 – 2013)

Variable	Mean	Median	Maximum	Minimum	S.D
Unemployment	3.29	3.30	4.34	2.44	0.40
GDP	7.11	8.75	20.32	-30.41	11.41
Inflation	2.80	2.74	5.44	0.58	1.35

Figure 4.1 is a graphical figure of the growth of variables Unemployment, GDP and inflation in Malaysia concerning the time series from starting from 1991 up to 2013. At first glance the Asian financial crisis which occurred in 1997 is clearly observable in this graph. The global mortgage crisis in 2007-2008 seems to impact Malaysian GDP as well. Whereas the Asian financial crisis has had impact immediately, the mortgage crisis seems to have its influence on Malaysia only slightly after it occurred in the end of 2007. The changes in unemployment and the inflation rate are not very strong, they remain balanced through time. The mean value of Malaysian unemployment in this timespan is 3.29 percent. The mean growth of GDP per capita is 7.11 percent. The mean inflation rate has been 2.80 percent.

Figure 4.1

Representation of the Variables in Malaysia (1991 – 2013)



4.2 Unit Root

The unit root test is an important step in the analysis of time series data. This test is used to check the stationarity of variable.

In this study, ADF test has been conducted to determine the stationarity of variables used. For a more elaborate discussion of why the Augmented Dickey-Fuller (ADF) test is carried out, please refer back to section 3.4.1.

Table 4.2.1 shows the results of the unit root test for the variables unemployment rate, change in GDP per capita and inflation rate of Malaysia for the years in-between 1991 and 2013. The results of ADF tests show that all the variables are stationary at level I (0) at five percent error

Table 4.2:

Results of ADF Unit Root Test of Malaysia

Variable	Level		First Difference		Results
	Intercept	Intercept and trend	Intercept	Intercept and trend	
Unemployment	0.017*	-	-	-	I(0)
GDP	0.003*	-	-	-	I(0)
Inflation	0.031*	-	-	-	I(0)

Note:* Stationary at 5 percent critical value (-2.95)

4.3 Cointegration

After performing the unit root tests for the data set, the ARDL model has been run to choose an optimal model for unemployment in Malaysia. The optimal model is chosen based on the lowest values of AIC and SBC. After running a couple of tentative ARDL models, the ARDL (1, 0, 0) model has been chosen because it has the lowest AIC (-2.6322) and SBC (-5.1215) values. The estimation results of the optimal ARDL model are shown in Table 4.3.

Table 4.3

Optimal ARDL (1, 0, 0) Estimation Results for Malaysia

Regressor	Coefficient	Standard Error	<i>t</i> -ratio	Probability
UNEMP(-1)	0.940	0.253	3.715	0.002
GDP	-0.018	0.006	-3.018	0.009
INF	0.011	0.050	0.228	0.822
C	0.308	0.257	0.835	0.762
T	0.002	0.010	0.193	0.850
R-Squared	.57618	R-Bar-Squared	.46316	
S.E. of Regression	.24821	F-stat. (18, 13)	5.0981	0.009
Mean of Dependent	.33876	S.D. of Dependent	.33876	
Residual Sum of Squares	.92411	Equation Log-likelihood	2.3678	
Akaike Info. Criterion	-2.6322	Schwarz Bayesian Criterion	-5.1215	
DW-statistic	2.4175			

According to the above table, the variable GDP is statistically significant at a five percent level of significance. It means that a change in GDP per capita has significant effect on the unemployment rate of Malaysia. The other variable, the inflation rate, is not significant at the same level of significance. Overall, the model can be accepted because *F*-statistic (5.0981) is greater than *F*-tabulated value at five percent. This proves that all variables in the model jointly influence unemployment of Malaysia.

4.4 Robustness

The robustness of the model has been confirmed by diagnostic tests for serial correlation, function form, normality, heteroscedasticity, and structural stability for the model. As shown in the Table 4.4.1, the selected model generally passes all diagnostic tests.

Table 4.4

Robustness Test for Malaysian Unemployment

The selected model : ARDL (0, 1, 0)				
Test	H_0	Statistic	p -value	Decision
SC	There is no serial correlation in the residual	$\chi^2 = 8.1004$	0.067	fail to reject H_0
HE	There is no autoregressive conditional heteroscedasticity.	$\chi^2 = 0.35823$	0.719	fail to reject H_0
NO	Normal distribution	$JB = 0.58067$	0.748	fail to reject H_0
FF	Absence of model misspecification	$\chi^2 = 0.073910$	0.794	fail to reject H_0

The SC result shows that there is no evidence of autocorrelation in the disturbance of error term. The ARCH test result suggests the errors are homoscedastic. The model passes the Jarque-Bera normality test suggesting that the errors are normally distributed. However, in the absence of model misspecification hypothesis, the model fails at the 5 percent level. Pesaran *et al.* (1999) also face a similar problem. They argued that it may be linked to the presence of some non-linear effects or asymmetry in the adjustment of the variables, of which their linear specification is incapable of taking into account. One possibility would be to switch to a non-linear model. This is beyond the scope of this paper.

4.5 Critical Bound Test

The F -test has a non-standard distribution which depends upon two factors. The first factor is whether variables included in the ARDL model are $I(0)$ or $I(1)$. Secondly, it depends on the the number of regressors. Pesaran (1999) provides two sets of critical

value bound; one set assuming that all regressors are I(1) and other are all I(0). Table 4.5.1 shows the upper and lower 90, 95 and 99 percent critical value bounds.

The null hypothesis of no cointegration is rejected if the calculated F -test falls above the upper bound. If the computed F -test falls below the lower bound, then the null hypothesis of no cointegration cannot be rejected. Finally, the result is inconclusive if it falls in between the lower and upper bound.

Table 4.5.1

Critical Value Bound

Regressors K**	Level of Significance					
	90%		95%		99%	
4	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)
Critical values*	2.65	3.71	3.70	4.19	3.46	4.65

Note: *The critical value bounds are from Table F , restricted intercept and no trend in Pesaran, 1999

**No. of regressors

The calculated F -tests are reported in Table 4.5.1 It shows that all F -values are higher than upper bound critical values at the 1 percent significance level. Thus, the null hypothesis of no cointegration is rejected. It means all variables are cointegrated to each other.

Table 4.5.2

F -tests for cointegration, unemployment, GDP and inflation

Test	F -statistic	Log selection
$F(UNEMP / GDP, INF)$	5.0981	1, 0, 0
$F(GDP / UNEMP, INF)$	6.4657	1, 0, 1
$F(INF / UNEMP, GDP)$	1.0300	0,0,0

4.6 Results of the long-term relationship

The primary focus of this study is on the long run effects of GDP and inflation on unemployment. The empirical results for this model are reported in Table 4.6.

Table 4.6:

The Estimated Long-run Coefficients Results

Model: ARDL		
Regressor	Coefficient	<i>t</i> -ratio
C	4.316	0.726
T	0.034	0.177
INF	0.194	0.136
GDP	-0.313	-2.240

Note: *Negatively significant with respect to *t*-value (-1.96)

**Positively significant with respect to *t*-value (+1.96)

The results of Table 4.6 indicates that INF is positively and GDP is negatively related to unemployment in Malaysia. Whereas the relationship of GDP with Unemployment show significance, that of inflation to unemployment does not.

4.7 Stability test

The results of the stability test are shown in Figure 1 and Figure 2. Both cumulative sum (CUSUM) and the cumulative sum of squares (CUSUMSQ) indicate the absence of any instability of the coefficients because the plots of these statistic remain within the critical bounds of the 5 percent significance level. Hence, these statistics confirm the stability of long-run coefficients of the unemployment function in the model.

Figure 4.7.1

Plot of Cumulative Sum of Recursive Residuals

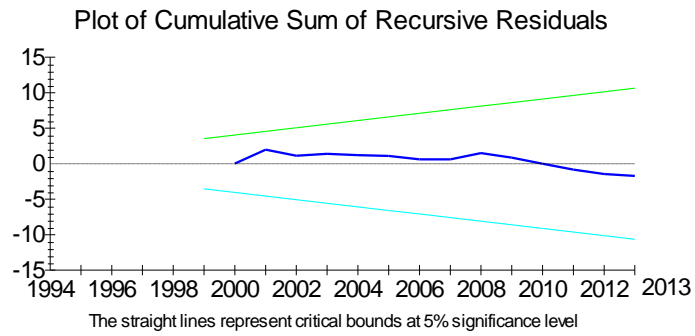
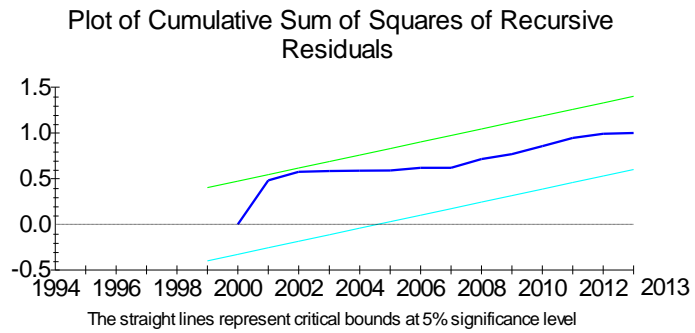


Figure 4.7.2

Plot of Cumulative Sum of Squares Recursive Residuals



CHAPTER 5

CONCLUSION

This chapter presents the discussion of the results found in this paper. By recapturing the intent of this paper, and comparing it alongside the results, conclusions are drawn based on the testing of Okun's Law and the Phillip's Curve. Suggestions for future research will be made as well.

5.1 Conclusion

The intent of this paper was to observe determinants of unemployment in Malaysia. While laying out previous studies on unemployment in general the paper progressed to looking at the circumstances in Malaysia more specifically. The qualitative analysis showed that the Malaysian economy experiences an increase in the service industry, and that the remaining manufacturing industry is increasingly relying on high-technology. These are trends that cause the movement of the unemployment rate in Malaysia.

First of all microeconomic factors that influence unemployment are important to understanding the context of unemployment in Malaysia. Notable microeconomic movement in Malaysia is the shift from the secondary economic sector towards the tertiary economic sector. There is also an increased focus on technology intensive production within the secondary sector, which reduces the need for human employment. This finding could be used for analysis of Malaysia's future. The ability to foresee the future is not only dependent on the relation of unemployment to microeconomic variables, but also to that of macroeconomic variables..

The empirical side of this paper is concerned with macroeconomic parameters. From the pool of macroeconomic variables in prior literature that are most widely examined to influence unemployment, are GDP and inflation. These variables are set within two given theorems, which are Okun's Law and the Phillips Curve. The methodology chapter sets out to discuss the manner in which these two theories are tested. First a unit root test was performed on each variable. All the variables proved to be stationary at level $I(0)$ in the Augmented Dickey-Fuller test at five percent critical significance. This meant that the variables could be used for Autoregressive Distributed Lag test. After having shown that there were no problems encountered in the diagnostic test. It was therefore possible to rely on a cointegration technique in order to describe the long-term relationship between the variables.

It was found that there is no evidence for the Phillip's Curve, whereas Okun's Law was tested positively. Whereas both these theorems were expected to be found present in the data, only one is actually measured. Okun's Law holds that there is a negative correlation between the growth of GDP and the unemployment rate. In this paper this is found to be true for Malaysia. However, there is no noticeable negative correlation between the inflation rate and the unemployment rate. Therefore we can conclude that the Philips Curve is not present in Malaysia.

These micro- and macroeconomic variables can be influenced by large business, and more importantly, governments. The predictive value that these factors hold is therefore important.

5.2 Limitations

Naturally it is important to discuss the shortcomings of this research. Whereas utmost care has been taken to provide ample evidence for the determining factors of unemployment in Malaysia, it would be obscure to say that the full spectrum is taken into account in this research. More micro- and macroeconomic factors could have been taken into account. The intent was to understand the sectorial shift in Malaysia in regard to unemployment, and to find out whether the traditional theories namely Okun's Law and the Phillips Curve are at play.

First of all, regarding the qualitative side of the research, it must be mentioned that certain factors may have been overlooked. The analysis included a view of Malaysia as whole, and a more in-depth investigation could have brought other aspects to light that may be of importance in shaping the makeup of the Malaysian unemployment. Looking at the shifting phases of Malaysian unemployment creates an overview, but not an in-depth study of microeconomic factors.

Secondly, the quantitative section of this research is based on data which is accurate only in the sense of capturing Malaysian macroeconomic data on an annual basis. Even though it is to be expected that monthly data would yield similar results, this is not necessarily true. If data were available dating further back in time, the accuracy could be improved as well.

5.3 Recommendations

Future research could implement steps to overcome those limitations described in the previous section. A larger data set could be used to determine the strength of factors in affecting unemployment in Malaysia. More variables could possibly improve the model as well.

An important recommendation for further research would be to test the two given theories, Okun's Law and the Phillips curve, for a larger set of countries. Whereas it is concluded that Okun's Law is present in Malaysia, and the Phillips Curve is not, it would be interesting to see whether the same can be said for other countries in the South East Asian region. This research could be applied to more developing countries.

As the intent of this paper was for a large degree placed on the quantitative side of investigating unemployment influences, research focusing more on qualitative factors could bring forward a different, more enriched, overview of the phenomenon.

Another important suggestion would be to see whether the economical shift that occurred in Malaysia shows any resemblance to the shifts of currently developed countries in the previous decades. The shift towards a service based industry is likely to have occurred at some point in the past for those developed countries, and it would be interesting to find whether the factors were similar in those countries too. The basis for that comparison has been laid down in this paper, as well as the basis for comparing against other developing countries that are likely to reach the phase of economic evolution of present day Malaysia in the future.

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