DETERMINANTS OF INFLATION: EVIDENCE FROM ASEAN-5 COUNTRIES

FARAH DINA BINTI ZAKARIA

MASTER OF ECONOMICS
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By

FARAH DINA BINTI ZAKARIA

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Abstract

Topic involving inflation has generated an enormous volume of literature and heated debate in recent years. It is important to study inflation because the consequences of inflation is terrible. By explaining inflation, different school of thought view the contrast cause and have different policies for fighting inflation. This study examines the relationship between selected independent variable towards inflation and theory that can explain inflation in ASEAN-5 countries using panel data analysis. This study used panel data spanning from year 1990 to 2014. A panel data approach was used to straighten out the time invariant country-specific effect and to reveal the relationship between the important variables across time. The results presented that fixed effect model was appropriate over the random effect models in this inflation model studied. Interestingly, the variables, namely wages, import, interest rate and gross domestic product were found to be significant determinants of inflation in ASEAN-5 countries. But, only money supply found to be insignificant by explaining the inflation in this sample of study. Based on these results, this study support the Post Keynesians view of inflation and several policy implications and recommendations were suggested.

Keywords: Inflation; ASEAN-5 countries; Fixed Effects Model; Random Effects Model, Post Keynesians

Abstrak

Topik melibatkan inflasi telah menjana satu jumlah yang sangat besar kepada kesusasteraan dan perdebatan hangat pada tahun-tahun kebelakangan ini. Ia adalah penting untuk mengkaji inflasi kerana akibat inflasi yang amat dahsyat. Dengan menjelaskan inflasi, sekolah pemikiran yang berbeza melihat punca kontras dan mempunyai dasar yang berbeza untuk melawan inflasi. Kajian ini mengkaji hubungan antara pembolehubah bebas yang terpilih ke arah inflasi dan teori yang dapat menjelaskan inflasi di negara ASEAN-5 yang menggunakan analisis data panel. Kajian ini menggunakan teknik data panel merangkumi dari tahun 1990 hingga 2014. Pendekatan data panel digunakan untuk meluruskan masa yang tak berubah kesan khusus negara dan untuk mendedahkan hubungan antara pemboleh ubah yang penting merentas masa. Keputusan yang dibentangkan bahawa model kesan tetap adalah sesuai ke atas model kesan rawak dalam model inflasi ini dikaji. Menariknya, pembolehubah, iaitu upah, import, kadar faedah dan keluaran dalam negara kasar didapati penentu penting inflasi di negara ASEAN-5. Tetapi, hanya bekalan wang yang didapati tidak signifikan dengan menjelaskan inflasi dalam sampel pengajian ini. Berdasarkan keputusan ini, kajian ini menyokong pandangan Post Keynesians inflasi dan beberapa implikasi dasar dan cadangan telah disyorkan.

Kata kunci: Inflasi; negara ASEAN-5; Model Tetap Kesan; Model Kesan Rawak, *Post Keynesians*

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This thesis is dedicated to them.

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Glossary of Terms

ASEAN-4:

Indonesia, Malaysia, Philippines and Thailand

ASEAN-5:

Indonesia, Malaysia, Singapore, Philippines and Thailand

M2 (Money supply):

M1 + narrow quasi – money

G-7 (Group of Seven Developed Countries):

Canada, France, Germany, Italy, Japan, United Kingdom and United Sates

List of Abbreviations

ADF	Augmented Dickey-Fuller
ASEAN	Association of Southeast Asian Nation
CPI	Consumer Price Index
ECM	Error Correction Model
FEM	Fixed Effect Model
FMOLS	Fully Modified Ordinary Least Square
GDP	Gross Domestic Product
GNP	Gross National Product
G-7	Group of Seven Developed Countries
GST	Goods and Services Tax
IMF	International Monetary Fund
M2	Money Supply
MAS	Monetary Authority of Singapore
OLS	Ordinary Least Square
OPEC	Organization of Petroleum Exporting Countries
POLS	Pool Ordinary Least Square
PPI	Producer Price Index
REM	Random Effect Model
WPI	Wholesome Price Index
VAR	Vector Error Correction
VECM	Vector Error Correction Model
VIF	Variance Inflation Factor

CHAPTER ONE
INTRODUCTION

1.1 Background of study

Persistent and substantial increasing in general level of prices has worrying impact. This situation has widely attracted the attention of the economists all over the world. Whitney (1982) define inflation as a "sustained increase in average prices". Issue involving inflation has generated a huge volume of literature and heated debate in recent years. It is crucial to study inflation because the effect of inflation is terrible.

Generally the inflation rate has an impact to world economic growth of the country whether negative or positive impact. This inflation rate and world economic growth have been fluctuating. A case study of Tanzania indicated that inflation has an negative impact on economic growth (Kasadi & Mwakanemela, 2013). Whereas, Shahbaz (2013) confirms there is co-integration among economic growth, terrorism and inflation in Pakistan. Rises in inflation and economic growth raises a terrorist attack and terrorism in Pakistan.

By utilizing panel regressions, Rousseau and Wachtel (2002) found finance growth relationship in inflation threshold. Studies states that, disinflation is positive effect related to financial depth on growth. However, studied inflation threshold done by Thanh (2015) found inflation and growth has an inversely relationship.

Based to this several studies on inflation, issue of inflation still on discussing within the researchers in different context because once inflation occurs, it creates problems

in the functioning of the economy that is likely to affect economic growth in a country. Inflation not also affecting to the country but also affects different people differently.

1.1.1 Inflation in ASEAN-5: An Overview

Association of Southeast Asian Nation (ASEAN) is the association that was established on 8 August 1967 in Bangkok, Thailand. Early of the establishment, this association was joining by Indonesia, Malaysia, Philippines, Singapore and Thailand or can be namely as ASEAN-5 members. Then, it has expanded to ten members that includes Brunei, Laos, Cambodia, Myanmar and Vietnam (Association of Southeast Asian Nation, 2016).

ASEAN-5 is the largest economies in Southeast Asia (Kok, 2014). These association have many similar characteristics which are bare to common regional shocks and have many common real and financial sector, and also had low to moderate rate of inflation (Jiranyakul & Opiela, 2010). When there is high inflation rate in some of the ASEAN countries, it could result dissimilar price levels and unequal purchasing power across ASEAN member countries. So, it giving some countries the ability to purchase more goods from other member country. Other than that, resulting in different levels of investment are from different level of inflation (Pooittiwong & Ramirez, 2016).

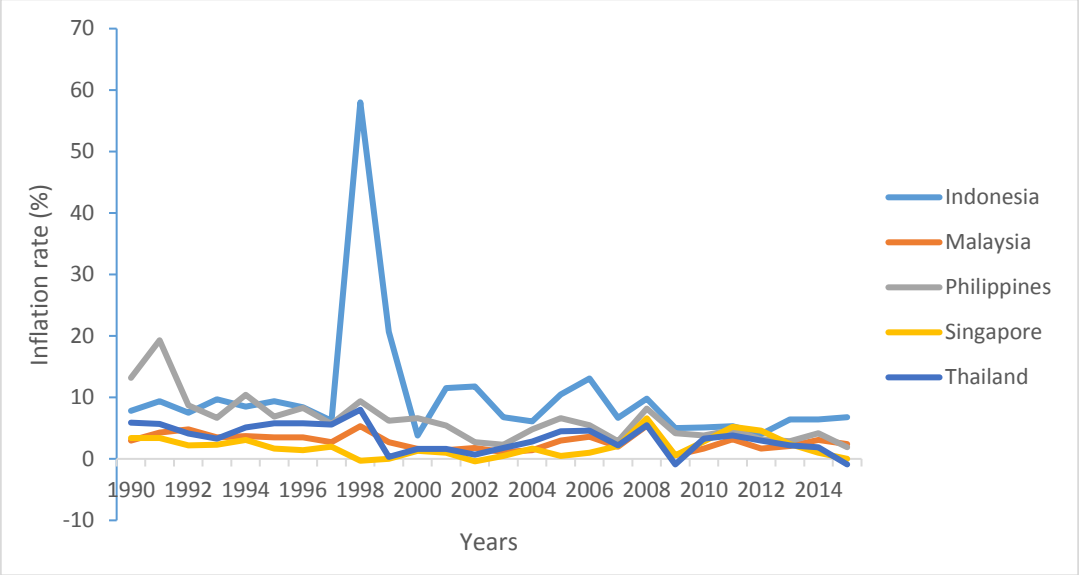

Figure 1.1.1
Inflation Rate across ASEAN-5 Countries
Source: World Economic Outlook (WEO), International Monetary Fund (IMF)

Figure 1.1.1 illustrates the inflation rate across the ASEAN-5 countries from year 1990 to 2015. During Asian financial crisis, Indonesia's inflation rate from 1997 to 1998 rose sharply compare to the others ASEAN-5 countries, from 6.2 % to 58% respectively. After to this crisis, inflation in Indonesia decrease dramatically, non-oil exports began to recover and stock exchange in Jakarta began to increase (Indonesia-Investment, 2016). Recently, growth of Indonesia GDP has been running well under potential and slowing, and now with higher rate of interest and inflation will likely keep on weak in year 2015. This situation drive up to dangerous two way causality in Indonesia. Under potential growth makes it extra problematic to push through reforms that long run dividends but are hurting in the short run.

Based on the Post Keynesian view of inflation, wages is the main contributor to cause inflation. Issues of wages was faced by each of ASEAN-5 countries. Recent month,

Indonesia was adjusted the minimum wage as attempt to boost the country's economic growth and strength domestic demand.

Starting from year 1990, Philippines have highest inflation rate. This is particularly true for the period 1990 to 1991 that occur another recession after 1984 to 1985's recession. After the recession in year 1985, one more crisis happen which is Asian financial crisis that occur in year 1997. During these period, devaluations of currency occur due to balance of payment crisis. This situation brings Philippines to stagflation that explains the recession and high inflation to this country (Joseph Lim, 1987). The minimum wages in the Philippines also differ regionally across ASEAN-5 countries. From the wage order, it should be noted that wage in Philippines only applies to the National Capital Region and does not distress other regions in the Philippines.

Meanwhile, Malaysia and Thailand decline their value of money at the time of this Asian financial crisis. The Malaysia ringgit drop from 2.5 to 4 dollar. Thailand indicate the equivalent drop of Thai baht from 25 to 40 dollar. This leads to a provisional increase in inflation to great stages more than long-term averages (McCauley, 2006). Discussing the wages in Thailand, the minimum wages in Thailand depended on the province on worked in. Many investors and employers may accept this change. Now, each province and the wage committees have the opportunity to propose a provincial minimum wage.

During 2016, Malaysia observe a raise in minimum wages which the government hopes will reduce dependence on foreign workers in Malaysia. The budget for 2016 includes a raise in minimum wage for private sector workers from RM 900 to RM

1000 per month in the peninsula. Meanwhile, the regions of Sarawak, Sabah and Labuan will see an increase from RM 800 to RM 920. So, when the government introduce the minimum wages it is might be the household faced the problem of increase in the price level. Other than that, the introduction of 6% goods and services tax (GST) in April 2015 is putting the pressure on domestic prices. While import costs are increasing after the ringgit slumped to 15% in year 2015 in Asia's worst performance.

Contrast to Singapore during the Asian Financial Crisis, this countries was nonimmune to the crisis. In the absence of inflationary pressure in 1998, Monetary Authority of Singapore's (MAS) exchange rate policy attempt to reduce quickly decelerating economy without undermining confidence in the Singapore dollar (Economic Explore Series 3, n.d.). Minimum wages in Singapore was the hotly topic debated. Numerous developed economies have long engaged in paying the minimum wages and Singapore has no such system in place. The wages rate in Singapore were regulated by the open market that raising concerns over too many low-paying jobs.

In year 2007 to 2008, financial crisis occur again in economic world. This crisis also recognized as the 2008 financial crisis and global financial crisis. All ASEAN-5 countries impressed and inflation rate fall due to this crisis. The Economists (2009) report the leading reason of the reduction in inflation rate has been fall in fuel and food prices. These source are relatively have a great share of the consumer price index (CPI) in most Asian countries.

Level and volatility inflation rate in Indonesia was higher from year 2011 to 2013. In this period, some countries for instance Malaysia and Philippines decreased in 2012 and back to increase in 2013. Dissimilar these countries, Thailand's interest rate increased in 2012 and decreased in 2013. While, Singapore is the only one that has low inflation and becomes smaller from year 2011 to 2013 (Statistics-Indonesia, 2013).

Against such an overview, this study chooses ASEAN-5 as a sample to analyze the relationship between the independent variables and inflation. Other than that, study inflation in this selected ASEAN countries also been interested cause of the inflation condition over the year.

1.2 Problem Statement

Recently, inflation is an important topic to be discussed over the country. The issue of the continued increase in the general level of prices is still happening and keep happening. Even though, developed countries also worries with the problem of inflation and not only developing countries worries when problem of inflation occurs. Examine this matter, potential study attempts to reveal the biggest contributor to inflation in ASEAN-5 countries. This has been the matter, in fact the main factors causing inflation and the theory that can explain well inflation happens to a country.

Across Asia, wage trends are driven by China and changes take place larger structural adjustments in the economy. The Global Wage Report, published by the International Labor Organization, states that wages in the ASEAN-5 countries have increased

almost two and half a half fold since the beginning of this century. This countries translate into a more dynamic economy, characterized by higher incomes and standards of living. Increases in wages often translate into less dependence on investment, labor foreign sources, export and consequence in acceptances in domestic demand.

By comparing wages across these ASEAN-5 countries, investors should be pay close attention to all attributes of wages within a given country as they can vary drastically leading to disproportionate costs of the production. Contrasting the measurement unit in conjunction with regionally specific wages within member states are specific significance in this regard. Collective bargaining should be noted as a common in Western economies. Consequently, government depend on a heavily minimum wages to drive average wages ascendant and mainly absent from ASEAN-5 economies.

According to Davidson (2011), different schools of economic thought have suggest differing primary causes and carries different evidence on the nature of inflation. Therefore, three different schools of thoughts which are Monetarists, Keynesians and Post Keynesians have different policies for fighting inflation. However, in state of the problem, this study will only contrast the different view between Monetarists and Post Keynesians Theory against inflation.

The monetarist, Friedman (1970) “inflation is always and everywhere a monetary phenomenon, and can be produced only by a more rapid increase in the quantity of money than in output”.

Having said this, inflation will occur if, and only if, growth rate of money supply exceeds the exogenously determined rate of growth in the real income. The monetarist approach based on the Quantity Theory of Money agrees that the growth of money is the primary determinant of the inflation rate. Due to the growth of money increase, people will spend more and directly cause increasing cost of living. If one agree to take this theory of money and assumes the exogenous money supply, causality chain are as follows:

Exogenous supply of money → price inflation → depreciation of exchange rate.

This opposing view of monetarist is clash to the Post Keynesian Theory that stated, inflation is not a monetary phenomenon (Tcherneva, 2001). The depreciation of the mark is seen as the important causal instrument and the causality chain are as follows:

Depreciation of exchange rate → wage and price inflation → money supply inflation

Conversely, the issue of why a firm would raise the price is still been questioning for the basic of microeconomic perspective. One of the clearly part of that question is cost of input which is wages for labor (Melberg, 1992). In addition, theory of wages on inflation has been lack discussing in the literature (Weintraub, 1978).

Studied done by Atesoglu (1997) one of the post Keynesian economist disclose that the wage-cost markup model has better clarification than another theories (eg:, Phillips curve, Phelps-Friedman model and quantity theory of money). It indicate that, wages in the Post Keynesians Theory as the main variables that can cause inflation.

Generally, the Post Keynesian view of the inflation process clearly differ from monetarist view of inflation. “Without rising money wages, inflation cannot occur, and whatever starts a violent in money wages starts inflation” (Robinson, 1938). Whereas, the monetarists retain a causal view of the quantity equation in which rises in the price level that directly and causality related to rises in the supply of money.

Based on the contrast view from monetarist stated that increase in money supply can cause inflation while, Post Keynesian view stated that increase in wages can cause the inflation. Therefore, from the overview of inflation in ASEAN-5 countries that discussed before, it is important to evaluate whether increase in wages, money supply or others independent variables can cause the inflation in these ASEAN-5 countries. Wages often fluctuate heavily and impact profits, productivity, and ultimately investor decisions.

1.3 Research questions

This research aims to response these following questions:

1. What are the main factors contribute to inflation in the ASEAN-5 countries?
2. What are the relevant economic theory that can explain well the phenomenon of inflation and implications of policy in ASEAN-5 countries?
3. What are the potential causal relationship between inflation and the control variables in ASEAN-5 countries?

1.4 Objectives of study

The main motivations of this study were highlighted as follows:

1. To investigate the main factors contribute to inflation in the ASEAN-5 countries.
2. To identify the relevant economic theory that can explain well the phenomenon of inflation and implications of policy in ASEAN-5 countries.
3. To examine any potential causal relationship between inflation and the exploratory variables in ASEAN-5 countries.

1.5 Significance of study

This study will examine the determinants of inflation in the ASEAN-5 countries. There are numerous important impacts that will contribute to the various parties.

The purpose of this research directly will contribute to the body of knowledge. The main determinants of inflation and which economic theory can explain well the phenomenon of inflation for the selected region of study. Inflation can also be described as a key indicator for monetary policy of central banks.

This research important to the central bank cause of inflation targeting policy, which consists in the formation of the medium-term inflation forecast and comparison with the target set. This inflation targeting policy demonstrated that, monetary policy could control inflation.

Study in inflation will help the government in deciding the greatest policy package that can implement to realize to single digit inflation level. So, this implementation will contribute to the economic growth of the country.

As we know, the rate of inflation is essential for the investor because it signifies the actual value of an investment could be rated, degenerate and loss in power of purchasing from time to time. For an example, investors precisely could recognize how many return (%) in their investment in stock or bond that needs to make them to perpetuate their living standard.

1.6 Scope of the study

This study will limits to the region of the ASEAN-5 countries that includes Indonesia, Malaysia, Philippines, Singapore and Thailand which spanning the year from 1990 to 2014. This countries would be choose cause of the inflation trend, problem with the rising of the general level of prices that cause the inflation and from the best knowledge of the researcher there is lack of research area study of inflation in ASEAN-5. This study was based on the panel data sourced from the World Development Indicators and International Monetary Fund. This study focused on the determinants of inflation by using inflation as dependent variable and wages, money supply, GDP, interest rate and import as the explanatory variables.

1.7 Organization of study

This research is separated into five chapters. Chapter one talk about background of study, problem statement, research questions, objectives of study, significance of study and scope of the study.

Chapters two contain a comprehensive review of the literature. This chapter provides a foundation for this research.

In chapter three, it focuses on the methodology (i.e., theoretical framework, data collection and others related component) regarding to this study.

Chapter four were discussed the empirical findings of the analysis based on the pool OLS, random effect method, fixed effect method and panel Granger causality test.

In the chapter five, the summary of the study and the implication of Post Keynesian view of inflation for ASEAN-5 countries are examined.

CHAPTER TWO
LITERATURE REVIEW

2.1 Introduction

This chapter were discussed about the concept and measurement of inflation, theoretical review regarding the inflation, several comparisons of techniques applied to examine the causes distressing inflation and previous studies concerning the determinants of inflation.

2.2 Concept and Measurement of Inflation

A single measure specific meaning of inflation will vary with the meaning implied by various measures. In broader terms, the meaning of inflation is *generalized* and *continual* increases in price (McNabb & McKenna, 1990).

In the literature, definition of inflation has the broadest receiving. Though it less accuracy, following meaning has benefit to mutual practice: "Inflation is a process of continuously rising prices, or equivalently, of continuously falling value of money" (Parkin & Laidler, 1975).

The other more precise definition of inflation from (Parkin & Laidler, 1975).

a. "It is not a one-time or short-run increase in the general price level".
b. "One must emphasize that inflation does not concern increases in the prices of individual commodities".
c. "One should hesitate to label as inflation increases in the general price level at a rate of less than 1% per year".

While, (Bronfenbrenner & Holzman, 1963) differentiate four types meanings of inflation:

1. When "too much money chases too few goods".
2. 'Increase of the money stock or money income, either total or per capita'.
3. "Increase in price levels with extra characteristics or conditions: it is incompletely anticipated; it leads (via cost increases) to further rises; it does not increase employment and real output; it faster than some 'safe' rate; it arises 'from the side of money'; it is measured by prices net of indirect taxes and subsidies; and/or it is irreversible.
4. "Reduction in the external value of money as measured by the price of gold, by foreign exchange rate or indicated by excess demand for gold or foreign exchange at official rates".

There are four natures of inflation which are:

1. Suppressed or open inflation
2. Creeping, moderate, or hyperinflation
3. Anticipated and unanticipated inflation
4. Demand pull or cost-push inflation

There are three approaches in order to measure the inflation. These approaches are CPI, producer or wholesome price index (PPI or WPI) and Gross National Product (GNP) implicit deflator. From changes time to time, the two approaches of WPI and CPI are considered as straight measures of inflation. Amongst the variety of price indices which attempt to measure inflation, CPI usually the greatest measure for

adapting payments to consumers, the most familiar to the general community and also as the indicators to measure the inflation in the ASEAN-5 countries. Meanwhile, the GNP implicit deflator is more comprehensive and a broader price statistics determining changes in the prices of entirely the products. The GNP comprises all domestic goods bought by government, manager for investment purposes, foreigners (exports) and consumers (Davidson, 1991).

2.3 Theoretical Review of Inflation

This section presents the macroeconomic theories of inflation. In order to recognize the determinants of inflation, various theories of inflation have been introduced. Respectively, each kind of theory tries to explain the elements that are likely to create inflationary circumstances. There are several macroeconomic theories origins of inflation, which are, shocks of monetary, supply side, demand side, structural and political factors. However, each theories indicate the dissimilar models for clarifying dissimilar ways and phenomena fighting for inflation (Melberg, 1992).

In this field of research attempts to prove the economics theories of inflation that can explain well the phenomenon of inflation.

2.3.1 Post Keynesians Theory of Inflation

Post Keynesian explanations of inflation emphasize the role of cost conditions instead of demand fluctuations (Bloch, Dockery, & Sapsford, 2004). In addition, rather than cost conditions, Post Keynesian inflation models also stress that money wages, commodity prices, import prices, and markups can explain the inflation (Perry &

Cline, 2013). Money wages can be defined as the "amount of money that someone is paid for work they have done, without allowing amount of goods it can buy". Based on this theory, inflation occurs as a result of decreases in aggregate supply.

By explaining inflation, Post Keynesian view have been devoted to attack the views of monetarism (e.g. Kaldor 1986; Moore, 1988). The Post Keynesian representative discussions of the inflation process can be found in (Davidson, 2011).

Davidson (2011) identifies four potential causes of inflation which are, diminishing return, increase in profit margin, increase in money wages relative to productivity increments and imports price.

Diminishing returns inflation denotes to the increased in costs incurred by firms as output. This increasing is by reason of the hiring of utilization of older, less efficient capital equipment and less-skilled workers. The increased costs of marginal are passed on in the form of higher prices. Davidson (2011) notice that this phenomenon was highlighted by Keynes as "a main reason for rising supply prices before employment". This practice of inflation is inevitable in the short run if the output is increasing under diminishing return, but perhaps offset in the long run over enhancements in training programs, capital utilization per worker and technology were increased.

Profit inflation emphasized the rise of gross profit margins by entrepreneurs when market conditions reduce this possible. This is connected to the degree of monopoly in the economy as a whole and in the market concerned. It is unnecessarily associated to the changes in aggregate demand, and yet diminishing prices elasticity of demand

could bring to increase in profit margins with the growth of output (Davidson, 2011). In addition, profit inflation also named as price-push inflation or administered-price inflation cause of the firms increase the products price to offset the increase in production cost and labor to gain greater profits (Totonchi, 2011).

Wages inflation bring up to the rise in rates in money wages which are not offset by productivity improvements, and which, with profit margin maintained, are passed on in the form of higher prices. Even though it may be more easily for workers to obtain larger wage when unemployment is decreasing. This source of inflation, in the Post Keynesians view is untied to changes in the level of aggregate output. Wage inflation is relatively related to the entire wage negotiation process which takes place in the economy. In this sense, it can be regarded as institutional in origin. Wage inflation is considered by Post Keynesians to be the primary cause of inflation.

Import inflation or deflation depending on the degree of imports that important in the purchases of domestic residents. Changes in the imports price can affect the inflation rate in the economy. Hence, for instance, if in an open economy the rate of exchange in the domestic currency is let fall, the domestic imports price will increase and contribute to the domestic inflation rate. An increasing rate of exchange, in contrast, will reduce the domestic imports price and lessen the inflation threat.

Post Keynesians Theory is one of the theory that often we overlook and must be concerned that kind of theory.

2.3.2 Demand-Pull Theory

John Maynard Keynes and his supporters express that inflation outcomes come from an increase in aggregate demand as the major source of demand-pull inflation. The aggregate demand consist of government expenditure, consumption and investment. They also states that, when aggregate demand exceeds aggregate supply at the full employment level of output, demand-pull inflation could happens (Agba, 1994). This indicates that only a rise in price over the full employment can be named as inflationary gap. The greater the gap between aggregate demand and aggregate supply, the more rapidly in increasing the inflation rate.

In addition, high in inflation cause the declining power of purchasing nominal assets, likes money and wages. Research of middle income developing countries: Chile, Korea, Mexico, and Turkey states that the innovation in the growth rate of nominal wages resulting in the rises of inflation (Agenor & Hoffmaister, 1997). This result of research is support the Keynesian Theory.

As stated by the Keynesian Theory, a decreasing in the component of aggregate demand considered as effective policy in reduction of inflation and demand pressure. The expenditure of government can be reduce by rising in tax and well manage the supply of money alone or together. This way can be effective in reducing demand and inflation control (Totonchi, 2011).

2.3.3 The Quantity Theory of Money

The quantity theory of money is one of the established economic doctrines. This theory states that changes in the level of general price are mostly regulated by changes in the circulation quantity of money. This theory of money was established since 19th century classical monetary that providing the foremost conceptual framework for interpretation of modern financial events. As stated by Totonchi (2011) this theory was contributed by Classical economist for instance Hume (1711-1776), Ricardo (1772-1823), Fisher (1876-1947) and Pigou (1877-1959).

Hume introduced the influence of monetary change spread from one sector to another economy sector, changing quantity and relative price in the process. He also offered extension, great refinement and explanation to the quantity theory of money.

Ricardo is the greatest pioneers of the classical economy believed was argued the disequilibrium effects is not important in the long run equilibrium. He exciting that inflation in Britain was the consequence of the irresponsible issue of money under the stress of the Napoleonic war in 1797. Ricardo depressed discussions on employment effects of monetary injection and potential beneficial output.

Fisher used mathematical analysis in his famous equation MV=PT. In neo-economic analysis this equation and other equation, for example Cambridge cash balance equation matches with the emerging mathematics use. This define the precise term to discover and compare which proportional assumption is valid. Fisher and Pigou

demonstrated that monetary policy could be reached by monitoring a certain exogenous part of monetary base in the fractional reserve-banking regime.

2.3.4 Monetary Theory of Inflation

Founder of the monetarism school of thought, Milton Friedman who believed that "only money matters" and the monetary policy is more potent than fiscal policy in stabilization the economic. Monetary theory of inflation was explained if any rise in price and money supply would exhaust in rising the employment and output level and not the level of general price in the economy, given that an economy has not achieved the full employment level. Supply of money can't influence the output level in the long-run but it determines output and prices in the short-run.

Modern quantity theory headed by Milton Friedman claimed that "inflation is always and everywhere a monetary phenomenon". Arif and Ali (2012) analyzed the data from Bangladesh and concluded that money supply in the short-run as a main aspect inducing inflation. Study by Jiang, Chang, and Li (2015) found that the money growth and inflation are positively related in the long run that agrees the monetarist school of thought.

2.3.5 Structural Inflation Theory

The theory of structural inflation pass in the economic research and debate about four decades ago. This theory of inflation concentrate in what manner inflation is correlated to the economy structure and tries to recognize the relationship among inflation and the structural foundations of economy. While the Structural Approach supports the

investigation organization of economies in order to discover the high inflation. Compare to monetarist, structuralism indicated that particularly in developing countries the source of the rise in price level is structural instabilities. Thus, in accordance to structuralism, inflation is "not always and everywhere a monetary phenomenon". This opinion of structuralism describes, excess demand assistances inflation process and rises in general level of price.

Structural theory of inflation stressed that, the cost of economic growth and the structural improvement generates the inflationary process. Structuralism argued that it is not necessary to change the current policy in order to control inflation by the government intervention in the market structure or by implementing a decisive plan for the distribution of inflation pressure. Other than that, they states that, the common monetary and fiscal policies to compromise inflation is nothing more than a perspective for stopping the economic growth.

The structuralism suggested another factors associated with the inflation is the fast growing in services sectors that are linked to the population growth and immigration. Conversely, the structural theory of inflation didn't exclusively restricted inflation to monetary factors, but the economy structure itself can cause inflation (Totonchi, 2011).

2.3.6 Rational Expectations Revolution

Macroeconomics in the 1970s suggested by a rational economist such as Lucas, McCallum, Sargent and Hansen. Under the monetarist assumptions of continuous

market clearing and imperfect information, the Rational Expectation Scholl argued that the people don't have the same forecast error as proposed in the idea of adaptive expectation.

The Rational Expectation approach derived a vertical Philip curve whether in the long run or short run. Monetarist argued that, a monetary announced in advance by the monetary authority, people expect price to increase. Likewise when the government announces an anti-inflation policy, people that don't believed this policy can reduce prices till to be applied virtually. The new classical framework summarized that the prices expectations is related to moral factors such as government sincerity and its reputation for coping with inflationary process (Totonchi, 2011).

2.3.7 New Neoclassical Synthesis (NNS)

As suggested by Paul Samuelson as an apparatus of enquiry the Neoclassical synthesis presented a view of Keynesian national income determination as well as the principle of Neoclassical to direct macroeconomic enquiry. Based on this assumption of price stability in the short run, the emphasized that the monetary or demand factors are the main determinants of the business cycle. At the same time they explained the real economy activity in terms of supply shocks as proposed in the new classical business cycle theory.

The NNS proposed new model called IS-LM-PC where PC refers to Philip Curve. This model considered prices as endogenous variable. The NNS also believed that the expectations are very important in the inflationary process.

The peculiarity of the new ISLM model is that the dynamic and behavior of economic agent can be derived from the potential decisions of households and firms which allow expecting the behavioral manner in the future. The IS curve exhibit the relationship between output and the interest rate which is the key consequence of the modern theory of money. The component of aggregate demand in Philip curve linked the inflation with the expected inflation and output gap (Totonchi, 2011).

2.3.8 New Political Macroeconomics of Inflation

As stated above, the most important theories focus on macroeconomic determining factor of inflation and pay no attention to the non-economic issues for example political process, institutions and culture in the inflation process. In the real world, political powers not as the social planner that decide on the economic policy. Result of a decision process is the economic policy that balances conflicting interest as a result choice collectively may emerge.

The new political economy, the literatures provides fresh perspective on the relations between timing of election, performance of policy maker, political instability, policy credibility and reputation and the inflation process itself. The case for Central Bank independence is usually framed in terms of the inflation bias presented in the conduct of monetary policies. However, the theoretical and empirical work suggests that monetary constitutions should designed to make sure a great degree of Central Bank autonomy.

2.4 Method Used for Analyze Determinants of Inflation

Detecting the determinants of inflation is based on the long run and short run estimation that from different approaches will apply. These approach includes granger causality, co-integration, unit root test, Vector Error Correction model (VECM), Vector Auto regression (VAR), Ordinary Least Squares (OLS), panel data techniques and others. Most of the studies apply Co-integration method (for long run estimate), VECM (for short run estimate) and granger causality (Alavinasab, 2014; Arif & Ali, 2012; Ashwani, 2014; Bashir et al., 2011).

Different authors have measured inflation in a variety of ways. Bashir et al. (2011) applied three methods (i.e. co-integration, VECM and granger causality) in their study and that money supply, GDP and government expenditures have positive significantly on inflation. By applying Co-integration and VECM, study discover that broad supply of money, rate of nominal exchange, rate of interest, fiscal deficit and real output, are positively accounted towards inflation in Ghana (Adu & Marbuah, 2011).

Whereas, Ashwani (2014) found long-run relationship between inflation, rate of exchange, social and private spending and supply of money by applying Co-integration approach. For instance, Monfort and Pena (2008) applied Co-integration and OLS method in their study and indicates that monetary is a main factor of inflation in Paraguay.

Then, Hausman and Taylor (1981) exposing that, individual-specific unobservable effects might correlated with other explanatory variables which be able controlled by

merging time-series and cross-sectional data. This combining approach can be called as panel data estimation.

A variety methods of panel data approach are used to assess inflation. For example, Thanh (2015) conducted a panel smooth transition regression approach in the ASEAN-5 countries. Furuoka and Munir (2009) illustrates pool OLS, one-way fixed effects, two-way fixed and random effects also in ASEAN-5 countries. The main findings states that there is no trade-off relationship between unemployment and inflation rate in these ASEAN-5 countries.

In addition, a panel unit roots test, panel co-integration and panel long-run estimations using panel fully modified ordinary least square (FMOLS) have measured by (Narayan & Smyth, 2009; Rasidah & Hawati, 2001). Narayan and Smyth (2009) indicate that, when real wages increase it will increase the productivity over the G-7 countries.

Furthermore, Darrat (1985) and Puzon (2009) also conduct the panel approach in their study by applying panel OLS in three major Organization of Petroleum Exporting Countries (OPEC) includes Libya, Nigeria and Saudi Arabia and ASEAN-4 (Indonesia, Malaysia, Philippines and Thailand) respectively.

In this case of study, researcher will use the panel data as an approach to analyze the data. There are two kinds of panel data which are, balanced panel and unbalanced panel. Balanced panel has equivalent number of observations for individually, whereas unbalanced panel does not consist equivalent number of observations for individually.

The main aim for utilizing panel data as for estimated the model is that it suggest an opportunity for monitoring unobserved individual in exact period of heterogeneity, that might connected with the consist of independent variables. Panel data also improves the quantity and quality of data in ways that would be incredible using either time series or cross section (Gujarati, 2003).

Other than that, this panel data approach was chosen because it enable to resolve temporal model effects devoid of aggregation bias, more efficiency, rises the accuracy parameter estimations, gives more informative data and a lesser amount of collinearity between variables, (Baltagi, 2005; Greene, 2005; Hsiao, 2003).

2.5 Previous Empirical Findings

Study on determinants of CPI or inflation has been carried out by numerous economists whichever internationally or nationally. But, these all are dissimilar with one another whether from time frame, size of sample, country to country and techniques or from variables chosen. Studies have been done on determinants of inflation on time series data surpass the studies on cross-sectional or panel data. A few of them are comprehensively reviewed in this section.

Most of studies have reveals to recognize time series data as a key elements of inflation (Arif & Ali, 2012; Ashwani, 2014; Bayo, 1996; Tafti, 2012). Alavinasab (2014), studied in Iran from 1965 to 2012 determined the existence of unit root and stationarity of the series and co-integration test indicate a long run relationship among variables of supply of money, revenue of oil export, GDP, and inflation.

The time series model for the period 1990 to 2009 inflation in Ghana demonstrated the supply of money and real output are the robust power to impose pressure on moving upward the depreciation of exchange rate to the price level to in Ghana (Gyebi & Boafo, 2013). By using OLS method Laryea and Sumaila (2001) have also observed the key determinants of inflation. Their study proves that supply of money and rate of exchange have positive relationship on inflation whereas GDP in Tanzania has negative effect on inflation.

Previous research has discussed that the money supply is a significant determinant of inflation (Adu & Marbuah, 2011; Bandara, 2011). Conversely, Altowaijri (2011) and Kim (2001) posits that there is no evidence to show the money supply affect in inflation.

Compare to the monetarist, the real wage and all markets were assuming to clear continuously in the labor market, whereas, Post Keynesians Theory argue that in the commodity market, output and real wage were determining (Yellen, 1980). Yellen (1980) posits that, when money wage demands increase it will lead to increase the prices without raising the real wage. Hence, this statement state that, once inflation begins there is nothing to stop it.

The differences between monetarists and the post Keynesians are based on contrasting views of the market. For the monetarists, markets works smoothly, speedily and inevitably Azam and Rashid (2014), while the post Keynesians in consider commodity market is a "unique market-clearing real wage and money wage cuts just lead to proportional price changes" (Yellen, 1980).

Arif and Ali (2012) study inflation in Bangladesh for period 1978 to 2010 determined that broad money, GDP, import, expenditure on government have a positive impact on the inflation in long-run. In contrast, export and revenue on government have a negative impact. The study Ashwani (2014) in India presence money supply, private final expenditure and exchange rate contribute the inflation significantly.

Gisser and Goodwin, (1986) introduce four macroeconomic performance indicators that are general price level, unemployment rate and real GDP and investment to indicate growth rate of nominal price of crude oil.

Then, authors who approximate the effect on price of oil rises in real income in the United States (U.S) and other developed countries are Darby (1982) and Hamilton (1983). Darby (1982) explains that, there is no oil effect occur in a regression of GNP growth on a price control and labor market that give recession in U.S. However, Hamilton (1983) founds statistically significant relationships between real GNP growth and changes on price of oil for economy in U.S. during 1948 to 1972 and 1973 to 1980. This supporting the proposition that oil shocks were accounted issue in at least certain of the U.S. recessions prior to 1972.

Study by Leblanc and Chinn (2004) in line with Hamilton (1983) that recommend rises in current oil price are probably to have impact on inflation in the Japan, Europe and U.S.

There are over and over again the variables that have been in used by researchers to explain inflation, includes money supply, interest rate, exchange rate, GDP, imported inflation and prices of oil.

So far, however, there has been little discussion about determinants of inflation across cross-sectional or panel data. For instance, Wang and Wen (2006) found inflation in eighteen developed countries have a significant average correlation in short-run. Other than that, Darrat (1985) examined inflation and money in Libya, Nigeria and Saudi Arabia. He stressed that greater supply of money and lower in real growth of income were outcome a high inflation.

However, studied inflation in each single countries of ASEAN-5 are still many, but only a few studies were concentrated on inflation determinants of ASEAN-5 countries. There are several studies done analyzing inflation in single countries of ASEAN-5; Indonesia (Anugrah, 2014; A. Hossain, 2005; Ramakrishnan & Vamvakidis, 2002; Tirtosuharto & Adiwilaga, 2013; Utomo, 2013; Wimanda, 2009), Malaysia (Cheng & Tan, 2002; Crichton, 2006; Furuoka & Munir, 2009; Khai, 2011; Kogid, Asid, Mulok, Lily, & Loganathan, 2011), Singapore (Cheung & Yuen, 2002; Ee, 2005), Philippines (Cacnio, 2012; J. Lim, 2006; Yap, 1996), Thailand (Jitsuchon & Siamwalla, 2009; Kushwaha & Stjernberg, 2011; Wattanmakoon, 2013).

Whereas, based on the best knowledge of researcher, example studied done on the ASEAN-5 countries are (Furuoka & Munir, 2009; Jiranyakul & Opiela, 2010; Thanh, 2015).

From the above discussion, many researchers have been concentrated study the issues involving inflation surpass the countries. So, this potential study attempts to determine variables that can cause inflation in the selected area of study which is ASEAN-5 countries.

2.6 Concluding Remarks

Decisively, considering the association among independent variables and inflation is crucial not just because their relationship but also because of its policy concerns. Issue regarding the relationship between independent variables and inflation from the literature review of this has keep on inconclusive. From the best knowledge of researcher, there is a lack of studies that applies the panel data approach in term of analyzing the findings on inflation in the ASEAN-5 countries. Hence, further studies on using ASEAN-5 countries data would arrange for a clear understanding and will used the panel data approaches that will reduce the problem of heteroscedasticity or multicollinearity.

CHAPTER THREE
RESEARCH METHODOLOGY

3.1 Introduction

In order to achieve these objectives study, several methods will use to obtain required information about factors determining the inflation in the ASEAN-5 countries. This chapter is going to review the methods used or applied in order to achieve objectives of the study and research questions as mentioned in Chapter 1. Figure 3.2 shows the theoretical framework for the model used in this study. This section also include hypothesis statement, variables and measurement, data collection and analysis as well as model specification test in this study.

3.2 Theoretical Framework

The summary of the theoretical relationship among inflation and the explanatory variables of this study will be shown on Figure 3.2.

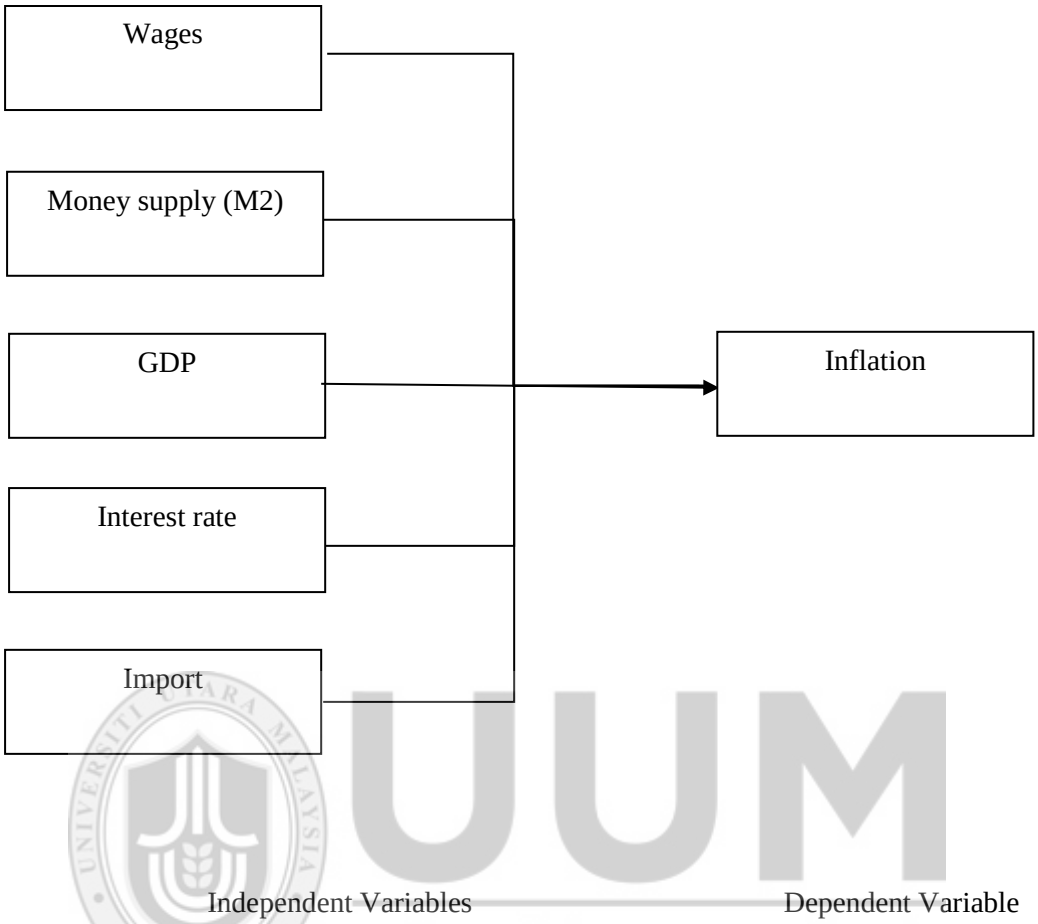

Figure 3.2
Determinants of inflation

Figure 3.2 above present the theoretical framework diagram for the determinants of inflation. There are several elements or major factors of inflation include wages, money supply, GDP, interest rate, and import.

3.2.1 Post Keynesian Model of Inflation

According to (H. sonme. Atesoglu, 1997) the Post Keynesian model of inflation can be described as the following three equations:

$$p = \alpha_0 + \alpha_1 \alpha + \alpha_2 q \; ; \ldots\ldots\ldots\ldots\ldots\ldots (1)$$

$$a = w - z\ ; \ldots\ldots\ldots\ldots\ldots\ldots (2)$$

$$w = \beta_0 + \beta_1 u\ + \beta_2\, p \ldots\ldots\ldots\ldots\ldots\ldots (3)$$

$$\alpha_1,\ a_2,\ \beta_2 > 0, \text{ and } \beta_1 < 0$$

Where,

p is the inflation rate,

α is the growth rate of unit labor costs,

q is aggregate demand,

w is the wages growth rate,

z is the labor productivity growth rate,

u is the unemployment rate.

Equation (1) that was employed by (Downward, 1995) is the aggregate demand augmented wage-cost markup model. As represented by the aggregate demand variable, this equation identifies the possibility of dependence of the markup on conditions of business. The intercept α_0 is measure the autonomous growth in markup.

Equation (2) is an identity, describing the growth rate of unit labor costs with the wages growth rate and labor productivity growth rate.

While, equation (3) is the wage-growth equation which permits conditions of business and aggregate demand that affect the wages growth rate. These influences are represented by the unemployment rate. The variable of inflation in the wage equation identifies the worker's anxiety over their share of the aggregate output and their real wages.

3.2.2 Monetary Theory of Inflation

According to monetarists, inflation is a solely phenomenon of monetary that can only be formed by expanding the supply of money at a faster rate than the capacity output growth (Humphrey, 1975). The general form of monetary theory of inflation is depicted with the following Quantity Theory of Money which is also named as Cambridge equation that can be shown on Equation 4.

$$MV = PY \ldots\ldots\ldots\ldots\ldots\ldots (4)$$

Where,

M is money supply

V is velocity of money

P is level of market price

Y is community output or real income

The Monetarists take on that money is neutral. Thus, the magnitude of the velocity variable is stable over time and both exogenous. Therefore, rise in the quantity of money cause the level of price to increase. In order to defeat inflation, restrictive money supply growth policy can be implement (Davidson, 2011).

3.3 Hypothesis Statement

Based on the developments of the literature on theory and previous study on inflation as discussed in chapter 2, the present study attempts to discover the theory and policy that suite to implement regarding to the phenomenon of inflation occurs in the

ASEAN-5. This study is planning to discover the null hypothesis of no significant causal relationship among variables. The hypotheses of the study are as follows:

a) Inflation and wages;

H_0: There is no significant causal relationship between inflation and wages
H_1: There is a significant relationship between inflation and wages

b) Inflation and money supply;

H_0: There is no significant causal relationship between inflation and money supply
H_1: There is a significant causal relationship between inflation and money supply

c) Inflation and GDP;

H_0: There is no significant causal relationship between inflation and GDP
H_1: There is a significant relationship between inflation and GDP

d) Inflation and real interest rate;

H_0: There is no significant causal relationship between inflation and real interest rate
H_1: There is a significant relationship between inflation and real interest rate

e) Inflation and import;

H_0: There is no significant causal relationship between inflation and import
H_1: There is a significant relationship between inflation and import

3.4 The Model

Given that the determinants of inflation contrast across different countries, some studies have developed from models of inflation. The econometric model used in this study was developed based on the Post Keynesians and Monetarist view of inflation,

but the model has been customized to accommodate other independent variables that effect the inflation. Specially, studies on inflation commonly employ money supply as important elements in inflation model. To adapt the Post Keynesian view of inflation and determinants of inflation in ASEAN-5 countries, other causes such as wages, GDP, real interest rate and import are also being consider as control variables.

Thus, this study will pool time series and cross-section data to examine the relationship between CPI, wages, money supply, GDP, real interest rate and import. The function of inflation can be written as the following equation:

$$CPI = f(WAGES, M2, GDP, R, IMP) \quad \ldots\ldots\ldots\ldots\ldots\ldots (5)$$

where,

CPI = Consumer price index

WAGES = Wages of employees

M2 = Money supply

GDP = Gross Domestic Product

R = Real Interest rate

IMP = Import

Equation (5) shows that CPI is dependent variable and other variables are independent variables which are expected to effect the CPI. Hence, the model of econometrical CPI function finally can be specified as follows:

$$lnCPI_{it} = \alpha + \beta_1\, lnWAGES_{it} + \beta_2\, lnM2_{it} + \beta_3\, lnGDP_{it} + \beta_4\, R_{it} + \beta_5 lnIMP_{it} + \varepsilon_{it}$$

3.5 Variables and Measurement

Whereas, this study will discovering six potential independent variables that investigate determinant of inflation towards the dependent variable. The independent variables include in this study are wages, M2, GDP, price of oil, interest rate and import.

3.5.1 Consumer Price Index (CPI)

CPI as the dependent variable that will be used in this study. This dependent variable are measured based on CPI (2010 = 100). We choose the CPI as the proxy to measure the inflation as all the single countries in the ASEAN-5 used the CPI as the measure to inflation. Consumer price index will be used as a proxy for inflation as used by previous studies such as (M. T. Hossain, 2013; Oseni, 2013; Sausa & Zaghini, 2008).

3.5.2 Wages

Wage and salaried workers (employees) clear as “paid employment jobs” those who hold the nature of jobs. Where the incumbents hold explicit or implicit employment contracts that give them a basic remuneration that is not directly dependent upon the revenue of the unit for which they work. As an wages measure it is used by previous study such as (H. S. Atesoglu, 1980). The relationship between wages and inflation is expected to be positive.

3.5.3 Money Supply Growth

Money supply (money and quasi money) consist deposits of demand other than the central government, total of currency outside banks, and the time, saving and foreign currency deposits of residents sector other than the central government. This explanation of money supply growth is normally known as M2. This is the prominent instrument used in measuring money growth also an economic indicator used frequently to evaluate the amount of liquidity in the economy, because it can be trace easily and M2 is used as a proxy of money supply growth as utilized by previous study such as (Arif & Ali, 2012; Mbutor, 2014). The relationship between money supply growth and inflation is expected to be negative.

3.5.4 Gross Domestic Product (GDP)

GDP is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. "It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources". GDP per capita which used in this study is gross domestic product divided by midyear population. As an economic growth measure it is used by previous studies such as (Haile, 2013; Maku & Adelowokan, 2013). The relationship between economic growth and inflation is expected to be negative, this is because an increase economic growth would lead to decrease in inflation.

3.5.5 Real Interest rate

Interest rate represent the rate that borrower paid to a lender for the purpose of using the borrowed money. This kind of variable is used by the researcher as a control variable and it represented by the real interest rate. The real interest rate is the lending rate that modified for inflation as measured through GDP deflator. The term and conditions attached to lending rates differ by country, however, limiting their comparability. As a measure of interest rate it is used by prior study such as (Sola & Peter, 2013). The expected relationship between the interest rate and inflation is positive.

3.5.6 Import

Import of goods and services characterize the market services received from the rest of the world and value of all goods. They comprise the value of freight, merchandise, transport, travel, insurance, license fees, royalties and other services. The other services which include financial, construction, communication, business, information, government and personal services. They ignore the employees' compensation and transfer payments and income of investment. The expected relationship between the import and the inflation rate is positive. The value of imported goods and services is used in this study as a measure of import as used by previous studies such as (Arif & Ali, 2012; Maku & Adelowokan, 2013).

3.6 Data Collection

The data for this study will cover the selected region, which is ASEAN-5 for a period of 25 years spanning from 1990 to 2014. Indonesia, Malaysia, Philippines, Thailand and Singapore is the ASEAN-5 countries that will used in this study.

By using panel data, we will only use secondary data as a method to collect the data. This kind of data assisted the researcher to gain the extra information. Collecting the secondary data could be as raw data for instance statistics or as generalizations and analyses. Secondary data can be taken for example World Development Indicators (The World Bank, 2015), International Monetary Fund (International Monetary Data, 2015) and others sources available on website.

3.7 Method of Analysis

The impact of explanatory variables to CPI will estimate using different kinds of panel data models which are called panel model, random effects models (REM) and fixed effects model (FEM). This study will used unbalanced panel data set which has a different number of observations for each cross-section. In choosing the best model, FEM hypothesis testing, FEM versus REM and Hausman specification test will be used (Gujarati, 2003; Hsiao, 2003).

Hsiao (2003) states the utilization of panel data has several superiority more than time series data. These include controlling for individual heterogeneity. Panel data considers that individual, firms, countries or states are heterogeneous. But, dealing with time series and cross section data, they can't control this heterogeneity.

Furthermore, having this panel data give more variability, less collinearity among variables, informative data, more efficiency and more degree of freedom (Baltagi, 2005).

Even so, there are several limitations of panel data which are problem in selectivity, problems in data collection, measurement errors disruption, dimension of time series is short, and dependence in cross section (Baltagi, 2005). In addition, Hsiao, (2003) also found a little limitations can be imposed in panels on the distributed lag model than in a time series study. However, the benefits provided by panel data more than its limitations itself.

3.7.1 Pooled Ordinary Least Square (POLS) Regression Model

Without regard to the time and country effects in analyzing the relationship and determinants between independent variables and inflation, POLS regression model will be used. In other words, this model estimates an intercept constant for all countries. Basically, there are no differences among the estimated cross-sections in the POLS regression model. In addition, this model is beneficial under the hypothesis that the data set is a priori homogeneous (Asteriou & Hall, 2011). For an example, this study used ASEAN-5 as the sample. But, this situation is somewhat restrictive. The POLS regression model can be written as the equation:

$$lnCPI_{it} = \alpha + \beta_1\, lnWAGES_{it} + \beta_2\, lnM2_{it} + \beta_3\, lnGDP_{it} + \beta_4\, R_{it} + \beta_5 lnIMP_{it} + \varepsilon_{it}$$

Where,

CPI_{it} =Consumer Price Index (2010=100) of country i during year t

$WAGES_{it}$ = Wage and salaried workers, total (% of total employed) of country i during year t

$M2_{it}$ = Money and quasi money (% of GDP) of country i during year t

GDP_{it} = Gross domestic product per capita (current US $) of country i during year t

R_{it} = Real interest rate (%) of country i during year t

IMP_{it} = Imports of goods and services (current US$) country i during year

ε_{it} = error term (disturbance term),

and α is an intercept and β_1, β_2, β_3, β_4 and β_5 is a parameter of the model.

3.7.2 Fixed Effects Model

The intercept in the FEM is considered as group specific. Means that, this model enable for dissimilar intercepts for each countries. The FEM basically not vary over time and involves entirely effects to particular countries. Thus, FEM fully consider the matters including natural treasures, factor of geographical and other foundation elements that differ between countries but do not over time.

Since this study concentrate on ASEAN-5 countries, hence the one-way fixed effects is appropriate to consider the model that constant for the group of countries. This kind of model consider that, the intercept is varies across the countries, but the slopes are common. The one-way fixed effects model can be written as the equation:

$$CPI_{it} = \alpha_i + \beta_1 \, lnWAGES_{it} + \beta_2 \, lnM2_{it} + \beta_3 \, lnGDP_{it} + \beta_4 \, R_{it} + \beta_5 lnIMP_{it} + \varepsilon_{it}$$

The variable α_i is well-defined as heterogeneity of country or effect of unobserved country that affects the CPI. Effect of unobserved country is stated to a fixed effect because its value is fixed over time.

3.7.3 Random Effects Model

REM is another method to estimate a model in a panel data set. Intercept in the REM is considered to be a random outcome variable, while the random outcome is a function of a mean value added a disturbance term. REM has a weakness in analyze the model. An explicit weakness of REM is that we are necessary to make particular assumptions regarding the distribution of random component (Asteriou & Hall, 2011). However, by handling this method it has several benefits, such as it has a little parameters to estimate compared to FEM. Other than that, it also enable for other independent variables that have equal value for all observations within a group. Hence, the REM will take the following equation:

$$CPI_{it} = (\alpha + v_i) + \beta_1 lnWAGES_{it} + \beta_2 lnM2_{it} + \beta_3 lnGDP_{it} + \beta_4 R_{it} + \beta_5 lnIMP_{it} + \varepsilon_{it}$$

As an alternative of treating $\alpha_i = (\alpha + v_i)$ as the constant for each section. v_i define as a zero mean standard random variable.

3.7.4 Panel Granger Causality Test

(Engle & Granger, 1987; Granger, 1988) proposed that "there could be granger causality in at least one direction if two variables are co-integrated". To attain the objective, an examination on the causality relationship between the variables will be

conducted. Then, this analysis will help to ascertain the way of a causal relationship in the case of ASEAN-5 countries.

The impression of granger causality is that a variable X granger-causes variable Y if variable Y can be better predicted using the histories of both X and Y than it can be predicted using the history of Y alone. This is shown if the expectation of Y given the history of X is different from the unconditional expectation of Y a second definition for causality.

3.8 Specification Test of the Model

By taking dissimilar expectations about covariance, people may think FEM and REM probably the same model. But, actually FEM and REM is the different model. Both of these model have varies test available. In order to test these model we are utilizing the *F* test, Hausman specification test, and Breusch-Pagan test.

3.8.1 Fixed Effect Hypothesis Testing

Prior to evaluate the validity of the FEM, we will utilize a test to examine whether FEM is appropriate in this study or not. As for contrast, POLS regression model is utilized as a fundamentals. To examine this, *F* test can be used to choose between of these two models. We allows to commit this significance test by the *F* test be similar to the structure of the *F* test for R-square (R^2) change. The null hypothesis indicate that entirely the constants are homogenous. If the results of the *F*-critical is smaller than *F*-statistical we reject the null. Hence, if we found significant in the R^2, there is a statistically significant of fixed effects.

3.8.2 Random or Fixed Effects Model

In order to choose the most appropriate model between FEM and REM, Hausman specification test is the test that can be used. Generally, this test supposed that there are two estimators which are $\hat{\beta}_0$ and $\hat{\beta}_1$ and included of two hypothesis-testing techniques. Under null hypothesis, both estimators are consistent, but $\hat{\beta}_0$ is incompetent. While, under alternate hypothesis $\hat{\beta}_0$ is competent and consistent, but $\hat{\beta}_1$ is inconsistent. Among the FEM and REM that is implicates examining whether the regressors are correlated with the countries effect or not. Although the estimators are correlated with the countries effect, it is still consistent when using this model. With that, the null hypothesis is that the random effects are competent and consistent. While, the alternate hypothesis is that the random effects are incompetent. As a results, big value of the Hausman test statistic means that we reject the null hypothesis. So, the REM is competent and consistent and FEM is more appropriate. In different, if the value of Hausman test statistic is small it indicate that the REM is more applicable than FEM.

3.8.3 Breusch-Pagan Lagrange Multiplier (LM) Test

The Breusch-Pagan LM statistic test the null hypothesis that the pooled OLS estimator is adequate against the random effects alternative. The specific hypothesis under this test are as follow:

$$H_0 = \sigma_T = 0$$

$$H_1 = \sigma_T \neq 0$$

3.9 Concluding Remarks

Generally, this chapter represents data, theoretical framework were used in this study. Other than that, this chapter also has concentrated on the methodologies that were used in addressing the objectives of the study. The economic model that's will employ in this study is inflation model. After that, we will employ *F* test, Hausman specification test and Breusch-Pagan test in order to examine the model in this study.

CHAPTER FOUR
RESULTS AND DATA ANALYSIS

4.1 Introduction

This chapter presents the results of the inflation model based on the analysis of panel data. These empirical findings are reported and discussed based on the objectives of the study as highlighted on chapter 1.

4.2 Results of Panel Data Analysis

After having done the discussion on the topic of the methods used in Chapter 3, we have reached the estimation results for ASEAN-5 countries by using POLS, fixed effect model and random effects model. The findings were presented in Table 4.2.

Table 4.2

Panel Data Estimation of ASEAN-5 Countries

Method / Variables	Pooled OLS		Random Effect		Fixed Effect	
	Coefficient	P-value	Coefficient	P-value	Coefficient	P-value
Constant	-6.1747 (-4.94)	0.0000	-6.1747 (-4.94)	0.0000	-2.6786 (-1.82)	0.0720
ln WAGES	0.3733 (3.83)	0.0000***	0.3733 (3.83)	0.0000***	0.7885 (3.46)	0.0010***
ln M2	-0.0370 (-0.65)	0.5170	-0.0370 (-0.65)	0.515	-0.2050 (-1.71)	0.0920*
ln GDP	- 0.1458 (-3.34)	0.0010***	- 0.1458 (-3.34)	0.0010***	0.2999 (2.59)	0.0110***
R	0.0080 (1.87)	0.0640**	0.0080 (1.87)	0.0610**	0.0014 (0.43)	0.6700
ln IMP	0.4102 (7.70)	0.0000***	0.4102 (7.70)	0.0000***	0.0914 (0.86)	0.3910

Notes:

1. Figure in the parentheses are t-statistics
2. *, ** and *** indicate the respective 10%, 5% and 1% significance level

From the Table 4.2 without taking into account the fixed effect result, finding of pool OLS clearly stated that wages and import have the main effect on CPI compared to the another control variables. The coefficient of determination (R2) is 0.5821. We arrived this assumption by comparing the coefficient values of the five independent variables. Import and wages shows the highest coefficient value which is 0.4102 and 0.3733 respectively and statistically significant at 1% level and it is positively related to the inflation. This implies that, 1% increase in import would lead to 0.41% increase in CPI and 1% increase in wages would lead to 0.37% increase in CPI. This results were support the Post Keynesian Theory of inflation, which are import and wages were support the view stated in (Bloch et al., 2004; Davidson, 2011).

However, the result on M2 found that there is statistically insignificant and negative relation between money supply growth and inflation. Thus, this study does not support the monetarist view of inflation that excess supply of money is the major cause of inflation. This result is in line with the previous studies such as (Altowaijri, 2011; Kim, 2001).

In addition, results in table 4.2 reveal that, GDP is statistically significant at 1% level and negatively related to CPI. This finding also in line with the previous studies as well as the priori expectation. This study is in line with (Haile, 2013; Laryea & Sumaila, 2001) findings. It indicates that, when GDP increase by 1% it would lead to 0.15% decrease in CPI. Interest rate as shown from the Table 4.2 is statistically significant at 5% level and positively related with CPI, where 1% increase in interest rate would lead to 0.01% increase in CPI. This finding conforms with the prior expectation and previous studies such as (Hossain, 2013).

While the FEM reported that, wages is still statistically significant and have positive relationship related to inflation. It point out that, when wages increase by 1% it would lead to 0.78% increase in CPI.

4.3 Results on the Specification Test of the Model

Table 4.3
Specification Tests

Specification test	p-value	Tested	Selection
F-test	0.0000	OLS/Fixed	Fixed
Hausman	0.0000	Fixed/Random	Fixed
Breusch-Pagan	1.0000	OLS/Random	OLS

F-test

To compare the pool OLS estimation and one-way fixed effects model, the null hypothesis that time effects equal zero is rejected at the 1% level of significance. Based on the result on Table 4.3., the result for significance test with F-test indicate that the R^2 have low p-value which counts against the null hypothesis that the pool OLS model is adequate, in favor of the fixed effect alternative.

Hausman Test

In order to choose between FEM and REM the Hausman test should be used which has an asymptotic chi-square distribution. Small p-value by this test indicate that coefficient estimated by REM and FEM are unequal. When the p-value is significant which is favor of FEM. Since the p-value is less than 0.05, we reject the null hypothesis. So, FEM is more appropriate than REM and we have to use the fixed effect model.

By comparing the one-way fixed effects model with random effect model, the Hausman test indicates that the fixed effects model is more appropriate than random effect model. These findings indicate that the one-way fixed effect model is the best model to examine the relationship between inflation and independent variable in these ASEAN-5 countries.

As the one-way fixed effect model shows, the wages and GDP are strongly influenced by country-specific effect (i.e. the countries' specific socio-economic backgrounds).

Breusch-Pagan Test

In the case of whether we need to choose pool OLS or REM, the Table 4.3 were presented the result. This test should be used which has the chi-distribution. Since the p-value is more than 0.05 we failed to reject the null hypothesis. Hence, the pool OLS is more appropriate than random effect model.

4.4 Diagnostic Checks

Diagnostic test is carried out in order to check the reliability of the model. Consequently, variance inflation factor (vif) is carried out to check the existence of multicollinearity and finally to check the heteroscedasticity problem it can be detect by using Modified Wald Statistic.

4.4.1 Variance Inflation Factor (vif) test

By using variance inflation factor (vif) the multicollinearity problem can be detected. Multicollinearity can be defined as the phenomenon in which two or more predictor variable in a multiple regression model are highly correlated. The results of the test was presented in Table 4.4.1.

Table 4.4.1
VIF Test for Determinants of Inflation

Variables	VIF
lwages	3.75
lM2	1.65
lGDP	8.00
R	1.13
limp	3.85
Mean VIF	3.68

Based on the results presented in Table 4.4.1, there is no multicollinearity problem since the VIF is less than 10. Hence, one of the advantages of using panel data is to reduce the multicollinearity.

4.4.2 Modified Wald Statistic

As a conclusion, the p-value is 0.0000 which is less than 0.05 that reject the null hypothesis. This means that, the variances are not constant and there is a heteroscedasticity problem.

4.5 Panel Granger Causality Test

After establishing the pool OLS in the Table 4.2., the following stage of this analysis is to test whether there is an existence of potential causal relationship between the inflation and independent variables. To achieve the final objective, this study focused on the direction of causality between CPI, wages, money supply as well as other variables in the panel context. The panel Granger causality test is used to estimate the causal relationship between the variables studied. The findings of the estimation are presented in Table 4.5.

Table 4.5
Pairwise Granger Causality Test Results

Null Hypothesis	F-Statistic	Prob.	Results
LWAGES does Granger Cause LCPI	4.2242	0.0182***	LWAGES →LCPI Unidirectional (one-way causality)
LCPI does not Granger Cause LWAGES	1.0024	0.3718	
LM2 does not Granger Cause LCPI	2.1072	0.1264	(no causality)
LCPI does not Granger Cause LM2	0.7994	0.4522	
LGDP does not Granger Cause LCPI	1.2853	0.2807	LCPI→LGDP Unidirectional (one-way causality)
LCPI does Granger Cause LGDP	6.6080	0.0019***	
R does not Granger Cause LCPI	1.3179	0.2719	LCPI → R Unidirectional (one-way causality)
LCPI does Granger Cause R	5.3987	0.0058***	
LIMP does not Granger Cause LCPI	0.5741	0.5649	(no causality)
LCPI does not Granger Cause LIMP	1.6344	0.1998	

Note: *** ,** and * indicate significance at 1%, 5% and 10% level respectively.

As presented in Table 4.5, the findings of the Pairwise Granger causality test shown that a unidirectional causality relationship between wages and CPI which is significant at 1% level. It indicates the direction of causality running from wages to inflation in the ASEAN-5 countries.

On the other hand, the Granger causality between money supply, import and inflation shows no existence of a relationship in any direction. The results indicate that money supply and import does not granger the CPI.

4.6 Concluding Remarks

From the result as the discussed above, it is clear that from pool OLS all the variables have effect on inflation rate except the money supply that cannot explain the inflation. The wages variable have positive and significant effect on CPI, interest rate and import also have positive effect on CPI, while GDP have negative and significant effect on inflation rate. Whereas, money supply shows the insignificant and negative relationship to CPI. While, FEM in the same vein, the Granger causality test results show that unidirectional causal relationship exist between money supply and inflation.

CHAPTER FIVE
CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter provides conclusions and recommendations throughout the study. Review of the overall study will be provided from the beginning of this paper. The first section take over the limitations of the study, the second section covers the conclusions and the last section provides the policy implication and recommendations. The recommendation will focus on giving the suggestion to conduct further research about the same field of this study in the future.

5.2 Limitations of the Current Study

There are some limitations that faced by the researchers in this study. Firstly, number of the observations that limited in this study, where the availability of the dataset and the selected variables is not large. For an example, the data on the oil price for this sample of study not been used cause of the availability of this variable. Other than that, the observations number only covered by 25 years that range from 1990 to 2014. Process on selecting suitable variable also quite challenging to the researchers.

5.3 Conclusions

This paper aimed to investigate the relationship based on the inflation model in ASEAN-5 countries by using panel data over the period of 1990 until 2014. This study used the econometric procedures such as pooled ordinary least square, fixed effects method and random effect method.

The FEM shows that there is significant relationship between wages, import and inflation in the ASEAN-5 countries. In other words, there is relationship between import, wages and inflation in these countries. In short, empirical findings support the Post Keynesian view on inflation. Other than that, these finding found that GDP and interest rate also have a relationship on inflation. While, only money supply are statistically insignificant and have negative relationship on inflation. Thus, this study does not support the monetarist view of inflation that excess supply of money is the major cause of inflation and could not explain the proposition of quantity theory of money. This study reveals that, there is no monetary phenomenon that stated by Friedman the monetarist economist.

Additionally, the result from the panel Granger causality test indicates that an unidirectional causal relationship exist between wages and inflation in the ASEAN-5 countries.

The final stage of the analysis in this is the diagnostic test that tests the robustness of the constructed inflation model. The result reveals there is no multicollinearity problem.

5.4 Policy Implications

The findings of this study have a number of important implications for future practice. Since, results on wages and import found statistically significant in pool OLS, and wages is statistically significant in FEM, Post Keynesians view of inflation should be taken into account rather than Monetarist view of inflation in order to curb the inflation in ASEAN-5 countries.

Post Keynesians disagree the causal validity of the quantity theory and practically no role with monetary aggregates in curbing the inflation. Inflation observed as an institutional phenomenon through the money wages contracting process, anti-inflation measures are not considered a key component of central bank policies. Curbing the inflation instead becomes the primary responsibility of executive government (the Treasury or Ministry of Finance, with co-operation from other ministries).

With the Post Keynesian view of the inflation process as being primarily in the money-wage negotiation sphere and economic institutional structure. Central bank measures need to support government anti-inflation policies, but are not the primary weapon for addressing inflation.

Post Keynesians have proposed several income policies to reduce inflation, of which the Tax-based Income Policy (TIP) which attributes to Weintraub is perhaps the best known (Davidson, 2011). The philosophy of this policy is that wage increases in excess of productivity growth are harmful to society as a whole. The proposed tax would operate through the corporate tax structure and be applied to firms awarding wage increase above the norm based on average labor productivity increases. To counteract any deflationary effect of additional tax, Weintraub recommended that TIP taxes collected be re-channeled back to firms in form of tax reduction, with a net benefit to those firms mot awarding inflationary wage increase.

In placing income policies to control inflation, Post Keynesians are not denying a role for monetary policy. However it is, a role in the context of an endogenous money supply with focus on credit flow, instruments and interest rate.

The Post Keynesian view fully recognizes import prices as a contributing cause of inflation and advocates policies to ameliorate import price effects. This is contrary to the monetarist view in which import price increases constitute relative price changes only, unless the money supply is increased to accommodate them.

As conclusion, the implication of the Post Keynesian view that primary cause of inflation lies in the wage-negotiation process. Policy makers and government would need to adopt measures such as income policies for example Tax-Based Income Policy to accord with a Post Keynesian view of inflation. They would need to promote a wage-bargaining framework in the economy in which the relationship between nominal wage increase, productivity improvement and inflation are recognized. Addition, the Post Keynesian view recognizes that restrictive monetary policy can have effect of curbing inflation in ASEAN-5 countries.

5.5 Recommendations for future studies

This study utilizes the panel data in order to investigate the determinants of inflation in ASEAN-5 countries. Results between inflation and the exploratory variables is very dynamic as it gives an opportunity to economist and policy makers in achieving macroeconomics objectives. So, researcher come out the suggestions for future research.

Since, this study of analysis incorporate five independent variables which are wages, money supply, GDP, interest rate and imports by explaining the behavior of inflation. So, in order to explain better model, future studies can include other determinant factors of inflation such as government expenditure, exchange rate and price of oil (commodity price).

Besides, this study utilize pool OLS, FEM, REM and panel granger causality in evaluating the inflation factors, so future studies can use another method such as panel unit root, panel co-integration that can explain the stationarity, short run and long run effect in inflation. Other than that, VAR model and ARDL model another method that can be used in order to see the reliability of the model.

Furthermore, future research should expand the scope of this study by making a comparison with other countries in order to see the extent to which the result differ across different countries. This study utilizes time series data only for 25 years, future studies should utilize a longer data in order to provide better and accurate results.

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