TESTING THE VALIDITY OF PHILLIPS CURVE IN THE NEWLY
INDUSTRIALIZED COUNTRIES (NICs)

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ABSTRACT

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By

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The existence of Phillips curve has been debated over a century. However, it cannot be denied that the Phillips curve does play an important role in the decision-making process on macroeconomic policy. This study examines the validity of Phillips curve in Newly Industrialized Countries (NICs) using quarterly data. Various econometric methodologies like unit root tests, cointegrating test in the ARDL framework, and Granger causality test are employed in this study. This study found that the Phillips curve does exist in NICs. Besides, Phillips curve exists in Brazil, Mexico and Turkey for both short run and long run. Furthermore, the Phillip curve is found to be valid and stable in Mexico and Turkey, whereas it is not stable in Brazil, South Africa and Thailand. In addition, this study suggests that Brazil, Mexico, South Africa, Thailand and Turkey should consider the Phillips curve theory in making monetary policy and shift their economy to supply side economy.
ABSTRAK

Mengkaji Kewujudan Keluk Phillips di Newly Industrialized Countries (NICs)

Oleh

Lai Chin Sian

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1.0 Background of Study

Fifty years ago, Phillips (1958) introduced a statistically significant trade-off relationship between wage of inflation and unemployment rate in United Kingdom. The trade-off relationship between wage of inflation and unemployment rate in this theory indicates that the variables are negatively correlated. Or it can be said that, lower rate of unemployment will has a higher wages for the labor. Adversely, when unemployment rate of the country is high, the labor wages is lower in that country. The inverse relationship between wage of inflation and unemployment rate is being known as Phillips curve. Phillips (1958) indicated that the trade-off relationship between wage of inflation and unemployment in Phillips curve is due to the demand for labor. When the demand for labor is high and there are few unemployed, the firms will increase the wages a little above the prevailing rate to attract the most suitable labor from other industries. Meanwhile, when the demand for labor is low and unemployment rate is high, the wage rates will automatically fall slowly. Thus, create a trade-off relationship between wage of inflation and unemployment rate.

Samuelson and Solow (1960) assumed that firm will automatically increase the overall goods price level in market due to a rise in nominal wage. Since the inflation in nominal wages is move together with inflation in prices, the wage of inflation in Phillips curve is substituted by inflation in prices. The Phillips curve illustrates that the level of inflation is positively related to economic activity where
proven by the lower rate of unemployment during inflation. The Phillips curve hypothesis has been criticized by some researchers. However, it is become integral to macroeconomic policy when many countries like United State and OECD countries yield the similar trade-off relationship among inflation and unemployment rate as portrayed by Phillips (1958) in United Kingdom.

Phillips curve is important for policymaker due to its inverse relationship between inflation and unemployment rate since inflation and unemployment are the macroeconomic key variables that concerned most by the policymakers around the world. Samuelson and Solow (1960) stated that Phillips curve is the menu for policymaker to monitoring the inflation and unemployment rate. In Phillips curve, it is suggested that if the government want to reduce unemployment rate, it has to accept higher inflation rate as a trade-off. The situation is same when the government wanted to reduce inflation rate in the country. Generally, during the inflation, the main policy for the government is price stabilization or monetary policy. Government will control the price level through monetary policy in order to reduce the inflation in a country. Meanwhile, if the Phillips curve is valid for the country, the dilemma that faced by the government is they have to accept higher unemployment rate in order to reduce the high inflation rate in the country. This condition makes the Philips Curve as an important consideration for government and central bank in making an appropriate policy during inflation period. Hence, it is important to investigate the existence of Phillips curve in a country.

This study is going to tests and investigates the existence of Phillips curve in Newly Industrialized Countries (NICs) before them moving toward to industrialized economies since Phillips curve is playing an important role in disinflation decision
making. NICs is chosen in this study because the characteristics of NICs like export oriented, large inflow of foreign investment, and rapid economic growth seem that the unemployment rate in NICs should be lower. Hence, a study on Phillips curve should be done in NICs so that the policymaker in NICs would not face the dilemma where they should accept high unemployment rate in order to disinflation in their countries during the inflation period. Besides, there is seldom Phillips curve studies have been done in developing countries. Most of the studies are done in developed countries like Australia, Japan, United State and United Kingdom. Hence, NICs is selected in this study to investigate the existence of Phillips curve.

1.1 Phillips Curve

Since Phillips curve is illustrating the relationship between inflation and unemployment rate, thus the Phillips curve equation will only consists of two variables, notably inflation rate and unemployment rate. The dependent variable in Phillips curve equation is inflation rate which is normally measured by consumer price index (CPI), while independent variable is unemployment rate. The conventional Phillips curve equation that proposed by Phillips (1958) is takes the following form:

\[ w_t - w_{t-1} = \alpha + \beta_1(u_t - u_{t-1}) + \epsilon_t \]  

(1)
where, \( w_t - w_{t-1} \) = changes in nominal wages
\( u_t \) = unemployment rate in year \( t \)
\( u_{t-1} \) = natural rate of unemployment or NAIRU (non-accelerating rate of unemployment)
\( \alpha \) = constant
\( \beta_1 \) = slope coefficient
\( \epsilon_t \) = error term

The slope coefficient \( \beta_1 \) is in negative sign. According to Samuelson and Solow (1960), the negative sign of \( \beta_1 \) is due to an increase in bargaining power of workers in periods which reflects lower levels of unemployment. The United Kingdom's evidence on trade-off relationship between inflation and unemployment rate (Phillips, 1958) is shown as below:

![Figure 1: UK's Evidence on Phillips Curve](image-url)
Figure 1 shows the scatter diagram of trade-off relationship between inflation and unemployment rate in UK from 1861-1913. From the figure above, when Phillips curve exists in a country, the government decreases the unemployment rate from 6% to 4.5% will results the inflation rate to raise from -0.1% to 0.5%. Hence, the existence of Phillips curve is important to be investigated so that the policymaker can make an appropriate decision regarding to reduce the unemployment rate or inflation rate.

1.2 Background of Country

Newly Industrialized Countries (NICs) is a category that applies for several countries around the world by political scientists and economists. Initially, the NICs is refers to Four Asian Tigers, namely Hong Kong, Singapore, South Korea, and Taiwan in the 1970s and 1980s. With the exceptionally fast industrial growth since 1960s, all these four countries have move their status from industrialized countries to developed countries. Nevertheless, with the combination of an open political process, high GDP growth, and export oriented economy policy, these countries are even surpassed the ranks of many developed countries. All these four countries are classified as high income economies by World Bank and advanced economies by IMF. Now, the new NICs is represented by nine countries from different regions, notably Brazil, China, India, Malaysia, Mexico, the Philippines, South Africa, Thailand and Turkey.

The NICs is formed together with several similar characteristics which the country members are listed by Bozyk (2006), Guillen (2003), Waugh (2000), and
Mankiw (2007). Among the characteristics are rapid economic growth, export oriented, and large inflow of foreign investment. These characteristics indicate the unemployment rate should be lower in NICs. Therefore, the Phillips curve study should be done in NICs so that it can provide appropriate information to policymaker when they are adopting the disinflation policy.

Generally, there are some researchers have examined the existence of Phillips curve in selected NICs country members, notably Brazil, China, India, Malaysia, the Philippines, Thailand and Turkey. All of them are yield the different results. Some results show the existence of Phillips curve and some show the nonexistence of Phillips curve. In ASEAN, both Wongwachara and Minphimai (2008) and Puzon (2009) tested the Phillips curve in Malaysia, Indonesia, the Philippines and Thailand. Both of them found that there is no Phillips relation hold in ASEAN. However, Bhanthumnavin (2001) studied the Phillips curve in Thailand by using quarterly data from 1993 to 2000 and proved that the Phillips curve in Thailand is only valid after the onset Asian crisis 1997. Besides, both Furuoka (2007) and Tang and Lean (2007) found a stable Phillips curve exists in Malaysia. Moreover, Scheibe and Vines (2005) found that China is experienced a vertical long run Phillips curve. Paul (2009) examined the existence of Phillips curve in India and found that the Phillips curve is valid in India. Conversely, the Phillips curve is not valid in Brazil and Turkey. Tajra (1999) examined the Phillips curve in Brazil and found that the Phillips curve does not exists in Brazil. For the case of Turkey, the nonexistence of Phillips curve between inflation and output is shown by Catik et al. (2008).

When the Phillips curve is exists and alive in NICs, the policymaker should consider both the inflation and unemployment rate due to their trade-off relationship.
in Phillips curve. Adversely, when Phillips curve does not hold in NICs, the policymaker can choose any suitable monetary policy to reduce the inflation rate without facing the dilemma among inflation and unemployment rate. So, it is important to study the Phillips curve in NICs in order to provide guidelines for government in implementing the monetary policy during inflation. In order to study the Phillips curve, first of all, the trend of inflation and unemployment in NICs should be studied. Hence, the following section discusses the trend of inflation and unemployment rate in Brazil, India, Malaysia, Mexico, the Philippines, South Africa, Thailand, and Turkey. Since China does not have complete data, hence it is not included in the following section.

1.3 Inflation and Unemployment Rate in NICs

1.3.1 Brazil

![Inflation Rate in Brazil from 2001Q4-2009Q3](image)

![Unemployment Rate in Brazil from 2001Q4-2009Q3](image)

Figure 2: Inflation and Unemployment Rate in Brazil from 2001Q4-2009Q3

Figure 2 above shows the trend of inflation and unemployment rate in Brazil from year 2001Q4 to 2009Q3. Brazil faced a relatively high accumulated inflation in 2003Q1, which is 6.22% compared to average 2%. However, in August 2003, Brazil
inflation rate dropped to 0.79% due to the Brazilian President changed the Brazil market sentiment through fiscal discipline, floating exchange rate and inflation targeting. After a sharp declined in 2003 inflation rate, Brazil inflation rate is fluctuated around 2% and experienced a small decline in 2006Q2 before increased to 1.82% in 2008Q1 due to the global financial crisis.

Compared to Brazil inflation trend, the unemployment rate is in downward trend. The Brazil unemployment rate in 2003Q3 hit the highest value along the sample period, which is 12.9%. This is because the inflation targeting that implemented by Brazilian President in order to control high inflation rate in 2003 has led to booming recession. While in 2009Q1, the unemployment rate increased from 7.3% in 2008Q4 to 8.57% due to the global financial crisis. However, the unemployment rate decreased again to 7.93% in 2009Q3.

1.3.2 India

![Inflation Rate in India from 1992Q1-2003Q2](image1)

![Unemployment Rate in India from 1992Q1-2003Q2](image2)

Figure 3: Inflation and Unemployment Rate in India from 1992Q1-2003Q2
From the Figure 3 above, it can be seen that India has a stable inflation rate along the sample size. However, there is a sharp slump of inflation rate in 1998Q4. The inflation rate is decreased from 4.50% in 1998Q3 to -3.92% in 1998Q4. However, the sharp slump of inflation in 1998Q4 is not due to the Asian financial crisis. The inflation rate of India increased again to around 2.11% in 1999Q3. After that, the inflation rate of India is stable and not much fluctuates from 1999Q4 to 2003Q2.

Besides, India also has a more stable unemployment rate compared to other NICs. It can be seen that, the highest unemployment rate is 3.08% in 1997Q2. Meanwhile, the lowest unemployment rate along the sample size is -2.17% in 2002Q1. In overall, it can be said that the unemployment rate is stable and fluctuated in around 1% in Brazil.

1.3.3 Malaysia

![Inflation Rate in Malaysia from 1998Q1-2009Q1](image)

![Unemployment Rate in Malaysia from 1998Q1-2009Q1](image)

Figure 4: Inflation and Unemployment Rate in Malaysia from 1998Q1-2009Q1
Figure above shows that Malaysia experienced a stable inflation rate before a sharp rise in 2008Q2 and a sharp drop in 2008Q4. Both the sharp rise and sharp drop of inflation rate in Malaysia is caused by the current subprime mortgage crisis. Malaysia is greatly affected by the global crisis that is started in US due to its international trade relationship with US. In the beginning of crisis, Malaysia’s inflation rate rose to 4.11% in 2008Q2 from a lower rate of 2.3% in 2008Q1. After gone through a high inflation rate, Malaysia experienced a recession in 2008Q3, which the inflation rate dropped to -1.57%. Even though the inflation rate increased to -1.06% in 2008Q4, however, Malaysia is still in a recession and recovery situation.

Malaysia has an inconsistent trend of unemployment rate. Actually, the unemployment rate in Malaysia is considered low compared to other NICs members except Brazil and Thailand. The highest rate of unemployment in Malaysia is 4.5% in 1999Q1 and the lowest is 2.9% in 1998Q1. The unemployment rate in 2008Q4 and 2009Q1 begins to creep upward after the economy shows signs of weaknesses toward the end of 2008. It can be shown in above figure where the unemployment rate is rise up sharply in 2009Q1.
1.3.4 Mexico

Figure 5: Inflation and Unemployment Rate in Mexico from 2000Q2-2009Q2

Mexico has a more fluctuating inflation rate compared to other members. Even though Mexico has a more fluctuating inflation rate, but the inflation rate is still remains in lower rate. After the 1994 crisis, Mexico improved the country’s macroeconomics fundamentals. Hence, it is not influenced much by the 2002 South American crisis. Figure above shows the inconsistent of Mexico inflation rate, which is dropped and then rose back again. There is a sharp drop in 2007Q2, which is from 1.34% in 2007Q1 dropped to -0.11%. In 2008Q4 and 2009Q1, the inflation rate rose to 2.33% before dropped to 1.41% in 2009Q1. This is because of the current global crisis.

Unemployment rate in Mexico is in upward trend which indicates that the unemployment rate is in increasing rate. The Mexico unemployment rate increased from initially 1.8% in 2001Q4 to 5.06% in 2009Q1. The keep increasing unemployment rate which started from 2008Q3 until 2009Q1 is caused by the subprime mortgage crisis. The unemployment rate increased from 4.19% in 2008Q3 to 4.3% in Q4 and then reached 5.17% in 2009Q2.
1.3.5 the Philippines

Philippines has a fluctuating inflation and unemployment rate. The inflation rate is fluctuated and experienced a great fall of -3.44% in 1999Q4. The great fall of the inflation rate is mainly due to the Asian financial crisis. Nevertheless, the inflation rate is started to increase from 2000Q1, 0.89% to 2.33% in 2000Q4. This means that, the Philippines domestic economy is started to recover from the Asian financial crisis, where the market inflation is started to be stable. However, due to the global financial crisis, the Philippines economy is affected and inflation rate rose from 0.26% in 2007Q1 to 4.54% in 2008Q2 before gone through a great recession in 2008Q4 with inflation rate, -1.22%.

However, the unemployment rate in the Philippines does not affected much by current global financial crisis. It can be seen that, the unemployment rate is higher along the period from 1998Q1 to 2005Q2, which is approximately 11%. The unemployment rate started to decline after 2005Q2 and reached a lowest rate of 6.3% in 2007Q4. Due to the impact of global financial crisis, the unemployment is raised.
a little bit from 6.3% in 2007Q4 to 8% in 2008Q2. After that, the unemployment has dropped to 6.8% in 2008Q4 before rose back to 7.7% in 2009Q1.

### 1.3.6 South Africa

![Inflation Rate in South Africa from 2000Q1-2009Q2](image1)

![Unemployment Rate in South Africa from 2000Q1-2009Q2](image2)

**Figure 7: Inflation and Unemployment Rate in South Africa from 2000Q1-2009Q2**

South Africa has a great deflation in 2003Q3 before its inflation rate continued to rise and create an increasing trend. In 2003Q3, South Africa has gone through a disinflation with the inflation rate of -0.80%, which is a sharp drop from 3.31% in 2002Q2. After that, the South Africa inflation rate continued to rise and create an upward trend. After reached 3.1% in 2008Q3, the inflation rate started to drop to 0.78% in 2008Q4 during the global financial crisis.

Despite of upward trend in South Africa inflation rate, the unemployment rate for South Africa is in downward trend. From the highest rate of 30.4% in 2002Q3, the South Africa unemployment rate decreased to 21% in 2007Q4.
However, the unemployment rate rose back to 23.3% in 2009Q1 due to the subprime mortgage crisis. Nevertheless, it is still in low value compared to 30.4% in 2002Q3.

### 1.3.7 Thailand

![Inflation Rate in Thailand from 2001Q1-2009Q2](image)

![Unemployment Rate in Thailand from 2001Q1-2009Q2](image)

**Figure 8: Inflation and Unemployment Rate in Thailand from 2001Q1-2009Q2**

Overall, Thailand has a quite stable inflation rate which is fluctuating approximately at 1% from 2001Q1 to 2004Q4. The inflation rate increased to 2.7% in 2005Q3 from 2% in 2005Q2. Then, the inflation rate is in inconsistent trend from 2005Q4 to 2008Q2 before experienced a sharp drop in 2008Q4 which is from highest value of 4.23% in 2008Q2 dropped to -3.44% in Q4. The sharp drop is caused by the subprime mortgage crisis. After the sharp drop, the inflation rate increased to -0.71% in 2009Q1 and be estimated recovery soon from the global financial crisis.

Similar with South Africa, the Thailand unemployment rate is also in downward trend. It is an inconsistent downward trend. From a high rate of 4.63% in 2001Q1, the unemployment rate decreased to 1.19% in 2008Q3. However, during