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RESEARCH ARTICLE

THE EXISTENCE OF PHILIPS CURVE IN THE LONG RUN: SOME EVIDENCES FROM AUSTRALIAN, SOUTH KOREAN AND INDONESIAN ECONOMIES

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ABSTRACT

This paper provides evidences on the existence of the Philips curve in an economy. The Philips curve depicted a negative correlation between the rate of inflation and unemployment rate. This dilemma has been a big problem faced by any government. Inflation cannot be eliminated without raising unemployment, at least for some time and moderate unemployment cannot be cut sharply without the risk of raising inflation. It was empirically evidence that this curve exist in the short-run. In the short run, inflation cannot be reduced without creating a recession. In the long run, many research proved that there was not any trade-off between inflation and unemployment. Data from Australia (1980-2015), South Korea (1980-2015) and Indonesia (1995-2015) have been used to provide evidence on the existence of Philips curve in the long run, using regression analysis. The results provide evidences that there were negative correlation between the rate of inflation and unemployment rate. It means that in the long run, the Philips curve do exist in the economy, even though the relationship between them was not statistically significant.

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INTRODUCTION

In economics, inflation is a sustained increase in the general price level of goods and services in an economy over a period of time (Blanchard, 2000; Dornbusch & Fischer, 1994). When the price level rises, each unit of currency buys fewer goods and services. Consequently, inflation reflects a reduction in the purchasing power per unit of money – a loss of real value in the medium of exchange and unit of account within the economy (Walgenbach, P.H., et.al., 1973). A chief measure of price inflation is the inflation rate, the annualized percentage change in a general price index, usually the consumer price index, over time (Mankiw, 2002). Inflation affects economies in various positive and negative ways. The negative effects of inflation include an increase in the opportunity cost of holding money, uncertainty over future inflation which may discourage investment and savings, and if inflation were rapid enough, shortages of goods as consumers begin hoarding out of concern that prices will increase in the future. Positive effects include reducing the real burden of public and private debt, keeping nominal interest rates above zero so that central banks can adjust interest rates to stabilize the economy, and reducing unemployment due to nominal wage rigidity (Mankiw, 2002).

Economists generally believe that high rates of inflation and hyperinflation are caused by an excessive growth of the money supply (Barro & Grilli, 1994). However, money supply growth does not necessarily cause inflation. Some economists maintain that under the conditions of a liquidity trap, large monetary injections are like "pushing on a string"

(Makin2010). Views on which factors determine low to moderate rates of inflation are more varied. Low or moderate inflation may be attributed to fluctuations in real demand for goods and services, or changes in available supplies such as during scarcities. However, the consensus view is that a long sustained period of inflation is caused by money supply growing faster than the rate of economic growth (Mankiw, 2002; Abel & Bernanke, 2005).

Today, most economists favor a low and steady rate of inflation (Hummel, 2007). Low inflation reduces the severity of economic recessions by enabling the labor market to adjust more quickly in a downturn, and reduces the risk that a liquidity trap prevents monetary policy from stabilizing the economy (Lars, 2003). The task of keeping the rate of inflation low and stable is usually given to monetary authorities. Generally, these monetary authorities are the central banks that control monetary policy through the setting of interest rates, through open market operations, and through the setting of banking reserve requirements.

Unemployment occurs when people who are without work are actively seeking paid work (ILO, 1982). The unemployment rate is a measure of the prevalence of unemployment and it is calculated as a percentage by dividing the number of unemployed individuals by all individuals currently in the labor force. During periods of recession, an economy usually experiences a relatively high unemployment rate (ILO, 2013). According to International Labour Organization report (2013), more than 200 million people globally or 6% of the world's workforce were without a job in 2012.

There remains considerable theoretical debate regarding the causes, consequences and solutions for unemployment. Classical economics, New classical economics, and the Austrian School of economics argue that market mechanisms are reliable means of resolving unemployment. These theories argue against interventions imposed on the labor market from the outside, such as unionization, bureaucratic work rules, minimum wage laws, taxes, and other regulations that they claim discourage the hiring of workers. Keynesian economics emphasizes the cyclical nature of unemployment and recommends government interventions in the economy that it claims will reduce unemployment during recessions. This theory focuses on recurrent shocks that suddenly reduce aggregate demand for goods and services and thus reduce demand for workers. Keynesian models recommend government interventions designed to increase demand for workers; these can include financial stimuli, publicly funded job creation, and expansionist monetary policies. Its name sake, economist John Maynard Keynes, believed that the root cause of unemployment is the desire of investors to receive more money rather than produce more products, which is not possible without public bodies producing new money (Dornbusch & Fisher, 1994).

The Phillips curve is a single-equation empirical model, named after A. W. Phillips (1958), describing a historical inverse relationship between rates of unemployment and corresponding rates of inflation that result within an economy. Stated simply, decreased unemployment, in an economy will correlate with higher rates of inflation. While there is a short run trade-off between unemployment and inflation, it has not been observed in the long run (Chang, 1997). In 1968, Milton Friedman asserted that the Phillips curve was only applicable in the short-run and that in the long-run, inflationary policies will not decrease unemployment (Friedman, 1968; Phelan, 2012). Friedman then correctly predicted that, in the 1973–75 recession, both inflation and unemployment would increase (Phelan, 2012). The long-run Phillips Curve is now seen as a vertical line at the natural rate of unemployment, where the rate of inflation has no effect on unemployment. Accordingly, the Phillips curve is now seen as too simplistic, with the unemployment rate supplanted by more accurate predictors of inflation based on velocity of money supply measures such as the MZM ("money zero maturity") velocity, which is affected by unemployment in the short but not the long term (Hossfeld, 2010).

Phillips (1958) wrote a paper untitled *The Relation between Unemployment and the Rate of Change of Money Wage Rates in the United Kingdom, 1861-1957*, which was published in the quarterly journal. In the paper Phillips describes how he observed an inverse relationship between money wage changes and unemployment in the British economy over the period examined. Similar patterns were found in other countries and Samuelson & Solow (1960) took Phillips' work and made explicit the link between inflation and unemployment: when inflation was high, unemployment was low, and vice versa. In the 1920s, an American economist Fisher (1973) noted this kind of Phillips curve relationship. However, Phillips' original curve described the behavior of money wages. In the years following Phillips' paper, many economists in the advanced industrial countries believed that his results showed that there was a permanently stable relationship between inflation and unemployment. One

implication of this for government policy was that governments could control unemployment and inflation with a Keynesian policy. They could tolerate a reasonably high rate of inflation as this would lead to lower unemployment; there would be a trade-off between inflation and unemployment. For example, monetary policy and/or fiscal policy could be used to stimulate the economy, raising gross domestic product and lowering the unemployment rate. Moving along the Phillips curve, this would lead to a higher inflation rate, the cost of enjoying lower unemployment rates. Economist Forder, J., (2014) argues that this view is historically false and that neither economists nor governments took that view and that the 'Phillips curve myth' was an invention of the 1970s. Since 1974, seven Nobel Prizes have been given to economists for, among other things, work critical of some variations of the Phillips curve. The authors receiving those prizes include Thomas Sargent, Christopher Sims, Edmund Phelps, Edward Prescott, Robert A. Mundell, Robert E. Lucas, Milton Friedman, and F.A. Hayek (Domitrovic, 2011).

Most economists no longer use the Phillips curve in its original form because it was shown to be too simplistic (Hossfeld, 2010). This can be seen in a cursory analysis of US inflation and unemployment data from 1953–92. There is no single curve that will fit the data, but there are three rough aggregations 1955–71, 1974–84, and 1985–92—each of which shows a general, downwards slope, but at three very different levels with the shifts occurring abruptly. The data for 1953–54 and 1972–73 do not group easily, and a more formal analysis posits up to five groups/curves over the period (Chang 1997). But still today, modified forms of the Phillips Curve that take inflationary expectations into account remain influential. The theory goes under several names, with some variation in its details, but all modern versions distinguish between short-run and long-run effects on unemployment. Modern Phillips curve models include both a short-run Phillips Curve and a long-run Phillips Curve. This is because in the short run, there is generally an inverse relationship between inflation and the unemployment rate; as illustrated in the downward sloping short-run Phillips curve. In the long run, that relationship breaks down and the economy eventually returns to the natural rate of unemployment regardless of the inflation rate (Reed, 2016).

The "short-run Phillips curve" is also called the "expectations-augmented Phillips curve", since it shifts up when inflationary expectations raise (Friedman, M., 1968). In the long run, this implies that monetary policy cannot affect unemployment, which adjusts back to its "natural rate", or "long-run Phillips curve". However, this long-run "neutrality" of monetary policy does allow for short run fluctuations and the ability of the monetary authority to temporarily decrease unemployment by increasing permanent inflation, and vice versa. The popular textbook of Blanchard (2000) gives a textbook presentation of the expectations-augmented Phillips curve. This paper aimed to provide evidences on the existence of the Phillips curve in the long run, using time series data from Australia, South Korea and Indonesia.

Data and Method of Analysis

Data for this time series study were collected from www.rateinflation.com/inflation-rate/australia-historical-inflation-rate?start-year=1985&end-year=2015 for Australia inflation rate data and

https://ycharts.com/indicators/australia_unemployment_rate annual for Australia unemployment rate data. Inflation data for South Korean were collected from https://ycharts.com/indicators/south_korea_inflation and for unemployment rate were collected from https://ycharts.com/indicators/south_korea_unemployment and for inflation and unemployment data of Indonesia were collected from Central Bank of Indonesia and National Statistic Agency.

To prove the existence of the Philips curve in each country, regression analysis was employed. If $Y = \text{inflation rate}$, and $X = \text{unemployment rate}$, then $y = x^{-e}$, so $\ln Y = -\ln X$, as data of Y and X were available, regression analysis could easily be calculated. Regression coefficients and their t-statistic were then analyzed to prove the existence of the Philips curve.

RESULTS AND DISCUSSION

Figure 1 (left panel) provides data on inflation rate and the rate of unemployment for Australian economy 1980-2015 (35 years). In general the rate of unemployment was higher than the rate of inflation, except for the year 1980-1983 and 1985-1989. In the right panel, the scatter diagram between inflation rate and the rate of unemployment. From diagram, the trend of the existence of the Philips curve could be predicted. As provided in Table 1, the regression coefficient between inflation and unemployment was -1.1392 (negative) and t-statistics indicated that the regression coefficient was not statistically significant as t-table for $\alpha=0.05$, $n=35$ was 1.690. Meanwhile, P-value for regression coefficient was $0.58 > 0.05$, means that the regression line was not statistically significant. It means that, in the long run, the Philips curve exist in Australian economy, but the existence of the Philips curve in Australian economy was not statistically significant.

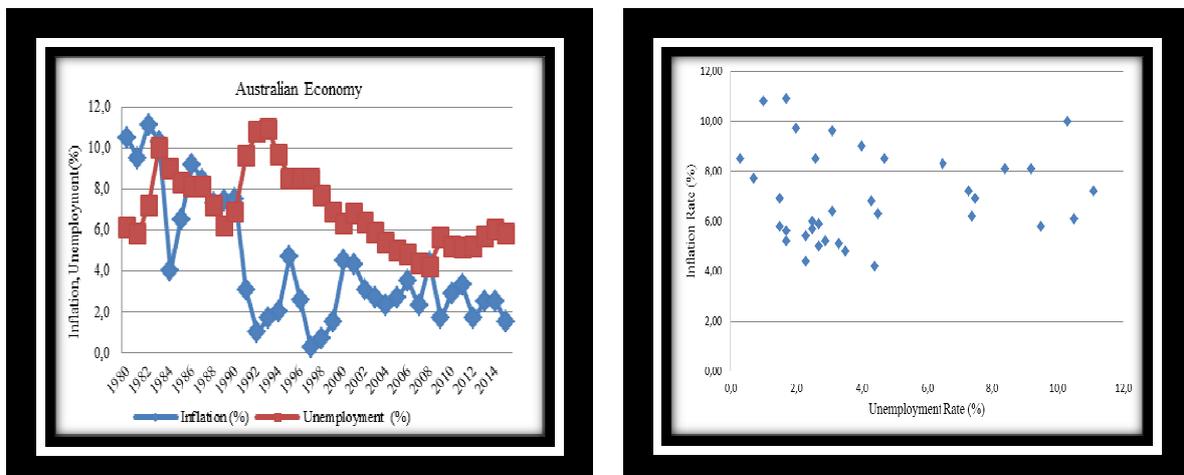


Figure 1 Inflation Rate, Unemployment Rate and the Scatter Diagram: Australian Economy (1980-2015).

Table 1 Regression Analysis : Inflation Rate (X) and Unemployment (Y) in Australia

	Coefficients	Standard Error	t Stat	P-value
Inflation	2.1317	3.9759	0.5361	0.5954
Unemployment	-1.1392	2.0604	-0.5529	0.5840

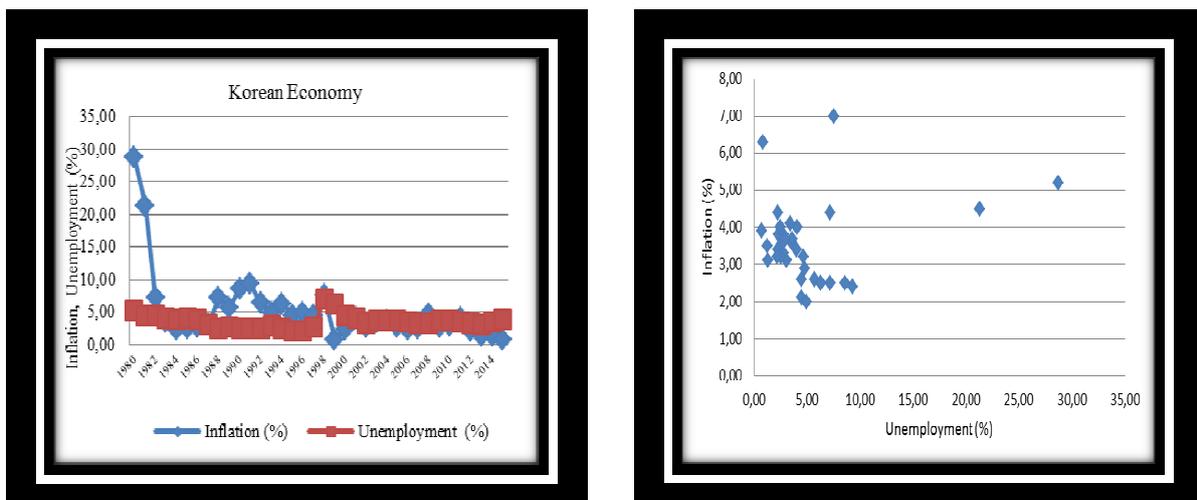


Figure 2 Inflation Rate, Unemployment Rate and the Scatter Diagram, South Korea (1980-2015).

Table 2. Regression Analysis : Inflation Rate (X) and Unemployment (Y) in South Korea

	Coefficients	Standard Error	t Stat	P-value
Inflation	1.4134	4.1736	0.3387	0.7369
Unemployment	-3.0349	3.3186	-0.9145	0.3669

Figure 2 (left panel) provides data on inflation rate and the rate of unemployment for South Korea economy 1980-2015 (35 years). In some time the rate of unemployment was lower than the rate of inflation. In the right panel provides the scatter diagram between inflation rate and the rate of unemployment. From diagram, the trend of the existence of the Philips curve could be predicted. As provided in Table 2, the regression coefficient between inflation and unemployment was -3.0349 (negative) and t-statistics indicated that the regression coefficient was not statistically significant as t-table for $\alpha=0.05$, $n=35$ was 1.690. Meanwhile, P-value for regression coefficient was $0.3669 > 0.05$, means that the regression line was not statistically significant. It means that in the long run, the Philips curve exist in South Korean economy, even though the existence of the Philips curve in South Korean, in the long run, was not statistically significant.

The regression coefficient was -1.1392; t-test showed that the regression coefficient was not statistically significant. Secondly, in South Korea economy in the long run, the Philips curve also exists as there was a negative correlation between the rate of inflation and the inflation rate. The regression coefficient was -3.0349; t-test showed that the regression coefficient was not statistically significant. Thirdly, in Indonesian economy in the long run, the Philips curve also exists as there was a negative correlation between the rate of inflation and the inflation rate. The regression coefficient was -1.3328; t-test showed that the regression coefficient was not statistically significant. Finally, it could be concluded that the Philips curve do exists in the long run as experienced in Australia, South Korea and Indonesia, but the existences were not statistically significant.

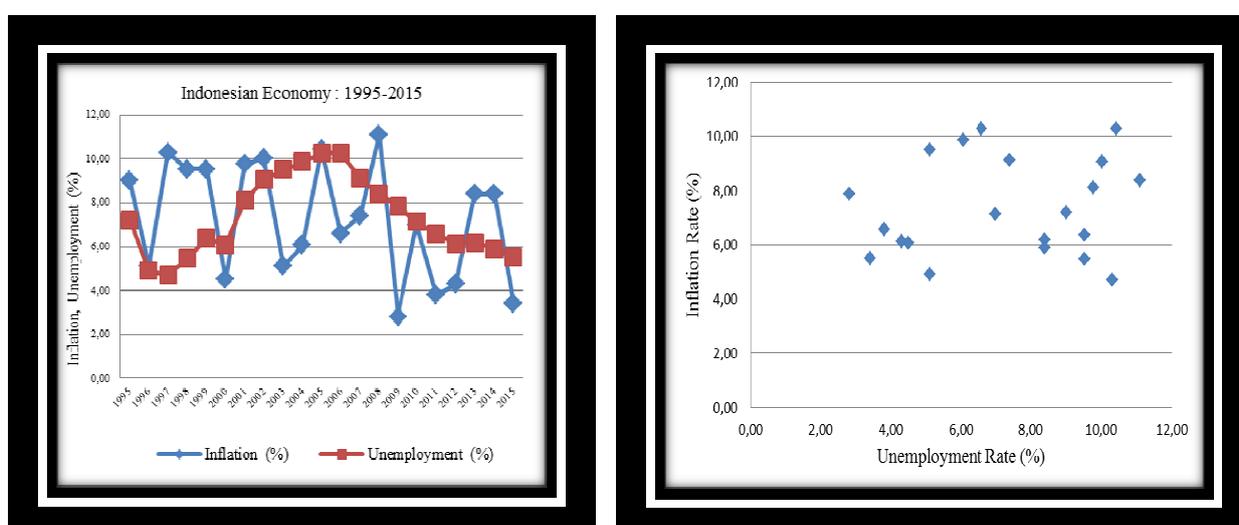


Figure 3 Inflation Rate, Unemployment Rate and the Scatter Diagram, Indonesia (1995-2015).

Table 3 Regression Analysis : Inflation Rate and Unemployment Rate in Indonesia

	Coefficients	Standard Error	t Stat	P-value
Intercept	4.6405	4.8512	0.9566	0.3508
X Variable 1	-1.3328	2.4472	-0.5446	0.5924

Figure 3 (left panel) provides data on inflation rate and the rate of unemployment for Indonesian economy 1995-2015 (20 years). In some time the rate of unemployment was lower than the rate of inflation. In the right panel provides the scatter diagram between inflation rate and the rate of unemployment. From diagram, the trend of the existence of the Philips curve could be predicted. As provided in Table 2, the regression coefficient between inflation and unemployment was -1.3328 (negative) and t-statistics indicated that the regression coefficient was not statistically significant as t-table for $\alpha=0.05$, $n=35$ was 1.690. Meanwhile, P-value for regression coefficient was $0.3669 > 0.05$, means that the regression line was not statistically significant. Negative regression coefficient indicates the existence of the Philips curve in the long run in the Indonesian economy, but the regression coefficient was not statistically significant.

CONCLUSION

It could be concluded that firstly, in the long run, the Philips curve exist in Australian economy as indicated by a negative correlation between the rate of inflation and the inflation rate.

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