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Decoding Inflation and Unemployment: Exploring the Phillips Curve's Insights on Short-Term and Long-Term Economic Dynamics

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Abstract. *The purpose of this study is to analyse the short-term and long-term economic dynamics based on the Phillips Curve regarding the relationship between inflation and unemployment. The analysis results show that there is an inverse relationship between inflation and unemployment when viewed from the Phillips Curve model in the short-term. The concept of the Natural Rate of Unemployment (NRU) and the Non-Rapid Inflationary Unemployment Rate (NAIRU) emphasizes that the relationship between inflation and unemployment in the long term will weaken due to people's inflation expectations. The results of the study also show that globalization and rapid technological developments are increasingly blurring the traditional relationship between inflation and unemployment, and the importance of adaptive monetary and fiscal policies. The results of this study provide insight for policymakers to formulate more effective strategies to manage inflation and unemployment.*

Keywords *Fiscal Policy, Inflation, Monetary Policy, Phillips Curve*

1. INTRODUCTION

In macroeconomics, the fundamental problem is the relationship between inflation and unemployment, whereas in the Phillips Curve model, first introduced by A.Q. Phillips in 1958, explained that in the short term, inflation and unemployment have an inverse relationship (Atkeson & Ohanian, 2001; Haschka, 2024; Ogbonna et al., 2024; Phillips, 1958; Stock & Watson, 1999). According to Phillips' original research, which used data from England between 1864 and 1957, the inflation rate tended to rise and the unemployment rate tended to decrease when both were low (McLeay & Tenreyro, 2020; Ogbonna et al., 2024; Phillips, 1958). Many nations used these conclusions as the foundation for their macroeconomic policies in the 1960s, particularly with regard to monetary and fiscal policy (Mankiw, 2000). In the long-term, Phillips (1958) findings in the Phillips Curve model contradict the concept of Natural Rate of Unemployment (NRU) and Non-Accelerating Inflation Rate of Unemployment (NAIRU) proposed by M. Friedman (1968) and Phelps (1967). In this concept, M. Friedman (1968) and Phelps (1967) stated that there is no inverse relationship between

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inflation and unemployment. According to M. Friedman (1968), a fall in unemployment below its natural rate will only raise the inflation rate without providing any long-run benefits to the decline in unemployment. If inflation is high, then the expectations of workers and firms will change which may eventually lead to an increase in the unemployment rate to its natural level (M. Friedman, 1968; Karanassou et al., 2008; Lucas, 1976; Ogbonna et al., 2024; Stock & Watson, 1999).

The difference in concept has made many researchers interested in refining the Phillips Curve model by using inflation expectations as the main variable. Inflation expectations can strengthen or weaken the relationship between inflation and unemployment in the short term, but in the long term this relationship tends not to exist (Blanchard, 2016; Galí, 2015). According to Galí (2015), the modern Phillips Curve, also known as the Phillips Curve of rational expectations, states that the behavior of workers and firms towards inflation and unemployment is determined by their future expectations. In the modern economic era, globalization, technological advances, and structural changes in the labor market make the relationship between inflation and unemployment more complex (Crump et al., 2024; Gabriel, 2023; Niken et al., 2023). In advanced economies, globalization can suppress inflationary pressures even if unemployment remains low (Ball & Mazumder, 2011; Forbes et al., 2021; Obstfeld, 2021; Tan et al., 2023). In addition, inflation and unemployment rates are also affected by automation and digitalization in the labor sector, with many workers being replaced by technological advances (Autor, 2019).

Since it was first introduced until now, research related to the Phillips Curve has undergone significant evolution. Such as the research conducted by Ball and Mazumder (2011) who examined the dynamics of the Phillips Curve during a period of massive recession where the results showed that the relationship between inflation and unemployment is not always consistent with the Phillips Curve model which states that inflation and unemployment have an opposite relationship. Therefore, in extreme economic conditions, it is necessary to update the model on the Phillips Curve (Ball & Mazumder, 2011). This is also reinforced by Galí (2015) and Blanchard (2016) who explain that the influence of dynamic inflation, monetary policy, and modern economic policy developments need to be considered in updating the Phillips Curve model in the current economic context (Forbes et al., 2021). Because these conditions indicate that

the relationship between inflation and unemployment can be influenced by macroeconomic factors.

Existing research has made important contributions to understanding the Phillips Curve model. However, from the existing literature and research results, there are significant gaps. For example, research conducted by Ball and Mazumder (2011) showed a change in the relationship between inflation and unemployment during the Great Recession, but this study still did not examine extensively the factors that could affect the dynamics of the relationship between inflation and unemployment in a sustainable manner such as the impact of globalization and technological progress (Ball et al., 2021; Forbes et al., 2021; Karanassou et al., 2008). In addition, Galí (2015) underlines the need for the integration of inflation expectations in the Phillips Curve, but in reality, not enough exploration has been done on how these expectations evolve in the context of developing countries that often have different labor market mechanisms. Research conducted by Blanchard (2016) highlights the uncertainty regarding the relevance of the Phillips Curve post-global crisis, but this research has not investigated how new economic policies can modify this relationship in a broader context, including countries with transition economies and developing countries.

This research seeks to fill the gap by conducting a comprehensive analysis using a literature review study on how the Phillips Curve is applied to the dynamics of the relationship between inflation and unemployment in the short and long-term in the modern economic era influenced by globalization and technological advances. Therefore, the researcher will examine the relationship between inflation and unemployment in the short and long-term according to the Phillips Curve, the relevance of the Phillips Curve in the context of a modern economy influenced by globalization, technological progress, and structural changes in the labor market, and the extent to which monetary policy and fiscal policy can affect the balance between inflation and unemployment in the short and long-term. This study aims to analyze the relationship between inflation and unemployment in the short and long term and the impact of technological progress and globalization on the relevance of the Phillips Curve in the modern economic era. In addition, this study also wants to analyze the influence of monetary and fiscal policies on the balance between inflation and unemployment in the context of the updated Phillips Curve model. This study, is expected to provide more

comprehensive insights regarding the relationship between inflation and unemployment based on the Phillips Curve in the dynamics of the modern economy.

2. METHODS AND DATA COLLECTION

The approach used in this study is a Systematic Literature Review (SLR). SLR is a literature review that is carried out systematically to identify and interpret all available evidence to answer research questions (Moher et al., 2009; Moher et al., 2015). In the research process, researchers use this approach because it can produce a more systematic and transparent synthesis to reduce subjective bias in library selection and can produce accurate findings.(Tranfield et al., 2003). The systematic literature review procedure used in this study is PRISMA (Moher et al., 2015). There are three procedures in this model, namely, a) search strategy and database selection, b) exclusion criteria, and c) data extraction and analysis (Moher et al., 2015).

a. Search Strategy and Database Selection

To determine the search strategy, the three main research questions have been disaggregated into three important dimensions: the first refers to the issues related to the problem under study (inflation; AND unemployment; AND Phillips AND curve), the second refers to the domain related to the different views between the relationship between inflation and unemployment in the long term and short term (short-term AND long-term). With all of this in mind, the strings used for the search were determined and conducted on some of the major academic databases including Google Scholar, JSTOR, ProQuest, ScienceDirect, Scopus, etc.

b. Selection Criteria

To select scientific papers to be properly researched based on their scientific impact, consisting of the following criteria: empirical research on the relationship between inflation and unemployment in the context of the Phillips Curve; articles or scientific papers that explain the development of the Phillips Curve theory, both short and long term; research that examines the impact of monetary and fiscal policies on inflation and unemployment; studies that analyze the influence of globalization and digitalization on the dynamics of inflation and unemployment.

c. Data Extraction and Data Synthesis

Data extraction by following the PRISMA procedure, initial data identification obtained 455 scientific papers. After applying the selection criteria,

61 scientific papers were obtained that were by the topic in this study. This study uses thematic analysis as a data analysis that allows the identification of key themes in the literature related to the relationship between inflation and unemployment. This approach is considered appropriate for identifying patterns of relationships, changes in trends, and variations between existing research results. In addition, this study also uses meta-analysis to analyze empirical results from various studies that use quantitative data on inflation and unemployment (Cooper et al., 2019).

3. RESULTS AND DISCUSSION

Phillips Curve in the Short-Term

From 1861 to 1957, Phillips (1958) for the first time identified the relationship between inflation and unemployment in the short-term. From the identification results, Phillips (1958) revealed that the behavioral change of nominal wage and unemployment rate has an inverse relationship. The Phillips curve shows that when the unemployment rate is low, there is pressure to raise wages due to labor shortage which will push up the inflation rate, and conversely inflation will tend to fall when the unemployment rate is high because the pressure on wages and prices decreases (Galuščák & Munich, 2002; Koktas et al., 2023; Phillips, 1958; L. Wang et al., 2022). In the 1960s, the results of the research conducted by Phillips (1958) became the basis in many countries in making macroeconomic policies to achieve a balance between inflation and unemployment, mainly determining fiscal and monetary policies.

In the traditional Keynesian model, declining unemployment through expansionary policies, namely either through increased government spending or lower interest rates, will cause aggregate demand to increase, which in turn leads to higher inflation (Aslanidis et al., 2024; Blanchard, 2021; Dornbusch et al., 2019; Mankiw, 2000). As the economy approaches full capacity, the rise in demand will increase prices due to the increase in production costs (Blanchard, 2021; Blanchard & Galí, 2010; Ciccarelli & Mojon, 2010; Dornbusch et al., 2019; Mankiw, 2020). Factors such as these expectations only hinge on the relationship between inflation and unemployment in the short term. People's inflation expectations in the long term will adjust to the reality of inflation so that unemployment suppression through expansionary monetary policy continues without a sustained increase in inflation (Binet & Pentecôte, 2015; M. Friedman, 1968; Karanassou et al., 2008; Phelps, 1967; Váry, 2021). According to M.

Friedman (1968) and Phelps (1967), the Phillips Curve can only explain the relationship between inflation and unemployment before people adjust their inflation expectations. M. Friedman (1968) illustrates, that in an expansionary policy if inflation increases from 2% to 4% then people will adjust their inflation expectations to a higher level. This will cause the effectiveness of the expansionary policy applied in reducing unemployment will decrease, this is because high inflation expectations will be reflected in higher wage negotiations and will cause actual inflation to increase without a significant reduction in unemployment in the long-term (Blanchard, 2016; M. Friedman, 1968; Mankiw, 2020; Romer, 2018; Taylor, 1993).

Phillips Curve in the Long-Term

The relationship between inflation and unemployment in the long-term will be more complex. The concept of the Natural Rate of Unemployment (NRU) proposed by M. Friedman (1968) states that a continuous increase in inflation is not affected by the unemployment rate (Adam et al., 2024). In the long-term and according to the minority view, inflation is not influenced by the unemployment rate but is influenced by inflation expectations (Bernanke, 2015; Castelnuovo & Surico, 2010; Samuelson & Solow, 1960). The concept of the Natural Rate of Unemployment (NRU) also emphasizes that monetary policy cannot suppress unemployment without causing inflation to rise (M. Friedman, 1968; Guerrieri et al., 2022; Mishkin, 2022). The concept proposed by M. Friedman (1968) didukung oleh konsep Non-Accelerating Inflation Rate of Unemployment (NAIRU) is supported by the concept of Non-Accelerating Inflation Rate of Unemployment (NAIRU) proposed by Phelps (1967) in which Phelps (1967) stated that the unemployment rate where inflation is stable and does not accelerate (Meloni et al., 2022). The concept explains that if unemployment is above the NAIRU then inflation will decrease and if unemployment falls below the NAIRU then inflation will increase (Ball & Mankiw, 2002; Mankiw, 2020; Meloni et al., 2022; Phelps, 1967). NAIRU is considered a benchmark to determine the balance between inflation and unemployment that is sustainable in the long-term. NRU and NAIRU are not fixed numbers where over time, the concept of NRU and NAIRU will shift which is influenced by various factors including structural changes in the economy, technology, and government policies (Blanchard, 2021; Gordon, 2010; Layard et al., 2005; Rudebusch & Williams, 2016). The natural rate of unemployment will not be constant as it is influenced by factors such as employment regulations, labor market dynamics,

and social policies (Blanchard, 2021; Gordon, 1997; Layard et al., 2005; Mankiw, 2020; Meloni et al., 2022; Nickell, 1997; Váry, 2021).

Later developments showed that in the long term, the relationship between inflation and unemployment is strongly influenced by people's rational expectations (Binet & Pentecôte, 2015; Blanchard, 2021; Lucas, 1972; Sargent, 1979). Lucas (1976) extended the adaptive expectations model proposed byM. Friedman (1968) and Phelps (1967) by proposing the theory of rational expectations, to predict inflation the theory of rational expectations assumes economic actors use more sophisticated information (Hegelund & Taalbi, 2023; Lothian, 2016; Meloni et al., 2022; Stirati & Meloni, 2021). ational expectations theory asserts that attempts to exploit the temporary relationship between inflation and unemployment will fail in the long-term, as people will change their behavior based on accurate inflation expectations (M. Friedman, 1968; Lucas, 1972, 1976; Mankiw, 2020; Sargent et al., 1973).

Influence of Globalization and Technology

Globalization and intense technological developments in recent decades have had an impact on inflation and unemployment rates (Gallegati & Delli Gatti, 2018; Guirguis et al., 2022; Obstfeld, 2021; Tan et al., 2023). his has become a widely studied research topic. One of the impacts of globalization is the expansion of the global labor market and the increase in international competition, which will change the dynamics of inflation and unemployment(T. L. Friedman, 2005; Guirguis et al., 2022; Stiglitz, 2003). Research conducted by Rogoff (2003) shows that globalization can serve to reduce the price of goods and services in developed countries and can reduce inflationary pressures even when unemployment falls.

Firms in developed countries can keep prices low despite an increase in aggregate demand because access to improvised goods is cheaper and easier (Feenstra, 2015; Mankiw, 2020; Rogoff, 2003). Not only that, the structure of the labor article has changed due to technological developments, especially rapid automation, and digitalization (Rogoff, 2003). With the development of technology, especially in the manufacturing sector, many jobs that originally used human labor were replaced by sophisticated technology such as robots, which caused structural unemployment to increase in many countries, and most workers lost their jobs because they did not have the skills that were suitable for the new jobs available (Acemoglu & Restrepo, 2020; Autor et al., 2003; Brynjolfsson & McAfee, 2014; Dong & McIntyre, 2014). This can

affect the unemployment rate, which is increasing in certain sectors even though the overall economy is increasing (Brynjolfsson & McAfee, 2014).

Technological advances are not always bad. On the one hand, automation can increase productivity, which can keep inflation at a low level (Autor, 2015; Autor et al., 2003; Brynjolfsson & McAfee, 2014). When productivity increases, firms can produce more goods and services at a lower cost, which prevents price increases despite an increase in economic output (Krugman & Wells, 2018; Mankiw, 2020; Pindyck & Rubinfeld, 2001). This explains why the relationship between inflation and unemployment has become increasingly difficult to predict in modern economies where the effects of technology and globalization tend to dampen the inflationary pressures traditionally associated with falling unemployment (Brynjolfsson & McAfee, 2014; Obstfeld, 2021)

The Effect of Monetary and Fiscal Policy

The central bank as the implementer of monetary policy has a key role in controlling inflation and unemployment through instruments such as interest rates and money supply control that can affect aggregate demand to control inflation and reduce unemployment (Altavilla et al., 2020; Bayar, 2018; Blanchard, 2021; D'Amico & King, 2023; M. Friedman, 1968). Research Taylor (1993) on the Taylor Rule shows that interest rate adjustments based on inflation and output gaps can help central banks achieve a balance between inflation and unemployment.

In developing countries, inflation and unemployment are more dominantly influenced by fiscal policy. Governments with large budget deficits often have to increase public spending or print money to finance the deficit, which can cause inflation and the government's limited ability to collect taxes and manage public debt makes fiscal policy more influential in determining inflation and unemployment rates in developing countries (Canzoneri et al., 2018; Dell'Erba et al., 2018; Fan et al., 2016; Mankiw, 2020; Ling Wang, 2018; Zamanzadeh et al., 2020). In developing countries, printing money to finance public spending, dependence on public debt, and large budget deficits cause inflation to rise (Dornbusch et al., 2019).

4. CONCLUSION

Research on the relationship between inflation and unemployment based on the Phillips Curve shows a significant difference between short-term and long-term

dynamics. In the short-term, the Phillips Curve depicts an inverse relationship between inflation and unemployment, where expansionary policies can lower unemployment with a consequent increase in inflation. However, this relationship becomes irrelevant in the long-term as inflation expectations are adjusted by society, as argued by Friedman and Phelps. They stated that in the long-term, the unemployment rate tends to return to the Natural Rate of Unemployment (NRU) or Non-Accelerating Inflation Rate of Unemployment (NAIRU), where inflation is not affected by unemployment. In addition, the development of rational expectations theory suggests that attempts to exploit the short-run relationship between inflation and unemployment will face limitations in the long-term. Globalization and technological development have further blurred the traditional Phillips Curve relationship, by increasing international competition and raising productivity through automation, which in turn depresses inflation despite falling unemployment.

Monetary and fiscal policies play an important role in managing inflation and unemployment, mainly through setting interest rates and controlling the money supply. In the short term, central banks can use monetary policy instruments to influence inflation and unemployment, but such policies should be conducted carefully to avoid uncontrolled inflation expectations in the long-term. In addition, in many developing countries, fiscal expansion policies often trigger inflation through high budget deficits and public debt, especially if the government relies on printing money to finance public spending. In developing countries, rising inflation can be caused by the high use of public debt, printing money to finance government spending, and large budget deficits. This shows why in developing countries, even though there has been a significant decline in unemployment, they are still vulnerable to rising inflation.

The results of this study provide an overview that to explain the relationship between inflation and unemployment in the short term, the Phillips Curve model can be used. However, if you want to understand comprehensively, in the long term, it is necessary to pay attention to various factors that can have an impact on inflation and unemployment, including inflation expectations, the influence of monetary and fiscal policies, globalization, technological developments, and economic dynamics. In further research, exploration can be carried out through empirical studies on how structural changes in the global economy can affect this relationship in the future and can prioritize broader empirical studies across countries.

5. LIMITATION

This study has limitations such as although globalization and technology are recognized as important factors, it does not comprehensively explore the specific impact of these two factors on different sectors of the economy or in countries with varying levels of development, inflation expectations are only analyzed from a theoretical perspective without directly measuring how these expectations are formed in society and researchers do not analyze international economic policy, global crises and commodity price fluctuations in depth so that conclusions drawn may differ in the event of significant external shocks.

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