

TESTING THE VALIDITY OF PHILLIPS CURVE FOR SELECTED ASIAN COUNTRIES

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ABSTRACT

Inflation is the major fear among the people living in the society as it increases the cost of living. Unemployment further adds in this fear as increased unemployment lowers the purchasing power and welfare of the people living in the society. This research study aims to examine the relationship between these two important socio-economic factors (inflation and unemployment) via testing the validity of Phillips Curve for selected Asian countries (Pakistan, Singapore, Sri Lanka, Indonesia, Thailand, Malaysia, Philippines, China, Japan, South Korea and India) using panel data from 1991-2020. The empirical findings show that in short run, the validity of Phillips Curve doesn't exist in case of the selected Asian countries, however, in the long-run it does. Further, the study found significant relationship between GDP growth and inflation in the studied Asian countries. Moreover, the result of Granger Causality analysis found bi-directional association of inflation and unemployment in selected Asian Countries.

Keywords: Inflation, Unemployment, Phillips Curve, Asian, Panel data.

INTRODUCTION

The inverse relationship between inflation and unemployment was firstly introduced by William Phillips (1958) known as Phillips curve. Besides that the government of both developed and developing countries try to control inflation and unemployment, however, to increase employment opportunities and production, there is an increase in inflation in order to achieve enhanced economic growth. The Phillips curve has both positive and negative impact on the individuals, society, economy and country. On one side, a decrease in unemployment has a positive effect on individuals, human welfare, society and economy. On the other hand, an increase in inflation worsens the purchasing power of the individuals, thus inversely affects human welfare and demand side of the economy (McLeay & Tenreiro, 2019).

Phillips curve insights the difficulties of steadying the inflation in relation to lowering the unemployment rate. An economy may face higher unemployment rate while lowering or controlling inflation, as reducing price level may harm producers due to which they decrease production which leads to an increase in unemployment in the country (Rubbo, 2020). Thus, the Policymakers should carefully consider these two important factor while formulating, framing and implementing the policy as erroneous decision regarding these two elements may deteriorate the economy, though the prime objective of governments and policy makers is to bring the economy at full employment level (potential GDP) as well as to decrease the general price level or control inflation (Mavroeidis et al., 2014).

At the beginning, Phillips Curve remained in the consideration of only academia, however, due to rapid changes in the global recessions during different periods that also disturb the stability in the economies due to changes in employment and price level. However, the Phillips Curve remained and nowadays has been in consideration of the monetary policy makers to observe the tradeoff, especially

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in developing countries. The Phillips Curve plays a significant part in the designing of monetary policy realization of the interest rate and forecasting the expected inflation (Atkeson & Ohanian, 2001).

The Phillips curve hypothesis can be related and studied from supply and demand side labor (Mavroeidis et al., 2014; and Jonathon et al., 2021). As the excess and shortage of either supply or demand of and for labor affects the wage rate, that leads to an alternate effect on inflation and unemployment in the economy. During the economic boom in the country, the employment opportunities rise due to increase in production and hiring of labor. In such an economic boom, low unemployment and high inflation can synchronize with each other, however, if there is recession in the economy, the production reduction leads to an increase in unemployment. In such a situation, there may be the co-existence of high unemployment and stumpy inflation.

Besides theoretical illustration of the Phillips Curve, it is also an important political phenomenon (Alogoskoufis & Philippopoulos, 1991). Phillips Curve defines the important trade-off that was and is the main aim of any government, central bank of the country, policymakers and important political slogan that is to control inflation and decrease unemployment. Most central banks aim to keep strict monetary policy in order to control inflation in the country as it adversely affects the citizens of the nation (Fitzgerald & Nicolini, 2014). But as per Phillips Curve, in contrary the connection of inflation and unemployment, so central banks can only sustain stumpy inflation to retain only desirable levels of unemployment. The Phillips Curve became the basic tool for decision and policy makers while making and implementing monetary policy, especially taking decision regarding inflation and employment.

Since a number of researchers and academicians questioned the applicability of Phillips Curve as a tool for macroeconomic policy, therefore the debate regarding its validity and usefulness has been more heated during the 1980's (Niskanen, 2002; and Barnes & Olivei, 2003). The undercurrents of the Phillips Curve altered during the past decades, which led to numerous investigators to experimentally examine the trade-off hypothesis of Phillips Curve for various countries than varied rulebooks about its definition to remove the ambiguity of Phillips curve theoretically and empirically. Therefore the current study aims to empirically test the trade-off hypothesis of Phillips Curve for the selected Asian countries in the current dynamics which believes that the prospect of asymmetric Phillips curve can revive the application of the Phillips curve in framing the appropriate policy.

Significance of this study

The Phillips Curve plays noteworthy role not only in macroeconomics policies that are closely related to the trade-off of inflation with unemployment (Chetty et al., 2011). Thus the Phillips curve has the main role in stabilizing the economy by steadying these two important factors. Both inflation and unemployment are not only economic phenomena, but also gain considerable importance in societal and political phenomena too. However, according to the Phillips curve, these two factors are closely related that not only affect each other, but also directly or indirectly affect the supply side and demand side of the country. So, the prominence of the hypothesis is closely related to the foreseeable role of inflation and unemployment that brings stability or explosiveness of monetary policy and the economy (Boone et al., 2002; and Rubbo, 2020).

On one side, the Phillips curve highlights the importance of the goods market, its stability and role in stabilizing the economy and employment opportunities. The inflation mainly occurs due the demand and supply gap between goods. Whenever, there is an excess of demand while shortage of supply, the price level may rise and the economy faces inflation. However, some of the researchers and economists are of the view that creeping inflation is good for the economy as it gives motivation to producers for more profit that enhances production, ultimately leads to an increase in employment opportunities.

On the other side, the Phillips Curve also highlights the basic issue of the labor market as it enlightens the relationship of inflation with unemployment. If there is an increase in the price of goods, producers will intend for more output that requires laborers and thus employment opportunities will be increased. So an increase in inflation may reduce unemployment, that's why Phillips describes the inverse trade-off of inflation and unemployment.

Some of past studies outline the due to imbalance of labor supply and demand (if labor supply is more than labor demand) resulting the wage rate to fall, leads to lowering the purchasing power of individuals and thus there may be fall in the general price level (decrease in inflation means deflation), but it may also leads increase in unemployment. If demand for labor exceeds supply, the increase in

wage rates may result high inflation that can generate more employment opportunities and lead to low unemployment. So, keeping this phenomenon, the Phillips Curve can be linked to the interaction of labor demand and labor supply (Nickell, 1999; and Blanchard & Portugal).

However, the continuous fluctuations in aggregate supply was evident in 1970's that occurred due to oil crises resultant in sever unemployment besides stagflation. Due to the continuous shocks experienced in different time periods by various economies, the Phillips Curve hypothesis was criticized by many researchers. This research study identifies and helps to understand the trade-off between inflation and unemployment for selected Asian countries that mainly face either inflation or unemployment. Therefore, this study also examines the Phillips curve behavior for the short and long run in the selected Asian countries.

Problem Statement

The Phillips after its emergence remained a key element for the policy maker, researchers and politicians till 1980's. However, due to sudden changes and unexpected shocks experienced by different economies in various times of spam, the empirical and practical findings weren't consistent with those of theoretical background. The volatility and persistent changes in the inflation and unemployment resulted in the ambiguous relationship between these two important factors. The researchers and policymakers who were more intending towards inflation allow shocks to have a grander sway on inflation intentions, however, it creates adverse effects on the demand side. On the other side, increased inflation may create greater opportunities for employment.

Some of the theorists and researchers support Phillips curve hypothesis, while many of the studies found that didn't support it. However, a larger number of developing countries mainly face issues, high inflation and unemployment. Therefore, this study attempts predominantly to empirically test the applicability of the Phillips curve in some selected Asian countries whether they are facing high inflation or unemployment. Inflation, which increases conditional volatility, is a condition that correlates with higher levels of unemployment in most of the countries, so it is also a concern to analyze it explicitly.

Previous studies have integrated various methods of estimating Phillips curve either from demand or supply side (such as unemployment, production outages, occupancy rates, and behavioral indices) to elucidate the process of inflation. However, this study uses the only trade-off relation of inflation and unemployment (Phillips curve hypothesis) to empirically examine the reliability of Phillips in selected Asian countries. Therefore, it is expected that the current research study may be of true representation of Phillips curve and may help the policy makers and especially monetary policy makers in controlling these two important factors, i.e. high inflation and unemployment.

Some of the studies found that inflation, unemployment and economic growth of various economies influencing each other, but so far this aspect is usually ignored while investigating the hypothesis of Phillips curve. Therefore, the variable economic growth is included considering a comparative analysis of selected Asian countries. The economic growth is driven by structural changes in the country, whereas, structural change cannot subsidize economic growth if the inflation and unemployment experiences rapid changes (Levine et al., 2012). However, most developing and Asian countries are facing the above issue. That's why, this research study explores the relation between inflation and unemployment empirically (testing of Phillips Curve hypothesis) for selected Asian countries.

Objectives of the study

This study aims to investigate

- i. The validity of Phillips Curve for the selected Asian countries.
- ii. To examine the causal relationship of inflation and unemployment in the selected Asian countries.

REVIEW OF LITERATURE

The Philips curve after its emergence were remained very debated not only in academics but also in researches. Many researchers have attempted from both developed (King and Watson, 1994; Gruen et al., 1999; and Greenslade et al., 2003) and developing countries to investigate the hypothesis and applicability of Philips curve (Nell, 2006; Burger and Marnikov, 2006; and Buchmann, 2009). However, the outcome of these researches is mixed, and also some of the investigator did a lot of criticism on the existence and hypothesis of Phillips curve. It is also a fact that at the start Phillips curve

hypothesis remained successful and considered a strong theoretical background up to 1980's (Pyyhtia, 1999), however, after that it remained in much criticism and in most of developing countries the hypothesis of trade-off relation between inflation and unemployment didn't exit (Veirman, 2009; and Balaban and Vintu, 2010).

The traditional theory Phillips curve remained dominant in the studies and many researchers tested the hypothesis of Phillips curve empirically that kept it in the literature (Gordon, 1971; Lucas and Rapping, 1969; Phelps, 1967; and Lipsey, 1960). However, some of the researchers and recent studies didn't found the hypothesis of Phillips curve (Balaban and Vintu, 2010; Veirman, 2009; and Buchmann, 2009). Still mixed literature found, (Nell, 2006; and Burger and Marnikov, 2006) have found the validity of Phillips curve in South Africa, (Gomez and Julio, 2000) investigated and found that the hypothesis existed in Columbia, (Huh and Lee, 2002) examined and empirical results supported the applicability of Phillips curve in Canada, for the United States, Sweden, Australia (Eliasson, 2001) concluded that Phillips curve hypothesis exists, (Correa and Minella, 2010) proved the validity of Phillips curve for Brazil, whereas, (Bilman and Utkulu, 2010) in Turkey and in European countries (Pyyhtia, 1999) found the existence of Phillips curve.

Islam et al. (2003) investigated the Phillips curve for the United States and found that the hypothesis prevails. Thus the study proved empirically the existence of Phillips for the US during the studied time period. Further, argued developed and less developed countries used the Phillips curve as an imperative tool for macroeconomic policies in 1960's and 70's. The Phillips curve has helped as an agent to governments and macroeconomic policy makers about the extent to which they have been able to ease either the inflation level or the unemployment level without imperiling the other because of the tradeoff connection in the of these two major macroeconomic variables. Haug & King (2011) examined and found the Phillips curve hypothesis for the United States. Their study concluded that high-income countries have mostly low level of unemployment and have steady rate of inflation. Nub (2013) attempted to test the hypothesis of Phillips curve for Germany during 1970 to 2012. However, the study didn't found any significant evidence and thus concluded that Phillips curve hypothesis doesn't exist. However, the founding of (Nub, 2013) was opposite to that of (Schreiber and Wolters, 2007; and Fitzenberger et al. 2007).

Tang and Lean (2007) tested the hypothesis of Phillips curve in Malaysia from 1971- 2004. They found the significant short and long run association of inflation and unemployment and thus concluded that Phillips curve hypothesis exit in Malaysia during the studied period of time. Furuoka (2007) also attempted concerning the inflation and unemployment relation for Malaysia from 1973-2004. The empirical findings of the analysis found the significant existence of the hypothesis both in short and long run, consistent to the study of (Tang and Lean, 2007).

Fendel et al. (2011) used several inflation forecasting tools to analyze the hypothesis of traditional and augmented Phillips Curve from 1989 to 2007 in G7 countries. The study found significant relation of inflation and unemployment except Italy in the studied countries. Rulke (2012) found the similar tradeoff relation while studied the hypothesis of augmented Phillips Curve for selected Six (06) Asian-Pacific countries. Further, the study concluded that the trade-off magnitude is very high in case of South Korea and Japan.

Resurrection (2014) tested the correlation between unemployment, inflation and economic growth from 1980 to 2009 in the Philippines. The estimates are based on the usual least square method and the outcomes show that intensification in inflation effect economic growth that also leads to decrease in unemployment. Thus the study concluded with the applicability of hypothesis in Philippines. Shaari et al., (2015) investigated and found the hypothesis of Phillips curve in Malaysia during 1982-2010. Al-Zeaud & Al-Hosban (2006) studied the hypothesis of Phillips curve for Philippines, and (Furuoka & Munir, 2007) for Malaysia. The findings of both studies were consistent to each other and concluded that the hypothesis of Phillips curve is somehow existed in the studied countries.

Ojapinwa & Esan (2013) examined the hypothesis of Phillips curve for Nigeria. The study found weak relation of inflation with unemployment in the short run, while didn't found any significant existence in long run in case of Nigeria. The consistent result was found by (Simionescu, 2014) for Romania. However, (Sian, 2010) found the evidences for validity of Phillips curve in emerging industrialized countries. Further the relation of inflation with unemployment was fairly stable in Turkey and Mexico, whereas insubstantial in case of Thailand, South Africa and Brazil.

Saidu & Muhammad (2015) examined the link amid inflation and unemployment in Nigeria. In the analysis of the study different techniques were applied. The findings of Granger causality showed uni-directional relation from inflation to economic growth, whereas, the growth didn't have any significant impact in inflation. However, the study didn't found any significant and causal relation between unemployment and inflation. Further, the study also didn't found any relation between inflation and unemployment, thus concluded that Phillips curve doesn't exist in case of Nigeria during the studied included period.

Muryani & Pamungkas (2018) tested the influence of unemployment, inflation, spending, the workforce, and total fixed capital formation on Indonesia's economic growth progression. The result showed that unemployment and total fixed capital formation have significant effect and thus have supportive impact on economic progression, whereas, labor force and inflation have low impact on growth. Moreover, the study didn't found any significant impact of government spending on economic progression of Indonesia. Tenzin (2019) didn't found any significant impact of unemployment on growth of Bhutan. Further, the study concluded that inflation in Bhutan creates uncertainty in the short run that leads unexpected impact on unemployment and economic growth both in short and in long run.

Empirical Methodology of the Study

Through chronological perception, it is fascinating that United States economic policy in the 1960s focused on the agent's ability to achieve an unwavering and stumpy unemployment rate through a fair rise in inflation. However, to keep the unemployment rate at low level without accelerating inflation was not possible and the economy faces a lot of hurdles including output gap. Economic theory postulates that when production reaches to its concentrated potential level and then falls diminutive of it, it leads to shortages of labor, goods and services, increases the burden of wages and price costs, and results in inflationary production. So whenever an output falls below its potential levels, inflationary pressures will begin to subside. The probability enhanced Phillips Curve (Friedman, 1968; and Phelps, 1967) concisely illustrates this method of price adjustment. From the above statement, the Phillips Curve depends upon the expected inflation and output gap, so probability-augmented Phillips curve describes this price adjustment method concisely that is:

$$\pi = \alpha\pi^e + z(y - y^*) \dots \dots \dots (1)$$

In the above equation “ π ” is used for inflation, “ π^e ” is for expected inflation, “ y ” is for real and “ y^* ” is for potential GDP. The inclusion of expected inflation “ π^e ” implies that inflation may be time-diverging (i.e., the conditional variance may not be constant). Assuming inflation is largely in line with the foreseeable rate, inflation may rise in the period following a wider than expected output gap. Inflation can rise above the tentative reading before (probably) falling to levels below the tentative reading.

Depending on the magnitude of the coefficients in Eq. (1), it may cycle that inflation roughly adjust the initial possible value over many periods before returning to a provisional value (where α measures the dynamics of the inflationary trend), reflecting unpredictability of inflation to anticipated inflation. Furthermore, it may be possible that inflation volatility produces more inflation (at least in the short run) as valor is the case if the associated indecision about prices made it more difficult for agents in the economy to devise pricing tactics. Therefore, this research study tries to explain the time-varying variance association of inflation and unemployment in the selected Asian countries.

Phillips curve suggests a volatile short-term expected relationship of inflation and the GDP gap. As inflation expectations change, this relationship changes and the Phillips Curve shifts. As a result, the observed relationship changes over time as inflation expectations change. As GDP develops at a different pace, the relationship between inflation and GDP also changes. In the long term, inflation may be at the expected level as GDP is at the expected level. Thus this phenomena is evident of neoclassical dichromic effectively negotiation amid pre-Keynesian neoclassical philosophy and Keynesian macroeconomics. So the fundamental elements of the above macroeconomic framework diverged from macro Keynesians, who attempted to build on microeconomic underpinnings (Blanchard, 2009; Samuelson & Solow, 1960).

The unemployment rate in line with the labor market equilibrium is affirmative, and labor market frictions such as costs of production and other related costs may leads to an increase in the price of goods.

Thus by maintaining surplus demand through monetary or financial policy, the unemployment and inflation may be controlled up to certain level that leads to an increase in national income. So, from the above the empirical model of this study that is regressed is functional relation of unemployment, national income and inflation, that is:

$$\pi_{it} = \alpha + \beta_1\pi_{it-1} + \beta_2Un_{it} + \beta_3Y_{it} + \mu_{it} \dots\dots\dots(2)$$

Whereas, “ π_{it} ” is inflation, “ π_{it-1} ” is inflation in previous or lag year. The “ Un_{it} ” is the unemployment and “ Y_{it} ” is the total output or national income, the $\beta_1, \beta_2, \& \beta_3$ are the parameters of the regressor and “ μ_{it} ” is the error term.

Data Description

This research is based on secondary data from the year 1991 to 2020. Data is collected from various national and international sources. Other official sources are the Pakistan Economic Survey, Bureau of Statistics and World Bank database.

Regression Analysis & estimated Results

This study consists of a pragmatic analysis of the foremost purposes of the study, investigated the applicability and causality of Phillips Curve in selected Asian countries. Asian economies have been troubled for most of their history, so the observed variables data had to be smoothened.

To auxiliary substantiate the stationarity of the model and specification of data, unit root tests were applied to all variables supporting the I(0) and I(1) order of integration amid the witnessed variables.

From such insights, therefore, the extended Dickey-Fuller (ADF), autoregressive distributed-lag (ARDL), Granger causality and diagnostic techniques to achieve regression analysis of variables and to manner realistic considers of inflation and unemployment have been developed.

Data Analysis

Data are analyzed by E-Views using appropriate econometric techniques i.e Unit root test, panel ARDL and Granger Causality. In addition, the data are further elaborated by descriptive statistics, trend analysis, graphs, tables, etc. The main focus is to analyze the variation of the two variables (inflation and unemployment) of the Phillips Curve in Asian countries in different years to see if it exists.

Testing of Data

In time series data, achieving the order of counteraction between variables is a prerequisite before performing regression analysis. To apply any noteworthy or good regression technique to time series data, we need to assimilate the data of the 0th or 1st order. According to I(0), I(1), (Ouattara, 2004), for the counteraction of I(2), the F statistic cannot be derived, and since there is no good fit, so we can't even get a suitable match. Therefore, it is imperative to check the order of counteraction using the unit root test before starting regression analysis.

Stationarity Test

Data are said to be stationary if the mean and variance of the sequences persist relentless or remain constant over time. To check the stationarity of the data, we perform an extended Dickey-Fuller unit root test. The H_0 of ADF test, that a given variable has a root of 1 and is rejected if the p-value is fewer or less than 5%. A unit root analysis is performed separately for each variable.

In this study, the Augmented Dickie Fuller (ADF) was performed on the pragmatic data to check the stationarity, order of integration, and the presence of spurious relations. Table (1) displays the findings, which shows that the inflation rate is stationary at level, but the GDP and unemployment rate are not stationary at level. Therefore, we can say that unemployment rate and GDP are linearly integrated.

Table No. 1. Stationarity Results

Variables		I(0)	I (1)
Inflation	INF	0.0060	----
Unemployment	UN	0.0625	0.0026
Economic Growth	GDP	0.7868	0.0000

Regression Analysis of the Variables

The Autoregressive Distributed Lag (ARDL) approach given by (Pesaran & Shin, 1995) and recommended by (Pesaran et al. 2001) is utilized here. The ARDL bounds test approach is a technique developed to assess the existence of long-term associations among the concerning variables. This

approach has several economic advantages over previous joint integration approaches. Therefore, ARDL gained wide acceptance.

The ARDL has some unique importance. First, the method is recycled nevertheless of whether the I(0) and I(1) series are stationary or not. Second, the method provides strong results and consistent assessment of both long-term and short-term coefficients. Therefore, this methodology has both short-term and long-term dynamics (Perasan & Shin 1995). Third, pragmatic fallouts show that this approach is loftier and delivers efficient results for large samples. If all variables in the stochastic method are stationary at I(0), OLS is appropriate, but if entirely variables are stationary at I(1), VECM (by Johansen, 1990; and Eagle & Granger, 1987 approach) is applicable.

Before estimating the ARDL model, the degree of consolidation of the variables was tested by unit root tests, the variables were consolidated by I(0) and I(1), the ARDL method was applied, and the concerned results are shown in Table 2 below.

Table No. 2 Inflation Unemployment Relation (ARDL short-run outcomes)

<i>Variables</i>	<i>Coefficient</i>	<i>Std. Error</i>	<i>t-Statistic</i>	<i>Prob.</i>
Cointeq01	0.001975	0.000597	3.306031	0.0011
D(Unemployment(-1))	0.186918	0.128888	1.450241	0.1485
D(Inflation)	0.001498	0.027775	0.053930	0.9570
D(Inflation(-1))	0.017062	0.015350	1.111570	0.2676
D(GDP_Growth)	-0.023247	0.032317	-0.719329	0.4728
D(GDP_Growth(-1))	-0.021037	0.020785	-1.012122	0.3127
C	0.327320	0.096545	3.390331	0.0008

ARDL models outperform other cointegration models and produce consistent results even with small sample sizes. ARDL model with endogeneity issues in estimates. The endogeneity problem can be solved by lagging the variables and making the model dynamic, as in (Perasan et al., 2001). The variables are not significant in Table 2, as they all show probabilities greater than 5%. Similarly, the t-statistic indicates that the unemployment score is less than 2, so it is not significant. The same applies to inflation and GDP. The coefficient values show that a 1% rise in inflation will lessen GDP by 2% in the short run. A 1% increase in inflation in the short term will increase unemployment by 18%. Keynes's theory also articulates that the main cause of high inflation is the unnecessary high spending of the people beyond their economic ability where prices are rising faster than the rate at which new goods and services are being produced (Hamilton, 2001; and Balami 2006).

Furthermore, the results of this study are similar to observed results from Malaysia (Furuoka & Munir, 2007) where they inspected the actuality of Phillips curves in various countries. Their outcomes are consistent, implying that a Phillips Curve exists for each country surveyed. On the other hand, in contrast to the results of Sian (2010), which show that the Phillips Curve in emerging markets is valid both in the short and long term. He also noted that price levels are fairly stable in Mexico and Turkey, but varying in Brazil, South Africa and Thailand.

Table No. 3 Co-Integration Results

<i>Variables</i>	<i>B's</i>	<i>Sd. Error</i>	<i>t-Statistics</i>	<i>P</i>
Cointeq01	-0.544870	0.156628	-3.478759	0.0006
D(inflation(-1))	-0.156736	0.147755	-1.060779	0.2904
D(inflation(-2))	0.051688	0.094959	0.544318	0.5870
D(unemployment)	0.048589	0.724407	0.067074	0.9466
D(unemployment(-1))	2.227779	1.737617	1.282089	0.2017
D(unemployment(-2))	-0.547760	0.521411	-1.050534	0.2951
D(unemployment(-3))	-2.428038	0.886459	-2.739030	0.0069
D(GDP)	-0.423745	0.235428	-1.799897	0.0738
D(GDP(-1))	-0.098357	0.300158	-0.327684	0.7436
D(GDP(-2))	-0.039143	0.083842	-0.466868	0.6412
D(GDP(-3))	0.004727	0.076842	0.061513	0.9510
Constant	0.902466	0.452239	1.995550	0.0477

Table 3 displays domino effects that are not significant in the long run because the probability values are above 5%. Currently, the t-statistic shows less than 2 percent. This is also a sign that doesn't

matter in the long run. Similarly, the coefficient values indicate that a 1% decrease in inflation will prime to a 4% increase in unemployment in the long run.

Table No. 4 Long Run Relation between Inflation & Unemployment

Variables	B's	Sd. Error	T	P
Inf	-0.392667	0.104917	-3.742654	0.0003
GDP)	0.359420	0.075123	4.784449	0.0000

The association concerning inflation and unemployment in the long run in Table (2) displays that there is statistically significant relation amid the inflation and unemployment.

Table No. 5 Granger Causality Analysis Result

Variables	Inflation	Unemployment	GDP Growth
Inflation	-----	0.0379	0.0340
Unemployment	0.0212	-----	0.0000
GDP Growth	0.0000	0.0000	-----

Table 5 demonstrates the outcomes of the Granger causality test. The findings show the two-way causality goes from inflation to unemployment and from unemployment to inflation, that both variables are correlated with each other.

The study also demonstrates bidirectional causality from GDP growth to unemployment and from unemployment to GDP growth and the findings shows that GDP growth causes inflation and due to inflation economic growth takes place.

CONCLUSION

The purpose of this study to test the validity of Phillips curve for Asian countries taking time-varying data of inflation dynamics. For that purpose, the study examines the association between inflation and unemployment uses two different panel data techniques to scrutinize the association amid unemployment and inflation, or the effectiveness of the Phillips Curve in selected Asian countries (such as Pakistan, Singapore, Sri Lanka, Indonesia, Thailand, Malaysia, Japan, China, Korea, India and the Philippines).

From the outcome of mixed order of integration of stationarity test, the study firstly applied ARDL approach. From the findings of ARDL approach, the study didn't found any significant relationship between inflation and unemployment in the selected Asian countries in the short run. Therefore, it can be said that the hypothesis of Phillips is not applicable in the short run in the studied countries. However, the long run relationship was found. Moreover, the finding also shows significant relationship between inflation and GDP growth in the selected Asian Countries. The result of Causality test found the bi-causal relation between inflation and unemployment. The causality analysis concludes that these two important variables affect each other and having strong causal relationship. Further, the bi-causal relationship exists between inflation and GDP growth, and as well as between unemployment and GDP growth for the selected Asian Countries.

RECOMMENDATIONS

Based upon the findings, the study suggested the following recommendations

1. Effective macroeconomic policies implementation is needed in such a way to achieve government's main objectives of full employment and stable economy.
2. Government needs to keep the labor market in the equilibrium, so that the wage cost didn't put pressure on price level
3. During the economic recession, when the country facing high unemployment and low inflation, the government needs to interfere to settle down the situation

Directions for Further Research on the Studied Topic

This study will be helpful for those who want to study Asian countries, but since the Phillips Curve is a concept of classical thought, it would be better for other researchers to collect data from the 1960s, and check the validity of Phillips curve for the studied countries.

Moreover, if the researchers conduct study on comparative analysis of developed and developing countries, it will be more helpful in framing the appropriate policy to control and study the relationship of inflation and unemployment.

The empirical findings of this study suggest in depth analysis by including some other important factor that might affect unemployment and inflation in these Asian countries, i.e. socio-economic factors, economic fluctuations, labor costs etc.

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