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# The Existence of Phillips Curve theory in Ethiopia

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**Abstract**
To continue Ethiopia's successful path towards becoming a middle income country, it is an important issue focusing on macroeconomic variables. In this modern world inflation and unemployment's are a most sensitive issue and needs critical attention to overcome problems which come from those two macroeconomic variables. Thus, the objective of the study was to investigate the long run and short run relationships, plus to this to look the causality between inflation rate and unemployment in Ethiopia. The study utilized Augmented Dickey-Fuller test, Auto Regressive Distributed Lag model and Granger causality test by using Vector Error Correction Model with a time spam of 1984/85-2019/20. The finding appears unemployment (contrarily and pitifully) and expected inflation (positively) has long run impact on the current inflation rate. Within the short run as it were anticipated inflation (positively) affect inflation rate but there's no short run relationship between inflation rate and unemployment rate. From this, the researcher proofs that Phillips curve exist in long run (contrary to 1970's theory), not in short run (contrary to 1950 and 1960's theory). At long last, the study suggests the government ought to center on fiscal approach which plays an incredible part on unemployment decrease and money related arrangement for inflation rate. Besides, a government ought to maintain a strategic distance from fumble on outside obligation utilization and outside coordinate venture. The government ought to alter the populace growth to economic progress.
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## 1. Introduction

To continue Ethiopia's successful path towards becoming a middle income country, it may be an important issue focusing on macroeconomic variables. In this modern world, inflation and unemployment's are a most sensitive issue and needs critical attention to overcome problems which come from those two macroeconomic variables. In Ethiopia unemployment and inflation's is the main bottleneck of our society welfare enhancement, especially from 2008 onwards those two variables shows a dynamic change. A number of young peoples are out of job, associated with tremendous economic and social costs for the whole community, inflation also in other side smash Ethiopian peoples. So at recently those variables are the opponents of Ethiopian people's welfare. Regarding to those excitement issues, a remarkable studies are conducted in developing and developed nation. Phillips (1958) was one of the first economists to present convincing confirmation of the converse relationship between unemployment and inflation. He premeditated the relationship between unemployment and the rate of change of inflation in the United Kingdom over a period of almost a full century (1861-1957). The tradeoff between inflation and unemployment is driven economists to utilize the Phillips Bend to fine-tune money related or fiscal policy. Since a Phillips Bend for a particular economy would appear an express level of inflation for a particular rate of unemployment and vice versa, it ought to be conceivable to point for a adjust between craved levels of inflation and unemployment.

Utilizing Phillips bend as introductory point, economists have attempted to set up the relationship between inflation and unemployment. These two factors are connected together economically. The connections that exist between them are contrarily related. These two components are basically utilized to look at the level of destitution in creating economies. Friedman (1977) said that *"both in social and natural science there is no certain substantive knowledge; only tentative hypothesis that can never be proved but can only fail to be rejected, hypothesis in which we may have more or less confidence, depending on such features as the breadth of experience they encompass relative to their own complexity and relative to alternative hypothesis, and the number of occasions on which they have escaped possible rejection. In both social and natural science, the body of positive knowledge grows by the failure of a tentative hypothesis to predict phenomena that the hypothesis professes to explain; by the patching up of that hypothesis until someone suggests a new hypothesis that more elegantly or simply embodies the troublesome phenomena and so on ad infinitum. In both, experiment is sometimes possible, sometimes not (witness metrology)".*

As the Friedman explanation, within the late 1960s, a bunch of financial analysts who were staunch monetarists, driven by Milton Friedman and Edmund Phelps, and contended that the Phillips Bend does not apply over the long term. They fought that over the long run, the economy tends to return to the natural rate of unemployment because it alters to any rate of expansion. Utilizing the information from the 1950s and 1960s

 

where the world economy tends to be steady, Philips Bend relationship demonstrated to be genuine for numerous created economies.

In 1970's the concept of a steady Philips Bend appears a break down as the economy endured from both high inflation and unemployment at the same time. The economists refer this kind of circumstance as stagflation where stagnant economies and rising inflation happens together. That's total supply stun can break the concept of Phillips bend since it can cause both higher the rate of inflation and unemployment. In long run there's no critical tradeoff between inflation and unemployment. At the conclusion the field of inflation and unemployment deliver destitution and monetary uncertainty confronted by the unemployed and fetched of living comes to at its climax. So, families may be disturbed; people cleared out destitute, criminal exercises rise, racial and ethnic hostility, expanded school dropouts, destitute pre-birth care, sick wellbeing both mental and physical, suicide, and other social issues.

According to Ayalew (2000), utilized output crevice as a proxy for unemployment, he inspected the relationship between inflation and unemployment from 1973(Q2)-1999(Q4). The result demonstrates that there's no Phillips bend in Ethiopia; he estimation result disclosed that there's no trade-off between the two variables under consider. A 100% rise within the rate of unemployment increments expansion by 47%. But the ponder was not seen the presence of Phillips hypothesis in brief and long run, and short run and long run causality by counting anticipated inflation. On this study the most rationale of the analyst is to see the presence of Phillips hypothesis on Ethiopia, in terms of three things, that is, the presence of Phillips bend in brief run and long run, secondly the ponder consider anticipated expansion as autonomous variable, thirdly the think about analyzes the casual relationship of inflation from unemployment and anticipated inflation from 1984/85-2018/19.

## 2. Conceptual, Theoretical and Empirical Review

### 2.1. Conceptual Review of the Study

Though, the rate of low inflation and unemployment are major economic objectives. But it isn't conceivable to attain both economic objectives at the same time. Inflation is the work of money related approach whereas unemployment is the work of fiscal approach. The point of money related approach is to control the level of inflation or to preserve the economical inflation within the economy by sacrificing employment (Al-Zeaud, 2014). Essentially, the term inflation alludes to extend in general cost level of goods and administrations within the economy which leads to diminish within the obtaining control of household. Since at whatever point costs will increment, the esteem of cash will be deteriorated and eventually the genuine salary of family will diminish. Ordinarily it is assumed that increment in costs of products and administrations are a bit like diminish in salary and bad habit versa (Adebowale, 2015).

The definition of unemployment is that the condition within the economy when supply of labor surpasses the demand of labor within the labor advertises of the economy. Basically, an individual who is willing to do the work but due to deficiency of the employments he or she might not discover the work within the economy is known as unemployment. There are numerous sorts of unemployment likewise, recurrent unemployment, frictional unemployment and classical unemployment (Adebowale, 2015).

### 2.2. Theoretical Review of the Study

According to Friedman (1977), "*there are three stages about the relationship between inflation and unemployment. The first stage was the acceptance of a stable trade off, the second stage was the introduction of inflation expectation as a variable shifting the short run Phillips curve and of the natural rate of unemployment, as determining location of a vertical long run Phillips curve. The third stage occasioned by the empirical phenomena of an apparent positive relation between inflation and unemployment".*

In addition, an awesome commitment almost the association between unemployment and expansion was made by (Phillips, 1958). His analyzing data with insights for the period of around a hundred a long time, he came to a conclusion that there's a certain level of unemployment (6-7%), in which the wage level is steady and its increase is invalid. When unemployment falls underneath this natural level, we are able see a more quick increment in compensation, and bad habit versa. His recommendation was compensation are driven by alter in unemployment rate. The assumption of a causal connects too worked well for a few periods within the UK. When it is connected to expansion and unemployment estimations within the USA, the PC effectively clarified the 1950s. The victory of the Phillips bend did not final long, be that as it may, and unused information measured within the late 1960s and early 1970 challenged the first adaptation.

The introductory translation of the Phillips bend as epitomizing a changeless trade-off between inflation and unemployment, thus inferring that money related approach seem have long-term impacts was criticized within the 1960s. In a few persuasive financial specialists (Friedman, 1977; Phelps, 1967) contended that such a trade-off was substantial as it were within the brief run, in this way restricting the convenience of financial arrangement measures to the close term only. The appearance of the judicious desires worldview within the 1970s brought almost an advance fortifying of the beginning feedback.

 

2.3. Empirical review of the Study

Yelwa et al. (2015) analyzed the relationship between unemployment, inflation and economic growth in Nigeria (1987-2012). The methodology utilized for the think about was ordinary least square. The result affirms that inflation and unemployment has reverse impacts on economic growth in Nigeria. Another consider on this nation, (Orji, et al, 2015) also defended that there's positive relationship between unemployment and inflation.

Adebowale (2015) inspected the relationship between inflation and unemployment in Nigeria for the period 1977 – 2013 through utilize of the Phillips Bend. This think about utilized Vector error correction model and Granger Causality method in arrange to test the legitimacy of the Phillips Bend relationship in Nigeria. The Granger Causality Test appears that inflation Granger causes the unemployment. Inflation and unemployment are damaging instead of accommodating to the financial improvement and development in Nigeria. Agreeing to the empirical discoveries of this considers, as within the Philips Bend, there's a negative relationship between inflation and unemployment rates in Nigeria. Another consider on Jordan demonstrated that, the outcome shows no causal relationship between unemployment and inflation, which implies there's no trade-off relationship between the two factors. This lends support Monetarist school of thought. One of Reasons for this may well be the foreign labor, which isn't included within the unemployment rate calculation. Hence, it may prevent the trade-off between the two factors within the short run (Al-Zeaud, 2014).

## 3. Methodology

This study has utilized the ARDL bounds testing approach to co-integration created by (Pesaran et al, 2001) in arrange to fulfill the objective of the study. The analyst utilized this approach since of its a few points of interest. To begin with, the approach works well with small-sized test information. Moment, an arrange of integration of series does not matter for applying the ARDL model in case factors are not found stationary at the level I (2). Third, on the off chance that there's a few of the demonstrate regrassors that are endogenous, the approach still gives fair long-run gauges and substantial t-statistics (Pesaran et al, 2001). The right alteration of the order of ARDL show is successful to adjust leftover serial relationship and the endogeneity issue. The design of an economic model is reliant on existing information on the study as entrenched in standard theories and further foremost empirical works. As a result, (Adebowale, 2015; Al-Zeaud, 2014; Orji et al, 2015) and augmented Phillips bend utilized as a guide line to develop a model. In order to examine the long and short-run relationships between inflation rate and unemployment, the following functional relationship is formulated:-

$INFR_t = f(\text{exINFR}_t, \text{UNR}_t)$…….. (1)

Mathematical shape of a function;

$INFR_t = exINFR_t + UNR_t$…….. (2)

Econometric frame of the model;

$INFR_t = \text{exINFR}_t + \text{UNR}_t + e_t$…….. (3)

Logarithmic form of the model;

$LnINFR_t = a_1 LnexINFR_t^{a_2}, LnUNR_t^{a_3} e^{\mu t}$…….. (4)

$LnINFR_t = a_1 + a_2 LnexINFR_t + a_3 LnUNR_t + \mu_t$…….. (5)

Where; $\text{LnINFR}_t$ = logarithm of inflation rate at time t, $\text{LnexINFR}_t$ = logarithm of expected inflation at time t, $\text{LnUNR}_t$ = logarithm of unemployment rate at time t, $a_1$ = intercept, $a_2$ and $a_3$ the parameters of independent variable, $\mu_t$ = error term. To realize the study's objective, there are a few steps of the econometric strategies to be performed. To begin with, we ought to check and guarantee that all factors are not at I (2) stationary level in order to maintain a strategic distance from spurious result (Pesaran et al, 2001). This checking will be done by Extended Dickey-Fuller (Dickey & Fuller, 1979). So, ARDL approach to co-integration model can be shaped: The common shape of ARDL (p, q) is as:

$Y'_t = \gamma_{0i} + \sum_{i=1}^{p} \pi_i Y_{t-i} + \sum_{j=0}^{q} \rho'_i X_{t-i} + \varepsilon_{ti}$ …….. (6)

Where, $Y'_t$ is a vector, $(X'_t)'$ are permitted absolutely $I(0)$ *or* $I(1)$ ; $\pi$ and $\rho$ are coefficients; $\gamma$ is the constant; $i = 1, \ldots., K; p$ is optimal lag order used for dependent variables; $q$ is ideal lag orders used for dependent variable; $\varepsilon_{ti}$ is a vector of error terms- inconspicuous zero mean white noise vector process. Taking after is the bound test co-integrations models (Sisay, 2019). The ARDL approach can be delimited as a condition, (7), (8) and (9).

$D\big(Ln\ (INFR_t)\big) = \beta_1 + \alpha_{11} Ln(INFR_{t-1}) + \alpha_{21} Ln(exINFR_{t-1}) + \alpha_{31} Ln(UNR_{t-1}) +$
$\sum_{i=1}^{p} \theta_{1i}\, D(Ln(INFR_{t-i})) + \sum_{i=1}^{q} \theta_{2i}\, D\big(Ln(exINFR_{t-i})\big) + \sum_{i=1}^{q} \theta_{3i}\, D\big(Ln(UNR_{t-i})\big) + \varepsilon_{1i}$……(7)

$D\big(Ln\ (exINFR_t)\big) = \beta_1 + \alpha_{11} Ln(exINFR_{t-1}) + \alpha_{21} Ln(INFR_{t-1}) + \alpha_{31} Ln(UNR_{t-1}) +$
$\sum_{i=1}^{p} \theta_{1i}\, D(Ln(exINFR_{t-i})) + \sum_{i=1}^{q} \theta_{2i}\, D\big(Ln(INFR_{t-i})\big) + \sum_{i=1}^{q} \theta_{3i}\, D\big(Ln(UNR_{t-i})\big) + \varepsilon_{1i}$…… (8)

$D\big(Ln\ (UNR_t)\big) = \beta_1 + \alpha_{11} Ln(UNR_{t-1}) + \alpha_{21} Ln(LnexINFR_{t-1}) + \alpha_{31} Ln(INFR_{t-1}) +$
$\sum_{i=1}^{p} \theta_{1i}\, D(Ln(INFR_{t-i})) + \sum_{i=1}^{q} \theta_{2i}\, D\big(Ln(LnexINFR_{t-i})\big) + \sum_{i=1}^{q} \theta_{3i}\, D\big(Ln(UNR_{t-i})\big) + \varepsilon_{1i}$…… … (9)

Where LnUNR is log of unemployment rate, LnINFR is the log of inflation rate, LnexINFR is the log of

 

expected inflation rate, and 'D' is difference operator. Hypothesis for testing long run existence among variables could be formulated (Sisay, 2019). $H_0$: $a_{jk} = 0$, no relationship. j ,k =1 to 3, $H_a$ : $a_{jk} \neq 0$, co integration. j, k =1to 3. If there is an evidence of long-run relationship of the variables, the following long-run ARDL $(q_1, q_2, p)$ mode will be estimated. Here all variables are as previously defined.

$$\left(Ln\ (INFR_t)\right) = \beta_1 + \sum_{i=1}^{p} \theta_{1i}\ (Ln(INFR_{t-i})) + \sum_{i=1}^{q1} \theta_{2i}\left(Ln(exINFR_{t-i})\right) + \sum_{i=1}^{q2} \theta_{3i}\left(Ln(INFR_{t-i})\right) + \varepsilon_{1t} \quad (10)$$

3.1. Short Run model

Once the approval of long-run co-integration between $INFR_t$, $UNR_t$, and $exINFR_t$, the researcher uses short run model to obtain the short-run dynamic coefficients and estimate the adjustment speed connected with the short-run estimates (Asteriou & Hall, 2006).

The overall form of short run model is as:

$\Delta p_t = z_0 + a_1 \Delta q_t - v\mu_{t-1} + \mathcal{E}_t$…… …….…… (11)

Where; $a_1$ = impact multiplier, v = adjustment effect. The impact multiplier dealings the immediate impact that changes in $q_t$ will have on change in $p_t$ and adjustment result displays how much of disequilibrium is being adjusted.

$\mu_{t-1} = p_{t-1} - \beta_1 - \beta_2 q_{t-1}$…….. (12)

In this equation $\beta_2$ being the long run response.

$D\ (Ln\ (INFR_t)) = \theta_0 + \Sigma^{p}_{i=1}\ \theta_{1i}\ D(Ln(INFR_{t-1})) + \Sigma^{q}_{i=1}\ \theta_{2i}\ D(Ln(exINFR_{t-1})) + \Sigma^{q}_{i=1}\ \theta_{3i}\ D(Ln(UNR_{t-1})) + rECT_{t-1} + e_t$…….…… (13)

Where; $\vartheta_t$'s the coefficients linking to the short -run dynamics of the model's convergence to equilibrium, r measures the speed of adjustment, where $ECT_{t-1}$ is the error correction term (Pesaran et al, 2001). This is defined as:

$ECT_{t-1} = D\ (Ln\ (INFR_{t-1})) - [\theta_0 + \Sigma^{p}_{i=1}\ \theta_{1i}\ D(Ln(INFR_{t-1})) + \Sigma^{q}_{i=1}\ \theta_{2i}\ D(Ln(exINFR_{t-1})) + \Sigma^{q}_{i=1}\ \theta_{3i}\ D(Ln(INFR_{t-1})))]$…….....(14)

To consider the objective, which expressed from over; the course of causality among inflation rate, anticipated inflation rate and unemployment rate is inspected by applying the VAR demonstrate. A co-integration test can decide the presence of Granger causality between factors, but it cannot decide the course of this connection. Granger (1969) propose that in case there's an affirmation of the nearness of long-run connections among the factors, there must be either bidirectional, unidirectional or unbiased causality connections among factors.

$$D\left(Ln\ (INFR_t)\right) = \theta_0 + \sum_{i=1}^{p} \theta_{1i}\ D(Ln(INFR_{t-i})) + \sum_{i=1}^{q} \theta_{2i}\ D\left(Ln(exINFR_{t-i})\right) + \sum_{i=1}^{q} \theta_{3i}\ D\left(Ln(UNR_{t-i})\right) + \varepsilon_t \quad (15)$$

$$D\left(Ln\ (exINFR_t)\right) = \theta_0 + \sum_{i=1}^{p} \theta_{1i}\ D(Ln(exINFR_{t-i})) + \sum_{i=1}^{q} \theta_{2i}\ D\left(Ln(INFR_{t-i})\right) + \sum_{i=1}^{q} \theta_{3i}\ D\left(Ln(UNR_{t-i})\right) + \varepsilon_t \quad (16)$$

$$D\left(Ln\ (UNR_t)\right) = \theta_0 + \sum_{i=1}^{p} \theta_{1i}\ D(Ln(UNR_{t-i})) + \sum_{i=1}^{q} \theta_{2i}\ D\left(Ln(INFR_{t-i})\right) + \sum_{i=1}^{q} \theta_{3i}\ D\left(Ln(exINFR_{t-i})\right) + + \varepsilon_t \quad (17)$$

3.2. Data source

The annual time series for all variables during the period of 1984/85 to 2018/19 are used in this study to address the objective of the study. All variables are found from World Development Index. To carry out the quantitative result of the research project the researcher benefited from E-Views 10.0.

## 4. Study Result

**Table 1**:-Augmented Dickey-fuller test (Stationary test of variables)

| Variables | Levels | | First difference | | Order of integration |
|---|---|---|---|---|---|
| | Constant | Constant and trend | Constant | Constant and trend | |
| LnUNR | (2.751582) | (2.734954) | (7.697294)* | (7.609472)* | Stationary at I(1) |
| | [0. 0761] | [0.2299] | [0.0000] | [0.0000] | |
| LnexINFR | (2.163587) | (2.627512) | (6.976959)* | (6.875584)* | Stationary at I(1) |
| | [0.2227] | [0.2714] | [0.0000] | (0.0000) | |
| LnINF | (4.168996)* | (7.536394)* | (7.691951)* | (7.536394)* | Stationary at I(0) and I(1) |
| | [0.0026] | [0.0000] | [0.0000] | [0.0000] | |
| MacKinnon (1996) with constant, no trend, ( ) Indicates t-statistics with absolute value, [ ] Indicates p-value. | | | Null Hypothesis: Each variable has a unit root at level and first difference. * Indicates rejection of the null hypotheses at 1% and 5% level of significant in level and first difference. | | |

*Source: E-views-v-10*

 

The unit root tests make beyond any doubt that there no I (2) variable. For that reason, an ARDL strategy of co-integration test can be connected for this study with considered steady term (Sisay, 2019).

**Table 2**:-Testing the presence of long run relationship

| Model | | | | | f-statistic | | Co-integration |
|---|---|---|---|---|---|---|---|
| $F_{LnINFR}$(LnINFR/LnexINFR, LnUNR) | | | | | 59.03408* | | yes |
| $F_{LnUNR}$(LnUNR/LnexINFR, LnINFR) | | | | | 2.917371 | | No |
| $F_{LnexINFR}$(LnexINFR/LnUNR, LnINFR) | | | | | 20.97186* | | yes |
| Critical value bounds of the F-statistic and T-statistic: unrestricted intercept and no trend | | | | | | | |
| | | F-statistic | | | | | |
| K=2 | Sign- level | 99% | | 95% | | 90% | |
| | | I(0) | I(1) | I(0) | I(1) | I(0) | I(1) |
| | | 5.15 | 6.36 | 3.79 | 4.85 | 3.17 | 4.14 |

Note: 1) K is the number of regressors 2) * denote statistically significance at 1 percent levels of significance. T-statistics values are in absolute value

Source: E-viwes-v-10

4.1. Long run and short run relationship of variables

ARDL model (1, 1, and 0) is used to estimate the long-run coefficients for the variables in the models of the study as resulting in table 3.3. The long run outcome displays the significance of long-run relationships among the variables at 1%, and 5% level. There are statistically significant long-run relationships between LnexINFR and LnINFR in Ethiopia at significance level of 1%. This indicates that an increase of the LnexINFR leads to an increase in the LnINFR.

**Table 3**:-long run and short run relationship

| **Long run relationship of variables** | | | | | |
|---|---|---|---|---|---|
| **Model** | **LnINFR** | **LnUNR** | **LnexINFR** | | |
| **DLnINFR** | | **-0.146360 [0.0926]** | **0.849738 [0.0000]** | | |
| DLnexINFR | 1.009841[0.0002] | 0.205625[0.5586] | | | |
| **Short run dynamics of variables** | | | | | |
| Models | Constant | DLnINFR | DLnexINFR | DLnUNR | ECM(-1) |
| **DLnINFR $R^2$=0.866530** | **1.229481 [0.0000]** | | **1.871933 [0.0000]** | **-0.114946 [0.5614]** | **-2.280912 [0.0000]** |
| DLnexINFR $R^2$=0.952367 | -0.425198 [0.0000] | 0.418759 [0.0000] | | 0.007448 [0.9367] | -1.135794 [0.0000] |
| **Note:** - Numbers without brackets are the long run and short run elasticity's of corresponding Series; [ ] are the P-Values; and D, represents the difference term. | | | | | |

Source: E-views-V-10

The results of the short-run relationship between dependent and independent variables at 1% significance levels is recorded in table 3.3. The study reveals that there is a positive relationship between variables LnINFR and LnexINFR, while the variables LnINFR and LnUNR are negatively associated but insignificant. The result is inconsistent from (Adebowale, 2015; Phillips, 1958). In addition, the highly significant and negative sign coefficients of (ECM(-1)) indicate a relative speed of achieving the long-run equilibrium. Specifically, the absolute values of (ECM (t-1)) coefficients for the DLnINFR, is -2.280912. This confirm that the models are corrected from the short-run towards the long-run equilibrium by 228%. The result proved that in the short run (contrary to 1950' and 1960' theory) and long run (contrary to 1970' theory), Phillips curve is not acceptable in Ethiopia. The Phillips curve suggests there is a trade-off between inflation and unemployment, at least in the short term. Other economists argue the trade-off between inflation and unemployment is weak. It is consistent from work of (Ayalew, 2000; Stephen et al., 2017).

4.2. Granger Causality Tests

**Table 4:**-Granger Causality Result

| Null Hypothesis($H_n$): | Obs | F-Statistic | Prob. | Decision |
|---|---|---|---|---|
| LnINFR does not Granger Cause LnexINF<br>LnexINF does not Granger Cause LnINFR | 34 | 28.0753<br>0.66894 | 2.E-07<br>0.5200 | Reject $H_n$ |
| LnUNR does not Granger Cause LnexINF<br>LnexINF does not Granger Cause LnUNR | 34 | 0.12335<br>0.45204 | 0.8844<br>0.6407 | Accept $H_n$ |
| LnUNR does not Granger Cause LnINFR<br>LnINFR does not Granger Cause LnUNR | 34 | 0.00148<br>0.27238 | 0.9985<br>0.7635 | Accept $H_n$ |

Source: E-views-v-10

 

The result show that there's causality that runs from **LnINFR** to **LnexINFR,** but the invert isn't genuine. The other clarification, there's no any granger case from inflation rate to unemployment and the reverse. Additionally, consider the associated that there's no granger causality from unemployment to anticipated inflation rate, the switch moreover genuine. The consider result isn't consistent from (Adebowale, 2015; Stephen et al, 2017).

4.3. Diagnostic Test

Table 5:-Diagnostic Test

| Diagnostic Test | F- Statistics/ LM F-statistic | P-value |
|---|---|---|
| Heteroscedasticity (Breusch–Pagan test statistics) | 1.967866 | 0.1250 |
| Autocorrelation (Breusch-Godfrey Serial Correlation LM Test) | 0.013489 | 0.9866 |
| Ramsey's RESET Test | 0.438044 | 0.5133 |

Source: E-views-v-10

We have sufficient affirmation to conclude that there's no heteroscedasticity, autocorrelation, and Ramsey's RESET test issue in the event that the p-value more prominent than 5% significance level.

## 5. Conclusion and Recommendation

5.1. Conclusion

The study utilized augmented Dickey-Fuller test in order to check the stationary of variables which consider under this study. The co-integration test shows that there is long run relationship among variables. To see the short run relationship of variables this study apply short run autoregressive distributed lag model, with a minor difference to see long run relationship of variables the researcher applied long run autoregressive distributed lag model. Moreover, granger causality tests also utilized to see causality of varibles. Finally to check the acceptance of the model the study used familiar diagnostic test like Breusch–Pagan test statistics, Breusch-Godfrey Serial Correlation LM test, and Ramsey's RESET Test, these tests imply that the model is free from Heteroscedasticity, Autocorrelation and model misspecification problem.

5.2. Recommendation

The consider result appears that Phillips bend not exist in Ethiopia. Be that as it may, the government ought to center on financial arrangement and fiscal approach; it is troublesome to exaggerate fair how vital palatable macroeconomic execution is for the well-being of the citizens of any nation. An economy that has effective macroeconomic administration ought to encounter low unemployment and inflation, and relentless and maintained economic growth.

- ✓ It is conceivable to decrease both inflation and unemployment. On the off chance that effective supply-side approaches are utilized, government can decrease unemployment without causing inflation. Too, in case the development is feasible, inflation will stay low.
- ✓ The government should change population growth to economic progress.
- ✓ The researcher advises other researchers to do this research by expanding the time period and variables.

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