VIABILITY OF THE PHILLIPS CURVE FOR THE INDIAN ECONOMY

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ABSTRACT

The reason of the research is to assess the relation between unemployment rate and inflation rate in the Indian economy. The research is based on secondary data for 2000-2019 period. The study uses Granger Causality test to identify causal association between unemployment rate and inflation rate. The paper concludes that unemployment rate and inflation rate has no causality in India. The finding does not assist presence of Phillips curve in India. Analysis has also been made with respect to monetary and fiscal policy measures taken at the time of Covid 19. Relationship between inflation and unemployment has also been studied through Quantitative Easing (US and India). The research concludes that even Quantitative Easing presents a break off in relation between the two variables.

KEYWORDS: Granger Causality, Inflation, Unemployment, Phillips Curve, Quantitative Easing

INTRODUCTION

The two most important macro-economic variables are unemployment and inflation. In order to understand the relationship between them, it is important to understand the causes and effect of these variables.

Inflation has adverse effect on the distribution of income, however it has the prospective to provide benefit to some and harm to others. Fixed earners of income are affected the most because real income decreases at the time of inflation. On the other hand inflation benefits the borrowers but lenders and savers stand to lose. Being globally connected, it adversely impacts the competitiveness of a country.

For a country like India unemployment has both social and economic implications. It yields in the loss of revenue and output. Unemployment has a social cost that cannot be monetarily measured but has huge bearing on human suffering. It causes frustration, lack of self-respect and poverty. The two most common types of unemployment find in India are Disguised unemployment and underemployment.

After having some knowledge about these two macroeconomic variables, their relationship is exhibited by an economic concept called “Phillips Curve”.

“Phillips Curve” was developed by “A.W. Phillips” that concludes that relationship between unemployment rate and inflation rate is inverse and stable. Diagrammatically the curve is downward sloping and concave in nature with Unemployment (X axis) and Inflation (Y axis). This is because economic growth is accompanied by inflation which results in more jobs and decreased unemployment. Increase in Fiscal stimulus results in following effects: Demand for labour increases which mean pool of unemployed workers reduces. Companies compete with another by increasing wages in order to attract talent pool. Spike in wages results in high cost of production and companies pass this to the consumers by increasing prices.
"Phillips Curve" in addition of having theoretical importance also has political implications. Central Bank’s one of the objectives is to maintain stability in price by controlling inflation. Hence main aim of central bank is such that it maintains low inflation as possible. However if Phillips curve exists, then in this case low inflation can be maintained by central banks only by having high unemployment rate. At time of crisis unconventional monetary measures are employed by central banks such as Quantitative Easing, this paper also studies the impact of such measures on Phillips Curve. In this way the importance of Phillips Curve in decision making process is highlighted.

Despite economic development over the years, India is still caught in the cobweb of inflation. Due to lack of control measures and hoarding prices have tendency to rise. On the other hand due to population explosion and lack of technical and vocational education unemployment is on an increase. At the times of Global Pandemic such as Covid 19 studying relationship between unemployment and inflation can help decision makers by finding out the policies that are optimum.

LITERATURE REVIEW

Many studies have been conducted to study the existence of Phillips curve.

"Solow (1970)" - He tested the relation between these two variables in United States of America. His paper concluded that negative relation occurs between unemployment rate and inflation rate. His study was backed up by another researcher "Gordon" in 1971.

On the other hand Lucas in 1976 did not believe in the existence of Phillips curve. According to him workers can foresee inflation and can ask higher wages. In such a situation there can be presence of spike in inflation and unemployment. This is also called Lucas critique.

"Turner and Seghezza (1999)" studied the presence of Phillips Curve in twenty one countries of OECD from period 1970-1997. In the twenty one countries that were selected Philips curve was found to be present.

"Arratibel et al(2002)" founded that inflation rates that are non-tradable have strong relation with unemployment rate. On the other hand "Masso and Staehr (2005)" failed to identify any relation between unemployment and inflation.

"Karanassou and Sala (2010)" concluded that there is negative relation between unemployment and inflation in long term because of presence of growth in productivity and money. This leads to decline in unemployment but increase in oil supply shocks leads to increase in unemployment rate.

"Al-Zeaud (2014)" stated that there is no negative relation between unemployment and inflation in Jordan economy from the period ranging from 1984 to 2011. The reason presented in the research paper is that foreign laborers were not included in calculation of unemployment rate. He made use of "Granger Causality Test" to test the relation between above mentioned variables and to test for presence of stationarity, integration and co integration.

"Furuoka (2007)" studied the relation of unemployment rate and inflation rate in the economy of Malaysia and gave factual evidence for the existence of Phillips Curve in Malaysia.

"Afzal and Awais (2012)" studied the relation of unemployment rate and inflation rate in Pakistan and concluded that Phillips Curve exists in Pakistan.

Hence there are mixed results about existence of Phillips curve. The relationship between variables depends on the geography of the economy where it is located and type of methodology and statistical approach used.

Studies conducted in India about presence of Phillips curve in India are very less and hence this is an attempt to fill this gap. Moreover very few papers have analyzed fiscal and monetary policy measures at the time of unprecedented times in relation to Phillips Curve. This paper will contribute towards understanding these policy measures at the time of Covid 19 in India with respect to relation between inflation rate and unemployment rate.

OBJECTIVES

- To analyze trend of unemployment rate and inflation rate in India.
- To study tradeoff between unemployment rate and inflation rate in economy of India-“Phillips Curve concept”.
- To do a comparative study on the use of Quantitative Easing by US and India in order to understand the effect on Phillips Curve.

RESEARCH METHODOLOGY

The paper is carried out on the secondary data collected for Indian economy from period 2000-2019. The data on inflation rate is collected from RBI Handbook of Statistics and data on unemployment is compiled from World Bank. E Views 8 software has been used for statistical calculations.

Unemployment in India

According to World Bank, “Unemployment is defined as the share of the labor force that does not has work but is looking for employment. Labour force would include people who are not a part of it but want to work. They do not actively “seek” work because they think that they have limited job opportunities or face discrimination in some form or the other or are in the cobweb of structural, cultural and social barriers.

The following table presents the unemployment rate in India for the period 2000-2019.
Table 1: Rate of Unemployment in India

<table>
<thead>
<tr>
<th>Year</th>
<th>Unemployment Rate (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>2.73</td>
</tr>
<tr>
<td>2001</td>
<td>2.87</td>
</tr>
<tr>
<td>2002</td>
<td>3.05</td>
</tr>
<tr>
<td>2003</td>
<td>3.18</td>
</tr>
<tr>
<td>2004</td>
<td>3.1</td>
</tr>
<tr>
<td>2005</td>
<td>3.1</td>
</tr>
<tr>
<td>2006</td>
<td>2.74</td>
</tr>
<tr>
<td>2007</td>
<td>2.4</td>
</tr>
<tr>
<td>2008</td>
<td>2.27</td>
</tr>
<tr>
<td>2009</td>
<td>2.48</td>
</tr>
<tr>
<td>2010</td>
<td>2.44</td>
</tr>
<tr>
<td>2011</td>
<td>2.52</td>
</tr>
<tr>
<td>2012</td>
<td>2.69</td>
</tr>
<tr>
<td>2013</td>
<td>2.82</td>
</tr>
<tr>
<td>2014</td>
<td>2.77</td>
</tr>
<tr>
<td>2015</td>
<td>2.78</td>
</tr>
<tr>
<td>2016</td>
<td>2.73</td>
</tr>
<tr>
<td>2017</td>
<td>2.56</td>
</tr>
<tr>
<td>2018</td>
<td>2.55</td>
</tr>
<tr>
<td>2019</td>
<td>2.55</td>
</tr>
</tbody>
</table>

Figure 1 presents that rate of unemployment in India for period 2000-2019 lies between 2.2-3.2%. It has been highest in 2003 and lowest in 2009. In recent years it has been hovering around 2.5%.

One of the important implications of high unemployment can be seen with credit card delinquencies. The following chart reflects that with increase in unemployment, credit cards delinquencies have tremendously increased. This point to the fact that there should be strenuous measures from the government and central bank to curb this as much as possible.
Redefining Methodology of Unemployment Rate

- In India employment estimates have been calculated using household and establishment surveys. However employment data in India has been calculated with a considerable time lag and tend to focus on the organized sector.

- The redefining of employment data needs to be done by giving due importance to the fact that employment in India is dominated by low wage and low productivity jobs in the unorganized sector.

- In addition to the dominance of the unorganized sector, evidence points out that the organized sector has undergone rapid informalisation over the years through the contractualisation and casualization of the workforce. Many of the new jobs being created in the platform economy (such as of taxi aggregators like Ola and Uber) are also non-standard in nature.

- India has emerged as the fifth largest country for Gig economy workers’. The country added 1.2 million flexi workers since 2015, and is expected to employ 3 million in 2021.

- However due to Covid 19 Gig Economy will be one of the hardest hit sectors in terms of increasing unemployment. This can be seen from the way many cab drivers have lost jobs.

- But these contractual workers are not included in calculation of unemployment data due to which the true figures cannot be reflected. Due to this Pandemic the unemployment rate will be substantially higher than the data reveals. The below figure presents the fact that for calculation of employment rate and unemployment rate LU1 and LU2 are taken respectively.

- However the true data on unemployment can be only calculated if along with LU1, LU3 is also taken into account that accounts for gig workers or potential labour force.

- It would be relevant to add the rate of “informal unemployment” as a key indicator of labour market. This sector has a pervasive role to play in the economy and in the livelihoods of people. It also has many interlinkages with the formal sector.
Unemployment acts as a lagging indicator in the Indian economy, this is because if there is an upturn in the economy employment will increase after two or three quarters. It is not a predictive or leading indicator because unemployment rate is dynamic; it doesn’t stay at highs or lows for a long time.

This is evident from the fact that in 2008 financial recession unemployment in US was all time low and it increased after the recession ended in March 2009.

Similarly in India 70% of the people are employed in unorganized sector due to which Unemployment rate acts as one of the most important leading indicators. Unemployment rates show a trend that has been followed and focuses on output.

However if we change the methodology of unemployment rate calculation we can accurately measure this lagging indicator.

Source: International Labour Organization

Figure 2: Calculation of Unemployment Rate.

Rate of Inflation in India

The table shows the inflation rate in India from 2000 to 2019. “The inflation rate is calculated using the price increase of a defined product basket. This product basket contains products and services, on which the average consumer spends money throughout the year. They include expenses for groceries, clothes, rent, power, telecommunications, recreational activities and raw materials (e.g. gas, oil), as well as fees and taxes”
Table 2: Rate of Inflation in India from 2000-2019

<table>
<thead>
<tr>
<th>Year</th>
<th>Inflation Rate (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>3.83</td>
</tr>
<tr>
<td>2001</td>
<td>4.31</td>
</tr>
<tr>
<td>2002</td>
<td>3.98</td>
</tr>
<tr>
<td>2003</td>
<td>3.86</td>
</tr>
<tr>
<td>2004</td>
<td>3.82</td>
</tr>
<tr>
<td>2005</td>
<td>4.4</td>
</tr>
<tr>
<td>2006</td>
<td>6.7</td>
</tr>
<tr>
<td>2007</td>
<td>6.2</td>
</tr>
<tr>
<td>2008</td>
<td>9.09</td>
</tr>
<tr>
<td>2009</td>
<td>12.31</td>
</tr>
<tr>
<td>2010</td>
<td>10.53</td>
</tr>
<tr>
<td>2011</td>
<td>9.5</td>
</tr>
<tr>
<td>2012</td>
<td>10</td>
</tr>
<tr>
<td>2013</td>
<td>9.4</td>
</tr>
<tr>
<td>2014</td>
<td>5.8</td>
</tr>
<tr>
<td>2015</td>
<td>4.9</td>
</tr>
<tr>
<td>2016</td>
<td>4.5</td>
</tr>
<tr>
<td>2017</td>
<td>3.6</td>
</tr>
<tr>
<td>2018</td>
<td>3.4</td>
</tr>
<tr>
<td>2019</td>
<td>4.5</td>
</tr>
</tbody>
</table>

Figure 2 presents that rate of inflation in India for the period 2000-2019 ranges from 3-5%. However year 2009 was exception in which inflation was the highest (12%).

Table 3: Descriptive Statistics

<table>
<thead>
<tr>
<th>Macro-Economic Variables</th>
<th>Meaning</th>
<th>Mean (S.D)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inflation</td>
<td>It is defined “as the annual percent change in consumer prices compared with previous year's consumer prices.”</td>
<td>6.17(2.86)</td>
</tr>
<tr>
<td>Unemployment</td>
<td>It is defined” as the percent of the total workforce that is voluntarily unemployed.”</td>
<td>2.71(0.25)</td>
</tr>
</tbody>
</table>

Phillips Perron Test (Unit Root Test)

“Granger Causality Test” can only be conducted if series is stationary. One way of examining this is doing Phillips Perron unit root test. The Null Hypothesis of this test is:“Series has unit root (no stationarity)” and alternate hypothesis is –“Series has no unit root (stationarity)”. 
The table presents the results of Phillip Perron Test. The null hypothesis for both the macro economic variables is not rejected. Thus it states that both the variables do not possess stationarity at level. However after first difference both the variables become stationary. Hence now “co-integration” test can be performed.

**Johansen Test (Co-Integration Test)**

Co-integration test identifies that series are integrated in such a way that they cannot deviate from equilibrium in long run. It helps in identifying degree of sensitivity of variables.

<table>
<thead>
<tr>
<th>Null Hypothesis</th>
<th>Trace Statistic</th>
<th>Max-Eigen Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>r=0</td>
<td>10.59</td>
<td>8.42</td>
</tr>
<tr>
<td>r=1</td>
<td>2.17</td>
<td>2.17</td>
</tr>
</tbody>
</table>

This test calculates causality on the basis of “Trace Statistic” and “Max-Eigen Value”. Null hypothesis (r=0) states that “there is no co-integration between the variables”. Null hypothesis is accepted (0.05). According to this result unemployment rate and inflation rate has no one direction relation. Though there is no co-integration, we can support this conclusion through Granger Causality Test.

**Test -Granger Causality**

This test helps to find causality link between variables. Y will Granger cause X if past values of Y forecasts the future values of X. Similarly X will Granger cause Y if past values of X forecasts future values of Y.

<table>
<thead>
<tr>
<th>Null Hypothesis:</th>
<th>Obs</th>
<th>F-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>UNEMPLOYMENT_RATE does not Granger Cause INFLATION_RATE</td>
<td>18</td>
<td>1.85251</td>
<td>0.1959</td>
</tr>
<tr>
<td>INFLATION_RATE does not Granger Cause UNEMPLOYMENT_RATE</td>
<td></td>
<td>0.90820</td>
<td>0.4274</td>
</tr>
</tbody>
</table>

There is no causal relation between unemployment rate and inflation rate because p value are greater than 0.05 which implies that there exists no tradeoff between the variables in context of Indian economy from the period 2000-2019.

**Reasons for Non Existence of Phillips Curve**

- The 1970 stagflation proved that increased inflation and unemployment can co-exist.
- Due to supply shocks such as oil prices fluctuations inflation can increase without having adverse effect on unemployment.
- There may not be so much rigidity in wages as many economists assume. This means they can adjust downward.
- Central Bank apart from controlling inflation also causes many structural changes that ensure unemployment is not increased.
• Friedman and Phelp’s developed “NAIRU-Non Accelerating inflation rate of Unemployment”. According to this there will be some unemployment rate that maintains stable rate of inflation.

• Monetarist view of Phillips Curve

Analysis of Current Situation in India

The following graph is taken from Bi Monthly Monetary Policy announcement made by RBI. RBI projects future inflation which points that in short run one can see increase trend in inflation. However increase in inflation is not such a big problem as increase in unemployment.

![Chart 1.4: Inflation Expectations of Professional Forecaster](image)
On the other hand according to recent data unemployment is increasing rapidly.

**Figure 5: Unemployment Rate in 2020.**

**Measures Taken by Monetary Policy**

As inflation is under the range of 4+/−2 %, monetary policy should give due focus on the issue of curbing unemployment. The following model is adopted by central bank to reduce unemployment.

**Figure 6: Model of Unemployment by Central Bank.**

- Monetary policy has maintained an accommodative stance and should maintain it in future as well.
- Monetary policy by injecting liquidity in the system can indirectly lead to decrease in unemployment.
• Decrease in CRR, Repo Rate and Reverse Repo Rate will give an incentive to banks and people to lend further. With an increase in investment there will be more possible opportunities for employment.

• The economy would experience increase in money supply through open market operations, 16 day variable rate Repo transactions or providing State Development Loans will infuse AD.

Quantitative Easing- Unconventional Monetary Policy

One of the way to increase the supply of money in economy is through Quantitative Easing. Aim is to boost economic growth by infusing liquidity in the financial system. Policies included under Quantitative Easing are:

• Purchasing assets such as Government Bonds and securities.
• Direct lending Programme
• Programs related to improvement of credit conditions

Central bank adopts QE when adjustment of short term interest rates are not effective and economy needs to fight against stagflation.

Analysis of QE Done by US- Post Financial Crisis

In order to fight with the aftermaths of Financial Crisis 2008 US adopted QE as one of the measures. However this process of Quantitative Easing led to break off the relationship between variables of Phillips Curve.

Timeline of the various QE done by Federal Reserve

| Nov 2008 Mar 2009 | QE1 initiated. Fed buys $100 billion of agency debt, and $500 billion of MBS. |
| Mar 2009 Mar 2010 | QE1 extended. Fed purchases another $750 billion of MBS. |
| Sept 2011 Jun 2012 | Operation Twist initiated. Fed buys $400 billion worth of treasuries with maturities between 72 and 360 months, and sold off treasuries with maturities between 3 and 36 months. |
| Sept 2012 Oct 2014 | QE3 intitiated. Fed buys $40 billion per month worth of MBS. |

Effect of QE on Balance Sheet of Fed

Federal Reserve’s balance sheet was at a constant level until 2008. There has been a constant increase since the financial crisis in the assets of the Fed. Fed not only purchased Treasury securities but also large amount of mortgage backed securities. With $ 4.48 trillion in the balance sheet, Fed could have infused liquidity in the system easily and helped to revive the economy back on track. However the effects on inflation and GDP showed contrary results.
Effect on Inflation

Increase in inflation is one of the most common effects of quantitative easing. This happens because greater money supply result in artificially lower interest rates while at the same time consumers have more money to spend. In US though this policy resulted in increase in inflation but it still hovers around 2% and there is no significant impact on the trend of inflation.

Reason why $ 4.48 trillion in Balance sheet of Fed did not result in increase in money supply in economy can be seen with the help of inflation trend. This happens because in a recession when there is spare capacity and low output banks hesitate in lending and people are reluctant to borrow because they are less optimistic about future. Hence although monetary base is increased by the Central bank but people like to save it rather than spend it. Producers are forced to sell at low prices in order to clear inventories.
Effect on Unemployment

QE has led to fall in the unemployment rate in US. The unemployment rate was highest in October 2009 at 10%, and in September 2014 it reached at the lowest at 6%—since the financial crisis of 2008. This was because there was huge unutilized resources initially and due to a little spur in income, increase in AD led to increase in jobs.

![Figure 9: Unemployment Trend in US. Source: US Bureau of Labor Statistics.](image)

Hence the above graph shows that though unemployment decreased at as sharp rate but inflation rate did not reflect any greater impact. According to Phillips Curve if unemployment decreases, then inflation should increase but this was not the case with US since 2008 after it resorted to QE. Therefore Phillips Curve relationship is not supported.

Measures taken by Fiscal Policy

Fiscal policy measures taken to decrease unemployment can be studied with the help of four major initiatives taken by Indian Government.

1. Development of MSME Sector

MSMEs are divided into two categories—Manufacturing sector and Service sector. MSME provide employment to 120 million people around the country and due to this pandemic it is one of the hardest hit sectors. Government has taken following measures to develop this sector:

- Collateral-free Automatic Loans for MSME worth ₹3 lakh crore.
- Stressed MSME will be given ₹20,000 crore for subordinate debts.
- MSMEs will be provided equity infusion of ₹50,000 through Fund of Fund.
- New definition of MSMEs.
Global tenders will be disallowed up to ₹200 Crores.

All these measures will help the MSME sector to cope with this pandemic. More liquidity will be infused; they will be protected from unfair competition and will also get a chance to get listed on stock exchanges. All these things will boost productivity in this sector and will turn into less people being unemployed.

2. MNREGA

Around 7.7 crore people work under MNREGA scheme and is one of the largest work guarantee programme in the world. Due to this pandemic 88.75% fewer jobs were generated in first month of 2019-2020 year on year. In order to help the poor households the government has cleared all the pending payments of Rs. 7300 crore to people under MNREGA. The national average wage has been increased to 202 Rs from 182 Rs per person. Allocation to the scheme will be raised from Rs 40000 crore to Rs 61000 Crore.

All these measures will help the rural households to earn minimum wages under MNREGA in these unprecedented times.

3. PSU

PSU sector plays an important role in providing self-reliance to people by providing food supplies, advancement and job security to the people. It plays a vital role in providing employment to more than one million people. 30% workforce of PSUs includes of high skilled labour. Hence in such unprecedented times it becomes very important to develop PSU so that economic growth can be accelerated. The following measures taken by the government will help to revive the economy:
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- PSUs that fall in Non-Strategic sectors will be privatized and those that fall in strategic sectors would be capped at four.
- PSUs in Non – Strategic sectors will be allowed to suspend loan default-triggered bankruptcy filings for one year.
- A new public sector enterprise policy will be announced which will include at least one enterprise of public sector in strategic sectors along with private sector.

4. Social Infrastructure

Social Infrastructure is important for a nation to develop on economic fronts as well as enhances standard of living of people. It becomes easy for businesses to prosper and grow with the services and facilities that are provided. Hence in such unprecedented times it becomes necessary to give due emphasis on social infrastructure. Government of India has taken following measures to boost the growth in social infrastructure:

- Government will resort to enhance viability funding for these projects to 30% of the total projects against 20% for other sectors. It will involve outlay of Rs 8100 crore.
- Social projects “suffer from poor viability “and this move will help flow of private investments in sectors like infrastructure, schools and hospitals.

The above monetary and fiscal policies measures taken point to the fact that Government and Central Bank have to move hand in hand in order to revive the economy. Though inflation is not a big concern for India right now, and unemployment is one of the factors that can be one of the greatest obstacles in the process of reviving the economy. Hence one can hope that these types of policy mixes can be helpful for the economy.

Monetization of Fiscal Stimulus

Government in order to cope up with the Covid -19 has come out with a package of Rs 20 lakh crore. These 20 lakh crore accounts for 10% of India’s GDP and out of this 7.3 percentage points can be funded through any means but 2.7 percentage points i.e. Rs 6.8 lakh crore will likely to be monetized by RBI. According to former RBI Governor Raghuram Rajan monetization is likely to be less inflationary in nature as banks would be reluctant to lend in such unprecedented times.

It is also evident from the projections made by RBI that inflation will remain in the inflation target range of 4+-2%. However the need of the hour is to revive the economy by focusing on job creation. In India where 22% of the people live below poverty line, the above policy measures will be a boon for the employment sector.

CONCLUSIONS

In this paper an attempt is made to study the correlation between rate of unemployment and rate of inflation in India using “Granger causality test”. Initially unit root has been tested by “Phillips-Perron test”. This test shows that, inflation and unemployment becomes stationary after first difference. In order to study co-integration Johansen Test has been conducted. On the basis of “Trace statistic” and “Max-Eigen value”, it is found out that there is no co-integration between rate of unemployment and rate of inflation.“Granger Causality Test” has been used to find the causality. This test shows that unemployment rate and inflation rate does not possess any causality. However, the central bank and government should take appropriate policy measures to control unemployment rate and inflation rate so that India’s growth can be accelerated.
REFERENCES


