Phillips Curve Analysis in United States, Germany, China, India, and South Africa

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Abstract: This study focuses on analyzing the relationship between unemployment and inflation, illustrating the Phillips Curve in the short-run and long-run, and comparing the Phillips Curve in different countries, especially in the United States, Germany, China, India, and South Africa. The conclusion is that the conventional Phillips Curve does not fit all the countries. There are existing country-specific differences in the relationship between the inflation rate and unemployment rate on account of different situations.

Keywords: Phillips Curve; United States; Germany; China; India; South Africa

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1. Introduction

The Phillips curve is named after New Zealand economist William Phillips. Since he published the paper about the relation between unemployment and the rate of change of money wage rates in Britain, the relationship has been expanded to price inflation (Engemann, 2020). His research is a meaningful milestone in macroeconomics development.

Phillips assumed that the lower the unemployment rate, the tighter the labor market; companies must raise salaries to attract employees. If the unemployment rate rises, the pressure dwindles. Phillips’s curve presented the trade-off relationship between unemployment and wage behavior (Hoover, n.d.).

2. Short-Run Phillips Curve

If aggregate demand (AD) rises, employees demand higher nominal wages. When they earn more nominal wages, they work longer because they feel real wages climb when their price expectations rely on last year. This growth in AD

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causes inflation, real wages remain the same. When they recognize their real wages are unchanged, they improve their price expectations and don’t supply extra labor; the real output restores to the beginning. Unemployment is stable, but inflation increases. The parabolic-shaped Phillips curve and the straight-line one are the same. Figure 1 and 2 both are Phillips Curve.

**Figure 1**
*Short-run Phillips Curve*

![Short-run Phillips Curve](image1)

*(Short-run Phillips curve, n.d.)*

**Figure 2**

![The Phillips curve](image2)

*(The Phillips curve, n.d.)*
Decreases in aggregate supply (AS) shift Phillips curve to the right because when AS plummets, there are fewer goods available in the economy. Inflation and price will rise (Hoover, n.d.). Similarly, increases in AS shift it to the left. Figure 3 displays the shift in the Phillips Curve.

3. Long-Run Phillips Curve

Friedman (1968) and Phelps (1967) indicated no trade-off between inflation and unemployment in the long run. Phillips Curve is a vertical straight line at the natural unemployment rate, which is called “Non-Accelerating Inflation Rate of Unemployment” (NAIRU) because NAIRU does not illustrate that unemployment rates are socially optimal, unchanging, or impervious to policy (Hoover, n.d.). Figure 4 is the long-run Phillips curve.
4. Phillips Curve & USA

One main issue in the U.S. is that before the COVID-19, the American unemployment rate steadily declined. The policymakers anticipated a climb in inflation, associated with such a tight labor market because the Phillips curve believed so (Marte, 2020). Yet low unemployment has not sparked higher inflation, the Phillips curve principles might be wrong due to the changeable economic environment. The Federal Reserve (Fed) has been more mindful about targeting inflation, which has resulted in lower, steadier inflation (Marte, 2020). Hence the relationship between inflation and unemployment has weakened, creating a flattening Phillips. The solution is that Fed needs not to increase interest rates in advance to prevent high inflation rates, which gives people more opportunities to get employed once we emerge from the crisis. Fed is focusing on developing the labor market, not boosting inflation (Marte, 2020), which addresses the issue. Figure 5 is the Phillips curve in America.

5. Phillips Curve & Germany

After 2010, Germany’s wage developments have consecutively exceeded other countries that use euros, so Germany’s inflation should be higher according to the Phillips curve. Ironically, inflations in other euro countries are even higher than that in Germany (Wolff, 2017).

Figure 6 is Germany’s Phillips curve. There is an inverse relationship between nominal wage growth and unemployment. The latter decreases when the former increases. Germany is facing these challenges. Dropping unemployment pushes German firms to increase prices because they must pay more salaries. Both inflation and real wage grow. Germany’s tighter labor market gives employees bargain power for higher wages, leading to inflation boosts. The challenges can be solved.
like these. Immigrants from other EU nations work in Germany, leading to short-term downward pressure on salaries. But immigrants can also leave Germany. High labor force liquidity balances the salary fluctuation and inflation growth. Labor participation in Germany is higher than others since so many Germans are already employed, unemployment will not be impacted much due to immigrants. Employers must pay more wages, inflation upturns (Wolff, 2017).

The inverse relationship between unemployment and inflation weakens, Germany’s wage settlements are rather cautious. The Phillips curve is valid in Germany, salaries do adjust. The Phillips curves of Germany and America are similar, but they have different reasons for a flattening curve.

**Figure 6**
Nominal wage growth Phillips curve, 1999Q1-2017Q3

(Wolff, 2017)

**6. Phillips Curve & China**

There is no accurate unemployment data for China, so economists cannot directly estimate China’s Phillips Curve, which is nonlinear and asymmetric (Fan, 2020). Traditional Phillips Curve does not fit China. The relationship between unemployment and inflation in China shows in Figure 7.
Major problems are deflations in 2002 and 2009. In 2001, China joined World Trade Organization, which brought massive foreign investments and developed technologies (Wang, 2019). The production effectiveness grew, the production cost lessened, so price decline. The decrease in costs was accompanied by an increase in profits, which stimulated enterprises to reproduce; the price decreased, which boosted demand. The growth of AS exceeds that of AD, which incurred a price reduction. The global financial crisis caused the 2009 deflation. China’s export volume dropped; many enterprises went bankrupt, growth rates of the money supply and the economy declined, so the consumer price index fell (Wang, 2019). To remove these problems, the central bank implemented a proactive fiscal policy and loose monetary policy. Later, inflation fluctuation was relatively small; the unemployment rate become stable (Wang, 2019).

Here is an explanation for the unemployment data. “Hukou” is the household registration system in China. The labor force situation in China is divided into four categories (Ma & Wang, 2011). First, formal urban employment means workers with urban hukou and formal employment, and who have never experienced unemployment. Second, formal urban unemployment is unemployed people once in the former group. Third, informal urban employment contains self-employed workers and employees in the formal sector without formal labor benefits or stable labor contracts. This informality creates many ambiguities and grey areas, the definition of “unemployment” is vague in statistical terms. Unemployment in this group is excluded from the registered unemployment statistic. Fourth, agricultural employment serves as the labor “reservoir” through “job-sharing” (Ma & Wang, 2011).

The only unemployment statistic with official data available is the urban registered unemployment rate for formal urban unemployment published by the National Bureau of Statistics (Ma & Wang, 2011). Transmissions between cities
and villages during an economic downtown, when the labor demand declines, will suffer many systemic barriers since many migrant employees are forced to return to villages to do farming again. In the financial crisis, enterprises lay off the rural migrant labor first, which doesn’t affect the official unemployment statistics.

China’s Phillips Curve can only be estimated by the vacancy-jobseeker ratio, which gauges labor demand through vacancies and labor supply by jobseekers. The mean of the vacancy-jobseeker ratio is 0.97 (Ji et al., 2015), indicating there are 0.9 jobs for one jobseeker. Labor demand is less than the supply, unemployment exists.

**Figure 8**
*Estimating Different Versions of the Phillips Curve*

<table>
<thead>
<tr>
<th></th>
<th>(1) Old curve</th>
<th>(2) New curve</th>
<th>(3) With crisis</th>
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</thead>
<tbody>
<tr>
<td>CPI</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vacancy-jobseeker ratio</td>
<td>1.764***</td>
<td>1.066**</td>
<td>1.767***</td>
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<tr>
<td>(0.609)</td>
<td>(0.433)</td>
<td>(0.447)</td>
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<tr>
<td>Expected inflation</td>
<td>0.470***</td>
<td>0.451***</td>
<td></td>
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<tr>
<td>(0.0227)</td>
<td>(0.0221)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ratio*crisis</td>
<td></td>
<td></td>
<td>−1.279***</td>
</tr>
<tr>
<td>(0.237)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>100.7***</td>
<td>52.73***</td>
<td>54.54***</td>
</tr>
<tr>
<td>(0.633)</td>
<td>(2.356)</td>
<td>(2.294)</td>
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<td>506</td>
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<tr>
<td>Number of id</td>
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<td>26</td>
<td>26</td>
</tr>
</tbody>
</table>

Note: Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1
(Ji et al., 2015)

Figure 8 shows the estimation results. Model 1 illustrated the old Phillips Curve without expected inflation, which is added in Model 2. Model 3 examines the financial crisis and creates a new dummy variable of crisis, which uses the value 1 for those after the second quarter of 2008, and 0 otherwise (Ji et al., 2015). The estimated parameter is positive, meaning a higher vacancy-jobseeker ratio comes with higher inflation. It represents more job vacancies available, unemployment is low. The trade-off relationship between unemployment and inflation that the Phillips Curve advocates exists in China.

7. Phillips Curve & India

Unemployment has been a central problem; inflation is a chronic issue. According to Jasuja and Sharma (2019), it is very difficult to estimate the Phillips Curve as the data are inaccurate and old. The short-run Phillips Curve for India exists, but it does not exist in long run due to supply shocks and oil price crisis. If data are achievable from supply shocks, Phillips Curve might be valid in long run. There is a Phillips curve relationship using the long-term data of unemployment.
and CPI inflation in a time-series approach. The estimate certifies the traditional Phillips curve presents in India (Jasuja & Sharma, 2019). Figure 9 illuminates the relationship between unemployment and inflation in India.

Figure 9
Relationship between unemployment and inflation in India

8. Phillips Curve & South Africa

Figure 10 displays South African (SA)’s unemployment/inflation mix with green dots. The blue line presents the theoretical Phillips Curve. The orange dot, which represents the “natural” rate, shows the average inflation and unemployment. The red line is the Phillips Curve for SA (Lowman, 2016). It is on the opposite trend of the theoretical Phillips Curve.

In SA, the relationship between unemployment and inflation is positive, because unlike other nations, SA’s inflation is not pushed by salary growth. Its economy is not performing nearly full employment because its manufacturing is not completely utilized. The class gap is huge. There is a high unemployment rate owing to mostly unskilled and inexperienced labor. Higher salaries must be paid to those skilled workers who are employed (Lowman, 2016). These are the main issues. If SA could educate more people with job-related skills and provide lower classes more job opportunities to reduce structural unemployment, its unemployment-inflation relationship would be normal.

Compared to America, inflation is influenced by wage-price changes. The economy operates close to full-employment capacity. The class gap is low. The relationship between unemployment and inflation is negative in America.
9. Conclusion

Overall, the Phillips curve is a theoretical inverse relationship between unemployment and inflation, but it does not fit all countries. There are diverse reasons for each country. The Phillips Curve in America is downward sloping and flattening due to Fed controlling inflation while unemployment is high. In Germany, the inverse relationship between unemployment and inflation is weak. The Phillips curve is still valid in Germany, and salaries matter because immigrants from other EU countries adjust the labor market. The Phillips Curve of China can only be estimated by vacancy-jobseeker ratios as the unavailability of unemployment data. When the vacancy-jobseeker ratio is high, the unemployment is low, the inflation upsurges. The Phillips Curve cannot be applied in India in the long run since data is unavailable, but it works in the short run. The relationship Phillips curve presents can be estimated in China and India, but there is no Phillips Curve graph available for them, so comparing their Phillips Curves with American’s is not feasible. The Phillips Curve for South Africa exhibits an upward slope.
References


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