Course:

Economics II (macroeconomics)

Chapter 5

5.2 Labor Market, Unemployment and the Phillips Curve, Part II

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Introduction

The aim of this chapter is to explain original Phillips curve and its modifications and derive short-term dynamic curve aggregate supply.

In real economic life, we can see that wages, prices and labor market adapt to aggregate demand shocks slowly and gradually, so in a short period of unemployment is not always at its natural level (degree), and production and employment is changing, if the aggregate demand. This is in contradiction with the conclusions that arise from the neoclassical model of the labor market. These are mainly the following:

- there is a short term inverse correlation between changes in nominal wages and the unemployment rate to change (impact) of aggregate demand;

- there is a considerable fluctuation in unemployment, which cannot be characterized as compatible with frictional unemployment, respectively. We can observe the period in which the real unemployment rate significantly deviates from the natural rate (long-term average rate) of unemployment.

1 Characteristics of the original and modified wage Phillips curve

a) The original wage Phillips curve

Proof of the existence of an inverse relationship between unemployment and the rate of growth of money (nominal) wage rates filed in r. 1958 AW Phillips, so the curve is called the Phillips curve.

The initial wage Phillips curve expresses mutual inverse relationship between unemployment and the rate of nominal wage growth has three basic characteristics:

> 1) negative slope,
>
> 2) the shape of a hyperbola,
>
> 3) the curve intersects the x-axis.

The study follows A. W. Phillips important conclusion that there is a substitution (tradeoff) between wage inflation and unemployment. Simultaneously, at the time of the Phillips curve (1957) had in macroeconomic theory behind that that relationship is stable in the long term. Therefore, the curve has become not only an important tool for economic analysis, but also of economic policy (decisions concerning inflation and unemployment - will be addressed either one or the other).
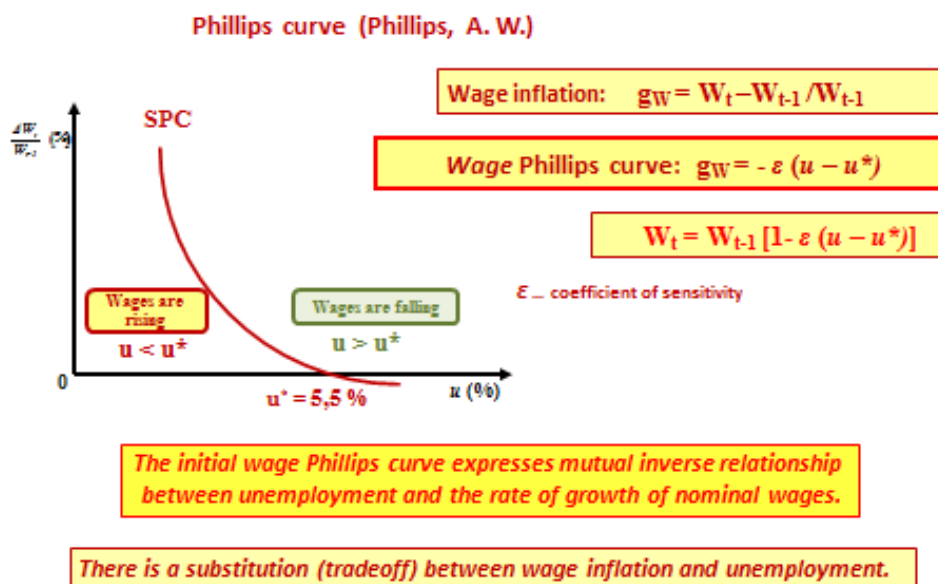
From the equation of the wage Phillips curve it implies that:

- wages are rising when the real unemployment rate is lower than the natural rate of unemployment;

- wages are falling when the real unemployment rate exceeds the natural rate of unemployment, as can be seen in Figure 5.2.1.

Until the late 60s, this relationship is characterized by many countries (and period) high stability.

Wage Phillips curve and wage rigidities - equation Phillips curve implies that the wage Phillips curve implies a process of gradual adjustment of wages (and prices) after the impact of aggregate demand (description of the mechanism - see study support).

Fig. 5.2.1 Original Phillips curve

Phillips curve (Phillips, A. W.)

Wage inflation: $g_W = W_t - W_{t-1}/W_{t-1}$

Wage Phillips curve: $g_W = -\varepsilon (u - u^*)$

$W_t = W_{t-1} [1 - \varepsilon (u - u^*)]$

ε ... coefficient of sensitivity

Wages are rising $u < u^*$

Wages are falling $u > u^*$

$u^* = 5{,}5\%$

The initial wage Phillips curve expresses mutual inverse relationship between unemployment and the rate of growth of nominal wages.

There is a substitution (tradeoff) between wage inflation and unemployment.

b) modified Phillips curve

P. A. Samuelson and R. M. Solow replaced the original Phillips curve wage growth rate of nominal money wage, i.e. the degree of wage inflation rate of growth of aggregate price level, i.e. a measure of price inflation. This created a modified Phillips curve, respectively inflationary cost version of the Phillips curve, which expresses an inverse relationship between the rate of growth of inflation (price level) and the unemployment rate.

The graphic representation of the modified Phillips curve in Fig. 5.2.2 shows that the desirable low unemployment rate is accompanied by undesirable high inflation.

Opposite is also true: a high unemployment rate is accompanied by low inflation, respectively negative inflation.

For policy-makers it implies that they always face a choice between two evils: inflation and unemployment.

Fig. 5.2.2 Modified Phillips curve

Modified Phillips curve
(Samuelson, P. A. + Solow, R. M.)

Inflation rate: $\pi_t = P_t - P_{t-1}/P_{t-1}$

π (%)

SPC

Cost inflationary version of the Phillips curve indicates an inverse relationship between the rate of inflation growth (π, the price level) and the unemployment rate (u).

$u^* = 4\%$ u (%)
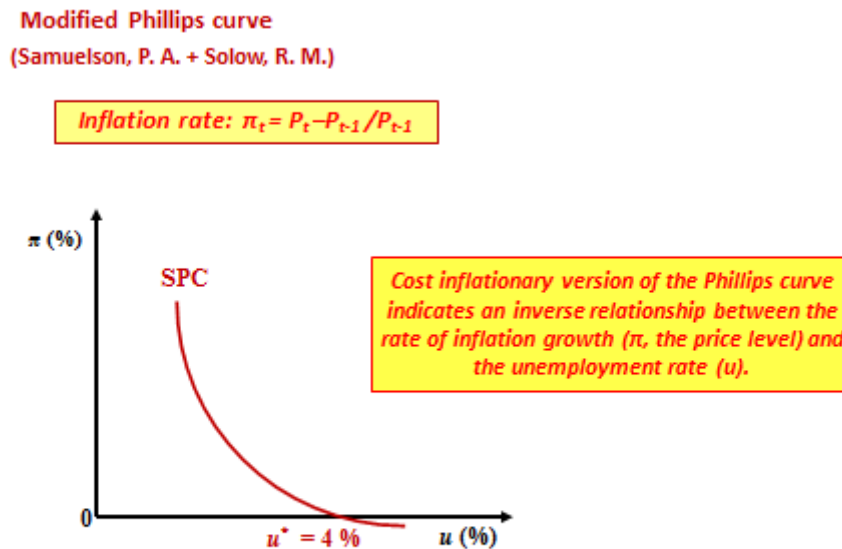
2 Phillips curve expanded on the rate of expected inflation

The real economy in the 70s affirmed until the observed regular inverse relationship between the rate of growth of nominal wage rates and unemployment rates. This relationship has "disappeared" and instead appeared simultaneously high and rising unemployment, and high and rising inflation, and even the growth of inflation and stagnation levels, respectively a drop in the product. Phillips curve began (in graphical expression) move up.

The problem of non-compliance from the wage Phillips curve resulting conclusions with real economic developments theoretically solved M. Friedman and E. Phelps, who rejected the conclusion of long-term stable inverse relationship between the rate of wage growth, respectively price inflation and unemployment and showed that the negatively sloping wage Phillips curve assumes the "money illusion" on the part of workers, which means that workers adjust their wage demands expected price level and not the actual price level.

Friedman and Phelps argue that money illusion, however, short-term nature, and therefore there may be a substitution (tradeoff) between the growth rate of prices and

the rate of decline in unemployment only in the short term. In the long run, there is no substitution between inflation and unemployment. Long-term Phillips curve is vertical.

Their expectations of price level (and thus the real wage) workers formed adaptively, it means that the basis for forming their expectations in the previous period, the achieved price growth and the belief that this will exist in the future.

Theorem acceleration (explain using the graph) - it shows that not the change in the amount of real money balances have an impact on real variables (and therefore operates), but changes in the rate (tempo) supply growth of real money balances affect real variables of the economy.

Partial Summary: from analysis shows that there is a stable long-term mutually inverse relationship between unemployment and inflation, but only the relationship between the natural rate of unemployment and changes in the inflation rate. The natural rate of unemployment is compatible with any inflation. Long-term Phillips curve is vertical.

Furthermore, according to Friedman and Phelps may be the unemployment rate decreased by an act of economic policy only temporarily, at a cost of permanently higher inflation. So if they want economic policy makers to increase the rate of inflation, unemployment temporarily reduced, but after some time it will rise again. Such a "fight" against unemployment and inflation, however, has a social cost. For this reason, the monetarists have postulated a constant rate of money growth, approximately equal to the growth rate of potential output, which is about to guarantee a steady rate of inflation. Therefore, a discreet little monetary policy has rather a negative effect.

The mechanism of forming expected inflation and the Phillips curve.

The mechanism of the formation of inflation expectations is crucial to answer whether there is substitution between inflation and unemployment.

Incorporating expected inflation into the equation modified Phillips curve receive "the original Phillips curve extended the expected inflation rate".

Acceleration principle = another name for the natural rate of unemployment: the natural rate of unemployment is that the unemployment rate, at which there is no acceleration (but also no deceleration) of the inflation growth rate. Economists talk about NAIRU or *NonAccelerating Inflation Rate of Unemployment.*

The specific case of the formation mechanism of adaptive expectations is "static expectations".

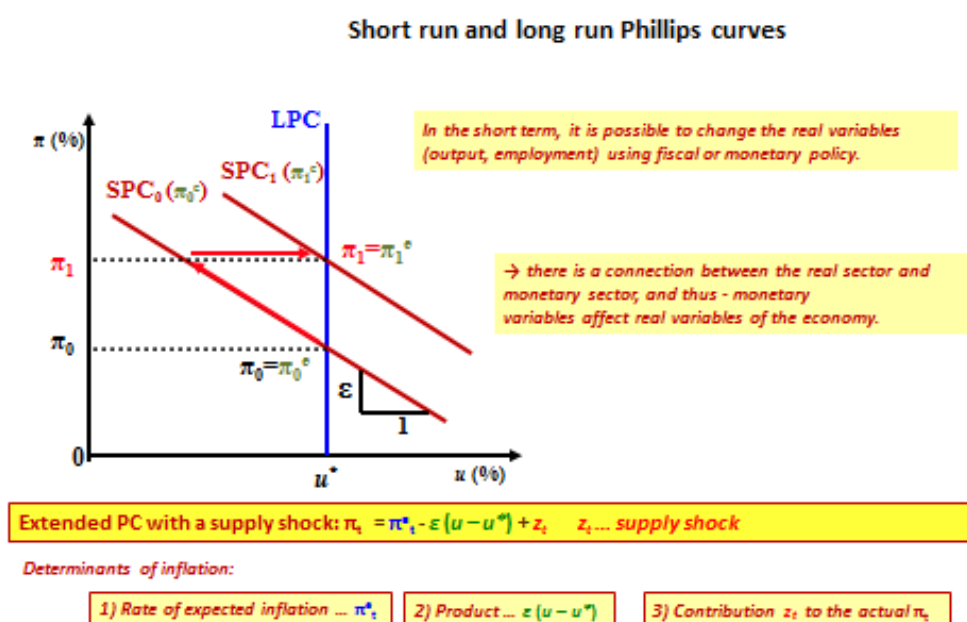## 3 Short-term and long-term Phillips curves

Substitution (tradeoff) between inflation and unemployment in the short term - "short term Phillips curve".

Policymakers may in the short term through fiscal and monetary policies to change production and employment (i.e. variable), they can:

- increase aggregate demand to reduce the unemployment rate and increase the rate of inflation;

- reduce aggregate demand, respectively its growth rate, to increase unemployment and reduce inflation.

Such substitution between unemployment and inflation, which implies an augmented Phillips curve, is called a "short-term Phillips curve" as the Figure 5.2.3 demonstrates.

Fig. 5.2.3 Short run and long run Phillips curves

Short run and long run Phillips curves

In the short term, it is possible to change the real variables (output, employment) using fiscal or monetary policy.

→ there is a connection between the real sector and monetary sector, and thus - monetary variables affect real variables of the economy.

Extended PC with a supply shock: $\pi_t = \pi^e_t - \varepsilon(u - u^*) + z_t$ z_t ... supply shock

Determinants of inflation:

| 1) Rate of expected inflation ... π^e_t | 2) Product ... $\varepsilon(u - u^*)$ | 3) Contribution z_t to the actual π_t |

Expanded Phillips curve and supply shocks

If you enter the equation augmented Phillips curve contribution invitation shock to the inflation rate, then inflation will be determined by the following factors:

- a measure of expected inflation;

- the product of ε and the difference between the actual and the natural rate of unemployment;

- contribution invitation shock to the real rate of inflation.

Phillips curve and the formation of rational expectations - people in shaping the economic variables (e.g. the inflation rate) taking into account all available

information that the development will affect the variables, e.g. the fiscal or monetary policy. Operators in advance include the effect of fiscal and monetary policy (and other information) in their decisions, and thus include the impact of economic policies in the relevant economic variables. Inflation is thus less inertia.

On the basis of forming expected inflation mechanism based rational expectations will reduce inflation without significant decrease in product, provided that:

- intention to reduce inflation is publicized in advance;

- wages and prices must be reduced (must be flexible) according to the nature of the intention of reducing the rate of inflation.

Assuming these conditions are fulfilled, the rate of expected inflation will fall, and therefore the actual inflation will fall without causing an increase in the unemployment rate.

4 Short-term dynamic aggregate supply and the long-term aggregate supply curves

a) short-term dynamic curve aggregate supply

Phillips curve and the aggregate supply curve expressed in essentially the same relationships - proof is a modification of the equation aggregate supply curve (Friedman model) in the form of an equation which is the equation of the curve short-term dynamic aggregate supply (extended for expected inflation).

The equation implies that the actual inflation rate is determined as the expected inflation rate and the difference between actual output and potential output, behind which lies the difference between the actual rate of unemployment and the natural rate of unemployment.

For short-term dynamic curve aggregate supply it is valid that:

- along the curve the expected inflation is given (fixed) - it is marked as a short-term;

- it expresses the relationship between inflation and the level of production, if the rate of expected inflation constant - if expected inflation rate does not change, the economy operates along the same curve of short-term dynamic aggregate supply;

- if the rate of expected inflation increases, the curve of short-term dynamic aggregate supply it moves up, and vice versa, when a decline in the expected inflation inches down;

- there is substitution between inflation and the growth rate of the product along the curve - the higher the expected rate of inflation, the higher the rate of actual inflation corresponding to any level of production.

It follows that it is possible that the inflation rate and the unemployment rate increased simultaneously, or inflation can grow, although the level of production is stagnating. This was explained the 'mystery' of the 70s, when at the same time, unemployment rose and inflation rose, respectively inflation rate increased and production declined.

b) long-run aggregate supply curve - to formulate conclusions of previous use graphical representation of curves of short-term dynamic aggregate supply.

Long-run aggregate supply curve:

- it is vertical and this means that in the long term production is not dependent on inflation rate;

- it connects the points of dynamic short-run aggregate supply curves, in which the actual inflation rate equals the expected rate of inflation and real output equals potential output;

References and further reading:

MACH, M. *Macroeconomics II for Engineering (Master) study, 1st and 2nd part.* Slany: Melandrium 2001. ISBN 80-86175-18-9.

ŠTANCL, et al. *Fundamentals of the theory of military-economic analysis.* 1st ed. Brno: Monika Promotion, 2012. ISBN: 978-80-905384-0-5.

MAITAH, M. *Macroeconomics in practice.* 1st ed. Praha: Wolters Kluwer CR, 2010. ISBN 978-80-7375-560-1

WAWROSZ, P., HEISSLER, H., MACH, P. *Facts in macroeconomics - professional texts, media reflection, practical analysis.* Prague: Wolters Kluwer ČR, 2012. ISBN 978-80-7275-848-0.

OLEJNÍČEK, A. et al. *Economic management in the ACR*. 1st ed. Uherské Hradiště: LV. Print, 2012. ISBN 978-80-260-3277-9.

ROMER, D. *Advanced Macroeconomics.* 3rd edition. New York: McGraw-Hill/Irwin, 2006. 678 p. ISBN 978-0-07-287730-4.