Macroeconomics

Based on the textbook by Karlin and Soskice: *Macroeconomics: Institutions, Instability, and the Financial System*

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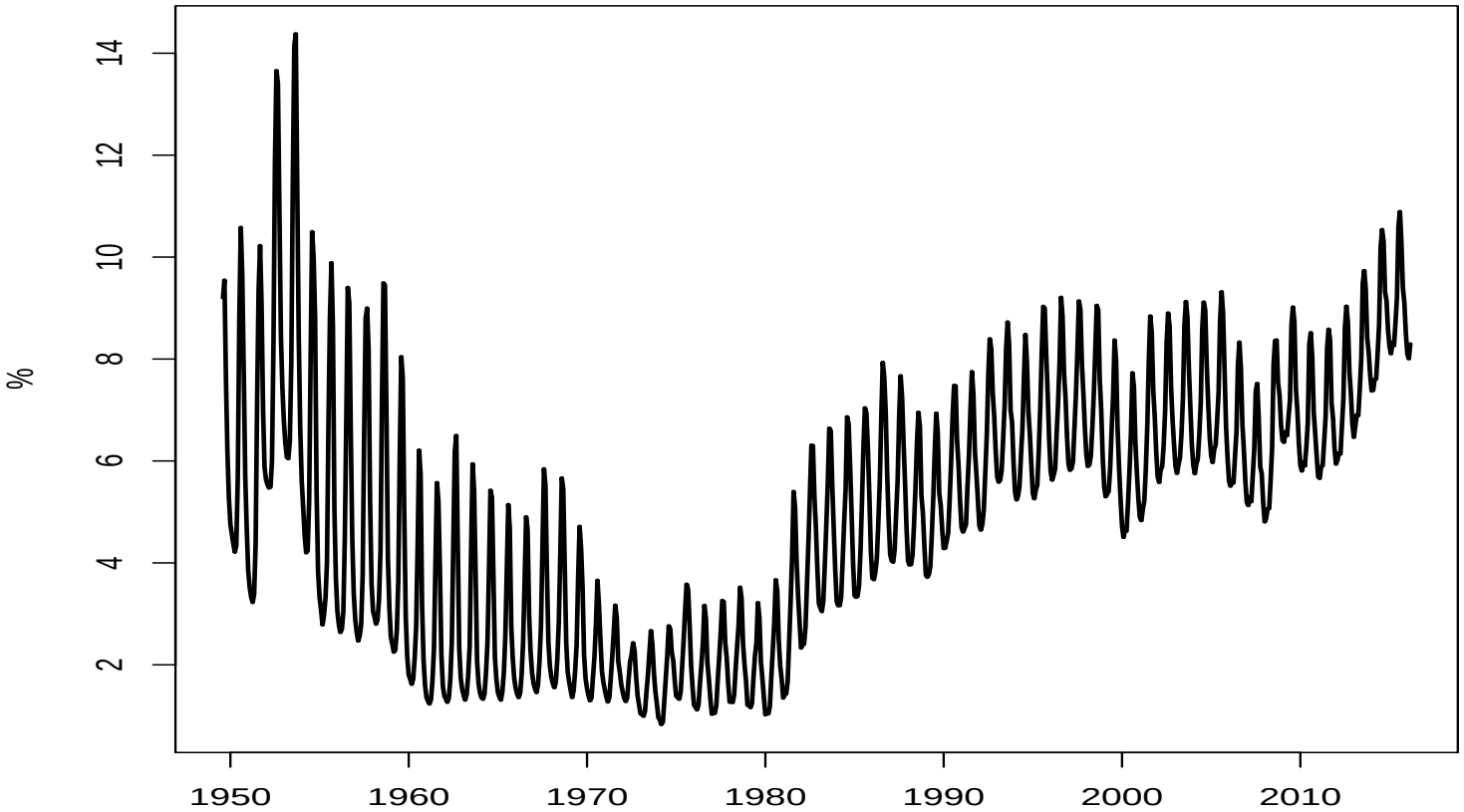
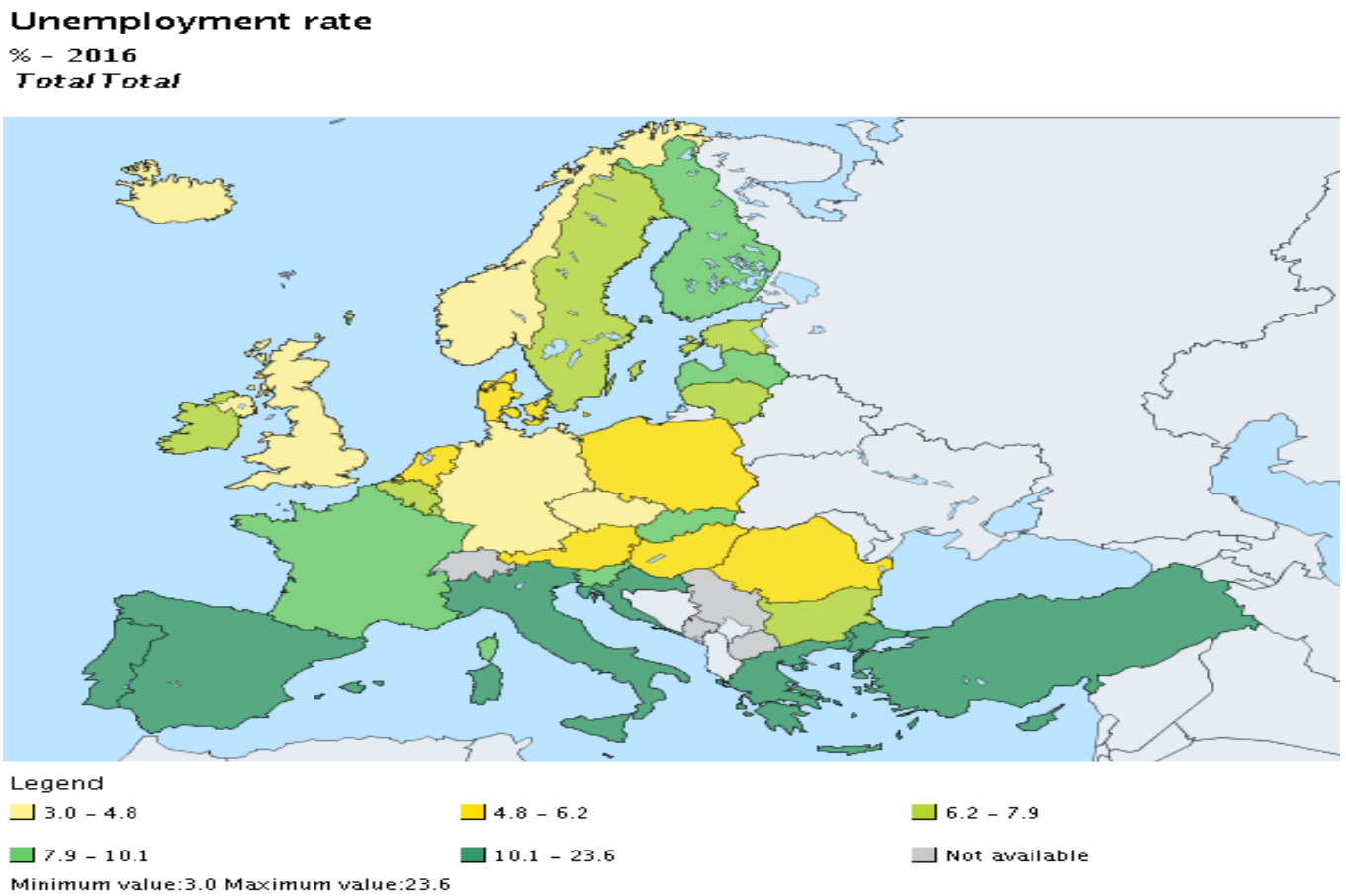
October 22, 2017

Unemployment: empirical evidence I



Austrian unemployment rate according to national definition, monthly since 1950.

Unemployment: empirical evidence II



Current (2016) unemployment rates across Europe. (Source Eurostat)

Unemployment rates

The *Austrian definition* of the *unemployment rate* is the simple ratio

$$\text{unemployment rate} = \frac{\text{unemployed}}{\text{labor force}} = \frac{\text{unemployed}}{\text{unemployed} + \text{employed}},$$

with employment excluding self-employment (lawyers, farmers, entrepreneurs), and all numbers taken from registers.

The *international definition* (EU, OECD) is based on questionnaires. It includes self-employment. It can be larger (Spain) or smaller (Austria) than the 'registered rate'.

Facts on unemployment

Contrary to the goods and financial market, the labor market does not clear. There is unsatisfied supply of labor (unemployment) and unsatisfied demand for labor (vacancies).

Involuntary unemployment can be a matter of strong concern. Unemployed persons are often unhappy or tend to be unhealthy. Employers can use the fear of losing one's job to discipline workers.

The wage-setting curve

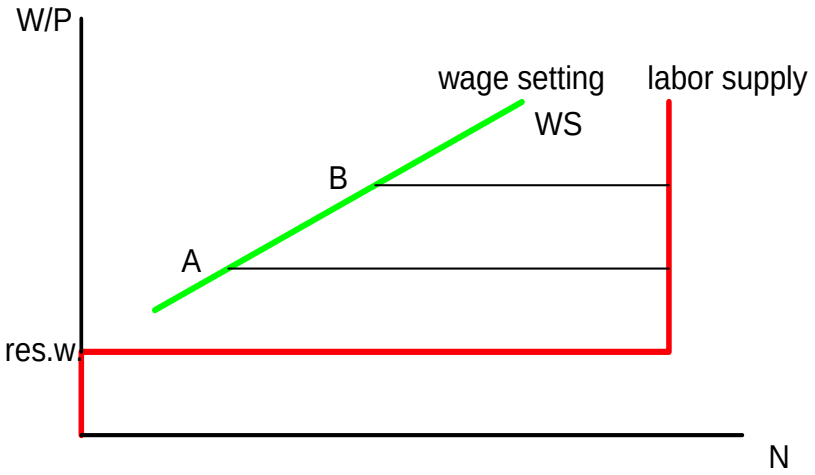
Currently, most economists describe the labor market by the *wage-setting* (WS) *curve*. The WS curve is an increasing function in the $(N, W/P)$ (employment – real wage) space. We use symbols N (employment), W (nominal wages), P (prices).

WS looks like a labor supply curve, with higher wages convincing unemployed persons to intensify their job search. Most economists, however, see WS as distinct from labor supply.

In the *efficiency wage* interpretation, the WS curve connects those real wages that are paid to discourage shirking. If the economy is 'good' and there is little unemployment, workers receive an incentive to work harder, as they lose much if they get fired.

In the *market power* interpretation, workers or trade unions can demand a higher real wage when unemployment is low, as employers fear losing workers.

The wage-setting curve and labor supply



If workers receive more than their reservation wage, they supply a fixed amount of labor N. With low unemployment as in B, they get higher wage offers than in A. Unemployment is the difference between the green line and the red vertical.

Reservation wage and efficiency wage

The *reservation wage* is the wage that workers require to compensate the disutility of work and the unemployment benefit.

A *minimum wage* is a legal minimum for wages.

An *efficiency wage* is a wage paid in excess of the reservation or minimum wage, in order to discourage shirking and layoffs by workers and generally to boost workers' morale.

The vertical distance between the WS curve and the reservation wage represents the cost of losing one's job.

Labor supply need not be vertical, but it is typically quite 'inelastic'. There is little empirical evidence on a dependence between labor supply and real wages.

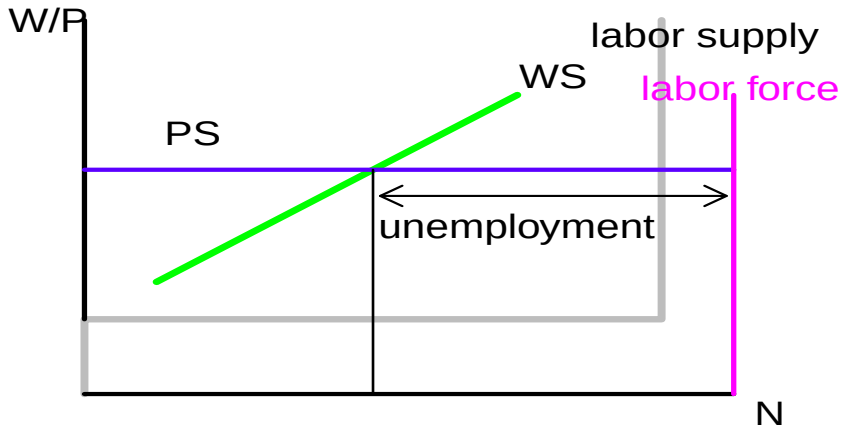
The price-setting curve and labor demand

Under competition, each production factor earns its marginal product, i.e. the derivative of the production function w.r.t. the factor. Labor receives the marginal product of labor as its real wage.

Firms are assumed to be imperfectly competitive. Their price P is a *mark-up* (μ) on wages. With a simple linear production function, the derivative is constant in the amount of labor demanded N. This horizontal line in the $(N, W/P)$ diagram is called the *price-setting curve* (PS).

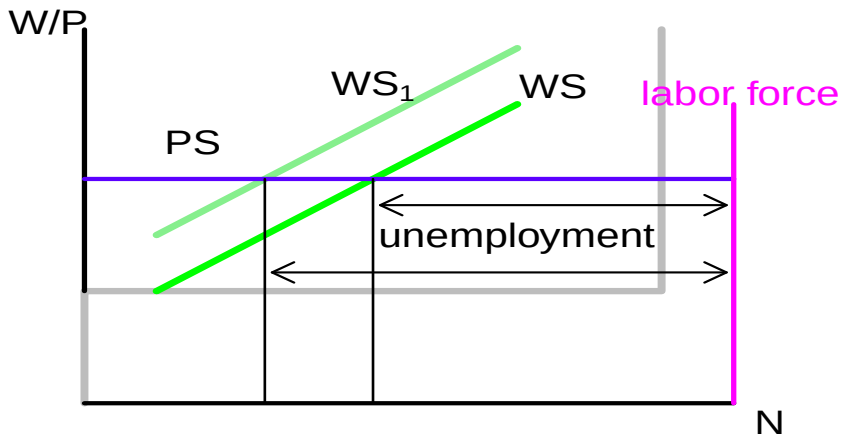
The interpretation may be that labor demand does not depend on the amount of labor. Any labor is demanded at a given wage.

The wage-setting and the price-setting curve



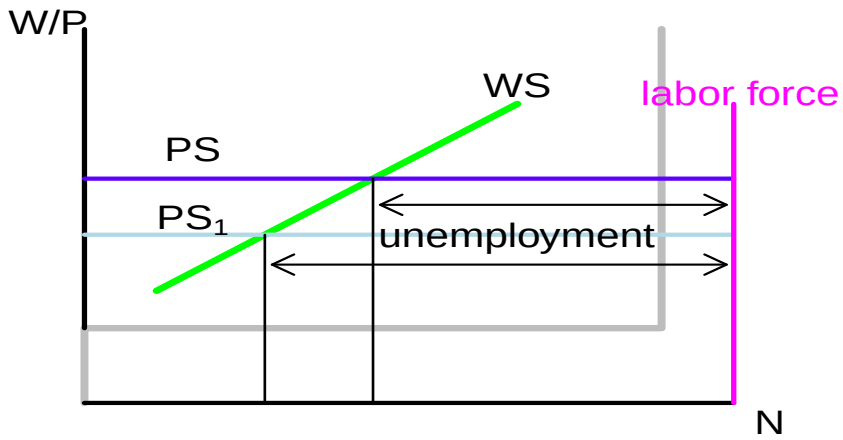
The vertical labor supply line (gray) separates involuntary and voluntary unemployment.

WS and PS: higher unemployment benefits



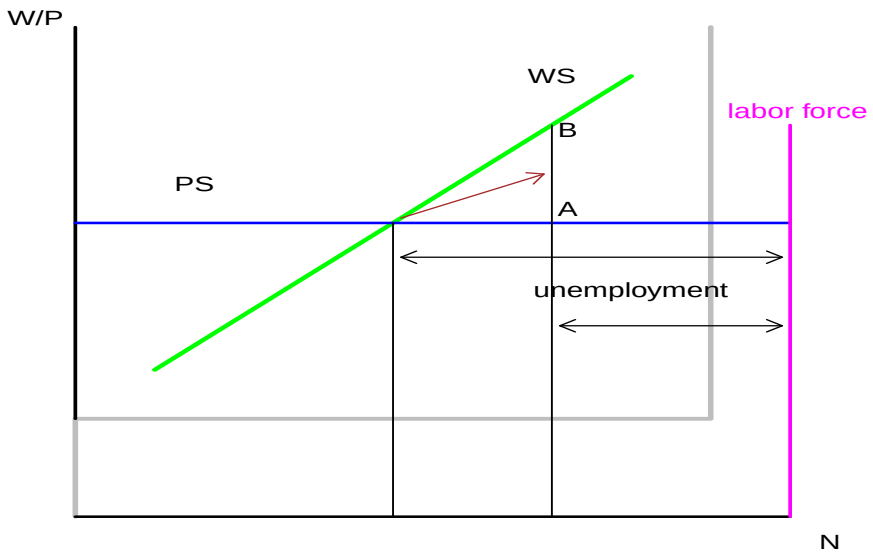
More generous unemployment benefits increase the reservation wage and shift up the WS curve. This results in more unemployment. The additional bargaining power will not yield higher real wages.

WS and PS: less competition, higher markup



An increase in the markup μ shifts the PS curve down. This results in more unemployment and a lower real wage. A higher μ is the consequence of less competition among producers in the goods market.

WS, PS, sometimes not in equilibrium



A sudden positive demand shock requires more employment than at the intersection of PS and WS. This situation is in line with the short-run IS world, but not with the labor market. The short-run point will be somewhere between PS and WS, between A and B.

How long does the economy live out of equilibrium?

If there is more employment than at the WS-PS intersection, real wages negotiated in the wage rounds are higher than the real revenues for the producer. Producers tend to increase prices. There will be more inflation than anticipated. The economy will move back to its 'medium-run equilibrium' at the WS-PS intersection.

If there is a negative demand shock, there will be deflationary tendencies. Falling or unexpectedly slowly rising prices push the economy back to its equilibrium.

A formal model for the WS equation

The *wage-setting* equation can be formalized as

$$W = P^E \cdot B(N, z_w),$$

where P^E is the expected price that serves as the basis in wage negotiations and z_w summarizes *wage-push variables* that may reflect the *bargaining power* of the workers, such as unionization or unemployment benefits. $B(.,.)$ is some function that increases in its arguments.

Re-writing this equation for the real wage w as

$$w^{WS} = \frac{W}{P^E} = B(N, z_w)$$

involves approximation, as the expectation of $1/P$ is not usually $1/P^E$.

A formal model for the PS equation

The *price-setting* equation can be formalized as

$$P = (1 + \mu)\frac{W}{\Pi_N},$$

where μ is the markup and Π_N is the marginal productivity of labor. This property follows from economic theory: with competition, the production factors are paid their marginal product. With imperfect competition, there is a markup. The equation is re-written as

$$w^{PS} = \frac{W}{P} = \frac{1}{1 + \mu}\Pi_N,$$

which for a linear production function is a horizontal line in the (N, w) diagram.

Equilibrium in the labor market

Suppose price setting can be described more generally by a function of *price push* variables, such as a tax 'wedge':

$$w^{PS} = \Pi_N F(\mu, z_p),$$

with $F(.,)$ some function that decreases in its first argument μ (as in $F(\mu, .) = 1/(1+\mu)$). Equilibrium in the labor market holds iff

$$w^{PS} = w^{WS} \quad \Rightarrow \quad \Pi_N F(\mu, z_p) = B(N, z_w).$$

With these assumptions, labor-saving technological progress yields profits that are directly distributed to workers. Some economists maintain that productivity affects the wage-setting function.

The equilibrium defined by this condition can be expressed as the equilibrium employment N_e, the 'natural' unemployment rate u_e, or as the equilibrium or natural output y_e

Labor force, labor supply, and output

The labor-market models use N for actual *employment* (employed persons) and L for the *labor force* (potentially available labor), with labor supply typically less than the labor force:

$$N < \text{labor supply} < L$$

If the production function $y = \Pi(K, N)$ is approximately linear in N, then output y will grow and fall with N. In 1962, Okun found empirically that a 1% growth in y above 'normal growth' causes the unemployment rate to drop by 0.5 percentage points (Okun's Law). The *Okun's coefficient* of 0.5 may have increased since then.

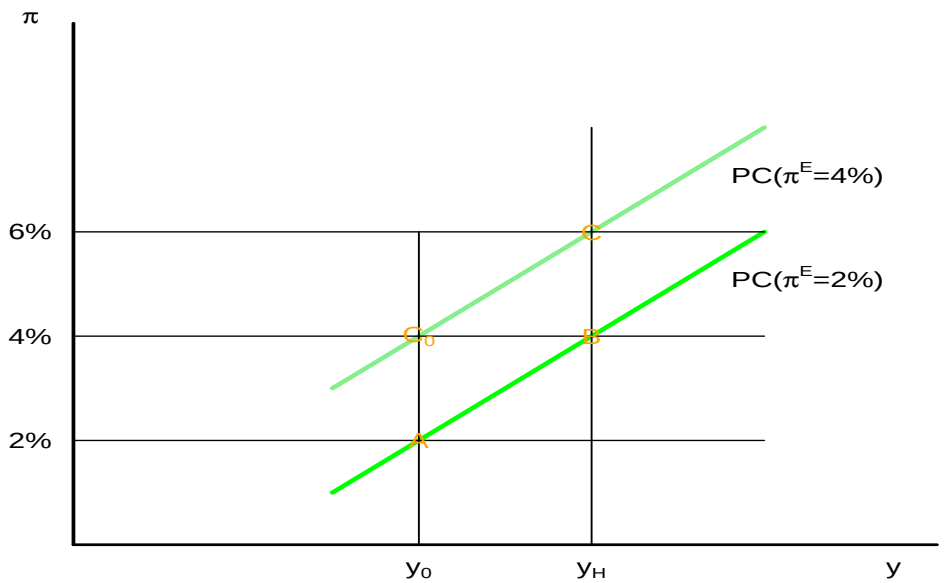
Phillips curves

The original *Phillips curve* from 1958 (after A.W. Phillips) was an inverse relation between *wage inflation* and the *unemployment rate*: episodes with high unemployment typically have less inflation.

The curve was also presented for *price inflation* and for *changes in the unemployment rate*. Its validity was often debated on theoretical and empirical grounds.

Current Phillips curves often substitute *output* or the *output gap* for unemployment. Output and unemployment are inversely related, such Phillips curves are usually upward sloping.

Phillips curve shifting



In A, the economy is in its medium-run equilibrium, WS=PS. A demand shock moves the economy to B, with more output and 4% inflation. In the next wage round, the 4% are expected and the Phillips curve shifts up. If the higher output y_H is targeted again, it comes with an inflation of 6% in C.

An equation for the Phillips curve

Modern Phillips curves are derived from WS and PS.

Inflation π_t evolves from bargaining at wage rounds, where workers negotiate for a money wage that takes price expectations into account. Their bargaining power increases with the *output gap* $y_t - y_e$, demand in excess of equilibrium output at the intersection of WS and PS:

$$\pi_t = \pi_t^E + \alpha(y_t - y_e)$$

Phillips curves will *shift* when inflation expectations or equilibrium output change by forces exogenous to the curve itself. With *adaptive expectations* $\pi_t^E = \pi_{t-1}$, the curve becomes

$$\pi_t = \pi_{t-1} + \alpha(y_t - y_e)$$

Can a Phillips curve exist?

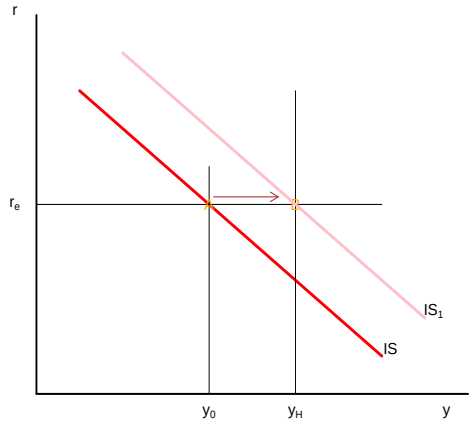
Many economists do not like the idea of adaptive expectations. They argue that bargainers learn from observed behavior. If inflation increases every year, then this must be accounted for. If expectations are *rational*, then $\pi - \pi^E$ can only be a small unpredictable random error:

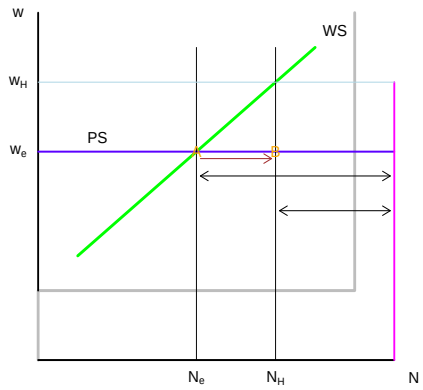
$$\pi_t - \pi_t^E = \varepsilon_t = \alpha(y_t - y_e),$$

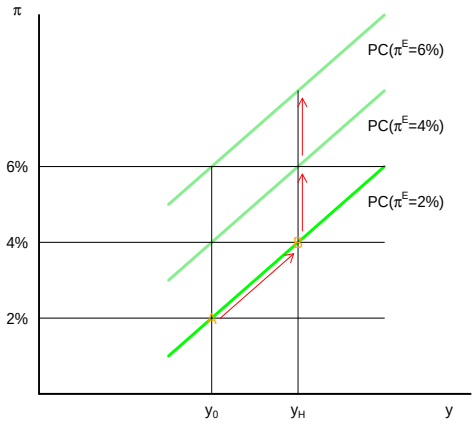
such that $\alpha = 0$ and there will be no Phillips curve.

A Phillips curve can only exist in the short run, when expectations of bargainers are 'fooled'. There can be no systematic relationship between something real (an output gap) and something purely monetary (inflation).

An aggregate demand shock

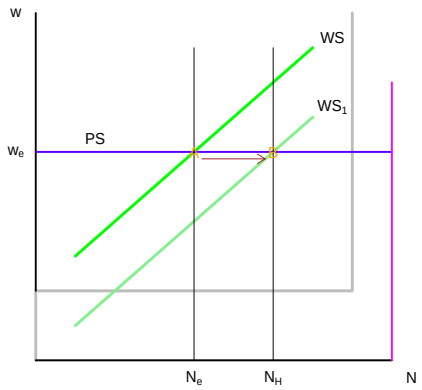


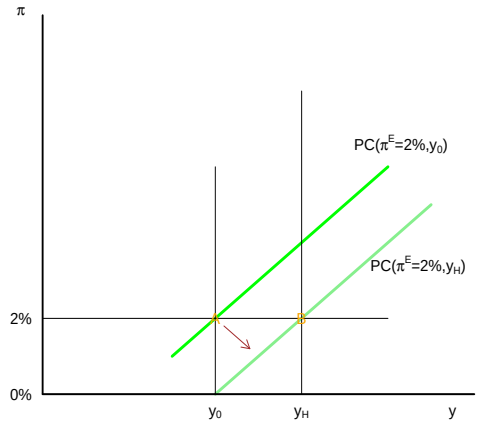




A demand shock shifts the IS curve out to a new short-run equilibrium output y_H. The disequilibrium in the labor market can only be sustained by repeated upward shifts of Phillips curves and inflation expectations. Workers will never receive w_H.

A shock to bargaining power





A sudden reduction of workers' bargaining power shifts the WS curve down, a new equilibrium y_H, N_H forms. If output does not increase immediately, a discrepancy $y < y_H$ shifts the Phillips curve down. At the end of the day, the medium-run equilibrium will prevail.

Equilibria in conflict

In the joint model of IS and WS-PS, the equilibrium in the goods market (IS) will often differ from that in the labor market ('supply',WS-PS). In the longer run, the labor-market point WS=PS is 'stronger'. It is attained by price inflation or deflation via shifting Phillips curves. Only *supply-side policy*, such as reducing unemployment benefits, affects this WS=PS point.

Usual short-run economic policy, fiscal and monetary, can play an important role in this process.

On the other hand, trying to keep output above the medium-run equilibrium (or below, but this target is unlikely) is only possible by never-ending shifts of Phillips curves. In the long run, it is impossible.