Employment Cycles in the Eurozone

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The introduction of the euro in 1999 provides an interesting natural experiment: Same currency, integrated goods and capital markets but in effect separate labour markets.

1. Good news so far:

- Integration of financial markets
    - Interest rate differentials decrease in the bond market
    - Competition between financial intermediaries increase
    - Equity investors treat euroland as one marketplace – share of non-domestic euro equities held by euro investment funds has increased rapidly
    - Enhanced foreign direct investment.
    - Greece, Portugal and Spain have had significant current account deficits, but no one pays any attention!

- Increased trade
    - Inter euroland trade increased by 5-15%.
    - Trade also increased with other countries

Trade/GDP ratios

	1998	2004
Austria	60.6	82.1
Belgium	133.5	165.4
Finland	56.7	60.6
France	40.9	45.6
Germany	46.8	60.0
Greece	32.3	33.3
Ireland	124.7	89.8
Italy	38.3	41.9
Netherlands	83.3	117.4
Portugal	54.4	53.8
Spain	40.4	43.1

Source: Lane (2006).

More benefits:

- Reduced price dispersion in case of the most tradable goods (such as electrical goods). However, limited in many other cases.
- Much larger reduction in price dispersion in peripheral countries.

2. Now the bad news!

- Labour mobility and flexibility
  - No apparent effect on the pace of structural reforms.
  - Mobility increased mainly because of immigration from new member countries.
- Fiscal policy
  - Failure to accumulate surpluses in good times cause problems in recessions.
  - Growth and stability pact suspended in 2003, revised version agreed on in 2005 which gives more flexibility to member states.
- Inflation differentials persist and these lead to diverging real exchange rates which sometimes threaten employment. These inflation differentials are caused mainly by differences in the rate of change of service prices.

Moreover, the introduction of the euro has contributed to price inflation by:

- Lowering real interest rates in periphery countries causing house prices to increase and a construction boom (Portugal, Spain, ..).
- When the economy starts booming and domestic inflation rises, real interest rates fall because nominal interest rates are kept unchanged.
- Trade patterns differ, hence the countries are differently affected by euro nominal exchange rate fluctuations.

Inflation and changes in competitiveness

	Inflation 1999-2004 (%)	Competitiveness 1999-2004 (%)
Austria	1.6	-0.8
Belgium	1.9	2.7
Finland	1.7	-0.6
France	1.8	2.2
Germany	1.4	-1.3
Greece	3.2	4.4
Ireland	3.8	16.9
Italy	2.4	5.6
Netherlands	2.8	8.6
Portugal	3.1	7.2
Spain	3.0	9.9

Source: Philip R. Lane, The Real Effects of European Monetary Union, Journal of Economic Perspectives, Fall 2006.

2. Blanchard's (2006) model of macroeconomic adjustment[1]

Wage equation

$$\Delta w = E\Delta p + E\Delta a - \beta(u - \bar{u})$$

w is the log (money) wage, *p* is the log price level, *a* denotes log productivity, *u* is unemployment and *u*-bar is the natural rate of unemployment.

There are two sectors, tradable output and non-tradable output (services!). Price inflation and productivity growth are averages of the rates of change of the price of each and the productivity of labour in each sector, respectively:

$$\Delta p = \alpha \Delta p_N + (1-\alpha)\Delta p_T$$
$$\Delta a = \alpha \Delta a_N + (1-\alpha)\Delta a_T$$

Assumption: Home and foreign tradable output are perfect substitutes.

This makes the rate of change of tradable prices equal to the rate of euro wage inflation minus the rate of euro productivity growth:

[1] Blanchard (2006): "Adjustment within the euro: The difficult case of Portugal." Unpublished.

$$\Delta p_T = \Delta p_T^* = \Delta w^* - \Delta a_T^*$$

The non-tradable sector produces under constant returns to labour so the price of non-tradables is given by:

$$\Delta p_N = \Delta w - \Delta a_N$$

Now define "competitiveness" as *z*:

$$z = p_T - w + a_T$$

This is the ratio of the euro-wide price P_T and the marginal cost of production W/A_T. This can be rewritten as follows:

$$z = w^* - a_T^* - w + a_T$$

This is the ratio of marginal cost of production in euroland (average) and our country.

Solution: Now assume that expectations are correct: $E\Delta p = \Delta p$, $E\Delta a = \Delta a$. Solving the six equations together gives;

$$\Delta z = \frac{\beta}{1-\alpha}(u - \bar{u})$$

Changes in competitiveness depend only on the unemployment gap, more unemployment buys increased competitiveness. It is independent of the level of productivity in tradables and non-tradables.

The parameter β measures the rigidity of real wages, the smaller its value the higher unemployment has to become to attain a given change in competitiveness.

Two extensions. First, we ask whether the existence of nominal wage rigidities is sufficient to generate some other way of increasing a country's level of competitiveness. Second, we ask if unanticipated productivity growth can help.

Nominal rigidity introduced: $E\Delta p = \Delta p(-1)$.

We assume constant productivity growth in both sectors.

This gives the following solution for competitiveness:

$$\Delta z = \alpha \Delta z(-1) - \beta(u - \bar{u})$$

In this case more unemployment is needed to achieve a given improvement in competitiveness.

Unanticipated productivity growth:

$$v_N = \Delta a_N - E\Delta a_N$$
$$v_T = \Delta a_T - E\Delta a_T$$

Average:

$$v = \alpha v_N + (1-\alpha) v_T$$

We assume again that $E\Delta p = \Delta p$. This gives:

$$\Delta z = \frac{\beta}{1-\alpha}(u - \bar{u}) + \frac{1}{1-\alpha} v$$

Competitiveness can be improved through unanticipated productivity gains.

Note that it does not matter whether the productivity growth occurs in the tradable or the non-tradable sector. If in tradables then competitiveness directly improved, if in non-tradable then the price of non-tradables falls and hence also wages which improves competitiveness.

The model is not complete in that unemployment in not determined within it!

3. Stability and permanent employment cycles

Assume: All goods are tradable and their price P^T is exogenous to any one country:

$P_T = P_T^*$

Moreover, we initially assume that labour supply is fixed

$L^s = \bar{L}^s$

but later relax this assumption to allow for intra-euroland mobility.

We start with a production function for the representative (traded-goods) firm

$$Y = AL^{\alpha}$$

which implies a labour demand function:

$$L^{d} = (\alpha A)^{1/1-\alpha} \left(\frac{W}{P_T} \right)^{-1/1-\alpha}$$

This gives an expression for the employment rate as a function of the level of competitiveness *C*, defined as $C=P_T/(W/A)$ and $\alpha'=\alpha^{1/1-\alpha}$:

$$e = \frac{\alpha^{1/1-\alpha} \left(P_T / (W/A) \right)^{1/1-\alpha}}{\bar{L}^s} = \frac{\alpha'}{\bar{L}^s} C$$

We now turn to money wages. Following a long tradition – see Phelps (1968), Alchian (1969), Holt (1969) and Gordon and Hynes (1969) – we propose the following general wage curve

$$\frac{w^*}{A} = \frac{w^e}{A^e} \left(1 - \beta (1 - e) + z \right)$$

where w^* denotes the representative firm's desired (efficiency) wage – that is the warranted wage – w^e is the expected (efficiency) wage, *e* is the employment rate – one minus the rate of unemployment – and *z* captures factors that make unemployment less onerous, such as the utility of leisure in case of search unemployment or the collection of state benefits that the unemployed are entitled to.

3.1 Static expectations

We initially assume that the expected (efficiency) wage w^e is static, as is the level of expected productivity A^e. Taking logs gives

$$\log W^* - \log W^e - a = \beta (e - \bar{e})$$

where $a = \left(A - A^e \right) / A^e$ so that in equilibrium $\left(W^* - W^e \right) / W^e = a$ – the desired wage growth is equal to the warranted wage growth – and we get:

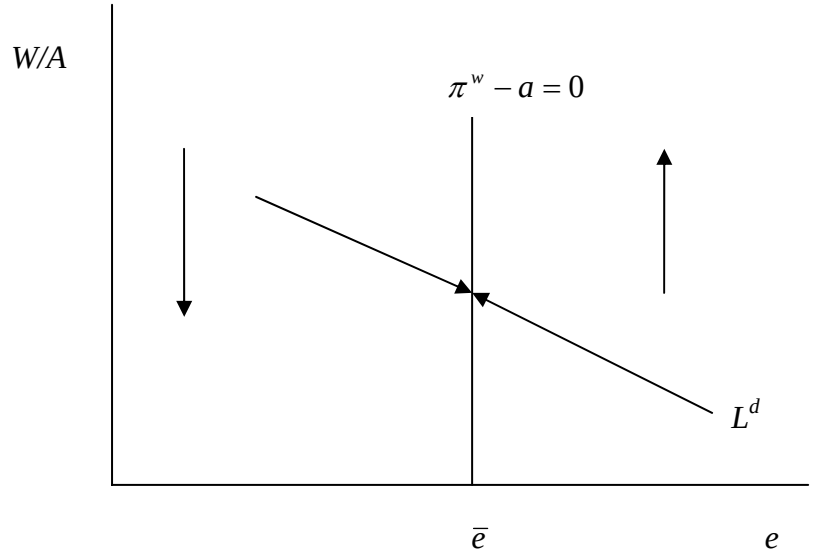
$$\bar{e} = 1 - \frac{z}{\beta}$$

This is the equilibrium employment rate. Clearly if $e > \bar{e}$ we get that $\log W^* - \log W^e > a$ and conversely if $e < \bar{e}$ we get $\log W^* - \log W^e < a$.

As all firms attempt to close the gap between desired and expected wages we get

$$\pi^w = a + \beta (e - \bar{e})$$

This give a stable equilibrium $\bar{e}$ so that when $e > \bar{e}$ wages are rising and employment falling while at $e < \bar{e}$ wages are falling and employment rising.



3.2 Adaptive inflation expectations

When we relax the assumption of static expectations and assume that expected wage inflation equals past wage inflation we get

$$\pi^w = a + \beta\left(e - \bar{e}\right) + \pi^{we}$$

where π^{we} denotes expected wage inflation. If expected inflation equals past inflation we can rewrite this as

$$*\ \dot{\pi}^w = a + \beta\left(e - \bar{e}\right)$$

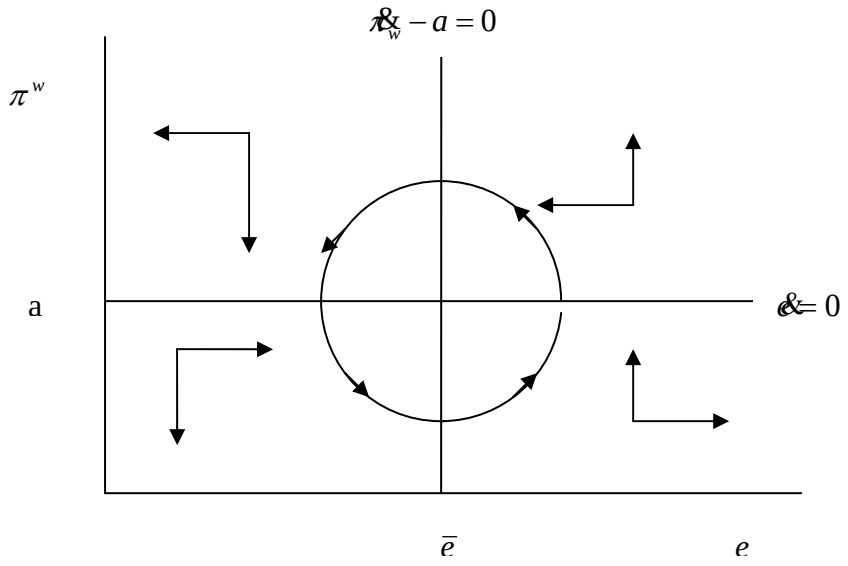
where $\dot{\pi}^w = d\pi^w / dt$

Now assuming a constant labour force L^s and taking logs of the employment equation above gives

$$**\ \frac{\dot{e}}{e} = \frac{1}{1-\alpha}\left[a - \pi^w\right]$$

which is a non-linear differential equation in *e*.

To solve this we need a phase diagram in *e* and π_w. From the phase diagram we can see that the equilibrium is unstable and the economy goes in infinite circles around it.



3.3. Migration and stability

We have so far kept the labour supply constant. This is in line with our initial assumption that while goods markets were integrated across countries, labour markets were not. However, we can now add migration to the model in order to show how it affects stability.

Assume that immigration is a positive function of the change of the rate of wage inflation

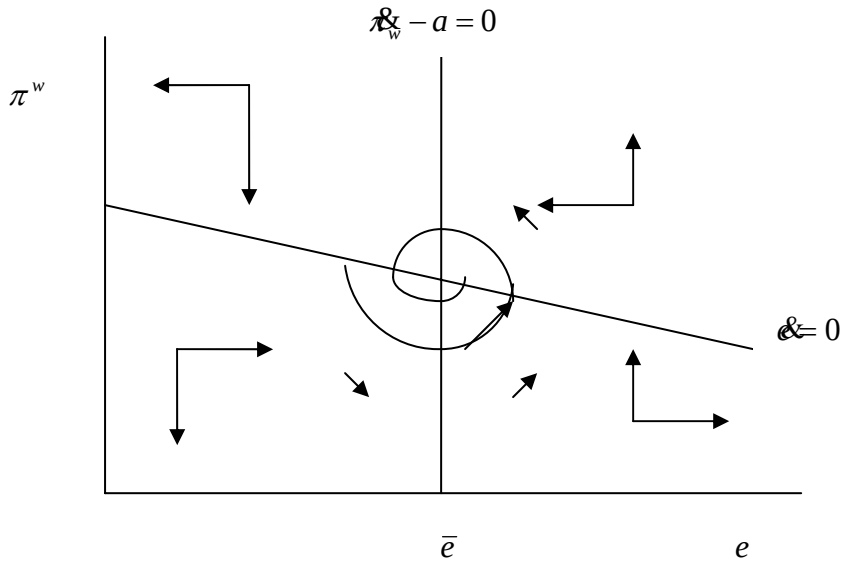
$$L^s = L^s\left(\pi^w\right), \quad L^{s\prime}(\cdot) > 0$$

$$\dot{L}^s = L^{s\prime}\left(\pi^w\right)\dot{\pi}^w$$

In this case equation ** changes to

$$** \quad \frac{\dot{e}}{e} = \frac{1}{1-\alpha}\left[a - \pi^w\right] - \frac{L^{s\prime}\left(\pi^w\right)}{L^s}\dot{\pi}^w$$

This changes the slow of the $\dot{e} = 0$ schedule and we get



3.4 Payroll taxes and stability

We now impose a payroll tax on firms so that their gross wage payments per worker equal $W(1+\tau)$ where τ is the rate of payroll taxes. The employment equation can now be written as

$$e = \frac{\alpha^{1/1-\alpha}\left(P_T/\left(W\left(1+\tau\right)/A\right)\right)^{1/1-\alpha}}{L^s}$$

and our measure of competitiveness can be written as

$$C^p = \left(P_T/\left(W\left(1+\tau\right)/A\right)\right)^{1/1-\alpha}$$

An increase in the domestic payroll tax will reduce competitiveness, hence also employment. Taking log and then taking the time derivative gives

$$\frac{\dot{e}}{e} = \frac{1}{1-\alpha}\left[a - \pi_w - \dot{\tau}\right]$$

where $\dot{\tau}$ is the time derivative of τ. In steady state $\dot{e} = 0$ we now have

$$\pi_w = a - \dot{\tau}$$

In order to eliminate the limit cycle in the solution above we need to have policy such that payroll taxes are rising in the rate of wage inflation

$$\tau = \tau\left(\pi_w\right),\ \tau' > 0$$

such that

$$\dot{\tau} = \tau'(\pi_w)\dot{\pi}_w$$

and in steady state $\dot{\tau} = 0$ we get

$$\pi_w = a - \tau'(\pi_w)\dot{\pi}_w$$

which gives a downward-sloping streamline in the phase diagram and a stable solution. We conclude that to eliminate the perpetual employment cycle payroll taxes need to be adjusted so that positive wage inflation is met by rising payroll taxes. This implies that when employment is above its natural rate we raise payroll taxes in order to bring it back to equilibrium and, similarly, when employment is below the natural rate we cut payroll taxes in order to raise employment to its equilibrium value.

4. Summary

The euro brings many benefits such as

- Increased capital and goods market integration
  - Lower nominal interest rates
  - Lower prices of many tradable goods
  - Increased foreign direct investment
- Reduced risk of financial stability.

But inflation differentials persist, real exchange rates and employment may fluctuate even in the absence of shocks. In order to reduce such cycles, countries will need to

- Increase labour migration between countries
- Raise payroll taxes (continuously) as long as employment exceeds its natural rate and wages are rising and lower them when employment is lower than its natural rate.