Aalto University
School of Business

31E2300
MACROECONOMICS: POLICY

THE SUPPLY SIDE, PART I:
THE PHILLIPS CURVE

WHAT EXPLAINS INFLATION? A "REDUCED FORM" PERSPECTIVE FROM NICKELL, JEP, 1998

Table 6

Regressions to Explain Log Unemployment Rate Percentage

(20 OECD countries, 1983–88 and 1989–1994)

	1 *Total Unemployment*	*2* *Long-term Unemployment*	*3* *Short-term Unemployment*
Employment Protection (1–20)	−0.0032 (0.03)	0.051 (0.034)	−0.046 (0.024)
Replacement Rate (%)	0.011 (0.0050)	0.011 (0.0080)	0.011 (0.0060)
Benefit Duration (years)	0.088 (0.055)	0.25 (0.089)	0.043 (0.062)
Active Labor Market Policies [a]	−0.024 (0.0087)	−0.039 (0.013)	−0.012 (0.0098)
Union Density (%)	0.012 (0.0063)	0.010 (0.0096)	0.0082 (0.0071)
Union Coverage Index (1–3)	0.45 (0.22)	0.83 (0.35)	0.39 (0.24)
Co-ordination (Union + Employer) (2–6)	−0.46 (0.087)	−0.54 (0.15)	−0.37 (0.11)
Total Tax Rate (%)	0.026 (0.0087)	0.023 (0.013)	0.025 (0.010)
Change in Inflation (% pts. p.a.)	−0.17 (0.11)	−0.30 (0.17)	−0.18 (0.10)
Dummy for 1989–94	0.20 (0.095)	0.30 (0.16)	0.17 (0.089)
R^2	0.76	0.84	0.60
N (countries, time)	40 (20, 2)	38 (19, 2)	38 (19, 2)

Notes: Estimation is by GLS random effects using two time periods (1983–88 and 1989–1994). Standard errors are in parentheses.

WHAT HAPPENS AWAY FROM MEDIUM RUN EQUILIBRIUM?

- We'll assume, for now, that in the face of AD shocks, output (and not wages or prices) adjusts, consistent with the identification of business cycles as (mostly) demand-driven.
- This is almost, but not quite, "price stickiness": firms do adjust prices, but in response to cost (wage) variation.
- We'll assume wages at the start of each 'wage round', but are otherwise fixed.
- In short, we'll model the effects of an AD shock as follows:

Aggregate demand shock → output and employment change
Next wage round → nominal wages change
Immediately after the wage round → prices change

PHILLIPS CURVE (SMALL VARIATION ON TEXTBOOK)

- Define the output gap = $y_t - y_e$
- Wage setters (workers and/or firms) adjust wages to cover last period's inflation (this period's expected inflation) and whatever increase or decrease in the real wage is consistent with current WS ("bargaining power") position:

$$(\Delta W/W)_t \approx (\Delta P/P)_{t-1} + \alpha(y_t - y_e) \qquad \text{(wage inflation)}$$

- Price setters set P immediately after this to keep mark-up fixed:

$$(\Delta P/P)_t = (\Delta W/W)_t - (\Delta \lambda/\lambda)_t \qquad \text{(price inflation)}$$

- Substituting of the second into the first produces the Phillips curve:

$$(\Delta P/P)_t = (\Delta P/P)_{t-1} + \alpha(y_t - y_e)$$

$$\underset{\text{current inflation}}{\pi_t} = \underset{\text{lagged inflation}}{\pi_{t-1}} + \alpha(y_t - y_e), \quad \text{output gap}$$

GRAPHICAL VERSION OF THE SAME ARGUMENT

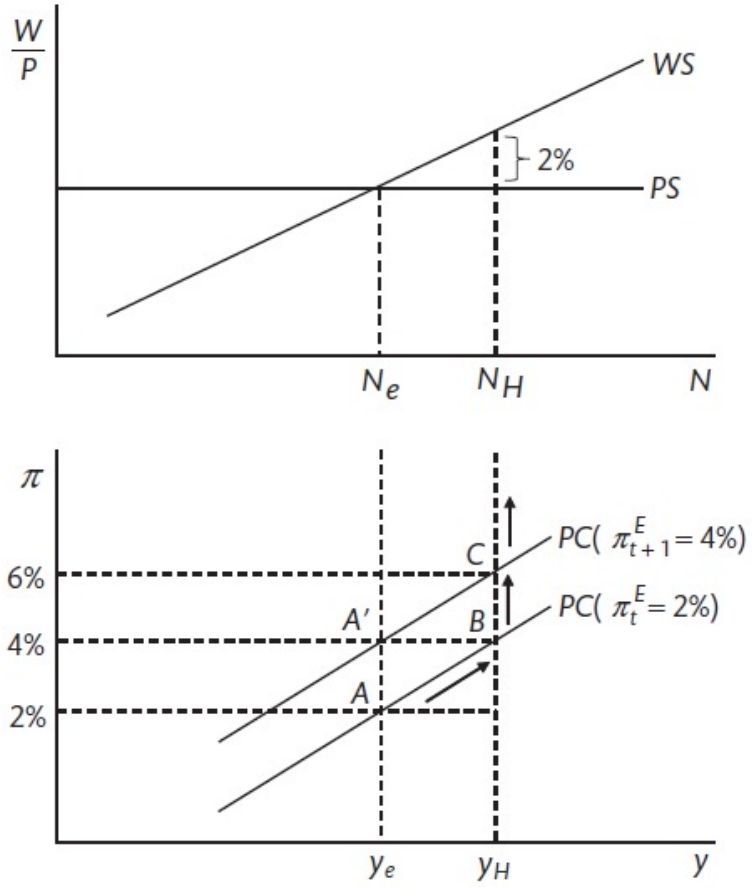


Figure 2.14 The derivation of the Phillips curve.

- Positive AD shock → Employment ↑ → ↑ Worker's power in the labour market → Wage-setter sets higher wages to cover π_{t-1} (2%) and the output gap (2%).
- Price setters set higher prices to cover higher wage costs (↑ by 4%) → ↑ Price Inflation (from 2% to 4%).
- A positive output gap causes Wage and Price Inflation to rise; Joining A and B in the π-y space gives us the PC.

THE PHILLIPS CURVE IS A DYNAMIC CONSTRUCTION

- The Phillips Curve then shifts, *from AB to A′C.* WHY?
- At the end of the previous period, price inflation (4%) is 2% higher than expected by wage-setters (2%).
- If output gap remains the same, in the next round, they will increase wages by an additional 2% to cover the *expected* inflation erosion of their real wages.
- Nominal wages increase by 4% + 2% but then so do prices.
- Price inflation is now 6%.
- The new PC curve (*A′C*) is higher than the old one (*AB*).
- BUT WHY DO WORKERS DO THIS, IF THEY KNOW THAT REAL WAGES GAINS WILL NOT, IN THE END, INCREASE?
    - COORDINATION GAME: WOULD YOU *UNILATERALLY* TURN DOWN THE NOMINAL WAGE INCREASE?

SUMMARY, AND EMPIRICAL IMPLICATIONS

If wage setters have adaptive inflationary expectations, the Phillips curve is "pinned down" by lagged inflation π_{t-1}

Upward sloping: if positive output gap, then $\pi_t > \pi_{t-1}$.

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

$$\underset{\text{current inflation}}{\pi_t} = \underset{\text{lagged inflation}}{\pi_{t-1}} + \underset{\text{output gap}}{\alpha(y_t - y_e)}.$$

Two Observations:

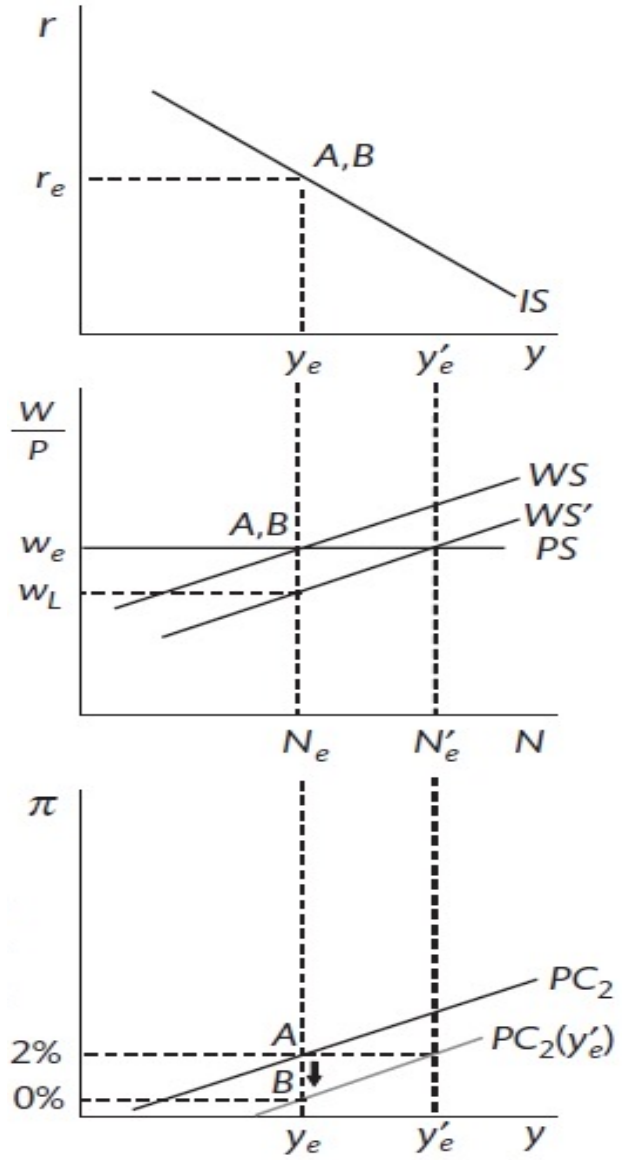
1. The terms of the inflation-output "trade-off" depend on the slope of the WS schedule, which depend on …? (Review the previous discussion, but note that norms and institutions matter.)

2. The second version of the PC allows us to estimate either potential output or, more commonly, the NAIRU, using actual data.

   (i) In unemployment terms, $\Delta\pi(t)=\beta(u(t)-u_n)$. With data on changes in inflation and actual unemployment, we can estimate u_n.

We'll use this for an extended problem set exercise!

ONE MORE EXAMPLE (AS SHOCK)



(i) PS curve shifts: changes in productivity (λ), mark-up (μ) or price-push factors (z_P)

(ii) WS curve shifts: Changes in wage-push factors (z_w)

1. For example, ↓ jobless benefits: WS shifts down →
2. Equilibrium y_e and N_e rises →
3. No stabilizing policy maker: r_e is fixed, and so is y →
4. Negative WS-PS gap at y_e →
5. W rises by 0%, Inflation falls by 2% →
6. π falls every period so long $y < y_e'$
   (IS curve: y is pinned down by r)

∴ With no stabilising policy, a positive supply shock → continuously falling Inflation. Is this a problem?