The Phillips Curve & the AS-AD Model

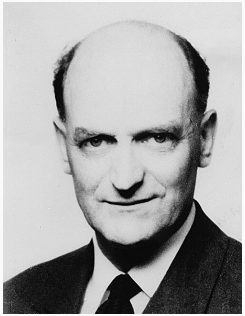
Javier Tasso

The Phillips Curve

Introduction

- Phillips (1958) documents a negative relation between wage inflation and unemployment in the UK.
- Samuelson & Solow estimate this for the US.
- Interpreted as a stable relationship which can be exploited by policymakers.
- Economists soon discover this relationship is not stable.
    - Lucas critique.

Phillips Curve



A. W. Phillips

When the demand for labour is high and there are very few unemployed we should expect employers to bid wage rates up quite rapidly, each firm and each industry being continually tempted to offer a little above the prevailing rates to attract the most suitable labour from other firms and industries. On the other hand it appears that workers are reluctant to offer their services at less than the prevailing rates when the demand for labour is low and unemployment is high so that wage rates fall only very slowly. The relation between unemployment and the rate of change of wage rates is therefore likely to be highly non-linear. [a]

[a] From Phillips' The Relation Between Unemployment and the Rate of Change of Money Wage Rates in the UK, 1861-1957

Phillips' Statistical Evidence

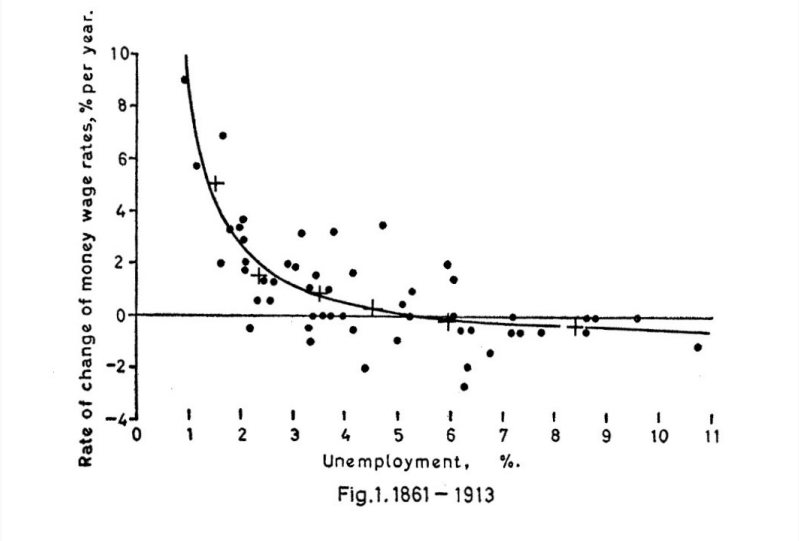


Fig.1. 1861 – 1913

A Simple Model of Price and Wage Determination

$$P = (1 + m)W$$
$$W = P^{E}(1 - \alpha u + z)$$

- Imperfect competition, firms set prices by adding a mark-up m over nominal wages.
- Workers negotiate nominal wages based on the expected price level P^{E}.
- Unemployment u and unemployment benefits z affect wage determination.

Inflation Depends on Expectations about it

$$P = (1+m)\underbrace{P^{E}(1-\alpha u+z)}_{W}$$

- π actual inflation and π^{E} expected inflation.

$$\boxed{\pi = \pi^{E} + m + z - \alpha u}$$

Natural Rate of Unemployment

$$u^{\mathrm{N}} = \frac{m + z}{\alpha}$$

- If the actual inflation coincides with the expected inflation, we are in a stable situation.
- Define the corresponding unemployment rate as the natural rate of unemployment.

Original Phillips Curve Formulation

$$\pi = \bar{\pi} + m + z - \alpha u$$

- Assume agents have myopic/anchored expectations: they always expect the inflation will be the same $\pi^{\mathsf{E}} = \bar{\pi}$.
- Phillips Curve with elasticity α.

Expectations Augmented Phillips Curve

$$\pi - \pi_{t-1} = m + z - \alpha u$$

- Assume agents have adaptive expectations: they always expect the inflation they saw in the past: $\pi^{E} = \pi_{t-1}$.
- The OG Phillips Curve shifts in every period.
- But it's still possible to have a Phillips Curve on the change of inflation.

Rational Expectations

$$\boxed{\pi = \pi^{E} + m + z - \alpha u}$$

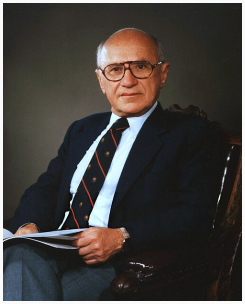
- Assume agents understand how prices are set, and they use all current information to anticipate what inflation will be.
- With rational expectations π^{E} doesn't deviate systematically from π. Why? If so...

Rational Expectations II

$$\boxed{\pi = \pi^{E} + m + z - \alpha u}$$

- With rational expectations, the Phillips Curve becomes vertical around the natural rate of unemployment.
- It's possible to have unemployment levels above and below the natural level, but these are temporal.
- It's not possible to systematically trick agents.

In Friedman's Words

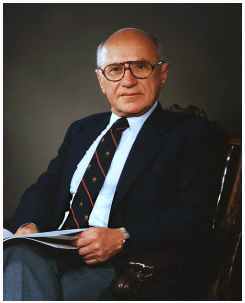


Milton Friedman

Phillips' analysis of the relation between unemployment and wage change is deservedly celebrated as an important and original contribution. But, unfortunately, it contains a basic defect, the failure to distinguish between nominal wages and real wages, just as Wicksell's analysis failed to distinguish between nominal interest rates and real interest rates. Implicitly, Phillips wrote his article for a world in which everyone anticipated that nominal prices would be stable and in which that anticipation remained unshaken and immutable whatever happened to actual prices and wages.[a]

[a] From Friedman's Role of Monetary Policy.

In Friedman's Words II



Milton Friedman

To state this conclusion differently, there is always a temporary trade-off between inflation and unemployment; there is no permanent trade-off. The temporary trade-off comes not from inflation per se, but from unanticipated inflation, which generally means, from a rising rate of inflation. The widespread belief that there is a permanent trade-off is a sophisticated version of the confusion between "high" and "rising" that we all recognize in simpler forms. A rising rate of inflation may reduce unemployment,a high rate will not.[a]

[a] From Friedman's Role of Monetary Policy.

Lucas Critique

Robert Lucas Jr.

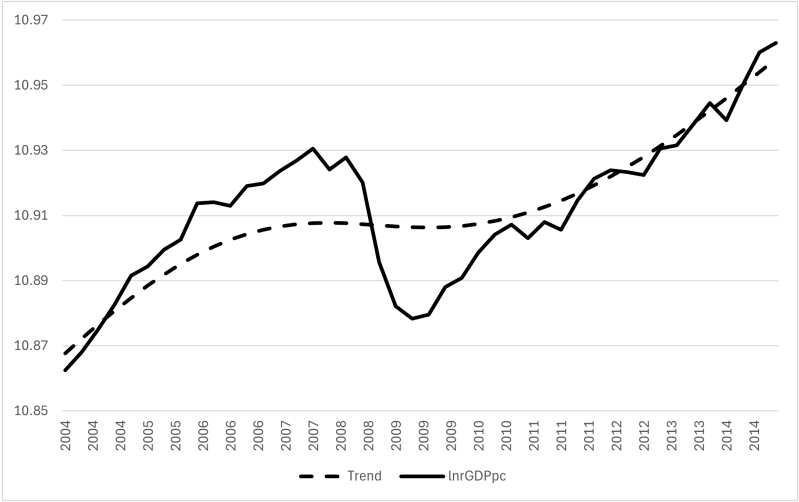
- It is naive to try to predict the effects of a change in economic policy entirely on the basis of relationships observed in historical data.
- Negative result. How not to do economic analyses.
- Microeconomic foundations for macroeconomic theory.

The Business Cycle & the AS-AD Model

Introduction

- Explain short run fluctuations in output without assuming away prices.
- Simple supply & demand model that builds on:
  - Keynesian ideas for output demand determination.
  - Classical ideas for long run output supply determination.
  - Speed of price adjustments and expectations to explain deviations from long run output.
- AS-AD model is an ad hoc representation of the macroeconomy. Not microfounded.

Business Cycle



Business Cycle II

- GDP fluctuates around a long-run growth trend.
  - Expansions.
  - Recessions.
- No regular or predictable pattern.
  - If so...
- Driven by supply and demand shocks.
  - Tool to understand them: the aggregate supply and aggregate demand (AS-AD) model.

Aggregate Demand

Aggregate Demand Curve: Inverse relationship between the price level and the quantity of real GDP demanded by households, firms, and the government.

- Movements along the AD curve.
- Shifts of the AD curve.
  - Interest rate, gov't purchases, taxes, expectations of future income, expectations of investment profitability, GDP of foreign partners, appreciation/depreciation of domestic currency.

Long Run Aggregate Supply

Long Run Aggregate Supply: The level of real GDP that corresponds to the full employment of factors of production (capital, labor) in the economy.

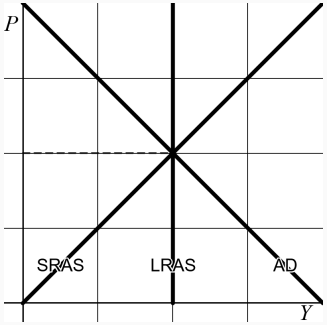
- Vertical. Why?
- Role of technology.
- Shifts in the LRAS?
    - Labor force, capital stock, productivity/technology.

Short Run Aggregate Supply

Short Run Aggregate Supply: Direct relationship between the price level and the quantity of real GDP supplied.

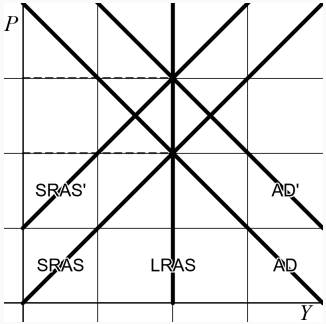
- Movements along the SRAS curve.
- Shifts of the SRAS curve.
  - The expected future price level, workers and firms adjusting, the cost of an important natural resource.
  - Anything that shifts the LRAS will shift the SRAS as well.

The AS-AD Model



- Long run equilibrium.
- One may temporarily deviate from the long run level of output.
- Boom.
- Recession.
- Fiscal/monetary policy and the role of expectations.

Expansionary Monetary Policy in the AS-AD Model



- Assume the policy was not anticipated.
- Initially the shift in the AD (from AD to AD') increases output beyond its natural level.
- Over time wages adjust and the SRAS shifts (from SRAS to SRAS').
- Output returns to its natural level, but with higher prices.
- What if the policy was anticipated?

Comments on the AS-AD Model

- Long run inherits the classical view:
  - Money neutrality.
  - Output pinned down by supply side.
  - Prices and wages fully flexible.
- Short run allows for price and wage stickiness:
  - Output can deviate from FE level.
  - AD drives short run fluctuations in output and employment.
  - Demand shocks have real effects because prices adjust slowly.
  - Policy can have real effects.