

Economics II

Lecture 20



School of Economics
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TECHNICAL UNIVERSITY OF LISBON

SINCE 1911

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Lecture 20

Summary :

10.2. Aggregate Demand Curve

10.3. Aggregate demand and supply shocks

Bibliography:

Frank and Bernanke (2011), Chapter 13

Lecture goals:

At the end of this lecture the student should be able to:

- Understand the concept of aggregate supply curve.
- Understand the equilibrium of short and long term in the model AD / AS.
- Understand the changes in these equilibrium as a result of demand shocks or aggregate supply shocks
- Understand the effects of economic policy in this model.

Exercises:

- 8.9. and 8.12.
- 9.2., 9.3. e 9.6. (week 13-17May).
- 10.1., 10.9. e 10.13. (week 20-24 May).

10.2. Aggregate Supply Curve

In the previous point we found that aggregate demand (AD) corresponds to the simultaneous equilibrium in:

- goods and services market (GSM),...
 - ... represented by the equation $Y = D$,...
- ... and the monetary market (MM),...
 - ... represented by the equation $M^s = M^d$.

But have not analyzed the equilibrium in the labor market (LM).

Related to LM in previous points we studied:

- Long run output (or potential, Y_p) is associated with natural unemployment rate (u_p);
- The output gaps, the cyclical gaps of the product ($Y - Y_p$) are associated to cyclical unemployment ($u - u_p$)...
- ... through what we called Okun's law.

In LM we have :

- a demand for labor (N^d) representing the intentions of enterprises to hire workers's services;
- A labor supply (N^s) representing the intentions of workers to provide services to companies;
- an equilibrium when $N^s = N^d$.

In Keynesian model studied in Chapter 8:

- there was underuse of capacity (including supply of labor) such that ...
- Searching for work ... (by firms) was simply determined by the level of economic activity (Y).
- Therefore, changes in aggregate demand determined the product (and the employment) equilibrium ...
- ...without visible consequences on the price level.

The observation of the existence of nominal stickiness:

- may be due to the existence of "menu costs" which discourage price modification ...
- But ... does not apply to all situations or firms.

The aggregate supply function (AS) represents the situations when:

- There is equilibrium in the labor market ($N^s = N^d$)...
- ... and such is compatible with the technology and installed capacity.

The AS function (short run AS) shows the equilibrium relationship that must exist between the product and the price level so that there is balance in the LM:

$$AS(Y, P, \bullet) = 0$$

- In the short-term, changes in the product correspond to changes in employment, since the other factors of production (e.g. Fixed Capital) require more time to be "installed."

In wage bargaining in the period $t - 1$ for the subsequent period (t):

- firms have a reasonable idea about the price level (P) that will exist...
- ... but workers have to form an expectation (P^e) for this index ...
- ...because their real wages depend on P .
- Nominal wages (price fixed in LM) will depend on that price level expected by workers.
- Thus, in period t a significant share of wage costs is already decided by firms.

Thus, situations in which there is not (much) excess of capacity:

1. If the real product at present (t) is at the “normal” level (potencial), it means if $Y_t = Y_p$...

... companies' sales are at their normal level.

- Therefore, there is no need to hire or fire workers beyond what is "normal" and ...
- ... Each company has no incentive to change their prices relative to other prices ...
- ... including those of its factors of production (labor, raw materials, etc..).
- Without "surprises," the price index is fixed at the level that workers had predicted: $P_t = P_t^e$

2. If the real product at present (t) is below its “normal” level (potential) it means if $Y_t < Y_p$...

... companies' sales are below their normal level.

- To respond to this situation, companies use resources (including labor) at a degree below its normal ...
- ... Each company has an incentive to lower its prices in order to not lose too much sales.
- But the lower rate of use of resources (including labor) leads to a fall in prices of factors (including labor).
- With this “surprise” , the price index is fixed at a level which is lower than the level that the workers had predicted:

$$P_t < P_t^e$$

3. If the real product at present (t) is above the “normal” level (potential), it means that , if $Y_t > Y_p$...

... sales of firms are above their normal level.

- To respond to this situation, companies use resources (including labor) at a degree above its normal ...
- ... Each company has an incentive to raise their prices in relation to their costs
- But the higher rate of use of resources (including labor) leads to a rise in the prices of factors (including labor).
- With this "surprise," the price index is fixed at a level higher than the level that workers had predicted: $P_t > P_t^e$

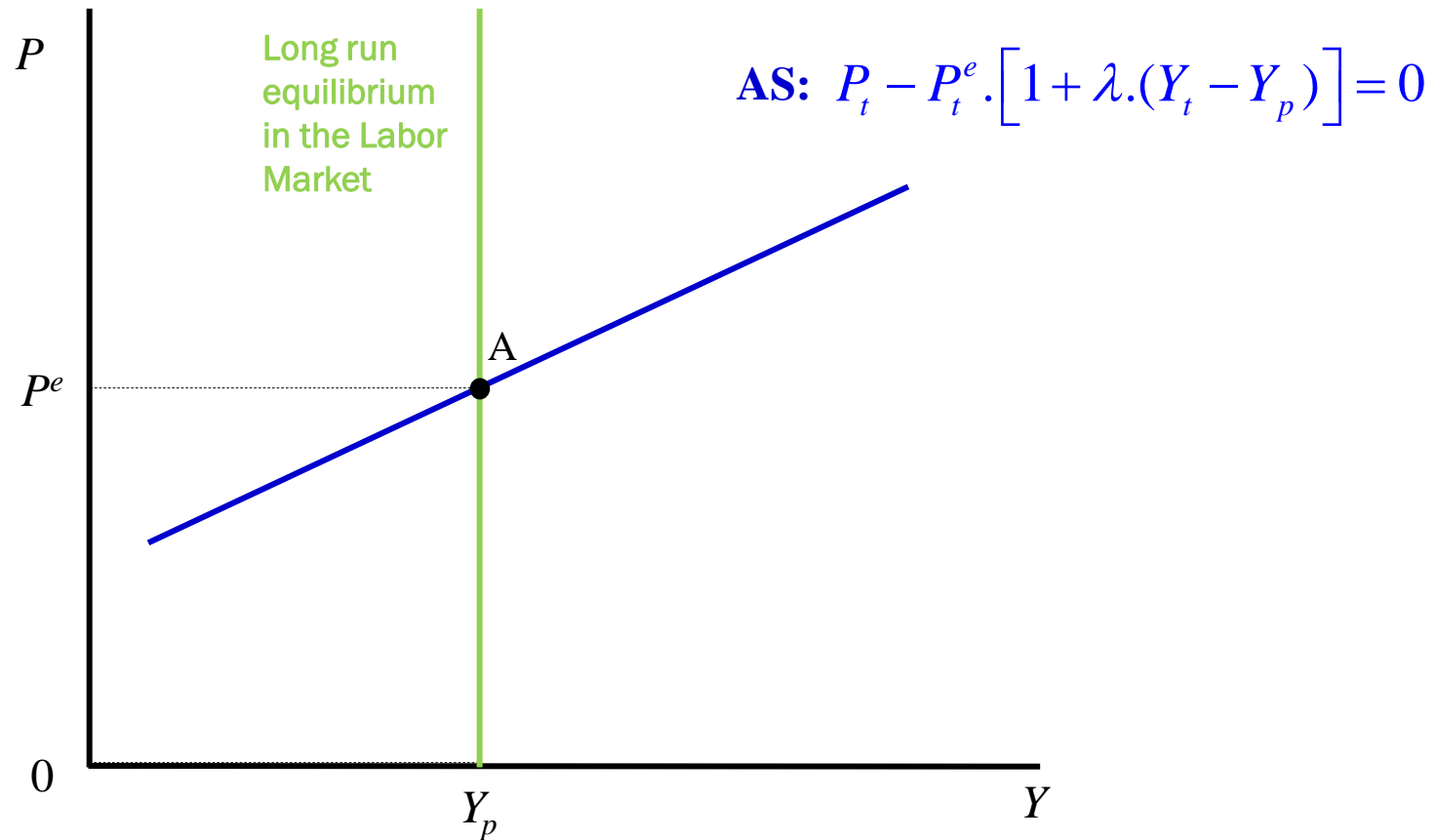
In brief:

- What determines the price level in the short term?
- Answer:
 - The expectations of workers (P^e) and ...
 - ... The output gap at that period ($Y_t - Y_p$).
- This behavior can be represented by this AS function:

$$P_t - P_t^e \cdot [1 + \lambda \cdot (Y_t - Y_p)] = 0$$

- Note that:
 - If $Y_t = Y_p$ then (workers did not make mistakes in their forecast); $P_t = P_t^e$
 - If $Y_t < Y_p$ then (overestimate P_t); $P_t < P_t^e$
 - If $Y_t > Y_p$ then (underestimate P_t); $P_t > P_t^e$

Graphical representation of the aggregate supply curve:



In the long run equilibrium output equals potential output, the price level equals the expected price level.

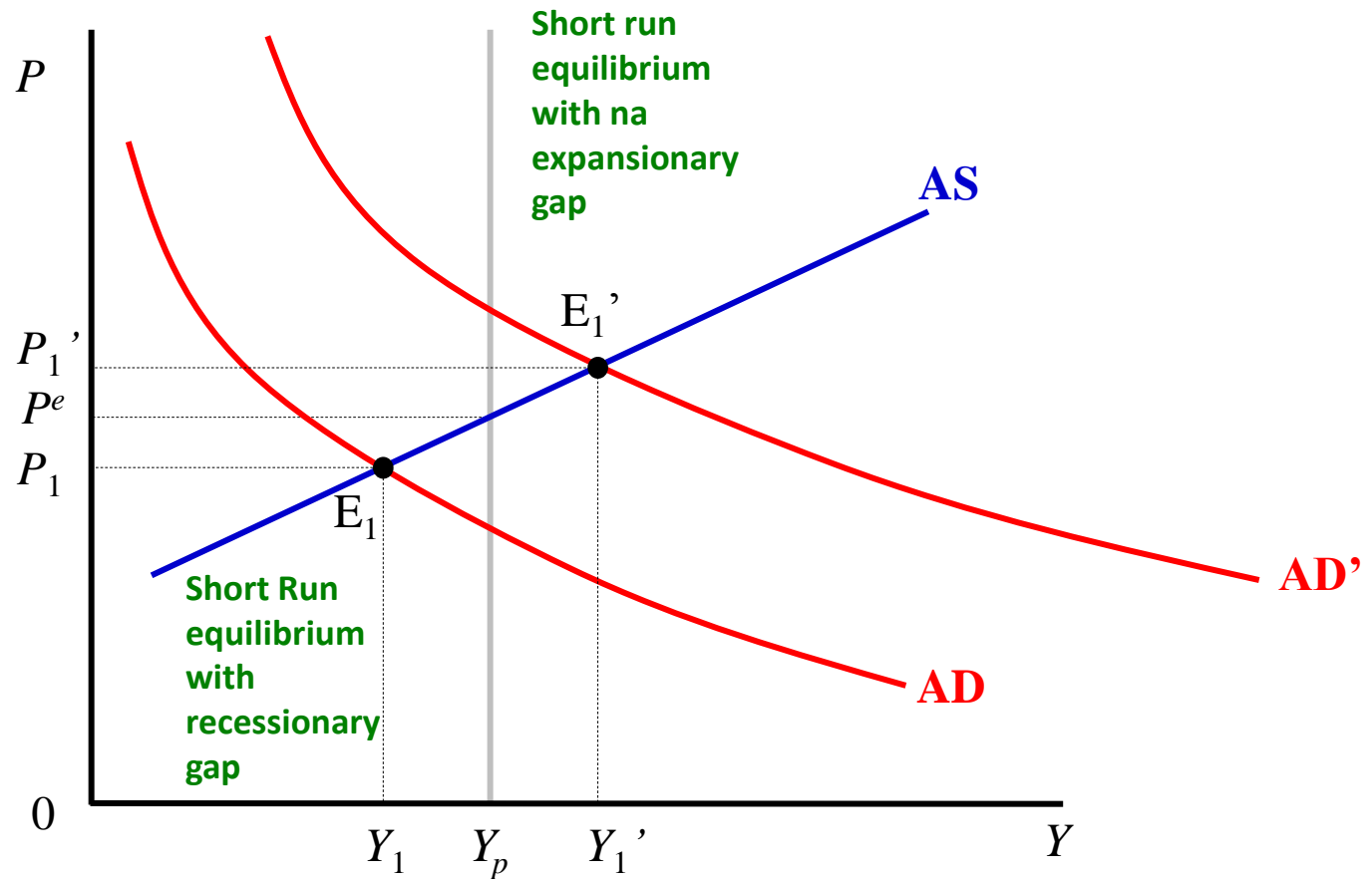
But in the short run, it can exist an equilibrium with a cyclical deviation of the product and cyclical unemployment because:

- workers' expectations about the price level can fail ...
- and it is not possible quickly adjust all wages and prices (and expectations) to the "new" economic conditions.

Short run equilibrium:

- We consider here that the "short-term" refers to the period in which the expectations of workers and some prices do not react.
- This period is measured in quarters ...
- ... not decades of economic growth!
- A macroeconomic equilibrium in the short run implies a simultaneous equilibrium in :
 - Goods and services market; } AD
 - Monetary market ;
 - Labor market. → AS
- Graphically, it occurs at the intersection of **AD** and **AS** curves.

Graphical representation of the short-run equilibrium:



Inertia in expectations and prices:

- For simplicity, we assume that workers follow a very simple rule in formulating their expectations:

$$P_t^e = P_{t-1}$$

- When they bargain the wages for t , the workers expect that the levels of prices will be equal to $t - 1$.
- Remember that during the period t only part of prices (and wages) can be modified when there are "surprises."
- With these assumptions, the AS curve gives the evolution of the price level across time dependent on the output gap:

$$P_t - P_{t-1} \cdot \left[1 + \lambda \cdot (Y_t - Y_p) \right] = 0 \Leftrightarrow \frac{P_t - P_{t-1}}{P_{t-1}} = \lambda \cdot (Y_t - Y_p)$$

π_t

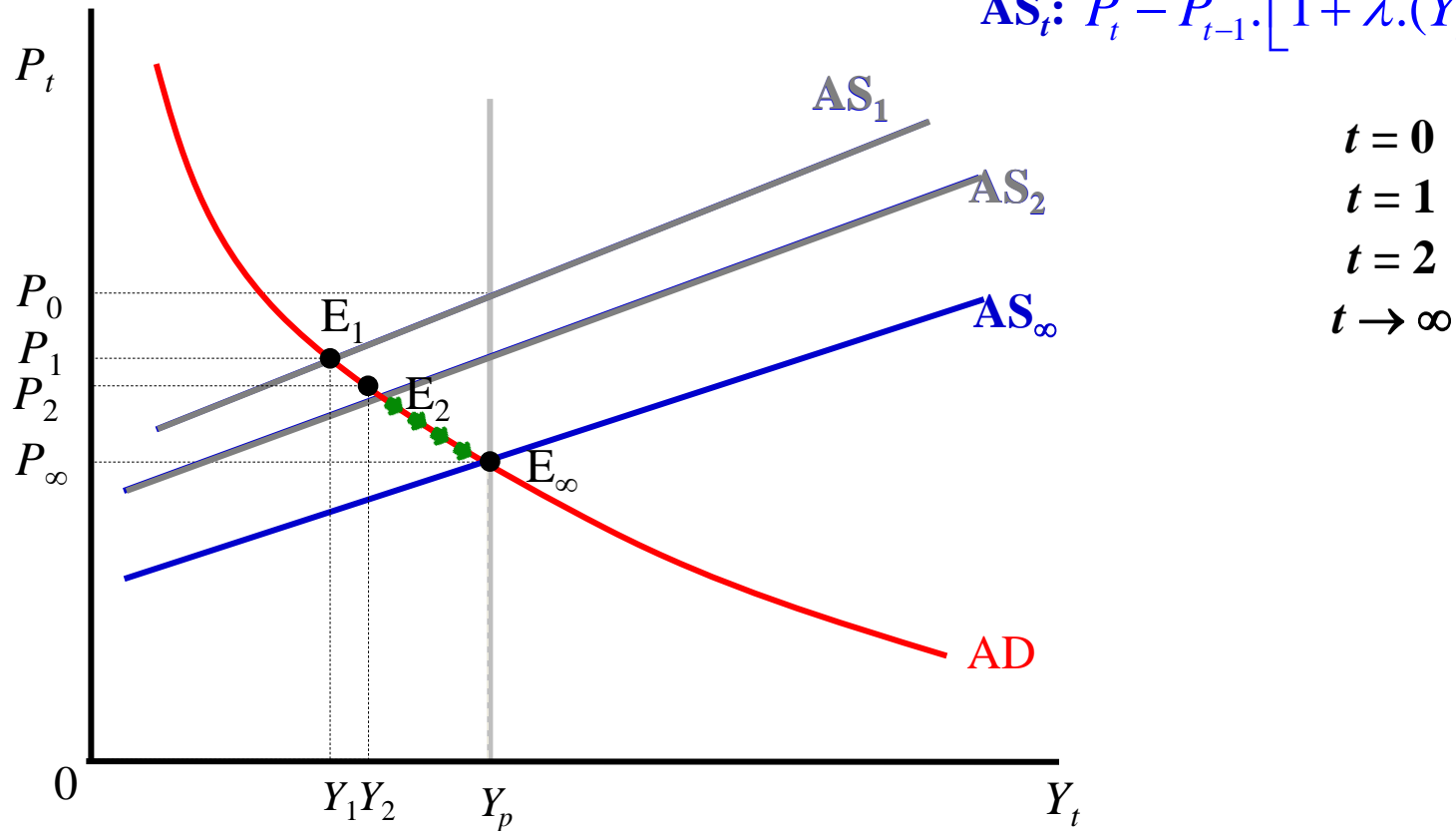
This means that the economy will automatically adjust across time.

How is the adjustment process, namely the transition from short term to long term?

- With a recessive gap at period t ($Y_t < Y_p$), the general price level will tend to decrease (deflation).
- With an expansionary gap at period t ($Y_t > Y_p$), the general price level will tend to increase (inflation).

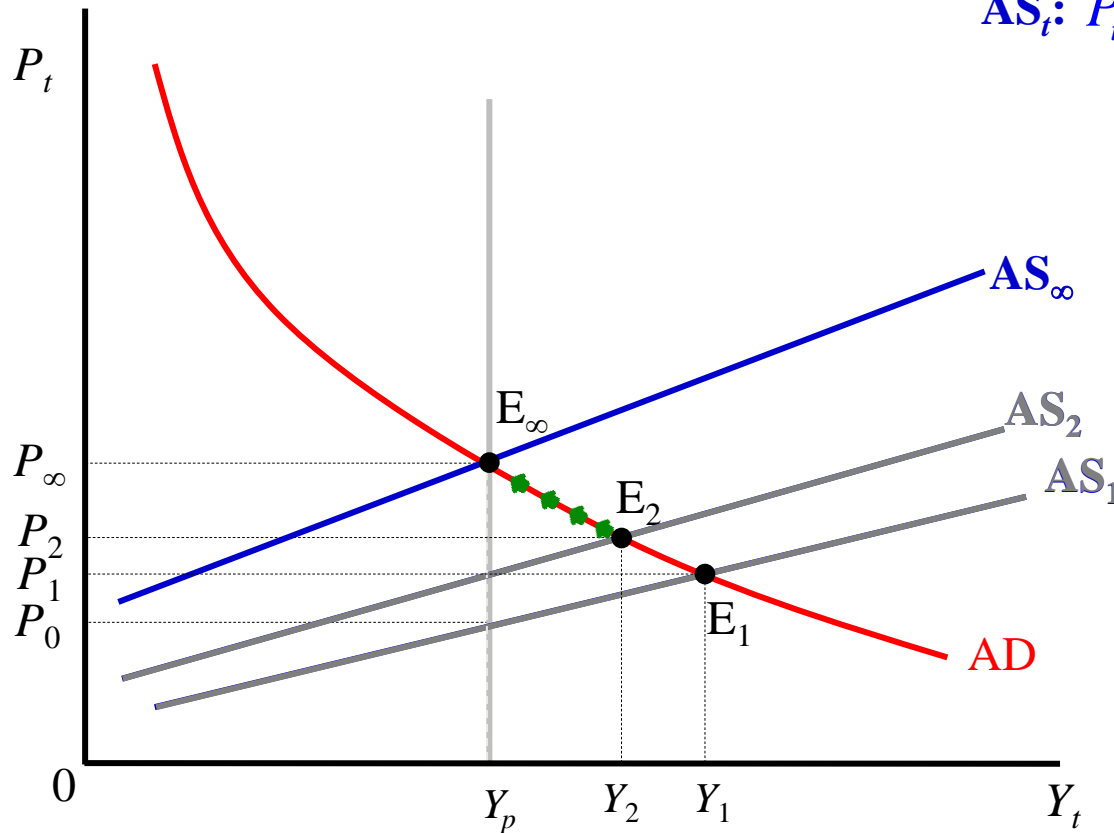
Adjustment of short run equilibrium to a long run equilibrium with a recessive gap .

$$AS_t: P_t - P_{t-1} \cdot [1 + \lambda \cdot (Y_t - Y_p)] = 0$$



Adjustment of short run equilibrium to long run equilibrium with an expansionary gap .

$$AS_t: P_t - P_{t-1} \cdot [1 + \lambda \cdot (Y_t - Y_p)] = 0$$



- $t = 0$
- $t = 1$
- $t = 2$
- $t \rightarrow \infty$

In the model AD / AS economy tends to self- correct.

- With enough time, the output gaps tend to disappear without any change in the monetary and fiscal policies.

This does not happen in the basic Keynesian model.

- The basic Keynesian model is a short-term model in which prices do not adjust.
- The long-term adjustments are not considered.

If the as self- correction is slow:

- the active use of monetary and fiscal policies can be important for the stabilization of the product.

If self-correction is fast:

- stabilization policies are not justified as much.

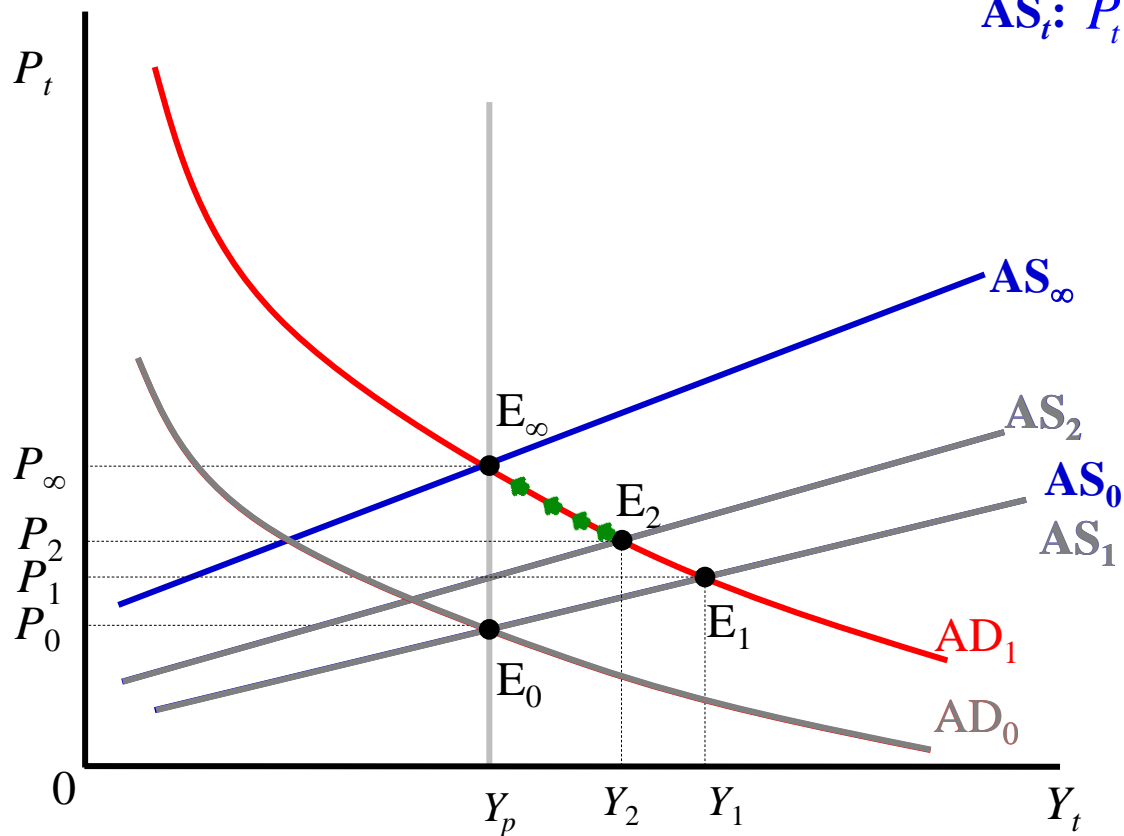
10.3. Aggregate Demand and Aggregate Supply Shocks

The economy is away from its long-term equilibrium level when the price level varies (relative to the expected by workers).

- An increase in the price level may be due to:
 - an "excess" of aggregate demand, ...
 - ... in other words, "too much expense to the volume of goods and services produced normally."
 - If that "excess" was not motivated by a decrease in potential output ...
 - ... This type of disequilibrium (in relation to long term) is identified as a shock or disturbance in demand.

Increase in the price level due to a positive shock (permanent) of aggregate demand:

$$AS_t: P_t - P_{t-1} \cdot [1 + \lambda \cdot (Y_t - Y_p)] = 0$$



$t = 0$
 $t = 1$
 $t = 2$
 $t \rightarrow \infty$

But an increase in the price level may also be due to a disturbance or a supply shock:

- A supply shock shifts the aggregate supply curve.
- In this case, the AS curve is temporarily given by:

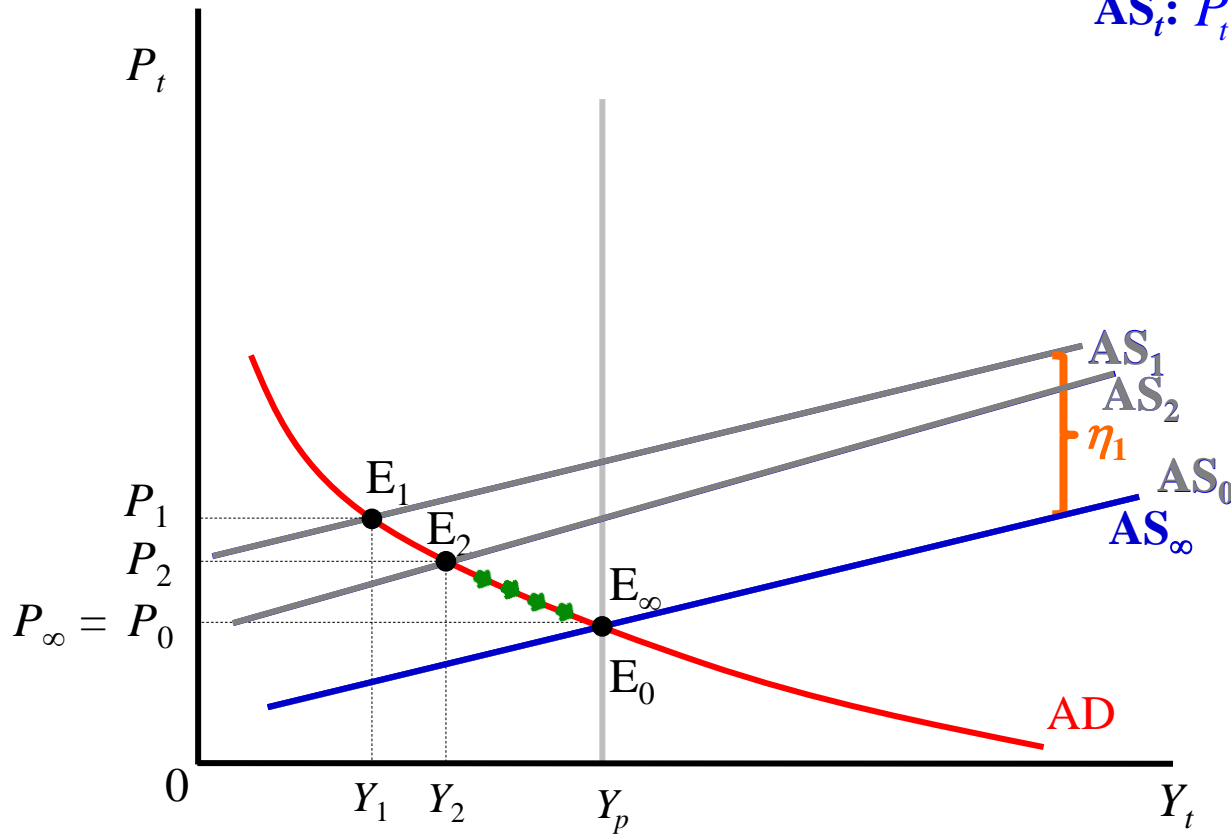
$$P_t - P_{t-1} \cdot [1 + \lambda \cdot (Y_t - Y_p)] = \eta_t$$

- ❖ Has a positive value to an adverse shock.
- ❖ In the long run will have a null value (again).
- ❖ Potential output is not changed with these temporary shocks.



Increase in the price level due to an adverse aggregate supply shock (temporary) :

$$AS_t: P_t - P_{t-1} \cdot [1 + \lambda \cdot (Y_t - Y_p)] = \eta_t$$



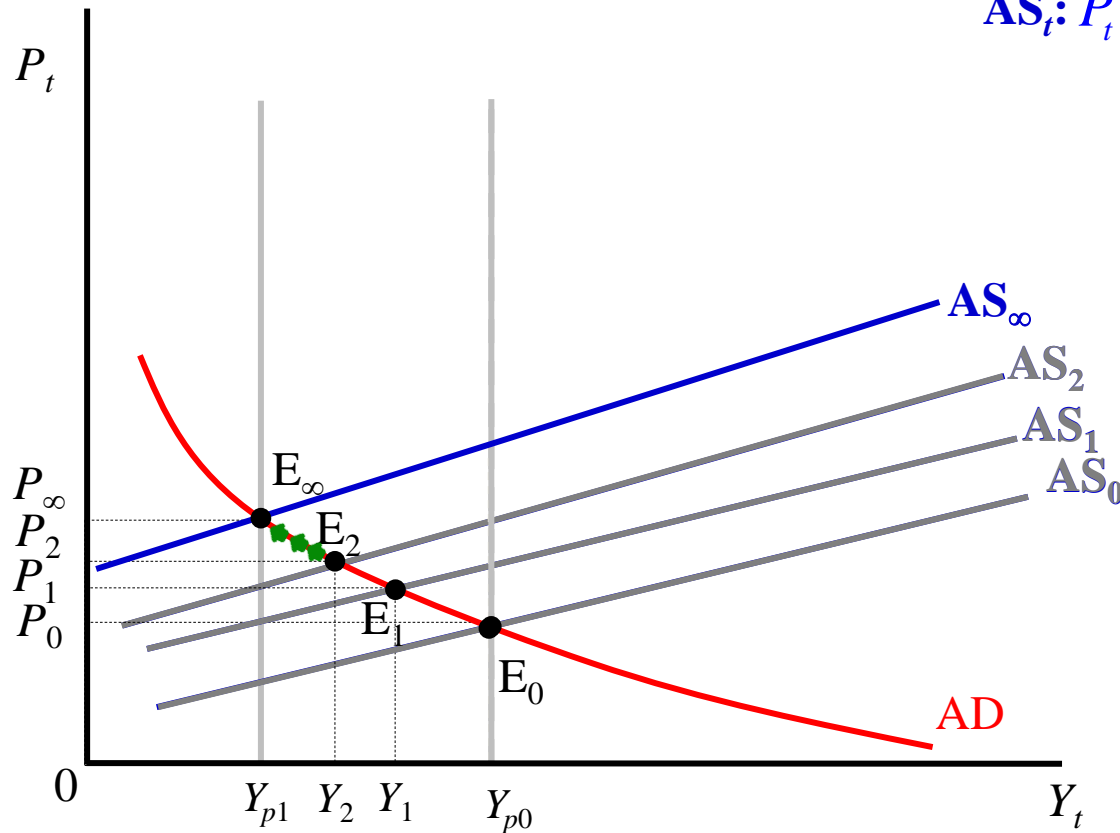
- $t = 0, \eta_0 = 0$
- $t = 1, \eta_1 > 0$
- $t = 2, \eta_2 = 0$
- $t \rightarrow \infty, \eta_\infty = 0$

The increase in the price level may also be due to another type of disturbance or adverse shock to aggregate supply:

- Potential output can change (decrease).
- In this case, the long run product will be permanently lower

Increase in the price level due to an adverse aggregate supply shock (permanent) :

$$AS_t: P_t - P_{t-1} \cdot [1 + \lambda \cdot (Y_t - Y_{p,t})] = 0$$



- $t = 0, Y_p = Y_{p0}$
- $t = 1, Y_p = Y_{p1} < Y_{p0}$
- $t = 2, Y_p = Y_{p1}$
- $t \rightarrow \infty, Y_p = Y_{p1}$

The examples presented to adverse aggregate supply shocks....

May ... also be given also to favorable shocks:

- **either to temporary shocks ($\eta < 0$)...**
- **... either for permanent shocks ($\Delta Y_p > 0$).**

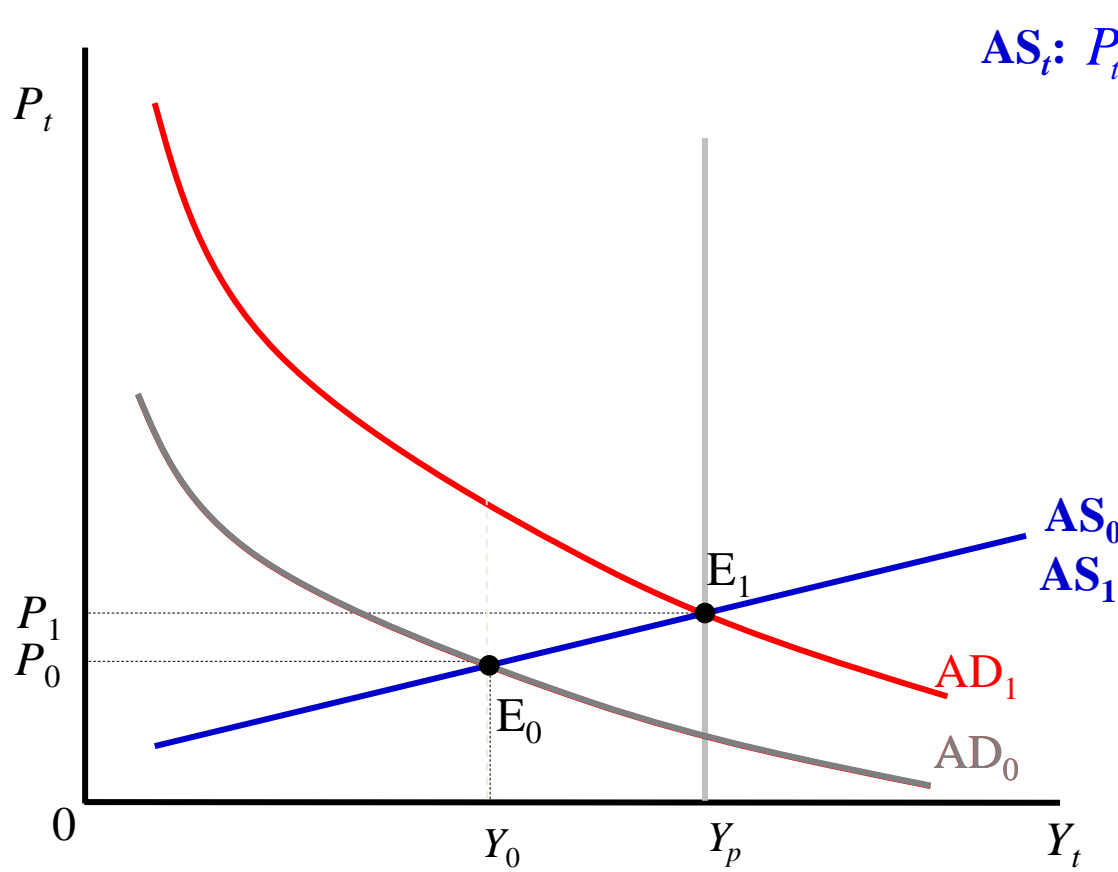
Given a cyclical deviation resulting from a shock, the economic policy authorities have two options:

- a) Leave working the mechanisms of self-correction.**
- b) Use fiscal policy, monetary policy or exchange rate policy to mitigate faster the gap.**

When the option a) is too slow, with big short-term costs, b) should be used.

However, we must be aware that b) also has costs and face constraints.

Using economic policy to correct a recessive gap:



$$AS_t: P_t - P_{t-1} \cdot [1 + \lambda \cdot (Y_t - Y_p)] = 0$$

$t = 0$

$t = 1$

Using an expansionist policy (fiscal, monetary or exchange rate) ...

... the long-term equilibrium can be reached faster ...

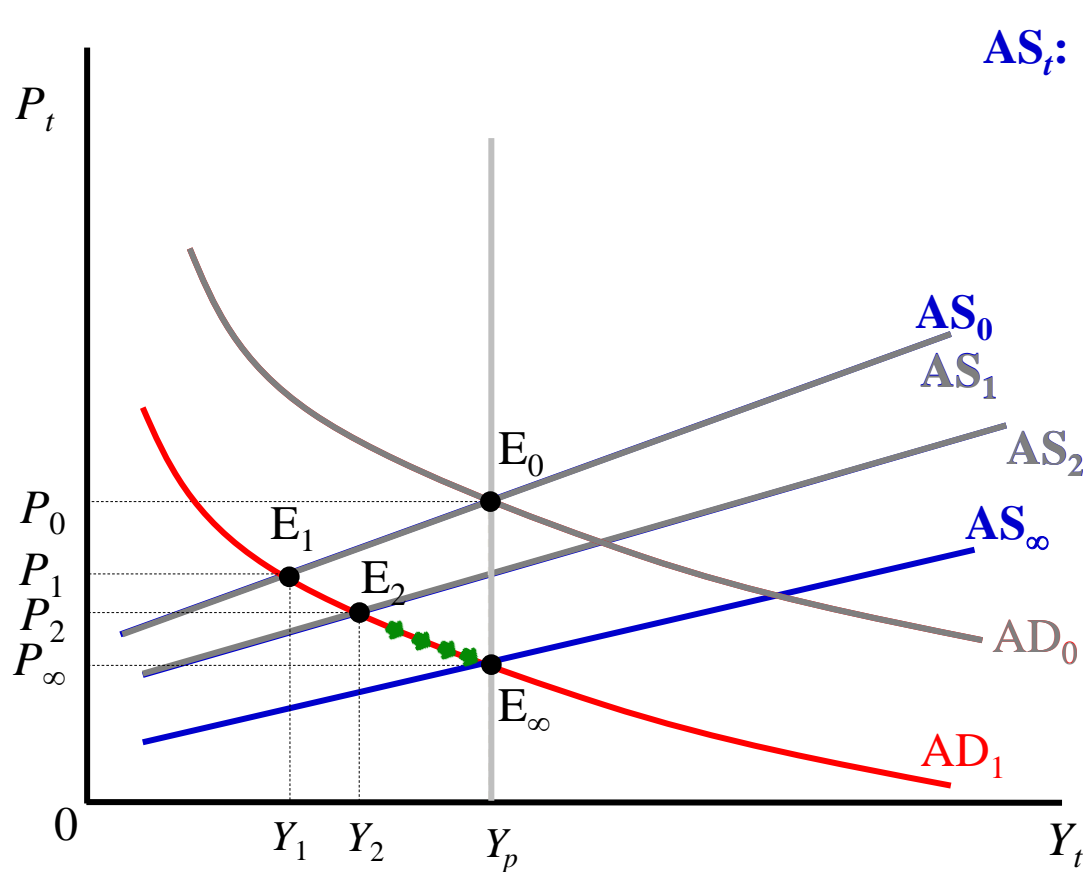
... but the price level rises permanently.

That should make a policymaker if she wants to reduce the price level?

The reduction of price level can increase the external competitiveness of the economy.

- **The price level can be reduced if policies for aggregate demand contraction are adopted .**
- **There are short-term costs of this measure - product decrease and higher unemployment**

Policy for permanent reduction of the price level:



$$AS_t: P_t - P_{t-1} \cdot [1 + \lambda \cdot (Y_t - Y_p)] = 0$$

- $t = 0$
- $t = 1$
- $t = 2$
- $t \rightarrow \infty$

Using a contractionary policy (fiscal, monetary or exchange rate) ...

... adjustment will be done slowly, ...

... but there are costs in product and unemployment during the transition.

Questions for Reflection

If the economic system is so vast and so complex, perhaps it is beyond understanding?

In: Dixon (2001), p. 5.

If I want to work in companies, why I have to learn (a little) Macroeconomics?

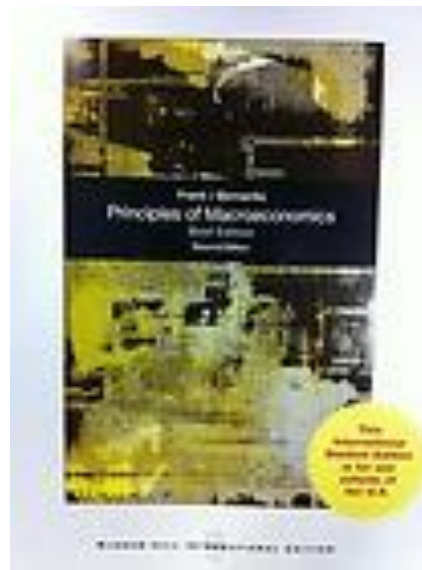
Macroeconomic models (actual models) are so mathematically unsophisticated ?

For what matters macroeconomics for those working in the financial markets?

Thank you for your attention!

Good luck!

And remember ...



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