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Topic 6. Business cycles

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Introduction

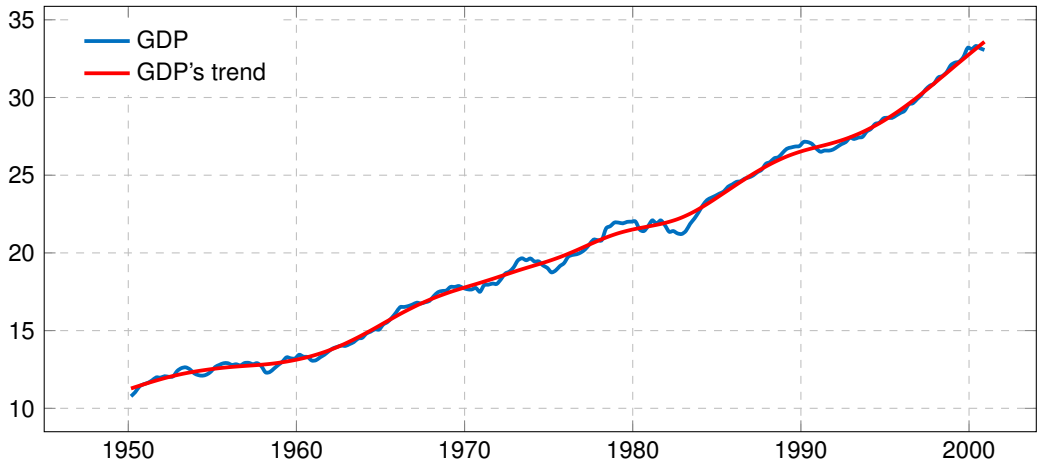
- In the previous topic, we discussed how economies grow over time → Trend component
  - Accumulation of capital per capita... but only up to a limit
  - Productivity growth through technology improvements
- But the economy experiences short-run ups and downs around that trend, aka natural output
  - Why does production fluctuate (ups and downs)?

    → Demand and supply shocks
  - Why does production go back to its trend?

    → The adjustment mechanism

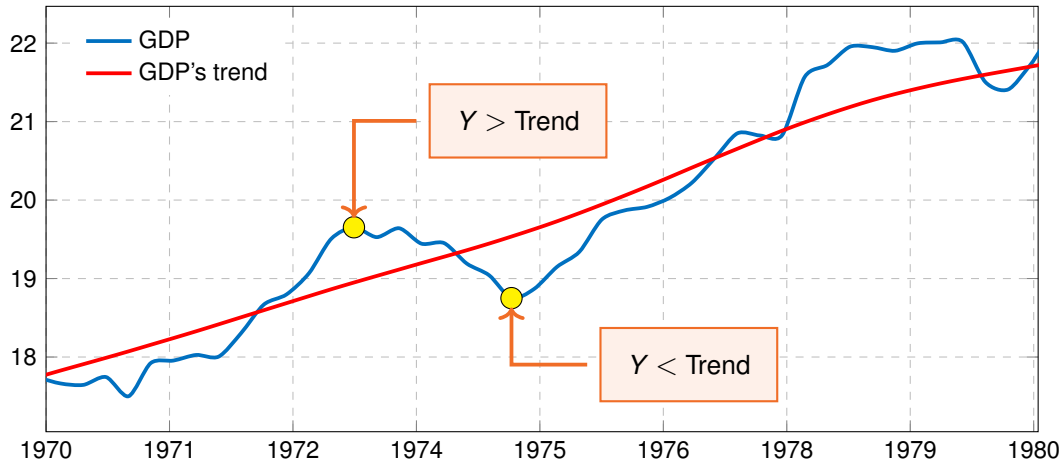
Introduction

US' Real GDP pc (thousands $ 2011)



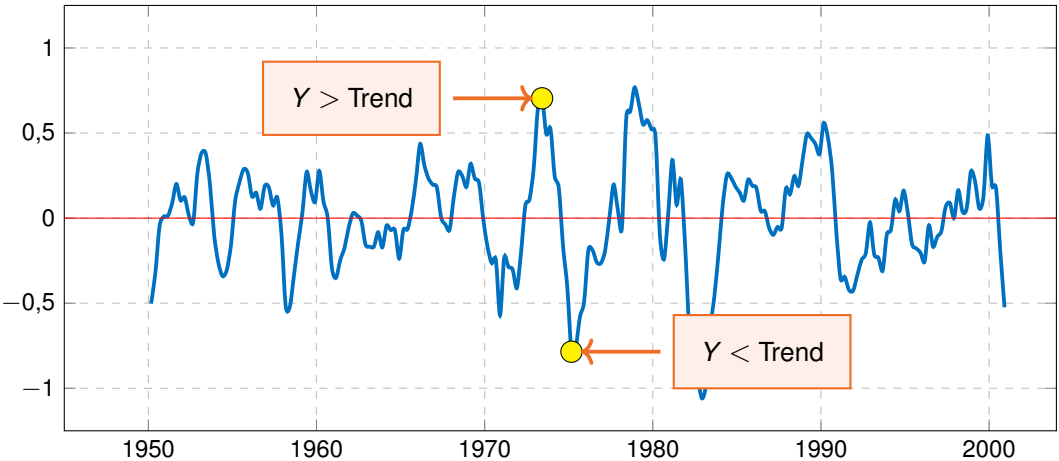
Introduction

US' Real GDP pc (thousands $ 2011)



Introduction

Cycle component of US' Real GDP pc (thousands $ 2011)



Outline

1. Aggregate demand
2. Aggregate supply
3. Dynamics in the short-run

Outline

Aggregate demand

- Aggregate demand: sum of all domestic goods demanded by all agents in the economy (households, firms and governments) and the (net) demand of rest of the world.
- Given an aggregate price level, the aggregate demand in the economy is:

$$Y^D(P) = C + I + G + NX$$

  - C is consumption of households *(a.k.a., private consumption)*
  - I is investments
  - G is government spending *(a.k.a., public consumption)*
  - NX is net exports: exports $-$ imports

Isn't this expression familiar to you? Its like the GDP measured through demand!

Consumption, C

- Consumption: all goods (domestic or foreign) demanded by domestic households.

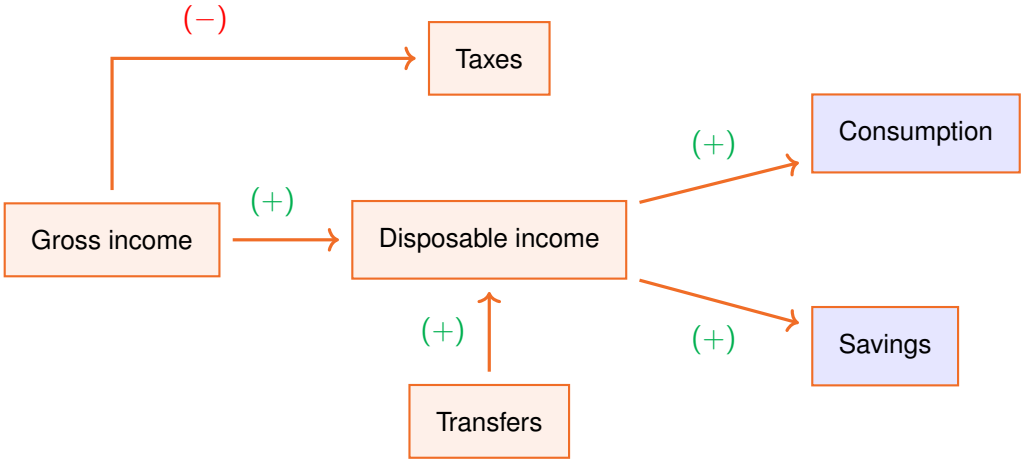
  Aggregate savings is the other side of the same coin: all the income that is not consumed is used for savings saved $\rightarrow$ future consumption

- Which factors does consumption depend on? Consume today *versus* tomorrow (savings)
  - The level of income
  - The level of prices
  - The value of households' assets/wealth
  - Other factors

Consumption, C

- Household income: higher income allows households to buy more goods.
  - Gross income: income household make before paying taxes and receiving transfers.
  - Taxes: when households face higher taxes, they have less income to consume/save.
  - Transfers: money received from the government.
- Household assets / wealth: higher (value) of wealth lowers savings, so consumption rises.
  - Assets/Wealth: when households accumulate more assets/wealth, they need to save less (they have enough savings for future expenses), increasing their demand for goods.
  - Access to and cost of credit: when households have greater access to credit (it is easier to get a loan), or credit is cheaper (lower interest rate), consumption increases.
- Other factors such as a higher level of confidence in the future, also increase consumption.
- The price level: higher price lowers the purchasing power of household income and wealth.

Consumption, C



Investments, *I*

- Aggregate investment: goods (domestic or foreign) demanded by domestic firms.
  - Equipment, computers, other forms of capital, etc. are included here.
  - The purchase of goods that are transformed during the production process are not.

    Examples: supply of energy, paper in an office, steel in a car factory, etc.
- What does investment depend on? Profitability *versus* Costs
  - Level of income: when the income in the economy is high, firms know they will face higher demand so they invest more to be able to serve it.
  - Access to and cost of credit: when credit is easy to get and/or cheaper, firms invest more.
  - Corporate taxes: when corporate taxes decrease, investing is more profitable.
  - Other factors: such as business confidence in the future also increase investment.

Government spending, G

- The government collects taxes from households and firms and use this money to finance:
  - Transfers to households: money that the government gives to households in the pursue of some social goal or to pay for a service.

    Examples: unemployment benefits, a transfer when a baby is born, pensions, the wages of doctors or school teachers, etc..

    - These act as an increase in household income or a decrease in taxes: households have more resources to finance their consumption and savings.
  - The purchase of goods and services needed to provide public services.

    Examples: building a road or an hospital, the computers for the ministries, etc.

    - These purchases are "direct" demand of goods $\rightarrow$ Government spending
- For the time being, assume these variables only depend on the will of the government.

Net exports, NX

- So far, we have seen that:
  - Consumption includes all goods demanded by domestic households.
  - Investment includes all goods demanded by domestic firms.
  - Government spending includes all goods demanded by domestic firms.
- But Y^D measures only the demand of domestic goods!
  - Some of the goods in C, I and G are bought from abroad. $\rightarrow$ these are Imports
  - Some of the domestic goods are demanded by foreigners. $\rightarrow$ these are Exports
- In net terms, we have that net exports are:

$$NX = \text{Exports} - \text{Imports}$$

Net exports, *NX*

- Net exports depend on:
  - The level of income: if our income rises, we'll demand more foreign goods $\rightarrow$ $\uparrow$ Imports
  - The level of foreign income: if foreign income rises, they increase their demand of our goods $\rightarrow$ $\uparrow$ Exports
  - The level of prices: if our prices increase, net exports will decrease
    - We are going to buy more foreign goods $\rightarrow$ $\uparrow$ Exports
    - Foreigners are going to buy less of our goods $\rightarrow$ $\downarrow$ Imports
  - The level of foreign prices: if foreign prices increase, net exports will increase
    - We are going to buy less foreign goods $\rightarrow$ $\downarrow$ Exports
    - Foreigners are going to buy more of our goods $\rightarrow$ $\uparrow$ Imports
  - The exchange rate: if the exchange rate increases, net exports will decrease

Net exports, *NX*

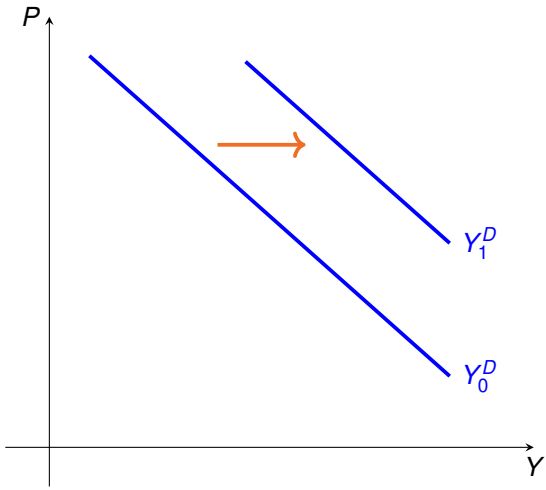
- Exchange rate: how much foreign currency you need to get one unit of our currency.

  Example: if the euro-dollar exchange rate is 1.17, you need \$1.17 to buy €1

- The exchange rate (E) determines:
  - How costly it is for a foreigner to buy goods in our economy: they pay $P \times E$ dollars
  - How cheap it is for us to buy goods from abroad: we pay P^{US}/E euros

	E. Rate = 1.5		E. Rate = 1.9	
	We pay	They pay	We pay	They pay
Spain's good for €10	€10	€15	€10	€19
US good for \$ 10	\$6.7	\$10	\$5.3	\$10

The aggregate demand



- The aggregate demand, Y^D, is decreasing in the level of prices. Why? If $\uparrow P$:
  - Consumption falls because the purchasing power of income and wealth.
  - Net exports fall because it is now cheaper to buy foreign goods (we buy more there, and they buy less here)
- Factor such as a lower cost of credit or a higher foreign price...

  ... induce an increase in aggregate demand for any level of prices.

Summary

	Consumption	Investment	P. Spending	Net Exports	Ag. Demand
↑ Prices	▼	–	–	▼	▼
↑ Income	▲	▲	–	▼	▲
↑ Taxes	▼	▼	–	–	▼
↑ Assets	▲	–	–	–	▲
↑ Cost of credit	▼	▼	–	–	▼
↑ Confidence	▲	▲	–	–	▲
↑ Foreign income	–	–	–	▲	▲
↑ Foreign prices	–	–	–	▲	▲
↑ Exchange rate	–	–	–	▼	▼

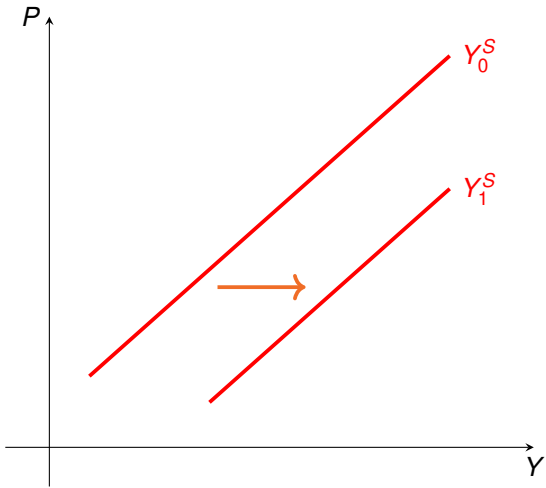
Outline

1. Aggregate demand
2. Aggregate supply
3. Dynamics in the short-run

Aggregate supply

- Aggregate supply: The sum of the supply of goods of all firms in the economy.
- In the short run, firms decide how much to produce taking into account:
  - The level of prices: higher prices increase the supply of each active firm and allows more firms to enter the economy (review topic 3.2).
  - The level of wages: higher wages make production more costly so firms decrease their supply of goods and some firms may prefer to stay inactive.
  - Other costs of production: such as energy prices, price of materials or cost of credit generate an increase in marginal cost, as wages.

Aggregate supply



- The aggregate supply, Y^D, is increasing in the level of prices. Why? Topic 3.2:
  - Active firms find it optimal to produce more (price = marginal cost)
  - Now some inactive firms find it optimal to produce
- Factor such as a lower price of energy or materials, or lower wages...

  ... induce an increase in aggregate supply for any level of prices.

Outline

Macroeconomic equilibrium

- In equilibrium, the supply of goods must equal the demand.

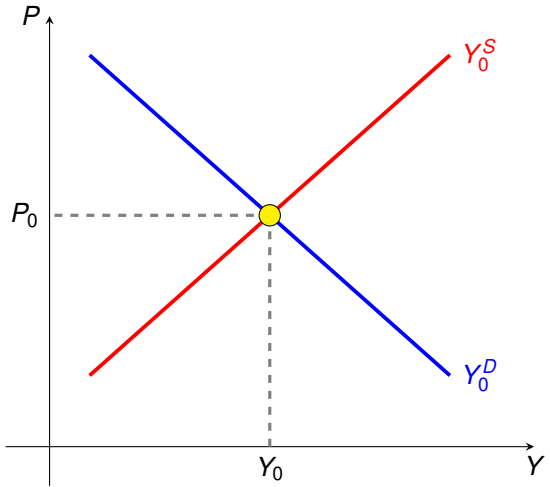
$$Y^* = Y^D(P) = Y^S(P) \quad \longrightarrow \quad P^*$$

  - There is only one level of prices such that his condition holds: the equilibrium price.
  - The equilibrium level of output determines the economy's income!

    Remember: GDP is the sum of all incomes generated in the economy

    $\rightarrow$ Equilibrium output depends on itself!

Macroeconomic equilibrium



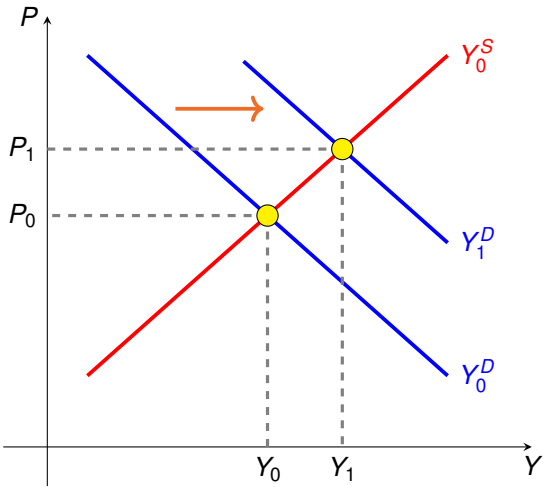
Demand shocks

- What is a demand shock? Any change in the components of demand that makes agents demand more goods given income and prices. For example:
  - Consumption: an increase in the value of assets, a higher level of confidence, a lower cost of credit, a tax cut or a subsidy received from the government.

    All this changes induce households to increase their consumption given income and prices.
  - Investments: a higher level of business confidence, a lower cost of credit or a tax cut

    All this changes induce firms to invest more given income and prices.
  - Government spending: the government decides to build a new road.
  - Next exports: an increase in foreign prices and/or income, or a lower exchange rate.

Demand shocks



- A demand shock shifts the whole curve:
  - To the right is the shock is positive.
  - To the left if the shock is negative.
- A positive demand shocks:
  - Increases production
  - Increases the level of prices

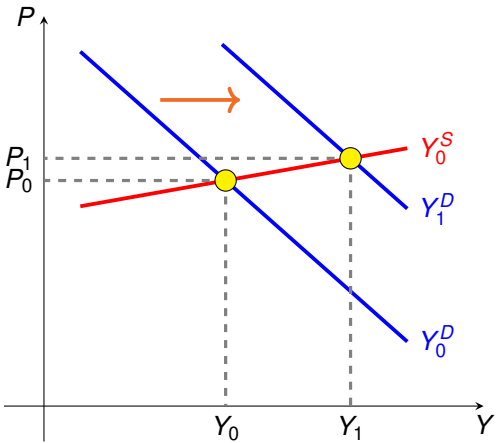
Demand shocks

- The magnitude of these effects on output and prices depends on:
  - The magnitude of the shock: an increase in government spending of €1M will increase demand less that a increase of €2M.
  - The (aggregate) supply elasticity: if the supply is very elastic, a small change in prices generates a large change in supply.

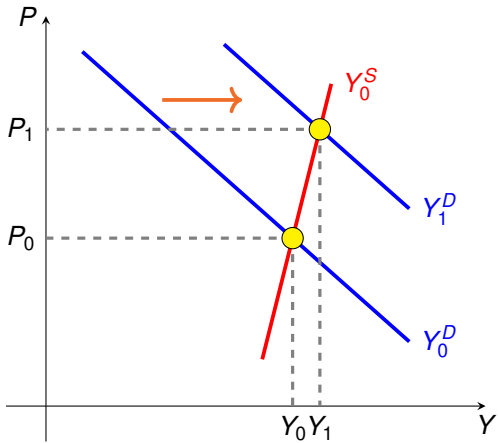
    → Very elastic supply: higher increase in output and lower increase in prices
  - The size of the demand multiplier:
    - An initial increase in demand of €1M, induce an total increase of demand of more than €1M through their effect on consumption, investments and net exports.

Demand shocks

+ Demand shock w/ elastic supply



+ Demand shock w/ inelastic supply



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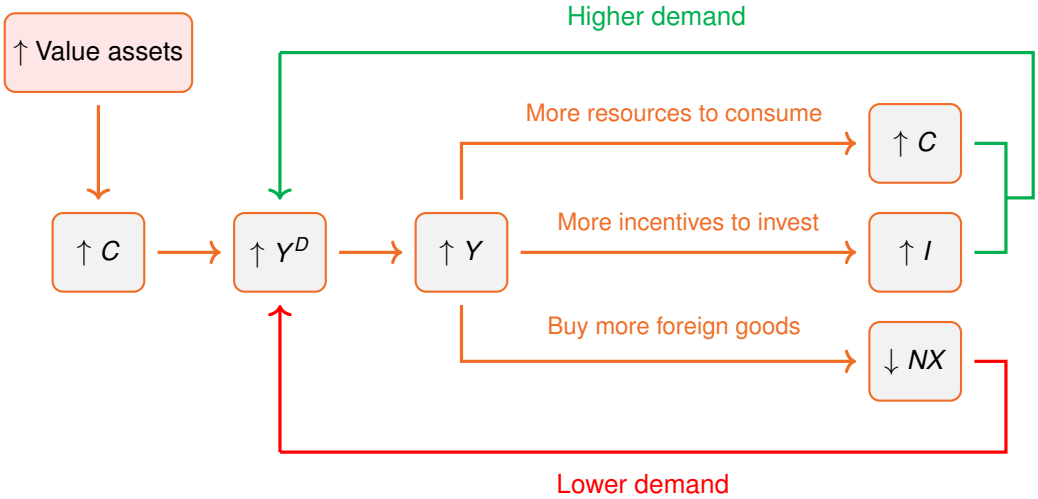

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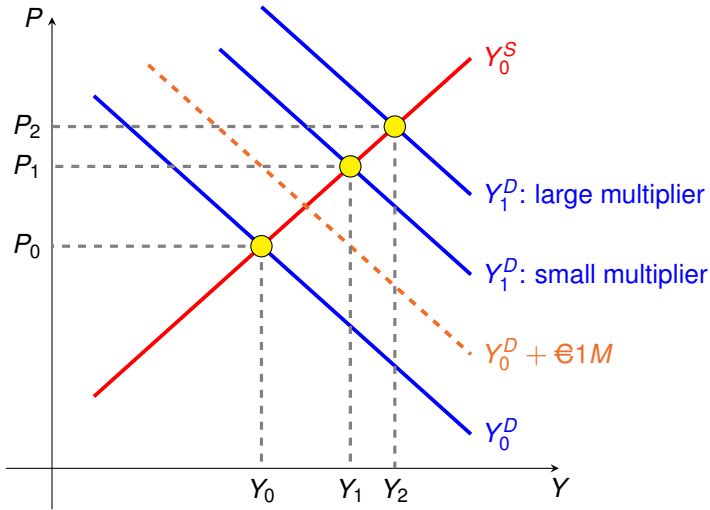
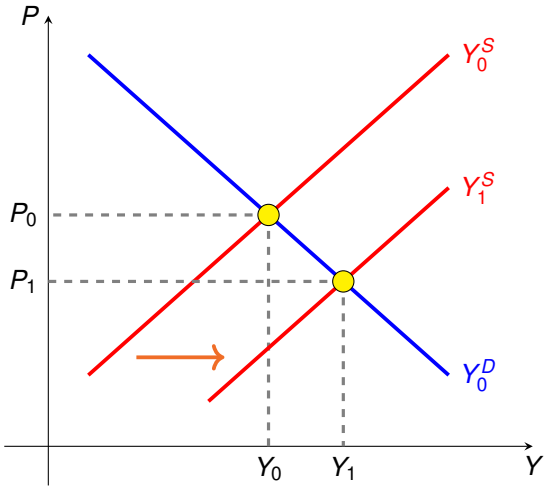


Supply shocks

- What is a supply shock? Any change in the components of supply that induce producers to produce more goods given the level of income and prices in the economy. For example:
  - Wages: an increase in wages, makes production more costly...
  - Other costs: a higher cost of energy or materials makes production more costly...

  ... so that firms reduce their supply (or even shut down), lowering the aggregate supply.

Supply shocks



- A supply shock shifts the whole curve:
  - To the right is the shock is positive.
  - To the left if the shock is negative.
- A positive supply shocks:
  - Increases production
  - Decreases the level of prices

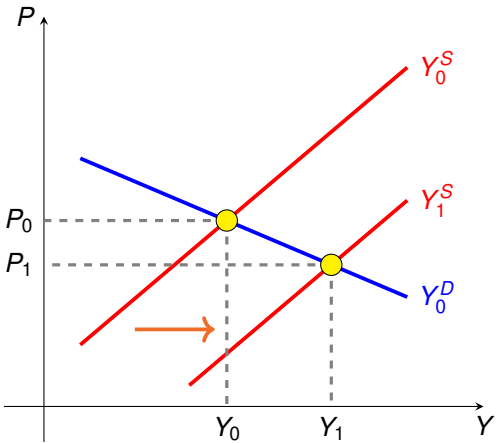
Supply shocks

- The magnitude of these effects on output and prices depends on:
  - The magnitude of the shock: an increase in wages of 20% will generate a larger effect than a 10% increase.
  - The (aggregate) demand elasticity: if the demand is very elastic, a small change in prices generates a large change in demand.

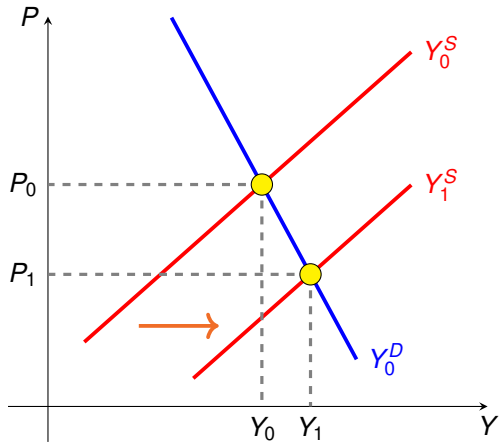
    $\rightarrow$ Very elastic demand: higher increase in output and smaller fall in prices

Supply shocks

+ Supply shock w/ elastic demand



+ Supply shock w/ inelastic demand



Adjustment mechanism

- What we have seen allows us to answer to the first question we asked:

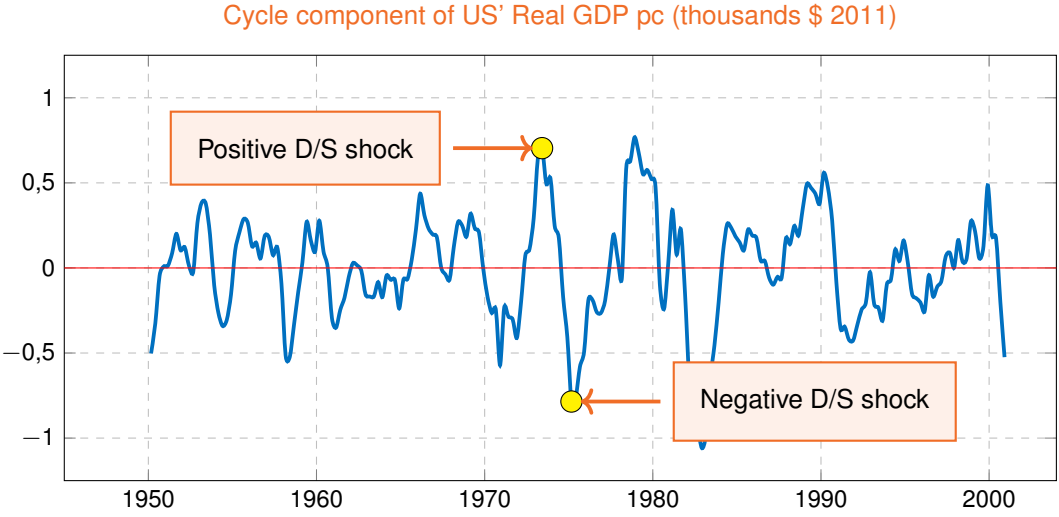
  Why does production fluctuate (ups and downs)?

  - Short-run economic fluctuations are produced by supply and demand shocks that shift aggregate supply and/or aggregate demand, generating changes in output and prices.
  - The magnitude of these fluctuations depend, among other things, on the aggregate elasticity of supply and demand.

- Our second question was: Why does production go back to the trend?

  $\rightarrow$ The key element are wages!

Adjustment mechanism

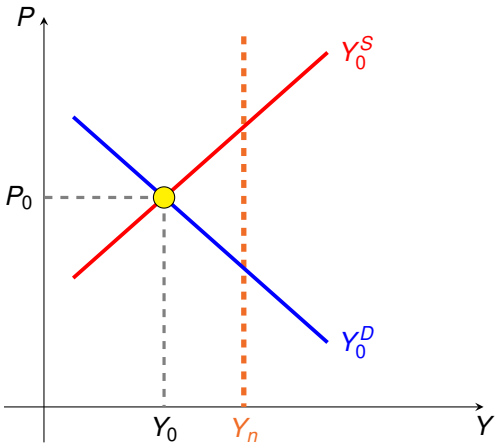


Adjustment mechanism

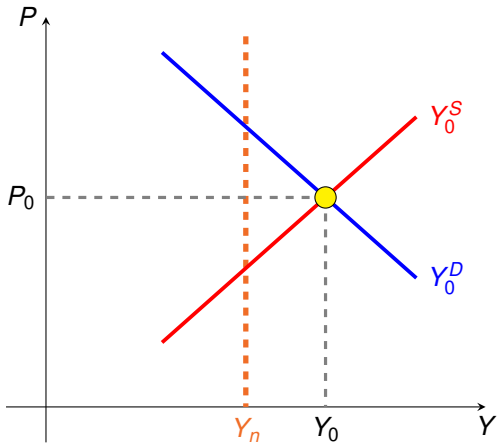
- The economy is hit with supply and demand shocks regularly, but it always converges to the trend component of GDP: the economy fluctuates around this trend.
- At a given point in time, this trend component of GDP is Y_n, also known as "natural output"
  - This is the level of output at which firms operate without overusing nor underusing their normal production capacity.
    - When output is below this natural level, the economy is producing "too little" given its inputs, technology, etc: the economy is in a slump.
    - When output is above this natural level, the economy is producing "too much" given its inputs, technology, etc: the economy is overheated.
  - This level of output is independent of supply and demand factors: it "just" depends on production inputs and technology (topic 5).

Adjustment mechanism

The economy is below the trend



The economy is above the trend



Adjustment mechanism

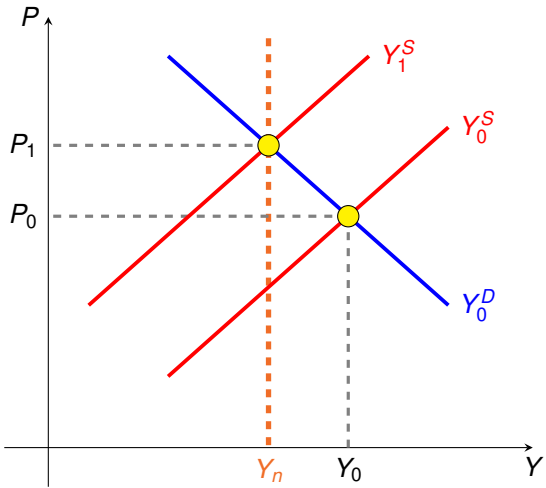
What happens when the economy is above the trend?

- When output is above this natural level, the economy is producing “too much” given its inputs, technology, etc: the economy is overheated.
- To be able to serve this “excessive” amount of goods, firms need to hire more workers, lowering unemployment in the economy.

  Firms use labor to produce this extra output because building capital takes more time.
- When unemployment falls, sooner or later, workers reclaim for a wage increase.
- As a result, the aggregate supply is negatively shocked: now production is costlier.

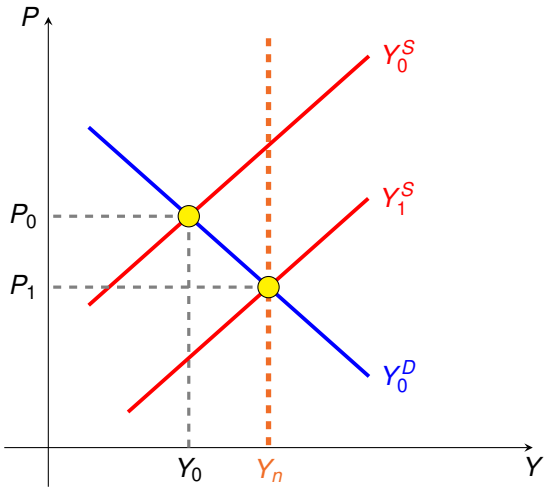
  $\rightarrow$ Production falls!

Adjustment mechanism



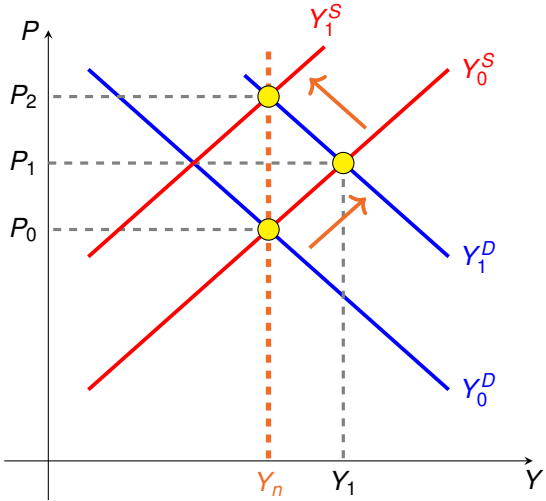
- In this equilibrium, output is above its natural level: firms are producing " too much".
- Sooner or later, unemployment falls and generates an increase in wages.
- Higher wages are a negative shock to supply, that shifts to the left.
- Output falls down to its natural level and prices increase (to compensate for the increase in wages).

Adjustment mechanism



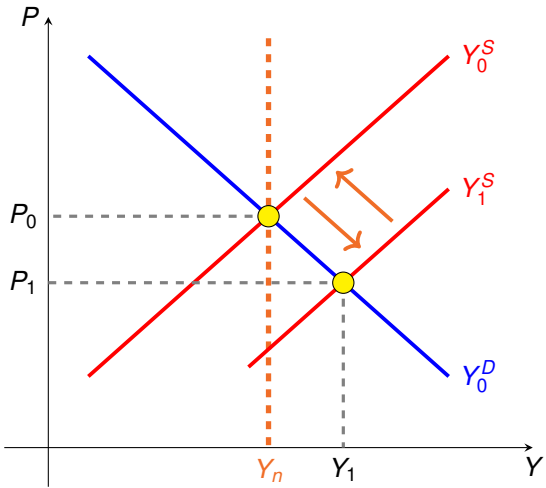
- In this equilibrium, output is below its natural level: firms are producing " too little".
- Sooner or later, unemployment increases generating a fall in wages.
- Lower wages are a positive shock to supply, that shifts to the right.
- Output increases up to its natural level and prices decrease (to compensate for the decrease in wages).

Adjustment mechanism



- Imagine we are in an equilibrium in which $Y = Y_n$.
- At some point, the economy is hit by a positive demand shock.
- New equilibrium: $Y_1 > Y_n$.
- Sooner or later, wages increase, shifting the supply to the left.
- The final equilibrium is one in which production is equal to the initial one but prices are higher.

Adjustment mechanism



- Imagine we are in an equilibrium in which $Y = Y_n$.
- At some point, the economy is hit by a positive supply shock.
- New equilibrium: $Y_1 > Y_n$.
- Sooner or later, wages increase, shifting the supply back to its initial level.
- The final equilibrium is one in which production is equal to the initial one but prices are higher.

Adjustment mechanism

- Overall, the effects of a negative/positive demand/supply shock can be summarized as:

	Initial effects		Final effects	
	Prices	Output	Prices	Output
Positive demand shock	▲	▲	▲▲	–
Negative demand shock	▼	▼	▼▼	–
Positive supply shock	▼	▲	–	–
Negative supply shock	▲	▼	–	–

Questions?