Sources of Fluctuations

Macroeconomics - EF01

Year 2022-2023

Sessions Program

- Session 1: introduction / reminders on macro
- Session 2: aggregate demand
- Session 3: aggregate supply
- Session 4: macroeconomic fluctuations
- Session 5: monetary policy
- Session 6: unconventional monetary policies

Equilibrium

AS/AD Equilibrium

We have derived the following short-term model:

- Aggregate Demand:

$$y_t = \theta_t - \sigma\gamma(\pi_t - \overline{\pi})$$

- Aggregate Supply[1]:

$$\pi_t = \kappa(y_t - y_n^t)$$

[1]Note that to simplify the model, we have left aside the formation of *expectations* by the firms. With adaptive expectations (firms extrapolate trends in inflation) we would have obtained: $\pi_t = \pi_{t-1} + \kappa(y_t - y_n^t)$

AS/AD Equilibrium

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We can now solve for the (inflation π_t / output y_t) pair that corresponds to shocks (demand θ_t, supply y_t^n).

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Short-Term Effect of Shocks

We obtain:

$$y_t = constant + \left(\frac{1}{1+\sigma\gamma\kappa}\right)\theta_t + \left(\frac{\sigma\gamma\kappa}{1+\sigma\gamma\kappa}\right)y_t^n$$

$$\pi_t = constant + \left(\frac{\kappa}{1+\sigma\gamma\kappa}\right)\theta_t - \left(\frac{\kappa}{1+\sigma\gamma\kappa}\right)y_t^n$$

Terms in brackets are called *multipliers*.

We see they have the expected sign.

Let's look briefly at how we can interpret their effect.

Demand Shock

Demand Shock

What does θ_t represents? What causes a negative shift to the demand curve?

Demand Shock

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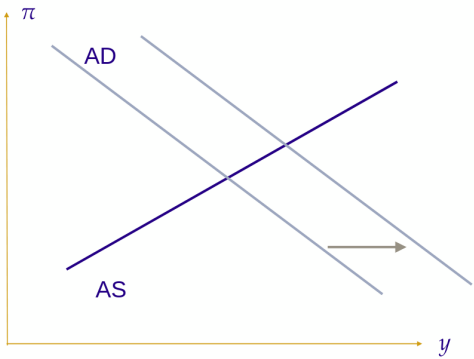
- Changes in consumer's preferences (desire to consume)
- Changes in consumer's and firm's expectations (about their future) income
- Higher uncertainty in consumer's and firms forecasts
- Shifts arising from net exports (reduced demand for domestic goods, exchange rate fluctuations)
- Changes in the central bank's monetary policy (e.g. interest rate hikes)
- Reduction in government purchases

Demand Shock



A shock θ_t to aggregate demand:

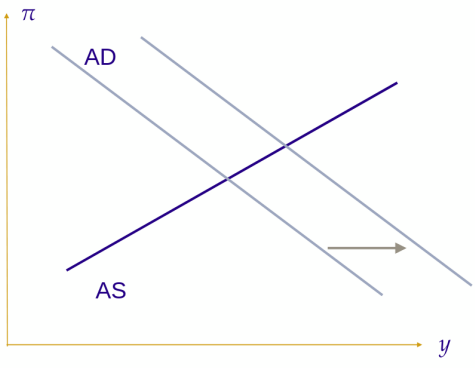
- Changes output by

$$y_t = \left(\frac{1}{1 + \sigma\gamma\kappa} \right) \theta_t$$

- Changes inflation by

$$\pi_t = \left(\frac{\kappa}{1 + \sigma\gamma\kappa} \right) \theta_t$$

Demand Shock



- We see the crucial parameters:
  - σ: investment-savings decision from consumers and firms
  - γ: reaction of the central bank
  - κ: price-setting behaviour of firms
    - larger when more firms adjust

Can we tell an intuitive story using the mechanisms we have seen so far?

Demand Shock

Theoretical Impact: Short Run

Can we describe intuitively what happens? (try it at home)

- Increased aggregate demand for goods...

Demand Shock

Theoretical Impact: Short Run

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- Increases production...

Demand Shock

Theoretical Impact: Short Run

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- Increases production...
- Which increases demand for labour...

Demand Shock

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Demand Shock

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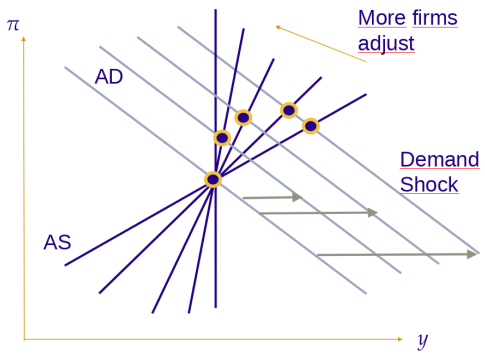
- Which drives real wages up (because labour supply is not perfectly elastic)
- Which increases production real costs...
- Which is translated into price inflation (but not 1 to 1 because not all firms adjust)
- Increased prices discourage demand, which partially compensates for production increase.

Demand Shock

Theoretical Impact: Dynamics



Consider a **transitory shock**

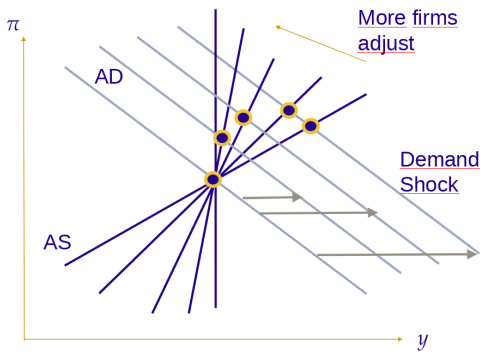
- i.e. a shock that lasts for a few periods before vanishing away.

As more firms have time to adjust the slope of AS curve increases

- remember slope is given by $\frac{\omega}{\kappa(1-\omega)}$ where ω is the number of firms that have adjusted
- slope goes from short term AS to LRAS

Demand Shock

Theoretical Impact: Dynamics

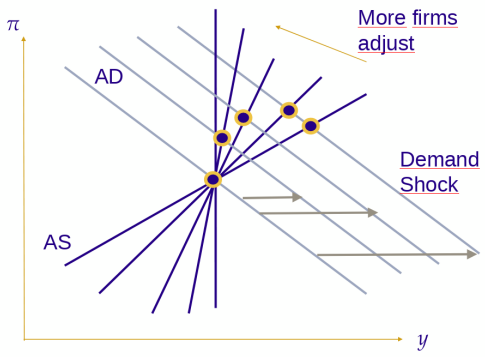


Here is an informal description of the *inflation dynamics*:

- There is an initial rise in inflation (due to the demand shock)
- Then more inflation as firms adjust their prices (rotation of AS curve)
- Inflation returns to normal when the demand shock ends
- The faster prices adjust the higher the inflation

Demand Shock

Theoretical Impact: Dynamics



What about output dynamics?

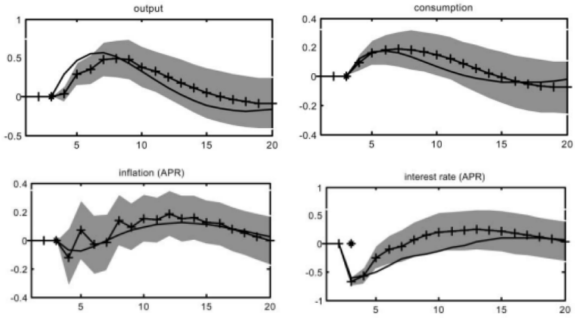
- Initially it rises with the demand
- Gradually comes back to normal as the effect of the demand shock vanishes.
- The faster prices adjust the shorter the effect on output

Demand Shock: Empirical Check

Graph shows the effect of a "pure" demand shock: an *unexpected monetary policy shock*[a]

It compares response of economic variables:

- In the data (econometrics: VAR estimate)
- In a workhorse NK model with nominal rigidities (DSGE modeling)
- Both look rather similar

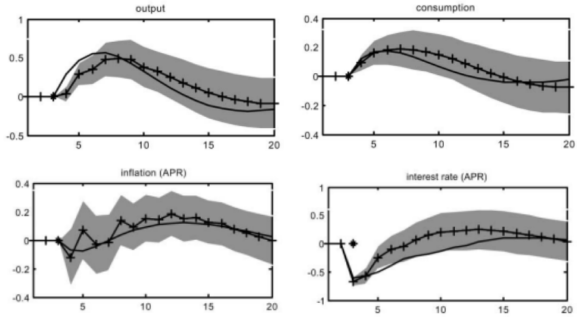


[a]From: *Nominal Rigidities and the Dynamic Effect of a Shock to Monetary Policy*, Christiano, Eichenbaum and Evans, Journal of Political Economy, 2005}

Demand Shock: Empirical Check

Compare with our model

- Output and consumption increase and return slowly to equilibrium
- Rise in inflation is slower than increase in output
- Central bank reacts to inflation by changing interest rate in the same direction
  - consistent with IS-MP



Mini Quizz

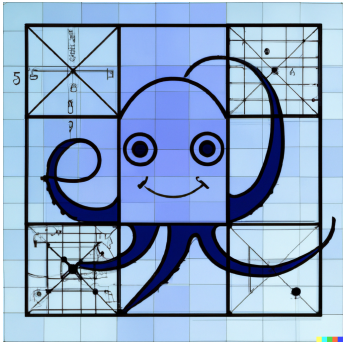


Figure 1: A smiling octopus performing a cognitive test, geometric art. Dall E-2

Quizz 1

Which of the following cases is *not* a good example of a positive demand shock, from the point of view of the *european* economy:

1. US plane makers stop importing german and italian made engines and start producing their own
2. the end of Covid-19 provokes a surge in consumer's optimism
3. credit regulations are updated so that borrowing becomes easier for all households
4. a new kind of low-cost electric stroller becomes a must-have for all urban fashionists

Mini Quizz

Figure 2: An octopus using all tentacles to update prices in front of a restaurant, flat art. Dall E-2

Quizz 2

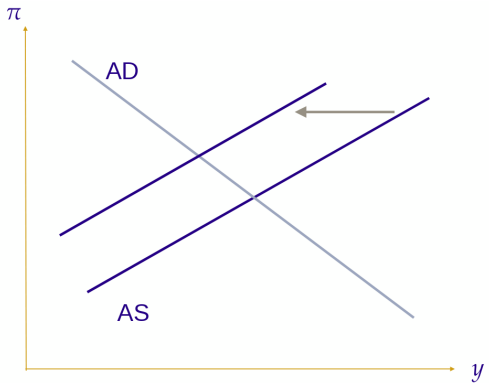
According to the NK version of the AS/AD model, seen during the course, which of the following statements is true:

1. after a temporary demand shock, prices rise, then decrease back to their initial level
2. a persistent positive demand shock reduces the output gap, only until all prices have adjusted
3. any demand shock induces an opposite supply response which will eventually cancel its effects in the long run
4. demand policies are more efficient when prices are more flexible

Supply Shock

Supply Shock

Theoretical Impact



A shock y_t^{nt} to aggregate demand:

- Shifts demand curve to the right
- Changes output by:

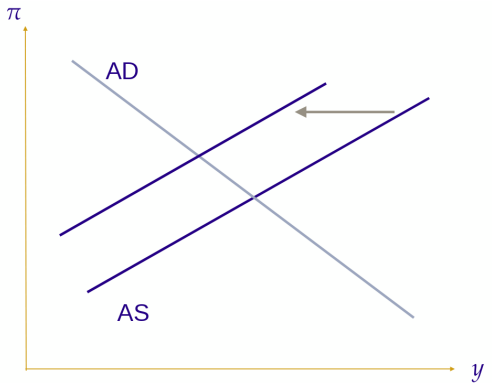
$$y_t = \left(\frac{\sigma\gamma\kappa}{1 + \sigma\gamma\kappa} \right) dy_t^{nt}$$

- Changes inflation by:

$$\pi_t = \left(\frac{\kappa}{1 + \sigma\gamma\kappa} \right) y_t^{nt}$$

Supply Shock

Theoretical Impact



Parameters are the same as before:

- σ: investment-savings decision from consumers and firms
- γ: reaction of the central bank
- κ: linked to the price-setting behaviour of firms

Supply

A supply shock is a shock to natural output y_t^{nt}.

What does it represent? What can cause a shift to the supply curve?

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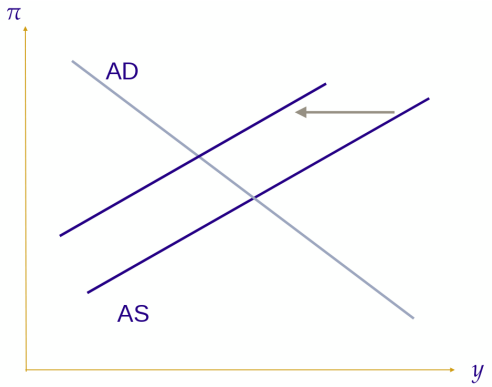
A supply shock is a shock to natural output y_t^{nt}.

What does it represent? What can cause a shift to the supply curve?

- Same changes that affect it in the long run (they affect natural output)
- Changes in the factors of production
- Productivity shock
- Changes to firm's markups
- Changes to firm's expectations

Supply Shock

Stabilization policy

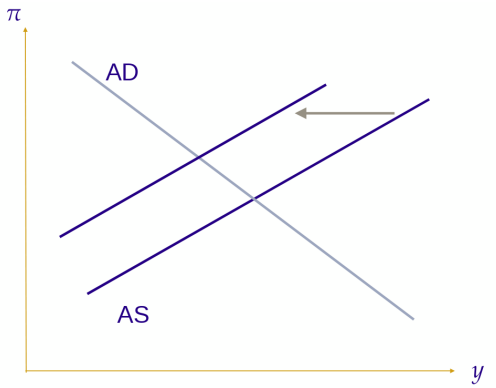


A negative supply shock shifts the AS curve to the left

- Higher inflation
- Lower output

Supply Shock

Stabilization policy

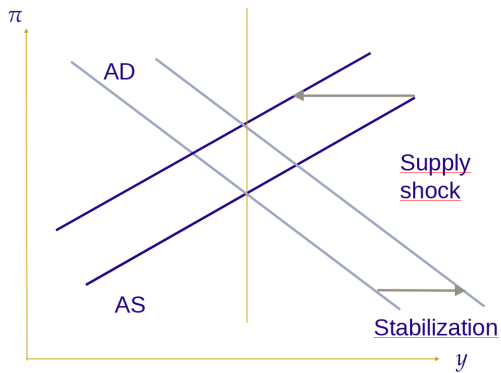


How can governement and central bank mitigate the shock?

- They can't quickly act on supply

Supply Shock

Stabilization policy



Government and central banks can stimulate demand to counteract the supply shock

- government can engage in fiscal policies
- central bank can lower interest rates
  - in this context it is called an *accomodating* policy

But this works only in the short run...

... And raises a few questions for the long run (is it efficient? will debt increase? is higher inflation acceptable?)

Mini Quizz

Figure 3: An octopus, operating an oil well, in a mad max universe. Dall E-2

Quizz 3

Which of the following is not a example of a positive supply shock?

1. an increase in the world oil price
2. the invention of power loom in 1785
3. an increase in the number of migrants of working age
4. the restart of all modes of transportation after the end of the Covid19 strict confinement episode

Mini Quizz

Figure 4: An octopus is the chief of the government. He is heading a meeting with his ministers. Black and white comics. Dall E-2

Quizz 4

After a negative supply shock

1. government purchases can mitigate the effect on unemployment
2. the central bank can't do anything since it is a real shock
3. the economy will stay out of equilibrium until the government or the central bank intervenes
4. firms should change suppliers

Conclusion

Main Takeaways

- After our model, in the short term:
  - (positive) Demand shocks imply a rise in inflation and an increase in output
  - (positive) Supply shocks imply a decrease in inflation and an increase in output
- After a lasting demand shock
  - As prices adjust, initial output increase is reversed
  - When demand falls back to normal, inflation comes back to natural level
  - Real world dynamics also feature lags between reactions of output and inflation
- Monetary and fiscal policy can reverse demand shocks in the short term
- Supply shocks can't be directly conteracted but..
  - Demand policies can accomodate them in the short term (until prices adjust)