Short Run:Reality, Theory, Policy

Monetary Policy Rule

(part 2/3)

T. Kam

File: 04-cycles_mp_apps.tex
Read: Mishkin, Ch. 10

Australian National University

Important News

Week 11 – Assignment #2 available

- Only ONE question.
- Your tutor will return your marked assignment with feedback at the end of Week 13.

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Outline of Talk

Learning Objectives

- Using empirical observations of business-cycle data to inform the design of a simple model.
- Model as:
  - interpretive framework for observed behaviour in data
  - laboratory for studying controlled experiments: shocks and policy changes
- We study this in **three** building blocks:
  - previous lecture: the IS curve
  - this lecture: PC curve
  - this/next lecture: the MP curve; all together

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Learning Objectives

We will see:

- How the central bank effectively sets the real interest rate in the short run, and how this rate shows up as the MP curve in our short-run model.
- That the Phillips curve describes how firms set their prices over time, pinning down the inflation rate.
- How the IS curve, the MP curve, and the Phillips curve make up our short-run model.
- How to analyze the evolution of the macroeconomy in response to changes in policy or economic shocks.

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Motivation

- In most modern economies, central banks play an important role in influencing short run business decisions and business cycle outcomes
- We are interested in understanding how central bank behaviour impacts on the short-run economy in terms of
  - output fluctuations,
  - inflation changes,
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Background

Monetary Policy: nuts and bolts

- Large banks and financial institutions borrow from each other.
- Central banks set the *nominal interest rate* by stating what they are willing to lend or borrow at the specified rate.
- *No-arbitrage opportunities*:
  - Banks cannot charge a higher rate
    - everyone would use the central bank
  - Banks cannot charge a lower rate.
    - They would borrow at the lower rate and lend it back to the central bank at a higher rate.

  Thus, banks must exactly match the rate the central bank is willing to lend at.

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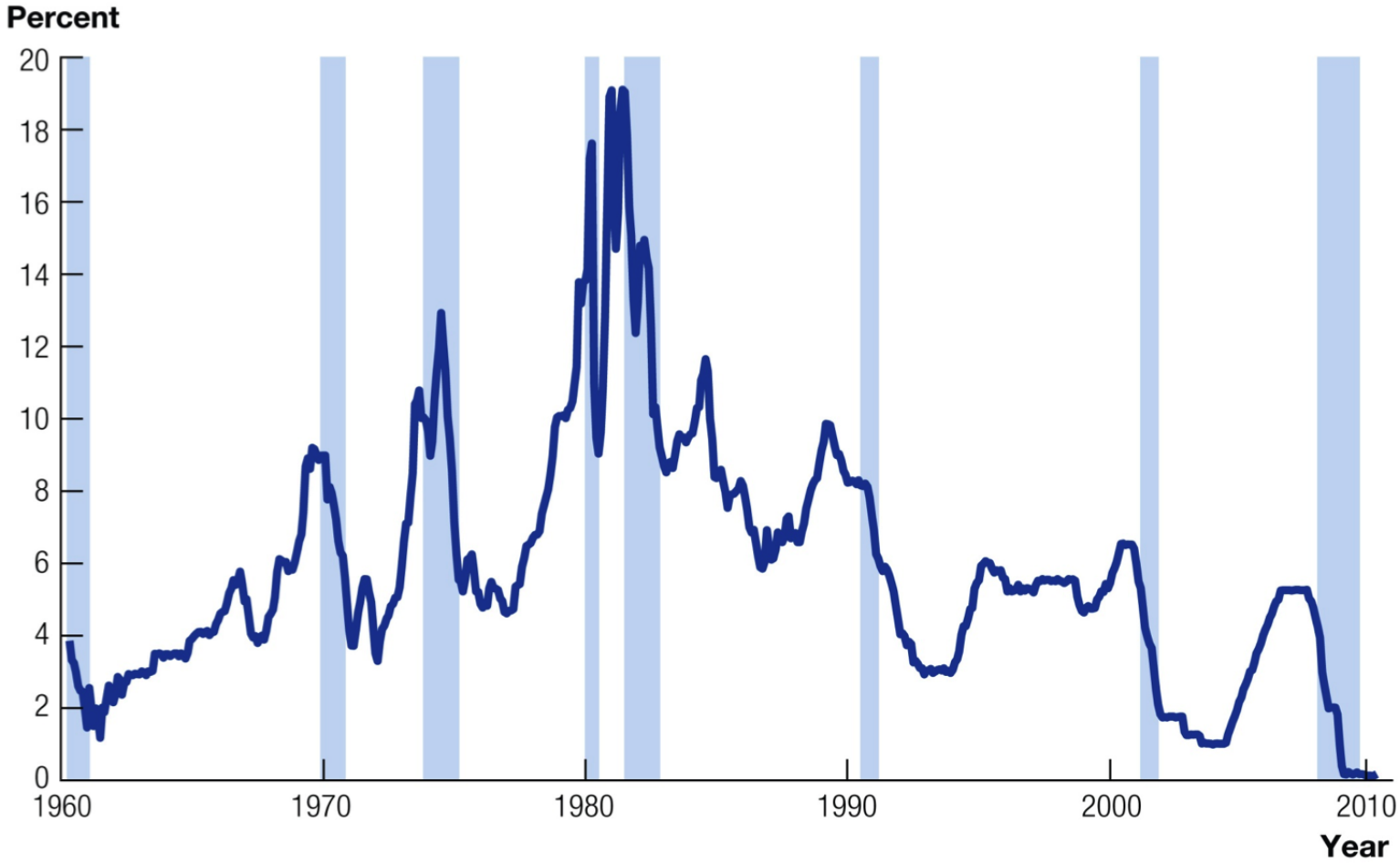

U.S. Fed Funds Rate (1960-2010)

Background

From nominal to real interest rates

The relationship between the interest rates is given by the Fisher equation:

$$i_t = r_t + \pi_t$$

Do you remember how this was derived from first principles?

Or, real interest rate is related to what the central bank controls i_t:

$$\underbrace{r_t}_{\text{real interest rate}} = \underbrace{i_t}_{\text{nominal interest rate}} - \underbrace{\pi_t}_{\text{inflation rate}}$$

Background

Expectations and Fisher relation

- In short run, agents don't really know what is tomorrow's price level (hence, tomorrow's inflation rate).
- More precisely, need to replace the inflation rate with the expected rate of inflation in the short-run version of the Fisher equation.

$$i_t = r_t + \underbrace{\pi_t^e}_{\text{expected inflation rate}}$$

- So then, *expected* real interest rate is

$$\underbrace{r_t^e}_{\text{ex-ante real interest rate}} = \underbrace{i_t}_{\text{nominal interest rate}} - \underbrace{\pi_t^e}_{\text{expected inflation rate}}$$

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- *A Keynesian Assumption*: adaptive inflation expectations (therefore sticky inflation):

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$$= i_t - \pi_{t-1} = \underbrace{r_t}_{\text{ex-post real interest rate}}$$

- That's why we could assume in the IS model earlier, that r_t is really what is relevant for investment I_t and (big-ticket) C decisions!

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What really matters?

But what the central bank directly sets in the nominal price i_t of interbank borrowing/lending.

- Fisher relation give us a link from i_t to r_t
- so then monetary policy has impact on short run output fluctuations and inflation ...
- ... if inflation is "sticky".

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The sticky inflation assumption

- The rate of inflation displays inertia, or stickiness, so that it adjusts slowly over time.
  - This adaptive expectations assumptionwill also feature in our baseline PC component as well.
- In the short run the rate of inflation does not respond directly to monetary policy.
- Central banks have the ability to set the real interest rate in the short run—i.e.
  - since π_t fixed in short run
  - then $r_t = i_t - \pi_t$ moves with the monetary policy instrument i_t

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Term Structure of Interest Rates

- We see different rates of return to different assets in reality. So which r_t do we mean?
- The *term structure of interest rates*
  - The different period lengths for interest rates
  - It should be the case that interest rates on investments of different lengths of times will yield the same return.
    - If not, everyone would switch investment to the one with the higher return.

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Term Structure of Interest Rates

- Interest rates at long maturities are equal to an average of the short-term rate investors expect in the future
- When the Fed (or the Reserve Bank) changes the overnight rate, interest rates at longer magnitudes change.
  - Financial markets expect the change will persist for some time.
  - A change in rates today often signals information about likely changes in the future.
- So for our purpose, these rates are all lumped into one as r_t in our model framework.
  - More spohisticated models take into account the financial-market *term structure* in more detail.

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Big picture

- But recall in long run, we have the quantity theory of money holding.
  - this implies the central bank has *no influence* over the *real return to investment* in the long run
  - monetary policy is neutral in the long run!
- As a corrollary, crucial to monetary policy having a *real effect* through r_t is the sticky inflation assumption (built into our PC)!
  - *sans* sticky inflation assumption in our model, money is also neutral in the short run; or
  - *sans* sticky inflation presumption in reality, society does not need to hire central bankers!

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Checkpoint!

Taking stock:

- We broadly described how central bank influences the real rate of return to investment in the short run:
  - sets nominal discount rate in interbank lending accounts held at central bank
  - ex-ante version of Fisher equation gives a link from nominal rate to expected real rate
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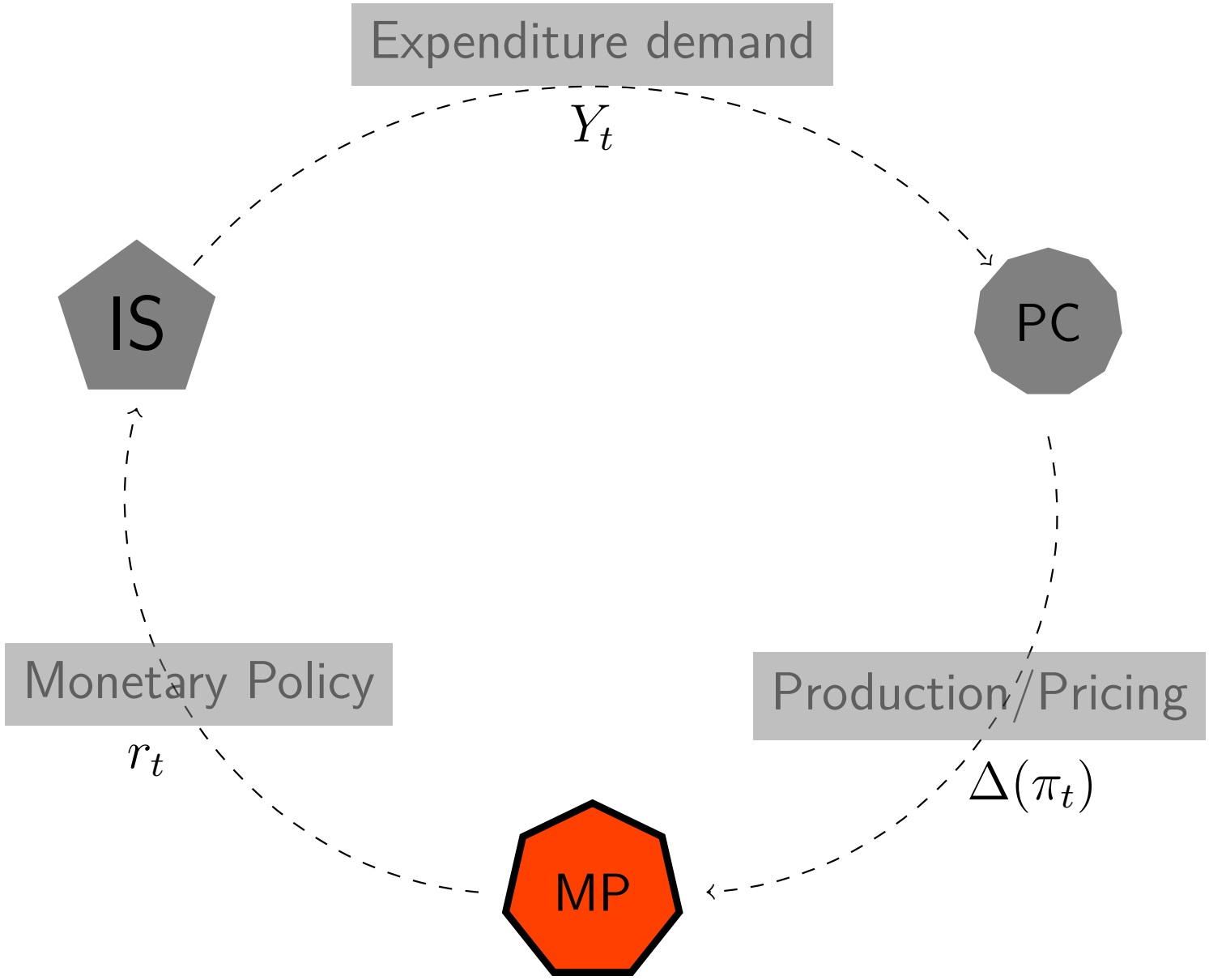
Block 2/3: MP Curve



Look-ahead: Schematic of IS-PC-MP model (to come).

IS-MP Diagram

The MP curve

- Central bank's nominal interest rate policy *behavior*, as a response to certain variables summarizing the state of the short run economy.
- Central banks *effectively control* the real interest rate at a particular value in the short run. (Why?)

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S-MP Diagram

The MP curve

- *Assumption:* The MP curve is given by this rule

$$r_t = \bar{r} + \lambda \pi_t, \qquad \lambda > 0.$$

  - What is interpretation of λ?
  - What is $\bar{r}$?
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  - (Again) why is policy real, and not nominal interest rate?

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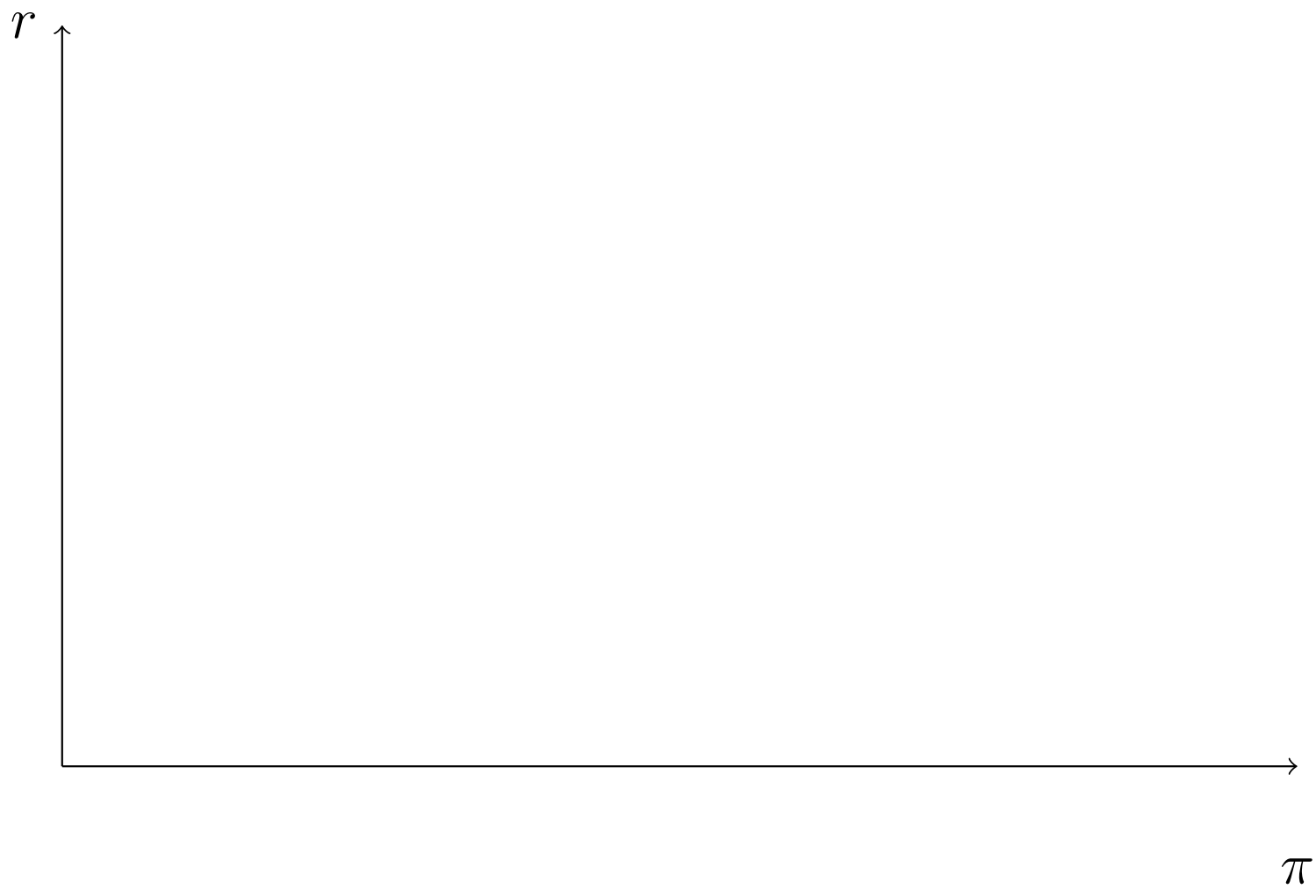
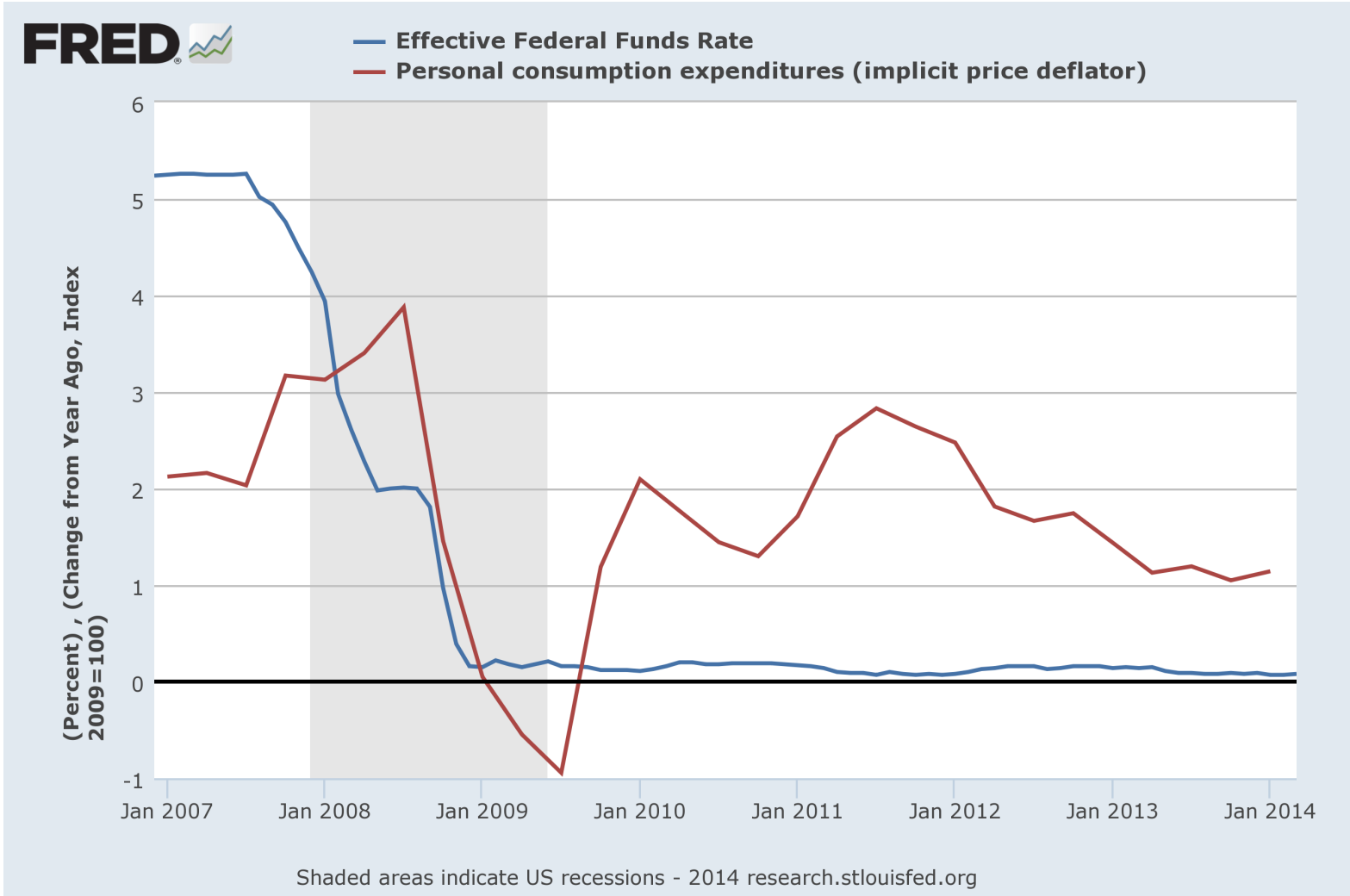


IS-MP Diagram

Short run non-neutrality of monetary policy



Australian National University

IS-MP Diagram

Short run non-neutrality of monetary policy

- If the central bank raises the nominal interest rate i_t
  - Inflation is slow to adjust.
  - The real interest rate rises.
  - Investment falls, Consumption falls, Net Exports fall. *Explain Why!*
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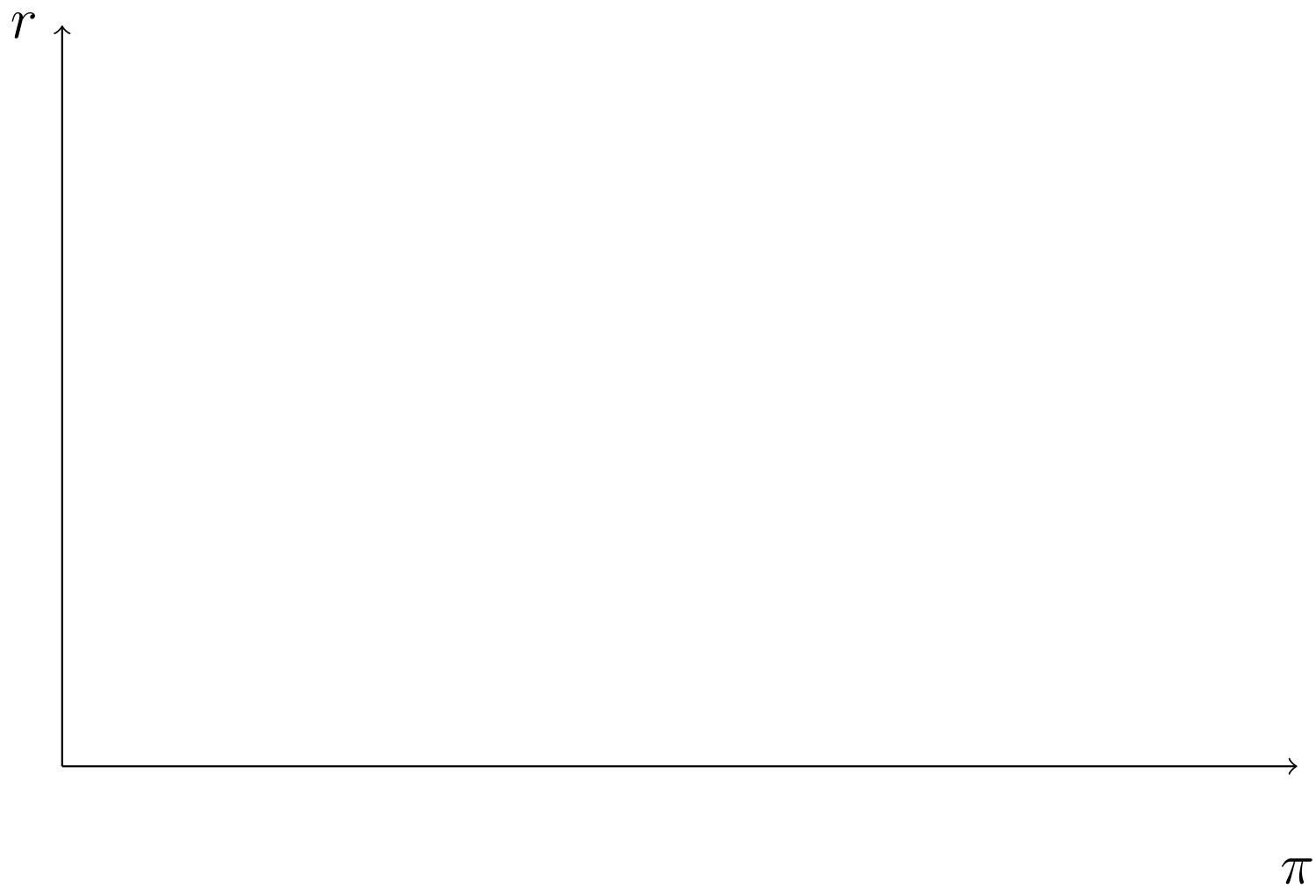

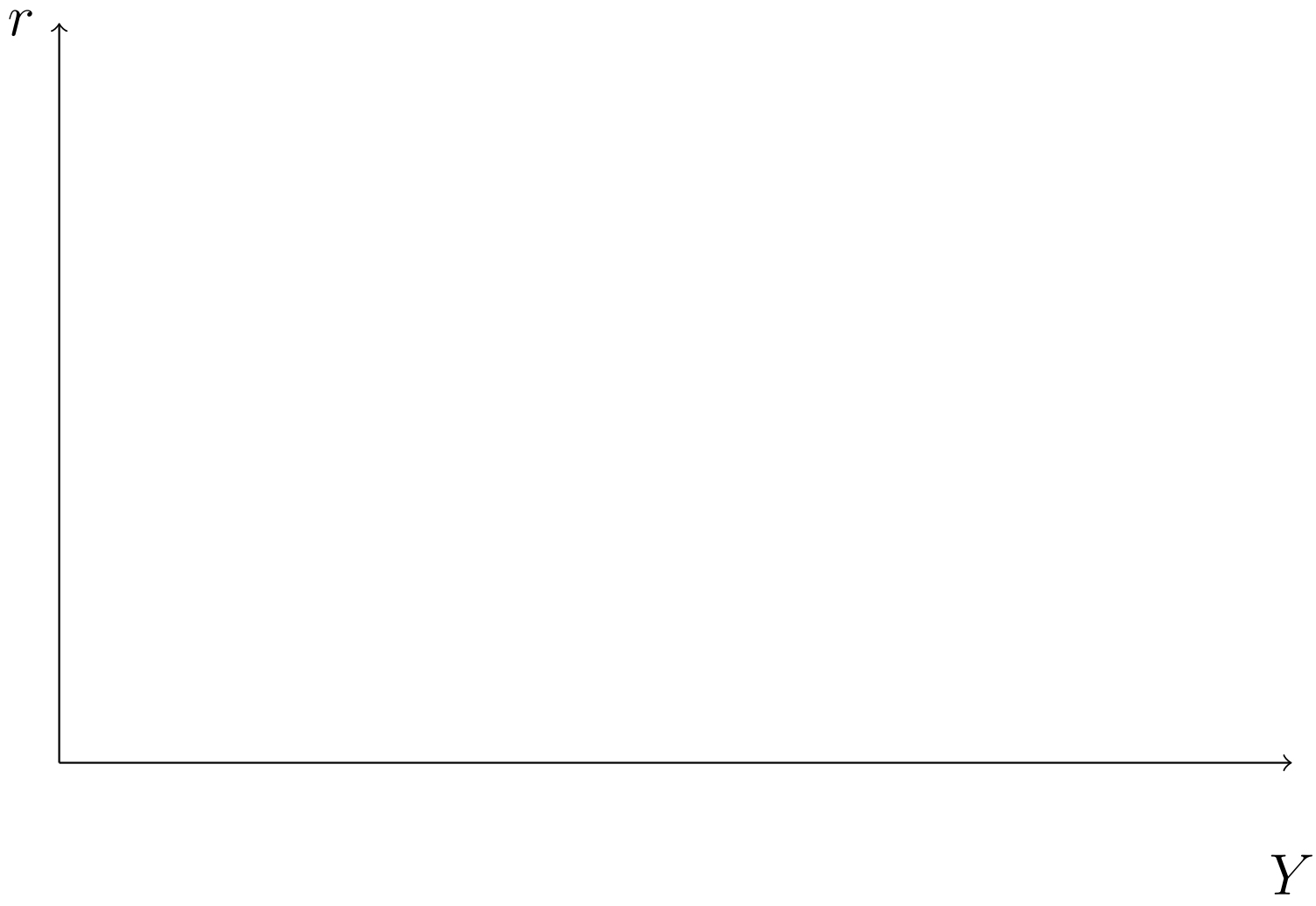

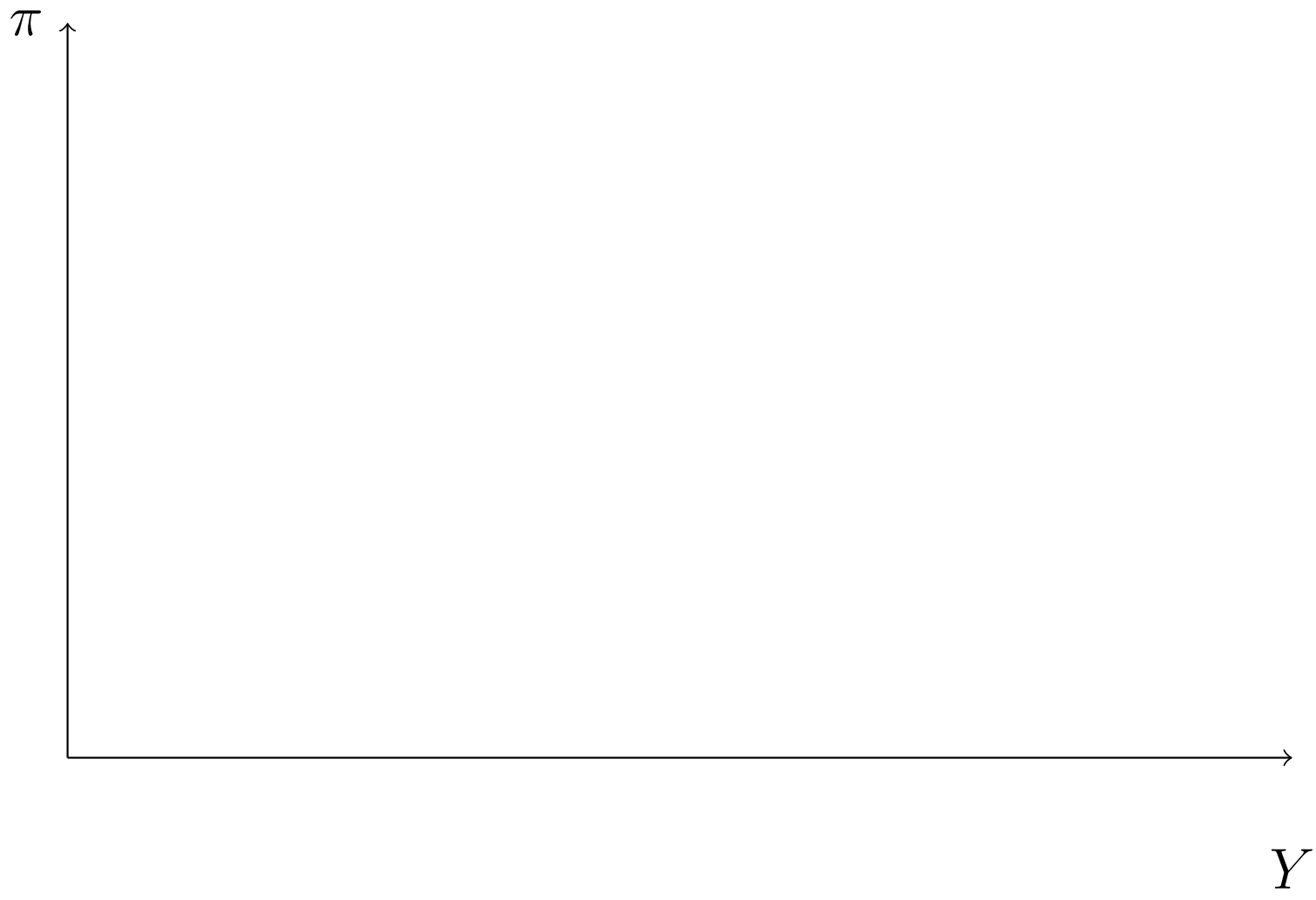

IS-MP to AD Diagram

- Notice what we just did in the last three sketches?
- From the MP and IS curves, we get the third figure "for free"!
- The third figure is called the AD curve which contains two important pieces of properties:
  - representing monetary-policy behavior (MP), and
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- *Warning*: we can use the AD in lieu of IS-MP, as long as conventional monetary policy (here MP) is in use or is *of use*.

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IS-MP to AD Diagram

Exercise

You have now derived the IS curve from the previous lecture as:

$$Y_t = \bar{a} - \bar{b} r_t \iff r_t = \frac{\bar{a}}{\bar{b}} - \frac{1}{\bar{b}} Y_t.$$

(Make sure you so what things affect $\bar{a}$ and $\bar{b}$, and, what that means economically!)

Now derive the AD curve. (Geometrically this is the last figure you sketched!)

Applications: IS-MP

Application

Example

Suppose housing prices had been rising, but then they fall sharply.

- The aggregate demand parameter declines. (Which component of $\bar{a}$ had shifted? Why? Justify/explain.)
- The IS curve shifts left. AD shifts left.

If the central bank lowers the nominal interest rate in response:

- The real interest rate falls as well because inflation is sticky. The AD shifts right.
- If judged correctly and without lag, the economy would not have a decline in output.

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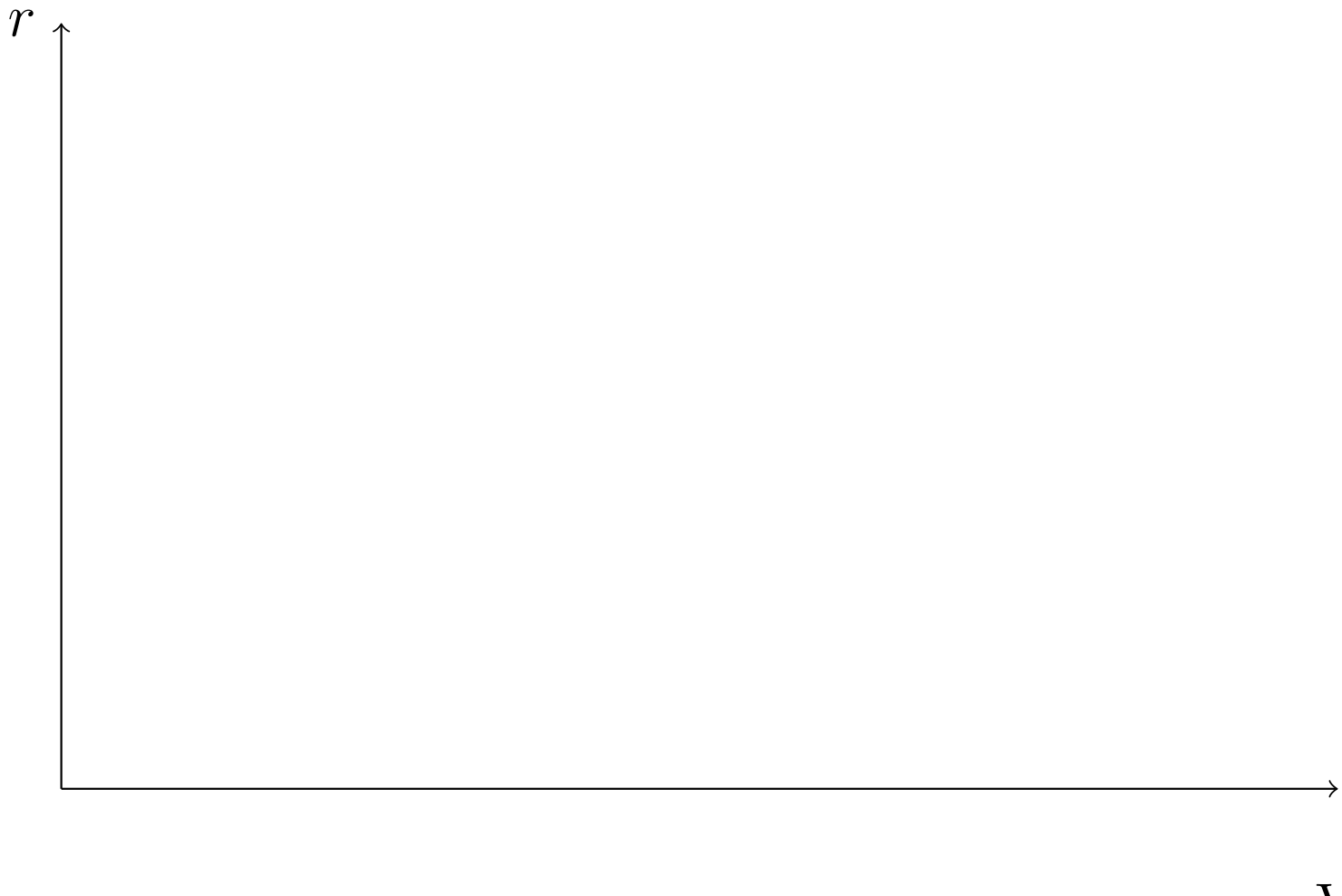

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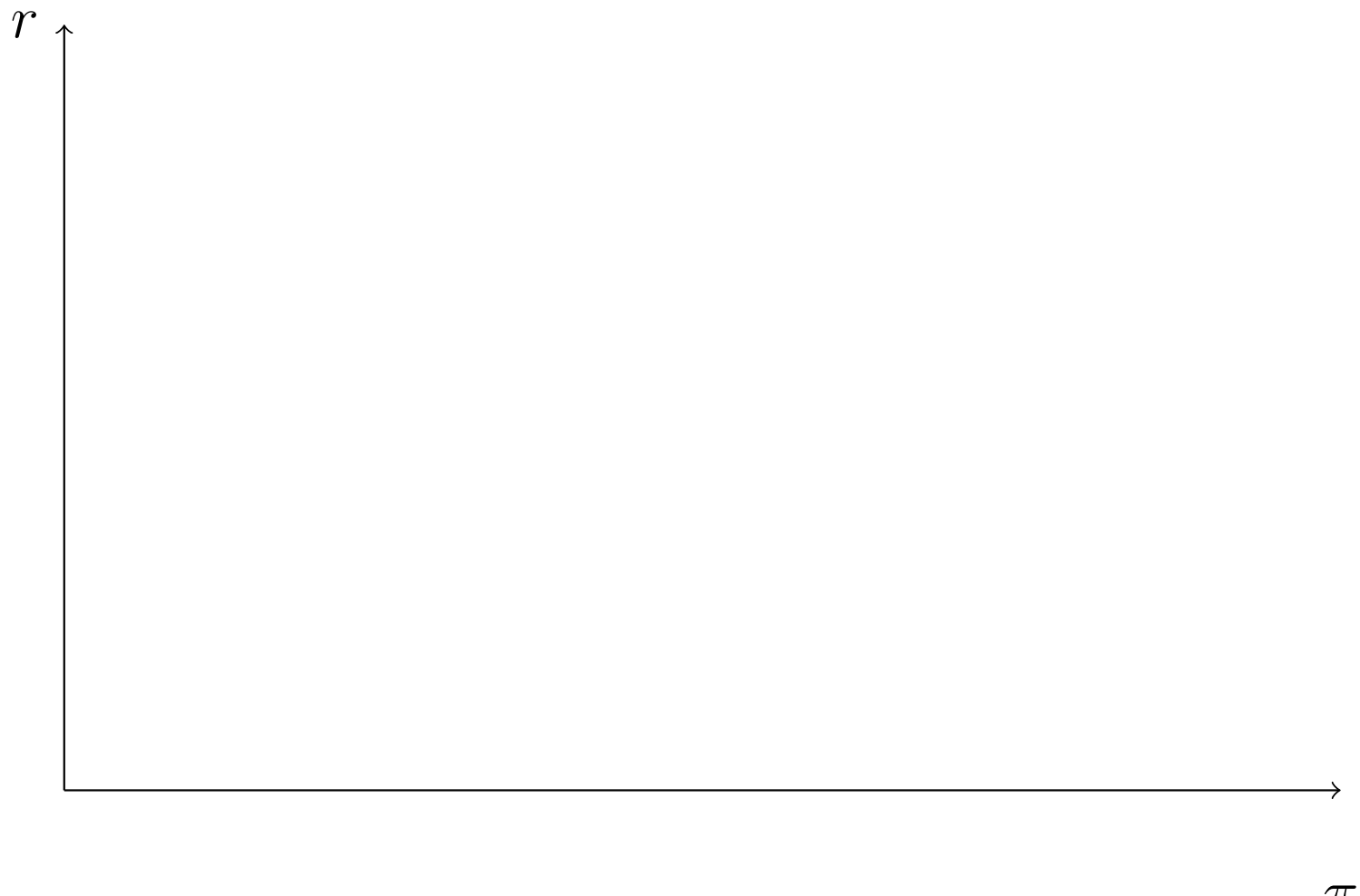
MP response



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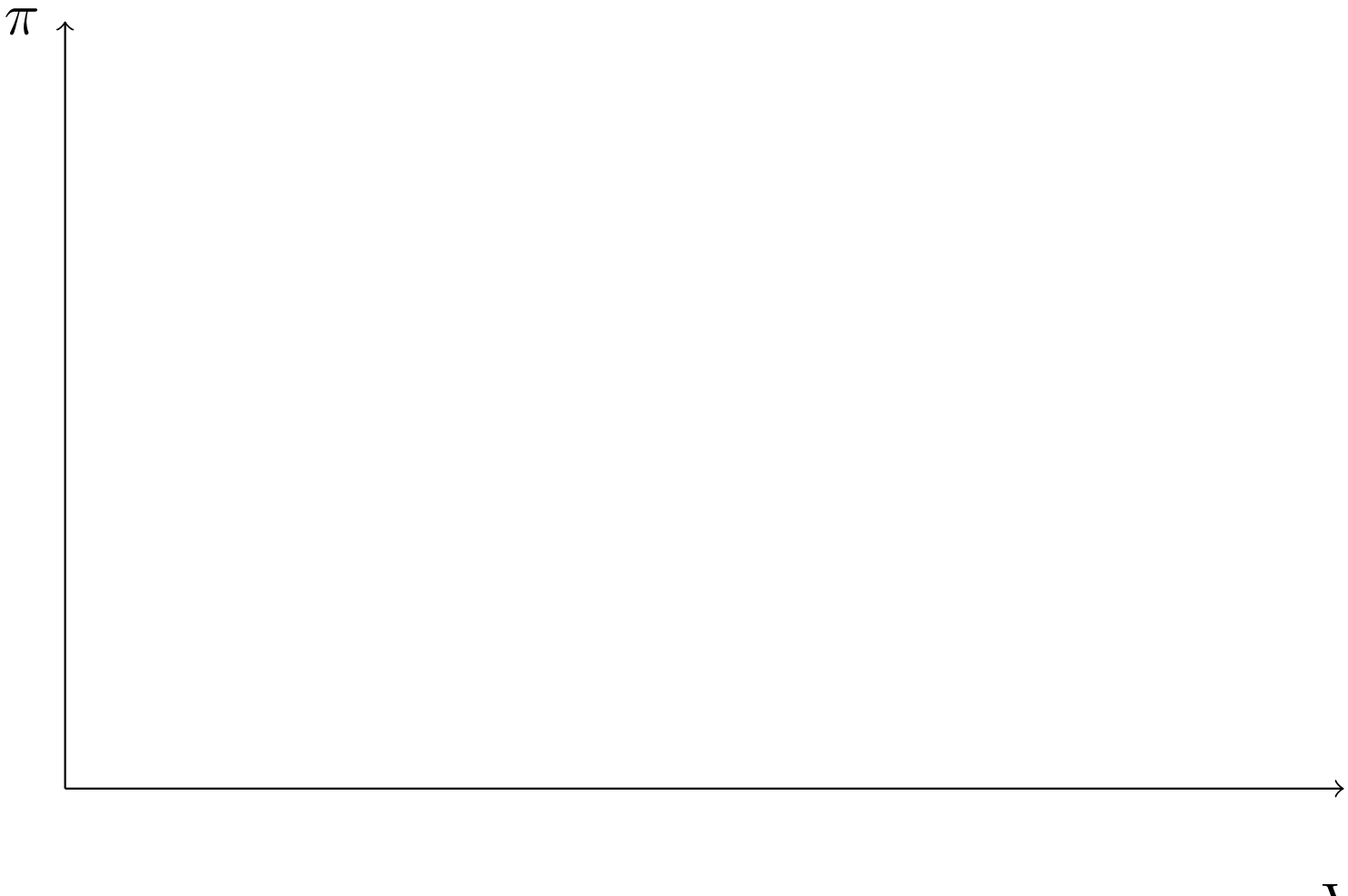

How Central Bank Controls Nominal Interest Rates

Microfoundations: Central Banking

- The central bank controls the level of the nominal interest rate by supplying the money that is demanded at that rate.
- The money market clears through changes in velocity,
  - which is driven by changes in the nominal interest rate
- The nominal interest rate
  - Is the opportunity cost of holding money
  - Is the amount you give up by holding money instead of keeping it in a savings account
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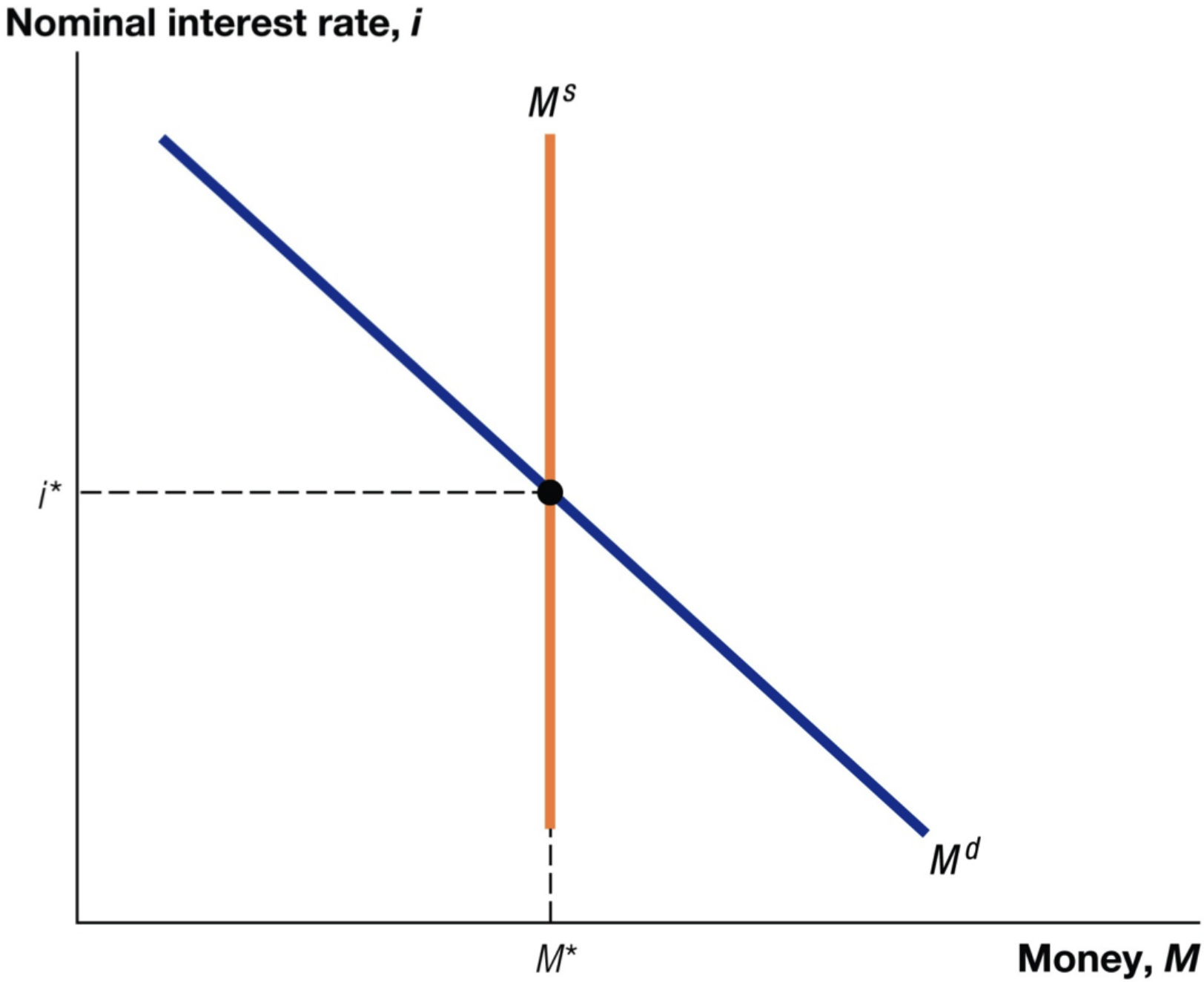

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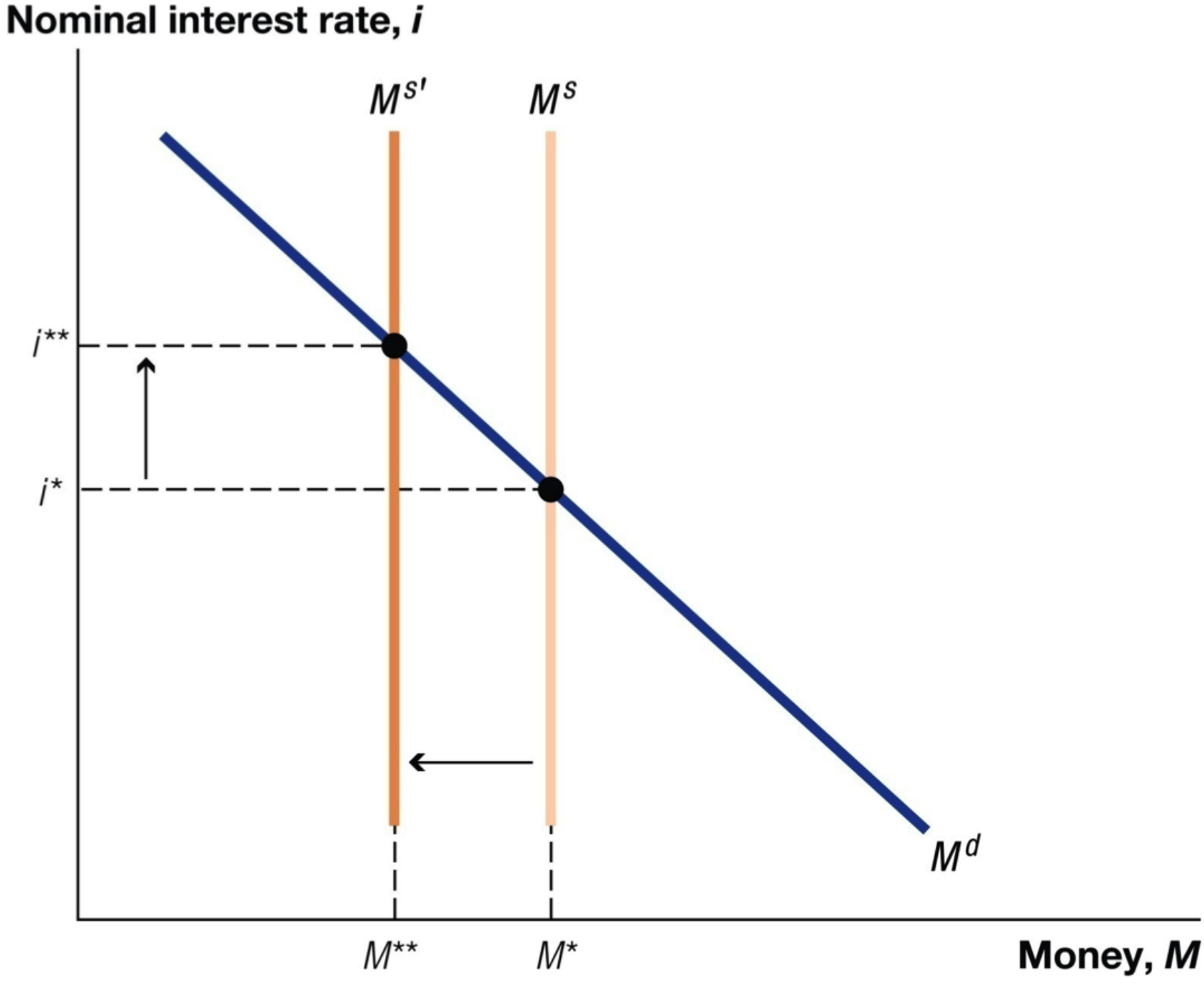

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- Since 1980s shift to focus on i_t.
- Why?
- Reason 1: The interest rate is crucial even when central banks focus on the money supply.

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- A contractionary (tightening) monetary policy
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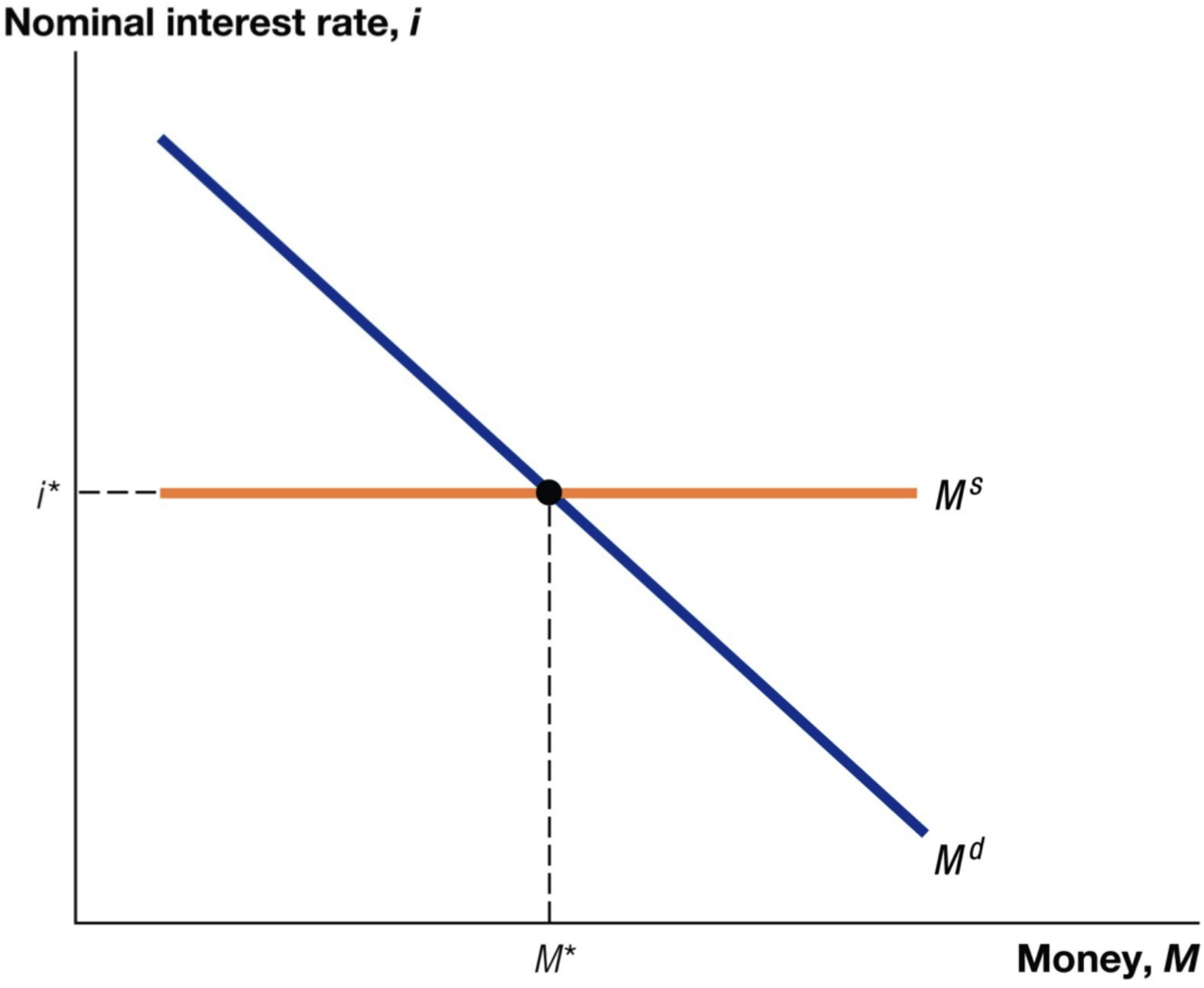

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  - The central bank trades interest-bearing government bonds in exchange for currency or non-interest bearing reserves.
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- expectations formation; adaptive expectations model; sticky inflation
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