Monetary Equilibrium and Policy

Lanny Zrill

March 24, 2014

Demand for Money

- We would like to model the market for money in a supply and demand framework
- But ... what is the "price" of money?
- Assumption: All individual income is used to purchase either money (non-interest bearing assets) or bonds (interest bearing assets)
- Hence, the opportunity cost of holding money is the return (interest) from holding bonds

Present Value

- Question: Would you prefer \$100 today or \$100 in one year's time?
- Principle: People prefer money today over the same amount in the future
- Why?
  - Money received today can be saved and earn interest

Present Value - cont'd

- Example: If the annual interest rate is 8%, how much money will you have if you deposit \$100 for 1 year?
  - Answer: \$108
  - This is more than you would have if you received the \$100 in one year's time instead
  - Hence, money promised in the future is worth less then money received immediately.
  - How much less?

Present Value - cont'd

- Question: How much would you be willing to accept today in lieu of receiving \$100 in one year?
  - Obviously, this should be less than \$100 (because you can earn interest!)
  - Tells us how much the future payment is worth *today*
  - This is called the present value and it depends on the interest rate (or opportunity cost)

Present Value - cont'd

Consider an asset that pays \$X in one year's time. If the interest rate is i% per year, the PV of the asset is

$$PV = \frac{X}{1+i}$$

In general, an asset that pays \$X in t years time has a present value of

$$PV = \frac{X}{(i+i)^t}$$

Can also be extended to assets with multiple payments (as is common with bonds):

$$PV = \frac{X_1}{1+i} + \frac{X_2}{(1+i)^2} + \frac{X_3}{(1+i)^3} + \ldots$$

Note: Present Value is *negatively correlated* with the interest rate

Bonds

Consider a bond with a face value of \$1,000 and a coupon rate of 10% that expires after 3 years. If the market interest rate is 8%, what is the present value of the bond?

$$PV = \frac{100}{1.08} + \frac{100}{1.08^2} + \frac{1100}{1.08^3} \approx \$1,051.54$$

How much would we expect this bond to sell for? What is the rate of return or yield at this price?

Bonds - cont'd

why you want to buy this bond
-getting a better rate of return than to put the $ into the bank and earn interest

- Consider a bond with a face value of $1,000 and no coupon that expires after 1 year. If the market interest rate is 11%, what is the present value of the bond?

$$PV = \frac{1000}{1.11} \approx \$900.90$$

- Would you pay $850 for this bond? What about $950? Why or why not?
- Hence, a bond will sell for for its present value and the yield will be equal to the market interest rate*

*Note: This assumes that the bond has no risk associated with it - not true in general

when you pay lower than the present value, the rate of return is likely higher
bond is sold in its present value (in this case, no risks)

Bonds - Summary

1. Present value is inversely related to the market interest rate
2. The equilibrium market price for bonds is equal to the present value
3. A bond's yield (rate-of-return) is inversely related to its price
4. Hence, the market interest rate and bond yields move in the same direction

Demand for Money

Reasons for Holding Money:

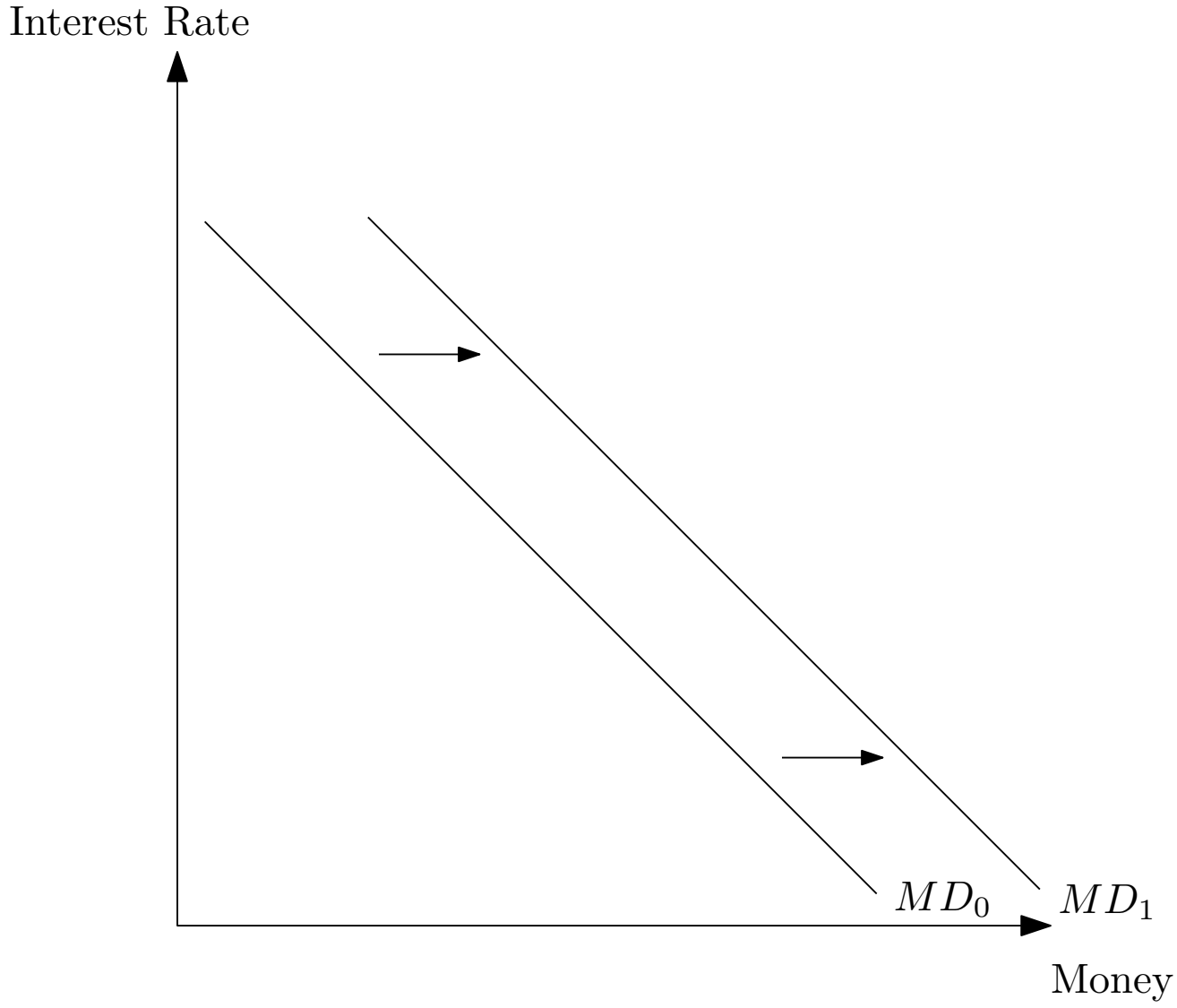
1. Transactions Motive
2. Precautionary Motive
3. Speculative Motive

Determinants of Money Demand

The transactions demand for money depends on:

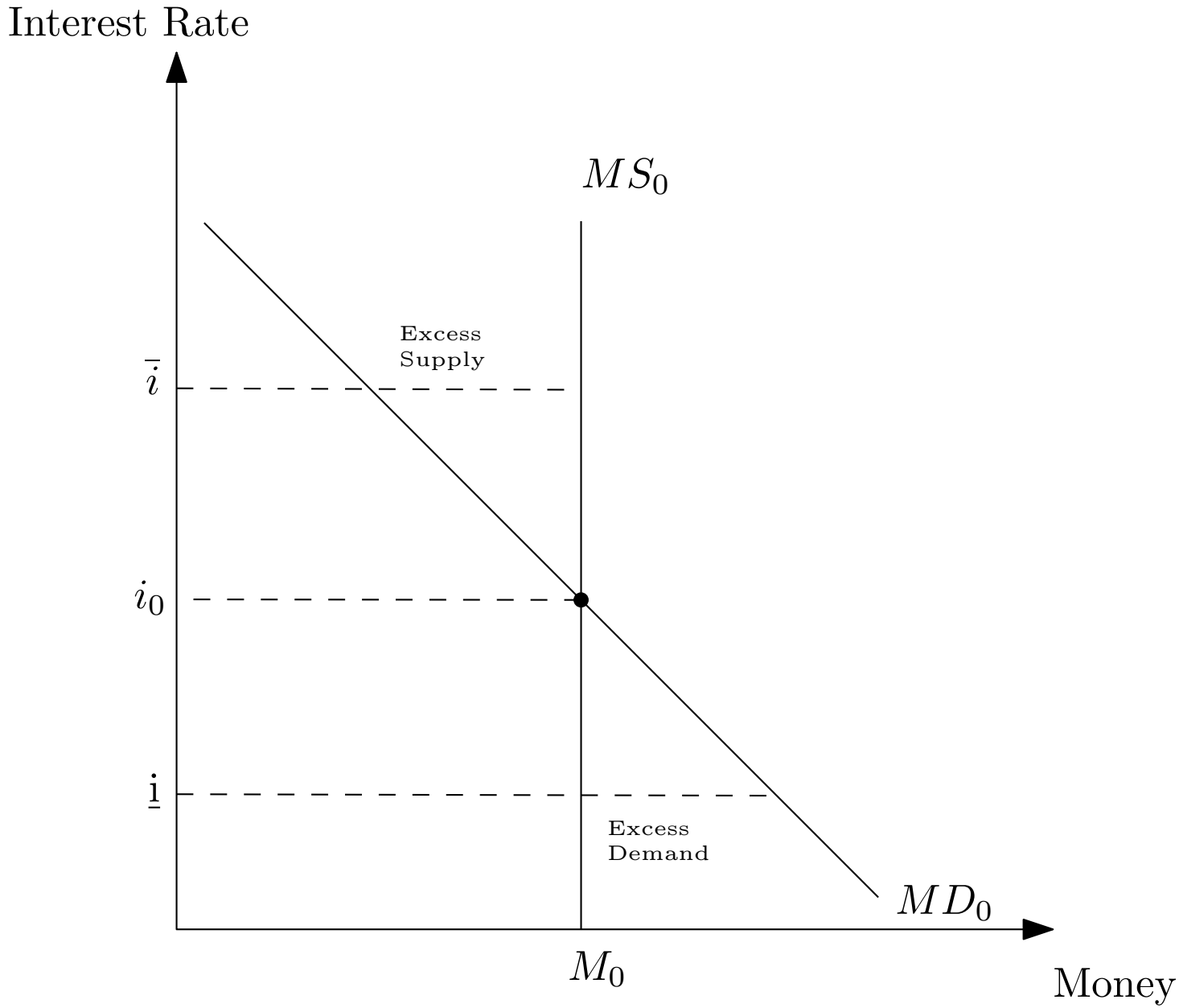
- Real GDP
- Price Level
- Interest Rate

The Money Demand Curve



*Changes in Real GDP or the Price Level causes the Money Demand Curve to shift

Monetary Equilibrium



The Monetary Transmission Mechanism

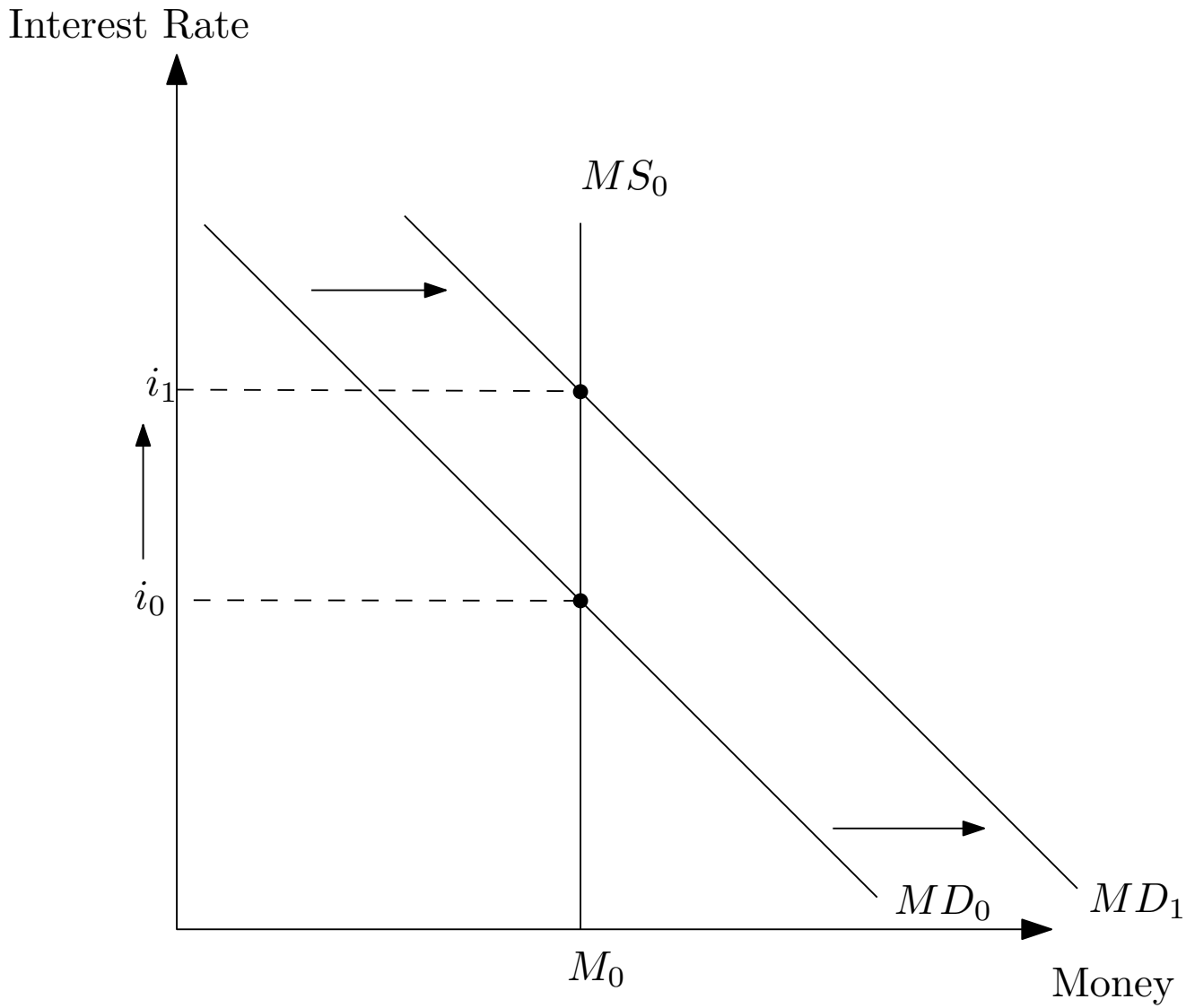
The Monetary Transmission Mechanism connects changes in Money Supply or Money Demand to changes in Real GDP and the Price Level

Three Stages:

1. Changes in M_D or M_S cause changes in i
2. Changes in i cause changes in I_D (Investment Demand)
3. Changes in I_D cause changes in Aggregate Demand and hence Y and P

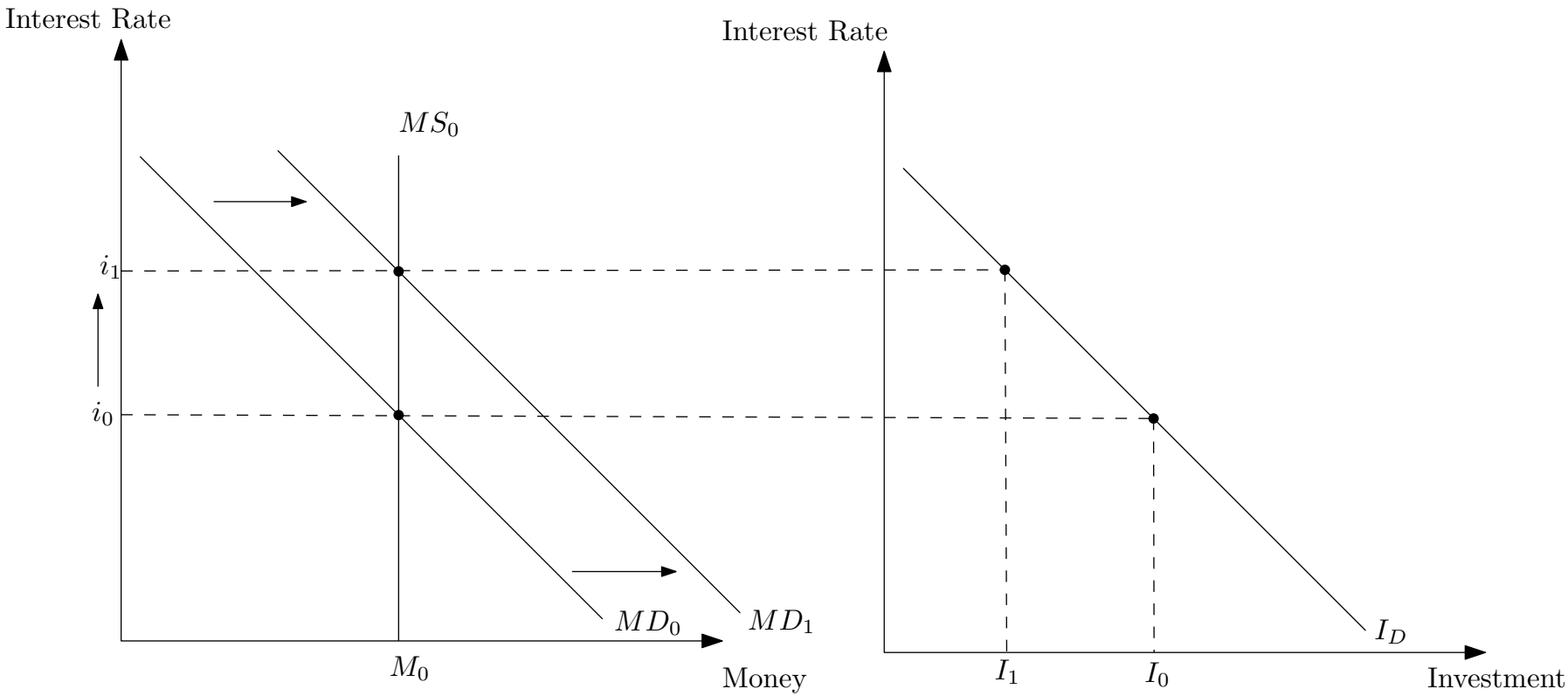
MTM - Stage 1

Changes in M_D or M_S cause changes in i



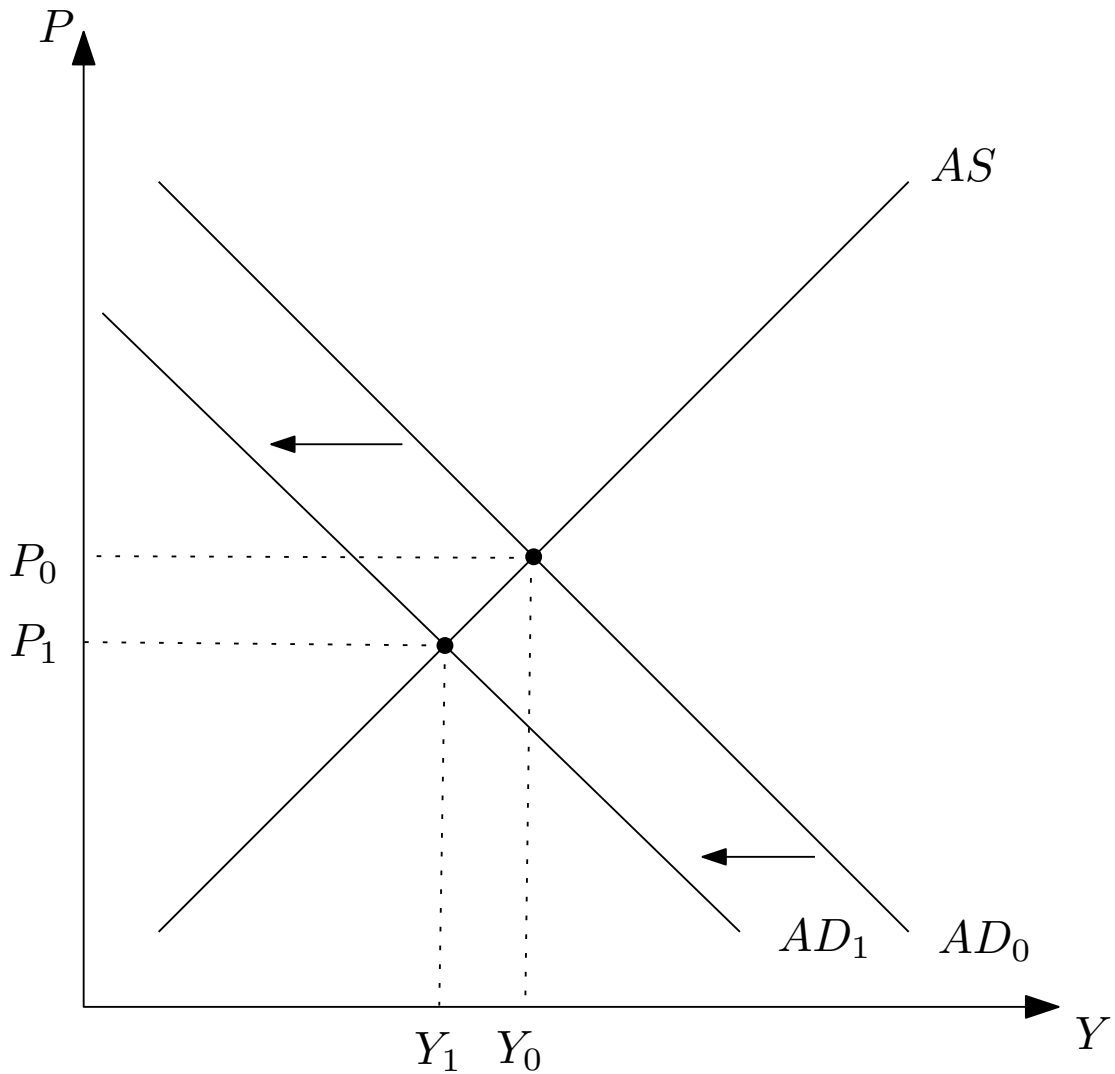
MTM - Stage 2

Changes in i cause changes in I_D



MTM - Stage 3

Changes in I_D cause changes in Aggregate Demand and hence Y and P



The Strength of Monetary Forces

- Long-Run Money Neutrality: In the long-run, changes in the money supply has no impact on real GDP
  - Nevertheless, there is a significant impact on the price level

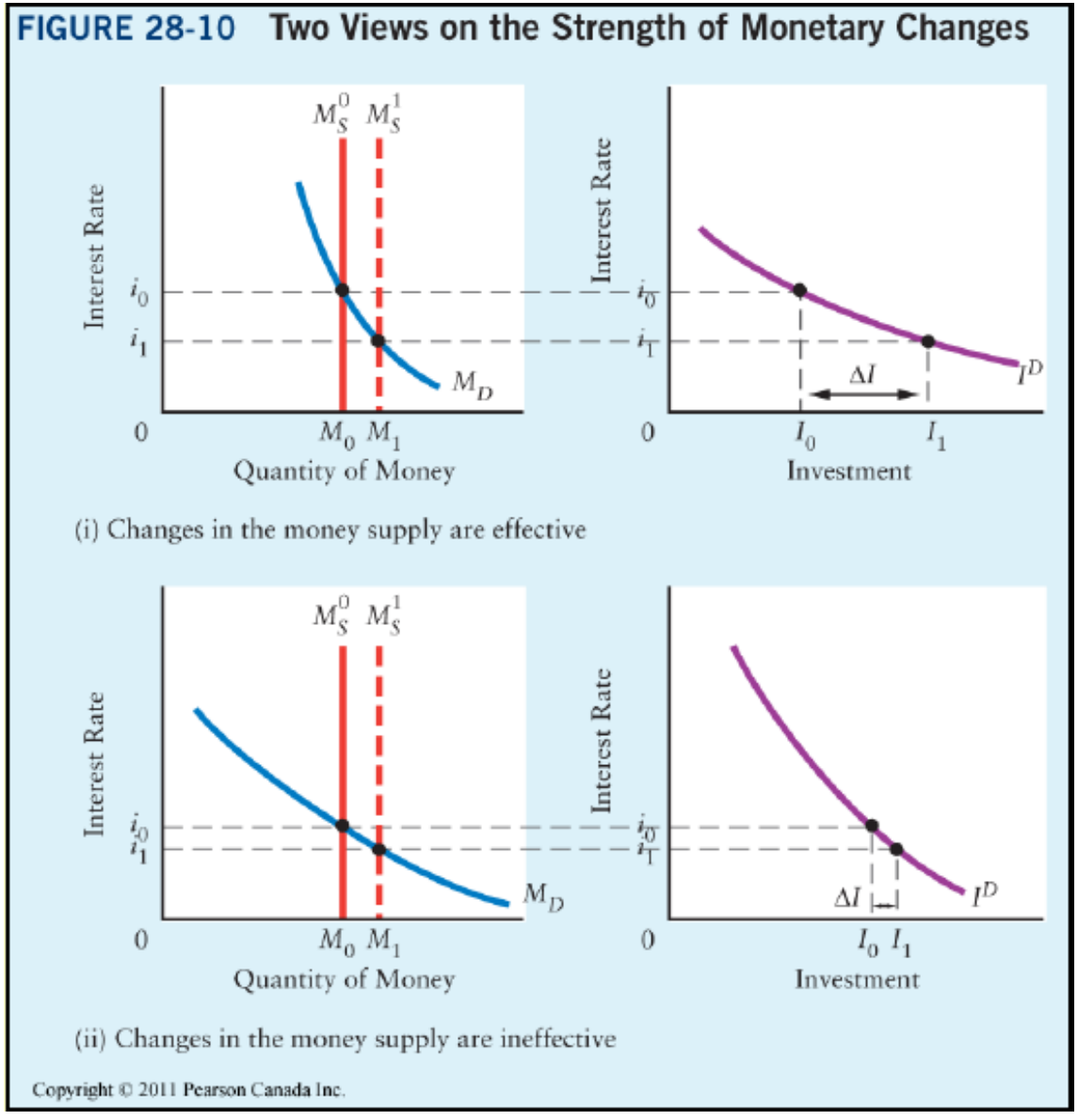
Money Neutrality

Short-Run Monetary Non-Neutrality

The effect of changes in the Money Supply in the short-run depends on how far the AD-curve shifts

- Depends on the slopes of the Money Demand Curve and the Investment Demand Curve

Short-Run Monetary Non-Neutrality, cont'd



Short-Run Monetary Non-Neutrality, cont'd

- There is empirical support that the money demand curve is *not* flat
  - Changes in the money supply do lead to changes in the equilibrium interest rate
  - Monetary Policy can be effective
- Evidence is inconclusive with respect to the slope of the I_D curve

Monetary Policy

The Bank of Canada can implement monetary policy by influencing either:

1. The interest rate
2. The money supply

*Note: the BoC cannot influence both simultaneously

Monetary Policy, cont'd

The BoC chooses to influence interest rates because:

1. The position and shape of the money demand curve is uncertain and unstable
2. The money supply is not completely under the control of the BoC
3. It is easier to communicate changes in the interest rate

But .... which interest rate do they target?

The Overnight Interest Rate

Overnight Interest Rate: The interest rate that commercial banks charge each other for overnight loans

- Banks with excess reserves lend to banks with depleted reserves on a short-term basis
- Recall: All interest rates tend to move in the same direction

Bank Rate: The interest rate the BoC charges commercial bank for loans

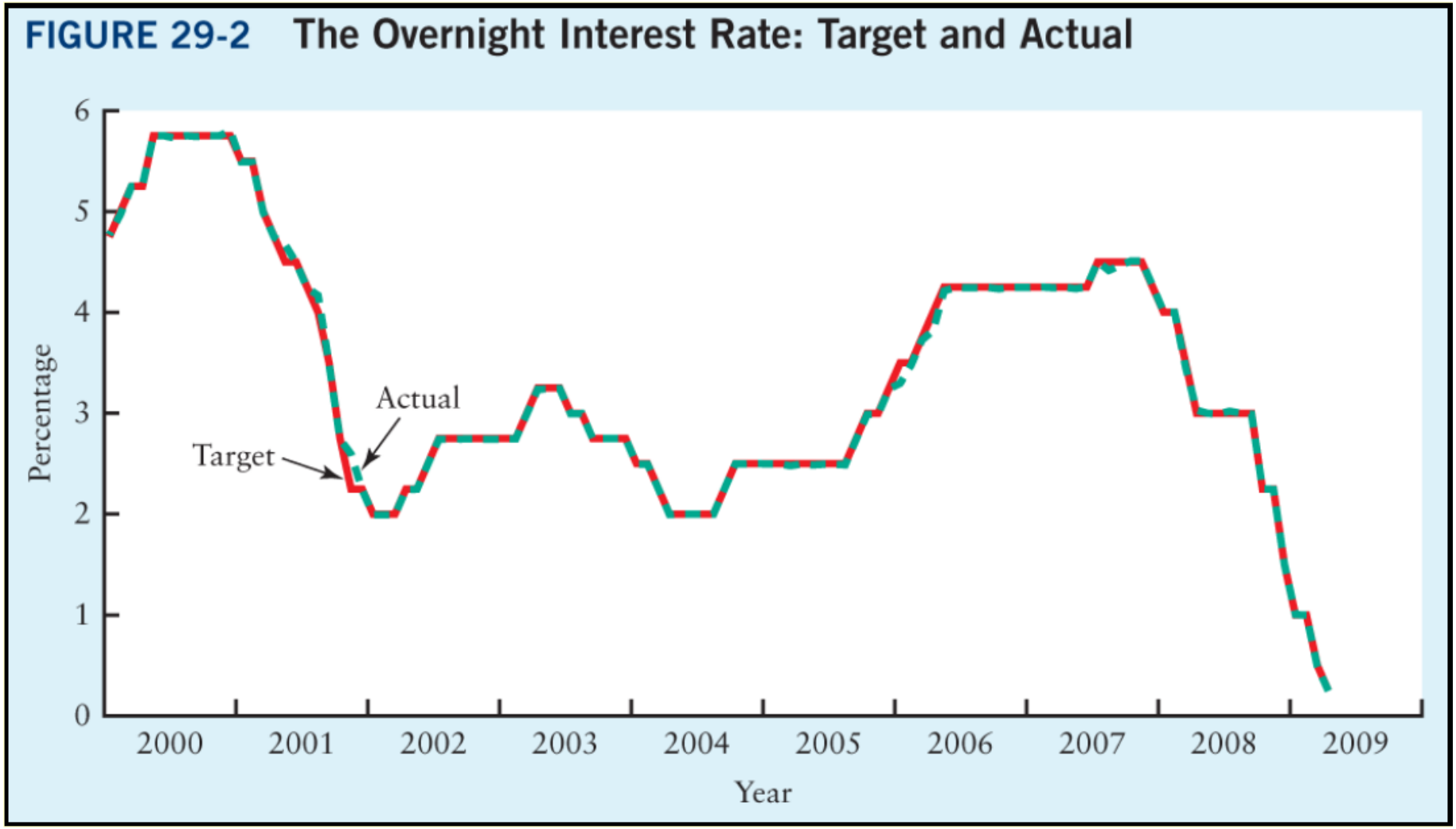
Manipulating the Overnight Rate

The BoC is able to exert considerable influence on the Overnight Interest Rate as follows:

1. It sets a target for the Overnight Interest Rate
2. It stands ready to pay interest on deposits at 0.25% less than the target
3. It stands ready to lend funds with interest 0.25% greater than the target

This suffices to keep the Overnight Rate within a 0.5% band

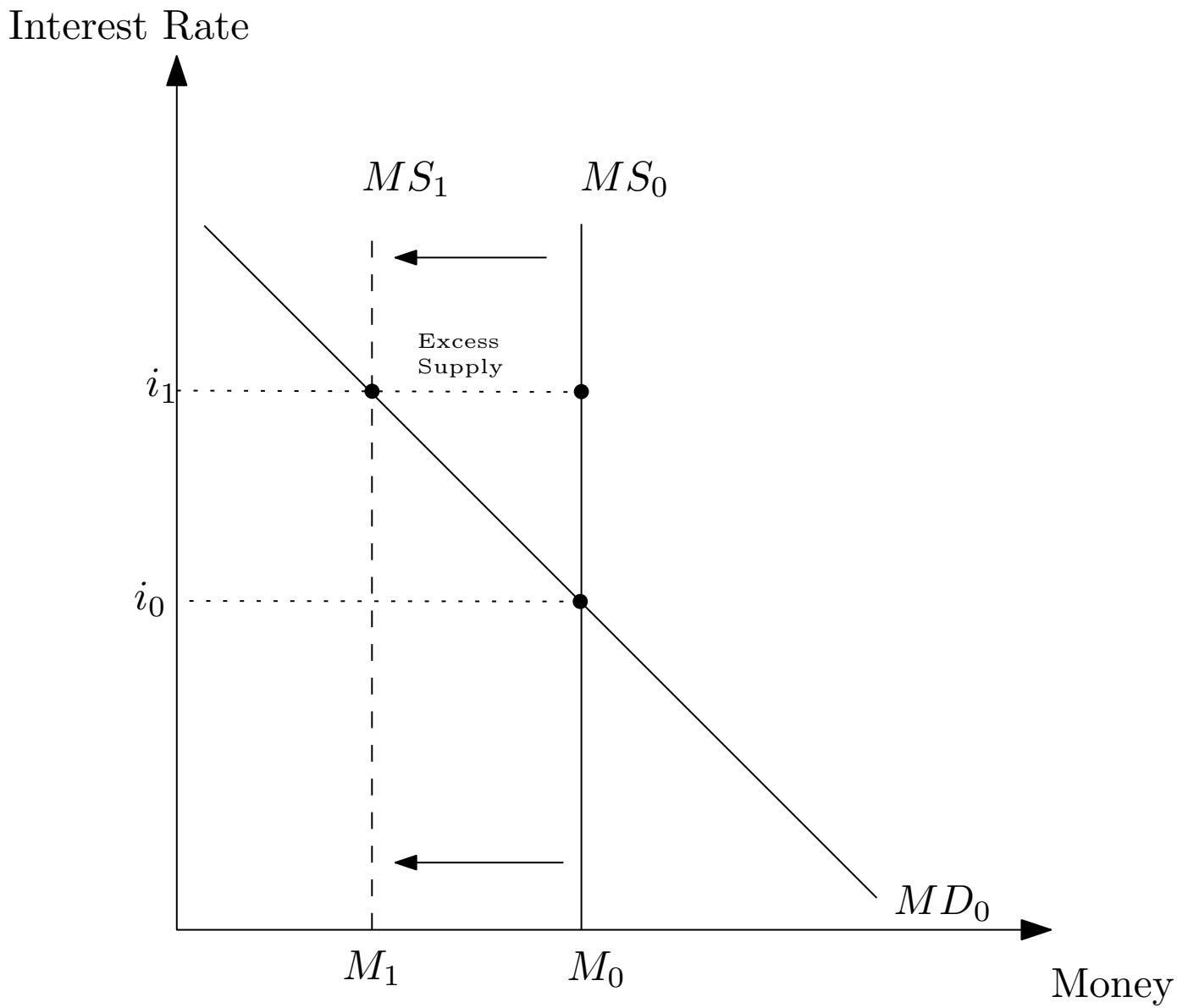
Overnight Interest Rate Targeting



Endogenous Money Supply

- When the BoC changes the target for the overnight interest rate:
  - Other interest rates change
  - Bank lending changes
  - Banks' demand for currency changes
- The BoC must respond by supplying currency or buying currency from the commercial banks
  - called open-market operations
  - **This is an essential feature of monetary policy**

Open-Market Operations



Inflation Targeting

The stated goal of monetary policy is a stable inflation rate (2% annually). Why?

1. High and uncertain inflation is damaging for the economy
2. BoC is confident in the relationship between monetary policy and inflation (see Fig. 28-9)

Inflation and Output Gaps

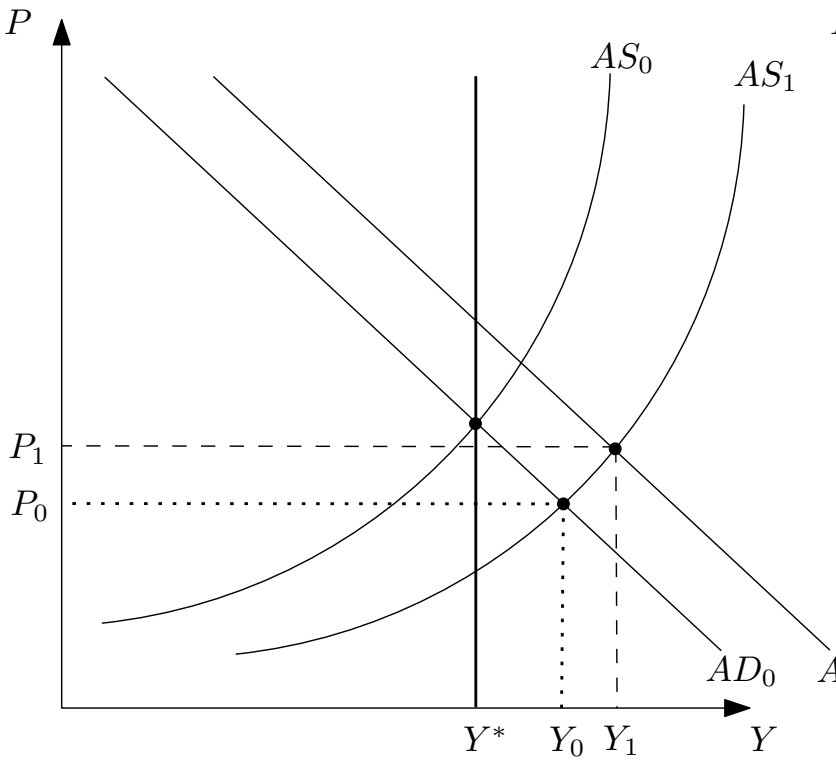
Increase price and GDP

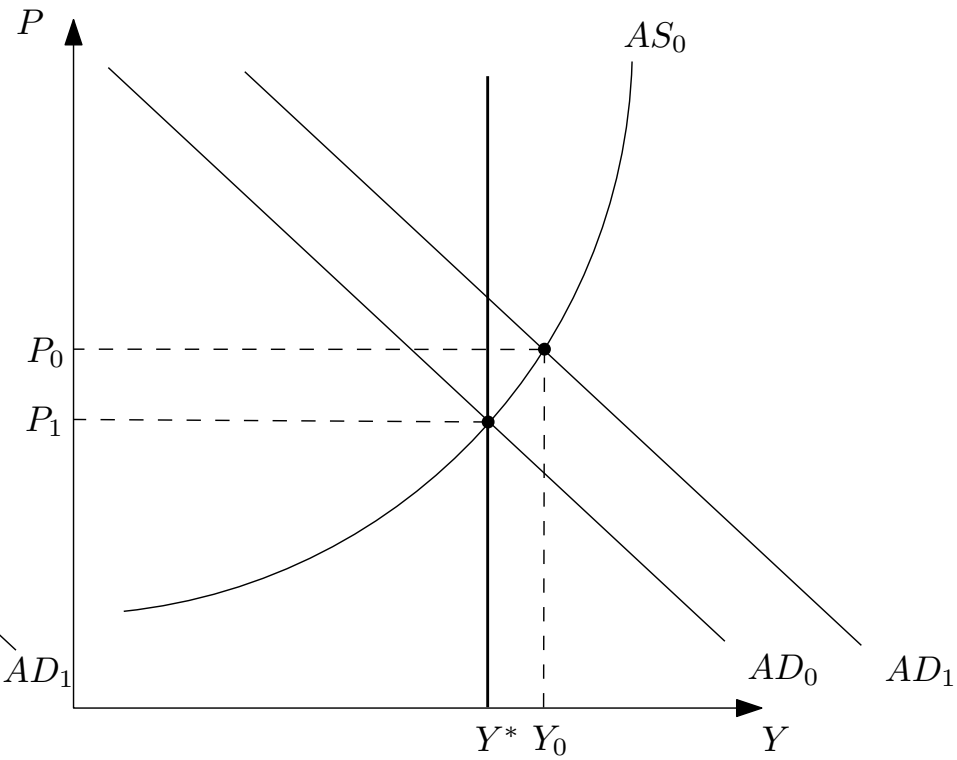
Consider an output gap created by a positive shock to aggregate demand ...

- What will be the response of the BoC?
- Is this consistent with the government's goal to stabilize the economy?
- What if it's a positive AS shock?

Inflation and Output Gaps, cont'd

positive supple shift
inflationary gap w/ a lower $
the bank of Canada and the government have different policy goals
- increase aggregate demand G= reduce aggregate demand





increase interest rate- reduces aggregate demand

inflationary gap
price level up
reduce aggregate demand back the optimal

Complications with Monetary Policy

1. Food and energy prices are determined globally, therefore, the policy within Canada will not influence these prices; they have to remove prices that they dont have control over with

Monetary policy is much more difficult to implement than implied by our theory due to:

1. Unstable Food and Energy Prices
2. Complications involving the exchange rate
3. Long and Variable Lags

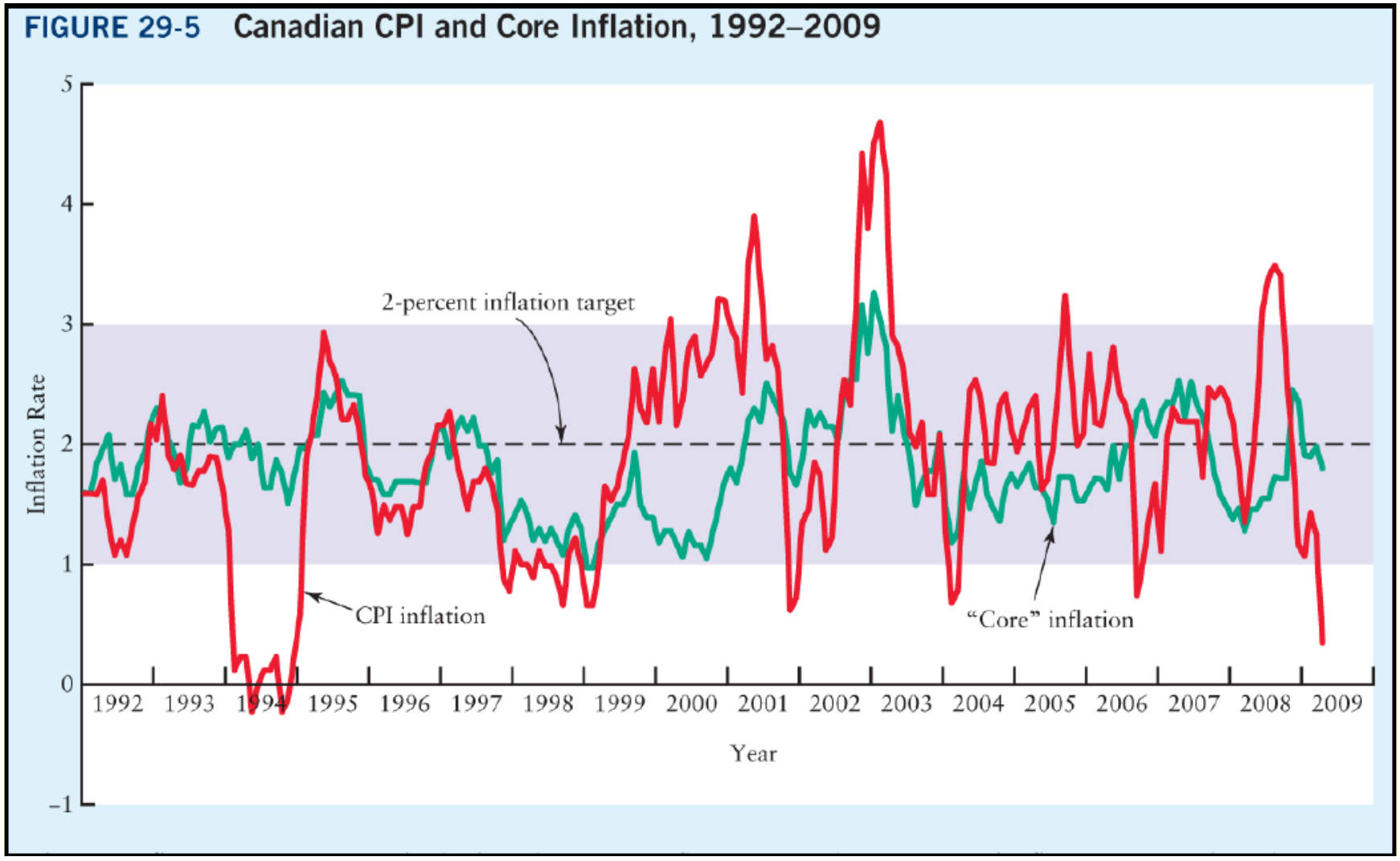
Unstable Food and Energy Prices

- Food and energy prices are:
  1. Extremely volatile
  2. Determined in international markets, i.e. Canadian firms are price takers
- BoC focuses on core inflation which removes the influence of these prices

Note: Core inflation is *not* a measure of the cost of living; only a policy tool

Unstable Food and Energy Prices, cont'd

core inflation is pretty stable



Changes in the Exchange Rate

- Changes in the exchange rate are an imperfect indicator of economic activity in Canada
- An appreciation of the Canadian dollar can be caused by:
  1. An increase in demand for Canadian gods and services
  2. An increase in the demand for Canadian assets, i.e. bonds
- These causes have different implications for monetary policy

Long and Variable Lags

As with all policy, it takes time to realize the full effects. This is for multiple reasons:

- Expenditure adjustments take time
- The multiplier process takes time
- There may exist political difficulties

Usually takes up to 9 months to affect real GDP and 18-24 months to for full effect on price level