EE432 Monetary Theory and Policy

Final Exam Recap

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Changing the size and composition of the balance sheet

Changing the Size and Composition of the Balance Sheet

- The *central bank can simply* **buy** *things* and then **create liabilities** *to pay for them*, which **increase the size** of its **balance sheet** as much as it wants.

1. **Open Market Operation**
   - *Buying or selling a security* initiated by the central bank.
2. **Foreign Exchange Intervention**
   - *Buy or sell foreign exchange reserves* initiated by the central bank.
3. **Extend a discount loan,** initiated by commercial banks.
4. *Decision by an individual* to ***withdraw cash*** *from their banks*

Open Market Operations

- When the central bank buys or sells securities in financial markets, it engages in **open market operations**.

Figure 17. 2 Balance Sheet Changes after the Federal Reserve Purchases a U.S. Treasury Bond

A. Federal Reserve's Balance Sheet

Assets		Liabilities	
Securities (U.S. Treasury bond)	+$1 billion	Reserves	+$1 billion

B. Banking System's Balance Sheet

Assets		Liabilities
Reserves	+$1 billion	
Securities (U.S. Treasury bond)	–$1 billion	

Foreign Exchange Intervention

- If the **central bank** *buy* ***German government bonds*** *(securities)* from **commercial banks**.
- The **payment** is *credited directly* to the ***reserve account*** of the *commercial bank* from which the bonds were bought.

Figure 17.3 Balance Sheet Changes after the Federal Reserve Purchases a German Government Bond

A. Federal Reserve's Balance Sheet

Assets		Liabilities	
Foreign exchange reserves (German government bonds in euros)	+$1 billion	Reserves	+$1 billion

B. Banking System's Balance Sheet

Assets		Liabilities
Reserves	+$1 billion	
Securities (German government bonds)	–$1 billion	

Discount Loans

- Commercial banks ***ask for loans***

Figure 17.4 Balance Sheet Changes after the Federal Reserve Makes a Discount Loan

A. Federal Reserve's Balance Sheet

Assets		Liabilities	
Discount loans	+$100 million	Reserves	+$100 million

B. Banking System's Balance Sheet

Assets		Liabilities	
Reserves	+$100 million	Discount loans	+$100 million

- For the commercial bank, it is a **liability** *matched by* an **increase in** the level of its **reserve account**.
- For the central bank, the **loan** is **an asset** that is created in exchange for *a credit to the commercial bank reserve account*, and **expands the monetary base**.

The Deposit Expansion Multiplier

The Deposit Expansion Multiplier

- ***Central bank liabilities*** *form* the base on which the **supplies of money and credit** are built.
  - This is why they are called the ***monetary base***.
  - The central bank ***controls*** the *monetary base*.
- Our primary interest, however, is in the **broader measure of money** which are *multiples of the monetary base.*
  - M1.
  - M2.

Deposit Expansion in a System of Banks

- We start with the following assumptions:
  - **Banks** hold *no excess reserves*.
  - The **reserve requirement ratio** is **10%**.
  - **Currency holding** does not change when deposits and loans change.
  - *When a borrower writes a check*, **none** of the recipients of the funds **deposit them back in the bank** that *initially made the loan*.

Deposit Expansion in a System of Banks

- Suppose OBI company pays $100,000 to American Steel.
- **American Steel** deposits $100,000 into ***Second Bank***.
- **Second Bank's reserve account** at the Fed is *credited with $100,000*.
- Second Bank will **make a loan** of its *now excess reserves minus the 10% they are required to hold*.
- The **new loan** is *deposited into* ***Third Bank*** and the process continues.

Deposit Expansion in a System of Banks

Figure 17.7 Changes in Balance Sheets

A. Second Bank after American Steel's Deposit

Assets		Liabilities	
Reserves	+$100,000	American Steel's checking account	+$100,000

B. Second Bank after Extension of a Loan

Assets		Liabilities	
Reserves	+$10,000	American Steel's checking account	+$100,000
Loan	+$90,000		

C. Third Bank after Deposit and Extension of a Loan

Assets		Liabilities	
Reserves	+$ 9,000	Checking account	+$90,000
Loan	+$81,000		

Deposit Expansion in a System of Banks

Table 17.3 Multiple Deposit Expansion following a $100,000 Open Market Purchase Assuming a 10% Reserve Requirement

Bank	Increase in Deposits	Increase in Loans	Increase in Reserves
First Bank	$ 0	$ 100,000	$ 0
Second Bank	$ 100,000	$ 90,000	$ 10,000
Third Bank	$ 90,000	$ 81,000	$ 9,000
Fourth Bank	$ 81,000	$ 72,900	$ 8,100
Fifth Bank	$ 72,900	$ 65,610	$ 7,290
Sixth Bank	$ 65,610	$ 59,049	$ 6,561
.	.	.	.
.	.	.	.
.	.	.	.
The Banking System	$1,000,000	$1,000,000	$100,000

Deposit Expansion in a System of Banks

- We can *derive* a formula for the **deposit expansion multiplier**
- Let's being by *assuming* there is *only one bank and everyone must use it*.
- The **level of reserves**, then, is just the **required reserve ratio** r_D *times* its **deposits**.
- If **required reserves** are RR and **deposits** are D, then the **level of reserves** can be *expressed as*:

$$RR = r_D D.$$

Deposit Expansion in a System of Banks

- Any **change in deposits** creates a corresponding **change in reserves**:

$$\Delta RR = r_D \Delta D$$

- The **change in deposits** is:

$$\Delta D = \frac{1}{r_D} \Delta RR$$

- For *each dollar <u>increase in reserves</u>, deposits increase* by $(1/r_D)$.

The Monetary Base and the Money Supply

The Arithmetic of the Money Multiplier

- The ***money multiplier*** shows how the **quantity of money** is ***related to the monetary base***.
- If we label the **quantity of money *M*** and the **monetary base *MB***, the **money multiplier *m*** is defined as:

$$M = m \times MB$$

The Arithmetic of the Money Multiplier

- We will start with the following relationships:
  - **Money** equals **currency, *C***, plus **checkable deposits, *D***,
  - The **monetary base *MB*** equals **currency** plus **reserves in the banking system** *R*, and
  - **Reserves** equal **required reserves *RR*** plus **excess reserves *ER***.

$$M = C + D$$

$$MB = C + R$$

$$R = RR + ER$$

The Arithmetic of the Money Multiplier

- We know that **banks** holdings of ***required reserves*** *depends on* the **required reserve ratio r_D.**
- The amount of **excess reserve** a bank holds *depends on* the ***costs and benefits of holding them***.
  - The *higher the interest rate* on loans, the *lower banks' excess reserves*, and
  - The *greater* banks' *concern* over the *possibility of deposit withdrawals*, the *higher their excess reserves.*

The Arithmetic of the Money Multiplier

- Labeling the **excess reserve-to-deposit ratio {*ER/D*}**, we can rewrite the reserve equation as:

$$R = RR + ER$$
$$= r_D D + \{ER/D\}D$$
$$= (r_D + \{ER/D\})D$$

- Banks ***hold reserves*** as a ***proportion of their deposits.***

The Arithmetic of the Money Multiplier

- The **currency-to-deposit ratio, {C/D},** is the *fraction of deposits that people hold as currency.*

$$C = \{C/D\}D$$

- The **decision of how much currency to hold** depends on the costs and benefits as well.
  - The **cost of currency** is the *interest it would earn on deposit*.
  - The **benefit** is its *lower risk and greater liquidity*.

The Arithmetic of the Money Multiplier

- Putting this all together, we can see to following.

$$MB = C + R$$
$$= \{C/D\}D + (r_D + \{ER/D\})D$$
$$= (\{C/D\} + r_D + \{ER/D\})D$$

- The **monetary base** has three uses:
  - **Required reserves**
  - **Excess Reserves**
  - **Cash in the hands** of the nonbank public

The Arithmetic of the Money Multiplier

- We can do the same with the **equation for money**.

$$M = C + D$$
$$= \{C/D\}D + D$$
$$= (\{C/D\} + 1)D$$

The Arithmetic of the Money Multiplier

- We can use the **equation for *MB*** to ***solve for deposits***:

$$D = \frac{1}{\{\mathrm{C/D}\} + \mathrm{r_D} + \{\mathrm{ER/D}\}} \times MB$$

- And **substituting D** into the **money equation**:

$$M = \frac{\{C/D\} + 1}{\{\mathrm{C/D}\} + \mathrm{r_D} + \{\mathrm{ER/D}\}} \times MB$$

Chapter 18

Monetary Policy: Stabilizing the Domestic Economy

The Federal Reserve's Conventional Policy Toolbox

Introduction

- Between September 2007 and December 2008, the **FOMC lowered its target for the federal funds rate** *10 times*.
- This was the first time since the 1930s that the **nominal federal funds rate hit zero**.

  - **Zero lower bound**: the idea that a *nominal interest rate cannot fall below zero*

  - **Effective lower bound**: the *nominal interest rate level below* which intermediaries and their customers ***will switch from bank deposits*** *to holding cash*.

Introduction

- To steady the financial system and the economy *after the crisis*, the **Fed** *utilized* its three of its **conventional policy tools:**
  - The ***target range*** for the **federal funds rate**
  - The **interest rate on excess reserves** (**IOER** rate)
  - The ***rate*** for **discount** window **lending**
- Policymakers then proceeded to develop and use a variety of **unconventional policy tools** including:
  - **Massive purchases of risky assets** in fragile markets
  - **Communicating its intent to keep interest rates low *over an extended period***

The Federal Reserve's Conventional Policy Toolbox

The Fed has **four** leading ***conventional monetary policy tools***, also known as *policy instruments*:

1. The **target federal funds rate range**
2. The **interest rate on excess reserves (IOER rate)**

The Federal Reserve's Conventional Policy Toolbox

- An important **supplementary tool** for monetary policy used by the Fed: ***overnight reverse repo (ON RRP) rate***.
  - Serves to ***keep the market federal funds rate*** *close to the IOER rate*
  - Can be **used to set a floor** *under* ***the market federal funds rate***

The Target Federal Fund Rate

- Prior to the financial crisis, the **target federal fund rate** *was* the ***FOMC's primary policy instrument***.
- The **federal funds rate** is the ***rate*** *at which* ***banks lend reserves*** *to each other* ***overnight***.
  - It is ***determined in the market*** and *not controlled by the Fed*.
- The ***target*** **federal funds rate** are **set by the FOMC,** and the **market federal funds rate**, *at which* **transactions between banks** take place.

The Interest on Excess Reserves

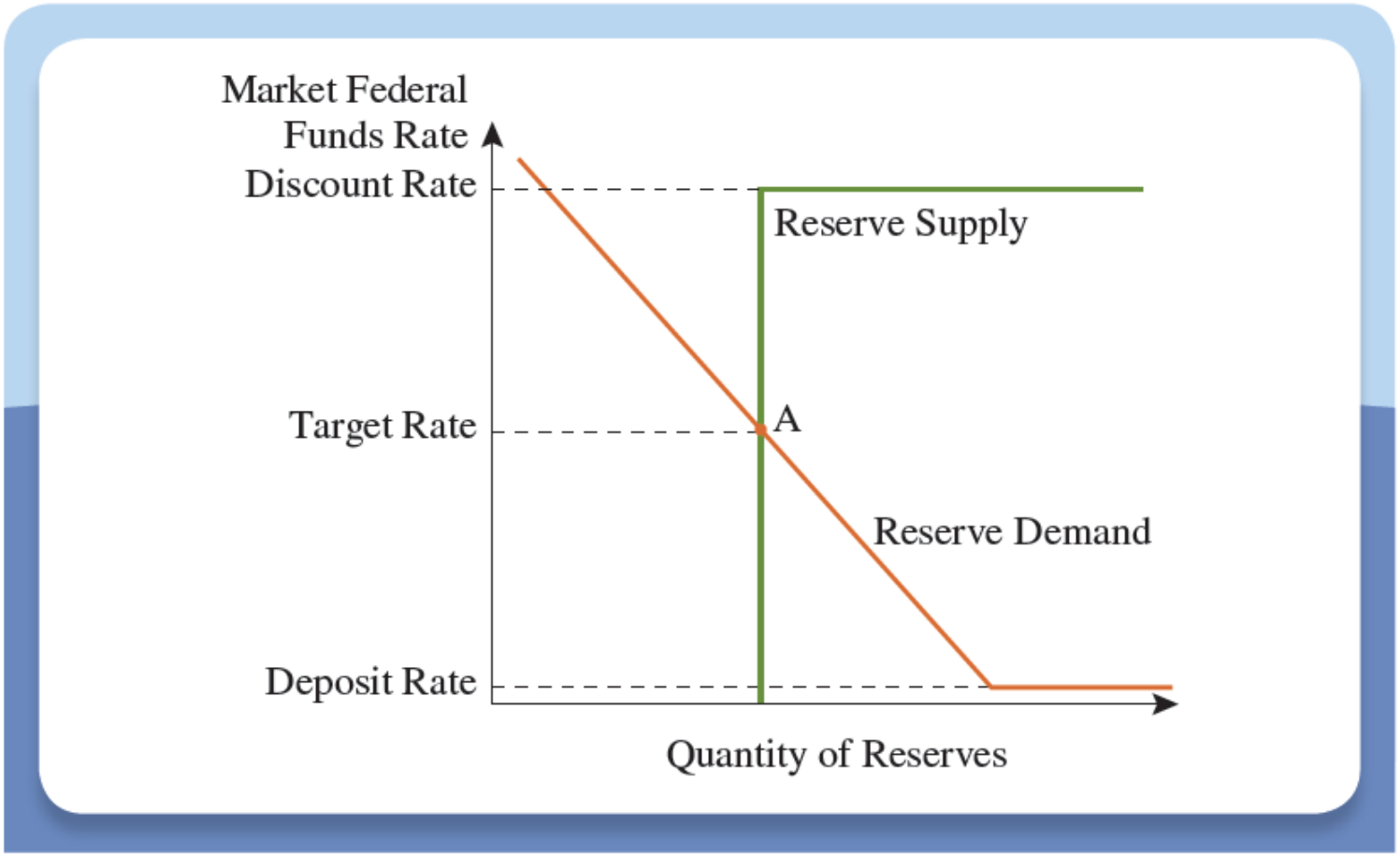
- *Discrepancies* between ***actual*** and ***desired*** **reserves** gave *rise to* ***a market for reserves***.
  - Some banks can ***lend out excess reserves***.
  - Some banks will ***borrow to cover a shortfall***.
- *Without this* market, *banks would need to* ***hold substantial*** quantities of ***excess reserves*** as insurance *against shortfalls*.

The Target Federal Fund Rate and the Interest on Excess Reserves

- As the market ***federal funds rate rises***, **banks demand *fewer reserves***
- The **Fed** continues to be the *monopoly* ***supplier of aggregate bank reserves***.
- By **buying or selling securities** in the market through an ***open market operation (OMO)***, the **Fed** could ***increase or decrease the supply of reserves*** in order to ***lower or raise the market federal funds rate***.

The Target Federal Fund Rate and the Interest on Excess Reserves

Figure 18.2 The Market for Bank Reserves prior to September 2008

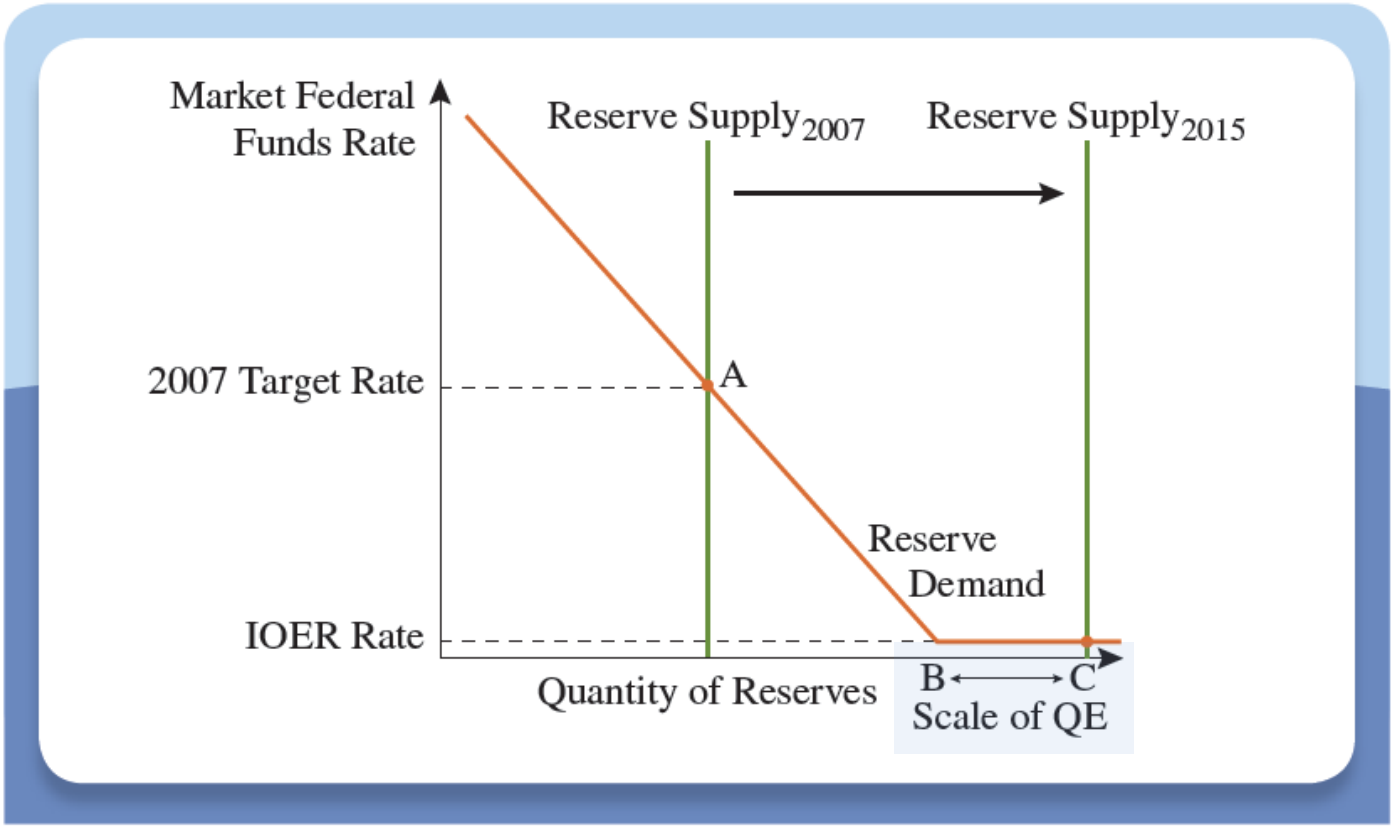


The Target Federal Fund Rate and the Interest on Excess Reserves

- *During the financial crisis*, the **Fed** *lowered its policy target close to zero*, and engaged in **quantitative easing** making ***large-scale asset purchases*** to *increase the* ***supply of reserves far beyond the level needed*** to ***keep the federal funds rate near zero***.
- Policymakers began **specifying a target range**, *instead of a target level* for the ***federal funds rate***
- The **IOER rate** forms the **upper limit** of *the* ***target range***

The Target Federal Fund Rate and the Interest on Excess Reserves

Figure 18.3 The Market for Reserves with Quantitative Easing (QE) after September 2008



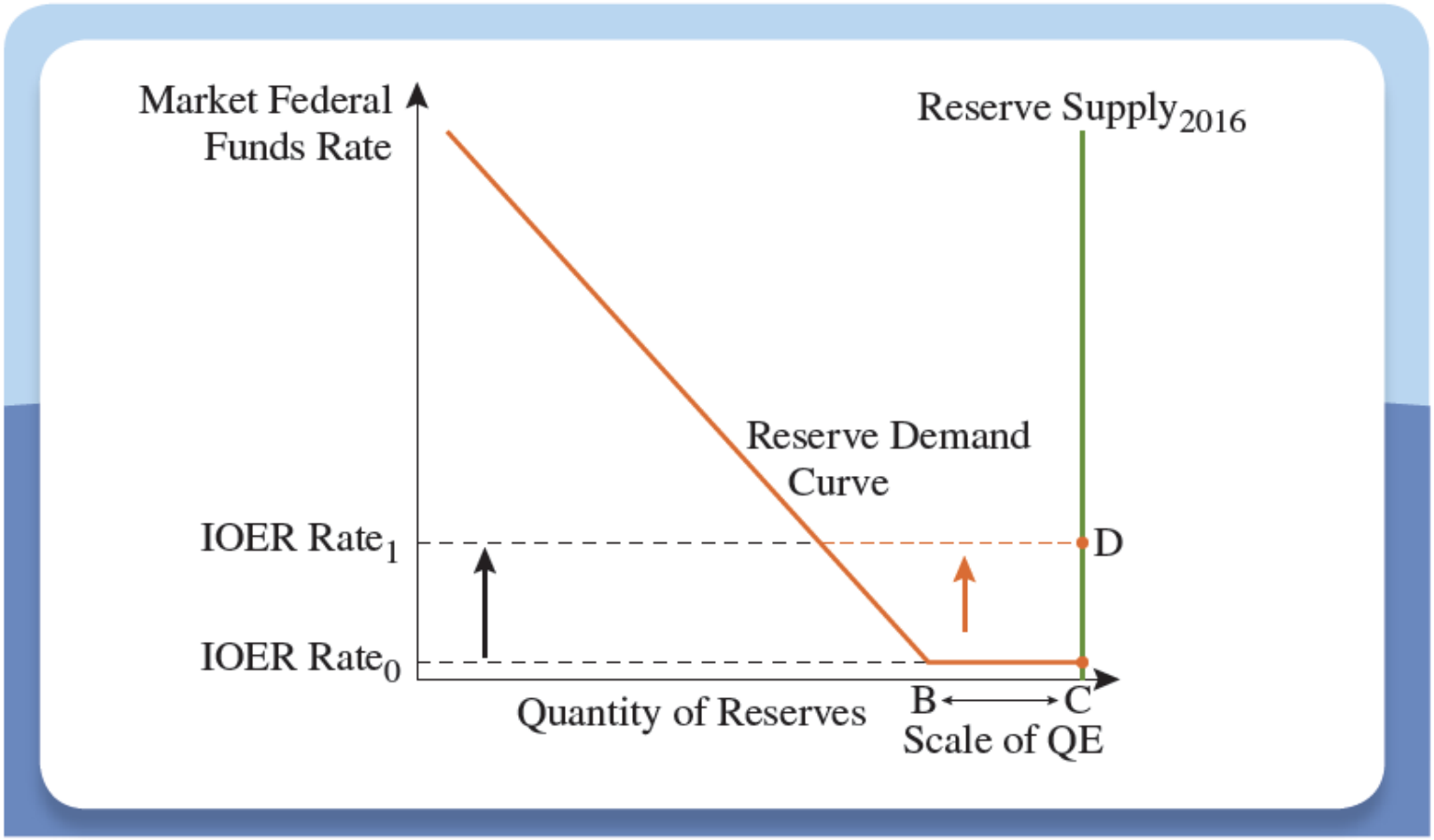
During crisis, the federal funds rate stays near zero. The **IOER rate** thus forms the **upper limit** of *the* ***target range***

The Target Federal Fund Rate and the Interest on Excess Reserves

- **Tightening monetary policy** through the ***IOER rate***
  - If there is an **increase** in the *target range for the federal funds rate*, the Fed will **raise the IOER rate**; ***raising*** *the* ***minimum rate*** at which *banks are* ***willing to lend*** *(deposit rate for excess reserve)*
  - *Allows the FOMC* to ***raise interest rates***, **tightening financial conditions**, ***without*** *altering the* **supply of reserves**

The Target Federal Fund Rate and the Interest on Excess Reserves

Figure 18.4 Tightening Monetary Policy by Increasing the IOER Rate



Inflation Targeting

- **Inflation targeting** focuses on the objective of ***low and stable inflation***
- It is a monetary policy strategy that involves ***public announcement*** of a **numerical inflation target** and underscores the central bank's *commitment* to *price stability*.
- When the ***target is credible***, ***inflation will be low***

Inflation Targeting

- **Long-term expectations** of *low* ***inflation*** act to ***anchor*** *low long-term* ***interest rates*** and *promote* ***economic growth****.*
- ***Hierarchical mandate*** in which **price stability comes first** and everything else comes second
  - The ECB, Australia, Chile, South Africa, United Kingdom, and dozens of other countries
- ***Dual mandate*** in which the **goal of price stability and maximum employment** are **equal**
  - The Fed

Inflation Targeting

- *Increases policymakers* ***accountability*** and helps *establish their* ***credibility***
- The result is *not just lower and* ***more stable inflation***, but usually *higher and* ***more stable economic growth***

A Guide to Central Bank Interest Rates: The Taylor Rule

- The FOMC sets a **target range for the federal funds rate** and **the day on which to make the changes.**
- The **Taylor Rule** *tracks the actual behavior of the target federal funds rate* and relates it to the *real interest rate, inflation, and output*.

Target fed funds rate =

Natural rate of interest + Current inflation + ½ (Inflation gap) + ½ (Output gap)

A Guide to Central Bank Interest Rates: The Taylor Rule

- The **natural rate of interest** is the *real short-term interest rate* that *prevails* when the *economy is using resources normally*.
  - Taylor **originally used 2 percent**, which is *close to the average real short-term rate*

A Guide to Central Bank Interest Rates: The Taylor Rule

- The **inflation gap** is *current inflation* minus an *inflation target* (both measured as percentages)
  - When *inflation exceeds the target level*, the **inflation gap** is *positive*
- The **output gap** is the percentage *deviation of current output (real GDP)* from *potential output*
  - When *current output is above potential output*, the **output gap** is *positive*

A Guide to Central Bank Interest Rates: The Taylor Rule

- When **inflation rises above its target level**,
  - The response is to ***raise interest rates***.
- When **output falls below the target level**,
  - The response is to ***lower interest rates***.
- If *inflation is currently on target* and there is *no output gap*,
  - The ***target federal funds rate*** should be set at the **natural rate of interest** plus **target inflation**.

A Guide to Central Bank Interest Rates: The Taylor Rule

- The Taylor rule has some interesting properties.
  - The **increase in current inflation** feeds *one for one into the* ***target federal funds rate***; however,
  - The **increase in the inflation gap** is *halved*.
- *A* ***1 percentage point increase in the inflation rate*** *raises the* ***target federal funds rate 1½ percentage points.***

Unconventional Policy Tools

Unconventional Policy Tools

- There are two circumstances when **unconventional policy** tools can *play a useful stabilization role:*
  1. When **lowering the target interest-rate to zero** is **not sufficient** to ***stimulate the economy***
  2. When an **impaired financial system** *prevents conventional interest-rate policy* from supporting economic growth

Unconventional Policy Tools

There are *three categories of* ***unconventional policy*** approaches:

1. **Forward guidance**
   - This is when the *central bank* ***communicates intentions*** regarding the *future path of monetary policy.*
2. **Quantitative easing (QE)**
   - When the *central bank* ***supplies aggregate reserves*** *beyond the quantity needed to lower the policy rate to its* ***target***, usually ***zero or lower***.

Unconventional Policy Tools

3. Targeted asset purchases (TAP)

- When the central bank alters the ***mix of assets it holds*** *on its balance sheet* in order *to* *change their relative prices* in a way that ***stimulates economic activity.***

Forward Guidance

- The *simplest unconventional approach* is for the *central bank to provide* ***forward guidance - guidance today*** about ***policy target rates in the future***
- They might express the ***intent to keep the policy target low*** *for an extended period of time.*
  - This could have a *specific termination date*, or *duration* could be dependent on some future change in economic conditions.

Forward Guidance

- To **stimulate economic activity**, *forward guidance* aims at **lowering the long-term interest rates** that affect private spending.
- **To be effective**, **forward guidance** *needs to be* ***credible*** *and* ***time consistent***

Forward Guidance

- *Although forward guidance can be effective*, it is **difficult to anticipate** and difficult to ***reach consensus on the desirable policy path*** and to *communicate these policy intentions simply*
- The potential for disturbing side effects, including **asset price bubbles**

Quantitative Easing

- **QE** occurs when the **central bank *expands the supply of aggregate reserves beyond*** the ***level*** that would be *needed to maintain its policy rate target*, usually ***zero***.
  - The central bank **buys assets**, thereby **expanding its overall balance sheet.**
- At a **market federal funds rate** equal to the ***interest on excess reserves***, an **addition to aggregate reserves** no longer reduces the funds rate
  - The Fed can **add unlimited reserves** without affecting the market federal funds rate.

Quantitative Easing

- It is **difficult to predict the effects of QE**.
- Fed policymakers argue their *balance sheet expansion* ***helped to lower long-term interest rates***, but there is *disagreement on the impacts*.
- An *increase in the supply of reserves (QE)* may simply lead banks to **hold more** of them *rather than provide additional loans*.

Quantitative Easing

- One mechanism is that *QE can add credibility to a policymaker's promise to keep interest rates low.*
- ***Announcements** of an **expansion** of aggregate reserves (QE)* could ***lower bond yields*** by *extending the time horizon* over which **bondholders expect a zero policy rate**.
- **QE** may ***reinforce*** *the impact of* ***forward guidance***

Quantitative Easing

- A problem with QE is that *central banks* **do not know *how much is needed to be effective***.
- **QE** can be ***powerful tool*** *for central bankers to* ***prevent a sustained deflation***, especially *when conventional policy tools have been exhausted.*

Targeted Asset Purchases

- ***Targeted asset purchases (TAP)*** *shift the composition of the balance sheet* ***toward selected assets*** in order to **boost their relative price and stimulate economic activity**.
- In the *absence of private demand for the risky asset*, the **central bank's purchase makes credit available** where none existed.

Making an Effective Exit

- What happens **when QE and TAP have vastly expanded the amount of reserves and assets** on the central bank's balance sheet?
  - The central bank ***may need to sell a large volume of assets*** to *reduce reserve supply* sufficiently ***to raise the policy rate target.***
- ***But****, QE and TAP assets are typically* ***more difficult to sell***.
- A central bank *may be unable to sell assets and withdraw reserves from the banking system rapidly* enough *to hike the policy interest rate* when it desires.

Chapter 19

Exchange Rate Policy and the Central Bank

Capital Controls and the Policymaker's Choice

- **Impossible Trinity**: a country *cannot* complete 3 conditions
  - **Free capital flows**
  - **Sovereign monetary policy**
  - **Fixed exchange rate**
- Policymakers must ***choose two of these three*** options.
- *If* a country is willing to participate in **international capital markets**, it *can*:
  - **Liberalize capital mobility**
  - Conduct **independent monetary policy**
  - But, it could not keep its ***exchange rate*** **fixed**

Mechanics of Exchange-Rate Management

The Central Bank's Balance Sheet

The Central Bank's Balance Sheet

- As the Fed works to **maintain** a ***fixed dollar-euro exchange rate***, its *balance sheet shifts*.
- **Buying euros** *or selling dollars* ***increases*** the **supply of reserves** to the banking system.
- These ***interventions*** have an impact on **interest rates** and the **quantity of money** in the economy.
- **Controlling the exchange rate** means **giving up control of the size of reserves** so that the ***market*** *determines the* ***interest rate***.

The Central Bank's Balance Sheet

- In *September 2000*, the world's largest central banks **intervened** to ***bolster*** the **value of the euro**.
- The **Fed *purchased €1.5 billion*** in exchange for $1.34 billion.
  - They did this **by purchasing bonds *issued by euro-area governments***.

The Central Bank's Balance Sheet

Figure 19.1 Change in the Federal Reserve's Balance Sheet Immediately following a Purchase of Euros

Assets		Liabilities	
Euro reserves (German government bonds)	+ $1.34 billion	Commercial bank reserves	+ $1.34 billion

- The Fed ***increased*** its **euro-denominated foreign exchange assets** by $1.34 billion.
- On the liabilities side, **commercial bank reserves** have increase by the same amount.

The Central Bank's Balance Sheet

- This transaction is **identical** to a ***purchase of U.S. Treasury bonds***.
- A foreign exchange intervention has the **same impact on reserves** as a ***domestic open market operation.***
- The **Fed** did **supply dollars** to the market through its intervention, but *more importantly*, the **interest rate has fallen**.

The Central Bank's Balance Sheet

- The **U.S. interest rate** will ***fall,*** while **European interest rates *remain the same***.
- Foreign investors will want to **buy fewer U.S. bonds**, and they will ***need fewer dollars*** to do it.
  - The **demand for dollars** in the foreign exchange market ***falls***.
- **U.S. investors** will **sell US bonds** to ***buy more foreign bonds***.
  - The **supply of dollars** will ***increase***.

The Central Bank's Balance Sheet

- When Fed intervened to buy euros, it did **not change *interest-rate targets.***
- We assumed that when the Fed bought euros, it **increased *commercial bank reserves***, which would **reduce the interest rate** in the *absence of any other action*.
- This is an example of an **unsterilized foreign exchange intervention**

Sterilized Intervention

Sterilized Intervention

- In fact, **central banks** in large countries **do <u>not</u>** ***operate that way***.
- They engage in **<u>sterilized</u> foreign exchange interventions**:
  - A **change in foreign exchange reserves** alters the ***asset side*** of the ***central bank's balance sheet*** but the **domestic monetary base** ***<u>remains unaffected</u>***.

Sterilized Intervention

A **sterilized intervention** is a ***combination*** of two transactions:

1. There is the **purchase or sale of foreign currency reserves**, which ***changes the central bank's liabilities.***
2. Then, an **immediate open market operation**, of ***exactly the same size***, designed to **offset** the impact of the first transaction on the ***monetary base***.

Sterilized Intervention

- For example, the **Fed's purchase of a German government bond**, is ***offset*** by the **sale of a U.S. Treasury bond**.
  - These two actions **leave the level of reserves unchanged.**
- This intervention is **sterilized** with respect to its ***effect on the monetary base***, or the ***size of the central bank's balance sheet***.
- An intervention is **sterilized** since it does **not change** the ***monetary base***.

Sterilized Intervention

- The **FOMC** had **not changed** the **target federal funds rate**.
- The ***foreign exchange desk*** had **purchased bonds issued by a euro-area government**, *paying for them with reserves*, and the ***open market desk*** had **sold U.S. Treasury bonds** to ***reverse the potential impact***.

Figure 19.3 Change in the Federal Reserve's Balance Sheet following a *Sterilized* Purchase of Euro-Denominated Bonds

Assets		Liabilities
Euro reserves (German government bonds)	+$1.34 billion	Commercial bank reserves unchanged
Securities (U.S. Treasury bonds)	–$1.34 billion	

The Costs, Benefits, and Risks of Fixed Exchange Rates

The Costs, Benefits, and Risks of Fixed Exchange Rates

- **Fixed exchange rates** not only ***simplify operations*** for *international trade businesses*, they also ***reduce the risk*** that investors face when they ***hold foreign stocks and bonds***.
- *In countries* that are prone to bouts of *high inflation*, a **fixed exchange rate** may be the only way to ***establish*** a **credible low-inflation policy.**

Assessing the Costs and Benefits

- One serious **drawback** to a **fixed exchange rate** is that it ***could <u>not</u> operate*** **independent monetary policy.**
  - You **<u>must adopt</u>** the ***other country's interest-rate policy.***
- A ***fixed exchange rate policy*** makes the most sense when the *two countries involved have <u>similar</u> macroeconomic fluctuations.*
  - Otherwise, the ***country with the flexible exchange rate*** that is in **control of monetary policy** might be ***raising interest rates*** at the same time **another country in going into a recession.**

Assessing the Costs and Benefits

Policymakers should consider several additional matters.

1. When a country **fixes its exchange rate**, the central bank is ***offering*** to **buy and sell its own currency** at a **fixed rate**.
   - Monetary policymakers will **need <u>ample</u> currency reserves.**
2. *Fixing the exchange rate* means **reducing** the domestic economy's natural **ability to respond to macroeconomic shocks.**

The Danger of Speculative Attacks

- **Fixed exchange rates** are *fragile and likely to a type of crisis* called a **speculative attack**.
- Suppose for some reason, *financial market participants* come to ***believe*** that the ***government will need to devalue*** its currency in the near future.
  - ***Investors*** are ***likely to attack the currency now*** and ***force*** an **immediate devaluation**.

The Danger of Speculative Attacks

Causes of a speculative attack:

1. Fiscal policy:
   - If investors begin to think that at current levels, ***government spending*** *must ultimately* **increase inflation**, they will ***not believe*** that ***officials can maintain the exchange rate*** at its **fixed level**.
2. Financial instability:
   - If a country's banking system is **insufficiently capitalized**, a central bank may face pressure to ***relax monetary policy*** to **avoid financial crisis**.
   - If **investors doubt** that the **central bank will keep interest rates high** enough for a ***sufficient time*** to **defend the currency peg**, an ***attack may follow***.

Assessing the Costs and Benefits

3. Spontaneously:
   - If enough currency **speculators** simply ***decide*** that a ***central bank <u>cannot</u> maintain its exchange rate***, they will **attack**.
     - **Spontaneous speculative attacks** are like **bank runs**; they can be ***contagious***.

Many observers suspect that in today's world, **<u>no</u> central bank *has the resources to withstand such an attack*** in the **absence of capital controls**

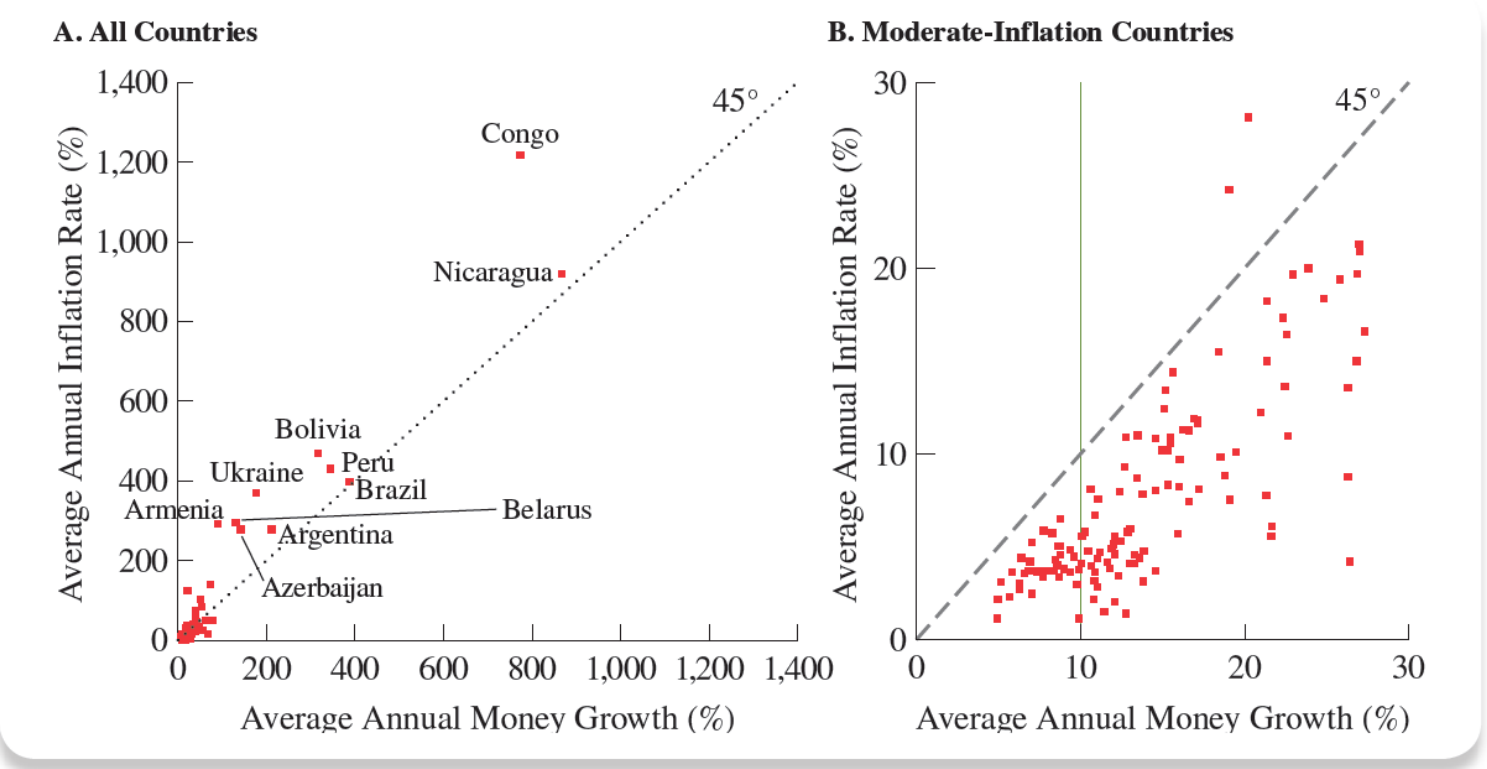
Chapter 20

Money Growth, Money Demand, and Modern Monetary Policy

Why We Care about Monetary Aggregates

Why We Care about Monetary Aggregates

Figure 20.1 Inflation Rates and Money Growth



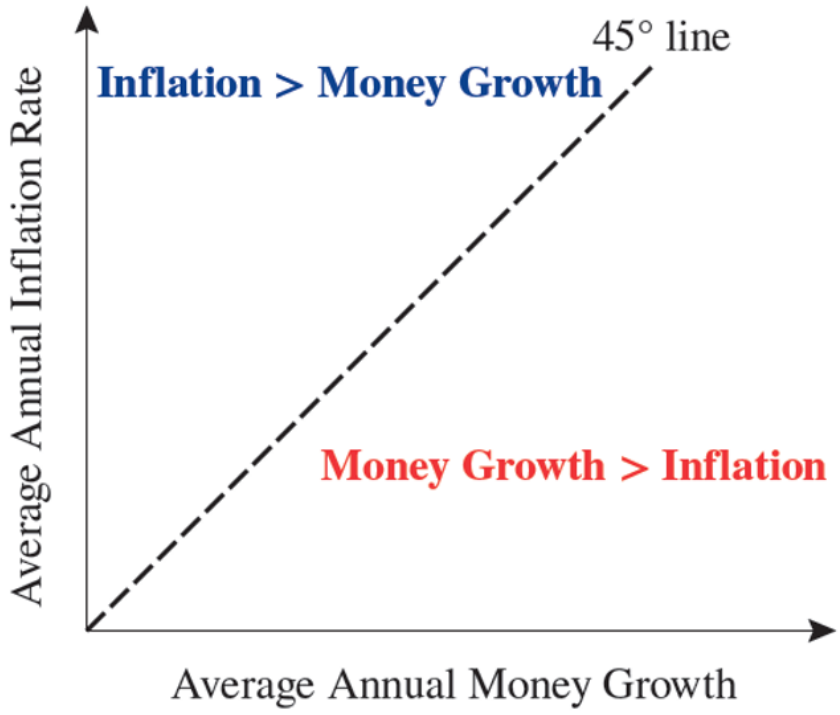
Inflation was computed from each country's analog to the consumer price index; money is the rough equivalent of M2. Data are for the 30 years beginning in 1980.

SOURCE: These figures are based on data from the International Monetary Fund's International Financial Statistics.

Every country with ***high inflation*** has ***high money growth***. To avoid sustained episodes of high inflation, a **central bank** must be ***concerned*** with **persistent rapid money growth**.

Why We Care about Monetary Aggregates

Figure 20.2 Money Growth and Inflation



In general, **countries with very high inflation** tend to ***lie above the line*** and *countries with moderate to low inflation* tend to *fall below* it.

Why We Care about Monetary Aggregates

- When the **currency** that *people are holding* **loses value very rapidly**, they will ***spend as quickly as possible*** - the *same effect* on inflation *as an increase in money growth*.
- By **limiting** the ***rate*** at which they ***purchase securities***, *policymakers can* **control** the ***rate of M2 grow***.
- It is *impossible* to have ***high, sustained inflation*** *without* ***monetary accommodation***.

The Quantity Theory and the Velocity of Money

Velocity and the Equation of Exchange

- We can ***rewrite*** the previous equation as:

$$MV = PY$$

- This is called the **equation of exchange**, and tells us that the ***quantity of money*** *multiplied by its* ***velocity*** *equals the level of* ***nominal GDP***.

Velocity and the Equation of Exchange

- We can ***rewrite*** the equation to allow *for the percentage change in each factor*.

$$MV = PY$$

$$\%\Delta M + \%\Delta V = \%\Delta P + \%\Delta Y$$

- ***Money growth*** *plus* ***velocity growth*** *equals* ***inflation*** *plus* ***real growth***.

The Quantity Theory of Money

- Suppose that there are ***no important changes*** occur in **payment methods** or the ***cost of holding money***.
  - If the **interest rate is fixed** and there is ***no financial innovation***, then **velocity will be constant**.
- Also assumed that **real output** is *determined* solely *by* **economic resources** and **production technology**, so it too is **fixed in the short run**.

The Quantity Theory of Money

- *Irving Fisher* concluded that **money growth *translates directly into*** **inflation**, an assertion that is termed the **quantity theory of money**.

The Quantity Theory of Money

- We can ***reinterpret*** the **quantity theory of money** to describe the ***equilibrium*** between ***money demand*** and ***money supply***.

- **Money demanded (M^d)** equals the **total value of transactions *divided*** by the **velocity of money (V).**

The Quantity Theory of Money

- For the economy as a whole, **the demand for money** equals **nominal GDP *divided*** by **velocity**:

$$M^d = \frac{1}{V} PY$$

- The **supply of money (M^S)** is *determined* by the ***central bank*** and the ***behavior of the banking system***.
- *Assuming* ***velocity*** and ***real output*** are **constant**, we can conclude that ***money growth*** equals ***inflation***.

The Quantity Theory of Money

The **quantity theory of money** *accounts for* some important characteristics:

1. It *tells us* why **high inflation** and **high money growth** go together.
2. It explains the tendency for ***moderate- and low-inflation countries*** to fall *below* the **45-degree line**.

The Quantity Theory of Money

- **Money growth** tends to be ***higher*** than **inflation** in those countries because they are ***experiencing*** **real growth**.
- If **velocity** is constant, then **money growth** equals the ***sum*** of **inflation** and **real growth**.

The Quantity Theory of Money

- At a *given level of money growth*, the **higher** the level of **real growth**, the ***lower*** the level of ***inflation***.
- In **countries *that are growing***, **inflation** will be ***lower than*** **money growth**, causing their *economies to fall below the 45-degree line*.

The Facts about Velocity

- If the **velocity of money** is ***constant***, it means the **trend in real growth** is *determined by* the **structure of the economy** and the **rate of technological process.**
  - This means countries **could control inflation** *directly by* **limiting money growth**.

The Facts about Velocity

- This logic led *Milton Freidman* to conclude that **central banks** should ***simply set money growth*** at a **constant rate**.
  - **M1 and M2 *should grow*** at a **rate** equal to the ***rate of real growth*** plus the ***desired level of inflation***.

The Facts about Velocity

- To make the rule viable, he **suggested *changes in regulations*** that would:
  - **Limit banks' discretion** in ***creating money***, and
  - ***Tighten the relationship*** *between* the **monetary aggregates** and the **monetary base**, **reducing fluctuations** in the **money multiplier**.
- *For example, an* ***increase in the reserve requirement*** *or* ***restrictions on the number and types of loans banks could make****.*

The Facts about Velocity

- But Friedman's recommendation that the **central bank** should **keep money growth constant** would ***stabilize inflation*** *only if* ***velocity were constant***.
- In countries with ***high levels of inflation***, ***changes in velocity*** *can probably be* ***ignored***.
- But in countries where *inflation rate is below 10% per year*, **changes in velocity** could have a ***significant impact*** on the ***relationship*** between **money growth** and **inflation**.

The Facts about Velocity

- Historical data seem consistent with Fisher's conclusion: *in the **long run**, the **velocity of money is stable**, so that* **controlling inflation** *means **controlling the growth of the money aggregates**.*

The Facts about Velocity

- Notice the **increase in velocity** in the *late 1970s and early 1980s*.
- This was a period of both **high nominal interest rates** and **significant financial innovations**.
- Together these ***reduced*** *the* **amount of money individuals held** for a given level of transactions, ***raising*** the **velocity of money**.

The Facts about Velocity

- These data clearly suggest that **fluctuations** in the ***velocity of money*** are *tied to* **changes in people's desire to hold money**.
- Policymakers *must understand* the **demand for money.**

Chapter 21

Output, Inflation, and Monetary Policy

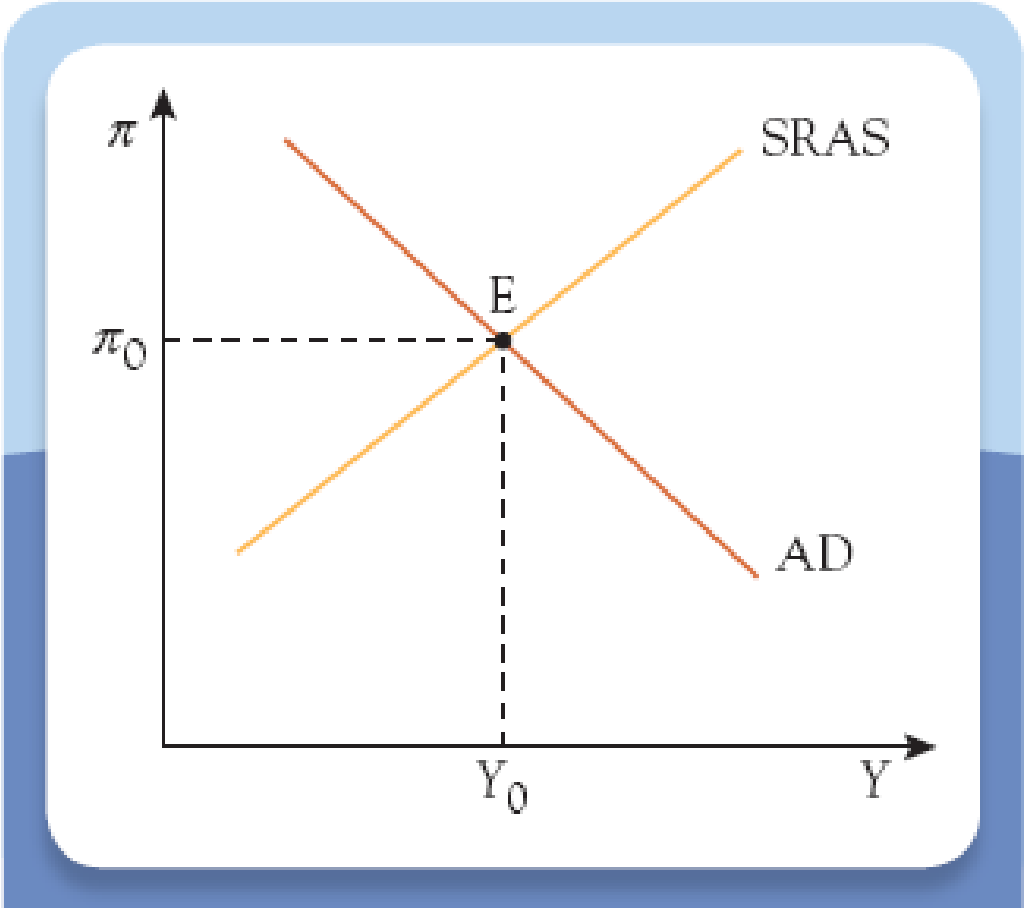
Equilibrium and the Determination of Output and Inflation

Equilibrium and the Determination of Output and Inflation

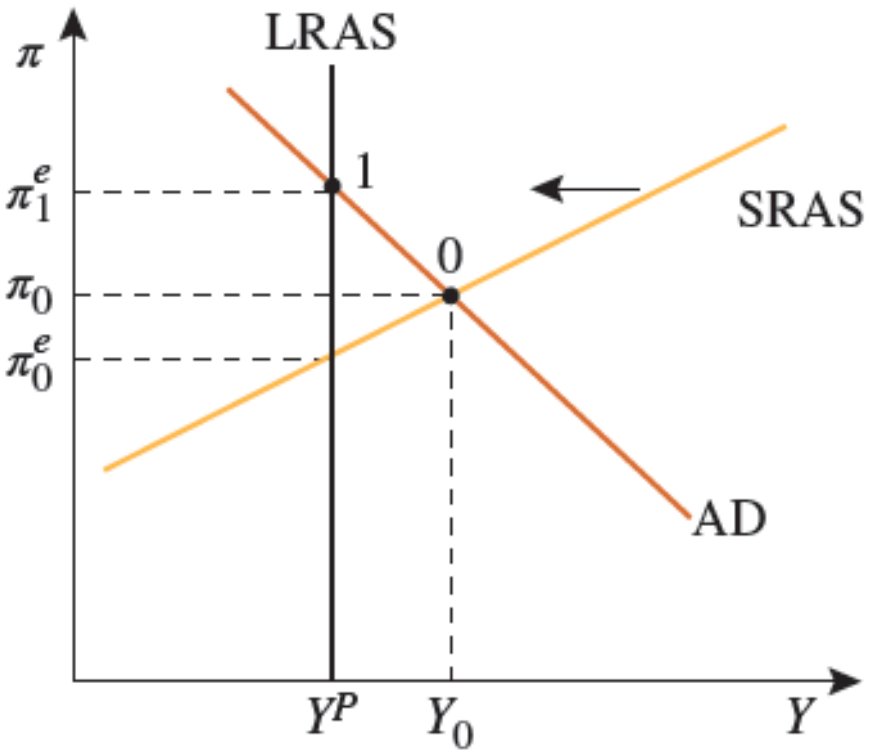
Short Run Equilibrium

- SR equilibrium is *determined by the* ***intersection*** of:
  - The **dynamic aggregate demand curve (AD)** and
  - The **short-run aggregate supply curve (SRAS).**

Figure 21.15 Short-Run Determination of Output and Inflation

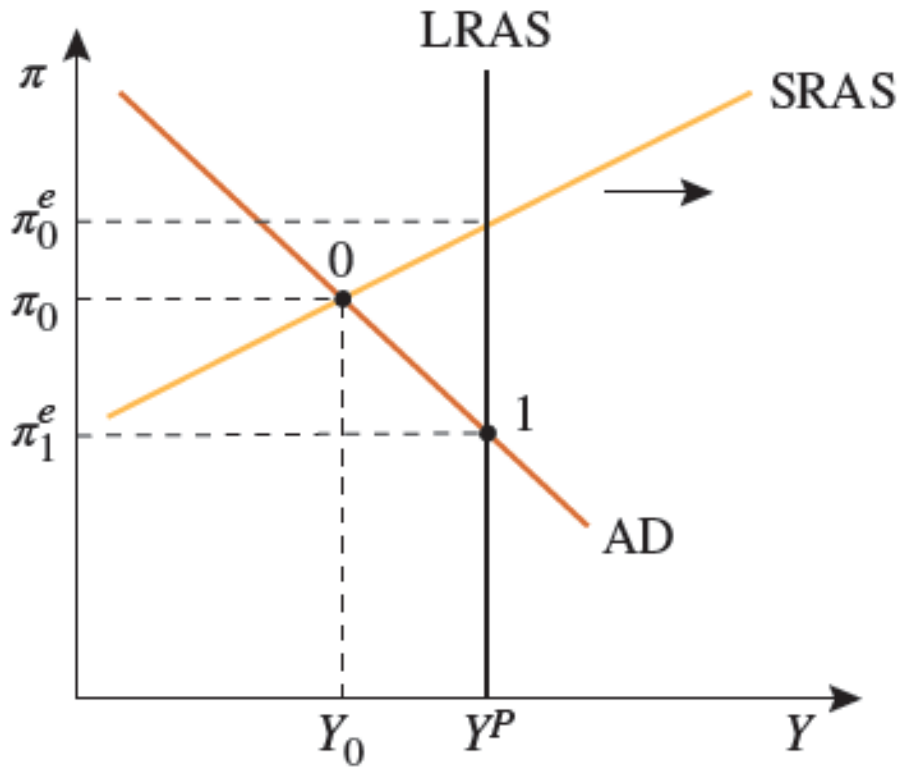


Adjustment to Long-Run Equilibrium



- ***Expansionary output gaps*** push **current inflation *above* expected inflation**
- **Current inflation** is *greater* than **expected inflation** so ***expected inflation rises***
- **SRAS *shifts left*** *until current inflation* and *expected inflation* are equal.

Adjustment to Long-Run Equilibrium



- ***Contractionary output gaps***
- **Current inflation** is *less* than **expected inflation** so ***expected inflation falls***.
- **SRAS *shifts right*** *until current inflation* and *expected inflation* are *equal*.

Adjustment to Long-Run Equilibrium

Implications

1. The economy has a ***self-correcting mechanism***.
2. The fact that ***inflation changes*** whenever there is an ***output gap***, so that the **long run output** returns to **potential output**.

Adjustment to Long-Run Equilibrium

There are **three conditions** for **long run equilibrium**:

1. **Current inflation** *equals* **expected inflation**: $\pi = \pi^e$.
2. **Current output** *equals* **potential output**: $Y = Y^P$.
3. **Current inflation** is *steady* and *equal* to **target inflation**: $\pi = \pi^T$

The Sources of Fluctuations in Output and Inflation

- **Inflation *in the long run*** will only change if policymakers have ***changed inflation target***.
- In the **short run fluctuations** can *come from*
  - **Increases** in **exogenous spending** (*shift* of **AD**)
  - A ***permanent easing*** of **monetary policy** (*shift* of **monetary policy reaction curve**)
  - **Increases** in the **costs of production** (*shift* of **SRAS**).

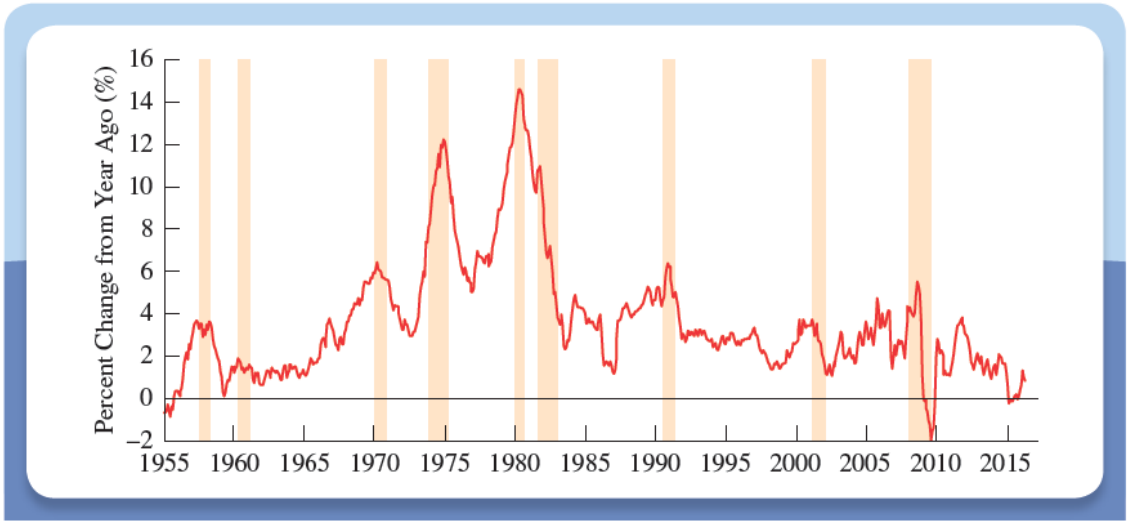
Chapter 22

Understanding Business Cycle Fluctuations

Sources of Fluctuations in Output and Inflation

Sources of Fluctuations in Output and Inflation

Figure 22.1 Inflation and the Business Cycle, 1955–2016



There appears to be a *connection* between **growth** and **changes in inflation**.

While there is no apparent *relationship between the level of inflation and recessions*,
It does appear that; the **inflation rate**, either ***falls*** when **the *economy is contracting***; or **rises** when it is **expanding**.

Sources of Fluctuations in Output and Inflation

Remember that **long-run equilibrium** means:

1. $Y = Y^P$ ***output = potential output***.
2. $\pi = \pi^T$ ***inflation = target inflation***.
3. $\pi = \pi^e$ ***inflation = expected inflation***.

Short-run equilibrium is:

The point where the ***dynamic aggregate demand curve*** (AD) **intersects** the ***short-run aggregate supply (SRAS) curve***.

Sources of Fluctuations in Output and Inflation

- Immediately after either the **SRAS curve** or **AD curve *shift***, the economy will *move away from its* ***long-run equilibrium*** – so called, **short-run fluctuations**.
- Economists define ***shocks*** as *something unexpected.*

Sources of Fluctuations in Output and Inflation

- A **shock** *shifts* the *AD* or *SRAS* curve.
  - A **supply shock** affects *costs of production*
    - For example; an **oil price increase**.
  - A **demand shock** affects *exogenous spending and thus aggregate expenditure*
    - For example; **change in consumer confidence**

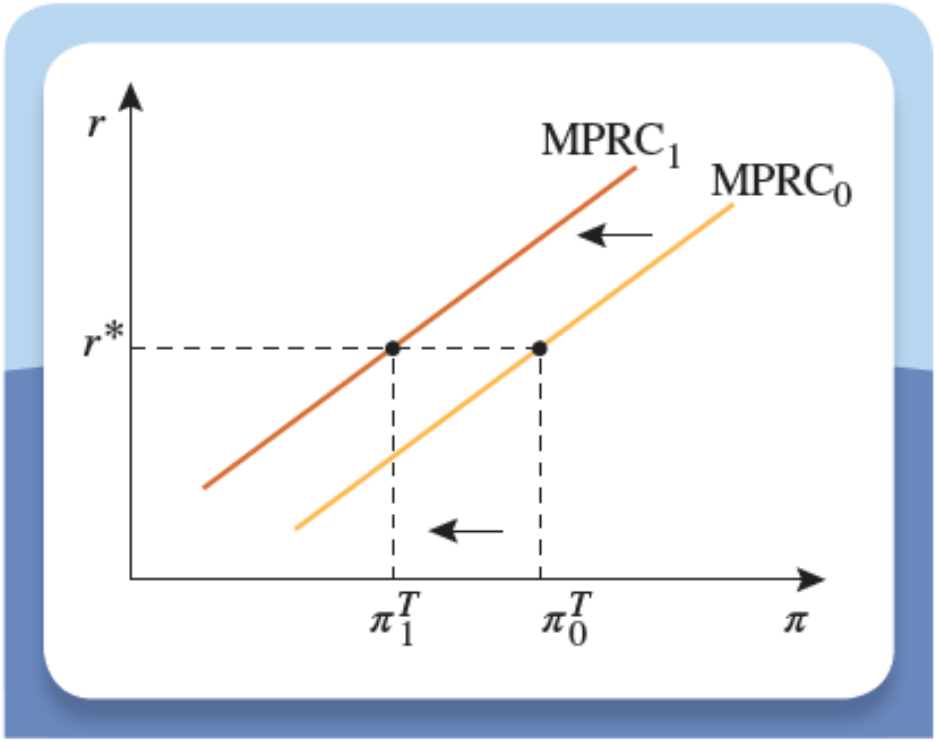
Demand Shock

A Decline in the Central Bank's Inflation Target

- A *fall* in π^T ***shifts*** *the* ***monetary policy reaction curve*** to the *left*.
  - The ***decrease*** in the ***inflation target*** **raises** the ***real interest rate*** policymakers s*et at each level of inflation*.
  - This **reduces aggregate expenditure *shifting*** the **AD curve** to the ***left*** as well.
    - The economy moves to a **new short-run equilibrium**.

A Decline in the Central Bank's Inflation Target

Figure 22.2 A Decline in the Central Bank's Inflation Target



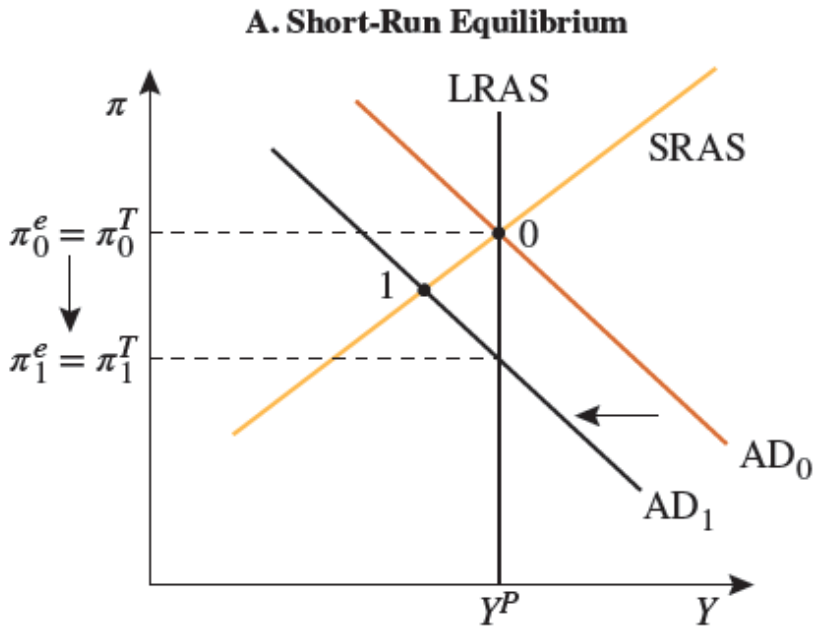
A decline in the inflation target from π_0^T to π_1^T shifts the monetary policy reaction curve to the left from $MPRC_0$ to $MPRC_1$

A Decline in the Central Bank's Inflation Target

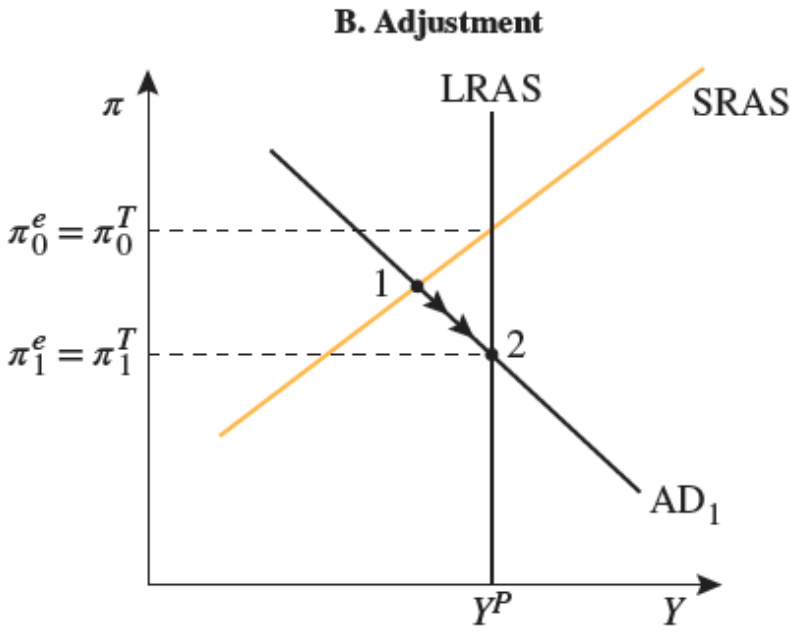
- At the new short-run equilibrium point, ***inflation*** and ***current output*** are **lower** than they were *prior to* the *monetary policy tightening*.
  - The **dynamic aggregate demand curve *shifts left***, moving the economy *along the SRAS*
- **Current inflation** is ***less than*** **expected inflation**
  - **Expected inflation *falls*, shifting** the **SRAS *right***
- The **economy** will ***move*** along the new dynamic aggregate demand curve ***to*** *the* ***new long-run equilibrium*** where **inflation** *equals* the **new central bank's target**, and **output** *equals* **potential output**.

A Decline in the Central Bank's Inflation Target

Figure 22.3 A Decline in the Central Bank's Inflation Target



A decrease in the central bank's inflation target shifts the dynamic aggregate demand curve to the left from AD_0 to AD_1, moving the economy from point 0 to point 1.



When the economy is at point 1, current inflation is less than the initial level of expected inflation (π_0^e). As a result, expected inflation falls, shifting the short-run aggregate supply curve to the right. The process continues until the economy reaches point 2, where expected inflation equals the new inflation target ($\pi_1^e = \pi_1^T$).

An Increase in Government Purchases

- An ***increase*** in **government spending *shifts*** the **AD curve** to the ***right***.
- The *economy* moves from the original *short-run equilibrium* to a ***new short-run equilibrium***.
  - The immediate impact is to ***raise*** both **current output** and **inflation**.

An Increase in Government Purchases

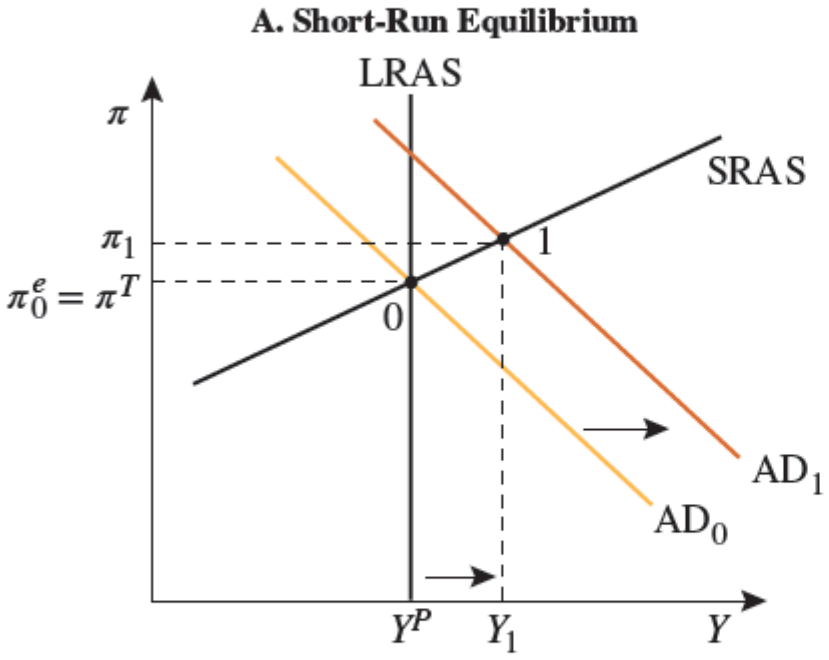
- Because **current inflation** *exceeds* **expected inflation**, this can't be the long-run effect.
- **Expected inflation *rises***, ***shifting*** the **SRAS** curve to the ***left***.
  - As the economy travels along aggregate demand, **current inflation *rises*** and **current output *falls*** until the point at which the **dynamic aggregate demand curve *crosses*** the **LRAS** curve

An Increase in Government Purchases

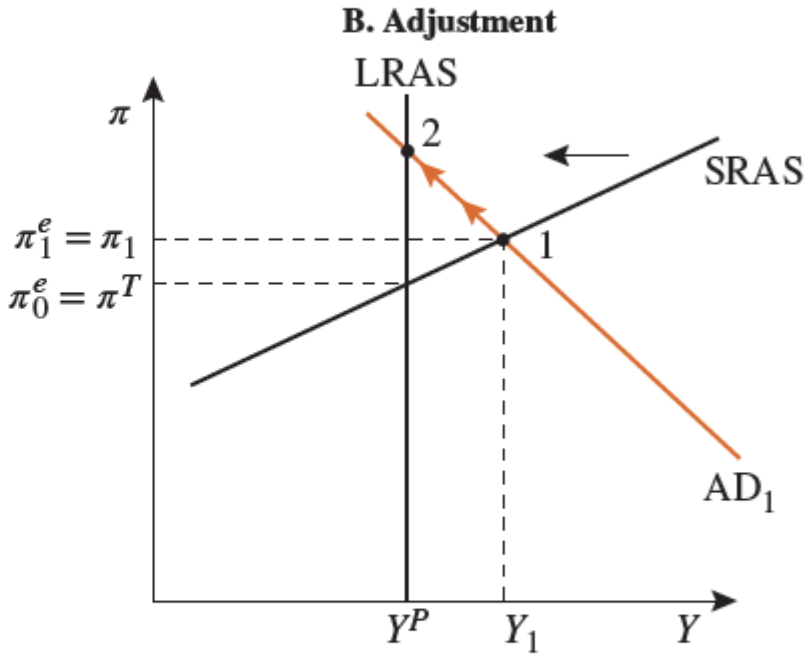
- **Inflation** is ***higher*** at the new equilibrium point than it at the original.
- This is ***above*** the **policymakers' original inflation target**, π^T
- **<u>Unless</u>** ***monetary policy adjusts***, when the *dynamic aggregate demand curve* shifts to the *right*, **inflation** *will* ***rise***.

An Increase in Government Purchases

Figure 22.4 An Increase in Government Expenditure



An increase in government expenditure shifts the AD curve to the right from AD_0 to AD_1. This moves the economy from point 0 to point 1. In the short run, output rises to Y_1 while inflation increases to π_1.



When the economy is at point 1, current inflation is initially above expected inflation ($\pi_1 > \pi_0^e$). As expected inflation rises in response, the short-run aggregate supply curve shifts to the left, moving the economy along AD_1 toward point 2.

An Increase in Government Purchases

- As long as monetary policymakers **remain committed to their *original inflation target***, they need to do something to *get the economy back to the point where it began*.
- In this case, **tighter monetary policy *shifts*** the **AD curve** to the ***left***.
  - This **brings the economy back** to the ***long-run equilibrium*** where **output** equals **potential output** and **inflation** equals the **central bank's target**.
- **Without a change in target inflation**, *an* ***increase in government purchases*** *causes a* ***temporary increase*** *in both* ***output*** *and* ***inflation***.

Supply Shock

Shifts in *Short-Run* Aggregate Supply

- **Changes in production costs *shift*** the **SRAS curve.**
- A ***negative supply shock*** that ***increases production costs***; for example, *increase in the price of oil*, will ***shift*** the **SRAS curve** to the ***left***, reducing the amount supplied at every level of inflation
  - **Higher inflation** and **lower growth**

Shifts in Short-Run Aggregate Supply

- The **short-run equilibrium** moves to where the **new SRAS curve *meets* AD**.
- This *creates* a condition referred to as ***stagflation***.
  - **Economic stagnation** coupled with ***increased*** **inflation**.
- **Expected inflation *rises*** as well and because **current inflation** is ***below*** this level, the **SRAS** curve ***shifts*** back to the ***right***

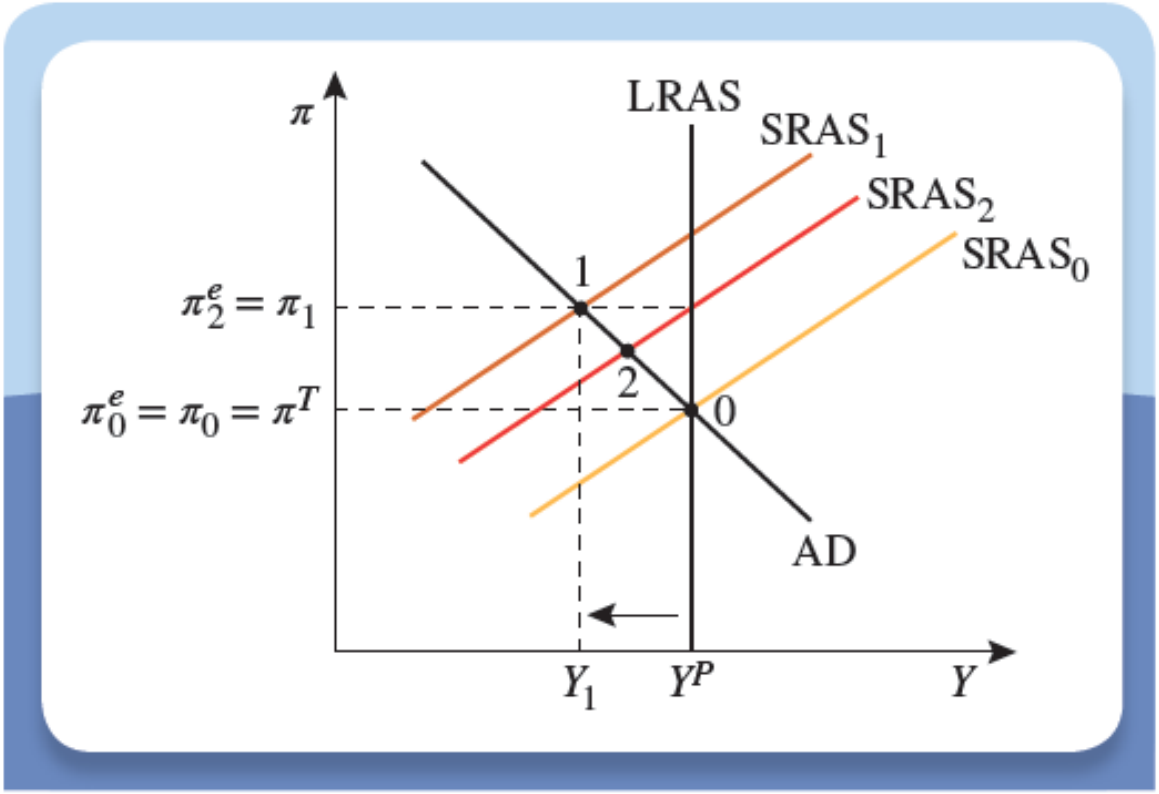
Shifts in Short-Run Aggregate Supply

- **Inflation** continues to ***fall*** and **output** *continues to* ***rise*** until **current inflation** and **expected inflation** ***return*** to the **central bank's inflation target**, and **output** equals **potential output**.

- ***Inflation*** *is at its* **highest** *and* ***output*** *at its* **lowest** *immediately,* ***following a negative shock to SRAS***
- ***Over time***, **self-correcting** forces *will unwind the shock,* ***restoring long-run equilibrium***

Shifts in Short-Run Aggregate Supply

Figure 22.5 A Negative Supply Shock



A negative supply shock shifts the SRAS curve to the left, moving the short-run equilibrium from point 0 to point 1, raising inflation to $\pi_1 > \pi^T$. At point 1, current inflation is *below* the intersection of $SRAS_1$ and LRAS that marks expected inflation in the long run, so the SRAS curve shifts back right to $SRAS_2$, which intersects the LRAS at the point where expected inflation (π_2^e) equals π_1. The SRAS curve continues to shift right until inflation and expected inflation again equal target inflation at point 0.

Shifts in Short-Run Aggregate Supply

- *As with an* ***increase in government purchases***, a **supply shock** has **no effect** **on** the economy's ***long-run equilibrium point***.
- A **supply shock** causes **inflation** to ***rise temporarily*** and *then* ***fall***.
  - This happens at the same time that **current output** ***falls temporarily*** and *then* ***rises***.
- In the **long run**, the economy ***returns*** to the point where **output** equals **potential output** and **inflation** equals the **central bank's target**.

How Do Policymakers Achieve Their Stabilization Objectives?

Monetary Policy

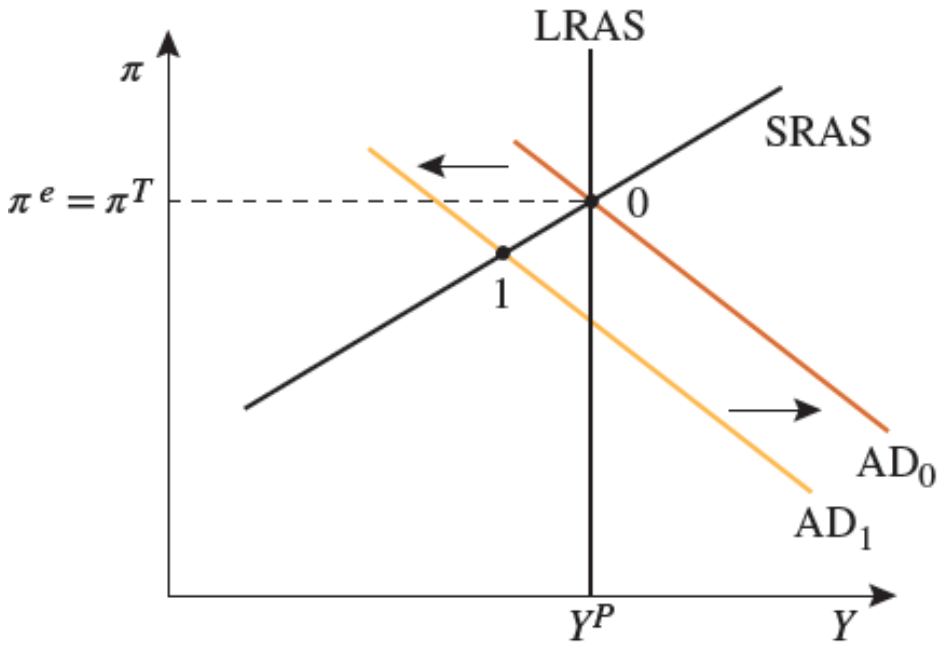
- A *reduction in consumption and investment*, ***shifts*** the **dynamic aggregate demand curve** to the ***left***
  - **Current inflation** would ***fall below*** **expected inflation** and **current output** to ***fall below*** **potential output**.

Monetary Policy

- **Drop in consumer or business confidence**:

  $AD_0 \rightarrow AD_1$

  Economy: points $0 \rightarrow 1$
- ***Stabilization*** *requires* ***shifting AD back*** *to where it started*.

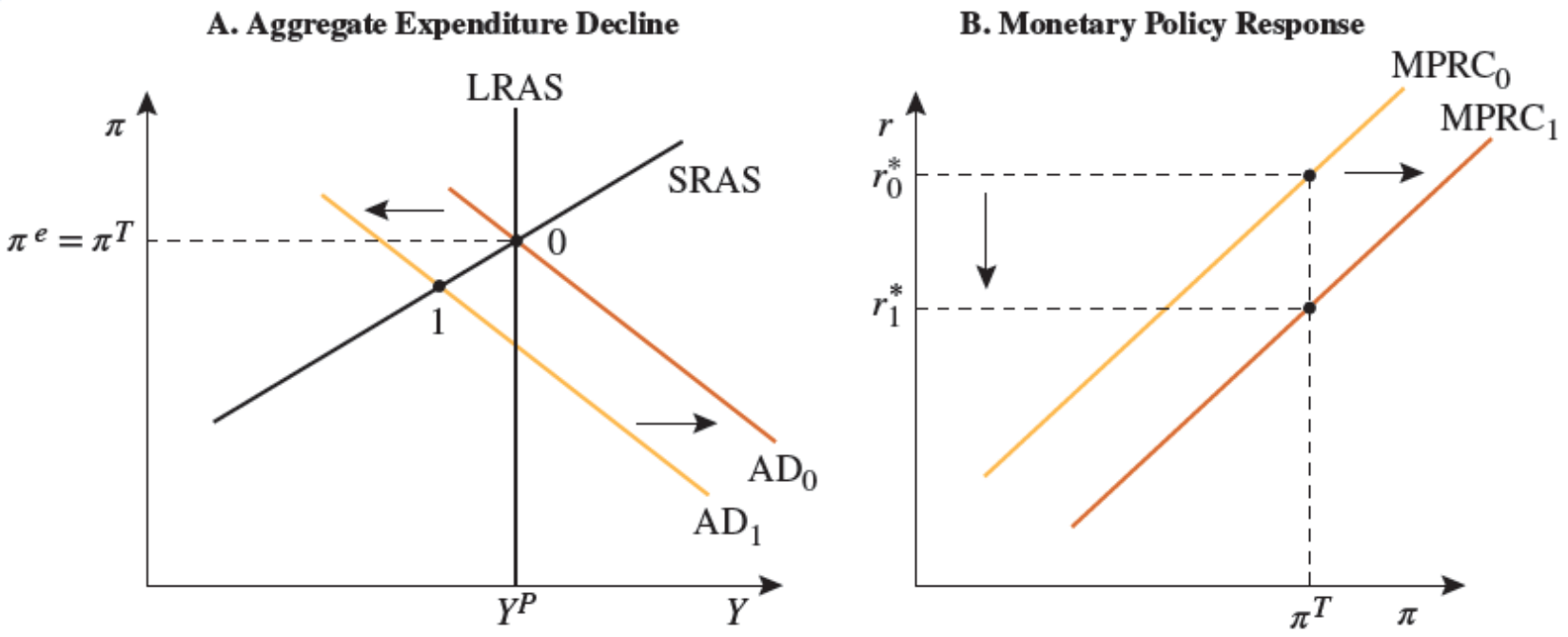


Monetary Policy

- Policymakers **realize to keep inflation on target** and thus conduct ***expansionary monetary policy***, implying **long-run real interest rate would be cut**.
- The ***drop*** in **aggregate expenditure** prompts policy maker to *shift the* ***monetary policy reaction curve*** to the *right*.
- The ***reduction*** in the level of the **long-run real interest rate** means the **AD curve** would then ***shifts right***, **back to its original level**.
- This policy response indicates that the **economy** will be **back** at **long run equilibrium**.

Monetary Policy

Figure 22.7 Stabilizing a Shift in Dynamic Aggregate Demand



Following a drop in consumer or business confidence the dynamic aggregate demand shifts to the left from AD_0 to AD_1, moving the economy from point 0 to point 1. Realizing this, monetary policymakers shift their MPRC to the right, shifting the dynamic aggregate demand curve back to where it started and returning the economy to point 0.

Following a drop in consumer confidence, the long-run real interest rate falls from r_0^* to r_1^*. Policymakers respond by shifting their reaction curve from $MPRC_0$ to $MPRC_1$, shifting the AD curve back to its original position, AD_0.

Monetary Policy

- *In practice*, it is extremely ***difficult*** *to* ***keep*** *inflation and output* ***from fluctuating*** *when* **aggregate expenditure changes**.
- There are two reasons:
  - It **takes time to recognize** *what has happened.*
  - ***Changes in interest rates*** do not have an ***immediate impact*** on the economy.

Positive Supply Shocks and the Opportunity They Create

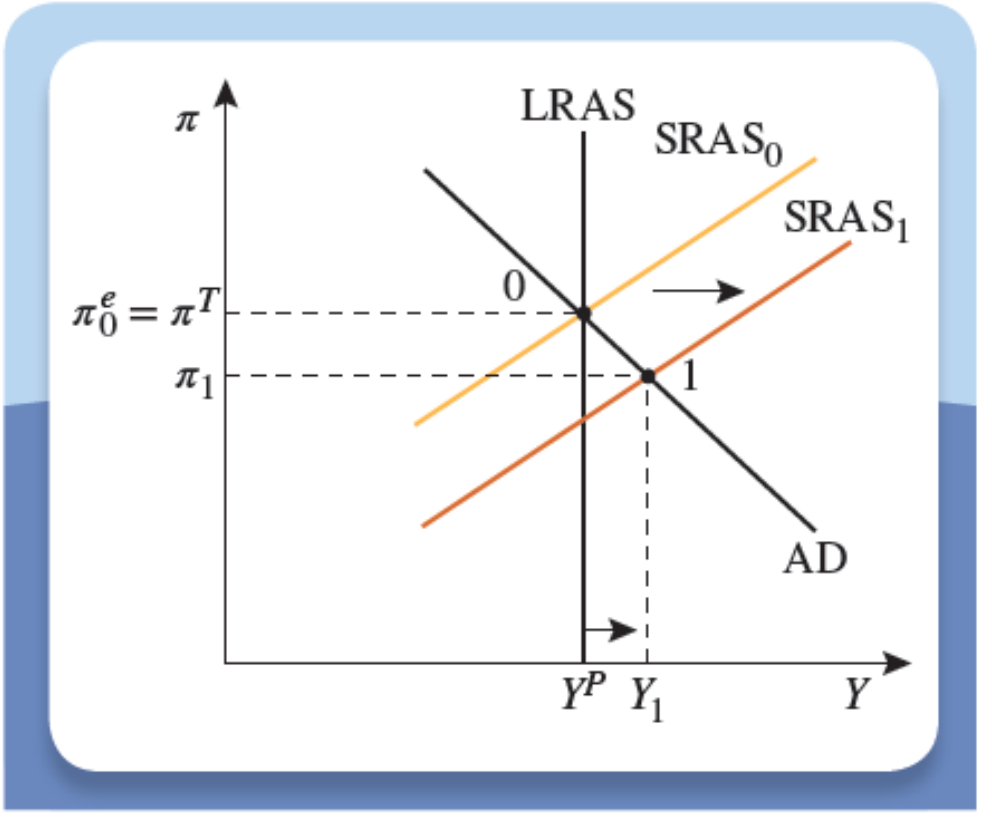
Positive Supply Shocks and the Opportunity They Create

- When **production costs *fall*** - a ***positive* supply shock**
- The **SRAS curve** *shifts* to the **right**.
  - This ***drives up* inflation** and **output** immediately.
  - **Current inflation** is ***below* expected inflation** and **expectations** initially ***fall***.
- This leads to **inflation** *above* **expected inflation** so ***expectations start to rise*** and the **SRAS curve** *shifts* to the **left**.
  - This continues **until the economy returns** to the ***original* long-run equilibrium**.

Positive Supply Shock

- ***Fall*** in **production costs** **shifts SRAS Right**.
  - Economy 0→1
- **Current inflation** is ***above*** **expected inflation** (given by the intersection between LRAS and $SRAS_1$), then **SRAS *moves back*** to *original level*.
  - Economy 1→0

Figure 22.8 A Positive Supply Shock

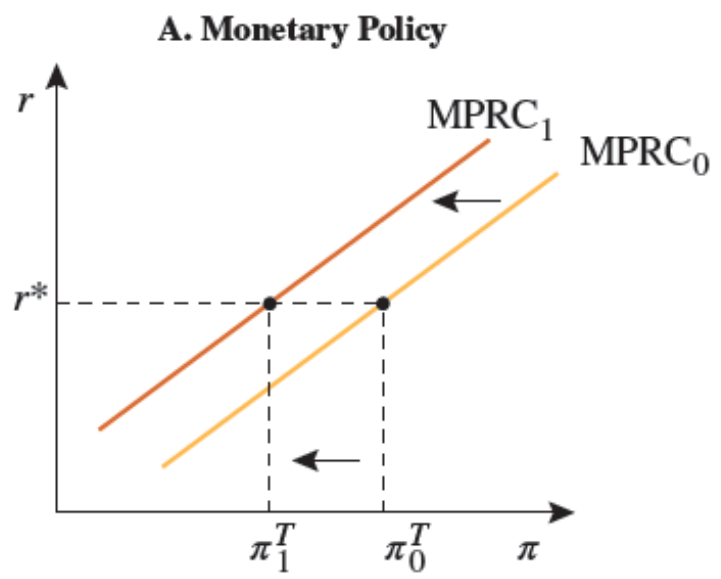


Positive Supply Shocks and the Opportunity They Create

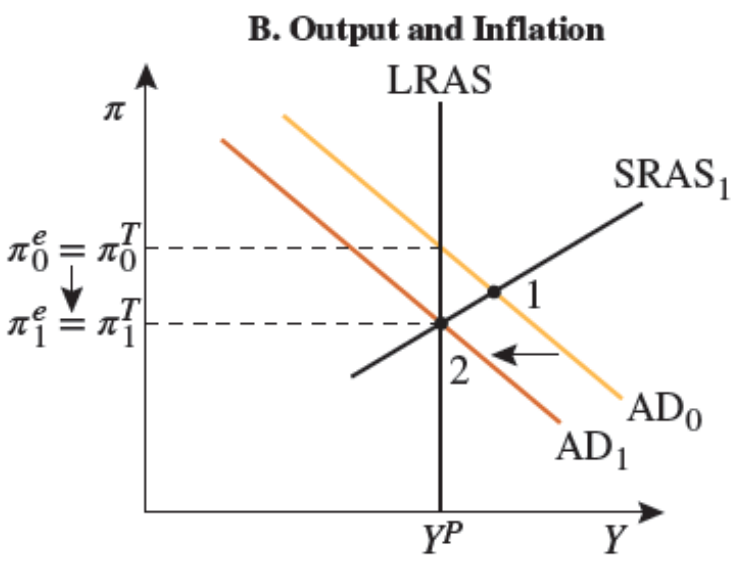
- A **positive supply shock** *creates an* ***opportunity*** for policymakers to ***guide the economy*** *to* ***a new***, ***lower inflation target*** *without* inducing a *recession*.
  - Central bankers will *shift* the **monetary policy reaction curve** to the **left**.
  - The **AD** *shifts* **left** as well.
  - This **continues** *until* it reaches the point where the **new SRAS curve *intersects*** the **LRAS curve**.

Positive Supply Shocks and the Opportunity They Create

Figure 22.9 Lowering the Inflation Target



A decline in the inflation target from π_0^T to π_1^T shifts the monetary policy reaction curve to the left from $MPRC_0$ to $MPRC_1$.



Following a positive supply shock, policymakers can reduce their inflation target by shifting the dynamic aggregate demand curve from AD_0 to AD_1. This lowers expected inflation from π_0^e to π_1^e. Instead of going to point 1, the economy moves to point 2.

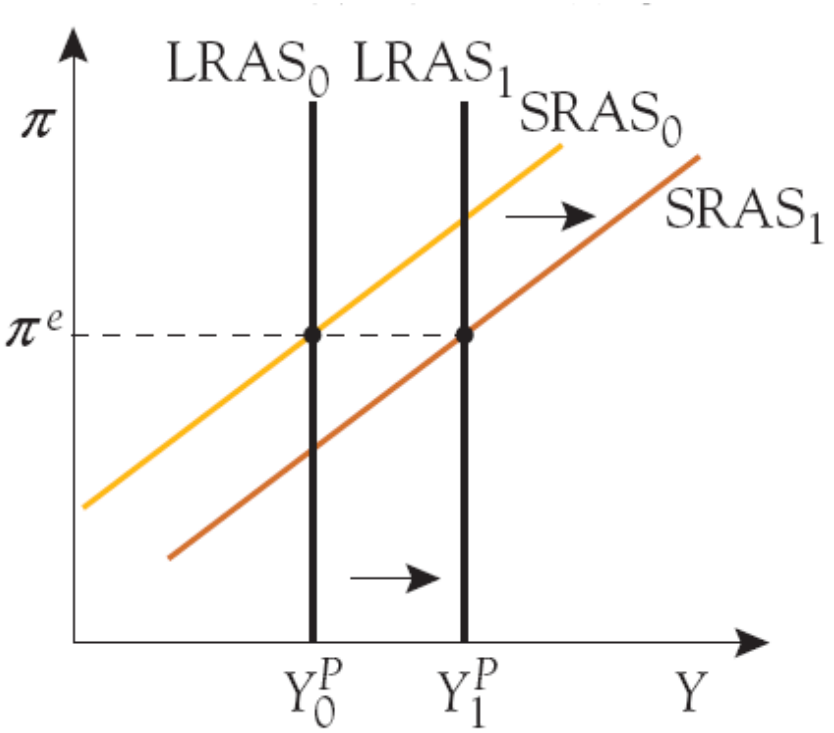
What Happens When Potential Output Changes?

What Happens When Potential Output Changes?

- *What happens* when **Y^P increases** due to an **increase in productivity**?
  - The **long-run aggregate supply curve** will *shift* to the **right** as **Y^P increases**.
  - An ***increase in productivity*** **reduces costs of production**, so it is a ***positive supply shock*** as well.
  - The **SRAS curve** will *shift* **right**.
    - Remember that the **SRAS curve** *intersects* the **LRAS curve** at the point *where* **current inflation** equals **expected inflation**.

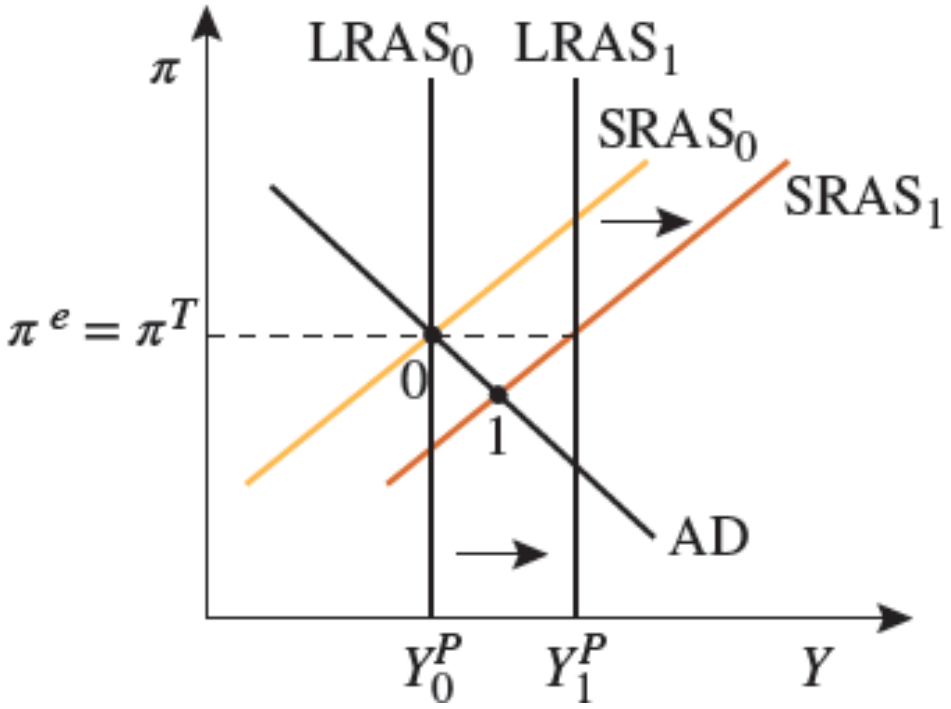
What Happens When Potential Output Changes?

- An **increase in Y^P** *shifts* **SRAS *right*** and shifts **LRAS** *right*.
- But **SRAS** still *crosses* **LRAS** where **$\pi = \pi^e$**.
- **SRAS** *shifts* the ***same distance*** as **LRAS**.



What Happens When Potential Output Changes?

- *In the short-run*, **output** *and* **inflation** are <u>determined by</u> the **intersection** of **SRAS** and **AD**.
- Since **AD** is **unchanged**, the ***economy is at <u>point 1</u>*** in the short-run.



What Happens When Potential Output Changes?

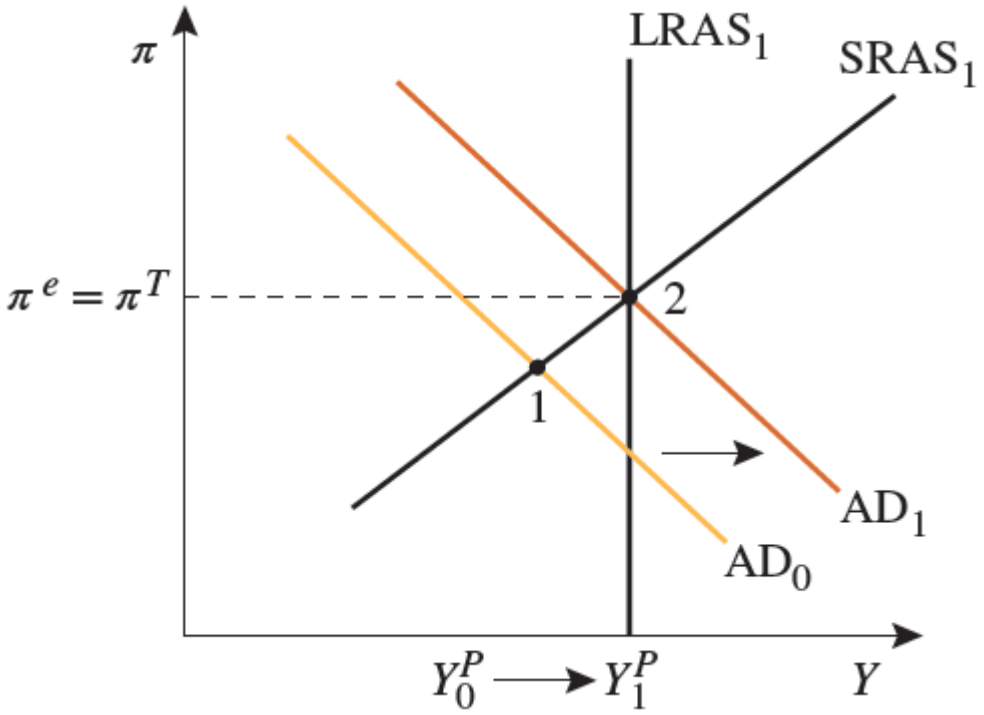
- In the **long run**, **output** must *go to the* ***new*** *level of* **potential output**, $\mathbf{Y^P_1}$.
- ***How it gets there*** depends on ***what monetary policymakers do*****.**
- *If* **policymakers** are happy with their ***inflation target***, they will ***work to move*** *the economy* to the point on the **LRAS curve *consistent with*** their **target**.

What Happens When Potential Output Changes?

- But the **higher** level of **potential output** *comes along with* a ***lower*** **long-run real interest rate**.
  - **Returning inflation** to its *higher level* means *shifting* the **MPRC** to the **right**.
  - This *shifts* **AD** to the **right**.
  - The policy adjustment will *drive* ***output*** and ***inflation*** *up* until they **reach their new LR equilibrium level** at the ***original inflation target*** and $\mathbf{Y^P_1}$.

What Happens When Potential Output Changes?

- With π^T **unchanged**, policymakers *shift* **AD right**.
- The economy *moves to* the **new** level of **potential output** *and* the **original** π^T *at point 2.*

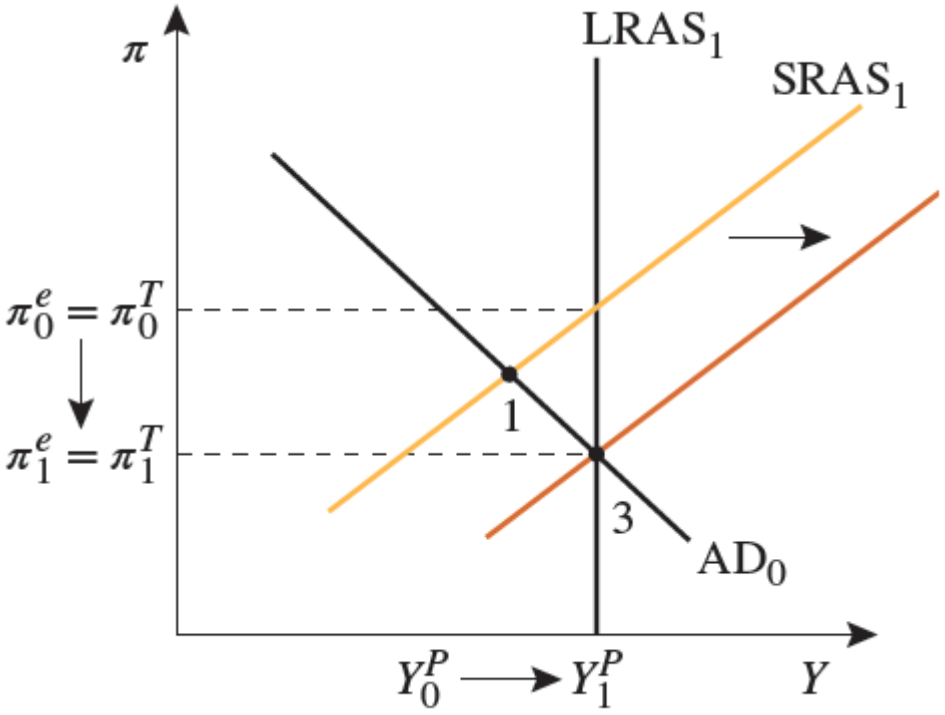


What Happens When Potential Output Changes?

- If **policymakers** now **do nothing**, **expected inflation** *exceeds* **current inflation**
  - The **SRAS curve** to the ***right***.
  - **Inflation *falls*** even *further*
- **Long run** in this case is at a ***new*** **lower inflation target** at the ***new*** **potential output**.

What Happens When Potential Output Changes?

- With a **new, lower π^T:** policymakers *allow the economy to move* to **point 3**.
- They do this by *leaving* the **monetary policy reaction curve** alone.



What Happens When Potential Output Changes?

- *In the 1990s* the **LRAS curve** *shifted* to the **right**, and the **Fed *took the opportunity*** to **reduce** their implicit **inflation target**.
- At the time, this was *referred to* as "***opportunistic disinflation*"**.
  - Declines in inflation
- **Real-business cycle theory**: ***prices and wages are flexible***, so ***inflation adjusts rapidly***, **current output** always equals **potential output**, and all ***business-cycle fluctuations*** arise *from* ***changes in potential output***

Chapter 23

Modern Monetary Policy and the Challenges Facing Central Bankers

The Traditional Channels: Interest Rates and Exchange Rates

The Traditional Channels: Interest Rates and Exchange Rates

- **Easing of monetary policy** - a *decrease* in the *target nominal interest rate*, which ***lowers the real interest rate*** - leads to a **depreciation of the dollar.**
- The ***less valuable dollar***:
  - **Drives up** the **cost of imported goods** and services, reducing imports from abroad, and
  - **Makes export goods** and services **cheaper**, so foreigners will buy more of them.

The Traditional Channels: Interest Rates and Exchange Rates

- The **interest-rate channel** is ***not*** very ***powerful***.
- Data suggest that the **investment** component of total spending is **not sensitive to interest rates**.
- While a ***small change in the interest rate*** does change the cost of external financing, it does **not** have much **effect on investment decisions**.

The Traditional Channels: Interest Rates and Exchange Rates

- The **impact of *short-term* interest rates** on ***household decisions*** is **modest**.
- The problems is that *people's decisions to purchase cars or houses* depend on ***longer-term* interest rates** rather than the *short-run target rate.*
- *Household consumption decisions* will only *change* to the extent that the **target interest rate *affects* long-term interest rates**.

The Traditional Channels: Interest Rates and Exchange Rates

- The **policy-controlled interest rate** is just *one of many factors* that *shift the demand and supply* for the dollar on ***foreign exchange markets***.
- The **traditional channels** of ***monetary policy transmission*** are **not** very **powerful**.
- Yet, evidence shows that **monetary policy** is **effective**.
- **Something else** must be ***amplifying*** the **impact of monetary policy changes** on ***real economic activity.***

Bank-Lending and Balance-Sheet Channels

Bank-Lending and Balance-Sheet Channels

- **Banks** are *essential* to the ***operation of a modern industrial economy***.
- **Banks** are also the **channel** through which ***monetary policy is transmitted*** to the economy.
- To understand monetary policy changes completely, we ***look at*** the **impact** of **policy changes** on **banks and bank lending**.

Banks and Bank Lending

- ***Borrowers*** do <u>not</u> have *access to capital market financing* - ***must go through banks***.
- When ***banks stop lending***, **borrowers** simply can **<u>not</u> obtain financing**.
- By ***altering*** the **supply of funds *to the banking system***, policymakers ***can affect*** **banks' <u>ability</u>** and **<u>willingness to lend</u>**.
  - The **bank-lending channel** of ***monetary policy <u>transmission</u>.***

Banks and Bank Lending

- An **open market purchase** has a ***direct impact*** on the **supply of loans**.
- **Financial regulators** can ***also*** influence **bank-lending practices**.
- **Changes in financial regulations**, will have an ***impact*** on the ***amount of bank lending***.
- **Credit conditions** typically ***tighten*** in *recessions* and ease in booms.

Firms' Balance Sheets and Household Net Worth

Firms' Balance Sheets and Household Net Worth

- The **balance-sheet channel** of *monetary policy transmission* works because ***monetary policy*** has the **direct influence** on the **net worth of potential borrowers**.
  - An *easing of monetary policy* **improves *firms' and households'* balance sheets**, *increasing* their ***net worth*** and *reducing* their ***credit risk premium***.
  - ***Increases*** in ***net worth*** *reduce* the problems of *moral hazard* and *adverse selection*.
    - This *lowers* information *costs of lending* and ***allows borrowers*** to ***obtain financing*** *more easily*.

Firms' Balance Sheets and Household Net Worth

How does ***monetary policy expansion*** *improve* borrowers' ***net worth***?

1. ***Expansionary policy*** *drives up* ***asset prices***, *increasing* the *value of firms* and the *wealth* of *households*.
2. ***Lower interest rates*** *reduce* the ***burden of repayment*** of *current loans of borrowers*.

Firms' Balance Sheets and Household Net Worth

- At **lower interest rates**, a person with *a variable rate loan* ***enjoys*** **lower interest payments.**
  - The ***percentage of person's income*** that is ***devoted to loan payments*** will be **lower**.
  - *As **interest rates fall**, the **supply of loans increases**.*
- **Information services** are central to ***banks' role*** in the *financial system*.
  - They help to *address the problems* of **adverse selection** and **moral hazard**.

Firms' Balance Sheets and Household Net Worth

- **Inferior information** leads to an ***increase*** *in* ***adverse selection***.
- This then:
  - ***Reduces bank lending***,
  - ***Lowers investment***, *and ultimately*
  - ***Depresses the quality of aggregate output demanded***.

Firms' Balance Sheets and Household Net Worth

- The **channels of monetary policy transmission** depend on the ***structure of the financial system.***
- ***If banks*** are ***unimportant sources of funds*** for firms and individuals, ***the bank-lending channel*** is **not** ***tremendously important***.
- Though ***technology*** *has made the processing of increasing amount of* ***information*** *easier* and *cheaper*, it seems **unlikely to solve** the problems of **adverse selection** and **moral hazard**.

Asset-Price Channels: Wealth and Investment

Asset-Price Channels: Wealth and Investment

- When the **interest rate *moves*, *so do* stock prices.**
  - This ***relationship*** is *referred to* the ***asset-price channel*** of **monetary policy transmission**.
- The **lower the interest rate**, the *higher the present value* is and the **higher the stock price**.

Asset-Price Channels: Wealth and Investment

- When ***policymakers*** *reduce their interest-rate target,* it drives the **mortgage rate *down***.
  - ***Higher demand*** for ***residential housing,*** *driving up* the ***prices of existing homes***.
- **Stock and property prices** affect both *individual* ***consumption*** *and business* ***investment***.
  - ***Higher stock*** and ***real estate prices*** mean an ***increase in wealth***.
  - *An increase in wealth means* ***higher consumption***.

Asset-Price Channels: Wealth and Investment

- As **stock prices *rise***, firms find it ***easier to raise funds*** by **issuing new shares**.
- As financing become *less expensive,* **more investments *become profitable***.

Financial Crisis and the Transmission of Monetary Policy

Financial Crisis and the Transmission of Monetary Policy

- The ***crisis of 2007-2009*** *intensified* fundamental problems of **asymmetric information** that *affect* the **provision of credit** in a modern economy.
- The ***widespread losses*** at intermediaries and the ***heightened uncertainty*** *about* the *damage suffered* by ***specific intermediaries*** **reduced confidence.**

Financial Crisis and the Transmission of Monetary Policy

- Funding **liquidity *dried up***.
- *Households' and nonfinancial firms'* **net worth *fell*** substantially, ***reducing*** their ***ability to borrow,*** *so* they ***cut spending***.
- The result of all this was a **destabilizing feedback loop;** also known as ***negative feedback loop***, between ***worsening economic prospects*** and the ***deterioration of financial conditions*** that *influence spending*.

Financial Crisis and the Transmission of Monetary Policy

- When the **policy transmission mechanism** is **obstructed**, ***central banks cannot*** assume that a ***cut in their target policy rate*** will ***ease the financial conditions*** that influence the economy.
- ***Central banks*** must always take into account the **workings of the monetary policy transmission mechanism** in order to ***achieve*** their goals of ***economic and price stability***.

The Challenges Modern Monetary Policymakers Face

The Challenges Modern Monetary Policymakers Face

- **Stock prices** and **property values** have a ***tendency*** to go through **boom and bust cycles**.
- Policymakers' ***options*** are **limited**
- The ***nominal interest rate*** cannot ***fall below*** the ***effective lower bound***.

Booms and Busts in Property and Equity Prices

Booms and Busts in Property and Equity Prices

- **Bubbles** are damaging because the **wealth effects** they create *cause* **consumption** *to* ***surge*** and ***then contract*** just as rapidly.
  - Bubbles are identified after the fact by a **sharp rise** then a **sharp decline** in ***prices***.
- The **collapse of the Internet bubble** in the **1990s** had a *relatively* ***minor impact*** because intermediaries faced ***limited credit exposure*** and ***remained well capitalized***.
- While the ***loss of capital*** in the financial system ***in 2007-2009*** could have ***led to catastrophe*** without *extraordinary government actions*.

Booms and Busts in Property and Equity Prices

- Proponents of a *policy of "leaning against bubbles"* say that ***stabilizing inflation and real growth*** means **raising interest rates** to ***discourage bubbles*** from developing.
- ***Opponents of this interventionist*** view claim that **bubbles** are **too difficult to identify *when they are developing.***
  - Central banks should **wait *until the bubble bursts*** and ***only then react aggressively to limit the fallout*** on the economy by cleaning up the mess.

Booms and Busts in Property and Equity Prices

- Today, the ***proper policy toolkit*** for *addressing bubbles* is not *interest rates* but the **macroprudential regulatory** approach
- According to this view, **bubbles** are a ***major threat.***
  - The best result would be to ***adjust regulatory rules*** to **inhibit *intermediaries*** from *extending* such ***risky credit*** in economic booms.

Booms and Busts in Property and Equity Prices

- This approach *still depends on* the **foresight and judgment of regulators** to limit the ***buildup of an asset price bubble***.
- Using **interest rates** to **combat *asset price bubbles*** now is *more likely* to be viewed as a ***backup*** approach for *extreme circumstances*.

Deflation and the Effective Lower Interest-Rate Bound

Deflation and the Effective Lower Interest-Rate Bound

- **Nominal interest rates** can **not** be ***deeply negative***.
  - There is an ***effective lower bound (ELB)*** that is **below zero** due to transactions costs
  - Investors can ***always hold cash***, so ***bonds must have yields*** above the ELB to attract bondholders.
- Such risk which policymakers have ***no scope to lower rates further***, **has concerned central banks** *since Japan's experience in the 1990s*.

Deflation and the Effective Lower Interest-Rate Bound

- Think about the *consequences of a shock* that ***depresses aggregate expenditure***.
  - The **dynamic aggregate demand curve** shifts to the ***left***.
  - **Real output *falls below* potential** - a *recessionary output gap* putting ***downward pressure*** on **inflation**.
  - **Monetary policymakers** would normally react by ***cutting interest rates***.
  - This would *increase spending*, ***raise*** **real output**, and ***eliminate*** the **output gap**.

Deflation and the Effective Lower Interest-Rate Bound

- What if, when the shock occurs, **inflation is zero** and the **policy interest rate** that central bankers control is ***at the ELB***?
  - The **decline in aggregate demand** still *drives* ***real output*** *below* ***potential output***.
  - There is ***downward pressure on inflation***.
  - But when **inflation *falls***, it drops ***below zero*** so that, on average, ***prices are falling***.
- This result is **deflation**.

Deflation and the Effective Lower Interest-Rate Bound

- When there is a **recessionary output gap**, **current inflation** is ***below*** *expected inflation* and **expected inflation *falls***, which drives deflation down even more.
- Because the **nominal interest rate** is at the **ELB**, policymakers cannot counter the ***worsening deflation*** by ***lowering*** it.

Deflation and the Effective Lower Interest-Rate Bound

- The **interest rate stays near zero** and could ***not be negative***.
- **Inflation *keeps falling*, real interest rate** *thus* ***increases***
- The *effects of the shock* could be ***amplified*** *through a* ***deterioration in confidence and expectations*** *of declining prices*, ***exacerbating*** *the initial* **deflationary impulse** *and* **recessionary output gap**.
- The result is ***deflationary spiral*** in which *deflation grows* worse and worse.

Deflation and the Effective Lower Interest-Rate Bound

- **Deflation** makes it *more difficult* for businesses to ***obtain financing for new projects***.
  - **Without investment** there is ***no growth***.
- **Deflation**, therefore, **increases** the ***real value*** of a **firm's liabilities** without affecting the real value of its assets.

Deflation and the Effective Lower Interest-Rate Bound

Policymakers can minimize the chances of this sort of catastrophe:

1. They can ***set*** their **inflation** objective with the ***perils of deflation*** *in mind*
2. They can ***act boldly*** when there is ***even an indication of deflation***
3. They can ***utilize*** **unconventional policy tools**

Deflation and the Effective Lower Interest-Rate Bound

- ***Reducing*** the **interest rate *significantly*** and ***rapidly*** *when faced with* the ***possibility of hitting the ELB*** is "**acting preemptively**"
- Central bankers can use ***unconventional policy tools*** that *include*:
  - **Forward guidance**
  - **Quantitative easing**
  - **Targeted asset purchases**

Deflation and the Effective Lower Interest-Rate Bound

- Central bankers are *very reluctant to use* ***unconventional policy tools***
  - Continued uncertainty about ***how and why they work*** and ***how to apply them effectively***
  - ***Policy exit*** may be difficult

End of lecture