EE432 Monetary Theory and Policy

Final Exam Recap I

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Semester 1/2019

Chapter 14

Regulating the Financial System

The Sources and Consequences of Runs, Panics, and Crises

- ***Banks' fragility arises*** from the fact that they *provide liquidity to depositors*, **allowing depositors to withdraw** their balances on demand.
- Banks also **promise to satisfy depositors' withdrawal requests** on a ***first-come, first-served basis.***

The Sources and Consequences of Runs, Panics, and Crises

- Reports that a **bank has become insolvent** can ***spread fear that it will run out of cash*** and close its doors.
- Such a **bank run** can ***cause a bank to fail***.

The Sources and Consequences of Runs, Panics, and Crises

- This phenomenon of **spreading panic** *on the part of depositors in banks* is **called contagion**.
- ***Information asymmetries*** are the reason that *a run on a single bank* can *turn into* a *bank panic*
- Depositors **cannot tell the difference between a good bank and a bad bank.**

The Government Safety Net

There are three reasons for the **government to get involved in the financial system**:

1. To **protect investors**.
2. To **protect bank customers** *from monopolistic exploitation*.
3. To **safeguard the stability** of the *financial system.*

The Government Safety Net

1. The government is **obligated to protect small investors.**
   - Many are ***unable*** *to judge the* ***soundness*** ***of their financial institution.***
   - Only the ***force of law*** can **ensure a bank's honesty**.

The Government Safety Net

2. The growing tendency for ***small firms to merge into large ones*** **reduces competition**.
   - **Monopolies** are ***inefficient***, so the government intervenes to ***prevent*** *the firms in an industry from* ***becoming too large***.

The Government Safety Net

3. The mix of **liquidity risk and information asymmetries** means that the financial system is ***inherently unstable***.
   - A *single firm's failure* can *bring down* the *entire system.*

The Government Safety Net

- Government officials **protect investors** and **ensure stability** of the financial system.
  - ***lender of last resort***, *making loans to banks* that face *sudden deposit outflows*.
  - ***deposit insurance***, *guaranteeing* that *depositors receive the full value of their accounts* if the institution fails.
- However, the safety net causes bank managers to take on too much risk.

Problems Created by the Government Safety Net

- Government officials are worried about the **largest institutions** because they can ***pose a threat to the entire financial system*** if they fail.
- Some intermediaries are treated as ***too big to fail*** or ***too interconnected to fail***.
  - ***too complex to shut down***
  - ***too big to resolve***
  - special legal definition to such a firm: **systemically important financial institution (SIFI).**

Problems Created by the Government Safety Net

- Whenever the government ***provides a safety net <u>without charging an appropriate fee in advance of the protection</u>***, they create an **incentive** for financial institutions **to take risks** that can **threaten the system as a whole**.
- It compounds the problem of **<u>moral hazard</u>**.

Government Deposit Insurance

- When a **banks fails**, the **Government Deposit Insurance** resolves the insolvency either by ***(i) closing the institution*** or ***(ii) finding a buyer***.
- **Closing the bank** is called the ***payoff method***.
  - ***pay all the bank's depositors***, then ***sell all the bank's assets.***
- The more commonly applied, is called the ***purchase-and-assumption method***.
  - ***finds a firm willing to take over*** the failed bank.

Government Deposit Insurance

- Depositors ***prefer*** the *purchase-and-assumption method.*
  - The transition is typically ***seamless***.
  - ***No depositors suffer a loss***.
- Deposit insurance *clearly helped* to **prevent runs** on commercial banks.
- Nonetheless, most economic historians *believe government insurance* ***led to rise in risk***.

Government Deposit Insurance

- Insurance *only* *covers* ***depository institutions***.
- However, as the system developed, **shadow banks** *gained importance*.
  - They face the *risk of runs* by their *short-term creditors*
  - Nonetheless, these nonbanks ***lack the benefits of deposit insurance.***

Problems Created by the Government Safety Net

- In the aftermath of the crisis, *limiting the unintended consequences* of the ***government safety net*** is the *leading problem facing regulators*.
  - Some argue that **too big to fail institutions** are *just too big* and *need to be broken up*.
  - This does *not eliminate the bad incentives from deposit insurance* and *government guarantees to smaller institutions*.

Problems Created by the Government Safety Net

- The conflict between crisis prevention and crisis mitigation exemplifies the problem of ***time consistency***.
  - *In good times*, governments and central banks say ***they will not bail out financial intermediaries***
  - The intermediaries know that *in a time of crisis*, policymakers will have an ***incentive to bail them out***.
  - Promises in the good times ***lack credibility***.

Regulation and Supervision of the Financial System

- Government officials employ *three strategies to ensure that the* ***risks created by the safety net*** *are* ***contained***.
  - ***Regulation*** establishes a *set of specific rules for intermediaries to follow*.
  - ***Supervision*** provides *general oversight of financial institutions.*
  - ***Examination*** of an *institution's books by specialists* provides *detailed information on the firms' operation*.

Regulation and Supervision of the Financial System

Regulatory requirements designed to **minimize the cost of failures** to the public:

1. *New banks must obtain* a **charter (license)**.
2. Once open, **regulations**
   - **Restricts competition**
   - Specifies what **assets the bank cannot hold**
   - Requires the bank to **hold a minimum level of capital**
   - Makes **public information** about the bank's balance sheet

Asset Holding Restrictions and Minimum Capital Requirements

- One way to prevent bankers from exploiting their safety net is **to restrict banks' balance sheets.**
- **Minimum capital requirements** complement those limitations on bank assets.
- Capital requirements take two basic forms:
  1. Most banks are required to keep their ***ratio of capital to assets above some minimum level***, regardless of the structure of their balance sheets.
  2. Banks are required to ***hold capital*** in proportion to the ***riskiness of their operations***.

Supervision and Examination

- The government *enforces banking rules and regulations* through an elaborate **oversight** process called **supervision**.
  - This relies on a combination of **monitoring** and **inspection**.
  - It is done both **remotely** and through **on-site examination**.

Supervision and Examination

- The most important part of bank examination is the **evaluation of past-due loans**.
- The examiner's job is to make sure that ***when borrowers stop making payments***, ***loans are written off*** and the ***bank's balance sheet properly reflects the losses***.

Micro-Prudential Versus Macro-Prudential Regulation

- The government official's job is *not to stabilize the profits of an* ***individual bank*** or *insurance company.*
- The regulator's goal should be to **prevent large-scale catastrophes.**

Micro-Prudential Versus Macro-Prudential Regulation

- Regulators are ***broadening*** *their focus* ***beyond micro-prudential oversight*** to encompass ***macro-prudential regulation***.
- Micro-prudential regulation aims at **limiting the risks *within* intermediaries** in order to ***reduce the possibility of an individual institution's failure***.

Micro-Prudential Versus Macro-Prudential Regulation

- *Micro-prudential* oversight is *insufficient to prevent* ***systemic risks***.
- **Macro-prudential regulation** treats ***systemic risk*** *taking by an intermediary* as a kind of ***pollution*** that **spills over** *to other financial institutions and markets*.

Micro-Prudential Versus Macro-Prudential Regulation

- Common Exposure
  - When ***many institutions*** have an ***exposure to the same specific risk factor***, it can make the **system vulnerable** *to a shock to that factor*.
  - Intermediaries may be ***directly*** **exposed** to a *fragile institution through financial contracts*.

Micro-Prudential Versus Macro-Prudential Regulation

- Common Exposure
  - They may be **exposed *indirectly*** and unknowingly *through their counterparties*, who are themselves *directly exposed to a fragile institution*.
  - *All institutions may be vulnerable* to the same underlying risks.

Micro-Prudential Versus Macro-Prudential Regulation

- Pro-Cyclicality
  - *Financial activity* is prone to *vicious cycles.*
  - The **interaction** between **financial** and **economic** activity can be ***mutually reinforcing*** leading to ***unsustainable booms and busts***.

Micro-Prudential Versus Macro-Prudential Regulation

- Macro-Prudential Policy
  - This aims to **make intermediaries** bear, or ***internalize***, **the costs that their behavior imposes on others**.
  - *To be effective in limiting systemic threats*, a **systemic capital surcharge** probably would be disproportionately ***larger for firms that contribute the most to systemic risk***
  - Intermediaries would have an *incentive to limit the systemic risks* they create.

Micro-Prudential Versus Macro-Prudential Regulation

- Macro-prudential regulators *could also make capital requirements vary* with the business cycle.
- In **good times**, **capital requirements would rise** *above the long-run average* to create a *capital buffer against adverse shocks* and to *discourage euphoria*.

Micro-Prudential Versus Macro-Prudential Regulation

- Regulators could *require banks* to buy **catastrophe insurance**.
- Could also have banks issue so-called **contingent convertible bonds** that *convert to equity in the event of a capital shortfall*.

Micro-Prudential Versus Macro-Prudential Regulation

Ultimately, addressing *systemic risk* will require a *broad framework* of **macro-prudential supervision** that includes

1. **Rules and mechanisms** that ***promote better risk management*** on the part of intermediaries, and
2. **Reforms** that ***reduce the vulnerability of the financial system*** to the liquidation of any single financial firm.

Supplement
Macro-Prudential Regulation

Tools Address Specific Types of Vulnerabilities

- **Loan-to-Value (LTV)** will ***limit bank loans***
- **Debt-to-Income (DTI)** help ***constrain overleverages in the house market***

Macro-Prudential

Macro-prudential motivation

– **Procyclicality**, ***macro-financial linkages***, ***interconnectedness***

– Macro-prudential policies help **reduce bubbles** and ***enhance the economy's resilience to shocks***

Macro-Prudential

Rationale for macroprudential oversight

Bank dimension (e.g. global financial crisis)

(Micro)prudential regulation underestimated externalities

1. System → Bank
2. Bank → System

Country dimension (e.g. euro area debt crisis)

Time series and cross sectional aspects in a cross country setting:

- Build-up of country-specific vulnerabilities
- Country spillovers and contagion

Policy domain	Objective		Systemic risk treated as
Microprudential supervision and regulation	Ensure soundness of individual financial institutions		exogenous
Macroprudential oversight	Limit systemic risk	Increase resilience	endogenous
		Lean against the financial cycle	endogenous

"Lean against the wind" means counter-cyclical monetary policy measures to limit the build-up of financial imbalances during the expansion.

Tools Address Specific Types of Vulnerabilities

Sectoral capital and **asset-side tools** to address *corporate and household vulnerabilities*

- **Loan-to-Value (LTV)** - a financial term used by lenders to express the ***ratio of a loan to the value of an asset purchased***.
- **Debt-to-Income (DTI)** - the ***percentage of gross monthly income that goes to paying monthly debt payments***

Chapter 15

Central Banks in the World Today

Stability: The primary objective of all central banks

Stability: The Primary Objective of All Central Banks

Central bankers objectives:

1. *Low and stable* **inflation**
2. *High and stable* **real growth**, together with *high* **employment**
3. **Financial** market **stability**
4. *Stable* **interest rates** and **exchange rates**

Stability: The Primary Objective of All Central Banks

- The **job of the central bank** is to **improve general economic welfare** by *managing and reducing* **systematic risk**.
- It is probably *impossible to achieve all objectives simultaneously* - **Tradeoffs**

Low, Stable Inflation

- Many central banks take their ***primary job*** as the ***maintenance of price stability***.
- The **purchasing power of currency *should remain stable*** over long periods of time.
- Maintaining price stability **enhances role of money** as a *unit of account* and as a *store of value*.

Low, Stable Inflation

- ***Prices*** *provide the* ***information*** to *ensure that* ***resources are allocated to*** *their* ***most productive uses***.
- Most people agree that **low inflation** *should be* the ***primary objective of monetary policy***.

Low, Stable Inflation

- However, *zero inflation is probably too low*.
- There would be a **risk of deflation**.
    - This makes ***debts more difficult to repay***
    - It would ***need to cut nominal wages,*** *which is difficult to do*.

High & Stable Real Growth

- ***Maximum sustainable growth in output and employment*** means working to *reduce the fluctuations of the business cycle*.
- The idea is that there is some **long-run *normal* level of production** *called* **potential output**, which depends on things like
  - **Technology**
  - The size of the **capital stock**
  - The number of **labours** and **working hours**.
- In the long run, **stability leads to higher growth**.
  - The greater the uncertainty about future business conditions, the more cautious people will be in making investments of all kinds.

Financial System Stability

- **Financial system stability** is an integral part of every *modern central banker's job*.
- If people ***lose faith in financial institutions*** and markets, ***intermediation will ultimately stop***.
- The *possibility of a s**evere disruption in the financial markets*** is a type of **systematic risk**.

Interest-Rate and Exchange-Rate Stability

- ***Interest-rate stability*** **and** ***exchange-rate stability*** are means for achieving the ultimate goal of **stabilizing the economy**.
- For *emerging market countries*, **exports and imports** are crucial.
- ***Stable exchange rates*** *are very important*.

Interest-Rate and Exchange-Rate Stability

- Most people ***respond to low interest rates*** by ***borrowing and spending more*** and vice versa.
  - **Interest-rate volatility** makes ***output unstable***.
- Interest-rate volatility means ***higher risk*** and therefore a ***higher risk premium***.
  - *Risk makes **financial decisions** more difficult, lower productivity, and lessen efficiency.*

Meeting the Challenge: Creating a Successful Central Bank

- To be successful, a central bank must:
  1. Be **independent** of political pressure.
  2. Be **accountable** to the public and **transparent** in communicating its policy actions.
  3. *Operate* within an *explicit framework* that *clearly states its* **goals** *and* makes clear the **trade-offs** among them.
  4. Make **decisions by committee**.

The Need for Independence

- **Independence** has two operational components:
  1. **Monetary policymakers** must be *free to control their own budgets*.
  2. The bank's policies **must not be** ***reversible by people outside*** the central bank.
  - cannot be overridden by politicians.

The Need for Accountability and Transparency

1. **Politicians** would ***establish a set of goals***.
2. The **policymakers** would *publicly report their progress* in *pursuing those goals*.
   - **Explicit goals** foster ***accountability*** and *disclosure requirements* create ***transparency***.
   - Legislatures usually *grant central banks* **instrument independence, not goal independence**

The Need for Accountability and Transparency

- Today **every central bank** *announces its policy actions almost immediately*.
- **Central bank statements** are far *more informative*.
- The economy and financial **markets should respond to information** that everyone received, *not to speculation* about what policymakers are doing.
- **Transparency** can help *counter the uncertainties and anxieties*.

The Policy Framework, Policy Tradeoffs, and Credibility

- To meet their objectives, **central bankers must** be **independent**, **accountable**, and **good communicators.**
- Central bankers face the **tradeoff** *between* ***inflation, growth and financial stability*** on a daily basis.
- Because policy goals often conflict, **central bankers *must make their priorities clear***.
- This ***limits the discretionary authority*** of the central bankers.

The Policy Framework, Policy Tradeoffs, and Credibility

- Finally, *a well designed policy framework* helps policy makers **establish credibility**.
  - To ***do what they say*** *they are going to do*.
- **Expected inflation** *creates inflation*.
  - Successful monetary policy, then, requires that **inflation expectations** be *kept under control*.

Chapter 17

The Central Bank Balance Sheet and the Money Supply Process

The Central Bank's Balance Sheet

Figure 17.1 The Central Bank's Balance Sheet

	Assets	Liabilities
Government's bank	Securities Foreign exchange reserves	Currency Government's account
Bankers' bank	Loans	Accounts of the commercial banks (reserves)

The Central Bank's Balance Sheet

- The *central bank's balance sheet* shows three ***basic assets***:
  - **Securities,**
  - **Foreign exchange reserves, and**
  - **Loans.**
- The **securities** and **foreign exchange reserves** are needed so that the central bank can *perform its role* as the *government's bank*.
- The **loans** are a *service to commercial banks*.

Assets

1. ***Securities*** are the **primary asset of most central banks**.
   - Traditionally, the central bank exclusively ***held Treasury securities***, which are virtually *free of default risk,* through *purchases and sales* known as ***open market operations***.

Assets

2. **Foreign exchange reserves** are the central bank's and government's ***balances of foreign currency.***
   - These are held in the form of **bonds** *issued by* ***foreign governments***.
   - These reserves are *used in* ***foreign exchange interventions***, when *officials attempt to change the market values of currencies*.

Assets

3. **Loans** are usually *extended to commercial banks*.
   - **Discount loans** are the **loans,** which central bank make *when* ***commercial banks*** *need short-term cash.*
   - Through its **liquid securities holdings**, the central bank *controls* ***the overnight rate*** and the availability of money and credit.

Liabilities

- On the **liabilities side** of the central bank's balance sheet, we see three major entries:
  - **Currency**,
  - The **government's deposit account**
  - The **deposit accounts** of the **commercial banks**
- The *currency and government's deposit* allow the central bank to ***perform its role as*** the **government's bank**, while the *commercial banks' deposits* allow it to ***fulfill its role as*** the **bankers' bank.**

Liabilities

1. ***Currency***. Nearly all central banks have a monopoly on the **issuance of the currency** *used in everyday transactions*.
   - Currency *circulating in the hands of the nonbank public* is the ***principal liability*** **of most central banks**.

Liabilities

2. ***Government's account***. Governments need a bank account which the ***government* deposits *funds (mostly tax revenue)*** into,

   and from which the ***government*** *makes* ***payments*** by shifting funds between its *accounts at* ***commercial banks*** *and the* ***central bank***

Liabilities

3. ***Commercial Bank accounts*** (reserves).
   - *Commercial bank reserves* are the sum of: **deposits at the central bank**, *plus* **cash in the bank's *own vault***.
   - the *commercial bank* can ***withdraw its deposits at the central bank***.
   - **Vault cash** is part of reserves.

Liabilities

- **Commercial bank reserves** are the most important in **determining** the ***quantity of money*** and ***credit supply*** in the economy
- Central banks ***run*** their ***monetary policy operations*** through **changes in these reserves**.
- There are *two types of reserves*.
  - **Required reserves** that banks must hold
  - **Excess reserves**, which banks hold voluntarily.

The Monetary Base

- Together, **currency in the hands** *of the public* and **reserves** *in the banking system* make up the **monetary base**.
  - This is the privately held **liabilities of the central bank**.
  - It is also called **high-powered money**.
- The central bank can ***control*** the *size* of the **monetary base**.

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

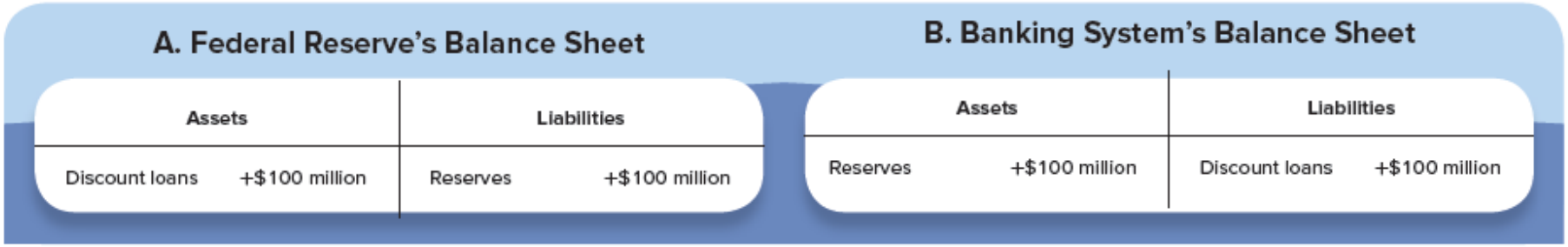
B. Banking System's Balance Sheet

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

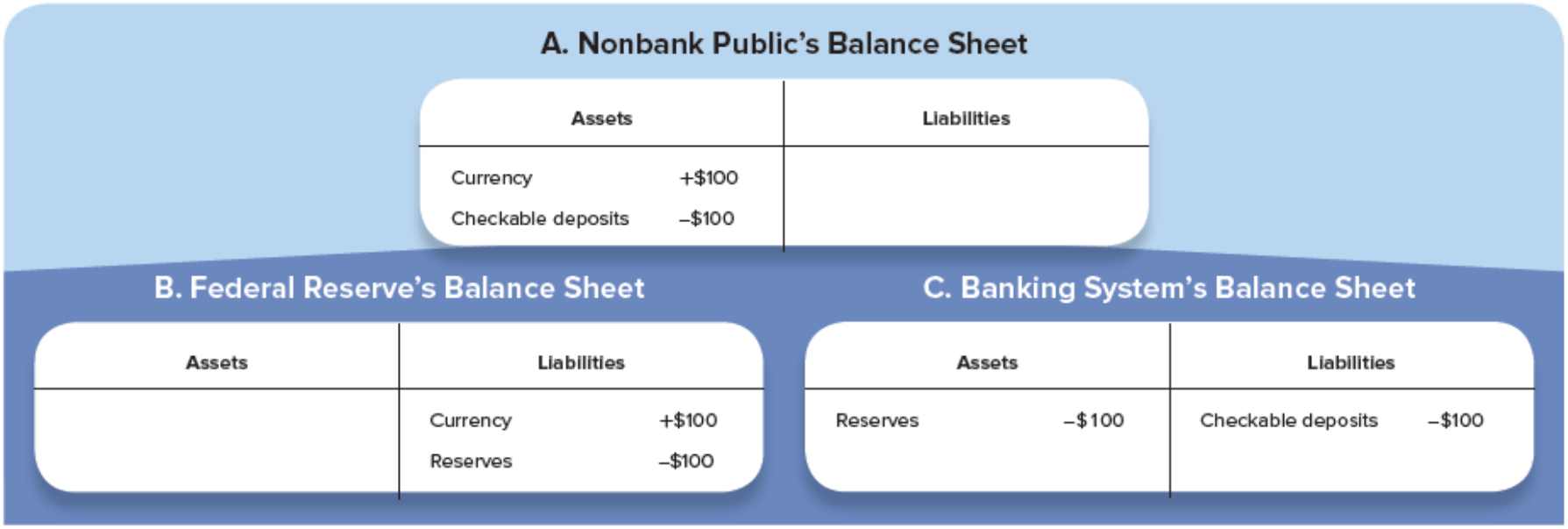
- For the commercial bank, it is a **liability** *matched by* an **increase in** the level of its **reserve account**.
- For the central bank, the **loan** is **an asset** that is created in exchange for *a credit to the commercial bank reserve account*, and **expands the monetary base**.

Cash Withdrawal

- When **individual** *takes cash from an ATM*, it **changes** the **central bank's balance sheet**.
  - **shift** from **reserves** to **currency** on the central bank's balance sheet.

Cash Withdrawal

Figure 17.5 Balance Sheet Changes after a Private Person Withdraws Cash from His or Her Bank Account



- **Individual assets** *shift* from checkable deposits to cash. For the **central bank**, the *change* comes in the *composition of liabilities*.
- By *withdrawing cash* from **commercial bank**, *individual* *decreased* the banking system's **reserves**.

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

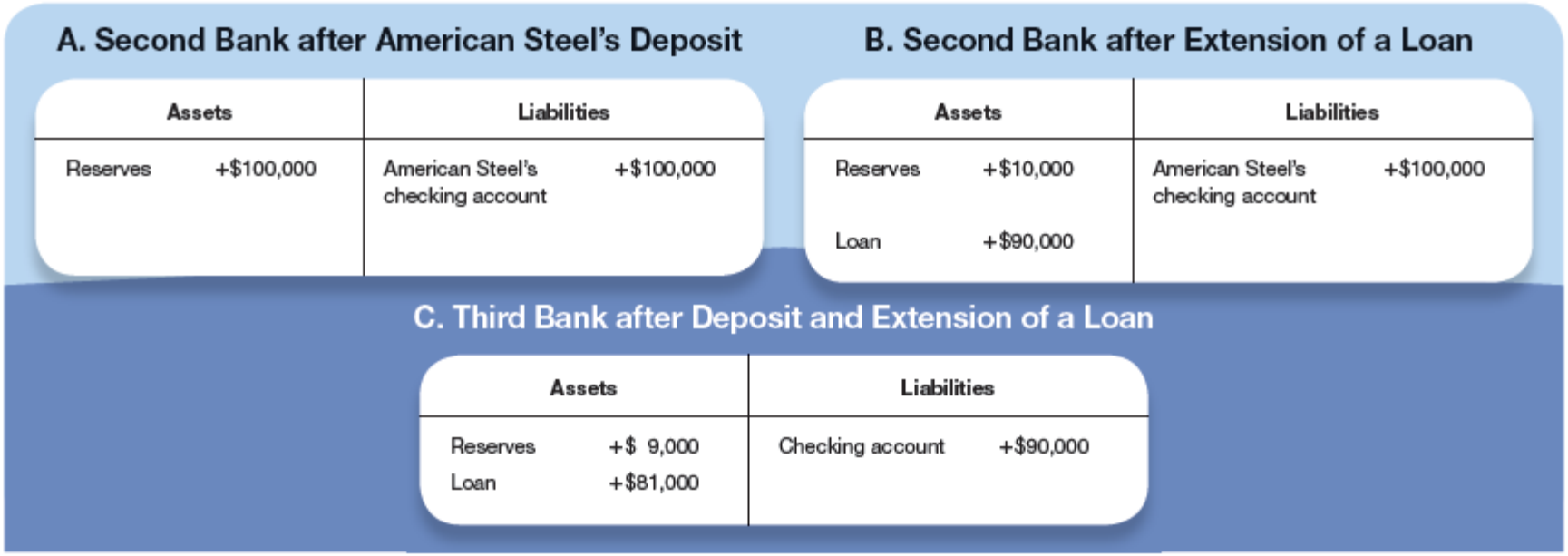
- We start with the following assumptions:
  - **Banks** hold *no excess reserves*.
  - The **reserve requirement ratio** is **10%**.
  - **Currency holding** does not change when deposits and loans change.
  - *When a borrower writes a check*, **none** of the recipients of the funds **deposit them back 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 increase in reserves, deposits increase* by $(1/r_D)$.

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**:

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

The Arithmetic of the Money Multiplier

The **quantity of money** in the economy *depends on:*

1. The **monetary base**, which is controlled by Fed,
2. The **reserve requirement**,
3. The ***bank's desire to hold excess reserves***, and
4. The nonbank **public's demand for currency**.

The Limits on the Central Bank's Ability to Control the Quantity of Money

- The **various factors** *affecting the quantity of money change* over time.
  - **Market interest rates** affect the *cost of holding both excess reserves and currency*.
  - As **interest rates increase**, we expect to see **{*ER*/*D*} and {*C*/*D*} fall**.
    - This **increases the money multiplier** and **the quantity of money.**

The Limits on the Central Bank's Ability to Control the Quantity of Money

- If these changes in the money multiplier were predictable, the *central bank might choose to exploit this link in its policymaking*.
- Although this made sense in the U.S. in the 1930s, **it no longer does**.
- In a financial crisis, **other balance-sheet tools** help address *liquidity needs and market disruptions* more directly.

Chapter 18

Monetary Policy: Stabilizing the Domestic Economy

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)**
3. The **discount rate**
4. The **reserve requirement**

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

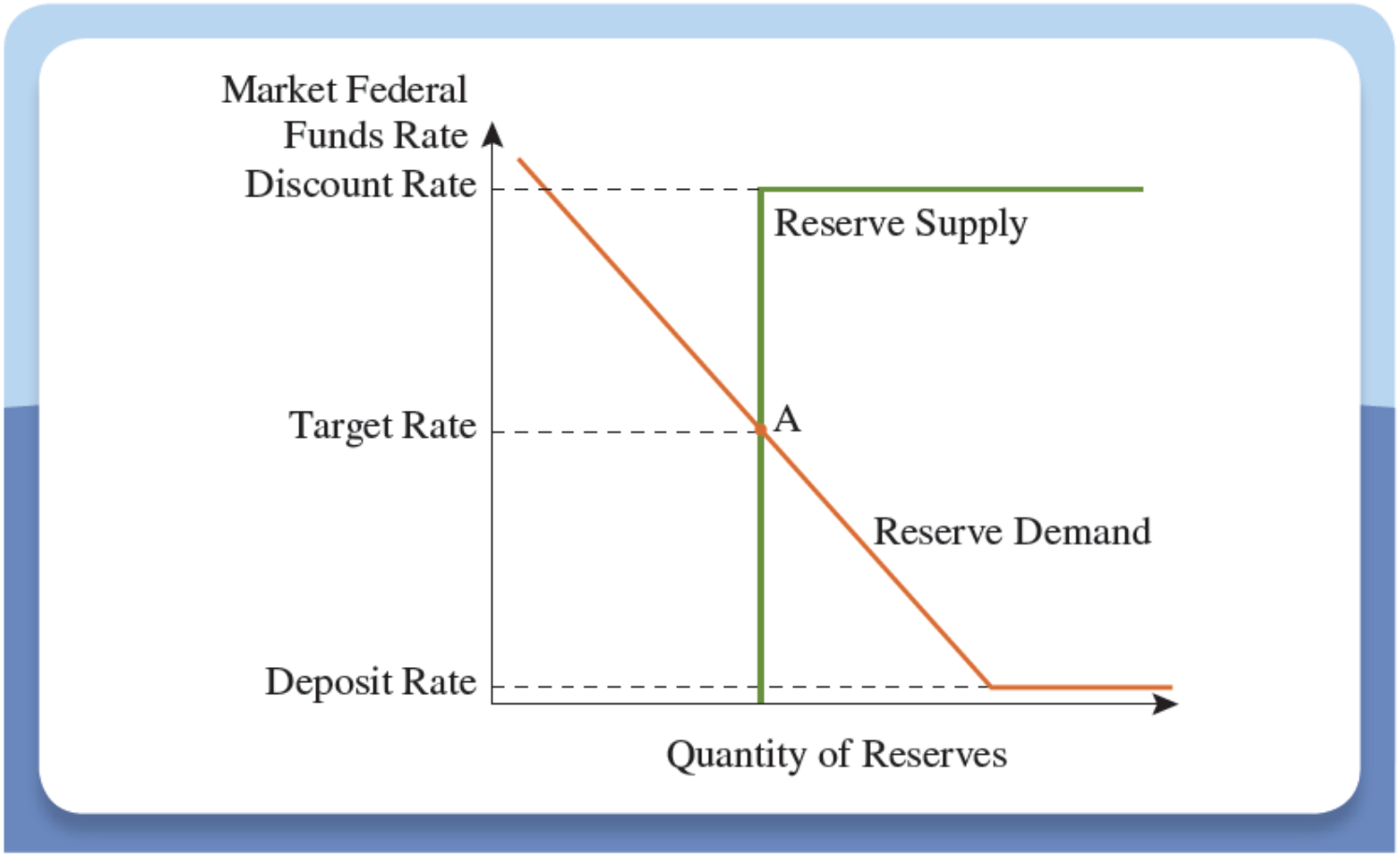
- *Discrepancies* between ***actual*** and ***desired*** **reserves** gave *rise to* ***a market for reserves***.
  - Some banks can ***lend out excess reserves***.
  - Some banks will ***borrow to cover a shortfall***.
- *Without this* market, *banks would need to* ***hold substantial*** quantities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

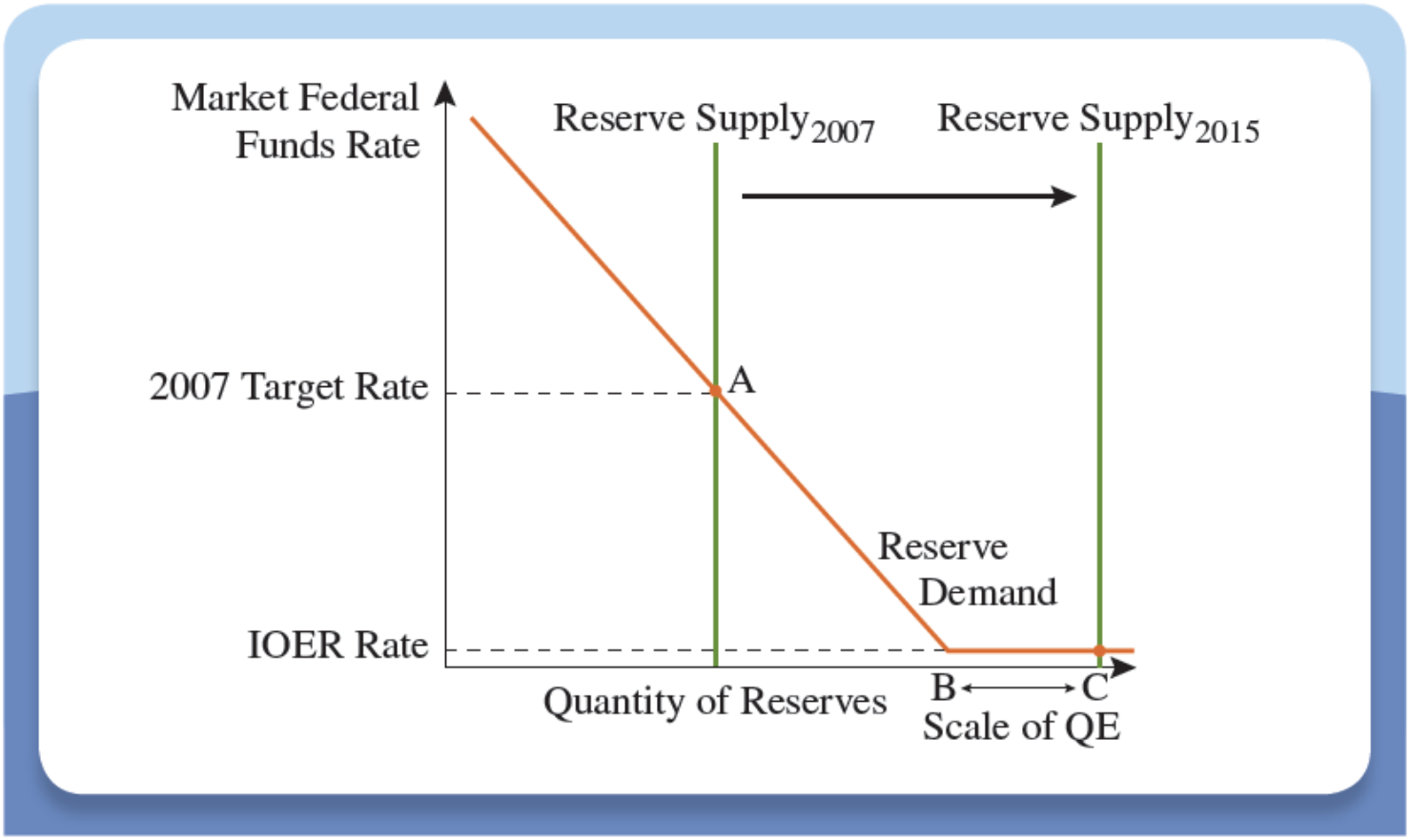


The Target Federal Fund Rate and the Interest on Excess Reserves

- *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 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

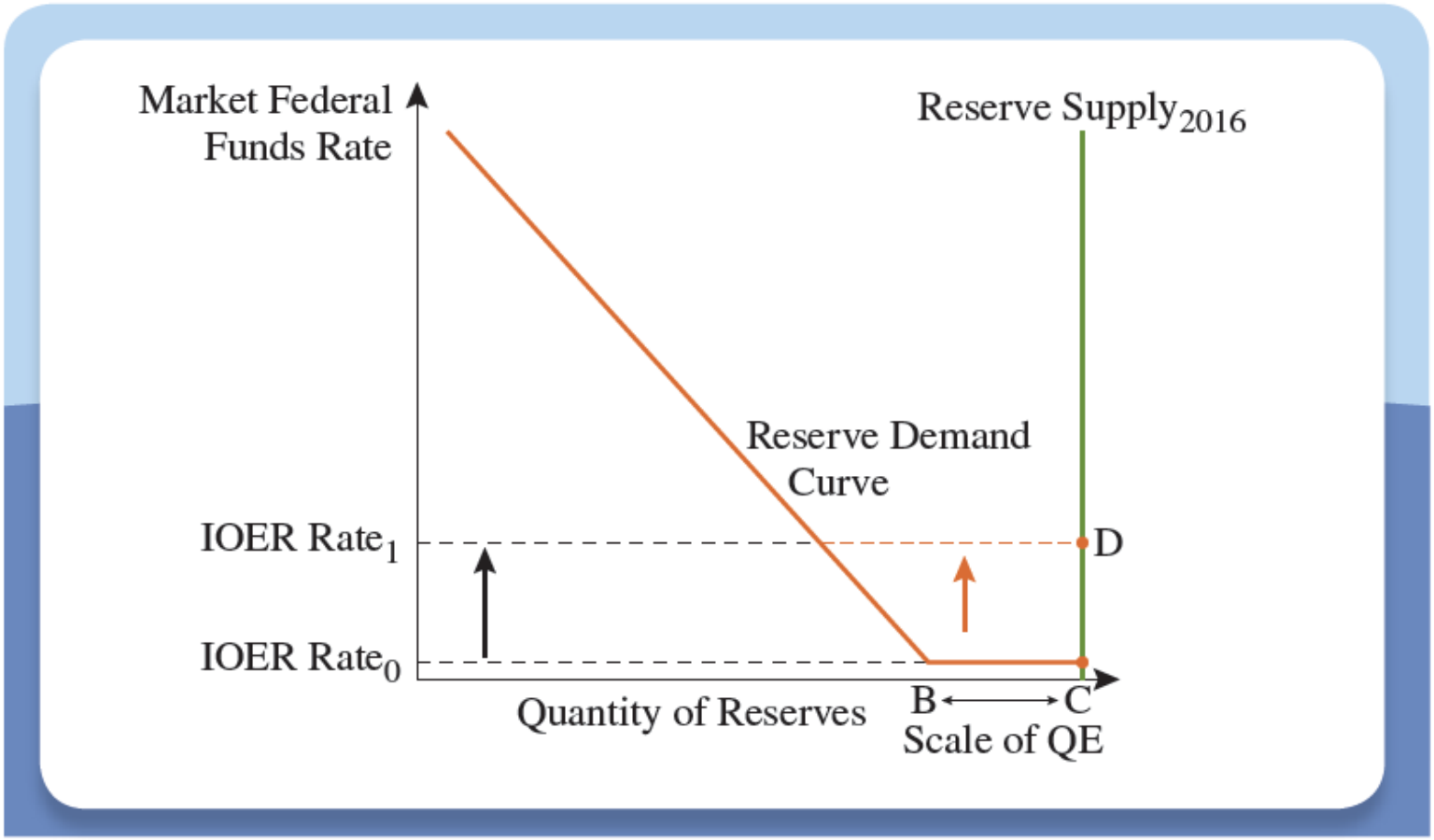


The Target Federal Fund Rate and the Interest on Excess Reserves

- **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***
  - *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



Discount Lending, the Lender of Last Resort, and Crisis Management

- By ***controlling*** the **quantity of loans** it makes, a *central bank can control*:
  - The **size of reserves**
  - The **size of the monetary base**
  - **Interest rates**
- *Today*, **lending** by the Federal Reserve Banks **to commercial banks**, called **discount lending**, is *usually small* aside from crisis periods.

Discount Lending, the Lender of Last Resort, and Crisis Management

- **Discount lending** is the Fed's primary tool for:
  - Ensuring **short-term financial stability**
  - **Eliminating bank panics**
  - **Preventing the sudden collapse** of institutions that are experiencing financial difficulties
- The central bank is the **lender of last resort**:
  - *Making loans to banks* when *no one else* will or can.

Discount Lending, the Lender of Last Resort, and Crisis Management

The **Fed** makes *three types of loans*:

1. **Primary credit**
2. **Secondary credit**
3. **Seasonal credit**

- The **Fed** *controls the* **interest rate** on these loans, ***not*** *the quantity of credit extended.*
- The ***banks decide how much*** *to borrow*.

Primary Credit

- **Primary credit** is ***extended on a very short-term basis***, usually overnight, to institutions that the Fed's bank supervisors deem to be sound.
- *Banks* **seeking to borrow much** post *acceptable collateral*.
- The **interest rate** on primary credit is **set at a spread *above* the IOER rate** called the **primary discount rate.**
  - The term **discount rate** *usually refers to* this *primary discount rate*

Primary Credit

- ***Primary credit* adds** to the ***Fed's supply of reserves*** to the banks
- When reserves were scarce, providing a facility through which **banks *could borrow*** at a ***penalty rate above the target*** *kept the market federal funds rate* from rising above the *discount rate*.

Secondary Credit

- **Secondary credit** is available to institutions that are **not sufficiently** *sound to* ***qualify for primary credit***.
- The **secondary discount rate** is set *above the primary discount rate*.
- There are **two reason** a bank might seek **secondary credit**:
  - A ***temporary shortfall*** *of reserves.*
  - They *cannot borrow from anyone else*.

Secondary Credit

- By *borrowing* in the **secondary credit market**, a bank **signals** that **it is in trouble**.
- Secondary credit is for banks that are *experiencing longer-term problems* that they need some time to work out.
- *Before the Fed makes the loan*, it has to believe that *there is a good chance the bank will be able to survive*.

Reserve Requirements

- The Federal Reserve Board has had the authority to set the ***reserve requirements***.
  - These are the **minimum level of reserves *banks must hold*** either as *vault cash* or on *deposit at the Fed.*
- *Changes in the reserve requirement* affect the ***money multiplier*** and the ***quantity of money and credit circulating*** in the economy.
- In the U.S., the *reserve requirement turns out not to be very useful.*

Linking Tools to Objectives: Making Choices

- **Monetary policymakers' goals** are:
  - ***Low and stable inflation***
  - ***High and stable growth***
  - ***A stable financial system***
  - ***Stable interest and exchange rates***

Linking Tools to Objectives: Making Choices

A consensus has developed among monetary policy experts that:

1. The **reserve requirement** is ***not useful*** *as an operational instrument*,
2. **Central bank lending** is ***necessary*** to ensure **financial stability**, and
3. **Short-term interest rates** are the ***conventional tool*** to use to *stabilize short-term fluctuations* in *prices and output*.

Desirable Features of a Policy Instrument

A **good monetary policy instrument** has ***three features:***

1. It is **easily *observable*** by everyone.
   - *Ensures* ***transparency*** in policymaking, which enhances ***accountability***.
2. It is ***controllable*** **and quickly changed**.
   - An instrument that can be ***adjusted quickly*** in the face of a ***sudden change*** in economic conditions is clearly more useful
3. It is **tightly *linked* to the policymakers' objectives**.
   - The ***more predictable*** the impact of an instrument, the ***easier*** it will be for policymakers ***to meet their objectives***

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

- 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*.
  - 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 limitlessly to 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.