Kenneth R. Szulczyk

Money, Banking, and International Finance

Edition 2, February 2014

Table of Contents

Preface

I taught Money & Banking and International Finance several times, and I converted my lecture notes into a textbook. Consequently, instructors can use this textbook for courses in Money & Banking, or International Finance or some hybrid in between them. Furthermore, financial analysts and economists could refer to this book as a study guide because this book contains concise information, and all facts and analysis are straight to the point, explaining how governments and central banks influence the exchange rates, the interest rates, and currency flows.

The Financial Crisis severely impacted the world's financial markets that are still felt in 2014. I included many examples from the 2008 Financial Crisis, when many U.S. banks and financial institutions teetered on bankruptcy. Unfortunately, the financial crisis has not ended, and it continues affecting the world's economies and financial markets.

1. Money and the Financial System

This chapter introduces the financial system. Students will learn the purpose of financial markets and its relationship to financial institutions. Financial institutions connect the savers to the borrowers through financial intermediation. At the heart of every financial system lies a central bank. It controls a nation's money, and the money supply is a vital component of the economy. Unfortunately, economists have trouble in defining money because people can convert many financial instruments into money. Thus, central banks use several definitions to measure the money supply. Furthermore, if an economy did not use money, then people would resort to an inefficient system – barter. Unfortunately, this society would produce a limited number of goods and services. Nevertheless, money overcomes the inherent problems with a barter system and allows specialization to occur at many levels.

Financial Markets
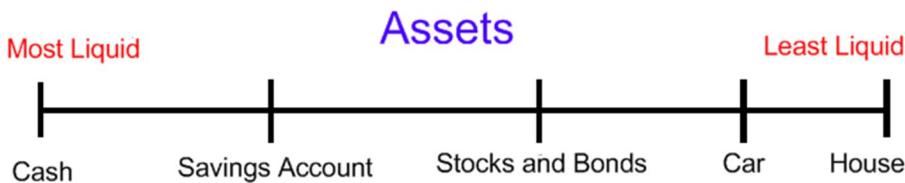
Money and the financial system are intertwined and cannot be separated. They both influence and affect the whole economy, such as the inflation rate, business cycles, and interest rates. Consequently, consumers, investors, savers, and government officials would make better-informed decisions if they understood how the financial markets and money supply influence the economy.

A *financial market* brings buyers and sellers face to face to buy and sell bonds, stocks, and other financial instruments. Buyers of financial securities invest their savings, while sellers of financial securities borrow funds. A financial market could occupy a physical location like the New York Stock Exchange where buyers and sellers come face-to-face, or a market could be like NASDAQ where computer networks connect buyers and sellers together.

A *financial institution* links the savers and borrowers with the most common being commercial banks. For example, if you deposited $100 into your savings account, subsequently, the bank could lend this $100 to a borrower. Then the borrower pays interest to the bank. In turn, the bank would pay interest to you for using your funds. Bank's profits reflect the difference between the interest rate charged to the borrower and the interest rate the bank pays to you for your savings account.

Why would someone deposit money at a bank instead of directly buying securities through the financial markets? A bank, being a financial institution, provides three benefits to the depositor. First, a bank collects *information* about borrowers and lends to borrowers with a low chance of defaulting on their loans. Thus, a bank's specialty is to rate its borrowers. Second, the bank reduces your investment *risk*. Bank lends to a variety of borrowers, such as home mortgages, business loans, and credit cards. If one business bankrupts or several customers do not pay their credit cards, then the default does not financially harm the bank. Bank would earn interest income on its other investments that offset the bad loans. Finally, a bank deposit has liquidity. If people have an emergency and need money from their bank deposits, they can easily convert the bank deposit into cash quickly.

Economists use liquidity to define money. *Liquidity* is people can easily convert an asset into cash with little transaction costs. For example, if you take all your assets and list them in terms of liquidity, then liquidity forms a scale as shown in Figure 1. Cash is the most liquid asset because a person already has money and does not need to convert it to money. Subsequently, a savings account is almost as good as cash because customers can arrive at a bank or ATM and convert their deposits into cash quickly with little transaction costs. Nevertheless, cars and houses are the least liquid assets because owners require time and high-transaction costs to convert these assets into cash.

Figure 1. Ranking assets by liquidity

Economists define the *money* or the *money supply* as anything that people pay for goods and services or repay debts. In developing countries, people use cash as money. In countries with sophisticated financial markets like the United States and Europe, the definition of money becomes complicated because money includes liquid assets, such as cash, checking accounts, and savings accounts. People can convert these assets into cash with little transaction costs. Consequently, economists include highly liquid assets in the definitions of money. However, economists never include assets such as houses in the definition of money. Unfortunately, homeowners need time and have high-transaction costs to convert a house into cash. Many homeowners will not sell their homes quickly by selling it for a lower value than the home's market value.

Central Banks

Every country uses money. Therefore, every country has a government institution that measures and influences the money supply. This institution is the *central bank*. For example, the central bank for the United States is the *Federal Reserve System*, or commonly referred to as the "*Fed*." The Federal Reserve regulates banks, grants emergency loans to banks, and influences the money supply. Since the money supply and the financial markets are intertwined, the Fed can influence financial markets indirectly, when it affects the money supply. Therefore, the Fed can indirectly affect the interest rates, exchange rates, inflation, and the output growth rate of the U.S. economy. When the Fed manages the money supply to influence the economy, economists call this *monetary policy*. Consequently, this whole book explains how a central bank can influence the economy and its financial markets. Furthermore, readers can extend this analysis to any central bank in the world.

Central bank influences three key variables in the economy, which are:

Variable 1: *Inflation* is a sustained rise in the average prices for goods and services of an economy. When a central bank increases the money supply, it can create inflation. For example, if you place $100 in a shoebox and bury it in your yard for one year. That $100 loses value over time because, on average, all the prices for goods and services in an economy continually rise every year. If the inflation rate rises 2% per year, then after one year, that $100 would buy on average, 2% fewer goods and services. Although inflation erodes the value of money, a low inflation rate is not necessarily bad because it might indicate economic growth.

Variable 2: A *business cycle* means the economy is experiencing strong economic growth, and economists measure the size of the economy by the *Gross Domestic Product (GDP)*. GDP reflects the total value of goods and services produced within an economy for one year. When businesses boost production, they produce more goods and services within the economy. If GDP grows quickly, then the economy experiences a business cycle. Thus, consumers' incomes are rising; businesses experience strong sales and rising profits, and workers can easily find new jobs, which decrease the unemployment rate. However, if the money supply grows too quickly, then inflation can strike an economy with rapidly rising prices.

Variable 3: *Interest rates* reflect the cost of borrowing money. People borrow money to buy cars, houses, appliances, and computers while businesses borrow to build factories and to invest in machines and equipment, expanding production. Moreover, governments borrow money when they spend more than they collect in taxes. Since economies with complex financial markets create many forms of loans, these loans have different interest rates. Usually economists refer to "the interest rate," because interest rates move together. As a central bank expands the money supply, the interest rates fall, and vice versa, which we prove later in this book. Thus, an increasing money supply causes interest rates to fall in the short run.

One important function of monetary policy is to create economic growth. Unfortunately, the GDP can grow slowly or decrease as businesses produce fewer goods and services within the economy, while consumers' incomes fall or stagnate. When an economy produces fewer goods and services, then unemployed workers have more difficulties in finding jobs. Subsequently the unemployment rate increases, and the economy enters a recession. Unfortunately, if the money supply grows too slowly, or even contracts, it could cause the economy to enter a recession.

Economists calculate both the nominal GDP and real GDP. *Nominal GDP* includes the impact of inflation. For example, if economy experiences inflation, or firms produce more goods and services during a year, then the nominal GDP rises. On the other hand, economists can remove the effects of inflation by calculating *real GDP*. When the real GDP increases, it means firms in society have produced more goods and services while inflation does not affect real GDP. That way, if real GDP is rising, then the public and economists know the economy is expanding, while a decreasing real GDP indicates a society's economy is contracting. Finally, economists define many variables in real or nominal terms, such as interest rates and wage rates, which we explain later in this book.

Barter and Functions of Money

If an economy did not use money, what would it look like? Without money, the buyers would exchange goods with the sellers by exchanging one good for another good, which we call *barter*. Unfortunately, barter has many problems.

Problem 1: Barter suffers from a ***double coincidence of wants***. For example, if you produce shoes and want to drink a Coca-Cola, then you search for a person who produces Cola-Cola and needs shoes. Thus, you need to search for a person who wants the opposite of you, which could take a long time.

Problem 2: Many goods, like fruits and vegetables, deteriorate and rot over time. Growers of perishable goods could not store their purchasing power. They would need to exchange their products for goods that would not perish quickly if they want to save.

Problem 3: Products and services do not have a common measurement for prices. For instance, if a store stocked 1,000 products and money circulated with this economy, subsequently, this store would have 1,000 price tags. Then customers can compare products easily. With barter and no money, this same store would have 499,500 price exchange ratios as calculated in Equation 1. Variable E indicates the number of price ratios while n is the number of products produced in a barter system.

$$E = \frac{n(n-1)}{2} = \frac{1,000 \cdot 999}{2} = 499,500 \tag{1}$$

A price ratio shows the amount of one good that buyers and sellers exchange for another good, and we show examples of price ratios in Figure 2. For example, a person could exchange one apple for 3 bananas or two Coca-Colas.

1 apple = 3 bananas
2 Coca-Colas = 1 apple

.
.

1 cup of coffee = 1 Coca-Cola

Figure 2. Examples of price ratios

Problem 4: Business people would have trouble writing contracts for future payments of goods and services under a barter system. Consequently, a barter society would produce a limited number of goods and services.

Money eliminates many problems with barter and has four functions. First function of money is a ***medium of exchange*** because people use money to pay for goods and services and repay debts. Medium of exchange function promotes efficiency and specialization. For example, the author teaches economics. Under a barter system, the author would search a market extensively to find a person who would exchange goods and services that the author needs. In

the author's case, he could experience considerable search costs for people wanting economics instruction. With money, the author does what he does best and teaches for money. Then he takes this money to the market and buys goods and services that he wants. This function of money allows the **specialization of labor** to occur and eliminates the problem of double coincidence of wants under a barter system.

Second function of money is a **unit of account**. Money conveniently allows people to place specific values on goods and services. For example, a two-liter of Coca-Cola costs $0.89 while Pepsi costs $0.99. Thus, customers can compare products' prices easily. This function is extremely important for businesses because business people place values on buildings, machines, computers, and other assets. Then they record this information into financial statements. Subsequently, investors read the financial statements and gauge which companies are profitable. Finally, this function of money eliminates the massive number of price exchange ratios that would occur under a barter system.

Third function of money is the **store of value**. Money must retain its value. For example, if a two-liter of Coca-Cola costs $0.99 today, then it should cost $0.99 tomorrow. Unfortunately, inflation erodes the "store of value" of money. As the price level increases, the value of money decreases because each unit of money buys fewer goods and services. Inflation causes consumers to lose their **purchasing power** over time. If the inflation rate becomes too high, then money as a "medium of exchange" breaks down too. In countries with high inflation rates, people resort to barter and immediately exchange their local money for stable money, such as euros or U.S. dollars. However, people must use money as a medium of exchange because government laws legally require people to accept money as a means of payment to repay a debt or to pay taxes. The legal requirement is "**legal tender**." On the other hand, bank checks are not legal tender, and people and businesses can reject checks as payment.

Fourth and final function of money is the **standard of deferred payment**. This function combines the "medium of exchange" and "unit of account" of money because contracts state debts in terms of a "unit of account" and borrowers repay using the "medium of exchange." Hence, this function of money is extremely important for business transactions that occur in the future. Businesses and people can borrow or lend money based on future transactions that create the financial markets.

Money needs six desirable properties for people and businesses to use money, which are:

1. *Acceptable:* Businesses and public accept money as payment for goods and services. People must trust money in order to accept it for payment.

2. *Standardized quality:* Same units of money must have the identical size, quality, color, so people know what they are getting. If a government issued money in different sizes and colors, how would people determine whether bills are legitimate or counterfeit?

3. *Durable:* Money must be physically sturdy, or it might lose its value quickly as it degrades and falls apart. In some countries, people do not accept torn, ripped, or faded money.

4. ***Valuable relative to its weight:*** People can easily carry large amounts of money around conveniently and use it in transactions.

5. ***Divisible:*** Public can break money down into smaller units to purchase inexpensive goods and services.

All modern countries use coins and paper bills as money, which possess the five desirable properties. Total value of paper bills and coins equals ***currency***. Furthermore, people become psychologically dependent on a currency because they use a particular currency for a long time. For example, U.S. citizens have used dollars as their currency for two centuries. If the U.S. government wanted to introduce a new currency with a different name, then the public could reject the new currency.

Forms of Money

People since the dawn of civilization created payment systems. Thus, money facilitates business transactions, and the payment system becomes the mechanism to settle transactions. First and oldest payment system is commodity money. ***Commodity money*** is government selects one commodity from society to become money, such as gold or silver. If society did not use gold or silver as money, then people still use the commodity for other purposes. People use gold in jewelry, teeth fillings, electrical wires, or the pins of a microprocessor. Commodity money could be anything. For example, prisoners use cigarettes as money in U.S. prisons, while people accepted vodka and bullets as payment in remote parts of Russia during the 1990s.

Commodity money could be ***full-bodied money***. Its value as a good in non-money purposes equals its value as a medium of exchange. For instance, if the market value of one ounce of gold is $1,000, and the government made one-ounce gold coins, then the face value of the coin would equal $1,000. Thus, this coin represents full-bodied commodity money because the coin's inherent value equals the coin's market value.

Governments discovered a trick about commodity money. What would happen if a government made one-ounce gold coins with a face value equaled to $2,000 while the coin contained $1,000 of gold? Subsequently, a government had created $1,000 out of thin air! Government can create value by "printing money," which we call ***seigniorage,*** and government could receive significant revenue by creating money.

Government can debase its currency by relying on seigniorage. For example, the Roman government "printed money" by recalling its gold and silver coins. This it re-minted more coins that contained less gold and silver by adding cheap metals. In the beginning of the ancient Roman Empire, coins were almost pure gold and silver, while, towards the end of the empire, Roman coins contained specks of gold and silver. For example, government can debase coins. If government issued one-ounce, gold coins for $1,000, and the coins were 98% pure gold, then government can print money by collecting the old coins and mint two new coins with a value of $1,000 that only contain 49% gold. Then government fills the remaining 51% of the coin with cheap metals. Unfortunately, government could create extremely high inflation rates if it depends on seigniorage too much.

Second form of commodity money is *representative full-bodied money*. This money has little inherent value, such as paper bills, but people can convert the money into a valuable commodity, such as gold and silver. For example, if you possessed U.S. dollar bills before 1933, you could exchange the bills for gold at the U.S. government's exchange rate of $20 per gold ounce. Most of humanity used commodity money before the 20th century until government and central banks had replaced it with fiat money.

Governments and central banks created the second payment system, *fiat money*, and it is a 20th century creation. Most central banks in the world today use fiat money. In the United States, the Federal Reserve System has the authority to issue U.S. dollars, and the public cannot use this money for anything else. Furthermore, the people cannot exchange U.S. dollars for another commodity from government. For example, if people do not want to use U.S. dollar bills as money, it has no other function other than being fancy paper. Unfortunately, no authority can limit the amount of money the Federal Reserve System can issue. If the Fed wants to inject an additional $1 trillion into the economy, it could do so easily. However, a rapid expansion in the money supply could be drastic to an economy. For instance, countries with high inflation rates or hyperinflation have rapidly growing money supplies. *Hyperinflation* is a country's inflation rate becomes extremely high, and prices become meaningless. Subsequently, people stop using money, and they resort to barter. We show a 100-trillion Zimbabwe note in Figure 3. A noble prize laureate in economics, Milton Friedman, stated, "Inflation is always and everywhere a monetary phenomenon."

Figure 3. One-hundred-trillion Zimbabwe note

Third payment system, a *check,* is credit money tied to a person's checking account. Banks, credit unions, and other financial institutions offer checking accounts to people and businesses. Then people use checks as a medium of exchange, allowing them to purchase goods and services. Once sellers accept a check, they present the check to a bank for payment. Consequently, checks have three benefits. First, people and businesses do not carry cash. Second, the check provides proof of a business transaction. Finally, checks become convenient in large transactions, such as buying a house or car. Buyer does not need to carry a suitcase of cash for this transaction. However, checks create two problems. First, the financial institution charges fees for using checks, or the check writers abuse their accounts and write fraudulent

checks for amounts that exceed their account balances. Some businesses and people do not accept checks because they cannot verify if a person has sufficient funds in his account.

Checks evolved into the last payment system – electronic funds. The most common form being debit cards. A *debit card* improves the payments system's efficiency and extends the function of checks. Many retail and grocery stores allow consumers to pay for goods and services using a debit card. When customers purchase their goods and services, they use a plastic card that contains either a chip or magnetic strip. Next, the store has machines that read the chip or magnetic strip and allow the store to transfers funds electronically from the customer's checking account to the store's bank account. Consequently, the debit card reduces the uncertainty the customers have sufficient funds in their account for business transactions. Although many businesses do not accept checks, they do accept debit cards.

Debit cards expanded electronic funds leading to the automated teller machine (ATM) and the internet. *Automated teller machine (ATM)* allows people to withdraw cash from machines that are located at banks, grocery stores, shopping malls, and gas stations. ATMs are connected together through computer networks, and one of the largest networks is Visa Debit. The Visa network allows customers to access their checking and savings accounts at financial institutions 24 hours a day, 7 days a week, from almost every city in the United States, and many foreign countries around the world. Finally, people can buy products and services, transfer bank funds, or pay utility bills by sitting behind a computer screen. They only need a computer connection to the internet to transfer money or pay bills.

Bitcoins

The internet created a new money that exists only in cyberspace. We call this money *Bitcoin*, where bit refers to the computer term – a piece of information, either a one or zero. This money has other names including virtual money or cryptocurrency.

No central bank or government issues Bitcoins, and 11.75 million Bitcoins were circulating in the world in October 2013. Bitcoins' supply continuously grows until 2140, stopping at 21 million Bitcoins. Furthermore, cryptography plays a key role in Bitcoins. Every Bitcoin has a unique, encrypted number that only a Bitcoin operator can decrypt. A person opens an account or wallet and can buy Bitcoins from online vendors. A person can store his Bitcoins on his computer or cellphone or use an online wallet.
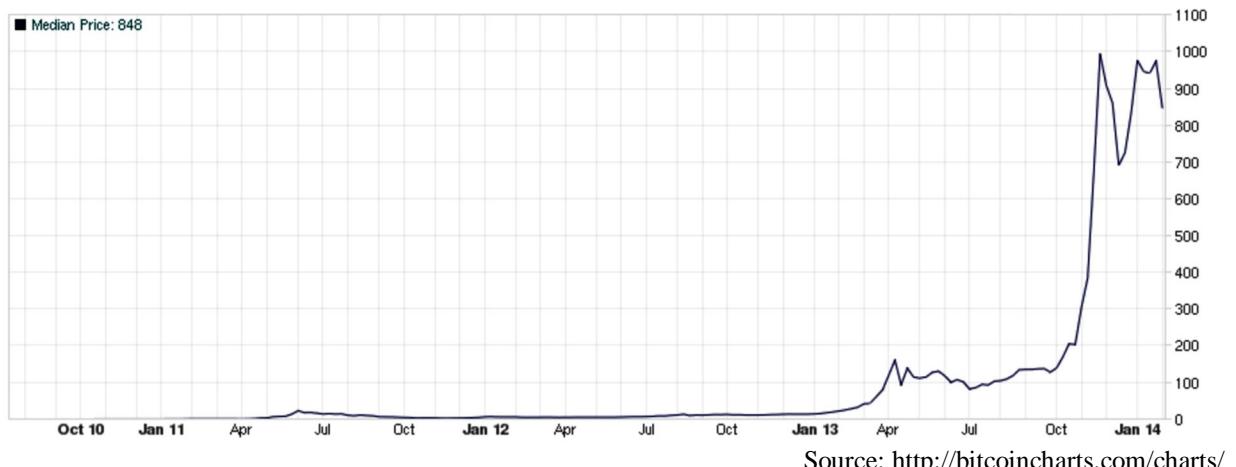
A person does not have to reveal his identity. Then he or she settles transactions by sending the other party his Bitcoin information. As a buyer completes a transaction, software encrypts that person's private key into the transaction along with the Bitcoin number. A private key is like a person's bank account number. Ensuring people do not spend the same Bitcoin for multiple transactions, a miner completes the transaction. A miner decrypts the transaction and records it in a ledger. Then it re-issues the Bitcoin to the seller. A miner can earn transaction fees and receives newly created Bitcoins by clearing transactions.

Miner is not the proper terminology. A miner functions as a clearinghouse. A *clearinghouse* can be a large bank that helps member banks transfer money between them. Then member banks have accounts at the clearinghouse. For example, you buy $500 in clothes from an internet store and send a check to the seller. Next, the seller deposits the check into his or her

bank account. Seller's bank sends information about the check to the clearinghouse and the clearinghouse checks with your bank. Your bank checks your balance ensuring you have enough funds in the account to pay the check. Once your bank approves the transaction, the clearinghouse reduces the account for your bank by $500 and adds $500 to the account for the seller's bank. Then your bank reduces your account by $500 while the seller's bank adds $500 to his or her account, thus clearing the transaction.

Bitcoins have four drawbacks that would prevent wide scale adoption.

1. People who deposit their savings into banks have deposit insurance. If their bank fails, the deposit insurance guarantees the depositors will not lose their money. The Federal Deposit Insurance Corporation insures bank deposits up to $250,000 for U.S. banks. However, no government agency insures Bitcoin or protects people from losses.

2. Hackers can break into online wallets and steal the Bitcoins. Since all transactions are electronic, they can erase history, and people may not recover their stolen Bitcoins.

3. Price of Bitcoin fluctuates greatly between $80 and $1,000, which we show in Figure 4. For people to use and accept money, people must know the money's value. Some investors purchased Bitcoins, hoping to buy at a low price and sell for a high price.

4. Few sellers accept Bitcoins as payment.

Source: http://bitcoincharts.com/charts/

Figure 4. The Bitcoin's value

Bitcoins provide three benefits. First, buyers and sellers do not have to reveal their identities to each other. They can remain secret. Second, people can use Bitcoin to launder or smuggle currency outside a country. A buyer would purchase Bitcoins in one country and withdraw the Bicoins in another country, circumventing currency controls. Finally, buyers and sellers use

18

Bitcoins to settle transactions in the underground economy that is hidden within the internet. We call this the deep internet where most internet users would never see. The deep internet allows buyers and sellers to communicate with each other without revealing their location or identities.

Bitcoin is evolving into the currency of the black markets on the internet. Buyers and sellers use Bitcoin like the numbered Swiss bank accounts. For example, they open a numbered account at a Swiss bank that contains no personal information. Then they can use the account to settle transactions secretly. For example, a person pays for an illegal service. This person contacts the Swiss bank and asks the bank to transfer the bribe amount from his bank account into the seller's bank account. This person gives the banker a code (or private key for Bitcoin) to approve the transfer. Consequently, the transaction remains secret because no one has revealed his or her identities.

U.S. federal government is cracking down on the internet black market and is closing down Bitcoin operators. Agents believe that if they can shut down the money, they can eliminate the black markets operating in the deep Internet or prevent the funding of terrorists. For example, the U.S. Department of Homeland Security shut down Mt Gox, the largest Bitcoin operator in the United States in May 2013 although Mt Gox did not participate in illegal activities. U.S. law requires all money exchangers to register with the Financial Crimes Enforcement Network. Unfortunately, the federal government will fail because people can use Bitcoins anywhere in the world.

Bitcoin continues to flourish despite its drawbacks and U.S. government crackdown. Bitcoin ATMs are cropping up in Hong Kong, New York City, and Vancouver, and more stores and vendors are accepting Bitcoins for payment.

Money Supply Definitions

Economists use two approaches in defining the money supply: transaction and liquidity. If economists use the *transaction approach*, they emphasize the money's function as a medium of exchange. Only a few assets possess this property. As the central bank boosts the money supply, people raise their spending that boosts national output, increases income, reduces unemployment, and creates inflation.

If economists use the *liquidity approach*, they take all assets, rank them by liquidity, and include only liquid assets in the money supply because people can easily sell these assets at a future time at a known price with minimum costs. This approach emphasizes money's function as a "store of value," because if highly liquid assets retain their value, people can easily use the assets to purchase goods and services directly or indirectly. Why does this approach work? When the central bank boosts the money supply, people will adjust their portfolios of assets, affecting consumer spending, national output, income, and employment.

The Federal Reserve System defines money supply as M1, M2, M3, and L. Many central banks in the world measure their money supply similarly to United States. However, they differ which financial instruments they include in their measures. Every country uses different financial instruments because countries differ in their legal systems, regulations of financial markets, and customs.

Economists define the *M1* as the narrowest definition of money supply because they use the transaction approach to determine which financial instruments to include. M1 adds the following three items together:

❖ Currency held by the public and in bank vaults. It excludes currency held by the government.

❖ All forms of checking accounts.

❖ Traveler's Checks that are held by people and not by the banks.

Economists define the *M2* as a broader definition than M1 because they use the liquidity approach to define the money supply. Economists add the following together for M2:

❖ Include everything in M1.

❖ Include all small denomination savings deposits and time accounts at all financial institutions. Small denomination in the U.S. means the bank account has a balance less than a $100,000. Examples include Certificates of Deposit or savings accounts at banks.

Economists define *M3* broader than M2 and include the following items summed together:

❖ Include everything from M2.

❖ Include large denomination savings and time accounts, and liquid securities with longer investment times than the financial instruments included in M2. For example, a corporation holds a $1 million Certificate of Deposit.

Economists define *L* for liquidity as the broadest measure of the money supply and include all liquid assets. The Federal Reserve does control this measure. L sums the following items together.

❖ Include everything from M3.

❖ Include all short-term securities, such as Treasury Bills issued by the U.S. Federal government. (Refer to Chapter 2 for examples of short-term securities).

The Fed stopped publishing the M3 definition of the money supply on March 23, 2006. It stated M3 does not provide any useful purpose, and the Fed does not use M3 in formulating monetary policy. Some international investors believe the Fed stopped publishing M3 because some people fear a U.S. dollar collapse on the international markets because the United States suffers from large trade deficits and a massive national government debt. (We discuss these

issues in Chapter 5). The M3 definition contains the amount of U.S. dollars held outside the United States.

Which definition of the money supply is the best? Four monetary aggregates grow at different rates, at different times, and even in different directions. Before 1981, a stable relationship existed between M1 and GDP, but the government had begun deregulating the financial markets during the 1970s and early 1980s, obscuring this relationship. Currently, many economists use the M2 definition of the money supply to explain changes in the GDP, inflation, and employment. Accordingly, the Fed does not formulate M1 targets and concentrates on M2 instead.

Key Terms

financial market	store of value
financial institution	purchasing power
information	legal tender
risk	standard of deferred payment
liquidity	currency
money	commodity money
money supply	full-bodied money
central bank	seigniorage
Federal Reserve System	representative full-bodied money
Fed	fiat money
monetary policy	hyperinflation
inflation	check
business cycle	debit card
Gross Domestic Product (GDP)	automated teller machines (ATM)
interest rates	Bitcoin
nominal GDP	clearinghouse
real GDP	transaction approach
barter	liquidity approach
double coincidence of wants	M1
medium of exchange	M2
specialization of labor	M3
unit of account	L

Chapter Questions

1. Identify the purpose of financial markets and financial institutions.

2. Which advantages do financial institutions provide when compared to the financial markets?

3. Why is liquidity important in defining the money supply for a country with sophisticated financial markets?

4. Define monetary policy.

5. Which three variables of the economy can central banks influence?

6. Please define the following terms: inflation, gross domestic product, and interest rates.

7. Identify the difference between real and nominal.

8. Which problems does a barter economy suffer from?

9. How do the functions of money overcome the problems associated with barter?

10. What is seigniorage?

11. Distinguish between the different payment systems.

12. Distinguish between the transaction approach and liquidity approach of defining the money supply.

13. Identify the differences between M1, M2, M3, and L.

14. Judge whether credit cards should be a form of money.

2. Overview of the U.S. Financial System

This chapter explains how financial markets link the savers to the borrowers. Savers can use two separate channels to lend to borrowers. First, the savers could deposit their funds into a financial institution that in turn, lends to the borrowers. Second, savers could lend directly to the borrowers by directly investing in financial securities. Thus, these two channels create a variety of financial markets, such as the spot and derivative markets, and primary and secondary markets. Furthermore, we examine the impact of financial innovation and government regulation of the financial markets. Finally, we define the common financial instruments at the end of the chapter that we will use for the rest of the book.

The U.S. banking system evolved into a complex system. As the United States was forming, the public and the government distrusted large, powerful banks. Consequently, the government passed laws that heavily regulated the banking system, enlarging the number of U.S. banks and shrinking the banks' asset size. Moreover, the United States created two layers of commercial banks: national and state banks. Several government agencies at the federal and/or state level regulate these banks. Consequently, banks have used ingenious methods and innovations to circumvent governments' regulations.

Financial Intermediation

A *financial system* transfers funds from *savers* to *borrowers*. Savers and borrowers can be anyone. Some households, businesses, and governments are net savers because they spend less than their income, and they become the source of loans while other households, businesses, and governments are net borrowers. They spend more than their incomes. For example, many college students are net borrowers. Students' incomes are usually lower than their yearly expenses, and they use student loans to pay for the difference. After graduation, the students enter the workforce, and they start repaying their student loans. As their incomes continually rise over time, the former students repay their loans and become net savers, saving funds for retirement. Using another example, many local and state governments have laws, requiring them to balance their budgets. This fiscal responsibility forces many local and state governments in the United States to be net savers while the U.S. federal government has been a net borrower for the last 50 years.
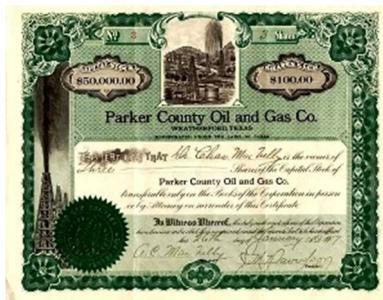
Transfer of funds from savers to borrowers is vital to an economy. If the borrowers invest the funds by purchasing machines and equipment, the borrowers can produce more goods and services. When businesses produce more goods and services, subsequently, the economy grows, and a growing economy creates jobs and rising incomes. As consumers experience rising incomes, they buy more goods and services, increasing the living standards. Beauty in the U.S. financial system is the financial institutions can collect and concentrate the meager savings of many people and then lend to a large company. For instance, 10,000 savers who have $200 in their savings accounts could allow a financial institution to grant a business loan for $2 million.

Subsequently, the business can invest new machines and equipment, boosting its production level, and creating economic growth.

Savers link to the borrowers through two routes: financial intermediaries and direct finance. Common *financial intermediaries* include banks, mutual funds, and insurance companies. For example, you purchased fire insurance for your home. When you pay your premium, the insurance company invests your payment into the *financial markets* by investing in *financial securities*. Financial intermediaries only provide this function for one reason – to earn profits. For instance, banks transfer your funds to borrowers to earn profits. Banks earn profits from the difference between the interest rate paid by the borrowers and the interest rate the bank pays on your accounts.

Second route links savers to the borrowers through *direct finance*. Net savers, like households, can lend directly to businesses through the financial markets. Two broadly defined financial instruments are common stock and bonds. If you buy *common stock*, you own shares of a corporation that we call *equity*. We show an example of a stock certificate in Figure 1. Moreover, stockholders have the right to vote on certain corporate policies and elect the Board of Directors. Each share of stock entitles the owner to one vote. For example, if you owned 100 shares of stock, and this corporation issued a million shares, your vote would have a small impact on corporate policy. Finally, the stockholders earn a share of the profits, which we call *dividends*.

Second financial instrument is a *bond*. A bond consists of a standardized loan to a corporation. A bond is fancy paper giving bondholders legal rights where the corporation promises to repay a long-term loan plus interest to the bondholders. If a corporation bankrupts and is liquidated, bondholders have a higher priority and claim on the corporation's assets, while the common stockholders come last.

Source: www.oldstockresearch.com/faq.htm

Figure 1. An example of a stock certificate

Bonds and stocks have two markets: the primary market and second market. A corporation or government issues brand-new securities in the *primary market* by selling them directly to security dealers. Thus, they sell new securities in the primary market, while investors sell and buy existing securities in the *secondary market*. Most famous secondary market for stock is the New York Stock Exchange. This exchange allows investors to buy and to sell existing stock for

the United States largest corporations. Furthermore, secondary markets are important because these markets increase the liquidity of financial instruments. Investors can easily sell or buy financial securities on secondary markets. Moreover, when government or corporations issue new securities, the prices from the secondary market set the prices for the new securities in the primary market.

Why would savers deposit their money into banks, instead of investing directly into the financial markets? Financial intermediaries provide three functions. First, your bank account has *liquidity*. If an emergency arises, you can easily withdraw funds from your account. If you purchased stock and bonds from the financial markets, you could experience time delays and pay a transaction cost to withdraw yours money. Second, financial intermediaries have specialists who collect *information* about borrowers. Financial intermediaries lend to borrowers who are not likely to *default* on their loans. Finally, the financial intermediaries reduce the *risk*. They lend to a variety of borrowers through a process called *diversification*. For example, banks will issue credit cards, grant mortgages, lend to a variety of businesses, and buy U.S. government securities. If several credit card holders default, a couple of households stop paying their mortgages, or a business bankrupts and defaults on a bank loan, overall, the banks could still earn profits because the majority of bank customers are repaying their loans. On the other hand, if you directly invested in a company that bankrupts, then you could lose all of your investment.

Savers could withdraw their money out of the financial intermediaries and invest directly in the financial markets, such as buying U.S. government securities. We call this process – *financial disintermediation*. Savers have two reasons to invest directly in government. First, a government may pay a higher interest rate than a bank. For example, your savings account earns 2% interest while a U.S. Treasury bill pays 4% interest. Thus, the investors want to earn the greater interest rate. Second, the U.S. government has a low risk of default because the government has the power to tax and "print" money (i.e. seigniorage). If the government experiences financial trouble, it can raise taxes, issue more government securities, or print money. One problem does occur. If a government accumulates a massive debt, it usually gets money for loans first, while businesses come second. If investors have limited funds, then the businesses might not get the money that they need for investing in machines and equipment. Consequently, a large government debt could impact the financial markets and hamper business investment because a large government debt crowds out private investment. For example, the U.S. government debt has exceeded $17 trillion in 2014. If the U.S. government had a debt of zero dollars, then the investors would invest their funds in the private markets.

Financial markets have two methods to complete a transaction. Up to this point, you assumed when a buyer and seller completed a financial transaction, they exchange money for the financial instrument immediately. We call this the *cash market* or *spot market*. However, buyers and sellers have another option to complete a transaction. Buyer and seller of a financial instrument can negotiate a price and quantity today, but they exchange money for the financial instrument on a future specific date. These transactions occur in the *derivative market*. For example, you negotiate a price today to buy 10 Treasury bills from a seller for $9,000 each in six months. You had entered into a contract with the seller for a future transaction. If these

contracts are standardized, investors can buy and sell these contracts on secondary markets. We study the derivatives market in Chapter 18.

Financial Instruments

Every financial instrument, except stock, has a principal, interest, and maturity. **Principal** is the loan amount the borrower received from the lender. Then the borrower pays **interest** as periodic payments to the lender because the lender allows the borrower to use the funds. Interest is a cost to the borrower, but income to the lender. Finally, **maturity** is the date the security expires, or the final date when the borrower pays the last payment for the principal plus interest.

Analysts and economists categorize financial instruments into two broadly defined classes: money market and capital market. **Money market** comprises of short-term securities with a maturity less than one year. Money market securities are popular and are simply a loan of funds from one party to another. Money market securities are highly liquid and almost as good as money – hence the name money market. Second category, the **capital market**, includes long-term securities with a maturity greater than a year. Capital market includes common stock because stock has no expiration date because the corporation, in theory, could live forever. Thus, we define stock as a long-term security.

You should memorize the following securities because we continually refer to these financial instruments throughout this book. For students to understand these securities, remember who issues the security, and whether it is a money market or capital market security. All these securities have one purpose. One party owes another party money plus interest except stocks. Stocks represent ownership in a corporation and are not loans.

Money market securities have maturities less than one year, and we list the common ones:

❖ **U.S. Treasury bills** or **T-bills**) are loans to the U.S. government. Maturities range from 15 days to one year. T-bills do not have an interest rate stamped on them, and they start at $10,000. If an investor buys a T-bill for $19,000, and the T-bill has a face value of $20,000 with a maturity of six months. Then six months later, the government will pay $20,000. The $1,000 reflects the interest.

❖ **Commercial paper** is a loan to a well-known bank or corporation for a short-time period. Corporations use commercial paper to raise funds without issuing new stocks or bonds. Commercial paper is a form of direct finance, and the loan has no collateral.

❖ **Banker's Acceptances** are used in international trade. For example, a firm wants to buy from a foreign exporter. Firm deposits money at a bank, and the bank guarantees payment by issuing a banker's acceptance. That way, the export accepts the banker's acceptance and ships the goods to the firm. If the firm does not deposit money at the bank and the bank guarantees payment, then the bank must pay the foreign exporter, even if the firm bankrupts. These securities are liquid because holders can sell them on a secondary market.

❖ *Negotiable Bank Certificates of Deposit* (*CD*s) are loans to banks that banks sell directly to depositors. CDs have a fixed time period. If a depositor withdraws a CD early, then the depositor forfeits the interest. Consequently, CDs usually pay a greater interest rate than a savings account.

❖ *Repurchase Agreements* (repos) are short-term loans. For example, a bank sells T-bills to a customer and promises to buy it back the next day for a higher price. Greater price reflects interest. Banks used repos to circumvent the law, so banks could pay businesses interest on their checking accounts. Before the 1980s, U.S. banks could not pay interest on checking accounts. For example, IBM has excess funds in their checking account. Bank sells IBM T-bills and uses IBM's funds. Next day, the bank returns IBM's funds with interest and takes the T-bills back. Consequently, the bank paid interest on a checking account, although the U.S. law prohibited banks to pay interest on checking accounts.

❖ *Federal Funds* are overnight loans between banks. For example, a bank with excess funds deposited at the Federal Reserve can lend these funds to another bank. Market analysts and the Fed scrutinize the interest rate in this market because monetary policy influences immediately the federal funds interest rate.

❖ *Eurodollars* are U.S. dollars that people deposit in foreign commercial banks outside the United States and in foreign branches of U.S. banks. Eurodollars are an important source of funds in the international market. Furthermore, the euro has become a popular currency for investors, who have bank accounts denominated in euros that are located outside the Eurozone. The Eurozone comprises of the 17 countries within the European Union that use the euro as its currency. If people and investors have euro denominated accounts outside the Eurozone, then we still call it Eurodollars.

   Capital market securities have maturities longer than a year, and we list the common ones:

❖ U.S. Treasury securities are loans to the U.S. government. The U.S. government issues *Treasury Notes* or *T-notes* from one to 10 years, while *Treasury Bonds* or *T-bonds* have maturities greater than 10 years. These Treasury securities have a stated interest rate, and government usually pays interest every six months.

❖ State and local governments can issue bonds, called municipal bonds. The U.S. federal government encourages investors to buy these bonds by exempting investors from U.S. income taxes. Furthermore, municipal bonds fall under two categories: General-obligation bonds and revenue bonds. For *general-obligation bonds*, a state or local government guarantees the bonds payment with its taxing power. For instance, a city government builds a new firehouse. Then the city government guarantees payment of the bonds with its power to tax. For *revenue bonds*, local or state government secures the bonds' payment by the revenues that the project generates. For example, a college builds a new dormitory, using

revenue bonds. When the students pay to live there, the university pays the bondholders some of the revenue.

❖ We include stocks and bonds that we had defined earlier in this chapter.

❖ *Mortgage* is a loan on a house or property and the loan duration ranges from 15 to 30 years. Usually, the property becomes the collateral. For instance, if a homeowner loses his job and cannot repay the mortgage, then the bank takes possession of his house. We call this process foreclosure as a bank takes the property and evicts the homeowners. A variety of savings institutions and banks grants mortgages, making mortgages the largest debt market.

❖ Commercial bank loans are banks lending to businesses. These loans do not have well developed secondary markets.

❖ Government agencies can issue securities. For example, Sallie Mae is a quasi-government agency and lends to college students. Then Sallie Mae pools the student loans into a fund and issues bonds, allowing investors to buy into the fund. Subsequently, the investors indirectly earn the interest from the students' monthly payments. Thus, Sallie Mae increases the liquidity of student loans.

Sallie Mae may experience financial hardship. U.S. economy has been plagued with weak economic growth since the 2007 Great Recession, and many college graduates cannot find jobs and start to default on their student-loan payments. Many call this the College Bubble. As college tuition soars into the stratosphere, many college students accumulate large amounts of debt to pay for their education, and some of these students have slim chances of finding good-paying jobs after they graduate. Consequently, high school graduates may shun college to avoid accumulating debt, sparking a financial crisis for the U.S. colleges and universities. Then the colleges and universities could contract similarly to the U.S. housing market after 2007.

The United States Banking System

The United States banking system differs from other industrialized countries. For instance, the United States has more banks per capita, and the banks possess fewer assets because the U.S. government imposed strict regulations. Early in the United States history, the public and government feared big banks, so state and federal governments passed regulations that forced banks to be smaller and encouraged a large number of banks to form.

The United States, furthermore, has a *dual banking system*. A bank chooses a charter from a state government or from the U.S. federal government. A charter is a document that legally establishes a corporation and allows a financial institution to participate in banking activities. A *national bank* receives a charter from the federal government, while a *state bank* receives a charter from a state government.

If a bank receives a charter from the federal government, then three government agencies can regulate that bank, which are:

❖ **Comptroller of the Currency**, an office in the U.S. Treasury Department, regulates national banks. This office also grants charters on behalf of the U.S. federal government, and it requires national banks to be members of the Federal Reserve and Federal Deposit Insurance Corporation. As of 2010, the United States had roughly 1,500 national banks and 50 foreign national banks.

❖ **Federal Deposit Insurance Corporation (FDIC)** insures deposits at member banks. If this agency insures, then it also regulates. As of 2009, the FDIC had 8,195 member banks.

❖ **Federal Reserve System (Fed)** is the central bank of the United States and the **lender of the last resort**. When a bank encounters financial difficulties and cannot receive a loan from other financial institutions, then the bank can ask the Fed for a loan. Moreover, the Fed regulates banks.

A state-chartered bank could have fewer regulations. A state government agency regulates its state banks, and many states require their banks to join the Fed and/or FDIC. Therefore, a state bank could have one or more regulatory agencies to deal with.

U.S. government imposed another restriction upon the U.S. banking industry – the McFadden Act. The **McFadden Act** prohibited a commercial bank from opening a branch in another state. This law put national and state banks on equal footing and helped foster competition. However, this law kept small inefficient banks in business, causing the United States to have the largest number of banks in the world. The United States had 14,217 banks in 1986, which fell to 9,459 banks by 2010.

Some states imposed more restrictions upon their banks than other states. For example, some states had imposed unit banking that restricted a bank to one geographic location. **Unit banking** restricts a bank to a single geographical location, such as in one city, and the bank cannot branch to other cities. Currently, no states enforce unit banking. Furthermore, **branch banking** allows a bank to have two or more banking offices owned by a single banking corporation within a geographical area. Geographic area can be a city, county, or statewide. Currently, 45 states allow statewide branch banking.

Different institutions evolved in the United States that differ from commercial banks. They include savings institutions and credit unions, and they are not commercial banks. Thus, they have their own regulatory agencies. These institutions either have a charter from the federal government or a state government. The Federal Home Loan Bank System (FHLBS) is a U.S. government agency similar to the Federal Reserve. The FHLBS regulates nearly 8,000 savings institutions. Moreover, the FDIC insures deposits at savings institutions. Most credit unions have charters from the National Credit Union Administration, which issues charters on the federal government's behalf. This agency also insures the deposits at credit unions while the FDIC does not.

Why did U.S. and state government propagate such a complex system? Financial sector is an extremely important sector of the economy, and every country around the world regulates its financial markets. Government uses six reasons to regulate a banking system and its financial markets, which include:

Reason 1: Governments want the financial system to be stable. Banks contribute to a nation's money supply. A wave of bank failures could trigger a large contraction in the money supply, shrinking the economy and triggering a severe recession. Many economists believe the Great Depression would not be severe if a wave of bank failures had not swept across the country.

Reason 2: Money supply and financial markets are intertwined. If the central bank uses the money supply to influence the inflation, business cycle, or interest rates, the central bank also affects the financial markets. Consequently, central banks need government regulations to control monetary policy effectively and help achieve low inflation and low unemployment.

Reason 3: The U. S. government wants to promote efficiency in the financial intermediation process.

Reason 4: The U.S. government wants to provide low-cost financing for homebuyers. This desire led to the U.S. Housing Bubble that occurred between 1997 and 2007.

Reason 5: Financial markets depend on accurate information. Governments ensure borrowers provide accurate information to investors. In the United States, the *Securities and Exchange Commission (SEC)* requires publicly traded companies (i.e. a company sells stock to the public) to disclose financial information based on acceptable accounting standards.

Reason 6: The U.S. government wants to protect consumers. Financial system, such as a bank can be very complicated. Many depositors do not understand the financial instruments, and therefore, they are not able to gauge the soundness of the institution or make rational decisions. In a competitive market like TVs, DVDs, computers, and cell phones, the consumers can easily evaluate and compare different products.

The Glass Steagall Banking Act

Politicians and the public thought commercial banks should not underwrite new stock and bonds for corporations because they believed banks were underwriting "risky" securities. Furthermore, the banks possess enormous power to create monopolies. Thus, the United States government passed the *Glass-Steagall Banking Act* in 1933. This law divided the functions of investment banking and commercial banking. A commercial bank is a standard bank while an investment banker markets and sells brand new stocks and bonds. In practice, the Glass-Steagall Banking Act insulated investment banking from the competition. Consequently, borrowers could pay more for issuing new securities than they would pay if commercial banks could underwrite new securities. The United States government repealed pieces of the Glass-Steagall Act in 1999 to allow U.S. investment banks to compete internationally as they moved into commercial banking and insurance.

The Glass-Steagall Act also created the Federal Deposit Insurance Corporation (FDIC). The FDIC, a public corporation, insures the deposits of each depositor in commercial banks up to $250,000. For example, if you have $150,000 in your checking account and $150,000 in

certificates of deposits, the FDIC would insure a total of $250,000. If your bank fails, you are guaranteed that you will get at least $250,000 from FDIC, potentially losing $50,000. In some cases, the FDIC insured all deposits that exceeded $250,000 per person, while it did not for other bank failures. It depends how FDIC handles the bank failure.

FDIC receives its funding from insurance premiums. Every commercial bank that is a member of FDIC must pay approximately $100,000 per year. The FDIC became very successful because bank failures averaged 10 per year between 1934 and 1981. On the other hand, bank failures averaged 2,000 per year during the Great Depression before the U.S. government created the FDIC.

The FDIC uses two methods to deal with bank failures. First, the FDIC closes the bank and seizes the bank's assets. Then the FDIC sells the bank's assets and returns the money to the depositors. If FDIC does not receive enough money to pay all depositors from selling the bank's asset, subsequently, the FDIC pays the difference from its own funds. Thus, the FDIC rarely uses the first method because the FDIC could pay out millions or billions in claims. Second, the FDIC purchases and assumes control of the failed bank. Next, the FDIC keeps the bank open and searches for another bank that will buy the failed bank. If the FDIC cannot find a buyer, then FDIC can grant extra incentives, such as low-interest rate loans from the FDIC, or the FDIC buys the problem loans from the failed bank's portfolio. The FDIC also allows a bank to cross a state line to buy a failed bank. Although federal law prohibited banks from crossing state lines and opening banks in another state, the federal government did not hesitate to violate its own rules when it needed to.

The U.S. government established the FDIC to reduce the bank failure rate by preventing bank runs. A *bank run* is depositors discover their bank has financial trouble, so everyone runs to the bank to withdraw their deposits. Unfortunately, a bank holds only a fraction of the total deposits because a bank grants loans. Thus, a bank will close its doors after the bank has drained all the cash from the vault. Furthermore, if the bank granted many illiquid loans, then the bank must sell these loans at a discount in order to raise more reserves. Selling the illiquid loans at a discount can cause the bank to become insolvent. *Insolvent* occurs as a bank's total liabilities exceed its total assets. Consequently, any bank on the verge of failing cannot return money to its depositors. Even a financially healthy bank could fail if people spread rumors the bank has financial troubles. Then the rumor triggers a bank run.

Bank runs can lead to contagion. *Contagion* is a bank run on one bank leads to bank runs on other banks. For example, depositors line up at one bank to withdraw their accounts; subsequently, many depositors do not get their money back. Then the depositors tell friends and family, and they begin questioning the health of their banks. Many people cannot gauge the financial health of banks. Friends and family run to their banks to withdraw funds from their accounts, triggering more bank runs. As the contagion spreads, it causes a wave of severe bank runs called *financial panics*. Financial panics can push the economy into a serious recession.

The FDIC charges insurance premiums based on the total amount of deposits at the bank and the risk level the depository institutions pose to the FDIC. Many banks are experiencing financial difficulties that resulted from the 2008 Financial Crisis because the banks approved anyone for a mortgage. As the U.S. entered a recession in 2007, some homeowners started

defaulting on their mortgages. Unfortunately, the housing values were falling since 2007. If a bank foreclosed on a person's house, then a bank possesses a home that is losing value. Thus, the financial crisis caused 140 banks to fail during 2009, causing financial difficulties for the FDIC. Then the FDIC requires banks to prepay their deposit insurance for 2010, 2011, and 2012. The FDIC wants banks to prepay $45 billion in deposit insurance after it already doubled the insurance premiums for 2009.

Financial Innovation

Financial markets and institutions continually change and evolve, and *financial innovation* can drive this change. If a new financial instrument lowers risk, increases liquidity, or increases information, then investors are attracted to the new security. For example, *mutual funds* are one financial innovation. A mutual fund pools money from many people together into a fund, and a fund manager invests the fund in a variety of stocks. Consequently, this method lowers investors' risk through diversification of stocks. For example, you manage your mutual fund, and you bought 30 different corporate stocks. Your Coca-Cola stock rises one day while the value of your IBM stock declines. Overall, the average of the fund's 30 stocks could earn a return for the fund investors. If you bought only Kodak corporate stock, then you would lose your investment when Kodak filed for bankruptcy.

Regulations can spur innovation. The U.S. and state governments have always heavily regulated their financial institutions. Consequently, these institutions ingeniously circumvented these regulations by creating new financial instruments or new financial institutions. First method to circumvent banking regulations, bank leaders and owners developed *bank holding companies*. A bank holding company is one corporation obtains ownership or control of two or more independent banks. A bank holding company can do three things.

❖ Bank holding company can branch within states or across state lines. For example, a corporation buys enough common stock of two banks to become the majority shareholder. Majority shareholder elects the Board of Directors and votes on corporate policy. Therefore, the holding company can control several banks in several states, circumventing the McFadden Act.

❖ Bank holding companies can buy other non-bank companies and enter other spheres of economic activity, such as data processing, investment advice, and insurance. Allowing banks to participate in nonfinancial activities is called *universal banking*.

❖ Bank holding company can raise non-deposit funds. For example, a bank holding company controls one bank, and this bank needs funds. Holding company issues commercial paper on itself and diverts these funds to the bank, circumventing the interest rate restrictions on bank deposits.

Second innovation, *nonbank bank,* allows banks to circumvent federal and state regulations. Legal definition of a bank is an institution that accepts deposits and makes loans.

What would happen if a bank stopped accepting deposits? Legally, the bank is no longer a bank and becomes exempted from the extensive U.S. bank regulations. Nonbank bank is simply a finance company.

Third innovation was the creation of ***money-market mutual funds (MMMF)***. MMMFs are pools of liquid money-market assets managed by investment companies. The MMMF is identical to a mutual fund. Investment companies sell shares to the public in small denominations, and the fund managers invest in money market instruments. Consequently, MMMF became very successful. MMMF grew from $3.3 billion in 1997 into $186.9 billion in 1981 and 959.8 billion by 2010.

The MMMFs began hurting the banks financially as people started withdrawing money from their bank accounts and investing them into MMMFs. MMMFs paid a higher interest rate, and they allow check-writing privileges. Accordingly, banks began losing customers, and they place pressure the regulatory agencies that, in turn, placed pressure on Congress and the President to change the laws. Since 1982, banks began offering ***money market deposit accounts (MMDA***) that are similar to a MMMF with only one difference. The FDIC considers a MMDA to be a bank account and thus, it insures them, while it does not insure MMMFs. Finally, MMDAs have no reserve requirements, and they have grown rapidly as people started to invest in them.

Last innovation, ***automated teller machine (ATM),*** allowed banks to circumvent regulations. Modern computer technology allows a bank's customers to receive banking services through computer terminals located at banks, stores, and shopping malls. Customers can make deposits, withdrawals, and credit-card transactions. Technically, ATMs are not bank branches, and are not subjected to branch banking restrictions. Therefore, ATMs are located some distance away from the main bank. Furthermore, many banks created networks, so customers could access their accounts from any place within the United States and across the world. Moreover, banks offer debit cards. For example, a customer uses a debit card to pay for goods and services by electronically transferring funds from his checking account to a store's bank account. Thus, the ***debit card*** has replaced checks. Some businesses do not accept checks, but take debit cards because the merchants know they will receive money from the customer's bank.

Political climate was changing in the United States before the 2008 Financial Crisis. Innovation, rising interest rates, and deregulation were eroding the regulatory structure set up in the 1930s. Banks can cross state lines, open branches in other states, offer investment advice and brokerage services. Thus, the banking industry experienced two trends. First, banks can acquire other banks, reducing the number of banks in the United States. Second, as banks merge, they become bigger as their assets grow. U.S. banks were approaching the size of Japanese and German banks, which traditionally were larger in asset size.

Then the 2008 Financial Crisis struck the U.S. economy, causing many commercial and investment banks to teeter on bankruptcy. The U.S. federal government came to the rescue and purchased stock of many financial corporations. Taxpayers indirectly helped the corporations. Subsequently, the U.S. government helped and approved many bank mergers, including mergers between commercial and investment banks. Consequently, the U.S. government bailed out these banks because they were too big to fail. A wave of large bank failures would implode the whole

U.S. financial system. Thus, the U.S. banks will become larger with partial government ownership (or interference depending on your viewpoint).

Many critics of financial deregulation demand the U.S. government to re-enact the Glass–Steagall Act that would separate commercial and investment banking activities. Many leaders around the world are debating whether to pass new laws to separate commercial and investment banking in their countries because the 2008 Financial Crisis forced governments to spend billions in bailing out their large banks.

Websites

Comptroller of the Currency	http://www.occ.treas.gov/
Federal Deposit Insurance Corporation	http://www.fdic.gov/
Federal Home Loan Bank System	http://www.fhlbanks.com/
Federal Reserve System	http://www.federalreserve.gov/
National Credit Union Administration	http://www.ncua.gov/

Key Terms

financial system	capital market
savers	dual banking system
borrowers	national bank
financial intermediation	state bank
financial market	Comptroller of the Currency
financial security	Federal Deposit Insurance Corporation
direct finance	Federal Reserve System (Fed)
equity	lender of the last resort
dividend	McFadden Act
primary market	unit banking
secondary market	branch banking
liquidity	Securities and Exchange Commission
information	Glass-Steagall Banking Act
defaulting	bank run
risk	insolvent
diversification	contagion
financial disintermediation	financial panic
cash market	financial innovation
spot market	bank holding company
derivative market	universal banking
principal	nonbank bank

interest   automated teller machine (ATM)
maturity   debit card
money market

The Common Financial Instruments

common stock   Treasury Note (T-note)
bond   Treasury Bond (T-bond)
U.S. Treasury bill (T-bill)   general-obligation bond
commercial paper   revenue bond
banker's acceptance   mortgage
negotiable bank certificate of deposit   mutual fund
repurchase agreement   money-market mutual fund (MMMF)
Federal Funds   money market deposit account (MMDA)
Eurodollars

Chapter Questions

1. Why would people deposit their savings into financial intermediaries, instead of directly investing in the financial markets?

2. Distinguish between stocks and bonds.

3. Distinguish between the primary and secondary markets.

4. Appraise the importance of the secondary markets.

5. Define financial disintermediation, and why it occurs?

6. Identify the money market instruments and capital market instruments.

7. Distinguish between a money market and capital market.

8. Do common stocks have a maturity date?

9. Appraise the difference between a state bank and a national bank.

10. Which government agencies regulate the commercial banks?

11. Explain why the government regulates the banking sector.

12. Explain the role of the Federal Deposits Insurance Corporation (FDIC).

13. Identify the two methods the FDIC uses to handle a bank failure.

14. Please define bank runs, contagion, and financial panics.

15. Why did the financial markets in the modern world become international?

16. Why do governments regulate the financial markets?

17. Identify methods a bank holding company uses to circumvent government regulations.

18. How does a nonbank bank and automated teller machines circumvent bank regulations?

19. Distinguish between a money-market mutual fund and a money-market deposit account.

3. Multinational Enterprises

This chapter defines and distinguishes the three business forms: proprietorships, partnerships, and corporations. Then students study the corporations extensively because they have many advantages over proprietorships and partnerships, as well as different management structures. Although corporations roughly comprise 20% of U.S. businesses, they dominate the business and financial markets. Unfortunately, the corporate structure has several disadvantages with the main one being susceptible to corporate fraud. Thus, students study the disadvantages and ways to minimize them. Finally, corporations dominate international trade and finance, which is why we study them in this book. Towards the end of the chapter, we explain the Law of Comparative Advantage, and why businesses engage and profit from free trade.

Forms of Business Organizations

Goal of a business is to earn profits. Alfred P. Sloan stated, "General Motors is not in the business of making automobiles. General Motors is in the business of making money." All business owners seek profit, and we classify them as a sole proprietorship, partnership, and corporations. *Sole proprietorship* is one person owns the business. That one person becomes liable for all the business's debts, and the business is dissolved legally, when the owner dies. Sole proprietors are the most numerous businesses in the United States, and they usually own farms, grocery stores, hotels, and restaurants.

A *partnership* is a business owned and managed by two or more people. Partnership is defined as general or limited liability. Under a general partnership, all partners become liable for the partnership's debts and obligations. If one partner applies for a bank loan, steals the money, and flees the country, the remaining partners become liable for the bank loan. A limited liability partnership restricts liability and helps protect the partners' assets that he or she does not use directly in the business. Thus, a partner can only lose assets invested in the partnership while his or her other assets are protected from creditors. On the other hand, general partnerships do not have this protection. If a general partnership bankrupts, then creditors can go after a partners' assets such as the partners' house, car, personal bank accounts, and other assets. Usual partnerships are accounting and law firms.

A *corporation* becomes the last form, and the focus of this chapter. Although corporations comprise approximately 20% of businesses in the United States, they dominate domestic and international markets because they enter into all spheres of business activity. Unfortunately, corporations can become so complex; the management loses sight on its goal of earning profits. For instance, *shareholders* represent the owners of the corporation, and they should benefit. Sometimes corporate managers lose sight of earning profits. Unfortunately, the managers do not maximize the shareholders' wealth, maximize share price, or maximize a firm's value. However, if a corporation continually earns losses year after year, then the business would fail, similarly to a proprietorship and partnership.
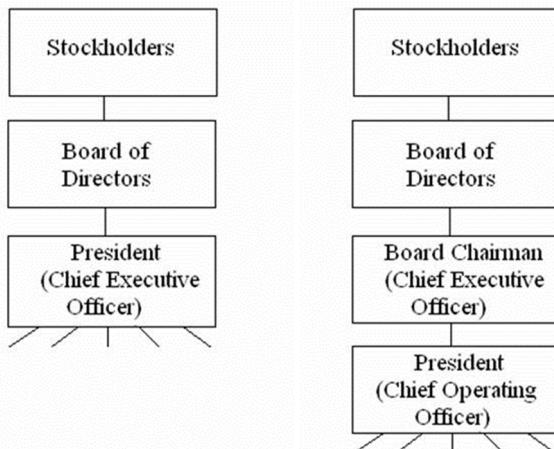
Corporations

Corporations start as private companies that transform into a corporation. They have an *Initial Public Offer (IPO)*, the day the corporation begins selling stock to the public. Usually, the corporation's founder holds large shares in the company's stock and becomes a millionaire or billionaire over night from the market value of his or her stock holdings.

A *charter* is a legal document from government that creates the corporation. By law, the corporation becomes an independent legal entity with rights similar to a person. A state government approves corporate charters in the United States. For example, several corporations choose the State of Delaware because the state charges the lowest fees to incorporate.

A corporation has three parties: stockholders, board of directors, and executive officers. Stockholders own the corporation, and they usually meet once a year to vote for the board of directors, and one share equals one vote. Consequently, the majority shareholder dominates the board of directors, and therefore, controls the corporation. Of course, a majority shareholder could be another corporation. Next, the board of directors sets corporate policy, declares dividends, and selects the president and executive officers. Executive officers operate the daily business of the corporation.

We show two corporate forms in Figure 1. For both forms, the stockholders are the owners and elect the board of directors. They differ who becomes the president of the corporation. In the first form, the board chairman is also the chief executive officer and president of the corporation. For the second form, the board appoints a chief operating officer to be president of the corporation.

Figure 1. Two forms of corporate management

Corporations are large organizations that can raise a substantial amount of financial capital. Consequently, a corporation has financial resources to enter foreign countries and dominate international trade. Furthermore, it creates special departments that employ specialists in law,

taxes, finance, and accounting, who handle operations for foreign countries. Advantages of the corporate form include:

- ❖ A corporation has limited liability. Stockholders own the corporation, and they are not liable for a corporation's debt. If a corporation fails, subsequently, the stockholders only lose their investment, the amount of common stock that they had purchased.

- ❖ Stockholders can easily transfer corporate ownership. *Stocks* are certificates that represent ownership in a corporation, and stockholders can freely buy or sell stock to other investors through the stock market.

- ❖ Corporations have continuity of life. Theoretically, a corporation could live forever.

- ❖ Stockholders do not have a *mutual agency relationship*, where the stockholders cannot bind a corporation to contracts. Stockholders have no say in the daily operation of the corporation even though they own the corporation.

Corporations have two disadvantages. First, government heavily regulates corporations. Corporations file many reports with government because corporations can expand into many countries, markets, and industries. Corporations may encourage regulations because bureaucratic red tape creates barriers to entry. Thus, new companies experience troubles entering the market with complex and arduous regulations. Second, government imposes taxes twice on corporations. Corporations pay taxes from their profits. Then stockholders receive profit from the corporation as *dividends*, and the dividends become income to the stockholder that a government also taxes.

Corporations could issue two different classes of stock: common stock and preferred stock. *Common stock* allows stockholders to vote at stockholder meetings, while *preferred stock* does not have any voting rights. For stockholders to give up their voting right, they will receive their dividends before the common stockholders. Consequently, a corporation could issue preferred stock to expand operations and not share control of the corporation with the new preferred stockholders. Moreover, corporations can pay different dividends, paying a higher dividend to the common shareholders.

We define preferred stock by the following categories:

- ❖ *Cumulative Preferred Stock* – a corporation must pay past-due dividends to cumulative preferred stockholders before it pays dividends to common stockholders. Stockholders only receive dividends, when the board of directors declares them.

- ❖ *Protected Preferred Stock* – a corporation must deposit part of its profits into a fund, and, thus, the corporation can guarantee dividend payments to preferred stockholders.

- ❖ *Redeemable Stock* – a corporation has the right to repurchase the preferred stock in the future.

❖ *Convertible Stock* – a stockholder can convert preferred stock into common stock on a specific date in the future.

Issuing of stock allows corporations to garner large amounts of financial capital. Furthermore, a corporation can raise capital by issuing bonds. A bond is a loan. However, a bond is standardized, allowing investors to buy or sell bonds on the financial markets. Moreover, a bondholder has two rights. First, a corporation pays interest on the bond, regardless of a corporation's financial position. Second, a corporation pays the face value of the bond on a specific date in the future. If a corporation bankrupts or it is dissolved, subsequently, the corporate debts are paid first that include bonds, bank loans, and taxes. If any assets remain, then the preferred stock holders are paid, and finally, the common stockholders are last.

Corporations can buy other corporations. For instance, a parent corporation can have many subsidiaries, and the parent company does not fully integrate the subsidiaries into the parent corporation. Corporations develop these complex structures because of lawsuits, taxes, and regulations. Unfortunately, lawsuits are common and excessive in the U.S. If a successful lawsuit bankrupts a subsidiary, only that subsidiary is impacted. For example, a judge sued a dry cleaner for $65 million because the dry cleaner lost his pants. Although the dry cleaner found the judge's pants a week later, the lawsuit bankrupted the dry cleaner. In another example, a corporation owns 10 different apartment complexes. A corporation establishes each apartment complex as a separate, legal entity. If a tenant is injured on one property, he or she can sue the complex that limits the lawsuit to one subsidiary.

Stockholders, of course, want a good return for their investment. A *return* reflects an investor's profit stated in annual percentage terms, and it has two sources: Dividend yield and capital gains. A *dividend yield* converts the dividend into a percentage. For example, you received $1 per share on your Facebook stock with a value of $20 per share. Dividend equals D; the stock price is P, and t indicates today's time. We calculate your dividend yield as 5% in Equation 1.

$$dividend\ yield = 100 \cdot \frac{D_t}{P_t} = 100 \cdot \frac{\$1}{\$20} = 5\% \tag{1}$$

Investors could earn a *capital gain*, which means they can sell their stock for a greater price than the amount they paid for it. For example, you bought your Facebook stock for $18 per share last year and sold it this year for $20. We compute a capital gain of 11.1% in Equation 2. Notice the subscripts; t represents today while t-1 represents last year. If the investment does not exactly equal one year, then we must adjust the capital gain. For instance, if your investment lasted for two years, subsequently, you would divide the capital gain by 2, converting it into an annual return.

$$capital\ gain = 100 \cdot \frac{P_t - P_{t-1}}{P_{t-1}} = 100 \cdot \frac{\$20 - \$18}{\$18} = 11.1\% \tag{2}$$

Your return from your Facebook investment is the dividend yield plus the capital gain, or 16.1%. Corporate managers can influence the dividend yield that ranges approximately 2% per year while they have little influence on the capital gains that could range as high as 12% per year. Unfortunately, investors could face catastrophic losses if a stock market quickly plummets during a downturn in an economy. For example, the U.S. stock markets dropped half in value during 2008, and many internet stocks became worthless during 2000 as the stock from internet companies plummeted. Consequently, investors could earn capital losses if they sell their stock as it falls in value, or the corporation bankrupts.

Corporations can use subsidiaries to avoid regulations or avoid taxes. For instance, a parent corporation could relocate to the Bahamas or Cayman Islands. These countries are tax havens with low taxes, little regulations, and strong confidentiality laws. Consequently, corporations can shift assets and liabilities among subsidiaries to decrease their overall tax burden. At this point, we clarify some tax terminology. *Tax evasion* is a person or corporation owes a government for taxes, but refuses to pay it. Some activity created the tax liability, and the law requires them to pay taxes. Otherwise, government can assess fines or send the tax evaders to prison. However, corporations can use tax avoidance because they can afford to hire specialists. *Tax avoidance* is the managers careful plan the corporate activities and prevent the creation of tax liabilities.

Dividing line between tax evasion and avoidance can be a thin one. Since the 2007 Great Recession is still impacting the world economy in 2013, some tax authorities penalize and fine companies that use tax avoidance. Unfortunately, tax collections are down, and many governments are becoming aggressive in tax collections. For example, Italian tax inspectors board yachts as they dock in Italian ports. Italian yacht owners registered their yachts in the Cayman Islands, avoiding registration fees and avoiding the VAT fuel taxes. Consequently, the Italian ports reported 40% declines in yacht docking as the yacht owners avoid Italy's ports. Unfortunately, the economies around the ports suffer from fewer customers, who shop and eat in the local communities, which could further depress tax revenues.

Corporate Fraud

The Enron Corporation declared bankruptcy in 2001 and became the universal symbol for corporate fraud. Enron managers created Special Purpose Entities (SPE) with the sole purpose to wipe debt and liabilities from Enron's financial statements. A *Special Purpose Entity* consists of a company or subsidiary of the corporation. A SPE could be a shell company, where the company does not physically exist, except on paper.

The Enron managers invested in many power plants around the world, and some of its investments soured and failed. Then, they created off-balance sheet companies, and they sold its bad investments to its SPEs. Afterwards, their balance sheet appeared financially strong, and Enron applied for more bank loans, gaining more cash. Next, the Enron management bought more companies, and they repeated the process. At the end, Enron hid $25 billion in debt from its investors.

Enron's managers invested Enron stock in the SPEs. As Enron's stock price soared, the SPE's finances remained healthy until Enron's stock price peaked at $90 per share. Once Enron's stock price began plummeting until it fell below one dollar per share in 2000, the SPEs earned substantial losses. Enron hid the losses and asked banks for more loans that would keep the company afloat, but Enron failed to obtain new loans. The U.S. economy entered a recession in 2001 after many internet companies bankrupted in 2000. A recession always exposes an organization's weakness. Unfortunately, Enron employees' pension funds were invested in Enron stock, and many employees lost their pension funds and became unemployed.

Almost everyone in the financial world overlooked the SPEs, including Enron's auditor, Arthur Anderson, Enron's law firm, and the regulators from the Securities and Exchange Commission (SEC). Then the U.S. government passed the Sarbanes-Oxley Act in 2002, which required CFOs and CEOs to sign their company's financial statements. Law's goal was to increase transparency. *Transparency* means outsiders can look at an organization, and know the rules and can accurately assess a firm's true finances. Unfortunately, Enron was "a black box," and only a few insiders knew Enron's genuine financial picture. On the other hand, a non-transparent government tends to be corrupt. For example, if government officials do not write down the laws and rules, or the laws and rules are vague, subsequently, the bureaucrats have wide discretion whether to approve a business license or activity, fueling corruption.

The U.S. economy rebounded from the strong, overly optimistic real estate market. Everyone forgot Enron's misdeeds until the 2007 Great Recession, when the scale of fraud became much larger. For example, Lehman Brothers used exotic securities such as credit default swaps and collateralized debt obligations to buy real estate (Discussed in Chapter 18). After the recession had struck, unemployment doubled, and many households started defaulting on their mortgages. Commercial and investment banks stopped lending overnight, and real estate prices began tumbling. Unfortunately, Lehman Brothers went on a spending spree, buying real estate toward the peak of the housing bubble. It held $768 billion in bank and bond debt while it had $639 billion in assets that dropped rapidly as real estate prices fell. Lehman Brothers filed for bankruptcy in 2008 and had closed its doors after 158 years of business.

Countries differ in corporate structure and planning. The U.S. corporations usually focus on short-term profits, and thus, they have problems with corporate fraud. On the other hand, the Japanese plan long term and they form a *Keiretsu*, a conglomerate of many companies with a bank member. Consequently, the bank could grant low-interest loans to its partner companies, and the Keiretsu usually focuses on long-term profits and market shares. Furthermore, corporations in South Korea, Germany, and Russia also established conglomerates, which are similar to a Keiretsu.

Some governments become a shareholder in a company, which the former communistic countries often use. Government retains control over the company, and it attracts partners who bring technology and efficient management practices. Unfortunately, government as a shareholder becomes susceptible to corruption because a government can use its authority to protect the company and isolate it from competition.

Some corporations suffer from the *principal-agent problem*, when two related parties have different incentives, creating conflicts and odds with each other. For example, the corporate

structure separates the managers from the owners (i.e. stockholders). Stockholders select managers, who maximize profits, maximize the return to the shareholders and/or increase shareholder value. However, managers may not act in the best interest to the owners. They want high salaries, generous benefits, luxurious offices, and access to private planes and Limousines, reducing the return to the stockholders.

The U.S. investment banks, for example, were partnerships before the 1990s, and the managers handled money carefully. They were both the principal and agent. Then the managers converted the investment banks to corporations during the 1990s, and the managers gambled and took high risks while the shareholders owned the corporations. Investment banks became involved in the mortgage market in the early 2000s and were caught in the mania of the U.S. housing bubble. When the bubble deflated, the shareholders lost their stock value during the 2008 Financial Crisis. Finally, for one perverse example, GM cancelled its stock, and the shareholders lost everything during 2008. Remember, the corporate managers represent the shareholders and run the corporation on their behalf.

A family who dominates a corporation could reduce the principal-agent problem. For example, the Walton family is the majority shareholders who actively manage the Wal-Mart Corporation. Microsoft was similar, when Bill Gates was both the CEO and majority shareholder. Consequently, they become both the agent and principal, and they have one united interest - to earn profits. Thus, these companies earned high returns, and managers have better vision and oversight over their corporations.

Expanding into Foreign Countries

A **multinational corporation** is a company incorporates itself in one country and operates in one or more foreign countries. For example, British Petroleum, General Electric, Toshiba, and Wal-Mart are multinational corporations with extensive business activities that span across the globe. Sometimes financial analysts use the term, **multinational enterprise** because a government could form a joint venture with a corporation, and the definition of an enterprise implies a broader meaning.

A multinational enterprise's goal is to earn profits. Therefore, they enter the international markets and foreign countries in the pursuit of profits. Every international enterprise has a choice. It could export to another country or relocate production outside their home country. For instance, many U.S. corporations relocated manufacturing outside the United States, although the U.S. suffers from a high unemployment rate since the beginning of the Great Recession.

Financial analysts and economists divide the world's markets into mature economies and emerging markets. **Mature economies** are competitive, and a company entering this market would face narrow profit margins. Some examples include the United States and Europe. On the other hand, the **emerging-market economies** are countries that recently opened their markets to international trade and finance. They can be very profitable but entail greater risk. For example, China, India, and Mexico are removing their government controls of their markets, and they allow international investors and corporations to invest in their economies.

A government that attracts foreign investment must change its laws to reflect three requirements. First, a government establishes an **open-market place** that means a government

allows free markets and allows the free movement of capital, labor, and technology. Thus, a government relaxes its control over its market. Second, a government allows *strategic management*. Thus, companies can develop new products and services, and compete with other companies. Furthermore, a multinational enterprise could tailor its goods and services to accommodate different cultures and tastes. Finally, multinational corporations need access to capital because international activities require financing. Hence, a country must allow the free movement of money, and corporations are free to issue more stock, bonds, or receive bank loans without government interference. Consequently, a firm has twelve reasons to relocate production to another country, rather than to export.

Reason 1: A foreign government offers subsidies and tax breaks to a company. Some countries such as Dubai (United Arab Emirates) and China have free-trade zones, where companies pay little or no taxes, experience few regulations, and can freely export their products and services to the international markets. Consequently, some governments offer incentives to companies because they want to create jobs and reduce unemployment and poverty rates.

Reason 2: A company gains access to technology from another country. For example, India has talented computer programmers and engineers, who work for relatively lower wages than their counterparts in the United States and Europe. Consequently, a company could relocate to India to tap into their skilled workforce.

Reason 3: An enterprise that moves its factories to a foreign country automatically avoids trade restrictions, like tariffs and import quotas. Government does not apply trade restrictions to products and services produced within a country.

Reason 4: A company relocates its manufacturing facilities to reduce transportation costs. For example, sugarcane is bulky and expensive to transport. Consequently, sugar producers locate the sugar mills close to the sugarcane fields. Then they extract and purify the sugar and ship it to distant markets.

Reason 5: A business gains access to new markets and more consumers. For instance, the Coca-Cola Corporation produces and sells its carbonated soda products in most countries around the world, boosting its consumers.

Reason 6: A company could diversify its business and manufacturing by expanding into foreign markets. Some foreign markets grow quickly, while other markets experience weak growth. Consequently, the business could earn a return on its investments.

Reason 7: A company needs an important raw material for production. For example, battery manufacturers need lithium to produce laptop batteries. They started mining and refining facilities in Bolivia because Bolivia possesses half the world's reserves for lithium.

Reason 8: Businesses and companies reduce their production costs. Consequently, many U.S. manufacturing companies moved to China and Mexico to take advantage of the lower wages and comparable productivity.

Reason 9: A company *outsources* its production to another company, usually located outside the country. For example, Microsoft outsourced its production of X-box consoles to Flextronics, a Singaporean company. Then Flextronics outsourced the production to a Chinese manufacturing plant. Consequently, outsourcing can lower a company's cost, granting it a cost advantage over its competitors.

Reason 10: A company investing in a foreign market today may lead to future investments. For example, a company opens a subsidiary in Moscow, Russia. After establishing the subsidiary, the company can open branches in other Russian cities or enter other Russian speaking countries.

Reason 11: A company that produces in a foreign market reduces economic exposure. *Economic exposure* is changes in economic factors, such as inflation, interest rates, and exchange rates affect a company's profits. One important factor is fluctuating exchange rates. A company could experience wide swings in profits if it produces in one country and exports to another. However, if the company produces and sells within the same country, fluctuating exchange rates would impact less because the company's revenues and costs are denominated in the same currency. Thus, a company's profit could remain stable in a foreign market.

Reason 12: Many companies relocate subsidiaries to politically safe and business-friendly countries, such as the Bahamas, Dubai, and Singapore. These countries have low taxes and few regulations.

Multinational enterprises are more complicated than businesses that remain in their home country. First, the businesses transfer resources, such as machines, equipment, and labor between different countries. Next, they ship products and services to other countries. Consequently, companies need excellent management in logistics, and specialists who monitors a country's different laws and regulations. Second, international enterprises are exposed to exchange rate risks and credit risks. Thus, a company's profit can quickly change due to fluctuations in currency exchange rates, or a company cannot get credit to finance operations in a specific country. Finally, enterprises have other exposures, such as country risk. For example, when Hugo Chavez became president of Venezuela, his government began nationalizing companies. Any international enterprise in Venezuela can experience the seizure of its assets without compensation.

A *country risk* is the risk of investing in a particular country as political conditions rapidly change. For example, the Republic of Kazakhstan was a former state of the Soviet Union that became an independent country in 1991. Country's president, Nursultan Nazarbayev, opened its economy to free markets in early 1990s. Consequently, Kazakhstan made great strides towards a market economy and attracted billions in international investment because the country contains vast petroleum and mineral wealth. After the 2008 Financial Crisis, the Kazakh government is gradually reviving the Soviet rules, practices, and regulations. Unfortunately, the Soviet legal system is very bureaucratic, slow, and arbitrary, and suffers from corruption and political favoritism. Moreover, the Kazakh government nationalized several foreign-owned companies, and international investment began plummeting in 2012.

The Law of Comparative Advantage
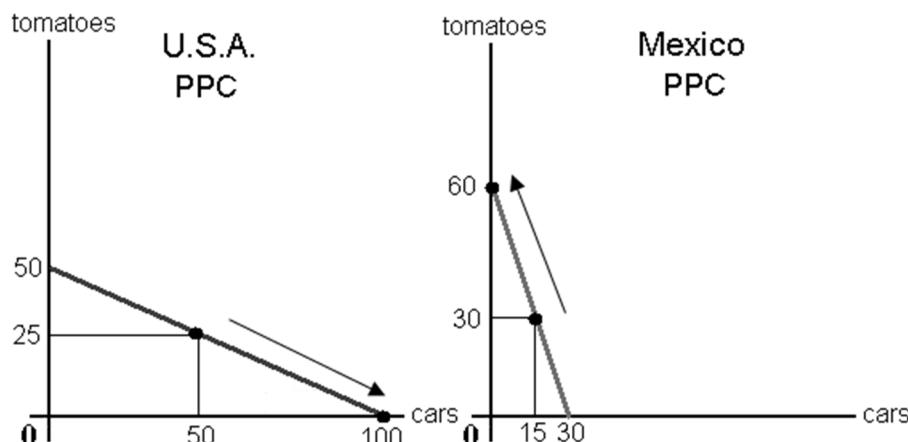
Law of Comparative Advantage forms the basis of free trade. David Ricardo, a British political economist, formulated the law in the 19 century. It states two countries can benefit from trade by specializing in the production of goods where a country has a relatively cheaper cost. Thus, governments that instituted free trade between themselves help fuel the rapid growth of globalization and the rise of the multinational enterprises. Political leaders reduced their

tariffs and trade barriers to allow money, products, and services to cross borders. Finally, the Law of Comparative Advantage still works for a large country that can produce everything.

Economists use a ***production possibilities curve (PPC)*** to show how two countries benefit from free trade. A PPC represents graphically a country's maximum production level for two goods given its endowment of resources. Resources include labor, machines, equipment, land, and entrepreneurs. The PPC has three assumptions:

❖ Both countries produce at full employment, which means a country produces on the boundary of the production possibilities curve. Thus, society employs its entire labor force, and entrepreneurs use all their machines, equipment, and land to produce goods and services.

❖ The PPCs are straight lines. Consequently, an industry experiences no losses when entrepreneurs move resources from industry to another. Although this analysis works with curved PPCs, the straight-line PPCs simplify the analysis.

❖ Two countries, the United States and Mexico, produce only tomatoes and cars.

We begin the analysis with no trade between Mexico and the United States. United States produces 50 units while Mexico produces 60 if they shift the entire country's resources to produce tomatoes. If entrepreneurs shift all the resources into car manufacturing, then the United States produces 100 cars while Mexico produces 30. The intercepts indicate the maximum production levels for the PPC curves, which we show in Figure 2.

Figure 2. The Production Possibilities Curves for Mexico and the United States

We set each country's production level at the half-way point. Thus, the United States produces 25 tomatoes and 50 cars while Mexico produces 30 tomatoes and 15 cars. Consequently, the total production for both countries equals 55 tomatoes and 65 cars.

If Mexico and the United States engage in free trade, subsequently, the countries specialize in producing products where they have low opportunity costs. Opportunity cost reflects the slopes of the PPCs. Slope for the United States equals 0.5, which means the U.S. must give up the production of one car to produce 0.5 tomatoes. On the other hand, Mexico has a slope of 2. It can produce two tomatoes by giving up one car. Consequently, the United States specializes in car manufacturing while Mexico specializes in growing tomatoes.

Straight-line PPCs lead to *complete specialization*, whereas curved PPCs have partial specialization because curved PPCs experience increasing opportunity costs as an industry expands. With complete specialization, the United States produces all cars while Mexico produces all tomatoes because the opportunity costs do not change. U.S. entrepreneurs continually shift resources from the tomato industry into the car industry until they reach the maximum car production. On the other hand, the Mexico entrepreneurs do the exact opposite. Consequently, the United States produces 100 cars and grows zero tomatoes while Mexico grows 60 tomatoes and produces zero cars. Gain in world production equals 35 cars and 5 tomatoes. Unfortunately, we need more trade theory to predict how the countries would divide this extra production between themselves.

This simple analysis of free trade has limitations. First, this analysis does not include the role of technology, or the flow of resources from one country to another. Second, this analysis does not include outsourcing. Outsourcing is a firm contracts part of its production to another firm in another country, and it has become very popular. Finally, the communication and transportation costs are decreasing, which strengthens outsourcing and the flow of resources.

Key Terms

sole proprietorship
partnership
corporation
shareholder
initial public offer
charter
stock
mutual agency relationship
dividend
common stock
preferred stock
Cumulative Preferred Stock
Protected Preferred Stock
Redeemable Stock
Convertible Stock
tax evasion
tax avoidance
return

dividend yield
capital gain
special purpose entity
keiretsu
principal-agent problem
multinational corporation
multinational enterprise
economic exposure
mature economies
emerging-market economies
open-market place
strategic management
outsource
country risk
Law of Comparative Advantage
production possibilities curve (PPC)
complete specialization

Chapter Questions

1. Explain why sole proprietorships are usually small businesses.

2. Identify the benefits of incorporating a business.

3. Board of directors of a corporation needs more funding to invest in a new factory. However, they do not want to issue more common stock because it would weaken the majority shareholders' position. Identify the board's options.

4. Could a corporation use a subsidiary to hide debt or manipulate its financial statements?

5. You bought stock for a new internet company for $25 per share last year and paid a $0.50 dividend per share. Unfortunately, the company faces bankruptcy, and you quickly sell your shares for $15. Calculate your rate of return for this investment.

6. Did the U.S. federal government fix corporate fraud after passing the Sarbanes-Oxley Act in 2002?

7. Could a bank that becomes a member of a Keiretsu create problems for the entire company?

8. Does the principal-agent problem exist if a university pays a commission to an enrollment counselor who enrolls students in the university?

9. Distinguish between a third-world country and an emerging economy.

10. Could a country produce within the interior of a production possibilities curve?

11. Identify the benefits for a business to expand into a growing country like China.

12. Is outsourcing a form of free trade?

13. You have two countries: Bosnia and Herzegovina and Colombia. Both countries grow tobacco and coffee. Two countries can produce a maximum with their resources in the table.

Production	Tobacco	Coffee
Bosnia and Herzegovina	1,000	500
Colombia	500	1,000

Please draw the two PPCs with the production set at the half-way point. Identify the gain of production if the two countries engage in free trade.

4. International Banks

Globalization influences the financial markets. In the last 40 years, savers and borrowers have become linked through the international financial markets. For example, a Japanese bank transfers funds from savers in Japan to lend to a company that builds a new factory in China. Thus, funds move between countries, and investors have access to financial markets that scale across the world.

Globalization has impacted the financial markets as products, services, and money flow across a country's borders. Moreover, globalization increased rapidly since World War II and has three causes. First, many government leaders repealed laws that restricted the free flow of investment between countries. Second, countries are growing economically. Thus, the savers can channel their funds into the international financial markets, pursuing greater returns abroad. Finally, international corporations produce products in one country and ship them to another. Furthermore, corporations need financing to engage in business in foreign countries; thus, they work with international banks. An international bank operates in two or more countries. Corporations move products, services, and resources across international borders while the banks move the money. After this chapter, students will understand why banks enter the international markets, and the methods a bank uses to enter a foreign market. Moreover, banks can circumvent government regulations as they cross borders, and they invented new financial instruments. Unfortunately, international banks pose many problems for government regulators.

Functions of International Banks

International banks transcend the functions of a domestic bank because they link savers and borrowers across different countries. Consequently, an international bank helps people and businesses engage in international trade and finance. Furthermore, an international bank helps with foreign-currency exchange rates and holds inventories of foreign currencies. For example, HP Corporation enters into a contract with a firm in Hong Kong to buy memory chips. HP goes to an international bank, where the bank grants a short-term loan for the memory chip purchase. Bank helps HP pay for the memory chips and can help HP with the currency exchange rates.

International banks provide three benefits. First, international banks accept deposits from savers and lend to borrowers, and the savers and borrowers are located in different countries. Second, international banks lower transaction costs by reducing information costs, lowering the risk of investments, and increasing the liquidity of financial markets. Liquidity is the ease of converting assets to currency. Currencies and bank accounts are the most liquid, while houses and cars are the least liquid assets. Finally, international banks stimulate financial innovation by creating new financial instruments.

International banks link savers and borrowers from different countries across the world, crossing international borders. International banks are concentrated in financial centers across the world, such as New York City, Tokyo, and London, and they operate 24 hours every day, seven days a week. Consequently, a government in one country has problems regulating its

bank's activities in other countries. For example, Citibank has branches and subsidiaries in many countries around the world. The U.S. government and Federal Reserve System have trouble regulating and monitoring all the bank's activities.

International banks are also located in *offshore markets*. An offshore market has little regulations, low tax rates, and strict banker-customer confidentiality laws. Leading offshore markets include the Bahamas, Cayman Islands, Dubai, Hong Kong, and Singapore. If the regulatory agency believes a bank is participating in risky investments, the regulatory agency has difficulty examining bank records for subsidiaries located in offshore markets. Consequently, some wealthy people, businessmen, and criminals hide their money in offshore accounts to evade taxes, to protect their wealth from countries with aggressive tax policies, or to hide their profits from illegal business activities.

Becoming an International Bank

Banks in the United States use four methods to become an international bank, which are:

Method 1: The U.S. bank opens a *bank branch* in a foreign country. These branches accept deposits and make loans. U.S. banks open branches in financial centers around the world or places where U.S. firms and corporations engage in business. Bank branches help the bank transfer money across nations' borders.

Method 2: The U.S. bank becomes a *holding company*. The U.S. bank buys and becomes a majority shareholder of a foreign bank. The Federal Reserve System restricts U.S. banks to invest in foreign firms that are "closely related to banking."

Method 3: The U.S. bank becomes an *Edge Act Corporation*. The U.S. bank establishes a subsidiary. Subsidiary can accept deposits from both U.S. residents and foreigners but can only grant loans for international business activity. These international banks assist with international trade and foreign-currency exchange. Furthermore, the Federal Reserve System exempts the subsidiary from some U.S. banking regulations and has the authority to approve the Edge Act Corporation.

Method 4: The U.S. bank creates an *international banking facility (IBF)*. An international banking facility, similar to an Edge Act corporation, accepts deposits from foreigners and makes loans to foreigners. The IBFs cannot conduct any business within the United States except with its parent company or with other IBFs. Government exempts IBFs from many regulations, and they do not pay local and state taxes. The Fed encourages U.S. banks to use an IBF to engage in the international markets.

Foreign banks can enter the banking market in the United States, using three methods.

Method 1: Foreign bank opens an *agency office*. Agency office cannot accept deposits from U.S. residents, but it can lend to them. Moreover, the agency office is not subjected to U.S. banking laws and does not carry FDIC deposit insurance. Agency office receives its funding from foreign depositors and investors. Agency office is similar to a nonbank bank, and it circumvents the numerous U.S. banking regulations because the legal definition of a bank is an institution that accepts deposits and grants loans. If the institution stops granting loans or stops accepting deposits, then legally the institution is no longer a bank.

Method 2: A foreign bank does business in the U.S. through a ***foreign bank branch***. This is a full fledge bank that accepts deposits and makes loans. Consequently, the foreign bank branch must follow the U.S. banking regulations.

Method 3: A foreign bank enters the U.S. market through a ***subsidiary U.S. bank***. Foreign bank buys U.S. bank stock, becoming the majority shareholder. Thus, the foreign bank controls the U.S. bank, converting it into a subsidiary. Many foreign banks use subsidiaries to enter the U.S. banking market because the U.S. has an extremely complex legal system. Hence, the U.S. bank employs staffs and experts who know the laws, rules, and regulations. If a foreign bank opened a new branch, the managers and staff would spend time learning and complying with all numerous rules and regulations.

Exchange Rate Risk

An ***exchange rate*** equals the ratio of one currency to another currency. We usually write an exchange rate as Equation 1. For example, one U.S. dollar equals 1.5 euros.

$$\$1 = 1.5 \text{ euros} \tag{1}$$

For instance, you plan a trip to the United States, and want to convert 1,500 euros into U.S. dollars. How many U.S. dollars would you have? We use a trick with exchange rates – retain the currency units in the calculation. If you computed correctly, then only one currency unit would remain after the calculation. We can form two ratios with the currency by dividing both sides of the equation by one of the currency units. We show the two ratios in Equation 2:

$$\frac{\$1}{1.5 \; euros} = 1 \quad \text{or} \quad 1 = \frac{1.5 \; euros}{\$1} \tag{2}$$

Now multiply the ratios by 1,500 euros. We see the first ratio is correct in Equation 3 because one currency unit remains after the calculation. Ratio for Equation 4 is wrong because the euro currency units become squared.

$$1,500 \; euros \frac{\$1}{1.5 \; euros} = \$1,000 \tag{3}$$

$$1,500 \; euros \frac{1.5 \; euros}{\$1} = \frac{2.25 \left(euros\right)^2}{\$1} \tag{4}$$

Exchange rates can fluctuate over time. If the exchange rate had changed to Equation 5, subsequently, the U.S. dollar buys more euros. Thus, the U.S. dollar appreciated. If the U.S. dollar appreciated, then the euro automatically depreciated. Consequently, ***appreciation*** means a currency becomes worth more in terms of another currency, while ***depreciation*** implies the

51

other currency falls in value. Consequently, appreciation and depreciation are relative concepts applied to one exchange rate. Trick is to examine the currency that has one unit. When you know what happens to that currency, then you automatically know what has happened to the other currency.

$$\$1 = 2 \text{ euros} \tag{5}$$

Exchange rate can also move in the other direction. If the exchange rate changes to Equation 6, subsequently, the U.S. dollar buys fewer euros. Thus, the U.S. dollar depreciated while the euro appreciated.

$$\$1 = 1 \text{ euro} \tag{6}$$

Financial analysts use the terms strong and weak to refer to a currency, which differs from appreciation and depreciation. For instance, a weak U.S. dollar implies we compare the dollar to a "basket" of currencies. Overall, the dollar fell in value relative to the currencies in the basket. Basket of currencies includes other industrialized countries, such as Britain, Canada, Eurozone, and Japan.

Fluctuating exchange rates leads to the ***exchange rate risk***, which can financially harm international banks, investors, and businessmen. Thus, they must analyze and examine the trends in exchange rates, when accepting deposits and granting loans. For example, an international bank accepts $1 million from depositors in the United States, and the bank lends to a business in Russia for $1 million. Many countries enforce laws, where business activity must be denominated in that country's currency. Hence, the bank converts the U.S. dollars into Russian rubles because businesses use the ruble in Russia. If the exchange rate equals $1 for 25 rubles, we compute the bank's loan at 25 million rubles in Equation 7.

$$Bank\ Loan = \$1,000,000 \cdot \frac{25\ rubles}{\$1} = 25\ million\ rubles \tag{7}$$

What would happen if the exchange rate varies? Then the international bank could gain or lose from the exchange rate movement. If the currency exchange rate changes to $1 for 50 rubles, subsequently, the U.S. dollar appreciated while the Russian ruble depreciated. When the Russian business repays its 25 billion-ruble loan, we calculate the bank receives $0.5 million in Equation 8. Therefore, the bank experienced a major loss.

$$Bank\ Loan = 25,000,000\ rubles \cdot \frac{\$1}{50\ rubles} = \$500,000 \tag{8}$$

If the exchange rate changes to $1 equal 10 rubles, then the Russian ruble appreciated while the U.S. depreciated. We compute the Russian business repays a total of $2.5 million dollars in Equation 9. Consequently, the international bank benefits in this case.

$$Bank\ Loan = 25{,}000{,}000\ rubles \cdot \frac{\$1}{10\ rubles} = \$2{,}500{,}000 \tag{9}$$

International Financial Securities

International banks created several financial securities to hedge against foreign exchange rate risk. Moreover, some financial securities allow international banks to circumvent government regulations and to facilitate international trade.

A bank, business, or investor can use a derivative as the first line of defense against the exchange rate risk. A *derivative* is a contract for a future exchange of a commodity for money at a known price on a particular date. Common commodities include foreign currencies, petroleum, coffee, corn, wheat, Eurodollars, stocks, and bonds. For example, a buyer and seller agree to a future price of coffee today. The day the contract expires; the buyer must buy the coffee for the price and quantity specified in the contract. Derivative contract protects a bank, company, or investor from price fluctuations, and they can buy and sell the contracts on the secondary markets before the contract matures. For the exchange rate risk, the investors can buy derivatives contracts where they buy a quantity of foreign currencies on a future date with a fixed exchange rate. On the other hand, the buyer and seller exchange a commodity for money immediately in the spot market, and the spot market provides no protection against future price fluctuations.

A derivative contract has many different forms. First form is a forward contract. For example, an international bank granted a loan to a business in Malaysia. As the business repays the bank in Malaysian ringgits, the international bank can use a forward contract to exchange ringgits for U.S. dollars at a future fixed exchange rate. Thus, the international bank protects itself from the foreign exchange rate risk. A *forward contract* contains the commodity's quantity, a fixed price, and the future transaction date. Furthermore, a forward contract is a tailor-made contract, and international banks usually write forwards for foreign currencies. Another derivative, similar to a forward, is a futures contract. Futures contracts are standardized, and investors can buy or sell easily the contracts on the futures markets. Forwards and futures have maturities of 1, 2, 3, 6, or 12 months.

International banks and investors use currency swaps to reduce exchange rate risk and lower transaction costs. A *currency swap* is the exchange of debt instruments denominated in different currencies. For instance, a *forward-forward swap* means a firm and a bank exchange two forward contracts with each other. Bank sells a forward contract for a specific currency to a firm, and the firm simultaneously sells a contract to the dealer for the opposite currency with the same maturity. Thus, a currency swap is similar to a loan with collateral from the bank, and it was a $3.2 trillion market in April 2007.

Intel, for example, wants to build a factory in Germany while Volkswagen wants to build a new factory in the United States. Intel needs euros while Volkswagen needs U.S. dollars for these investments. These companies are well known within their own countries and can borrow on favorable terms with their banks. A U.S. bank lends to Intel while a German bank lends to

Volkswagen. Now Intel and Volkswagen can exchange their loans, using currency swaps. Intel has euros to build a factory in Germany while Volkswagen has U.S. dollars to build a factory in the United States. The key to understanding a forward-forward swap, the exchange involves two cash flows, and a forward contract protects each cash flow.

A popular currency swap is a *spot against a forward*, and it comprised 57% of trades in 2004. Investors or businessmen can protect themselves from the exchange rate risk by purchasing currency from a bank on the spot market today, and then they use a forward to transfer the same currency back on a future date for a fixed exchange rate. For example, an investor invests $10 million in Malaysia. He buys ringgit currency from an international bank today and invests his money for one year in Malaysia. Afterwards, the investor cashes out his ringgits and exchanges his ringgits for U.S. dollar with the original bank using a forward contract. Thus, an investor protects himself from fluctuations in the exchange rate because he exchanged his currency in the future for a known price.

International banks and investors created another financial instrument, *Eurodollars* that reduce the foreign exchange rate risk. Banks create Eurodollars when a bank customer transfers a deposit from the United States to a foreign bank. Then the bank does not convert the account to the local currency, but keeps the account denominated in U.S. dollars. The Soviet Union created Eurodollars because it accumulated U.S. dollars from selling petroleum to the international markets. The Soviet leaders wanted to hold U.S. dollars but not in U.S. banks. They were afraid the U.S. government would seize them, and they convinced European banks to hold accounts in U.S. dollars.

Eurodollars allow banks to circumvent laws and regulations. In the United States, banks originally did not pay interest on checking accounts. During the 1970s, depositors withdrew their funds from their checking accounts as interest rates soared. In Britain, banks originally could not grant loans outside of Britain. Nevertheless, Eurodollars allowed these banks to circumvent these laws. U.S. banks could borrow Eurodollars from Britain instead relying on domestic deposits. The U.S. banks paid market interest rates on the Eurodollar while British banks could lend outside of Britain by using Eurodollars. Eurodollars were so successful that many governments repealed regulations, and the U.S. dollar still dominates the Eurodollar market.

Eurodollars are not limited to only Europe. During the 1970s, Organization of Petroleum Exporting Countries (OPEC) had reduced their production of petroleum, causing the oil price to surge. High oil prices caused a large inflow of U.S. dollars into the OPEC nations, and OPEC became the largest source of Eurodollars. Currently, Japan and South Korea also have sizeable deposits in U.S. dollars. Nevertheless, many countries are alarmed at the large U.S. debt and massive trade deficits that cause an outflow of U.S. dollars into the international markets. Many believe the U.S. dollar will depreciate. Accordingly, the Federal Reserve stopped publishing the M3 definition of the money supply in 2006 that measured the quantity of Eurodollars.

Eurodollars created two offshoots: *Euroloans* and *Eurobonds*. Consequently, the principal and interest payments for Euroloans and Eurobonds are denominated in U.S. dollars. For example, a European bank lends to a Russian company, using an Euroloan. All terms of the loan are in dollars, and Russia must repay the loan in dollars. Thus, the bank protects itself from

changes in the ruble-dollar exchange rate because the bank pushes the exchange rate risk upon the Russian business. However, Euroloans and Eurobonds are not completely free from the exchange rate risk. If the Russian business earns profits from sales denominated in rubles, then a severe ruble depreciation can cause the Russian business to default and/or bankrupt. Subsequently, the business cannot afford to convert a depreciating currency into an appreciating one, and it defaults on the Euroloan.

Banks can grant Euroloans in billions of dollars. Therefore, several international banks cooperate to grant a sizable loan. We call this cooperation a *loan syndication*. Syndicate spreads a large loan among several banks, and one bank manages the loan and earns a management fee. Most international banking business is conducted through the *Euromarkets*. These markets remain unregulated and include all financial markets that are denominated in U.S. dollars and are located outside of the United States.

Last financial instrument, a *banker's acceptance*, facilitates international trade. If a U.S. store wants to import coffee from Costa Rica, the exporter in Costa Rica has little information about the U.S. store's credit worthiness. Furthermore, if the exchange of coffee for money occurs in the future, the U.S. store does not know what the future exchange rate will be. Thus, this becomes an information problem, and an international bank can use a banker's acceptance. The U.S. store deposits money at its international bank. Bank guarantees payment by issuing a banker's acceptance and sends a letter of credit to the exporter in Costa Rica. If the U.S. store bankrupts, the exporter in Costa Rica still gets his money. If the firm does not deposit money at the bank and the bank guarantees payment, then the bank must pay the exporter in Costa Rica. When the exporter in Costa Rica exports the coffee to the U.S., the exporter deposits his letter of credit at his bank. Exporter's bank would contact the U.S. store's bank and arrange payment. Consequently, banker's acceptances lower transaction costs and are liquid assets because banks and holders can sell or buy them on secondary markets.

Regulatory Oversight

After World War II, the U.S. dollar became the international transaction currency. An *international transaction currency* is the preferred currency used in negotiating transactions in the international financial markets. For example, traders negotiate all transactions in the petroleum market in U.S. dollars.

During the 1980s, several developing countries threaten to default on their Euroloans. Loan default would trigger a global banking crisis in the industrialized countries. Consequently, twelve countries, including the United States met in Switzerland to discuss capital requirements. They named the meeting after the city, Basel. Basel committee wanted to ensure banks had enough capital to survive a financial crisis and avoid massive profit losses. Unfortunately, countries have difficulty in implementing the Basel agreement because every country has distinctive regulations and different accounting standards. Nevertheless, the Basal agreement set common capital standards for banks engaged in currency swaps, financial futures, and options.

The 1980s debt crisis forced central banks to meet and discuss their roles of being the lenders of last resort during a banking crisis. Central banks concluded they should concentrate on the financial stability of their own domestic banks. However, many banks are linked

internationally to other banks abroad. Consequently, a banking crisis in one country can spread and trigger a banking crisis in another. Thus, one central bank cannot contain a financial crisis.

Leaders of central banks and government finance ministries push for coordination and restrictions on deposit insurance. For instance, deposit insurance in the United States insures up to $250,000 for each person. Other countries do not have generous deposit insurance. Currently, U.S. banks pay modest premiums only on domestic deposits. If the Federal Deposit Insurance Corporation (FDIC) requires U.S. banks to pay deposit insurance on all accounts, including foreign accounts, then their premiums would increase. Furthermore, governments have two problems coordinating international deposit insurance. First, many regulatory agencies in other countries lack the FDIC's monitoring power. Second, only three countries in Europe, Netherlands, Spain, and United Kingdom, have laws requiring the government to step in and fund the deposit insurance if the insurance premiums cannot cover all accounts during a bank failure.

The United States and many countries were deregulating, when the 2008 Financial Crisis struck the world economy. The United States, Ireland, Spain, and many countries experienced a strong real estate bubble that deflated in 2007. As the unemployment rate soared, businesses lay off many people, and the unemployed could not find jobs. Subsequently, some people stopped paying their mortgages, harming the banks financially. Banks stopped granting new mortgages, and brand new housing construction has halted. Afterwards, the housing prices began falling as the banks foreclose on houses that are losing value.

The U.S. government responded quickly, using the identical response many other countries had used.

❖ The U.S. government purchased preferred stock in the largest banks in the United States, infusing the banks with funds. The first time the U.S. government started ownership in a business directly.

❖ The Federal Reserve bought many of the toxic mortgage loans from the banks, removing the bad debt from their books. A *toxic loan* is a bank granted a mortgage to a family or person with no credit history or poor credit. Toxic loans became the first loans to sour as the world's economy entered the 2007 Great Recession. Toxic loans were called subprime loans before the financial crisis because banks earned enormous profits.

❖ The Federal Reserve is rapidly expanding the money supply to offset the declines in the U.S. economy. The Federal Reserve also granted trillions of dollars in emergency loans to the U.S. banks.

❖ The Federal Reserve became the lender of the last resort for the developed world. Central banks from Britain, European Union, and Japan can borrow U.S. dollars from the Federal Reserve through the U.S. dollar liquidity swap. A *U.S. dollar liquidity swap* is a central bank can borrow U.S. currency from the Federal Reserve by giving its own currency as collateral. Then on the maturity date, the central bank repays its loan in U.S. dollars, and the Fed returns the currency. This is similar to a forward-forward transaction.

❖ The U.S. government plans to implement the Basel III requirements that increase banks' capital requirements and force banks to boost their holdings of liquid securities. During the housing bubble, many banks increased their leverage ratio to unsustainable levels. Unfortunately, leverage has several meanings depending on its context. **Leverage**, in our case, equals the ratio of debt a business uses to acquired assets. Many banks accumulated debt to acquire properties at the peak of the housing bubble. Once the bubble deflated, the property fell in value, and the banks could not sell it without enormous losses. Banks had high leverage ratios as they accumulated debt for assets with falling market values. If banks hold more capital or hold more liquid assets, then they would have more capital to deal with a financial crisis.

Effects of the 2008 Financial Crisis still plague the world's economy. Although the Great Recession had ended in 2009, many developed countries are on the verge of entering a new recession in 2014. Consequently, banks tightened their lending standards while new housing construction remains at a standstill. Many countries including Great Britain, Ireland, Italy, Greece, Spain, and the United States are afflicted with an unemployment crisis because the unemployment rate remains stubbornly high, and the unemployed cannot find work. Thus, government regulations and regulatory differences among countries will diminish because governments want to avoid an economic crisis like the 2008 Financial Crisis.

Key Terms

globalization	forward contract
international bank	currency swap
offshore market	forward-forward swap
bank branch	spot against a forward
holding company	Eurodollars
Edge Act corporation	Eurobonds
international banking facility (IBF)	Euroloans
agency office	loan syndication
foreign bank branch	Euromarkets
subsidiary U.S. bank	banker's acceptance
exchange rate	international transaction currency
appreciation	toxic loan
depreciation	U.S. dollar liquidity swap
exchange rate risk	leverage
derivative	

Chapter Questions

1. Identify the benefits of being an international bank.

2. Explain an offshore market.

3. Identify the methods a U.S. bank becomes an international bank.

4. Identify methods a foreign bank enters the United States banking industry.

5. Identify an exchange rate risk.

6. You loaned a Mexican business $100,000. However, the business is repaying the loan in Mexican pesos. Exchange rate was $1 = 10 pesos on the day of the loan but had changed to $1 = 15 pesos; what happened to the value of your investment?

7. Distinguish between a spot market and a derivatives market.

8. Identify a forward transaction.

9. Define a currency swap with a 'spot against a forward.'

10. Identify the purpose of a currency swap.

11. Explain how a banker's acceptance facilitates trade.

12. Define Eurodollars, Euroloans, and Eurobonds, explain why these financial instruments are popular.

13. Identify the problems that governments experience as they regulate international banks.

5. Financial Institutions

Financial analysts and economists classify the financial markets and institutions into five categories: securities market institutions, investments institutions, contractual savings institutions, depository institutions, and government financial institutions. Thus, students will study the prominent characteristics of each category and understand how a financial institution from one category differs from another category. Unfortunately, these categories are not etched into stone because a financial company could be classified under two or more categories. Since the 1980s, the U.S. federal government started deregulating the financial markets allowing the financial institutions to expand into new activities as they cross into other categories. Consequently, financial institutions began competing fiercely as financial institutions in one sector started competing with institutions in other sectors. For instance, a company could expand across three categories because it offers banking services, sells insurance, and becomes a broker for financial securities.

Securities Market Institutions

Securities market institutions include investment bankers, brokers, dealers, and organized exchanges. These institutions enhance the liquidity of the secondary markets. However, these institutions are not financial intermediaries, and they do not link the savers to the borrowers. Instead, the securities market institutions help the savers locate the borrowers.

Prominent securities market institution is the investment bank. An ***investment bank*** helps corporations issue new stock and bonds, or it helps a local or state government issues new bonds. Furthermore, an investment bank could help a corporation take over another. Consequently, the investment bank influences the primary market heavily. In the United States, an investment bank is not a regular bank. It serves as a marketing agent for new securities. For example, Ford wants to build a new factory and decides to issue new stock. New stock will provide funds that Ford can use to build the factory. Ford will go to an investment bank, and the investment bank will assist Ford in creating the new securities. Then the investment bank sells these new Ford stock to customers. If these customers want to sell their stock, subsequently, they sell them on the secondary markets or organized exchanges. Some prestigious investment banks include Merrill Lynch, Goldman Sachs, and Credit Suisse.

The U.S. government passed the Glass–Steagall Act of 1933 to separate the functions of commercial and investment banking. A commercial bank is a standard bank that accepts deposits and makes loans. Many countries, such as the European Union, Great Britain, and South Korea do not legally separate commercial and investment banking. Then the U.S. government repealed parts of the Glass-Steagall Act in 1999 and allowed U.S. investment banks to branch into commercial banking and insurance, so they could compete internationally. Unfortunately, the largest commercial and investment banks in the world teetered on bankruptcy during the 2008 Financial Crisis. Consequently, many government leaders across the world are debating to enact similar laws to the Glass-Seagall Act.

Process of issuing new stock is called underwriting. **Underwriting** lowers information costs. Investment bank guarantees a stock or bond price to the corporation. Then the investment bank sells the new stock or bond for a higher price. Greater price reflects the investment banker's profit. Furthermore, investment banks may work together, which we call *syndicates*. One investment bank acts as the manager and retains part of the profits while other investment banks help sell the new securities.

The U.S. government requires investment bankers to disclose information to investors, helping to prevent risk and fraud. Unfortunately, investment bankers have access to **inside information** about corporate mergers. When a corporation takes over another corporation, the merger causes the company's stock price to soar. Thus, investment bankers can secretly buy stock or share information with friends and family who buys that particular stock. Insiders can earn a substantial amount of profit, and it is illegal in the United States. The Securities Exchange Commission has the authority to investigate and to prosecute these cases.

Investors can buy or sell corporate stock through organized exchanges. Exchanges are secondary markets, and they increase the liquidity of securities. We define **organized exchanges** as either an exchange or over-the-counter market. An **exchange** has a physical location, and buyers and sellers of securities meet face to face. Only members, called *specialist*, can enter these exchanges. For example, if you want to buy Coca-Cola stock, you must contact a broker who contacts a specialist at the New York Stock Exchange. Subsequently, the specialist matches prices and quantity of stock for buyers and sellers. Consequently, the broker and specialist earn commission from each transaction. Oldest and largest U.S. corporations are listed on the New York Stock Exchange, while unknown corporations are listed on American Stock Exchange.

Over-the-counter (OTC) market does not have a physical location. Telephones and computers connect the dealers and brokers together. Both new and small firms are traded in the over-the-counter market. The OTC market in the United States is the National Association of Securities Dealers' Automated Quotation (NASDAQ), or commonly referred to as **NASDAQ**. New high-tech firms, such as Texas Instruments had started in NASDAQ and eventually switched their listing to a major exchange. Europe has their equivalent of NASDAQ, which the Europeans call EASDAQ.

Many countries removed the barriers to their financial markets, allowing international companies to sell or buy stock in their countries. For example, a German investor can buy U.S. corporate stock like GE and IBM on the Frankfurt Stock Exchange, while an American investor can buy Japanese stock for Honda Motors and Sony on the New York Stock Exchange. Consequently, the financial markets are truly global, and link savers and investors together across the world.

Financial analysts compile market indices that measure broad movements in a financial market. Most popular and the oldest stock market index used today is the **Dow Jones Industrial Averages**, otherwise known simply as the "Dow" or "the industrials." The Wall Street Journal invented the Dow in 1882, and it calculates the Dow by a weighted average of 30 representative stocks of New York Stock Exchange. The Dow includes Coca-Cola, IBM, Proctor & Gamble, and Exxon. Analysts at the Wall Street Journal adjust the Dow for corporate mergers, corporate bankruptcies, and stock splits. Another popular market index is Standard and Poor's 500 (S&P

500). Standard & Poor's index includes 500 stocks that are listed on the Stock Market Exchange. We list the major stock exchanges in the world in Table 1 along with their market indices.

Table 1. The Major Stock Exchanges in the World

Country	Name	Major Market Index	City
Australia	Australian Securities Exchange	Australian EXchange (AEX)	Sydney
Canada	Toronto Stock Exchange	S&P/TSX 60	Toronto
China	Hong Kong Stock Exchange	Hang Seng Index	Hong Kong
China	Shanghai Stock Exchange	Shanghai Stock Exchange (SSE) 180	Shanghai
England	London Stock Exchange	Financial Times Stock Exchange (FTSE) 100	London
France	Euronext Paris	Cotation Assistée en Continu (CAC) 40	Paris
Germany	Frankfurt Stock Exchange	Deutsche Aktien Xchange (DAX) 30	Frankfurt
Italy	Borsa Italiana	MIBTEL	Milan
Japan	Tokyo Stock Exchange	Nikkei 225	Tokyo
Mexico	Bolsa Mexicana de Valores	Bolsa Mexicana de Valores (BMV)	Mexico City
Netherlands	Euronext Amsterdam	Amsterdam EXchange (AEX)	Amsterdam
United States	New York Stock Exchange	Dow Jones Industrial Average	New York
United States	NASDAQ	NASDAQ	-

Note: Numbers in the market indices indicate the number of stocks included in the calculation

Note: The Amsterdam Stock Exchange, Brussels Stock Exchange, and Paris Stock Exchange merged to form Euronext.

Market indices provide two benefits. First, the market indices provide fast information. Financial analysts calculate a market index in seconds and distribute the index to investors instantly. Second, private companies calculate the market indices. Thus, government does not influence the numbers.

A stock market, occasionally, experiences a rapid drop in stock prices, which precipitate a stock market crash. A *stock market crash* means a dramatic drop in stock prices during a short time period. Unfortunately, a stock market crash bankrupts investment companies, insurance companies, pension funds, and commercial banks. Although commercial banks are not directly involved with the stock market, they may have granted loans to investors who cannot repay. Finally, a stock market crash in one market can trigger another stock market crash, even a stock market located in a foreign country.

Stock market crash became the prelude to the Great Depression. In 1929, the stock market crashed on October 24, October 28, and October 29. Afterwards, the unemployment rate peaked at 26% in the United States. Moreover, the New York Stock Exchange crashed on October 19, 1987. The Dow Jones fell by 508 points (or 27.8%) in one day, the largest loss in U.S. history. However, the United States did not enter a recession because the Federal Reserve came to the rescue, providing emergency loans to the financial institutions. Then the United States experienced a stock market crash in March 2000, which triggered the 2001 Recession. Many people call this the dot-com crash because stock value for many internet companies became worthless overnight. Finally, the U.S. experienced the 2007 Great Recession, which became the

most severe recession since the Great Depression. Your author calls this the 2008 Financial Crisis, when pandemonium struck the financial world.

A stock market crash occurs from a financial bubble. A *bubble* is a dramatic, rapid rise in asset prices. As the asset prices reach a peak, then the prices rapidly fall, bankrupting financial institutions that became caught in the market. The United States along with other industrial countries experienced a strong real estate bubble that popped in 2007. Collapsing housing bubble triggered both the 2007 Great Recession and the 2008 Financial Crisis. Unfortunately, real estate prices began falling while both foreclosures and the unemployed were soaring. Consequently, both the investment banks and commercial banks earned enormous losses from the mortgage market as homeowners stopped paying their mortgages. Banks refused to lend to anyone, causing a credit crunch. A *credit crunch* means financial institutions stop lending to themselves and the public, disrupting business activities, such as construction and manufacturing.

Investment banks became involved in mortgages because they packaged mortgages into new exotic securities, which was tremendously profitable before 2007. Then stock prices began plummeting during 2008 until they had lost half their value. Some banks were particularly hit hard like Citigroup and Bank of America as their stocks traded below $1 per share, which was a significant drop. Investment bank, Lehman Brothers, declared bankruptcy, and it closed its doors to the financial world. Unfortunately, many Americans were on the verge of retirement, and many experienced a 50% or more decline in their pension funds, causing many workers to delay retirement. (We study the 2008 Financial Crisis in detail in Chapter 18 after students learn derivatives.)

Stock market embodies more psychology than logic. Investors are human! When investors see the Dow Jones soaring, they invest more money into the stock market. As investors dump more money into the stock market, the stock prices continue rising. If investors see the stock market prices began falling, then they pull their money out of the stock market, and stock prices continue falling. If stockholders become afraid, they cash in all their stocks at once, causing the stock prices to plummet. Thus, the market moves in cycles, being driven by public's psychology and their expectations about future stock prices.

Investment Institutions

Investment institutions include mutual funds and finance companies. A *mutual fund* manager groups together funds from many investors and invests the money in a variety of stocks. Consequently, a mutual fund diversifies stocks, and it lowers investors' risk. For example, you start your own mutual fund and offer investors a chance to invest in this fund. You take the money and buy 30 different corporate stocks. The Coca-Cola stock rises one day while the value of IBM stock falls. Overall, the average of the fund's 30 stocks should earn a return to your fund and to the investors. If you bought only Kmart corporate stock, you would lose your investment if this company bankrupts.

Mutual fund companies have different strategies and characteristics, and well-known mutual fund companies include Fidelity, Vanguard, and Dreyfus. Mutual fund companies develop strategies where they only buy stock in certain industries, large companies, or foreign

company's stock. Furthermore, the mutual fund company may issue a fixed number of shares to the fund that we call **closed-end mutual funds**. Then investors may buy and sell these shares in over-the-counter markets, just like stock. Thus, the mutual fund company does not buy its shares back for closed-end mutual funds. A mutual fund company may offer another alternative called **open-ended mutual funds**. Mutual fund company can buy back shares to the fund, and the price of the shares becomes tied to the value of the stock in the fund. Finally, the mutual fund managers use two methods to earn profits. First, fund managers charge management fees for **no-load funds**, usually 0.5% of asset value. For the second method, the fund managers charge a commission for selling or purchasing of shares for **load funds**. The load reflects the commission that lowers the fund's value.

Money-market mutual funds are similar to mutual funds. However, the fund manager buys only money market securities, and the fund excludes corporate stock. Theory behind money-market mutual funds is simple. If you have five friends with $2,000 each, and they want to buy a Treasury bill with a minimum face value of $10,000, then your friends can pool their money together and buy one T-bill. Once the T-bill matured, your friends split the interest among themselves.

Money-market mutual funds are very popular because these funds offer check-writing privileges, and some investors do not want to tie up their funds for a long time. Moreover, the value of the fund does not change much, when interest rates changes because money market securities have maturities less than one year. In 2008, money-market mutual funds had assets of $3.8 trillion.

Commercial banks offer **money market deposit accounts** that are similar to the money-market mutual fund. Two funds differ because the Federal Deposit Insurance Corporation (FDIC) insures the money market deposit accounts, while it does not insure money-market mutual funds. If your bank bankrupted and you invested in money market deposit accounts, subsequently, you are guaranteed not to lose you funds up to the maximum insured amount.

Finance companies are another investment institution, and they raise money by selling stock, bonds, and commercial paper. Commercial paper is a short-term loan with a maximum maturity of 270 days, and a well-known bank or corporation can issue it. Commercial paper is a form of direct finance and has no collateral. Furthermore, finance companies lend to consumers for furniture, appliances, cars, home-improvement loans, or they lend to small businesses. Some corporations created their own finance companies to help consumers buy their products. For example, General Motors Acceptance Corporation (GMAC) lends money to people, so they can buy cars from General Motors (GM). However, GM sold its 51% stake in GMAC to Cerberus Capital Management in 2006. Then GMAC expanded into the mortgage market and was caught in the 2008 financial storm, when the housing bubble deflated. Currently, GMAC was renamed Ally Bank in 2010 and became part of the bank holding company, Ally Financial, Inc.

Contractual Saving

Contractual saving institutions are insurance companies and pension funds. **Insurance companies** provide protection for people who buy insurance policies. Insurance policy prevents financial hardship, such as a medical emergency, car accident, or the death of a family member.

Insurance companies are financial intermediaries because they link the funds from the policyholders to the financial markets. Policyholders make periodical payments to the insurance company called *premiums*. Insurance company will invest the premiums in the financial markets. For the insurance company to earn a profit, the amount of interest earned in the financial markets plus the total amount of premiums must exceed the amount paid for claims. Largest insurance companies include Allstate, Aetna, and Prudential. Most states established commissions that regulate insurance companies. Commissions may limit premiums, minimize fraud, and prevent the insurance companies from investing in risky securities.

Insurance companies use the *law of large numbers* as they insure a large number of people. On average, statisticians can predict an insurance company's pay out in claims because they, on average, accurately predict the rates of death, illness, injury, and property damage for an entire country. Statisticians do not know which specific individuals will experience hardship, but they can predict how often it occurs. Unfortunately, insurance companies have two problems, when selling insurance policies: Adverse selection and moral hazard. *Adverse selection* means a person buying insurance has more information than the insurance company. For example, a person knows he has a heart problem and decides to buy a very large life insurance policy, and he hides this information. *Moral hazard* means people buying insurance becomes more careless than when they did not have insurance. For instance, a person buys theft insurance for his home, and this person stops locking his windows and doors when he leaves, increasing the risk a burglar will break into his home.

Insurance companies use two strategies to combat moral hazard and adverse selection. First, insurance companies gather information about the policyholders, such as driving records, medical records, and credit histories. Consequently, the insurance company charges a higher premium to a person who is likely to file a claim, which we call a *risk-based premium*. Second, insurance companies use a *deductible*. When a person makes a claim, the person must pay the first portion. For example, a person buys health insurance with a $500 deductible. After this person has paid the first $500 to a doctor, then the insurance company pays the remainder of the claim. This passes some of the responsibility to the person holding the insurance policy. Finally, a person could buy insurance with smaller premiums but with a greater deductible.

First type of insurance company is a *life insurance company*. These companies purchase long-term corporate bonds and commercial mortgages because they can predict future payments with high accuracy. Furthermore, the insurance companies are organized in two ways: Mutual company or stock company. Insurance policyholders own a *mutual company* because the insurance policy functions as corporate stock, while a *stock company* is a corporation that issues stock. Thus, the shareholders own the company, while the insurance policyholders do not. Stock company is more common because a stock company has more funding sources. They receive funding by selling stock to shareholders, and receive revenue by selling insurance policies. Most policies issued are called *term life policies*. Person buying the life insurance must pay the premium for the rest of his life. These policies are popular because the policyholder can borrow against the value of the life insurance policy, when he retires. Borrowing against insurance is an annuity. An *annuity* pays a retired person a specific amount of money each year.

Second type of insurance company is property and casualty insurance companies. They are organized as either a stock company or mutual company, and they insure against theft, floods, illness, fire, earthquakes, and car accidents. These companies tend to purchase liquid, short-term assets because these companies cannot accurately predict the amount of future claims. Insurance companies charge premiums that correspond to the chance of the event occurring. For example, a homeowner in California would pay a higher premium for earthquake insurance than a homeowner in the Midwest of the United States because California experiences more earthquakes.

Pension funds are another contractual savings institution. Many people save money for retirement, and pension funds become a vital form of saving. Some employers sponsor pension funds as a job benefit, or workers can voluntarily pay into personal retirement accounts. Then the financial companies manage the pension funds, and they invest pension funds into the financial markets. Pension fund managers can accurately predict when people will retire and usually invest in long-term securities, such as stocks, bonds, and mortgages. A person can only receive benefits from the pension fund after the person becomes vested. *Vested* means employees must work for their employer for a time period before they can receive the benefits from the pension plan. Time period varies for the pension funds. For example, some city governments require a person to be employed by the city for 10 years before this person becomes 100% vested in the city's pension plan.

Employers have three reasons to offer pension plans to employees. First, the pension fund managers can more efficiently manage the fund, lowering the pension funds' transaction costs. Second, the pension funds may offer benefits such as life annuities. A life annuity is a worker contributes money into the annuity until he retires. Then the worker receives regular payments every year from the annuity until his death. Life annuities could be expensive if a worker buys them individually. However, a large employer with many employees can request discounts from pension plans. Finally, the government does not tax the pension fund as workers invest funds into it, allowing the fund to grow faster. Nevertheless, government usually imposes taxes on withdrawals from a pension fund. If the employer offered higher wages and no pension plans to the employees, then the government taxes the greater income, reducing the amount an employee could invest into a retirement plan.

Employers have two choices for the ownership of a pension plan. First, employees own the value of the funds in the pension plan, called a *defined contribution plan*. If the pension fund is profitable, subsequently, the retired employees will receive greater pension income. If the pension fund is not profitable, then the retired employees will receive a low pension income. Companies that have a defined-contribution plan are likely to invest the pension funds into the companies' own stock. That way, employees have an incentive to be more productive because the value of their pension plan depends on their company's profitability. However, this pension fund becomes dangerous if this company bankrupts. Then the employees own worthless stock. One infamous case was the Enron collapse in 2001. Some employees were millionaires until their stock portfolios collapsed in value overnight. Second, the most common type of plan is the *defined-benefit plan*. An employer promises a worker a specific amount of benefits that are based on the employee's earnings and years of service to the company. If this pension fund is

profitable, the company pays the promised benefits and retains the remaining funds that are not paid to the retired employees. If the pension fund is unprofitable, then the company pays the promised benefits out of its own pocket.

Federal and state governments regulate the pension funds. Regulations require the managers of the pension funds to disclose all investments. That way, employees know which securities the pension fund managers have invested in. Regulations help prevent fraud and mismanagement. Unfortunately, a pension fund will bankrupt, when the company where the employees work bankrupts. Consequently, Congress created the Pension Benefit Guaranty Corporation that insures pension fund benefits up to a limit if the company cannot meet its obligations. Some economists believe a pension fund disaster will occur for state and local government retirees after 2012. Many state and local governments offered generous defined-benefit plans to public employees, and they have not placed enough money aside to fund the pension plans.

A recent trend in pension funds allows employees to manage their own pension plans, which are the 401(k) plans. The 401(k) refers to a section of law in the Internal Revenue Service's regulations, and the benefit of this pension plan is the employee can take his pension plan with him when he switches employers. However, the 401(k) has one risk. Amount of money a person has accumulated at retirement depends upon how much money he invested in the plan and how well the investments have done.

Depository Institutions

Depository institutions accept deposits and make loans. Thus, they include intermediaries that link the savers to borrowers. **Commercial banks** are the largest and dominate the depository institutions. Many borrowers seek bank loans for mortgages, car loans, or credit cards. Savers have three reasons to deposit their savings in a bank than invest directly into the financial markets. First, the bank deposits are liquid. A depositor can quickly exchange his bank deposit for cash. Second, the banks gather information about their borrowers, lowering the risk of loan default. Banks hire financial specialist who monitors investments. On the other hand, an investor would spend much time and effort to monitor his or her investments in the financial markets. Finally, banks reduce the risk by lending to a variety of borrowers. Consequently, commercial banks are important for a community because its role of accepting deposits and granting loans.

Savings institutions are another depository institution. Originally, these institutions accepted deposits and granted low-cost mortgages for homebuyers. During the early 1980s, many savings institutions experienced financial crisis because of higher interest rates. For example, if you borrowed $10,000 at a 5%, interest rate and loaned it out at 10%, then you earn a profit. However, if you borrowed $10,000 at 10% interest rate and loaned it out at 5%, subsequently, you earn a loss. Unfortunately, this happened to the saving institutions. Interest rates rose during the 1980s as the savings institutions paid a greater interest rate to the depositors than the amount of these institutions earned on the mortgages. Mortgages are usually 30-year loans, and savings institutions were locked into low interest rates from the 1960s. Currently, savings institutions are similar to banks, except different government agencies regulate the savings institutions.

Credit unions are another depository institution. Credit unions are similar to commercial banks except they restrict membership. Credit union extends membership to people who share a common interest. Usually people work for a particular company or industry. For example, many states have credit unions for schoolteachers. These institutions only allow schoolteachers to open accounts. Originally, credit unions offered savings deposits and made consumer loans for cars and boats. Currently, credit unions evolved similarly to banks, and they offer the same services, such as checking accounts and loans for mortgages. Some credit unions lessened their member restrictions as they compete directly with banks. Consequently, the commercial banks want credit unions on equal grounds with commercial banks because a credit union does not pay income taxes on its profit.

Government Financial Institutions

Federal, state, and local governments in the United States create *government financial institutions* that lend funds to the public. First, The U.S. government uses direct financing, when it creates a public corporation that sells bonds and commercial paper to investors in the financial markets. Then the public company uses the investors' money to lend to borrowers directly. For example, the Farm Credit System, a U.S. government agency, lends to farmers. Farmers use these loans to finance growing crops, equipment, or mortgage loans. Second, the U.S. government lends money to students who pursue a college education. For example, the Student Loan Market Association, known as Sallie Mae, lends directly to students or buys student loans from banks. Finally, the Federal National Mortgage Association (Fannie Mae) and Federal Home Loan Mortgage Corporation (Freddie Mac) grant mortgages to low-income households. They also buy and sell mortgages to boost the liquidity of the mortgage loan market.

For the second method, a government can lend to the public through loan guarantees, which is similar to insurance. For example, a bank lends to a student to pay for an education, and the U.S. Department of Education guarantees the loan. If the student defaults, subsequently, the U.S. Department of Education repays the loan to the bank, and then the U.S. government uses its authority to collect from the student.

Some people question a government's role in financing. When a government directly lends, the government squeezes the financial institutions out of the loan market. Furthermore, the federal government loan guarantees increase the problem of moral hazard. Financial institutions receiving the loan guarantees might not screen borrowers as much, lending to borrowers with a high default risk. For example, the effects of the 2007 Great Recession continue to linger in the U.S. economy, even in 2014. Recession caused mass layoffs and doubled the unemployment rate. Then the housing values continue to plummet while foreclosures continue soaring. Consequently, the U.S. government might be liable for trillions of dollars in loan guarantees and bailout of public corporations. We explain several examples below:

❖ The U.S. Department of Education, SallieMae, and commercial banks granted college student loans that had surpassed $1 trillion in 2012. Unfortunately, college graduates continue to enter an abysmal job market in 2013. Student-loan default rate hovers around 24%. College students, on average, owe approximately $24,000 while law school graduates

accumulate loans exceeding a $100,000. Unfortunately, a stagnant economy would force the U.S. government to pay billions in loan guarantees.

❖ Fannie Mae and Freddie Mac hold roughly $6 trillion in mortgages, comprising half the mortgages in the United States. The U.S. government had seized these two institutions in 2008, and it has spent billions of dollars to bail them out. Bailout cost will continue to soar if the U.S. economy does not recover. Unfortunately, the U.S. government helped create this mess because it encouraged Fannie Mae and Freddie Mac to grant mortgages to low-income households, who become vulnerable to downturns in the economy.

Key Terms

investment bank
underwriting
syndicates
insider information
organized exchange
exchange
specialist
National Association of Securities Dealers' Automated Quotation
NASDAQ
Dow Jones Industrial Averages
stock market crash
bubble
credit crunch
investment institution
mutual fund
closed-end mutual fund
open-ended mutual fund
no-load fund
load fund
money-market mutual fund
money market deposit account
finance company

contractual saving institution
insurance company
premium
law of large numbers
adverse selection
moral hazard
risk-based premium
deductible
life insurance company
mutual company
stock company
term life policies
annuity
pension fund
vested
defined-contribution plan
defined-benefit plan
depository institution
commercial bank
savings institution
credit union
government financial institution

Chapter Questions

1. Which institutions are defined as securities market institutions?

2. Please explain the purpose of the Dow Jones Industrial Average and its usefulness.

3. What are stock market crashes, and why are they bad for an economy?

4. Which institutions are classified as investment institutions?

5. Identify examples of moral hazard and adverse selection for a person buying car insurance.

6. Which institutions are defined as contractual saving institutions?

7. Which institutions are classified as depository institutions?

8. Which institutions are defined as government financial institutions?

9. Could France suffer from a college bubble, where students do not pay tuition nor take out student loans?

6. Financial Statements and the Value of Money

This chapter provides an overview of financial statements and the value of money. Business people and financial analysts use and examine four financial statements: the income statement, balance sheet, statement of changes to stockholder's equity, and statement of cash flow. Since all accountants record financial statements in a currency, then they must discount future payments and receipts of money using the present value formula. Consequently, students will learn to use the present value formula to compute a value today of future withdrawals, payments, and investments. Furthermore, students will learn to use the present value formula to calculate the amortization table for a mortgage, annuity payments, value of savings accounts, and investments. Then we expand the present value formula for foreign currency.

The Financial Statements

Accountants use and create four financial statements. Income statement is the first and most important financial statement because investors must know whether a business has earned a profit or a loss. We also call a profit the net income, and every income statement has two items:

❖ *Revenues* are inflows of assets received in exchange for goods and services that the business produces. Businesses earn revenue by selling products or services.

❖ *Expenses* are outflows of assets because a business pays costs to operate a business. A business must pay workers' salaries, materials, taxes, and utilities.

We show an example of an income statement in Table 1. PEMEX is Mexico's Petroleum Company, and the p refers to the Mexican currency, the peso. The Mexican government owns PEMEX after it established PEMEX as a monopoly over all Mexican petroleum production, refining, and distribution. We omitted some categories to simplify the income statement. In 2005, PEMEX's net sales were 505,109,185 pesos for domestic sales and 423,533,791 pesos for exports. Thus, PEMEX sold 505 million peso products within Mexico and exported 423 million pesos of petroleum to the United States.

Next category is PEMEX's operating costs, and they are separated into three categories. First, PEMEX incurred a cost of sales of 361,177,339 pesos for petroleum production, refining, and distribution. Cost of sales is the cost PEMEX pays to supply its customers with petroleum and petroleum products. Second, PEMEX paid 21,910,789 pesos to transport its products between its facilities or retail markets. Furthermore, the corporation paid 46,800,391 pesos to administer the corporation. Finally, we add all costs and write negative numbers as a red number in a parenthesis.

Exchange gain (or loss) influences the company financially because a country's exchange rate had changed. International petroleum market is denominated in U.S. dollars, and PEMEX sold petroleum to the United States for U.S. dollars and exchanged dollars to pesos. Thus,

PEMEX experienced a gain of 17,627,605 pesos from currency exchange. Thus, the U.S. dollar must have appreciated against the Mexican peso during 2005.

Table 1. The 2005 Income Statement for PEMEX

Net Sales		
Domestic	505,109,185 p	
Export	423,533,791	
Total Revenues		928,642,976 p
Costs and Operating Expenses		
Cost of sales	361,177,339 p	
Transportation expenses	21,910,789	
Administrative expenses	46,800,391	
Total cost and operating expenses		(429,888,519) p
Exchange gain (loss)		17,627,605 p
Taxes and duties		(580,629,293) p
Net income		(64,247,231) p

Source: PEMEX (2006)

The Mexican national government relies on PEMEX to pay taxes because the company paid 580,629,293 pesos in taxes and duties. Consequently, PEMEX earned a 64,265,231 peso loss because it paid a large amount of taxes to the Mexican government. If you want to know the approximate U.S. dollar value, then divide all numbers in the Table 1 by 11 because the peso-dollar exchange rate roughly equaled $1 = 11 pesos in 2005.

Balance Sheet is the second financial statement and shows the financial position of a business on a specific date. Balance sheet itemizes a business's assets, liabilities, and equity. **Assets** are economic resources owned by a business while **liabilities** are debts and financial obligations of the business. Finally, **equity** equals total assets minus total liabilities that we also call net assets. We express equity in Equation 1. Moreover, creditors want businesses to have a positive equity. If a business cannot repay its debts, the creditors can legally force the business to sell its assets to repay debts. We list several assets and liabilities in Table 2.

Equity = Total Assets – Total Liabilities   (1)

A corporation divides its equity into two capital accounts: Contributed Capital and Retained Earnings. **Contributed Capital** is the amount of capital that a corporation sold. In other words, the amount of stock that circulates between investors outside of the corporation. Table 3 shows stockholders' equity for preferred stock and common stock. We list the amounts of authorized and outstanding shares for both stock types. When a corporation earns profits, it records the

profits in the **Retained Earnings** account. Subsequently, a corporation can use retained earnings to finance expansions or pay dividends to investors.

Table 2. A Listing of Assets and Liabilities

Assets	Liabilities
Accounts Receivable – Customers owe money to the business for goods and services sold on credit	**Accounts Payable** – Business owes money to creditors for goods and services bought on credit.
Buildings and Land	Interest payable
Equipment	Salaries owed to workers
Cash	Taxes payable
Patents and copyrights	

Table 3. Stockholders' Equity

Preferred stock, 2,000 shares authorized, 1,000 share issued and Outstanding	$250,000	
Common stock, 12,000 shares authorized, 10,000 shares issued and outstanding	$350,000	
Total capital contributed by common stockholders		$600,000
Retained earnings		$80,000
Total stockholders' equity		$680,000

Accountants divide a company's assets into current and fixed assets. We show an example in Table 4 for Stores USA. **Current assets** include cash, accounts receivable, merchandise inventory, and prepaid expenses. They are important because a business needs these assets to operate the daily business. On the other hand, **fixed assets** include buildings, plants, and equipment with long life spans. Stores USA has a store and office equipment valued at $25,000 and $4,000 respectively. Accountants subtract the accumulated depreciation from the equipment because equipment becomes old and deteriorates. Depreciation equals $5,500 for the store equipment and $1,500 for the office equipment.

Accountants divide The Stores USA liabilities into current liabilities and long-term debt. Current liabilities are debts and obligations that are less than a year and include accounts payable, notes payable, and income taxes. Long-term debt includes all debt with maturities greater than a year such as corporate bonds. Stores USA has no long term liabilities. Furthermore, the corporation issued 10,000 shares for $50 per share and earned income of $6,500 under retained earnings listed under Stockholders' Equity. Board of directors can pay dividends from this account or finance an expansion of the business. Finally, the total assets equal the total liabilities plus shareholders' equity, conforming to Equation 1.

Table 4. A Balance Sheet for Stores U.S.A.

Current assets:		
Cash	$8,000	
Accounts receivables	10,000	
Merchandise inventory	20,000	
Prepaid expenses	<u>1,000</u>	
Total current assets		$39,000
Plant and equipment:		
Store equipment	$25,000	
Less accumulated depreciation	5,500	
Office equipment	4,000	
Less accumulated depreciation	<u>1,500</u>	
Total plant and equipment		<u>22,000</u>
Total Assets		$61,000
Current liabilities:		
Accounts payable	$3,500	
Income taxes payable	<u>1,000</u>	
Total liabilities		$4,500
Stockholders' Equity		
Common stock, $5 par value, 10,000 shares authorized and outstanding		$50,000
Retained earnings		6,500
Total stockholders' equity		<u>56,500</u>
Total liabilities and stockholders' equity		$61,000

    The Statement of Changes in the Owner's Equity is the third financial statement and shows the changes in the owner's equity. For all business organizations, profits or net income always increases equity because the organization has more resources flowing into it. However, proprietors and partners could invest and/or withdraw from the business. Thus, investment increases the equity, while withdrawals reduce it. For corporations, the Statement of Changes in the Owner's Equity is called the Statement of Retained Earnings. We show an example in Table 5 for XYZ Corporation. Profits or net income increases retained earnings, while dividends declared decreases it. Dividends are similar to a proprietor's or partners' withdrawals. If the corporation issues more stock, then the corporation increases investment and records this transaction under the Stockholders' Equity.

    Statement of Cash Flows is the last financial statement and shows the money inflows and outflows of a business. This statement is important because a business needs adequate cash to operate such as paying workers, taxes, rent, and interest payments. A corporation could have a strong balance sheet, excellent income growth, but it fails from poor cash flows. Table 6 lists the

activities that cause cash inflows and outflows. Financial analysts view the cash flow statement importantly because future business expansion impacts the cash flows over time. Furthermore, a company could be financially healthy, but poor cash flows impose hardship on the business. For example, if an employer cannot pay workers' wages, then some workers quit and leave the employer.

Table 5. Statement of Retained Earnings for Corporation XYZ

Net income	$50,00
Add retained earnings, December 31, 2010	$10,000
Total	$60,000
Deduct dividends declared	20,000
Retained earnings, December 31, 2011	$40,000

Table 6. Activities that Affect a Business's Cash Flow

Cash Inflows	Cash Flows
Operating Activities	
Customers pay for sales in cash	Pay salaries
Customers pay accounts receivables	Pay expenses (in cash)
Merchandise inventory decreases	
Accounts payable increases	
Investing Activities	
Received cash from investments	Purchased securities
Sold property or equipment	Purchased land
Financing Activities	
Company issues more stock	Company pays dividends
Company issues bonds	Company retires its bonds or stocks

We show a Statement of Cash Flows in Table 7. If cash enters a business, then the cash flow is positive. As cash leaves a business, subsequently, the cash flow is negative. Furthermore, the cash flow statement has three sections: operating, investing, and financing activities. For example, the business received $100,000 from customers and paid $20,000 in taxes for the operating activities. The $100,000 is net cash received from customers, which equal total cash sales minus merchandise returns. Then the business invested in the business by purchasing $20,000 in new equipment for the investment activities. Finally, the business issued $50,000 in brand new stock to expand the business and paid $30,000 in dividends for financing activities. Consequently, the business has $110,000 in total cash at the end of the year. You can calculate this amount by starting with the cash on hand at the beginning of the year and add the net cash flow that the business received during the year.

Table 7. Statement of Cash Flows

Cash flow from operating activities		
Cash Received from customers	$100,000	
Payments for taxes	(20,000)	
Cash flow from investing activities		
Cash paid for equipment purchase	(20,000)	
Cash flows from financing activities		
Cash received from issuing stock	50,000	
Cash paid for dividends	(30,000)	
Net increase in cash		$80,000
Cash balance at beginning 2010		$30,000
Cash balance at end of 2010		$110,000

Single Investment

Financial analysts use the present value formula to price financial securities or calculate mortgage payments. Present value formula places a value of future cash flows in terms of money today. Therefore, the present value emphasizes the present because people want their money now than wait for a future payment. Consequently, an interest rate rewards savers for delaying payment. For example, if you deposit $100 into a bank at 5% interest rate, you earn interest:

❖ After one year, you earn 0.05($100) = $5 in interest. Your ending balance becomes $105.00.

❖ After two years, you earn 0.05($105.00) = $5.25. Your ending balance grows into $110.25.

We can use interest compounding to compute the ending balance in Equation 2.

$$\$100(1 + 0.05)(1 + 0.05) = \$100(1 + 0.05)^2 = \$110.25 \qquad (2)$$

If you let the money earn interest after T years, then you build the sequence in Equation 3. In this case, we multiply the beginning balance by the interest repeatedly. Moreover, the one inside the parenthesis indicates the principal as $1 while the 0.05 reflects the interest.

$$\$100(1 + 0.05)(1 + 0.05) \cdots (1 + 0.05) = \$100(1 + 0.05)^T \qquad (3)$$

For example, your $100 grows into $13,150.13 at 5% interest in one-hundred years. We write the mathematical notation as:

❖ Future Value (FV) in dollars at Time T.

❖ Present Value (PV) in dollars at Time 0.

❖ Interest rate (i) is the discount rate.

❖ Subscripts reflect the time with the final time period being T.

We write the formula in Equation 4.

$$FV_{100} = PV_0(1 + i)^T = \$100(1 + 0.05)^{100} = \$13{,}150.13 \tag{4}$$

You want your money today because one hundred years is very far away. Present value of $13,150.13 in one hundred years is worth $100 to today because you can take that $100 today, invest it in a savings account at 5% interest, and let it grow into $13,150.13. If you receive a payment in the future, then we compute the present value in Equation 5.

$$PV_0 = \frac{FV_T}{(1+i)^T} = \frac{{,}150.13}{(1+0.05)^{100}} = \$100 \tag{5}$$

We use algebra to solve for unknown variables. For example, you have $10,000 to invest and want the final balance to grow into $15,000 in four years. We can calculate the minimum interest you must earn to achieve this goal. We show all steps of algebra in Equation 6, and the minimum interest rate equals 10.66% annually.

$$FV_0 = PV_T(1 + i)^T \tag{6}$$
$$\$15{,}000 = \$10{,}000(1 + i)^4$$
$$\frac{{,}000}{{,}000} = (1 + i)^4$$
$$\sqrt[4]{1.5} = \sqrt[4]{(1 + i)^4}$$
$$1.1066 = 1 + i$$
$$i = 0.1066$$

We have an easy formula to calculate how long something doubles in size, known as the **Rule of 72.** Interest rate, i, as a percentage, and the time indicates the number of years. Accordingly, the product of the interest rate and time equals 72 in Equation 7.

$$i \cdot t = growth \cdot time = 72 \tag{7}$$

For example, if your bank deposit earns 4% interest per year, how long does your deposit double in size? Just divide 72 by 4, and your bank account doubles in 18 years. What would happen if your interest rate climbed to 7% per year? Then your bank deposit would double in 10.3 years, or $72 \div 7$.

Of course, we could solve for the interest rate using the Rule of 72. For example, which interest rate do you need for your savings account to double in 5 years? Your interest rate must be 14.4% annually, or $72 \div 5$.

We could apply the Rule of 72 to economic variables other than financial securities. For example, the Chinese economy grows 10% per year. How many years does Chinese economy need to double in size? The Chinese economy doubles every 7.2 years, or $72 \div 10$. On the other hand, the U.S. economy grows slowly at 1% per year after the 2008 Financial Crisis. How many years does the U.S. economy double in size? The U.S. economy doubles in size every 72 years, or $72 \div 1$. What would happen if the U.S. economy begins contracting in size by 1% per year? We cannot use the Rule of 72 for negative growth rates. It is impossible for something to double in size with a negative growth rate.

Multiple Investments

We can alter the analysis, so people receive or pay multiple future payments. For instance, you deposit $500 into the bank account every year at 6% interest.

❖ After the first year, you earn $500 × 0.06 = $30 in interest. Your balance grows into $500 + $30 + $500 = $1,030 because you have the initial $500, and then you deposited another $500 at the end of the year into your account.

❖ After the second year, you earn $1,030 × 0.06 = $61.80 in interest. Your balance grows into $1,030 + $61.80 + $500 = $1,591.80. You added another $500 to your account at the end of the year.

❖ After the third year, you earn $1,591.80 × 0.06 = $95.508 in interest. Your balance becomes $1,591.80 + $95.508 + $500 = $2,187.31. You added the last $500, which did not earn interest.

We calculate the future value of your bank deposits in Equation 8.

$$FV_3 = \$500(1 + 0.06)^3 + \$500(1 + 0.06)^2 + \$500(1 + 0.06)^1 + \$500(1 + 0.06)^0 \quad (8)$$
$$FV_3 = \$2,187.31$$

Last term in Equation 8 is the final deposit. Although you multiply this term by an interest rate, the exponent equals zero setting the term inside the parenthesis to a one. Consequently, the exponent indicates how many years of interest that specific $500 earned over the course of three years.

We can reverse our logic and calculate the value of these cash flows today if you receive $500 now, $500 in one year, $500 in two years, and $500 in three years. We calculate the present value of $1,836.51 in Equation 9.

$$PV_0 = \frac{}{(1+0.06)^0} + \frac{}{(1+0.06)^1} + \frac{}{(1+0.06)^2} + \frac{}{(1+0.06)^3} = \$1{,}836.51 \qquad (9)$$

If you received \$1,836.51 as a lump sum today, you could invest this money into a savings account and earn \$2,187.31 in three years at 6% interest. We converted a multiple stream investment into a single deposit investment.

Present value formula is flexible because it can handle uneven withdrawals and investments. For example, you do the following activities with your bank account in Table 8.

Table 8. Withdrawals and Deposits for a Bank Account

Year	Activity	Amount	Interest + Balance
0	Deposit	\$100	\$148.15
1	Deposit	\$300	\$389.88
2	Withdrawal	\$50	-\$57
2	Deposit	\$100	\$114.00
3	Withdrawal	\$75	-\$75
		Total	\$520.03

Withdrawal or deposit determines the sign. A withdrawal is negative, while a deposit is positive. Furthermore, the interest plus balance column in Table 8 includes the interest rate that the deposit would earn if held it until the end of the third year. For example, you deposited \$100 into your account at Time 0 that grew into \$148.15 in 3 years at 14% interest. Moreover, you withdrew \$50 in Time 2, which would earn \$57 for the next two years. However, you withdrew it, making it negative. Value of your withdrawals and deposits equals \$520.03 at the end of Year 3.

We use the present value formula to calculate today's value of these cash flows. You would be indifferent about receiving a lump-sum payment of \$351.01 today or \$520.03 in three years. We calculated the present value in Equation 10.

$$PV_0 = \frac{}{(1+0.14)^0} + \frac{}{(1+0.14)^1} + \frac{-}{(1+0.14)^2} + \frac{-}{(1+0.14)^3} = \$351.01 \qquad (10)$$

If you invested \$351.01 today at 14% interest, then in 3 years, you would have \$520.04, the final balance of your bank account.

Compounding Frequency

Financial analysts always define an interest rate as an annual term, called the ***Annual Percentage Rate (APR)***. The APR come from the Federal Reserve's regulation that helps prevent fraud. For example, do you consider a 1% interest rate a good interest rate to charge a borrower? Unfortunately, we do not know the time period this interest rate applies to because the time period was omitted. If the 1% is annual, then it is an excellent interest rate for a loan.

However, if it is daily, subsequently, this rate is terrible. Borrower took money from a loan shark. For this book, we define all interest rates in annual terms, unless otherwise stated.

Banks and finance companies usually calculate interest payments and deposits monthly. Thus, we adjust the present value formula for different time units. If you refer to Equation 11, we add a new variable, m, the *compounding frequency* while APR is the interest rate in annual terms. In the monthly case, m equals 12 because a year has 12 months.

$$FV_T = PV_0 \left(1 + \frac{APR}{m}\right)^{m \cdot T} \tag{11}$$

For example, you deposit $10 in your bank account for 20 years that earns 8% interest (APR), compounded monthly. Consequently, we calculate your savings grow into $49.27 in Equation 12: If your bank compounded your account annually, then you would have $46.61.

$$FV_T = PV_0 \left(1 + \frac{APR}{m}\right)^{m \cdot T} = \$10 \left(1 + \frac{0.08}{12}\right)^{12 \cdot 20} = \$49.27 \tag{12}$$

Although the compounding frequency is usually 12 months, we could use semi-annually (two payments per year, or m equals 2), or quarterly (four payments per year, or m equals 4).

We can convert any compounding frequency into an APR equivalent interest rate, called the *effective annual rate (EFF)*. From the previous example, we convert the 8% APR interest rate, compounded monthly into an annual rate without compounding, yielding 8.3%. We show the calculation in Equation 13. The EFF is the standard compounding formula removing the years and the present value terms.

$$EFF = \left(1 + \frac{APR}{m}\right)^{m} - 1 = \left(1 + \frac{0.08}{12}\right)^{12} - 1 = 0.083 \tag{13}$$

If you deposited $10 in your bank account for 20 years that earn 8.3% APR with no compounding (or m equals 1), then your savings would grow into $49.27, which is the identical to an interest rate of 8% that is compounded monthly. We calculate this in Equation 14.

$$FV_T = PV_0 \left(1 + \frac{APR}{m}\right)^{m \cdot T} = \$10 \left(1 + \frac{0.083}{1}\right)^{1 \cdot 20} = \$49.27 \tag{14}$$

We can adapt the present value formula for frequency compounding. For example, what is the present value if you receive $50 in a month, $100 in six months, and $75 in 13 months at 10% APR? We must adjust our time units to months, which the smallest time unit.

❖ We expressed the interest rate in APR, so divide it by 12 to obtain the monthly interest rate, yielding 0.8333% in our case.

❖ All time subscripts are monthly.

We calculated a present value of $212.06 in Equation 15.

$$PV_0 = \frac{1}{(1+0.008\overline{33})^1} + \frac{1}{(1+0.008\overline{33})^6} + \frac{1}{(1+0.008\overline{33})^{13}} = \$212.06 \tag{15}$$

Compounding frequency has a special case. As m approaches infinity ($m \to \infty$), the compounding equation transforms into Equation 16, called ***continuous compounding***. Continuous compounding means for every fraction of a second; your balance earns interest. Abbreviation, lim, refers to the limit and defines how the function behaves when m becomes very large. Thus, the number e is a constant and equals approximately 2.1828. Number e is similar to pi, and its digits do not repeat any patterns.

$$FV_T = \lim_{m \to \infty} PV_0 \left(1 + \frac{APR}{m}\right)^{T \cdot m} = PV_0 \cdot e^{APR \cdot T} \tag{16}$$

For example, you deposit $50 into your bank and leave it alone for 70 years. If the bank uses continuous compounding, then your savings grow into $9,528.31, calculated in Equation 17: Every fraction of a second over 70 years, you earn interest on your account. On the other hand, if your bank uses monthly compounding, subsequently, your savings would grow into $9,373.90, yielding $154.41 less than the standard compounding.

$$FV_T = PV_0 \cdot e^{APR \cdot T} = \$50 \cdot e^{0.075 \cdot 70} = \$9,528.31 \tag{17}$$

Banks and financial institutions rarely use continuous compounding to calculate market values of financial securities. Financial analysts and mathematicians use continuous compounding to simplify complex calculations of financial formulas and mathematical models.

Annuities and Mortgages

Financial analysts use the present value formula to calculate an annuity. An ***annuity*** is an investment for people who plan for retirement. An annuity has two parts. As people work, they make periodic deposits into an annuity account. Subsequently, once they retire, they receive periodic payments until death.

We define annuities as an ordinary annuity or an annuity due. If a person pays into an annuity at the end of period, then it is an ***ordinary annuity***. However, if a person pays into an annuity at the beginning of the period, he or she receives one extra payment that earns interest over the life of the annuity, called an ***annuity due***. Consequently, they only differ when payment is applied to the annuity account and when payments begin earning interest.

For this chapter, we stick to ordinary annuities. For example, you invest in an annuity that earns 9% APR interest with annual compounding. Calculate the value of your annuity in five years if you pay $20,000 into the annuity. We computed the annuity growth as $119,694.21 in Equation 18.

$$FV_5 = \$20{,}000(1 + 0.09)^4 + \$20{,}000(1 + 0.09)^3 + \cdots + \$20{,}000(1 + 0.09)^0 \quad (18)$$
$$FV_5 = \$20{,}000[1.09^4 + 1.09^3 + 1.09^2 + 1.09^1 + 1.09^0]$$
$$FV_5 = \$119{,}694.21$$

Do you notice anything strange about the exponents? We raise the first term in Equation 18 to the fourth power because your initial payment occurred at the end of period 1, and has earned four years of interest. Finally, the last term has a zero exponent, and the final $20,000 does not earn interest. Moreover, mathematicians derived a formula to calculate an annuity without calculating a long series of numbers. They derived a formula in Equation 19, and c is the periodic payment into an annuity. Using the previous example, the value of the annuity still equals $119,694.21.

$$FV_T = C\left[\frac{(1+i)^T - 1}{i}\right] = \$20{,}000\left[\frac{(1+0.09)^5 - 1}{0.09}\right] = \$119{,}694.21 \quad (19)$$

We also have the other side of an ordinary annuity. For example, you saved a $60,000 annuity that earns 4% APR. You plan to withdraw equal annual payments over 10 years. How much do you receive annually? Remember, you receive your first payment at the end of the first period, which is the beginning of the second period. That $60,000 earns interest for the first period. We compute an annual withdrawal payment of $7,397.46 in Equation 20.

$$FV = \frac{i \cdot PV}{1 - (1+i)^{-T}} = \frac{0.04 \cdot \;,000}{1 - (1+0.04)^{-10}} = \$7{,}397.46 \quad (20)$$

Financial analysts use the present value formula to calculate mortgage payments, which is vital to building an amortization table. An ***amortization table*** itemizes every payment for a mortgage loan and decomposes every payment into interest and the amount that reduces the principal. A mortgage is a bank loan for a property, and the property becomes the collateral. For instance, if a person has a mortgage for a house and defaults on the loan, the bank can legally take possession of the house. We use the present value formula to build an amortization table.
Mathematical notation for a mortgage is:

❖ All future mortgage payments (FV) are equal and are usually monthly.

❖ Interest rate (i) is loan rate and becomes fixed throughout life of the loan.

❖ Bank loan is amount recorded for PV_0 because the bank loaned you money at time 0.

We show a mortgage as a stream of cash flows to the bank in Equation 21.

$$PV_0 = \frac{FV_1}{(1+i)^1} + \frac{FV_2}{(1+i)^2} + \frac{FV_3}{(1+i)^3} + \cdots + \frac{FV_T}{(1+i)^T} \quad (21)$$

All loan payments are equal, so we set $FV = FV_1 = FV_2 = FV_3 = ... = FV_T$. Thus, we can factor the FV terms from all interest terms in Equation 22.

$$PV_0 = FV \left[\frac{1}{(1+i)^1} + \frac{1}{(1+i)^2} + \frac{1}{(1+i)^3} + \cdots + \frac{1}{(1+i)^T} \right] \tag{22}$$

We solve for FV, which becomes the loan payment, yielding Equation 23.

$$FV = \frac{PV_0}{\left[\frac{1}{(1+i)^1} + \frac{1}{(1+i)^2} + \frac{1}{(1+i)^3} + \cdots + \frac{1}{(1+i)^T} \right]} \tag{23}$$

For example, a bank granted a mortgage for \$60,000 at an interest rate of 12% APR. Mortgage is a six-year loan and paid annually. We solve for FV and calculate your annual payment of \$14,594 in Equation 24.

$$FV = \frac{,000}{\left[\frac{1}{(1+0.12)^1} + \frac{1}{(1+0.12)^2} + \frac{1}{(1+0.12)^3} + \cdots + \frac{1}{(1+0.12)^6} \right]} \tag{24}$$
$$FV = \$14,594$$

We can use the mortgage loan information to build an amortization table. We show an amortization table in Table 9. For Year 0, you have \$60,000 outstanding because you did not make a payment yet. Then you make your first payment in Year 1. Your interest is 12% multiplied by \$60,000, equaling \$7,200. If your payment is \$14,594, then \$7,200 is the interest while the remainder reduces the principal. Thus, you subtract \$7,394 from the loan balance. For Year 2, and beyond, you repeat the sequence until you pay the loan in full in Year 6.

Table 9. An Amortization Table

	Payment	Interest	Principal Paid	Loan Balance
Year 0	-	-	-	$60,000
Year 1	$14,594	$7,200	$7,394	$52,606
Year 2	$14,594	$6,313	$8,281	$44,325
Year 3	$14,594	$5,319	$9,275	$35,050
Year 4	$14,594	$4,206	$10,388	$24,662
Year 5	$14,594	$2,959	$11,635	$13,027
Year 6	$14,594	$1,563	$13,027	$0

All amortization tables have one feature. First payment has the highest interest while the lowest principal applied to the loan balance. Then the interest amount declines over the life of the loan until it becomes the smallest for the last payment.

If a mortgage is monthly, then you divide the interest rate by 12 and multiply the number of years by 12. For instance, a 20-year mortgage will have 240 payments, 12×20. As you can see,

Equation 24 would have 240 terms. Consequently, mathematicians devised a formula to calculate a mortgage with many payments.

For example, compute your monthly payment if you bought a $150,000 home at 6% APR with a 30-year mortgage. We calculated your monthly payment of $899.33 in Equation 25. If you notice, Equation 25 is the same formula for an annuity payout with compounding frequency included. Interest rate, i, is the APR interest rate divided by 12.

$$FV = \frac{i \cdot PV}{1-(1+i)^{-T \cdot m}} = \frac{0.005 \cdot \quad ,000}{1-(1+0.005)^{-30 \cdot 12}} = \$899.33 \tag{25}$$

Amortization table can also handle balloon payments and variable interest rate mortgages. However, these topics go beyond the textbook's scope. A balloon payment is a person pays a low monthly payment every month. For the last payment, the person would pay the remaining balance, which could be large. Moreover, variable-interest rate loan is the bank can adjust the loan's interest rate as market interest rates change.

Foreign Investments

We can use the ***net present value (NPV)*** to calculate the monetary return to an investment in Equation 26. This equation is almost identical to the present value formula, except the PV_0 is negative and located on the right-hand side while we add a new variable, NPV. If the net present value (NPV) equals zero, then this equation reduces to the present value formula. With the NPV formula, we could invest the amount PV_0 today that generates the future cash flows, FV_i, that ends at Time T. Market interest rate is i, and it automatically compares out investment to the market interest rate.

$$NPV = -PV_0 + \frac{FV_1}{(1+i)^1} + \frac{FV_2}{(1+i)^2} + \cdots + \frac{FV_T}{(1+i)^T} \tag{26}$$

If we calculate a positive, net present value, then our investment is paying off. Consequently, the investment is increasing the investor's wealth because more money flows in than out. Furthermore, investors would use the net present value formula to evaluate several investment projects. Then they select the project with the highest NPV, as long as the NPV is positive. An investor would never choose a project with a negative NPV because the project's return would be negative. Over time, more money flows out than in, creating a net loss.

For example, your brother wants you to invest $10,000 into his business. He promises to repay you $12,000 in two years. If you invested your money into financial securities, you believe you would earn an annual 10% APR. Is it profitable to invest in your brother's business? We calculated a net present value of -$82.64 in Equation 27. Unfortunately, you could earn more on the financial securities than your brother's business because the NPV is negative.

$$NPV = -\$10,000 + \frac{,000}{(1+0.1)^2} = -\$82.64 \tag{27}$$

Investors can use the net present value formula in Equation 28 to calculate the return of a foreign investment. We add a new variable, the exchange rate, E_i, to the formula. Exchange rate converts the value of the foreign investment into the equivalent of our home currency. Unfortunately, the exchange rates change continually, and we assume we know the exchange rate at every point in time. Subscript indicates the specific exchange rate for that year.

$$NPV = -PV_0 E_0 + \frac{FV_1 E_1}{(1+i)^1} + \frac{FV_2 E_2}{(1+i)^2} + \cdots + \frac{FV_T E_T}{(1+i)^T} \tag{28}$$

For example, you invested 20,000 euros into Greece, and you expect to earn \$8,000 each year for Year 1, Year 2, and Year 3. Nevertheless, you could invest your money into your country's financial markets that earn a 5% APR. Is your investment profitable? We forecasted the exchange rates below, and your home country is the United States:

Time 0: Exchange rate equals \$1.50 per 1 euro.
Time 1: Exchange rate equals \$1.75 per 1 euro.
Time 2: Exchange rate equals \$2.00 per 1 euro.
Time 3: Exchange rate equals \$2.10 per 1 euro.

We calculate the net present value of your investment of \$12,358.27 in Equation 29. The NPV is positive, and the investment increases your wealth. However, we must forecast the exchange rates, except today's exchange rate, E_0. Exchange rates could fluctuate in any direction.

$$NPV = -20{,}000€ \cdot 1.50\,{}^{\$}\!/_{€} + \frac{8,\ €\cdot1.75\,{}^{\$}\!/_{€}}{(1+0.05)^1} + \frac{8,\ €\cdot2.00\,{}^{\$}\!/_{€}}{(1+0.05)^2} + \frac{8,\ €\cdot2.10\,{}^{\$}\!/_{€}}{(1+0.05)^3} \tag{29}$$

$$NPV = -\$30{,}000 + \$13{,}333.33 + \$14{,}512.47 + \$14{,}512.47 = \$12{,}358.27$$

We continue our example, and we see Europe experiences a financial crisis. Euro begins plunging against the U.S. dollar causing the exchange rates to change to below:

Time 0: Exchange rate equals \$1.50 per 1 euro.
Time 1: Exchange rate equals \$1.25 per 1 euro.
Time 2: Exchange rate equals \$1.00 per 1 euro.
Time 3: Exchange rate equals \$0.50 per 1 euro.

We calculate the net present value of -\$9,764.60 in Equation 30. Our investment became a disaster because we earned a negative return because the euro had depreciated.

$$NPV = -20{,}000€ \cdot 1.50\,{}^{\$}\!/_{€} + \frac{8,\ €\cdot1.25\,{}^{\$}\!/_{€}}{(1+0.05)^1} + \frac{8,\ €\cdot1.00\,{}^{\$}\!/_{€}}{(1+0.05)^2} + \frac{8,\ €\cdot0.50\,{}^{\$}\!/_{€}}{(1+0.05)^3} \tag{30}$$

$$NPV = -\$30{,}000 + \$9{,}523.81 + \$7{,}256.24 + \$3{,}455.35 = -\$9{,}764.60$$

Key Terms

revenue

expense

balance sheet

asset

liability

equity

contributed capital

retained earnings

accounts receivable

accounts payable

current assets

fixed assets

statement of cash flows

Rule of 72

Annual Percentage Rate (APR)

compounding frequency

effective annual rate (EFF)

continuous compounding

annuity

ordinary annuity

annuity due

amortization table

net present value

Chapter Questions

1. Compute the net income if a company sold $50,000 of goods in cash, sold $60,000 of goods on accounts receivable, paid $100,000 in costs and operating expenses, paid taxes of $30,000, and paid $30,000 in administrative expenses.

2. Calculate the retained earnings of a corporation at the end of the year if retained earnings were $20,000 at the beginning of the year, net income was $50,000, declared $60,000 in dividends, and sold $50,000 in additional stock.

3. Compute a business's cash balance at the end of the year if the company starts with a cash balance of $10,000, paid salaries of $70,000, received $100,000 in cash sales from customers and $30,000 for accounts receivable, and paid taxes of $10,000.

4. You will receive $1,000,000 in one hundred years exactly. How much is this worth to you today if the market interest rate equals 5% APR?

5. You deposit $5,000 into a bank that earns 10% APR. How much will your balance grow in 50 years?

6. You deposit $1,000 in a bank for two years. Which interest rate in APR must you earn for your ending balance to be $1,200?

7. You deposit your savings into a money market that earns 3% APR. How many years would it double?

8. If the U.S. economy grows 5% per year, how many years does the U.S. economy need to double?

9. You will receive a $1,000 each year for two years. Your first payment starts in Year 0. Calculate cash flow value to you today if the market interest rate equals 7% APR.

10. Every year, you save $700. How much would this money grow into after 3 years if the market interest rate equals 3% APR?

11. Compute the present value if a friend repays a loan over 3 months with an annual interest rate of 12% and the monthly payment of $100. First payment begins at the end of the first month.

12. If you deposit $500 into a savings account that earns 5% APR for 30 years, calculate the ending balance for the following compounding frequencies: annual, monthly, and continuous.

13. If you are earning 16% APR on your investment that is compounded quarterly, compute the effective annual rate.

14. You are saving for retirement, and plan to invest $2,000 every year into an ordinary annuity that earns 7% APR. Compute the value of your annuity in 20 years.

15. You have save an ordinary annuity with a balance of $50,000. Calculate your annual withdrawal payments if the annuity earns a 5% APR which you withdraw over 15 years.

16. Compute the monthly payment for a $500,000 mortgage for 30 years with a 7% APR.

17. You reside in Malaysia and have an overseas bank account in Europe. You expect the following annual payments and exchange rates. Malaysia uses the ringgits (rm) currency while the Eurozone uses the euro, €

Time	Payments	Exchange rate
0	2,000 €	4.00 rm / €
1	3,000 €	4.25 rm / €
2	4,000 €	4.50 rm / €
3	5,000 €	5.00 rm / €

Calculate the net present value of your cash flows for a market interest rate of 4%.
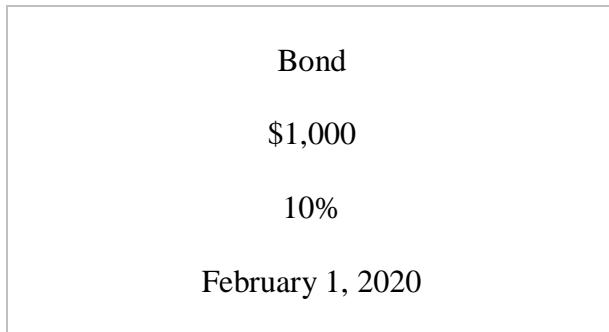
7. Valuation of Stocks and Bonds

This chapter provides an overview of stocks and bonds, and the methods financial analysts use to calculate the market price using the present value formula. Furthermore, corporations issue a variety of bonds and stocks, and use them to expand business operations. Corporations sell their bonds to investors who buy these bonds and stock for investment. They either hold the bonds until maturity or sell the bonds and stock for a capital gain or loss. Consequently, investors must know the difference between yield to maturity and the rate of return. This chapter expands on Chapter 6, and we expand the present value formula to value a variety of bonds and stocks.

Overview of Bonds

Corporations often borrow money by issuing bonds. A ***bond*** is similar to notes payable because they are written promises to pay interest and principal. We show a picture of a bond in Figure 1. Face value of this bond equals $1,000, and this bond matures on February 1, 2020. Consequently, whoever holds this bond will receive $1,000 on this date, and the bondholder also earns $100 ($0.1 \times \$1,000$) per year in interest. Most bonds pay interest twice annually or $50 every six months for this example.

<div style="text-align:center; border:1px solid;">

Bond

$1,000

10%

February 1, 2020

</div>

Figure 1. A picture of a bond

Bonds, however, differ from notes payable. A ***notes payable*** is a loan from a single creditor such as a bank, while a bond is a loan that corporations issue in denominations of $1,000, $2,000, etc. Finally, bonds are standardized, and thus, investors can purchase them. Moreover, investors can buy and sell these bonds on the financial markets before the bonds mature.

Bonds differ from corporate stock. A share of ***stock*** represents ownership in a corporation. For instance, if a shareholder owns 1,000 shares out of 10,000, then he or she owns 10% of the corporation's equity. Moreover, the shareholder also receives 10% of the corporation's earnings, when the board of directors declares dividends. On the other hand, a bond represents a debt or a liability to the corporation. For example, if a person owns a bond with a face value of $1,000

with an 11% coupon interest rate and 20-year maturity, then the bondholder has two legal rights. Bondholder has a legal right to receive 11% or $110 interest each year while the bond is outstanding. Furthermore, the bondholder has a legal right to receive $1,000 when the bond matures in 20 years.

A corporation needing long-term funds may consider issuing additional shares of stock or issuing new bonds. However, if the corporation issues new stock, then the existing stockholders share control with new stockholders. Consequently, the stockholders lose part of control of the corporation. On the other hand, the bondholders do not share in the management or earnings of the corporation. Although the corporation must pay the bond interest, whether it earns profits or losses, bonds reduce net income, thus lowering a corporation's taxes. U.S. corporations pay between 15 and 35% of their net income in taxes. Nevertheless, bond interest payments are an expense, which lowers the corporation's net income. If a corporation issues new bonds, then the common stockholders could increase their dividend earnings.

We show an example of a corporation expanding operations in Table 1. This corporation had sold 300,000 shares of outstanding common stock to investors, and it needs $2 million to expand its operations. After the expansion, the management estimates the company can earn $1,000,000 annually. Consequently, the corporation has two plans. For Plan A, the corporation issues 200,000 new shares of the corporation's stock at $10 per share. For Plan B, the corporation issues $2 million of bonds with a 10% interest rate. Hence, the interest expense equals $200,000 per year.

Examining these two plans, Plan B results in a greater income per share for the shareholders because the bond's interest lowered the tax burden by $60,000. Thus, the stockholders retained control of the corporation, and they potentially earn higher dividends per share by using bond financing.

Table 1. A Corporation Finance an Expansion through Bonds or Stocks

	Plan A	Plan B
Earnings before bond interest and income taxes	$1,000,000	$1,000,000
Deduct interest expense		(200,000)
Income before corporation income taxes	$1,000,000	$800,000
Deduct income taxes (assumed 40% rate)	(400,000)	(320,000)
Net income	$600,000	$480,000
Plan A income per share (500,000 shares)	$1.20	
Plan B income per share (300,000 shares)		$1.60

The Valuation of Bonds

Governments and corporations issue a variety of bonds with different characteristics and cash flows. Consequently, we explain the main bonds, and the methods investors and analysts use to value them. We show a *discount bond* in Figure 2, and it is the simplest to calculate. This

discount bond is a Treasury Bill issued by the U.S. government. For this example, the Treasury Bill has a face value of $10,000, which we call T-bills for short. Discount bonds do not have an interest rate listed on them. Thus, U.S. government sells T-bills at a discount or lower price. Lower price reflects the market interest rate.

Treasury Bill

U.S. Government
$10,000
August 10, 2013

Figure 2. A picture of a Treasury Bill

For example, if the U.S. federal government sold this T-bill to you for $9,500, then the present value, PV_0, becomes the market price. Subsequently, the federal government will repay you $10,000 for this instrument on August 10, 2013. The $500 difference reflects the interest on this loan.

Investors and analysts calculate the yield to maturity (YTM), the return to an investment. Yield to maturity reflects an investor's profit from a security that is similar to an interest rate. We state both interest rates and yield to maturity in annual percentage terms. For our example, we calculated the yield to maturity of 5.26% in Equation 1 if the bond's face value equals $10,000 while the market value is $9,500 with a maturity of one year.

$$PV_0 = \frac{FV_1}{(1 + YTM)}$$

$$\$9,500 = \frac{\$10,000}{(1 + YTM)}$$

$$1 + YTM = \frac{\$10,000}{\$9,500} \qquad (1)$$

$$YTM = 0.0526$$

If a discount bond has a maturity less than one year, then the time subscript remains one year. However, we adjust the yield to maturity to annual terms. For example, if the T-bill in the previous example matured in 180 days, then we calculate it in the same way. Nevertheless, we multiply the rate of return by two because 365 days divided by 180 is approximately two. In our case, the return would equal 10.52%.

Discount bonds usually have a maturity of one year or less. However, we can adjust the present value formula to calculate bonds with longer maturities. For example, you purchased a

discount bond for $15,000 that has a face value of $20,000 with a three-year maturity. We calculate your annual rate of return of 10.1% in Equation 2. Did you notice the time subscript is a three?

$$PV_0 = \frac{FV_3}{(1+YTM)^3}$$
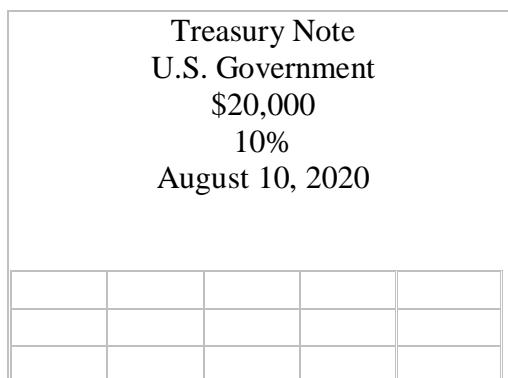
$$\$15,000 = \frac{\$20,000}{(1+YTM)^3}$$

$$(1+YTM)^3 = \frac{\$20,000}{\$15,000} \tag{2}$$

$$YTM = \sqrt[3]{1.333333} - 1$$

$$YTM = 0.101$$

A ***coupon bond*** differs from a discount bond because its interest rate is stated on the certificate. During the old days, an investor would detach a coupon from the bond and mail it to the corporation or government for an interest payment. Then the corporation or government would send a check to the bondholder. We show a coupon bond in Figure 3 with dated coupons at the bottom of the certificate.

Treasury Note
U.S. Government
$20,000
10%
August 10, 2020

Figure 3. An example of a coupon bond

This coupon bond is a U.S. Treasury note with a face value of $20,000, or T-note for short. Moreover, U.S. government pays 10% interest every six months; consequently, the person who possesses this instrument would clip off one coupon and send it to the U.S. federal government for payment. Hence, the interest payment equals $0.1 \times \$20,000 \times 0.5 = \$1,000$ for every six months. When the T-note matures on August 10, 2020, the bondholder receives $20,000.

Market interest rate rarely equals the bond's stated interest rate. If the market interest rate is lower than the coupon interest rate, then a corporation or government would never sell the bond for the face value because it would pay a higher interest rate than the marker. However, the

government or corporation could sell the bond for a greater market price, reducing the investor's return. Higher market price means the bond issuer sold the bond for a ***premium***.

A corporation, for example, has a $1,000 bond that pays interest twice a year. Interest rate on the bond is 8%, equaling $80 a year or $40 every six months. If the bond matures in two years, then the present value formula has 4 periods.

Market interest rate currently is 4% a year, or 2% for a payment period. If the market interest rate drops to 4%, the corporation would not sell this bond at face value because the corporation would pay a higher interest rate than the market. Consequently, the corporation can sell this bond for a greater price, reflecting the market interest rate. We calculate the bond market price in Equation 3, and it, PV_0, equals $1,076.15. Therefore, a corporation pays 4% interest on bonds with an 8% interest coupon rate.

$$PV_0 = \frac{\$40}{(1+0.02)^1} + \frac{\$40}{(1+0.02)^2} + \frac{\$40}{(1+0.02)^3} + \frac{\$40+\$1,000}{(1+0.02)^4} \tag{3}$$
$$PV_0 = \$1,076.15$$

Market interest rate could swing in the opposite direction. Consequently, the corporations and governments could sell bonds at a ***discount*** if the market interest rate exceeds the bond's interest rate. For example, a corporation sells a $1,000 bond that pays 8% interest rate that pays twice a year. Thus, the corporation pays $80 a year in interest, or $40 every six months. Furthermore, the bond matures in two years, or 4 periods in the present value formula. If the market interest rate rises to 12% a year (or 6% for a payment period), an investor would never buy this bond at face value. They would earn 8% interest year. However, the corporation could sell this bond for a lower price, compensating the investors for a greater market interest rate. We calculate the bond market price in Equation 4, and the bond's market price, PV_0, equals $930.70. Consequently, investors would earn a 12% return on their 8% interest bonds.

$$PV_0 = \frac{\$40}{(1+0.06)^1} + \frac{\$40}{(1+0.06)^2} + \frac{\$40}{(1+0.06)^3} + \frac{\$40+\$1,000}{(1+0.06)^4} \tag{4}$$
$$PV_0 = \$930.70$$

A government or corporation could issue a bond that never matures, which we call a ***consul*** or ***perpetuity***. Consequently, the bond has no maturity date, but the bondholder receives interest payments forever. A government or corporation rarely issues these bonds because most people and government like end dates for loans. However, this bond possesses nice mathematical properties.

A government, for example, sold a consul that pays $50 interest per year, and the bond never matures. If the market interest rate equals 8%, then calculate the market price, PV_0, of this consul. Since all interest payments are equal, subsequently, all future values, FV, are the same in the present value formula. Thus, the present value becomes an infinite series, which reduces to $FV \div i$. Consequently, we calculate the market price of this consul as $625 in Equation 5.

$$PV_0 = \frac{FV}{(1+i)} + \frac{FV}{(1+i)^2} + \frac{FV}{(1+i)^3} + \cdots = \frac{FV}{i}$$

$$PV_0 = \frac{\$50}{0.08} = \$625$$

(5)

We list several bonds with different characteristics below:

❖ **Registered Bonds**: Corporation registers the names and addresses of the bondholders. Most corporations register bonds because the registration protects the investors from loss or theft of the bonds.

❖ **Bearer Bonds**: Who possesses these bonds receive the interest payment. Coupon bonds are usually bearer bonds.

❖ **Debenture Bonds** are unsecured bonds. Thus, the corporation does not pledge assets for the bond issues. A corporation must be financially strong to issue these bonds because these bonds rely on the corporation's credit standing.

❖ **Convertible Bonds:** Bondholders have the right to exchange the corporate bonds into corporate stock on a specified date.

❖ **Municipal Bonds**: City and county governments issue municipal bonds to finance local projects. These bonds are popular with investors because the U.S. government does not tax their interest earnings. Consequently, municipal bonds usually pay lower interest rates than other bonds.

Yield to Maturity and Rate of Return

Investors who purchased a financial security know the face value, the maturity date, number of interest payments per year, and the amount of interest payments. However, investors do not know the discount rate. They can substitute the information into the present value formula and solve for the discount rate. Then investors can calculate the discount rate for several different bonds and select the bond that has the highest discount rate.

If investors hold the bond until maturity, then we call the **discount rate** the yield to maturity. Economists consider **yield to maturity** the most accurate measure of the interest rates because the yield to maturity allows investors to compare different bonds. For example, you want to buy a coupon bond today for a market price of $1,600. Bond pays $400 interest per year and matures in three years. Finally, the bond pays $1,000 on the maturity date. Consequently, we calculate your yield to maturity of 14.11% in Equation 6. You can compare this yield to other investments and choose the investment with the greatest yield.

$$\$1,600 = \frac{\$400}{(1+YTM)^1} + \frac{\$400}{(1+YTM)^2} + \frac{\$400+\$1,000}{(1+YTM)^3} \tag{6}$$

$$YTM = 0.1411$$

As you can see, this calculation becomes very complicated. If you calculate the discount rate manually, then you must calculate the PV_0 by selecting various discount rates, such as 0%, 5%, 10%, and 20%. Next, you insert your particular discount rate, r, into the Equation 7, and select the discount rate that has a present value, PV_0 close to \$1,600. Mathematicians wrote programs that can solve for the discount rate. If you visit the author's website, www.ken-szulczyk.com, he has a JavaScript program that can solve for the discount rate.

$$PV_0 = \frac{\$400}{(1+r)^1} + \frac{\$400}{(1+r)^2} + \frac{\$400+\$1,000}{(1+r)^3} \tag{7}$$

Yield to maturity generates two important rules on bonds, which are:

❖ Market interest rate (or yield to maturity) and the market price (or present value) of the securities are inversely related. For example, if you examine the present value formula, the interest rate, or yield to maturity is located in the denominators of the fractions. Thus, the market price falls as the interest rate rises, and vice versa.

❖ If a bond has a shorter maturity, subsequently, its price will fluctuate less for a change in the market interest rate. We show this by an example.

For example, we have two bonds with a face value of \$5,000 and a coupon interest rate of 10%, paid annually. In our case, both bonds pay \$500 once a year. First bond matures in one year while the other bond matures in 10 years. If the market interest rate rises to 16%, then the one-year bond has a market price of \$4,741.38 while the 10-year bond has a market value of \$3,550. Consequently, the interest rate change affected the 10-year bond more than the one-year bond. We calculated the market value of the one-year bond in Equation 8 and the ten-year bond in Equation 9. As this example illustrates, investors prefer money market securities because they fluctuate less when the interest rate changes.

$$PV_0 = \frac{\$500+\$5,000}{(1+0.16)^1} = \$4,741.38 \tag{8}$$

$$PV_0 = \frac{\$500}{(1+0.16)^1} + \frac{\$500}{(1+0.16)^2} + \cdots + \frac{\$500+\$5,000}{(1+0.16)^{10}} = \$3,550.03 \tag{9}$$

You can become confused by the terms used throughout this book. We use yield to maturity, discount rate, and interest rate interchangeably, and you can interpret these terms to mean an interest rate. However, a rate of return differs because investors could sell their securities before they matured. Thus, the rate or return includes the interest rate and capital gains or losses. A *capital gain* is an investor sells a financial security for greater price, while a *capital loss* is an investor sells a financial security for a lower price. Investors do not want capital losses, but they can occur. For instance, an investor must sell an asset whose market price has dropped because he or she needs cash quickly. Thus, the present value still works for capital gains and losses. Finally, if the investor holds onto the security onto the maturity date, then the rate of return equals the yield to maturity.

A bond, for example, has a face value of $2,000 with a coupon interest rate of 5% and a 10-year maturity. You bought this bond for $2,000 and then resold it two years later for $2,400. Thus, you collected two years of interest. Consequently, your rate of return equals the two years of interest plus the capital gain of 14.33%. We calculated the capital gain in Equation 10, and r equals the rate of return. The author used a computer program to solve for r.

$$
\begin{aligned}
PV_0 &= \frac{FV_1}{(1+r)^1} + \frac{FV_2}{(1+r)^2} \\
\$2,000 &= \frac{\$100}{(1+r)} + \frac{\$100 + \$2,400}{(1+r)^2} \\
r &= 0.1433
\end{aligned}
\tag{10}
$$

A capital loss is similar. As an illustration, you bought a financial security for $2,000 with a coupon interest rate of 5% and held it for two years. Although you earned two years of interest, this company reported financial trouble, and the bond price dropped to $1,000. Unfortunately, we calculated your return from the investment as a huge loss of -23.3% in Equation 11.

$$
\begin{aligned}
\$2,000 &= \frac{\$100}{(1+r)} + \frac{\$100 + \$1,000}{(1+r)^2} \\
r &= -0.233
\end{aligned}
\tag{11}
$$

The Valuation of Stocks

Value of a stock equals the present value of an asset's future cash flows. Thus, the present value of all future cash flows is the asset's market price in Equation 12. Market price of stock per share equals P_0. Market price in the time period 1 is P_1 while D_1 indicates the dividends. Finally, the rate of return is r, and the subscripts indicate the time period.

$$
P_0 = \frac{D_1}{(1+r)} + \frac{P_1}{(1+r)}
\tag{12}
$$

An investor values his stock, P_0, at time 0 that equals the discounted dividend he receives next year and the market price the investor receives if he sells the stock. Furthermore, if the investor is in the first time period, then the investor faces the same choice for Period 2 in Equation 13. Thus, we moved the time subscripts ahead by one period.

$$P_1 = \frac{D_2}{(1+r)} + \frac{P_2}{(1+r)} \tag{13}$$

We obtain Equation 14 by substituting Equation 13 into Equation 12.

$$P_0 = \frac{D_1}{(1+r)} + \frac{D_2}{(1+r)^2} + \frac{P_2}{(1+r)^2} \tag{14}$$

Then we build our sequence by examining an investor's decision for Period 3, and substitute that equation into Equation 14 for variable P_2. We continue to examine an investor's future decision for each time period until we derive an infinite sequence in Equation 15.

$$P_0 = \frac{D_1}{(1+r)} + \frac{D_2}{(1+r)^2} + \frac{D_3}{(1+r)^3} + \cdots \tag{15}$$

If the corporation pays the same dividends, then $D = D_1 = D_2 = \cdots$, subsequently, the market price becomes a perpetuity, where we simplify a stock's value to Equation 16.

$$P_0 = \frac{D}{r} \tag{16}$$

As an illustration, you purchase stock as a long-term investment. Your annual rate of return is 5%, and you expect the corporation to pay $2 per share indefinitely. Consequently, you compute the market value of this stock of $40 per share in Equation 17.

$$P_0 = \frac{D}{r} = \frac{\$2}{0.05} = \$40.00 \tag{17}$$

If you want to know the market value of this stock for one year, then this becomes a trick question. Since you expect to earn the same dividend year after year, subsequently the market price is still $40.00. Thus, the investor does not experience any capital gains or losses.

Many investors want their dividends to grow over time, and Equation 16 can include a dividend growth rate. If the dividend grows at g percent per year, then we update the present

value formula to include a dividend growth rate in Equation 18. Consequently, we can simplify this infinite sequence into something similar to a perpetuity.

$$P_0 = \frac{D(1+g)}{(1+r)} + \frac{D(1+g)^2}{(1+r)^2} + \frac{D(1+g)^3}{(1+r)^3} + \cdots = \frac{D}{r-g} \tag{18}$$

For instance, you purchase stock as a long-term investment. Your rate of return equals 10%, and you expect the corporation to pay $2 dividend that grows 5% per year. Thus, we compute a market value of the stock of $40 per share in Equation 19.

$$P_0 = \frac{D}{r-g} = \frac{\$2}{0.10-0.05} = \$40.00 \tag{19}$$

Using the same numbers, what would happen if dividends grow at a slower rate, such as 2% per year? We calculate a market value of $25 per share because the dividend grows slowly in Equation 20.

$$P_0 = \frac{D}{r-g} = \frac{\$2}{0.10-0.02} = \$25.00 \tag{20}$$

Two forces reduce future cash flows. First, a greater discount rate lowers the future value of cash flows. Second, a larger dividend growth rate increases the value of future cash flows, causing the dividends to grow faster than the rate of return. Nevertheless, the dividend growth rate must become lower than the discount rate, or $g > r$. Otherwise, the future cash flows become more valuable over time, making the present value negative.

For example, you purchase stock as a long-term investment. Your rate of return is 12%, and you expect the corporation to pay $5 at Time 1 with dividends growing at 5% per year. We calculated a market value of this stock of $71.43 per share in Equation 21.

$$P_0 = \frac{D}{r-g} = \frac{\$5}{0.12-0.05} = \$71.43 \tag{21}$$

Market value of stock for the second period does not equal $71.43 because the stock price has grown 5% per year. Instead, we calculate the market value of $75 in Equation 22.

$$P_1 = P_0(1+g) = \$71.43(1+0.05) = \$75.00 \tag{22}$$

Using Equation 18, we can solve for different variables, depending what we know. For example, the stock price equals $100 per share while dividends are $3 per share that grows 5%

per year. Compute the rate of return on this investment. We calculate a rate of return of 8% per year in Equation 23.

$$\$100 = \frac{\$3}{r - 0.05}$$
$$r = 0.08$$

(23)

Some corporations, especially in high-tech industries, pay low dividends in the beginning. Subsequently, the corporation grows rapidly over time, and it begins paying higher dividends. We can modify the present value formula to handle this situation. Present value formula has two components:

❖ Non-steady state – we use the present value to write out all cash flows, when the dividend growth rate is not constant. Non-steady state occurs for a new corporation.

❖ Steady state – the corporation begins paying dividends over time that increase at a constant rate. This occurs after the corporation becomes mature. Consequently, we calculate the cash flows as a perpetuity.

As an illustration, we set the rate of return to 10%. A corporation pays a dividend of $6 at time 1. Corporation expects to increase the dividend by 2% for the first year, 4% for the second year, and 6% for year 3. After Year 3, the dividend grows at a constant rate of 6% per year. In this case, we solve for the dollar value of the dividend for each year with no fixed growth rate. We calculate the following:

❖ Year 1: $D_1 = \$6(1+0.02) = \$6.12$

❖ Year 2: $D_2 = \$6.12(1+0.04) = \$6.3648$

❖ Year 3: $D_3 = \$6.3648(1+0.06) = \$6.746688$

Third year becomes the perpetuity because the corporation begins increasing the dividend at a constant rate. For this example, we must observe the time subscripts. Remember, we calculate the stock price, P, one period before the dividend payment, D, in Equation 24.

$$P_2 = \frac{D_3}{r - g} = \frac{\$6.746688}{0.10 - 0.06} = \$168.67$$

(24)

Finally, we can calculate the market value of the stock share in the time period 0 by discounting the future cash flows of the stock in Equation 25.

$$P_0 = \frac{\$6.12}{(1+0.1)} + \frac{\$6.3648}{(1+0.1)^2} + \frac{\$168.67}{(1+0.1)^2} = \$150.22 \qquad (25)$$

A new startup internet company does not pay dividends for the first three years. In year 4, the company begins paying a dividend of $10 per share that grows 5% per year. If the rate of return is 8%, then calculate the market value of the stock.

❖ First, we set the dividends to zero for the initial three years, which means $D_1 = D_2 = D_3 = 0$

❖ Second, we set the dividend to $10, for the fourth time period, or $D_4 = \$10$. Next, we calculate the perpetuity that begins in Period 3 in Equation 26.

$$P_3 = \frac{D_4}{r-g} = \frac{\$10}{0.08-0.05} = \$333.33 \qquad (26)$$

Unfortunately, Equation 26 yields the market value of stock for Period 3. If we are in Year 0 for the cash flow, then we use the present value formula to calculate the stock price in Time 0 in Equation 27. Consequently, the market value of the stock equals $264.61 per share.

$$P_0 = \frac{\$333.33}{(1+0.08)^3} = \$264.61 \qquad (27)$$

Key Terms

bond	registered bond
notes payable	bearer bond
stock	debenture bond
discount bond	convertible bond
coupon bond	municipal bond
premium	discount rate
discount	yield to maturity
consul	capital gain
perpetuity	capital loss

Chapter Questions

1. Explain the similarities and differences between notes payable and a corporate bond.

2. Identify the advantages of issuing more bonds instead of stock.

3. A T-bill has a face value of $20,000 with a yield to maturity of 3%, and this bill matures in 270 days. Calculate the market value of this T-bill.

4. If a consul pays $100 of interest every year and the market interest rate equals 6%, compute the market value of this consul.

5. A bond has a face value of $2,000, an interest rate of 10%,and pays interest twice a year. If the yield to maturity is 5% and the bond matures in three years, calculate the market value of this bond.

6. A bond has a face value of $2,000, an interest rate of 10% and pays interest twice a year. If the yield to maturity is 20% and the bond matures in three years, compute the market value of this bond.

7. Explain why money market securities make better investments than capital market securities.

8. If you expect the central bank to lower interest rates, define a good investment strategy.

9. You bought a discount bond for $4,500. If the bond matures in 3 years with a face value of $5,000, calculate your yield-to-maturity (YTM).

10. If a corporation expects to pay $1 dividend every year that grows 3% per year while the market interest rate is 4%, compute the market value of this stock.

11. A new internet company does not pay dividends for the first two years. However, in Year 3, the company will pay a $1 dividend that grows at 5% per year. Calculate the market price of this stock if the interest rate is 10%.

8. Determining the Market Interest Rates

We explain in this chapter which factors determine interest rates by using the market forces of supply and demand for bonds. Furthermore, several factors shift the supply and demand functions, which alter the bond's market quantity, market price, and market interest rate. These shifts allow analysts and economists to predict changes in the interest rates and bond prices. Moreover, we use demand and supply functions to explain interest rate behavior during business cycles and recessions and explain the Fisher Effect. Finally, we introduce a loanable funds market for a small country. Then we expand the supply and demand for bonds to include a world's real interest rate. Consequently, the world's interest rate either causes loanable funds to enter or leave a small country.

The Supply and Demand for Bonds

Interest rates have fluctuated substantially in the United States during the second half of the 20th century. For example, interest rates on 3-month T-bills were 1% in the early 1950s. Then, the interest rates on T-bills soared to over 15% in 1981 and subsequently, plummeted to below 6% in the mid-1980s and 1990s. Currently, T-bill rates have fallen below 1% after the 2008 Financial Crisis.
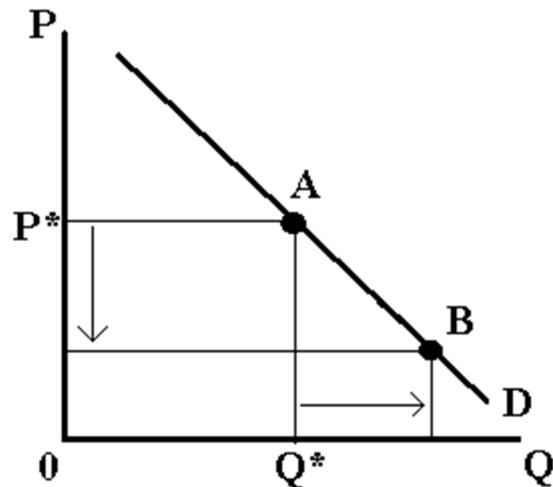
Everyone closely watches the interest rates. They determine whether consumers should save or buy, whether families should buy a house or purchase bonds. Furthermore, the interest rates influence business decisions to invest in new equipment or invest their money into financial securities. From Chapter 2, you have learned the major financial instruments. All these instruments represent credit market instruments. All these instruments are loans, where one party lends funds to another party except corporate stock. Stock conveys ownership in a corporation and is not a loan.

Companies and governments issue a variety of credit instrument with different maturities. Therefore, each credit instrument has an interest rate associated with it. Financial markets have hundreds of financial instruments, which create hundreds of interest rates. Good news is all interest rates usually move together. If one interest rate increases, then the other interest rates rise too. For our analysis, we assume a market has one interest rate.

Bond's supply and demand determine the interest rate in the *bond market*, and a bond becomes the tradable commodity. Investors buy bonds while businesses and government supply bonds. Consequently, the intersection of supply and demand functions in the bond market determines the bond's market price and quantity.
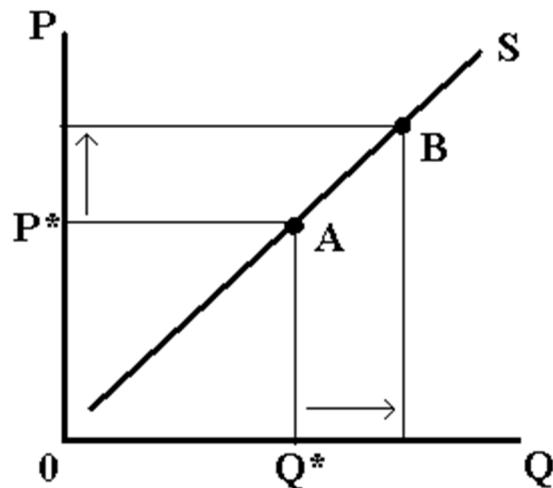
Demand function reflects the relationship between the quantity demanded and the market price of bonds, when we hold all other economic variables constant. We show a demand function in Figure 1. Demand function has a negative slope because as you move from point A to point B, the price of bonds becomes lower, so investors buy more bonds for a cheaper price. Just imagine bonds are similar to a product. For example, if the price of a soda becomes cheaper, then consumers buy more sodas. Please note as you move from point A to point B, the

price of bonds decreases, so using the present value formula, the market interest rate rises. Hence, the investors are attracted to the greater interest rate.

Figure 1. Demand function for bonds
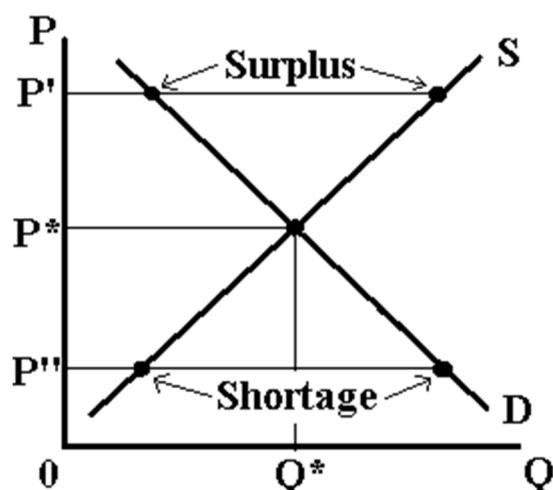
Supply function shows the relationship between the quantity supplied and the market price, when we hold all other economic variables constant. We drew a supply function in Figure 2. Supply function has a positive slope because as you move from point A to point B, the price becomes higher while the market interest rate falls. Consequently, businesses and firms borrow more funds because the interest rates are cheaper. Remember a bond's interest rate moves in the opposite direction of a bond's price.

Figure 2. Supply function for bonds

Demand and supply functions intersect at one point, the equilibrium. ***Equilibrium*** reflects a state of rest. As long as the supply or demand function does not change, then the price and quantity remain where they are. We show supply and demand functions in Figure 3. At this point, the quantity demanded equals the quantity supplied for bonds. The Q* and P* represent equilibrium quantity and price. Using the present value formula, we can deduce what happens to the market interest rate.

What would happen to the bond market if the bond's price exceeds the equilibrium price? Consequently, the quantity supplied is greater than quantity demanded, creating a ***surplus***. Businesses and government sell more bonds because the price of bonds is high, and interest rates are low. However, the investors do not buy these bonds because the high price and low interest rates. Thus, the bond's price falls until restoring equilibrium at P* again.
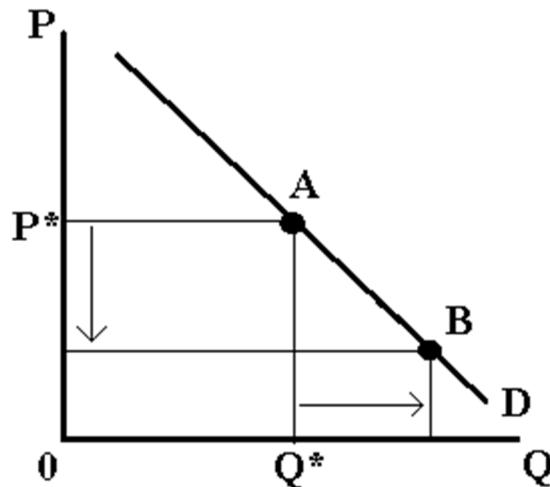
Figure 3. Supply and demand for bonds
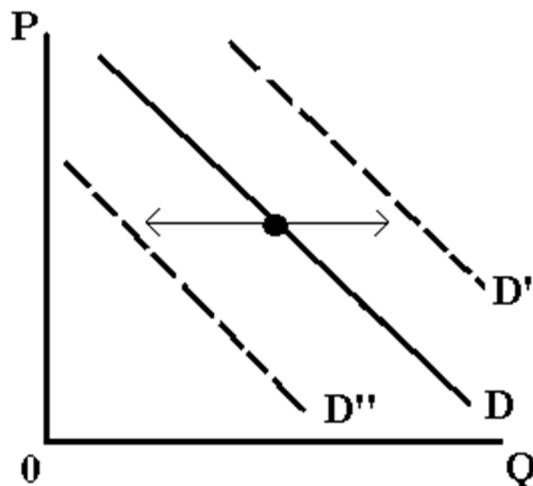
What would happen in the market if the price of bonds were lower than the equilibrium price? Quantity supplied becomes less than quantity demanded, creating a ***shortage***. Bond prices are low, and interest rates are high. Consequently, the investors have a large demand for bonds because the bonds make a good investment. However, businesses and government do not sell bonds for a low price and high interest rate. Thus, the bond's price must increase until equilibrium is restored at P* again, decreasing the market interest rates. Therefore, the market always gravitates to equilibrium and consistently eliminates shortages and surpluses as long as a government does not interfere in the market.

Demand function can shift because a factor has changed. Please know the difference between a movement along a demand curve and a demand function shift. We show a decrease in quantity demanded in Figure 4. Investors demand more bonds as we move from point A to point B. Economists call this a change in "***quantity demanded.***" Investors increase quantity demanded because the price of bonds became cheaper. Consequently, a factor has changed the supply function and not the demand function. If an outside factor affects the demand function, then the

demand function would shift. Economists call a rightward shift an "***increase in demand***," while a shift to the left is a "***decrease in demand.***" We show demand function shifts in Figure 5.
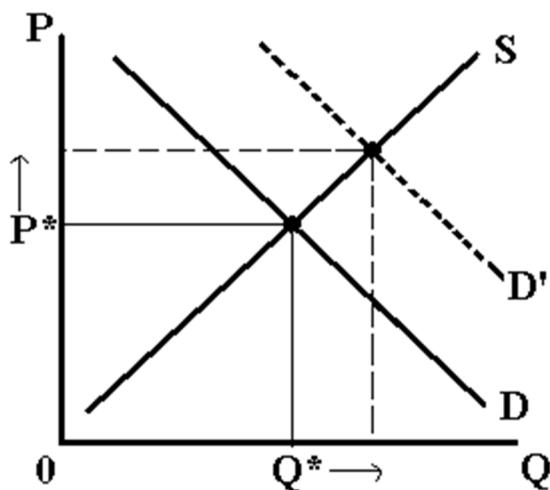
Figure 4. A movement along a demand function

Figure 5. A demand function shifts

We listed six factors to show an increase in the demand function, shifting it rightward. We show the increase in the demand function in Figure 6. When the investors increase their demand for bonds, the demand function shifts rightward because investors buy more bonds. Thus, both the equilibrium quantity, Q*, and bond's market price, P*, rise. When we discount the bonds using the present value formula, the market interest rate for the bonds fall.

Figure 6. A demand function increases

Listing the six factors that increase the demand function:
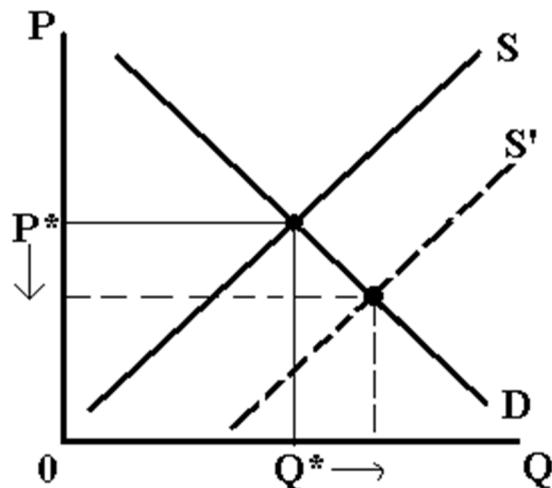
❖ An *increase in wealth* increases the bond's demand function shifting rightward. A growing economy creates wealth. Thus, the demand for bonds increases too because investors and the people have more wealth and invest more in the bond market.

❖ A *decrease in the expected returns* on investment increases the bond's demand function shifting rightward. If investors believe the interest rates will become lower, then investors would buy more bonds now. For example, if you believe interest rates will fall, subsequently, the bond prices would increase. Consequently, you buy bonds now because you buy bonds for a cheap price at a high interest rate and could resell the bonds in the future for a greater price as market interest rate falls.

❖ A *decrease in expected inflation* increases the bond's demand function shifting rightward. Inflation erodes the purchasing power of households, businesses, and governments. Inflation also erodes the value of investments, such as stocks and bonds. Thus, the investors would buy fewer bonds if they believe the inflation rate will rise in the future, especially long-term bonds. If investors believe inflation would decrease in the future, then investors buy more bonds for investment.

❖ A *decrease in the risk* of bonds increases the bond's demand function shifting rightward. Investors loan funds to borrowers, who will not default on their loans. Investors are usually risk averse. If investors believe the bond market becomes more stable and "safer," then they buy more bonds.

❖ An *increase in the liquidity* of the bond market increases the bond's demand function shifting rightward. Investors are attracted to highly liquid bonds. Future is uncertain, and

investors can sell an asset fast for little transaction cost. If the bond market becomes more liquid, such as U.S. government securities, then investors boost their demand for U.S. government bonds.

❖ A *decrease in information costs* increases the bond's demand function shifting rightward. Investors continually need information, so they can evaluate their investments. For example, firms like Standard & Poor's evaluate the financial strength of large corporations and the corporations' ability to repay their debts. Investors have low information costs for large corporations, increasing their demand for large corporate bonds.

Please note the demand function can shift leftward by the same six factors. You just reverse the logic for the six factors. For example, an increase in expected inflation causes the demand function to decrease and shift leftward. Consequently, the bond price falls while the interest rate rises.

Four factors cause the supply function to shift. We listed them in a way that causes the supply function to increase and shift rightward in Figure 7. When businesses and governments issue more bonds, the supply function shifts rightward, causing the equilibrium quantity (Q*) to increase while the bond's market price (P*) falls. When we discount the bond's price using the present value formula, then the bond's market interest rate rises.

Figure 7. A supply function increases

Four factors shift the supply function:

❖ A *rise in expected profits* increases the bond's supply function shifting rightward. A business would borrow and boost its debt to buy assets like machines and equipment if the business expects larger profits. Usually businesses issue bonds for machines and

equipment during a business cycle because of profit expectations, while the opposite occurs during a recession.

❖ A *decrease in business taxes* increases the bond's supply function shifting rightward. If a government subjects a business to high taxes, then the business has a low incentive to invest in machines and equipment or expand its production. More investment, such as borrowing funds through the bond market, enlarges the firm, increasing its tax burden. If a government had lowered the tax burden on businesses, subsequently, businesses would invest more by using bonds, increasing the bond's supply of bonds, and the bond supply would shift rightward.

❖ A *rise in expected inflation* increases the bond's supply function shifting rightward. Inflation erodes the value of the dollar. Consequently, the value of debt decreases over time. If businesses and government believe inflation would rise, they borrow more funds by issuing bonds. Then, they repay their loans with "cheaper" dollars.

❖ A *rise in government borrowing* increases the bond's supply function shifting rightward. When government spends more than what it collects in taxes, the government can borrow by issuing government bonds. The United States federal government operated with budget deficits for the last 40 years. Every year, the U.S. government issues more debt via bonds, and the supply of bonds keeps increasing, which raises interest rates and reduces bond prices.
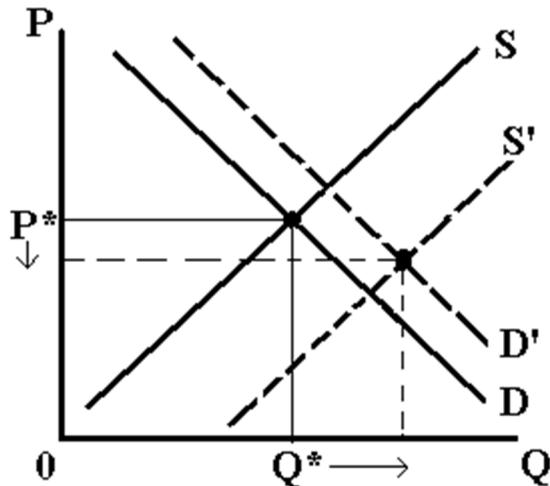
Please note the supply function can shift leftward by the same four factors. You just reverse the logic for the four factors. For example, a drop in expected inflation causes the supply function to decrease and shift leftward. Consequently, the bond price rises while the interest rate falls.

Interest Rates and the Business Cycle

Empirical evidence indicates that market interest rates rise during a business cycle and fall during recessions. During a business cycle, the amount of goods and services produced in the economy increases because businesses become optimistic about future profits and invest in machines and equipment by issuing more bonds. Consequently, the bond's supply increases. Moreover, if an economy produces more goods and services, the economy creates more wealth. Investors save more and invest in the financial markets. Thus, the bond's demand increases and the demand function shifts rightward in Figure 8.

When both the supply and demand functions shift, we know either the price or quantity while the other variable becomes indeterminate. In this case, both functions increase, causing the quantity of bonds to increase, but bond prices and interest rates become unknown. If you do not believe me, then experiment with the supply and demand functions. First, increase the demand function by a good deal, and increase the supply function by a little. Second, increase the demand function by a little and increase the supply function by much. Consequently, the

market price is greater in the first case and lower in the second case. Therefore, changes in bond prices and interest rates become ambiguous. Unfortunately, we cannot prove interest rates rise during economic expansions and fall during recessions.

Figure 8. Both supply and demand functions increase

The Fisher Effect

We only discussed nominal interest rates. We did not adjust the nominal interest rates for inflation. Unfortunately, inflation can have a significant influence on the financial markets. Investors and savers are concerned about the real interest rate because the real interest rate reflects the true cost of borrowing. The *Fisher Effect* relates nominal and real interest rates and we define the notation as:

❖ i is the nominal interest rate.

❖ r equals the real interest rate.

❖ π^e is the expected inflation rate.

We show the Fisher Effect Equation in Equation 1. It equals a geometric average of the expected inflation rate and real interest rate.

$$(i+1) = (1+r)(1+\pi^e) \tag{1}$$

For low inflation and low interest rates, we can use the approximation that we had derived in Equation 2. We set the cross term $r\pi^e$ to zero because it becomes a tiny number. However, if

the inflation rate or interest rate becomes high, then the approximation loses accuracy as the cross term becomes large.

$$(i+1) = (1+r)(1+\pi^e)$$
$$i+1 = 1 + r\pi^e + r + \pi^e \qquad (2)$$
$$i \approx r + \pi^e$$

For example, you expect the inflation rate will be zero ($\pi^e = 0$), and you grant a loan for 5% for one year. At the end of Year 1, you have 5% more money in real terms because you can purchase 5% more in goods and services. We calculated the real interest rate in Equation 3.

$$r \approx i - \pi^e \approx 5 - 0 = 5 \qquad (3)$$
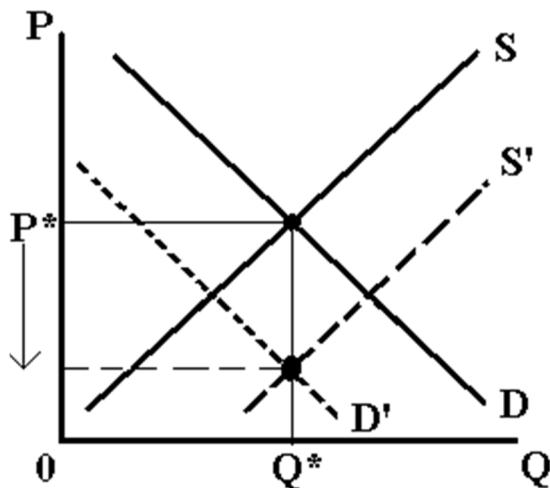
What would happen if you believe inflation will increase to 5% ($\pi^e = 5\%$), and you grant a loan for one year at 5%? At the end of year 1, you would have 5% more money, but prices, unfortunately, became 5% greater too. Consequently, your purchasing power would not change in real terms. We calculated the real interest rate in Equation 4.

$$r \approx i - \pi^e \approx 5 - 5 = 0 \qquad (4)$$

Real interest rate, therefore, reflects the true cost of borrowing and becomes a better indicator of incentives to lend and borrow. Many financial analysts use nominal interest rates because inflation is low in the United States, averaging 3% per year or less.

We can use the bond market to show the Fisher Effect. If the investors and businesses expect higher inflation in the future, then investors buy fewer bonds while businesses sell more bonds. Investors know the inflation would erode the value from their investment while businesses could repay the bonds with inflated dollars. Consequently, the demand for bonds shifts toward the left while the supply for bonds shifts rightward. We show the impact on the bond market in Figure 9. Accordingly, the price of bonds decreases and the interest rates increases. In this case, the amount of bonds (Q*) in the market is ambiguous. You prove this by shifting the demand and supply curve enough, so the quantity does not change. Then shift either function a little more and the equilibrium quantity changes direction. Thus, the greater inflationary expectations cause greater bonds prices and lower bond interest rates as we discount bond prices.

Financial analysts always write interest rates for financial instruments in nominal terms. If investors and the public have higher expectations of inflations (π^e), then nominal interest rates (i) become greater. If the government wants low nominal interest rates, then the public and investors must believe the inflation rate will be low.

Figure 9. Supply and demand functions explain the Fisher Effect

Bond Prices in an Open Economy
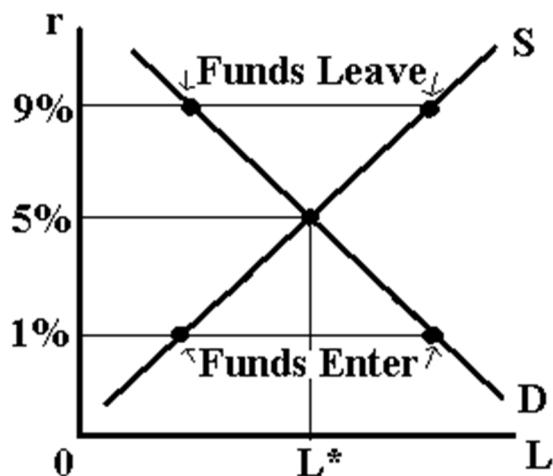
In the previous supply-demand graphs, the bond was the good for the market. However, we could switch the analysis, where the money exchanged for the bond becomes the commodity. Then money becomes the *loanable funds*. Consequently, the bond and loanable funds markets yield identical results because we examine the same picture in a different manner. Nevertheless, loanable funds switch the roles of supply and demand. If investors buy bonds, then they have a demand for bonds. Investors become a source of loanable funds because they trade money for bonds. Thus, the investors represent the supply function in the loanable funds market. If a businesses or governments sell bonds, then they demand loanable funds. Therefore, they represent the demand function for loanable funds. Equilibrium price in the loanable funds market is the interest rate while the equilibrium quantity is the amount of loanable funds.

Previous supply-demand examples viewed the bond market as a closed economy. A *closed economy* has no financial transactions with other countries because the country does not allow money and goods to flow across its borders. However, we could alter the analysis to allow international investors into the market. An *open economy* is a country allows goods, services, and financial securities to flow freely in or out of a country. Consequently, the analysis uses the loanable funds approach. Quantity represents the amount of loanable funds while the price is the real interest rate. We use the real interest rate because investors are concerned about their investment return after accounting for inflation. Thus, we deduct a country's inflation rate from the nominal interest rate, yielding the real interest rate.

If a country were a closed, small economy, the loanable funds market would be at equilibrium. Domestic investors represent the supply of loanable funds while businesses and governments demand them. Furthermore, we assumed the country is small because the investors, government, and businesses cannot influence the international interest rate.

Consequently, the real interest rate equals 5% in Figure 10 while the amount of funds in the market is L*.

If the world's real interest rate were 9%, then the domestic investors would invest their funds in the international market, earning a higher interest rate in Figure 10. However, businesses and governments would not borrow funds at this interest rate because it is too high. Consequently, the difference between quantity supplied and quantity demanded reflects the amount of funds leaving the country at 9% real interest rate. If this country were a closed economy, subsequently, the market would have a surplus, and market forces would lower the real interest rate to 5%.

Figure 10. Loanable funds in an open economy

If the world's real interest rate were 1%, then firms and the government would borrow at the cheap rates in Figure 10. However, the domestic investors would not lend at that rate. Consequently, the difference between quantity demanded and quantity supply reflects the amount of funds entering the country. If this country were closed, then the loanable funds market would cause a shortage, and market forces would increase the real interest rate.

We assumed the country is a *small open economy* because this country is too little to influence the world's real interest rate. Many countries, such as the Netherlands and Belgium would fall within this category. However, a large country like the United States, Germany, or Japan would affect the world's real interest rate.

Key Terms

bond market	increase in demand
demand function	decrease in demand
supply function	Fisher Effect
equilibrium	loanable funds

surplus   closed economy
shortage   open economy
quantity demanded   small open economy

Chapter Questions

1. Which six factors shift the demand for bonds and in which direction?

2. Which four factors shift the supply for bonds and in which direction?

3. Draw a bond market with a supply and demand function. What would happen in the market if the 2008 Financial Crisis causes wealth to drop?

4. Draw a bond market with a supply and demand function. What would happen in the market if a government imposes higher taxes on businesses?

5. Draw a bond market with a supply and demand function. What would happen in the market if investors expect greater returns from their investment?

6. How would the demand and supply functions for a bond market shift during a business cycle and during a recession?

7. Calculate the real interest rate if the nominal interest rate equals 90% while the inflation rate is 100%. Please calculate the exact and approximation.

8. How would the demand and supply functions shift in the bond market if investors, governments, and businessmen expect greater inflation? You will prove the Fisher Equation and the impact of expected inflation on the market interest rate and the bond's price.

9. Distinguish between the loanable funds market and bond market.

10. Draw a loanable funds market with an equilibrium interest rate of 7%. What would happen if the world's interest rate is 9%?

11. Draw a loanable funds market with an equilibrium interest rate of 7%. What would happen if the world's interest rate is 5%?

9. Risk and Term Structure of Interest Rates
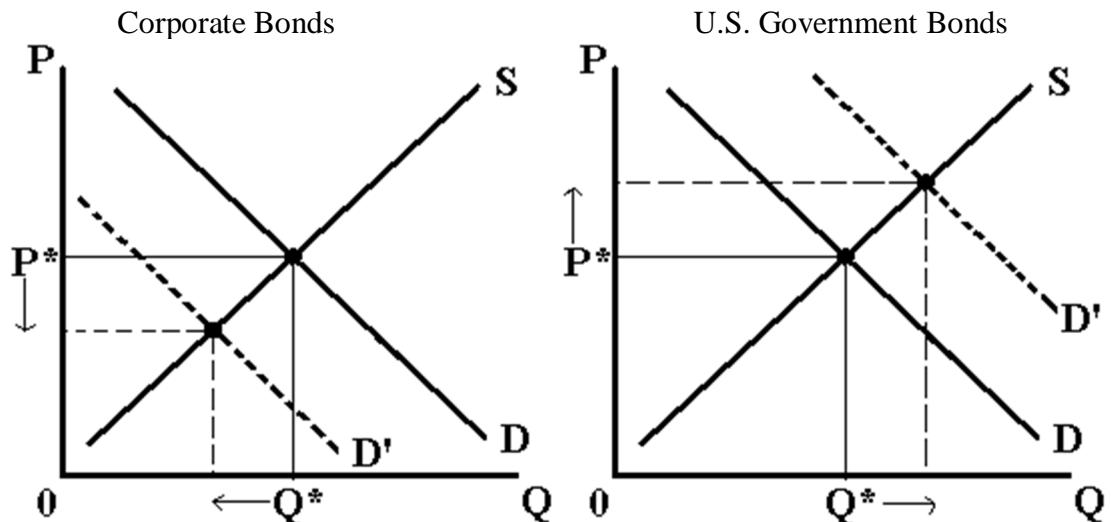
Businesses and governments offer a variety of bonds that differ in default risk, liquidity, information costs, and taxes. Thus, these differences cause interest rates and bond prices to differ among these different securities. Furthermore, the U.S. government offers Treasury Bills, Treasury Notes, and Treasury Bonds that range in maturity from 15 days to 30 years. Consequently, economists study these interest rates from these securities that they call the term structure of interest rates. Then economists can plot the term structure, called the yield curve. Yield curve usually slopes upward and means the long-term U.S. government securities pay a higher interest rate than the short-term ones. Economists use three theories to explain the characteristics of the yield curve and utilize the yield curve to predict recessions.

Default Risk and Bond Prices

Default risk is the possibility a borrower will not repay the principal and/or interest on a loan. For instance, the U.S. government has little risk of default, and investors call U.S. securities *default-risk-free instruments*. U.S. government can raise taxes, print money, or issue new debt, when it experiences financial trouble. On the other hand, a business has some risk of default. Business can bankrupt and cannot repay its debt. Economists call the difference between the interest rate on the U.S. government bonds and corporate bonds the default risk premium. Investors add d*efault risk premium* to a risk-free investment, so they can invest in "risky" bonds because they earn a greater return. Risk premium is always positive. Rating companies such as Standard & Poor's Corporation and Moody's Investor Service assess the default risk for corporations. These companies calculate a single statistic, called the *bond rating*, based on a corporation's net worth, cash flow, and ability to meet its debt obligations.

Supply and demand functions that you already learned in the last chapter can help explain the impact of risk of a market. We draw the supply and demand for two markets: government bond market and corporate bond market. We set the same equilibrium price and quantity for both markets in Figure 1, which means both markets have identical risks. Unfortunately, a corporation could have financial trouble, so investors believe the corporation could default. Some investors demand fewer corporate bonds and invest more in government bonds. Thus, the demand for corporate bonds falls while the demand for government bonds rise because the investors consider the government bonds default-free.

Did you notice the government bonds have a higher bond price while corporate bonds have a lower bond price? Thus, the market interest rate always moves in the opposite direction of bond prices because of the present value formula. Consequently, corporations pay greater interest rates for their bonds while the U.S. government pays a lower interest rate. Taking the difference between the government bond and corporate bond interest rates, we can calculate the risk premium. As the default risk increases, then the risk premium increases too. During recessions, when some businesses bankrupt, the default risk increases, increasing the risk premium. Hence, the difference between government and corporate interest rates would widen.
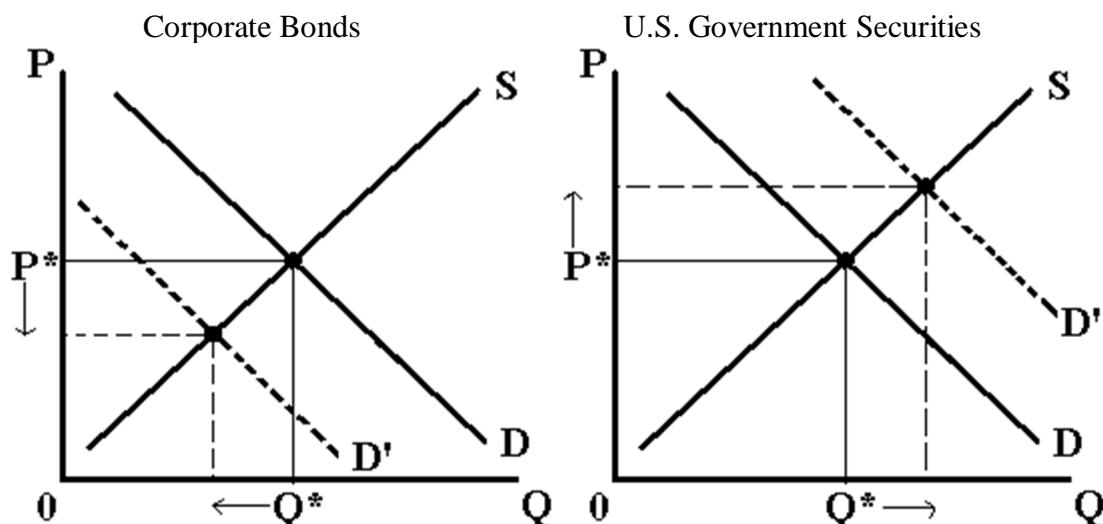
Figure 1. Impact of a risk premium on the bond markets

Liquidity and Bond Prices

Liquidity causes bond prices and interest rates to differ. For instance, U.S. government securities are widely traded and are the most liquid. Hence, investors can buy and sell them. On the other hand, corporate bonds are not as liquid and not as widely traded, so investors have more difficulties in buying and selling them. Consequently, we use a similar analysis to default risk, which we have explained in the previous section. We start the analysis with the same liquidity in both the government bond and corporate bond markets in Figure 2. Thus, both bond markets have the identical equilibrium bond price, P*, and hence, the exact liquidity.

Then the secondary markets expand for government bonds boosting the liquidity for these securities. Consequently, the investors are attracted to the government bonds because they are more liquid. Demand function increases and shifts rightward for government bonds. However, investors reduce their purchases of corporate bonds because they are less liquid, decreasing the demand function and shifting it leftward. Thus, the government bond prices rise, which reduces the interest rate for government bonds. On the other hand, the corporate bond prices decrease, raising the market interest rate for corporate bond. Taking the difference between the two interest rates, we measure the degree of liquidity. Nevertheless, economists refer the difference in interest rates as a risk premium.
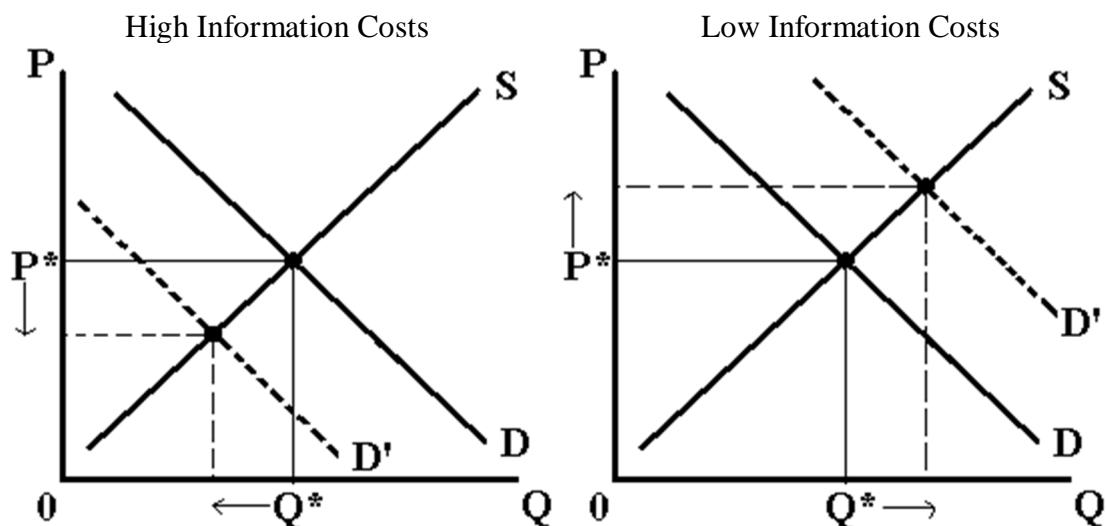
Figure 2. Impact of liquidity on the bond markets

Information Costs and Bond Prices

Information costs influence the bond prices and interest rates. If investors need time and money to acquire information on securities, then they pay a greater information cost. We include these costs in the bond's market price and interest rate, and they raise the cost of borrowing. For example, investors know both U.S. government securities and corporate bonds from large corporations well, and the securities have the lowest information costs. On the other hand, the information costs for new and small companies are high, and therefore, these companies pay greater interest rates when they borrow funds.

We can use the demand and supply analysis to create two markets for the high and low-information-cost bond markets. Both markets start with the same level of information, and consequently, the bond prices and interest rates are identical. We depict the bond markets in Figure 3. The equilibrium bond prices are identical for both markets and equal P* and the interest rates would be equal.

Investors pay a greater cost to acquire information for the high information cost bonds. Thus, investors are attracted to the low-information cost bonds, boosting their demand for low-information cost bonds, increasing the market price and decreasing market interest rate. High-information cost bonds are not as attractive as an investment, so investors buy fewer bonds, reducing bond prices and raising interest rates. Therefore, low-information-cost bonds pay a lower interest rate.

114

Figure 3. Impact of information costs on the bond markets

Taxes and Bond Prices

Taxes can cause bond prices and interest rates to differ. For example, the U.S. government bonds have a lower risk of default and higher liquidity than municipal bonds, whereas *municipal bonds* are the state and local government bonds. However, the interest rates of municipal bonds are consistently lower than U.S. government bonds for the last 50 years because investors do not pay U.S. taxes on the interest they earn on municipal bonds while they pay U.S. government taxes on U.S. government securities. If you bought municipal bonds, subsequently, you would earn a lower interest than U.S. government securities. Nevertheless, you pay no taxes, compensating you for the greater risk and lower liquidity.
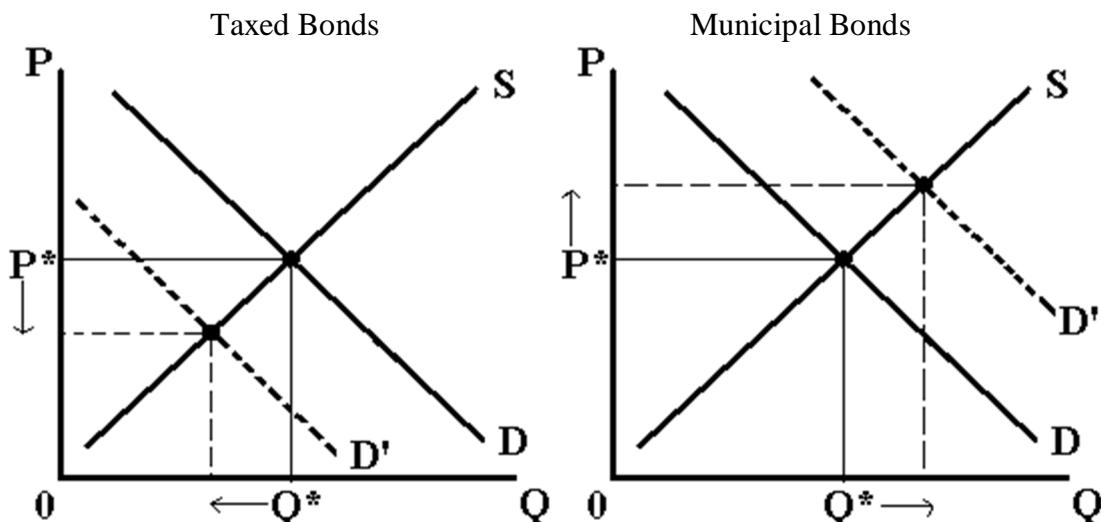
Demand and supply analysis shows the impact of taxes on the bond markets in Figure 4. Government taxes both the municipal and non-municipal bonds while the default risk, liquidity, and information costs are equivalent for both markets. Consequently, bond market prices have the same market price, P* and pay identical interest rates.

U.S. Government has exempted municipal bonds from federal taxes. Thus, investors are attracted to municipal bonds, boosting their demand, increasing the market price and decreasing the market interest rate. On the other hand, the taxed bonds are not as attractive as an investment, so investors buy fewer bonds, causing bond prices to fall and interest rates to rise. Therefore, municipal bonds have a lower interest rate than U.S. government bonds.

Term Structure of Interest Rates

Term structure of interest rates is the interest rates differ by maturity if the securities have identical risk, same liquidity, similar information costs, and the same taxes. Economists define

the term structure of interest rates for U.S. securities because the U.S. government issues a variety of securities with maturities ranging from 15 days to 30 years. No other finance company or business issues a wide range of securities that differ by maturity than the U.S. government. We show the interest rates for U.S. government securities in Table 1 for three specific dates: July 28, 1999, July 31, 2000, and July 17, 2006. Year 1999 was a good year for the U.S. economy as it grew fast with a low unemployment rate. Yield curve for years 2000 and 2006 predicted the recessions in 2001 and 2007.

Figure 4. Impact of taxes on the bond markets

Table 1. Term Structure of Interest Rates for U.S. Government Securities

Maturity	7/28/1999	7/31/2000	7/17/2006
1 month	N/A	N/A	4.91
3 month	4.71	6.27	5.11
6 month	4.79	6.42	5.30
1 year	5.04	6.07	5.24
2 year	5.54	6.30	5.12
3 year	5.59	6.24	5.07
5 year	5.70	6.16	5.04
7 year	5.97	6.19	5.04
10 year	5.81	6.04	5.07
20 year	6.30	6.13	5.23
30 year	6.01	5.79	5.10

Economists plot U.S. government securities by the market interest rates and maturity, which they call a *yield curve*. Yield curve could display a positive, negative, or flat slope and has two

characteristics. First, the yield curve usually slopes upward because the long-term securities have higher interest rates than short-term securities. Consequently, T-bonds would usually have a greater interest rate than T-bills. Second, interest rates move together, so the yield curve normally shifts upward or downward as the interest rates change.

Economists use three theories to explain why the yield curve has these two characteristics.

Segmented markets theory is supply and demand in each bond market determine the interest rate. For example, U.S. government securities are classified into specific and separate markets based on maturities. One group of investors only invests in T-bonds, while another group invests in T-bills. Consequently, the yield curve usually slopes upward because people prefer to hold short-term bonds rather than long-term bonds. Unfortunately, this theory cannot explain why interest rates move together in different markets, shifting the yield curve. If the markets of different maturities are separated and independent, a change in one bond market would not affect another market.

Expectations theory states investors view all securities with the same liquidity, risk, information costs, and taxes as perfect substitutes. Consequently, the interest rate on a long-term bond must equal the average of short-term interest rates that people expect to occur over the life of the security. For example, the current market interest rate on a one-year bond equals 9%. You expect the interest rate to rise to 11% next year, so when you buy another one-year bond for the following year, the average interest rate you expect to earn is 11%. If you decide to hold a two-year bond, the interest rate must be 10% because the interest rate will be 9% for the first year, and you believe interest rates will increase to 11% for the second year. After we average the two years, your return would equal 10%. If investors expect that short-term interest rates will rise, then the yield curve has a positive slope. If investors expect that short-term interest rates will drop, subsequently, the yield curve has a negative slope. If investors expect short-term interest rates will not change, then the yield curve becomes flat. Although expectations theory explains why short-term and long-term interest rates move together, the theory cannot explain why the yield curve usually has a positive slope. This implies investors would think short-term interest rates will increase most of the time, but the short-term interest rate could fall or rise.
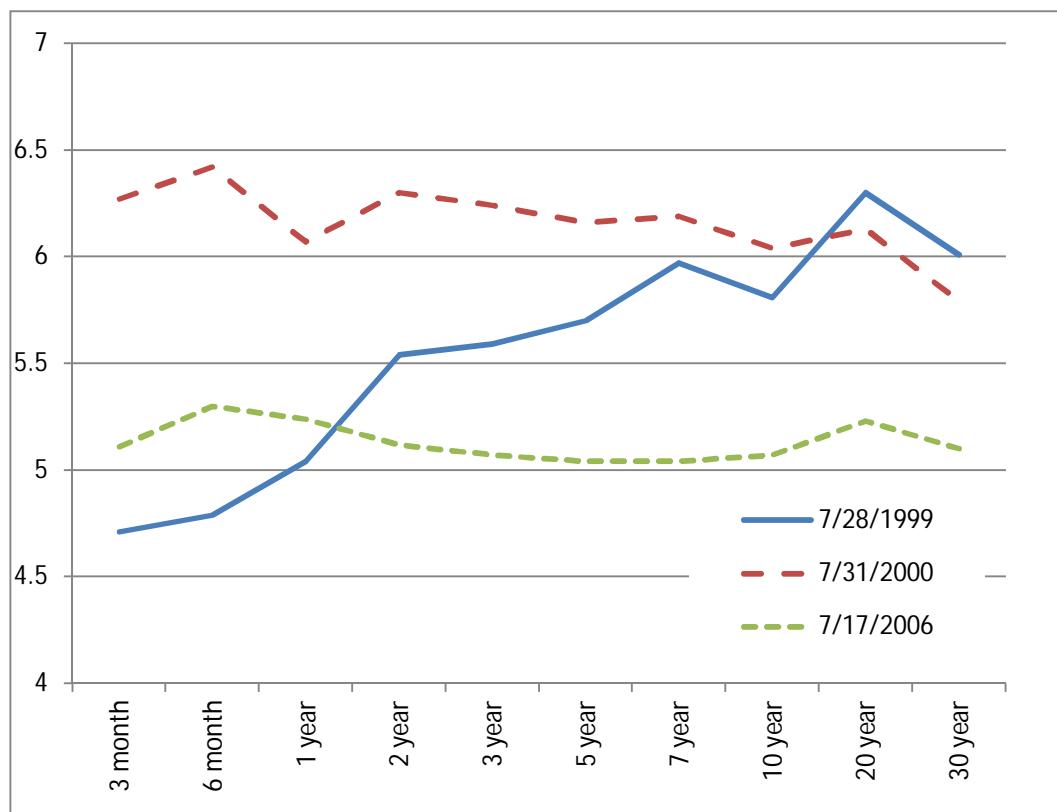
Preferred habitat theory is the most widely accepted theory and combines the expectations theory and segment markets theory together. Investors prefer to hold short-term bonds with a low, expected return because investors prefer that type or habitat. Money market securities fluctuate less than capital market securities as interest rates change. However, the investors will invest in long-term bonds if they earn a *term premium*, a higher interest rate. Consequently, the yield curve slopes upward because the investors add the term premium to long maturity bonds.

Preferred habitat theory, furthermore, explains why the long and short-term interest rates move together. Interest rate on a long-term bond equals the average of the short-term interest rates expected to occur over the life of the long-term bond. If investors expect the short-term interest rates will increase, then the yield curve has a positive slope. If investors expect that short-term interest rates will decrease, subsequently, the yield curve will have a negative slope. However, investors add a term premium, so the yield curve has a positive slope because the term premium is high enough to cancel the effect of changing interest rates.

Economists use the yield curve to predict economic activity. When a yield curve is downward sloping, such as a three-month T-bill interest rate exceeds the 10-year T-bond, a recession usually occurs one year later. Investors become pessimistic about the future and reflect their pessimism in the term structure of interest rates. We illustrate a normal, upward-sloping yield curve in Figure 5 for July 28, 1999, when the U.S. economy grew furiously with a low unemployment rate.

Yield curve inverted before the recessions of 2007, 2000, 1991, and 1981 had started. For example, the yield curve inverted on July 31, 2000, and the United States entered a recession in March 2001. Furthermore, the yield curve flipped upside down on July 17, 2006 and inverted several times through the year. Subsequently, the U.S. economy entered the Great Recession in December 2007, becoming the worst recession since the 1930s Great Depression (Haubrich and Millington 2014). Unfortunately, the world's economy still feels the lingering effects of the Great Recession in 2014.

Although many economists and analyst use the yield curve to forecast recessions, the yield curve is not a perfect predictor. It predicted two recessions in 1966 and 1998 that never occurred (Haubrich and Millington 2014).

Figure 5. The Yield Curve for U.S. government securities for three specific dates

Key Terms

default risk

default-risk-free instruments

default risk premium

bond rating

municipal bonds

term structure of interest rates

yield curve

segmented markets theory

expectations theory

preferred habitat theory

term premium

Chapter Questions

1. If one bond market has a high risk while the other is low risk, then how does risk impact the bond markets? Please use demand and supply analysis to answer this question.

2. If one bond market were highly liquid while the other market has low liquidity, subsequently, how would liquidity impact the bond markets? Please use demand and supply analysis to answer this question.

3. If one market has high information costs while the other does not, then how would information cost affect the bond markets? Please use demand and supply analysis to answer this question.

4. If a government taxes one bond market but not another, subsequently, how would taxes affect the bond markets? Please use demand and supply analysis to answer this question.

5. Explain both the term structure of interest rates and the yield curve.

6. Which three theories explain the characteristics of the yield curve? Which theory is plausible?

7. If you saw a yield curve with a negative slope, which economic phenomenon would you predict to occur in a year?

10.   The Banking Business

We study the business of banking by examining a bank's assets, liabilities, and capital. Then we examine several bank scenarios to show how outside factors influence a bank's balance sheet. We record these changes by using a reduced balance sheet called T-accounts. For example, we illustrate how a bank could become insolvent, while another scenario includes the impact of interest-rate risk upon a bank's balance sheet. Then we discuss how banks use securitization to convert loans into marketable securities and how this led to the 2008 Financial Crisis. Furthermore, students must understand Chapter 10 to understand the next chapter because Chapter 11 examines the Federal Reserve's balance sheet, and the public and banking system influence over the money supply.

A Bank's Balance Sheet

Checking and savings accounts are very popular in the United States. U.S. households invest nearly 1/4 of their wealth in banks. They make payments by using checks that transfer money from one bank and to another bank. One reason behind the popularity of bank accounts is the *federal deposit insurance*. If a bank bankrupts and customers cannot withdraw cash from their bank accounts, then the federal government will step in and pay the depositors their accounts. Deposit insurance guarantees each customer will not lose a maximum of $250,000 if his or her bank fails.

A *balance sheet* is a financial statement that lists all the bank's assets and liabilities. Assets are things a bank owns, while liabilities are things a bank owes to other people. Accountants list assets on the left and liabilities on the right. Subsequently, accounting transactions conform to the Equation 1.

Total Assets = Total Liabilities + Capital   (1)

Capital equals total assets minus total liabilities. Capital has many names, such as net equity, net worth, or net assets. If the business is a corporation, then we call this capital – stockholders' equity.

Liabilities are the first item on a bank's balance sheet. They are the source of funds for a bank with the most important being deposit accounts. Referring to Table 1, people and businesses held $8.1 trillion in deposits. Then checking accounts become one the most important deposit accounts. For example, if you needed money and went into a bank, the bank must allow you to withdraw money from your checking account immediately on demand. Consequently, checking accounts become a liability to the bank because the bank owes you this money. Moreover, checking accounts earn the lowest interest rate and are usually the cheapest source of funds for a bank.

Non-transaction deposits are the second liability. These deposits include the various types of savings accounts. These accounts earn interest and do not allow check-writing privileges.

Consequently, these deposits require fewer bank services and earn higher interest rates than checking accounts. Non-transaction deposits include:

- ❖ *Savings account* is the most common and pays a higher interest than interest on checking accounts. However, savings accounts have fewer services than checking accounts.

- ❖ *Small-denomination time deposits* (Also called Certificates of Deposit) have maturities ranging from several months to over 5 years. Although they are less liquid than a savings account, they pay higher interest.

- ❖ *Large-denomination time deposits* are accounts that exceed $100,000. Corporations and banks invest in these securities. Investors can sell these time deposits in a secondary market before maturity. Therefore, they are liquid and an alternative to T-bills. As Table 1 shows, investors held $702.8 billion in large time deposits in December 2013.

Table 1. Commercial Banks Assets and Liabilities on December 2013

Assets in billions of dollars		Liabilities in billions of dollars	
Securities in bank credit	2,515.0	Deposits	
Loans			
Commercial and industrial loans	1,334.2	Large time deposits	702.8
Real estate loans	3,498.2	Other deposits	8,114.2
Consumer loans	1,155.8	Borrowings	
All other loans and leases	756.5	Borrowings from U.S. banks	97.1
Allowance for loan and lease losses	*(123.3)*	Borrowings from others	840.3
Fed funds	81.8	Trading liabilities	116.7
Loans to commercial banks	8.9	Net due to related foreign offices	40.5
Cash assets	1,379.1	Other liabilities	360.1
Trading assets	119.9		
Other assets	1,060.0	Capital	1,514.6
Total assets	11,786.2	Total Liabilities plus capital	11,786.3

Source: Board of Governors of the Federal Reserve System. February 7, 2014. Assets and Liabilities of Commercial Banks in the United States (Weekly) - H.8. Available at http://www.federalreserve.gov/releases/h8/current/default.htm (access date: 02/12/14).

   Borrowings become the last liability. A bank borrows funds if the bank can lend the funds to a borrower for a higher interest rate than the interest rate paid on the borrowings. Borrowings are not deposit accounts. Banks can borrow from the Federal Reserve or from other banks. We call a Federal Reserve loan a *discount loans*. We show the banks' borrowings in Table 1. U.S. banks borrowed $97.1 billion from U.S. banks and $840.3 billion from others nonbanks.

   On the other side of a bank's balance sheet, a bank has *assets*. Bank takes funds from depositors and loans these funds to borrowers who pay interest. Thus, banks earn interest from the loans becoming a vital source of income for the bank. Reserves are the first and most liquid

asset. They include three items. First, a bank holds *vault cash*, which is simply cash the bank holds in its safe. A bank has money, so a bank can pay depositors cash when they come to the bank to withdraw funds. According to Table 1, U.S. banks held $1.4 trillion in December 2013. Second, a bank holds deposits at another bank because these deposits can aid in check clearing and in foreign exchange transactions. Finally, the bank holds deposits at the Federal Reserve. A central bank forces banks to hold a percentage of the bank's checkable deposits, which are *required reserves*. The Federal Reserve wants to ensure that banks have enough reserves to meet depositors' withdrawals.

Marketable securities are the second asset. Banks hold U.S. government securities, such as T-bills, T-notes, T-bonds, and municipal bonds. (Banks can hold mortgage-backed securities, which we discuss under Securitization). These securities are very liquid that we sometimes call secondary reserves. If banks need cash reserves fast, then the bank can sell its marketable securities quickly. U.S. banks held roughly $2.5 trillion in December 2013 as shown in Table 1.

Loans are the third asset and the most important source of income. In December 2013, loans represented roughly 60% of total assets. Unfortunately, loans have a greater probability of default than other assets, lower liquidity, and more information costs. However, banks are compensated for this risk by earning higher interest rates. Loans earn higher interest rates than marketable securities. According to Table 1, U.S. banks lent $1.3 trillion as commercial and industrial loans, $3.5 trillion for real estate, and $1.2 trillion for consumer loans. Fifty-four percent of consumer loans comprise credit cards.

Federal funds market can be a bank asset or a liability. Each bank must hold reserves in the form of vault cash plus deposits at the Federal Reserve. The Federal Reserve sets the percentage of reserves a bank must hold because reserves help ensure banks have cash to meet depositors' withdrawals. Federal funds market is one bank with excess reserves at the Fed can lend these reserves to another bank that is short in reserves. These loans are usually overnight, where banks transfer electronically the funds. Consequently, Federal Funds become an asset for the lending banks and a liability to the borrowing banks. Referring to Table 1, banks lent $81.8 billion to other banks in the Federal Funds in December 2013. *Federal funds rate* reflects the interest rate for this market.

Table 1 contains two items that are not self-explanatory. U.S. banks estimated $123.3 billion in bad debt and losses during December 2013. We labeled this loss - Allowance for loan and lease losses. Furthermore, U.S. banks held 119.9 billion in trading assets that banks use in derivatives trading. Finally, the remaining bank's assets earn no interest and include physical capital, such as the bank's buildings, computers, and other equipment, which totaled roughly $1 trillion.

Bank's *net worth* or capital becomes the last item on the bank's balance sheet. Capital equals total assets minus total liabilities. All banks organize themselves into corporations. A corporate bank's capital is the stock sold to the investors plus the bank's profit. Creditors consider capital important because it provides a financial cushion for loans and obligations. If a company bankrupts and cannot repay a loan, the creditors have the first priority of the company's assets, while the shareholders have the last priority. A positive capital ensures the bank can repay its loan obligations. A bank's net worth averaged roughly 12.9% in December

2013. After the 2008 Financial Crisis, banks started accumulating more capital to deal with future financial crises.

A Bank Failure

A *bank failure* is a bank develops financial problems and fails. Unfortunately, the bank cannot return the depositors' money. A government imposes regulations to encourage banks to hold a large amount of reserves, marketable securities, and equity capital, reducing a chance of bank failure.

In this analysis, we use T-accounts. A *T-account* represents a simplified balance sheet listing only changes for assets, liabilities, and net worth. For example, you open a checking account at your bank and deposit $100 cash. We record the transaction below:

Your Bank

Assets	Liabilities
+$100 Reserves	+$100 Checking account

A central bank, for example, requires commercial banks to hold 10% of deposits in the form of vault cash and/or reserves at the central bank. Therefore, $10 of your checking account becomes required reserves while the remaining becomes excess reserves. Banks can lend their *excess reserves* to borrowers, and we record the transaction below:

Your Bank

Assets	Liabilities
+$10 Required reserves + 90 Excess reserves	+$100 Checking account

Bank earns no interest on reserves, so the bank grants a loan to a borrower for $90. Loan becomes the bank's source of income, and we record the transaction below:

Your Bank

Assets	Liabilities
+$10 Required reserves + 90 Loans	+$100 Checking account

For the bank to earn a profit, the bank must earn a higher interest rate on the loan than the level of interest the bank pays on your checking account. If a borrower defaults and does not repay the loan, subsequently, the bank must return your $100, when you demand it. The bank would pay $90 from the bank's net worth and $10 from required reserves.

Banks face another complication, *liquidity risk* – the depositors withdraw more money from their accounts than the amount of cash held in a bank's vault. Consequently, banks developed asset and liability management to prevent liquidity risk. Asset management is banks lend to

borrowers, who will pay high interest rates and are not likely to default on their loans. Then, banks purchase securities that have high returns, are liquid, and have low default risk. If depositors begin withdrawing funds, the banks can sell the liquid securities and pay the depositors' withdrawals. Liability management is banks cannot force customers to open checking and savings accounts. Thus, banks are limited in these funding sources. However, banks use financial instruments, such as certificates of deposits, Eurodollars, federal funds market, and repurchase agreements. Currently, banks have few restrictions in raising funds.

Illustrating liquidity risk for your bank, we show your bank's balance sheet below. The Federal Reserve requires your bank to hold 10% of deposits as required reserves. Thus, your bank has enough funds to meet depositors' withdrawals.

<div align="center">Your Bank</div>

Assets			*Liabilities*
Required reserves	$10 million		
Excess reserves	10 million	Deposits	$100 million
Loans	80 million	Bank Capital	10 million
Securities	10 million		

Depositors withdraw $10 million that decreases deposits by $10 million. Bank pays the funds from excess reserves, equaling $10 million. Consequently, this bank has met withdrawal demands. Both bank deposits and excess reserves decrease by $10 million, shown in the T-account below:

<div align="center">Your Bank</div>

Assets			*Liabilities*
Required reserves	$10 million		
Excess reserves	0 million	Deposits	$90 million
Loans	80 million	Bank Capital	10 million
Securities	10 million		

Depositors withdraw another $10 million, and the bank pays the withdrawals from required reserves. Both deposits and required reserves decrease by $10 million, shown in the T-account below

<div align="center">Your Bank</div>

Assets			*Liabilities*
Required reserves	$0 million		
Excess reserves	0 million	Deposits	$80 million
Loans	80 million	Bank Capital	10 million
Securities	10 million		

Bank must hold 10% of deposits as reserves, and the bank must find $8 million for required reserves. Your bank has the following options:

❖ Bank could sell $8 million of securities to raise funds.

❖ Bank asks several borrowers to repay $8 million in loans. Moreover, the bank could sell loans to other banks.

❖ Bank borrows the funds from the central bank or from another commercial bank.

Your bank borrows the $8 million from the Federal Reserve as a loan. Your bank managed the liquidity risk well. We show your bank's balance sheet below:

Your Bank

Assets				Liabilities
Required reserves	$8 million		Deposits	$80 million
Excess reserves	0 million		Bank Capital	10 million
Loans	80 million			
Securities	10 million		Fed loan	8 million

How does a bank prevent a bank failure? A bank holds excess reserves and short-term, highly liquid securities to prevent a bank failure. In the next example, your bank has the following balance sheet below, and your bank will fail.

Your Bank

Assets				Liabilities
Required reserves	$10 million			
Excess reserves	0 million		Deposits	$100 million
Loans	90 million		Bank Capital	10 million
Securities	10 million			

Public circulates a rumor the bank president lost millions in the derivatives market and had disappeared to the Bahamas. Consequently, you and the other depositors are afraid your bank will fail, so you and the depositors withdraw $20 million from your bank. Your bank sells $10 million in securities and uses $10 million in required reserves to meet depositors' withdrawals, shown in the T-account on the next page.

Your Bank

Assets			Liabilities
Required reserves	$0 million		
Excess reserves	0 million	Deposits	$80 million
Loans	90 million	Bank Capital	10 million
Securities	0 million		

Now your bank needs $8 million in required reserves. If your bank sold the loans, the bank would sell the loans for a lower value than the bank's book value. Furthermore, the other banks do not know your bank's borrowers, so these banks will buy the loans for a fraction of the loan's value, generating a substantial loss. Your bank could ask other banks for a loan, but other banks may decline if they believe your bank will fail. Your bank could ask the Federal Reserve for a loan, but the Fed may not grant the loan.

Your bank sells $40 million of loans, but the other banks will pay $25 million for them. Now your bank became insolvent because total liabilities exceed total assets. Unfortunately, your bank could fail. When a bank becomes insolvent, the U.S. federal government can legally take control of the bank. The bank could have prevented its failure if the bank had more reserves or more highly liquid securities. We display your insolvent bank's balance sheet below.

Your Bank

Assets			Liabilities
Required reserves	$25 million	Deposits	$80 million
Loans	50 million	Bank Capital	10 million

As you can see from the previous example, a bank could fail if too many loans go bad. A bank is concerned about credit risk. **Credit risk** is a risk that borrowers will default on their loans. One method banks use to lower credit risk is to diversify their loan portfolios. Banks spread their loans across different industries, different regions, and different loan borrowers. For example, a bank grants loans for credit cards, mortgages where the homes are spread across the state, and commercial loans for hotels, restaurants, retail stores, and factories. If a factory bankrupts and defaults on its commercial loan, the loan default does not harm the bank severely because the bank is earning income on the other loans.

Adverse selection becomes a problem for banks. Some borrowers apply for bank loans, when the borrowers know they will default. Banks implement six procedures to reduce adverse selection, which include:

❖ Banks perform *credit-risk analysis*. Bank collects information about the borrowers' employment, income, and net worth. From this information, the bank assesses the borrowers' ability to repay their loans.

❖ Bank prevents adverse selection by requiring *collateral*. Borrowers pledge assets to the bank. If a borrower defaults on the loan, then the bank will seize the asset. For example, the house becomes the collateral for a mortgage. If the homeowner defaults on the mortgage, then the bank takes possession of the house.

❖ Bank minimizes adverse selection by *credit rationing*. Banks establish a maximum amount of loan for a borrower. For example, banks grant a maximum credit of $1,000 to college students. If a bank granted a credit limit of $10,000, then some students would borrow the full amount and cannot repay the credit-card balance.

❖ Banks use restrictive covenants to minimize adverse selection. Banks specify conditions or *restrictive covenants* in the loan agreement that prevent the borrowers engaging in certain activities. For example, a person applies for a home-improvement loan and plans to use the loan to speculate in the derivatives market. Bank place a restrictive covenant in the loan agreement. Borrower can only use the loan for home improvement.

❖ Banks may ask the borrower to have another relative having a good credit history co-sign the loan. If the borrower defaults, then the bank can demand payment from the borrower or co-signer.

❖ Banks minimize adverse selection by fostering a long-term relationship with the borrowers. When the banks know their customers well, they can accurately assess the customers' risk of default.

The Interest Rate Risk

Interest rates became volatile during the 1980s, forcing banks to become more concerned with interest-rate risk. Banks experience an *interest-rate risk*, when changes in the interest rates cause the banks' profit to fluctuate. We show an example of a bank's balance sheet below:

Your Bank

Assets		*Liabilities*	
Interest-rate sensitive assets:	$20 million	Interest-rate sensitive liabilities:	$50 million
❖ Variable-rate loans		❖ Certificates of deposit	
❖ Short-term securities		❖ Money market deposit accounts	
Fixed-rate assets:	$80 million	Fixed-rate liabilities:	$50 million
❖ Long-term bonds		❖ Checkable deposits	
❖ Long-term securities		❖ Savings accounts	

Interest-rate sensitive items are short-term securities, variable interest-rate loans, and short-term deposits. When the interest rate varies, these items change almost immediately. On the other hand, the fixed-rate assets and liabilities are not sensitive to interest rate changes. These loans and securities are locked into one interest rate for a long time period. Banks consider checking and savings accounts fixed-rate liabilities because these accounts pay little or no interest.

If the interest rate increases from 10% to 15%, which equals a 5% interest increase, then the income from interest-rate sensitive assets increases by $1 million (0.05 × $20 million = $1 million). Moreover, the cost of funds increases by $2.5 million (0.05 × $50 million = $2.5 million). Consequently, the bank's profits decline by $1.5 million ($1 M - $2.5 M = -$1.5 million). Unfortunately, changes in the interest rates impact a bank's profits significantly.

Three conditions occur as the interest rates fluctuate:

❖ If the interest-rate sensitive liabilities **exceed** the interest-rate sensitive assets, then rising interest rates cause banks' profits to plummet, while falling interest rates cause banks' profits to increase.

❖ If the interest-rate sensitive liabilities **are less than** interest-rate sensitive assets, subsequently, increasing interest rates cause banks' profits to soar, while declining interest rates cause banks' profits to plummet.

❖ If the interest-rate sensitive liabilities **equal** the interest-rate sensitive assets, then fluctuating interest rates do not affect bank profits.

For example, if the bank manager knows the interest-rate sensitive liabilities exceed the interest-rate sensitive assets, and he believes interest rates will fall, then he will do nothing. Bank manager expects the bank's profit to rise. If a bank manager thinks interest rates will increase, subsequently, he would boost interest-rate sensitive assets and decrease interest-rate sensitive liabilities by manipulating balance sheet items.

During the last 20 years, four factors changed how a bank manages its balance sheet. First, the U.S. federal government deregulated the financial markets, granting banks more flexibility in acquiring assets and liabilities. Second, financial innovation created new, liquid financial instruments, such as repurchase agreements, federal funds market, and securitization. Banks securitized their bank loans and transformed them into liquid securities. Third, the high volatility of interest rates during the 1980s contributed to the creation of new financial instrument, such as the *floating-rate debt*. Some banks grant loans to borrowers with variable interest rates. If the interest rate rises, subsequently, the banks increase the interest rate on the loans. For example, a variable interest rate mortgage is an *adjustable-rate mortgage (ARM).* Finally, the derivatives market expanded during the 1980s. Banks could buy futures and options to protect themselves from changing interest rates and exchange rate. Therefore, banks learned to protect themselves from interest rate fluctuations.

Securitization and the 2008 Financial Crisis

Securitization is similar to a mutual fund. We define securitization as the process of transforming illiquid financial assets into marketable securities. Banks and financial institutions package similar loans together, such as mortgages, place them into a fund, and issue securities that are tied to the fund's assets. Then investors buy the securities to earn the return on the fund's assets. On average, the pool of funds has a predictable cash flow as people pay their loans. Then investors receive these payments as investment. Banks used securitization because they use computers to simplify the record keeping process.

Securitization is more complex because a fund could issue different bonds called tranches. A *tranche* is a French term meaning a portion or slice. Each tranche has a bond associated with a risk level and a different credit rating. Credit-rating agencies could rate some bonds as AAA that pays the lowest return to investors, but investors are first in line if the fund goes bust. Furthermore, the fund issues risky bonds, called speculative grade that pay a higher return, but investors would lose their investments if the fund bankrupts.

Banks did not use securitization on a large scale before the 1990s because the banks could not price the different tranches in the fund until a statistician, David Li, devised a method in 2000. Li's method allows easy and quick pricing of these tranches. Consequently, the bankers and financiers applied securitization to a variety of assets. They securitized mortgages, car loans, third world debt, credit cards, and student loans. Securitization of mortgages has its own named, *mortgage asset-back securities (ABS)*. Unfortunately, the securitization of mortgages led to the U.S. housing bubble between 2000 and 2007. Even in 2013, banks held $1.3 trillion in asset-back securities.

A problem of the U.S. housing bubble was the banks relaxed their loan requirements. Before 2000, banks would grant home loans only to borrowers with a stable work history and good credit history. Furthermore, the borrowers documented their incomes completely. During the housing bubble, several large U.S. banks relaxed their lending standards. Homebuyers could state their incomes without verifying them. Furthermore, banks granted mortgages to people with poor credit or poor work history, called *subprime loans*. After the U.S. economy had entered the 2007 Great Recession, the subprime loans turned into toxic loans as the subprime borrowers began defaulting on their loans in record numbers.

Banks relaxed their loan standards because they would not suffer from a mortgage default. Banks used securitization to "cash" out the mortgages and "pushed" the default risk onto the investors. Cashing out of the mortgages gave banks funds to grant new mortgages and continue the process. Consequently, the banks relaxed their loan standards maintaining a strong demand for mortgage loans. This credit flow rapidly appreciated housing prices in the United States between 2000 and 2007. If a borrower had defaulted on the mortgage, homes kept appreciating over time, so foreclosures did not harm banks and investors. Banks and investors foreclosed on homes that soared in value.

Banks earn short-term profits from the mortgage closing cost fees and managing the fund. In addition, attorneys earn legal fees from the fund's setup. Of course, the banks do not earn the cash flow from a mortgage because the fund investors do. For example, if a family bought a

$100,000 home at 7% interest rate, as a 30-year mortgage, then their monthly payment equals $665 per month. This payment does not include property taxes, homeowner's insurance, and other fees. However, the homeowner pays a total of $139,509 of interest to the investors' fund over the life of the loan.

Banks persuaded homeowners to accept adjustable-rate mortgages (ARMs). Thus, a mortgage payment changes as the interest rate changes. At the beginning, homeowners paid low mortgage payments, but payments would explode in size as interest rates reset to higher levels. Using the same example with a $100,000 mortgage with no principal paid, and the interest rate climbs to 10%, then the homeowner's monthly payment climbs to $878 per month, increasing by $213. Thus, they pay a total interest of $215,925 to the investor fund. With home prices in California averaging $500,000, these numbers become extreme. Some of the largest players in securitization included Countrywide Financial, Lehman Brothers, and Wells Fargo.

Investment banks profited from the U.S. housing market, contributing to the housing bubble. Investment banks packaged the bonds from mortgage asset-backed securitized into *Collateralized Debt Obligations (CDOs).* They used re-securitization, where the investment banks took securitized bonds and placed them into a fund, and issued new securities that they sold to investors. The bankers created CDOs with tranches to offer different returns and risk levels to investors. Then the investment bankers sold CDOs to investors around the world, avoiding U.S. regulations. Consequently, the investment banks earned fees from the fund's setup and from the fund's management.

Credit-rating agencies, such as Standard & Poor, and Moody's conspired with the investment banks. Credit agencies always rated CDOs with an AAA credit rating, even though some CDO's funds contained subprime mortgages. Credit-rating agencies were either incompetent or perpetuating fraud. Many investors and pension fund managers only invest in AAA rated securities. Without the AAA rating, the investment bankers could not sell the CDOs. For example, many state governments require pension fund managers to invest in AAA rated investments. Thus, the Wall Street Bankers sold their CDOs to pension funds for police, teachers, and government workers. Furthermore, the CDOs were not transparent, and many investors did not understand how they worked. The AAA credit rating became vital for bankers to sell the CDOs.

A company can use a collateralized debt obligation to enhance their financial statements artificially. For example, a company could package their debt into CDOs. Subsequently, they became investors and purchased the bonds to this CDO fund, converting liabilities into assets. Financial analysts do not know how many companies used CDOs to improve their financial statements. The CDO market ranged from $0.5 trillion to $2 trillion in 2006.

Mortgage asset-backed securities and collateralized debt obligations attracted large sums of money to U.S. housing market, causing the rapid appreciation of housing prices. Commercial banks kept lowering their lending standards to grant more people mortgages. Real estate agents in Houston repeated a joke – if you have a heartbeat and paycheck stub in your pocket, then a bank would grant you a mortgage loan. Subsequently, the 2007 Great Recession struck the U.S. economy. Unemployment rate soared to 10%, and households, especially the subprime market, began defaulting on their mortgages in record numbers. Housing construction industry had

collapsed, when homeowners stopped buying houses. Then the U.S. housing bubble deflated as housing prices began plummeting.

Surge in mortgage defaults caused the investors to question ABS and CDOs, and they stopped investing in securitized debt. Subsequently, both the commercial and investment banks became stuck with billions in unsold CDOs. Furthermore, the banks and investors of CDOs and ABS foreclosed on homes that are losing value. Unfortunately, if the banks accumulate too many bad mortgages, then they become insolvent. Finally, the 2008 Financial Crisis caused fear, panic, and paranoia to sweep across the financial world. Banks and financial institutions had frozen all credit and loans overnight.

Key Terms

federal deposit insurance	net worth
balance sheet	bank failure
capital	T-account
liabilities	excess reserves
non-transaction deposit	liquidity risk
savings account	credit risk
small-denomination time deposit	credit-risk analysis
large-denomination time deposit	collateral
borrowings	credit rationing
discount loan	restrictive covenants
assets	interest rate risk
vault cash	floating-rate debt
required reserves	adjustable-rate mortgage
marketable securities	securitization
loans	tranche
Federal funds market	mortgage asset-back securities
Federal funds rate	collateralized debt obligations

Chapter Questions

1. Identify a bank's assets, liabilities, and capital.

2. Explain a bank's net worth and its importance.

3. Explain liquidity risk.

4. How does a bank become insolvent?

5. Identify methods banks can reduce adverse selection.

6. How did the 2007 Housing Bubble cause banks to become insolvent?

7. Identify methods a bank can protect itself from the interest rate risk.

8. Explain floating rate-debt.

9. Define and explain securitization.

10. Could the Federal Reserve have prevented the 2008 Financial Crisis?

11.   The Money Supply Process

We examine the Federal Reserve's balance sheet in this chapter and explain how fluctuations in the Fed's assets and liabilities affect the money supply. Money supply greatly influences the interest rates, exchange rates, inflation, and a country's production of goods and services. Furthermore, fluctuations in the money supply impact the financial markets, such as bond and stock prices and the economic well-being of society. Unfortunately, the Fed can only influence the money supply because the public and banks also influence the money supply. For this chapter, we use the definitions of money, M1 and M2, to explain how the banking system expands the money supply by the multiple deposit expansion.

The Fed's Balance Sheet

Monetary base equals the currency in circulation plus reserves held by commercial banks. *Currency in circulation* is the Federal Reserve Notes the public is holding, i.e. U.S. money, which does not include *vault cash* at the banks because we already counted the vault cash as bank reserves. Moreover, the Fed can directly influence the monetary base, and in turn, the monetary base influences the money supply. Before understanding how the money supply process works, we introduce the Fed's balance sheet. Consequently, the currency in circulation and *bank reserves* are liabilities to the Federal Reserve.

Using a simple example, the Fed sets the *required reserve ratio* to 10%, which is the percentage of total reserves that banks must hold as reserves at the Fed or as vault cash. If you open a bank account by depositing $100, then the bank must hold 10% of your deposit, which equals $10. Thus, the $10 is the *required reserves*. A bank could hold more than $10, which are *excess reserves*. Consequently, the bank holds reserves to meet depositors' withdrawals. You could return to your bank and withdraw your $100 deposit. Subsequently, the bank returns your money from its reserves. Bank either holds $10 in its vault or deposits the $10 with the Fed. Did you notice bank reserves are assets to the bank, but liabilities to the Fed? On the other hand, the public holding money is an asset, but money is a liability to the Fed.

The Fed has two important assets: government securities and discount loans. When the Fed increases its assets, the monetary base rises When the Fed decreases its assets, the monetary base declines. The Fed can change the monetary base through open-market operations. An *open-market operation* is the Fed buying and selling financial securities. Usually the Fed buys and sells U.S. government securities. When the Fed buys U.S. government securities, we call it an *open-market purchase* because the Fed's assets increase, expanding the monetary base. The Fed can sell U.S. government securities, called an *open-market sale*. The Fed's assets decrease, contracting the monetary base. For example, the Fed buys a $10,000 T-bill from your bank. We list the transaction on the next page in the T-account:

Your Bank

Assets	Liabilities
-$10,000 T-bill +$10,000 Deposit at the Fed	

The Fed

Assets	Liabilities
+$10,000 T-bill	+$10,000 Bank reserves

The Fed buys the T-bill by using a Fed check. When the bank sends the check to the Fed, the Fed increases the reserves at your bank. A Fed check is not backed by money per se. As the Fed clears its own check, it adds numbers to a bank's accounting books. Afterwards, the bank's reserves increase and your bank can lend to someone, so the bank earns interest. Consequently, the Fed's assets increase while both the monetary base and money supply expand.

For the second example, the Fed buys one T-bill from you for $10,000, using a Fed check. Subsequently, you deposit the Fed check at your local bank, and your net assets did not change. Bank's reserves increase by $10,000, as well as the demand deposit. Finally, the Fed's T-account becomes identical to the last example.

You

Assets	Liabilities
-$10,000 Treasury Bill +$10,000 Demand Deposit (Checking)	

Your Bank

Assets	Liabilities
+$10,000 Fed Reserve Deposit	+$10,000 Demand Deposit

The Fed

Assets	Liabilities
+$10,000 T-bill	+$10,000 Bank reserves

Money supply has risen because you traded the T-bill for a demand deposit. It makes no difference if the Fed purchased U.S. securities from the public or a bank. Consequently, the Fed's assets increase, expanding the monetary base. Your bank's reserves increase, and your bank can lend to earn interest. Then the money supply increases. If the Fed sells U.S. government securities, subsequently, the opposite occurs.

The Fed loans are the second most important asset. The Fed lends to banks, helping the banks survive liquidity problems. The Fed loans are called ***discount loans***. Furthermore, we call the interest rate the Fed charges for these loans the ***discount rate***. The Fed does not use loans to influence the monetary base. Instead, the Fed relies on open-market operations because the Fed

has complete control over how many securities, it buys and sells. With discount loans, the banks determine whether they want to borrow from the Fed. The Fed cannot force a bank to accept a loan. However, if the Fed makes more discount loans, subsequently, the Fed's assets increase, expanding both the monetary base and money supply. For example, a bank asks the Fed for a loan of $1 million.

<div align="center">The Bank</div>

Assets		Liabilities	
Reserves at Fed	+$1 million	Loan from Fed	+$1 million

<div align="center">The Fed</div>

Assets		Liabilities	
Loan to institution	+ $1 million	Bank reserves	+$1 million

Bank's reserves increased by $1 million, and the bank can grant more loans, expanding the money supply. When the bank repays the Fed loan, subsequently, the Fed's assets become smaller. Furthermore, both the monetary base and the money supply decrease. We show the transaction below in the T-accounts:

<div align="center">The Bank</div>

Assets		Liabilities	
Reserves at Fed	-$1 million	Loan from Fed	-$1 million

<div align="center">The Fed</div>

Assets		Liabilities	
Loan to institution	-$1 million	Bank deposit at Fed	-$1 million

Multiple Deposit Expansion and Contraction

Banking system creates the money supply through *multiple deposit expansion*. This means if the Fed increases the monetary base by $1, then the amount of checkable deposits in the banking system will increase by more than $1. Checkable deposits are a component of the M1 definition of money, consequently, the money supply increases by more than $1. We show the multiple deposit expansion by using an example.

The Federal Reserve increases the money supply, so the Fed buys a $10,000 U.S. T-bill from you. You take the Fed check and deposit the whole $10,000 at your bank into your checking account. We record the transaction in the T-account on the next page.

Your Bank

Assets		Liabilities	
Required Reserves	$1,000	Deposits	$10,000
Excess Reserves	9,000		

Money supply immediately expands by $10,000. Bank must hold 10% of its deposits as required reserves. Thus, the bank holds $1,000 of reserves against your account as a deposit at the Fed or as vault cash. However, the bank has $9,000 in excess reserves. These reserves earn no interest, and consequently, the bank loans them out. For instance, your bank grants a $9,000 car loan to your friend. We display the transaction below:

Your Bank

Assets		Liabilities	
Required Reserves	$1,000	Deposits	$10,000
Excess Reserves	0		
Loans	9,000		

Bank sends your friend a check for $9,000. Your friend takes this check to a car dealership and buys a car. Car dealer deposits this check at his bank, and we record this transaction below:

The Car Dealer's Bank

Assets		Liabilities	
Required Reserves	$900	Deposits	$9,000
Excess Reserves	8,100		
Loans	0		

Did you notice the change in the money supply? Money supply expanded by $19,000 because you have $10,000 sitting in your account, and the car dealership has $9,000 in his account. Car dealer's bank must hold 10% of the deposit, equaling $900. Remaining funds, $8,100, earn no interest. Consequently, the car dealer's bank lends this out. Car dealer's bank grants $8,100 business loan. We record this transaction below:

The Car Dealer's Bank

Assets		Liabilities	
Required Reserves	$900	Deposits	$9,000
Excess Reserves	0		
Loans	8,100		

Small business contracts with a construction company to renovate his business. Construction company receives a check for $8,100 and deposits this check in its bank. We record the transaction below:

Construction Company's Bank

Assets		Liabilities	
Required Reserves	$810	Deposits	$8,100
Excess Reserves	7,290		
Loans	0		

Construction company's bank must hold 10% of this deposit, equaling $810. Remaining reserves, $7,290, earn no interest, and consequently, this bank grants a loan. Did you notice the change in the money supply? Money supply has expanded by $27,100, which includes the $10,000 in your account, $9,000 in the car dealer's account, and $8,100 in the construction company's account. When the construction company's bank grants a loan, then the money supply would increase again, and multiple deposit expansion occurs infinitely.

We can derive the maximum change in the money supply when the monetary base changes. First, we start with the formula for total reserves in Equation 1.

$$\text{Total Reserves} = \text{Required Reserves} + \text{Excess Reserves} \tag{1}$$

In this case, excess reserves equal zero because banks earn no interest. Banks grant loans using their excess reserves. Second equation calculates required reserves. When a bank accepts a new checking account, the bank must hold a percentage of the deposit, which is Equation 2.

$$\text{Required Reserves} = \text{Deposits} \times \text{Required Reserve Ratio } (r_r) \tag{2}$$

We substitute Equation 2 into Equation 1 and set the excess reserves equal to zero, which yields Equation 3.

$$\text{Total Reserves} = \text{Deposits} \times r_r \tag{3}$$

Did you notice the money supply changes when the Federal Reserve changes the bank reserves? We show reserve changes in Equation 4 and deposit changes in Equation 5. The Δ symbol means change, and we take the difference between two adjacent time periods. First time period is t, while the future time period is t+1.

$$\Delta\text{Reserves} = \text{Total Reserves}_{t+1} - \text{Total Reserves}_t \tag{4}$$

$$\Delta\text{Deposits} = \text{Deposits}_{t+1} - \text{Deposits}_t \tag{5}$$

If we write Equation 3 for two adjacent time periods: t and t+1. Equations become Total Reserves$_{t+1}$ = Deposits$_{t+1}$ × r$_r$ and Total Reserves$_t$ = Deposits$_t$ × r$_r$. Then we subtract the equation for the time period t+1 from the equation for the time period t, yielding Equation 6.

$$\Delta\text{Reserves} = \Delta\text{Deposits} \times r_r \tag{6}$$

We solve Equation 6 for change in deposits, yielding the money supply equation in Equation 7.

$$\mathit{\Delta}\text{Deposits} = \mathit{\Delta}\text{Reserves} \times \frac{1}{r_r} \tag{7}$$

If the Federal Reserve increases the monetary base by buying \$10,000 of T-bills, subsequently, the bank reserves increase by \$10,000. If the required reserve ratio equals 10%, then we substitute this into Equation 7. Consequently, checkable deposits would rise by \$100,000. We call this formula the ***simple deposit multiplier***, which equals ($1 \div r_r$). Simple deposit multiplier shows the maximum increase of the money supply for a change in bank reserves.

Simple deposit multiplier assumes the banks lend all their excess reserves. Banks continue to lend until the Fed's entire increase in reserves becomes required reserves held by the banking system. If the required reserve ratio equaled zero, then a one-dollar increase in reserves would expand the money supply infinitely because the banks do not hold any reserves.

Leakages cause the money multiplier to be smaller in the real world. Some people withdraw cash, when they deposit checks at the bank while some banks do not lend all their excess reserves. For example, banks refused to grant loans during financial panics, such as the 2008 Financial Crisis. Instead, banks invested in safe investments, like U.S. government securities. Some economists argue the Federal Reserve could inject trillions of dollars into the banking system without creating inflation by purchasing bad loans and government debt. However, these economists are wrong. If banks held onto the entire excess reserves, the money multiplier would equal one. Thus, if the Fed increased the monetary base by \$1 trillion, then it expands the money supply by \$1 trillion as it buys assets from the public. A rapid, expanding money supply creates inflation. If the banks lent their excess reserves, then the money supply would increase more than \$1 trillion, creating greater inflation.

The Fed decreased the monetary base by selling its assets, contracting both bank reserves and the money supply. We call the Fed selling securities the ***multiple deposit contraction***. Transaction is similar to multiple deposit expansion, except the numbers become negative.

Consequently, the Fed can control the monetary base easily but has less control over the money supply. For instance, people can change their behavior that largely impacts bank reserves. For example, you went to your bank to withdraw \$200. We record the transaction in the T-account on the next page:

Your Bank

Assets		Liabilities	
Required Reserves	$1,000 – 200	Deposits	$10,000 – 200
Excess Reserves	0		
Loan	9,000		

Bank pays your $200 from required reserves. Bank does not have any excess reserves because it loaned the excess reserves out. Consequently, your deposit becomes $9,800, and the bank must hold $980 in required reserves. However, it only has $800, so the bank is short $180. Bank calls in loans, causing other banks to lose deposits. Thus, the money supply contracts by Equation 8.

$$\Delta \text{Deposits} = \Delta \text{Reserves} \times \frac{1}{r_r} = -\$180 \times \frac{1}{0.10} = -\$1,800 \tag{8}$$

We do not include your $200 because you converted $200 from a checkable deposit into currency. Remember the M1 definition of money, as defined by Equation 9. We start at the $180 because you switched the first $200 from a checkable deposit into currency, and unfortunately, we cannot count the same money twice.

$$\text{M1} = \text{checkable deposits} + \text{currency} \tag{9}$$

The Money Supply Multipliers

People, who hold more currency and fewer deposits, can cause bank reserves to fall, contracting the money supply. Thus, the public determines the level currency to hold relative to the bank deposits. Economists examine the proportion of cash (C) to checkable deposits (D) as the *currency-deposit ratio* (C/D). Consequently, four factors influence this ratio over time, which are:

❖ Higher wealth causes the currency-deposit ratio to fall. When a country becomes wealthier, people have greater income. Thus, people would deposit their money into banks because holding large amounts of currency is risky.

❖ Higher interest rates lower the currency-deposit ratio. Banks pay interest rates on deposits while currency does not. When interest rates rise, people begin depositing money into banks to earn the greater interest rate.

❖ Risk could raise the currency-deposit ratio. During a financial panic, people convert their deposits into currency, harming the economy. When depositors convert deposits into currency, banks' reserves decrease, shrinking the money supply. Unfortunately, a contracting money supply could trigger a recession.

❖ Underground activities raise the currency-deposit ratio. People participate in illegal activities do not want the government to know about them, so they deal exclusively with currency. Bank accounts leave transaction records. Currency-deposit ratio would increase if people evaded taxes or participated in illegal activities.

What would happen if the Fed bought a T-bill from you for $10,000? Subsequently, you take the Fed check to a bank and ask the bank to pay in cash. In this case, the total bank reserves would not change, but currency in circulation and monetary base rise by $10,000. Effect of an open-market purchase on the monetary base is always the same, whether the proceeds from the sale are in deposits or currency. When the Fed sells U.S. government securities, it decreases the monetary base by the amount of government securities it has sold. Consequently, the Fed has complete control over the monetary base.

Money multiplier equals the ratio between the money supply and the monetary base. We define the notation as:

❖ We define the money supply (M1) as the currency in circulation (C) plus checkable deposits (D), written as M1 = C + D.

❖ Monetary base (B) equals banks' reserves (R) plus currency in circulation (C), written as B = C + R.

❖ Money multiplier (m) equals the ratio between the money supply (M1) and the monetary base (B) or as $M1 = m \times B$.

We use a clever substitution. First, we start with the equation M1 = M1 and on the right-hand side, multiply and divide by the monetary base, shown as Equation 10. The B's would cancel, and M1 still equals M1.

$$M1 = \left[\frac{M1}{B} \right] \times B \qquad (10)$$

Then we substitute M1 = C + D and B = C + R into the Equation 10 for the variables within the brackets, yielding Equation 11.

$$M1 = \left[\frac{C + D}{C + R} \right] \times B \qquad (11)$$

Money multiplier becomes the term within the brackets. We divide both the numerator and denominator in the fraction by D, shown in Equation 12.

$$M1 = \left[\frac{C/D + 1}{C/D + R/D} \right] \times B \tag{12}$$

Currency-deposit ratio equals C / D while the reserves-deposit ratio is R / D. Both ratios are fixed.

For example, the currency in circulation equals $240 billion; checkable deposits equal $600 billion, and total bank reserves equal $60 billion. We substitute these numbers into the currency-deposit ratio and total reserves-deposit ratio in Equations 13 and 14.

$$C/D = \frac{\$240B}{\$600B} = 0.40 \tag{13}$$

$$R/D = \frac{\$60B}{\$600b} = 0.10 \tag{14}$$

We substitute the currency-deposit and reserve-deposit ratios into the money supply equation, yielding Equation 15.

$$M1 = \left[\frac{0.4 + 1.0}{0.4 + 0.1} \right] \times B \tag{15}$$
$$M1 = 2.8\,B$$

Money multiplier equals 2.8. Although the money multiplier relates the total monetary base to the money supply, the money multiplier also works for changes in the monetary base. For example, if the Fed buys $100,000 in T-bills, then the monetary base increases by $100,000, expanding the M1 money supply by $280,000. The multiplier assumes the banks lend their entire excess reserves.

Banks can weaken the ratio between the monetary base and money supply. For example, if the Fed increased the monetary base by buying $100,000 in T-bills and the banks hold the entire excess reserves, subsequently, the money supply expands only by $100,000. Banks do not lend any reserves, causing the money supply multiplier to equal one. We can prove this because R = D.

We derive the money supply multiplier for M2 similarly. The M2 definition includes time deposits, denoted by T. We define the M2 definition as M2 = C + D + T.

Similarly to the M1, we start with Equation 16. Monetary base (B) would cancel, leaving M2 = M2.

$$M2 = \left[\frac{M2}{B}\right] \times B \qquad (16)$$

We substitute the M2 and monetary base definitions for the variables in the brackets, yielding Equation 17.

$$M2 = \left[\frac{C + D + T}{C + R}\right] \times B \qquad (17)$$

We divide the numerator and denominator by D, yielding Equation 18.

$$M2 = \left[\frac{C/D + T/D + 1}{C/D + R/D}\right] \times B \qquad (18)$$

We add a new variable - the time deposit to the checkable deposit ratio. Public determines this ratio by depositing their funds between time deposits, checkable deposits, and currency.

For example, the currency in circulation equals \$240 billion; checkable deposits equal \$600 billion; total bank reserves equal \$60 billion, and total time deposits equal \$800 billion. Subsequently, we calculate the ratios for currency-deposit, reserves-deposit, and time-checkable-deposit in Equations 19, 20, and 21.

$$C/D = \frac{\$240B}{\$600B} = 0.40 \qquad (19)$$

$$R/D = \frac{\$60B}{\$600B} = 0.10 \qquad (20)$$

$$T/D = \frac{\$800B}{\$600B} = 1.333 \qquad (21)$$

We substitute these ratios into Equation 18, yielding Equation 22.

$$M2 = \left[\frac{0.4 + 1.333 + 1.0}{0.4 + 0.1}\right] \times B \qquad (22)$$

$$M2 = 5.47B$$

The M2 money multiplier exceeds the M1 always. Furthermore, we can derive the money multipliers for M3 and L similarly. Of course, these multipliers would be larger than M2 and M1. Consequently, economists can measure the sophistication of a country's financial system by comparing the money definitions and their money multipliers. If a country's money multipliers are close together, then this country small, undeveloped financial markets. If these multipliers diverge greatly, subsequently, this country possesses sophisticated financial markets.

Fed has problems implementing monetary policy if the money multipliers are unstable. Although the Fed can control the monetary base precisely (B), it only influences the money supply. The Fed sets the required reserve ratio, but the public determines the currency-deposit ratio, and the banks decide the level of excess reserves to hold. Hence, we conclude the Fed cannot control the money supply precisely.

Key Terms

monetary base	open-market sale
currency in circulation	discount loan
vault cash	discount rate
bank reserves	multiple deposit expansion
required reserve ratio	simple deposit multiplier
required reserves	multiple deposit contraction
excess reserves	currency-deposit ratio
open-market operation	money multiplier
open-market purchase	

Chapter Questions

1. Identify the assets and liabilities on the Fed's balance sheet.

2. Defines the money multiplier and identify the parties who influence the money multiplier.

3. Required reserve ratio equals 5%; the banks hold zero excess reserves, and the public does not withdraw money out of their currency accounts. Calculate the change in the M1 definition of the money supply if the Fed purchases $50,000 in U.S. government securities.

4. Required reserve ratio equals 20%; the banks hold zero excess reserves, and the public does not withdraw money out of their currency accounts. Compute the change in the M1 definition of the money supply if the Fed sells $10,000 in U.S. government securities.

5. Required reserve ratio equals 10%, and the banks hold zero excess reserves. Calculate the change in the M1 definition of the money supply if a person deposits $1,000 in cash into his checking account.

6. Required reserve ratio equals 10%, and the banks hold zero excess reserves. Compute the change in the M1 definition of the money supply if a person withdraws $5,000 in cash from his checking account.

7. Identify the currency-deposit ratio, and explain why it changes over time.

8. Why do excess reserves present a problem for the Fed?

9. Why does the Fed have trouble controlling the money supply?

10. Currency in circulation equals $500 billion; checkable deposits equal $900 billion; total bank reserves are $700 billion, and total time deposits equal $1,200 billion. Calculate the M1 and M2 money multipliers.

12.   The Fed's Balance Sheet

This chapter explains the items on the Federal Reserve's balance sheet and uses more T-account transactions. For instance, the students learn how the Fed clears a check between two banks. Then we derive an equation that relates changes in the Fed's assets and liabilities to the monetary base and money supply. Then students learn whether a government issues securities to cover a budget deficit impacts its central bank's balance sheet, monetary base, and money supply. Finally, a central bank can intervene in its currency exchange markets to strengthen or weaken its currency.

The Fed's Balance Sheet

Similar to any corporation or business, the Federal Reserve has a balance sheet. The Fed's assets are anything of value the Fed owns. Moreover, the Fed has liabilities, which are obligations and debt the Fed owes to another party. After we subtract the Fed's total assets from total liabilities, the remainder becomes the Fed's net worth. The Fed publishes its balance sheet in the Federal Reserve Bulletin, and the public has free access to it. The Federal Reserve Bulletin is a monthly publication of the Board of Governors that includes money supply numbers, interest rates, and other economic data. Each Federal Reserve's asset, liability, and net worth are itemized in Table 1 for September 26, 2012: The word consolidated means all assets, liabilities, and capital for all 12 Federal Reserve district banks are added together.

The Fed's Assets:

❖ *Securities* are the largest holdings of the Fed's assets, and they consist of U.S. government securities: T-bills, T-notes, and T-bonds. When the Fed uses open-market operations, it buys and sells securities. The Federal Reserve held $1.7 trillion in securities in 2012.

❖ *Mortgage-Backed Securities:* The Federal Reserve purchased mortgage securities from the commercial banks and public corporations during the 2008 Financial Crisis. These mortgages are bad loans, where the borrowers defaulted. The Fed purchased $835 billion in mortgage-back securities, removing the bad loans from the banking industry.

❖ *Discount Loans* are Federal Reserve loans funds to banks, helping the banks overcome short-term liquidity problems. The Fed controls the interest rate on these loans, which influence the amount of loans that banks need. We call the interest rate the discount rate. The Fed loaned $1.7 billion to the commercial banks in 2012.

❖ *Items in the Process of Collection (CIPC)* are assets that arise from the Fed's check clearing process, and it equaled $138 million in 2012. We show the check clearing process in this chapter.

Table 1. Federal Reserve's Consolidated Balance Sheet on September 26, 2012

Assets	$ millions	Liabilities and Capital	$ millions
Securities held outright	1,731,808	Federal Reserve notes	1,085,808
Mortgage-backed securities	834,979	Deposits by depository institutions	1,473,576
Loans	1,732	U.S. Treasury deposits	65,665
Items in process of collection	138	Foreign official deposits	24,220
Gold certificates	11,037	Deferred availability cash items	779
Special Drawing Rights	5,200	Other liabilities	101,421
Coins	2,183		
Central bank liquidity swaps	14,693	Capital accounts	54,718
Bank premises	2,350		
Other assets	202,067		
Total assets	2,806,187	Total liabilities and capital	2,806,187

Source: Federal Reserve. September 27, 2012. Federal Reserve Statistical Release-Factors Affecting Reserve Balances. Available from http://www.federalreserve.gov/releases/h41/current/h41.htm#h41tab9 (accessed 9/29/2012)

❖ *Gold Certificates* are claims to gold held by the U.S. Treasury. When the U.S. Treasury buys gold, it sells the certificates to the Federal Reserve. In turn, the Fed credits the U.S. Treasury account at the Fed. The Fed held $11 billion in gold certificates in 2012.

❖ *Special Drawing Rights (SDRs):* The International Monetary Fund (IMF) issues Special Drawing Rights that are credit securities. The IMF allocates SDRs to various countries around the world, and the Fed holds approximately $5.2 billion. We discuss SDRs in Chapter 15.

❖ *Coins:* The U.S. Mint designs and produces all coins for the United States. The U.S. Mint is a department under the U.S. Treasury. Normally, the Federal Reserve prints the U.S. paper money, a Fed's liability. Nevertheless, the Fed buys the coins from the U.S. Mint, making it an asset. The Fed had $2.2 billion in coins in 2012.

❖ *Central Bank Liquidity Swaps* are Federal Reserve loans made to other country's central banks of developed countries. For example, the European Central Bank needs a loan from the Fed. The Fed can lend the European Central Bank dollars and can accept euros as collateral. The Federal Reserve created the central bank liquidity swaps during the 2008 Financial Crisis. The Fed granted $14.7 billion in central bank liquidity swaps in 2012.

❖ *Bank premises* are the buildings and equipment owned by the Federal Reserve, which was $2.4 billion in 2012.

❖ *Other assets:* The Fed owns other assets, including foreign-exchange reserves, deposits and bonds denominated in foreign currencies. Moreover, the Federal Reserve created companies, such as Maiden Lane Transactions, to facilitate transactions with investment

banks and insurance companies during the 2008 Financial Crisis. The Fed held $202 billion in 2012 for other assets

The Fed's Liabilities and Capital Accounts:

❖ *Federal Reserve notes* are U.S. paper money that the Federal Reserve issues. Currency outstanding only includes cash held in bank vaults or cash circulating within the economy. In 2012, $1.1 trillion of U.S. currency circulated outside the Federal Reserve.

❖ *Deposits by depository institutions:* Banks hold reserves in vault cash and deposits at the Fed. Deposits are assets to the financial institutions, but liabilities to the Fed. The Federal Reserve held $1.5 trillion in bank deposits in 2012.

❖ *U.S. Treasury deposits:* The U.S. Treasury deposits its money into commercial banks that it collects from tax payments, fees, and U.S. government securities. When the U.S. Treasury pays expenditures, it transfers funds from its commercial bank accounts to its accounts at the Fed. Then the Treasury Department writes checks on its Fed account. Consequently, the U.S. Treasury Deposits are an asset to the U.S. government, but a liability to the Federal Reserve. The U.S. Treasury deposited $65.7 billion at the Fed.

❖ *Foreign and other deposits:* The Fed holds deposits from foreign governments, IMF, World Bank, United Nations, and U.S. government agencies such as FDIC. The Fed held $24.2 billion in 2012.

❖ *Deferred Availability Cash Items (DACI)* are liabilities that arise from the Fed's role in the check-clearing process, which was $779 million in 2012. We explain the check clearing process in this chapter.

❖ *Other liabilities* include reverse repurchase agreements and dividends the Fed owes to the national commercial banks. Other liabilities were $101.4 billion in 2012.

❖ *Capital account* equals the Federal Reserves' total assets minus total liabilities. This category was substantial and equaled $54.7 billion in 2012. The Federal Reserve is a public corporation and every U.S. commercial bank with a charter from the U.S. government must buy stock into its Federal Reserve district bank. Subsequently, the Fed pays the commercial banks 6% annual dividend on their Fed stock.

The Check Clearing Process

The Fed has the authority to clear checks, and the check clearing process can cause bank reserves and the money supply to fluctuate through the *Federal Reserve float*. The Federal Reserve float is the difference between *cash items in the process of collection (CIPC)* and

deferred availability cash items (DACI), and it is always positive. As a float increases, it expands both the bank reserves and money supply.

For example, you live in California, and you sent a $1,000 check to a firm in New York City to buy a computer. Computer firm deposits the check in its bank account. Subsequently, its bank sends the check to the Fed because the Fed can clear the check between your bank and the computer firm's bank. Accordingly, the Fed credits the computer firm's bank a $1,000 asset, the DACI. Next, the Fed must collect $1,000 from your bank, the CIPC. We record the computer firm's bank and Fed's T-accounts below:

The Computer Firm's Bank

Assets	*Liabilities*
+$1,000 DACI	+$1,000 Deposits

The Federal Reserve

Assets	*Liabilities*
+$1,000 CIPC	+$1,000 DACI

Computer firm's bank cannot touch the asset, DACI. The Fed acknowledges the asset and is in the process of collecting money for the computer firm's bank. After two days, the Fed converts the DACI into bank reserves. Consequently, the bank can lend these reserves.

The Federal Reserve

Assets	*Liabilities*
	–$1,000 DACI
	+$1,000 Reserves for computer firm's bank

The Computer Firm's Bank

Assets	*Liabilities*
–$1,000 DACI	
+$1,000 Reserves at the Fed	

If the Fed did not collect $1,000 from your bank with two days, subsequently, the Fed extends credit to the computer firm's bank. Thus, the total reserves of the banking system increase because banks did not lose reserves. That $1,000 check you wrote now exists as a $1,000 in your bank account and the computer firm's bank account. We calculated the float from your check in Equation 1, and it equals $1,000.

$$\text{Float} = \text{CIPC} - \text{DACI} = \$1,000 - 0 = \$1,000 \tag{1}$$

The Fed collects the $1,000 from your bank. Accordingly, the float returns to zero, and your checking account decreases by $1,000. Your check for $1,000 no longer exists in two places. Check clearing process is a long-drawn-out process because if you write a check for $100 and

have only $10 in your checking account, then this check does not clear. That is why the Fed needs permission to lower the bank's reserves to clear the check; instead of automatically doing it. We display the final transaction below:

<div align="center">The Federal Reserve</div>

Assets	*Liabilities*
– $1,000 CIPC	–$1,000 Reserves at your bank

<div align="center">Your Bank</div>

Assets	*Liabilities*
–$1,000 Reserves at the Fed	–$1,000 Your checking account

Usually the float changes predictably during the mid-month because people pay their bills. Furthermore, the float changes in December because people write checks to buy Christmas presents or in April when people pay their taxes. Moreover, bad weather and transportation strikes can cause the float to soar expectantly as the Fed experiences delays in check collections. Consequently, an increase in the float expands both the bank reserves and money supply. Then the Fed must nullify the float by selling U.S. government securities that reduce the money supply.

Many banks join a clearinghouse that can clear checks and wire transfers without using a central bank. For example, a large bank in New York is the clearinghouse between two small banks. One bank is May Bank in Malaysia while the other is First National Bank in Indiana. Both banks have accounts at the clearinghouse. If a person transfers money from Malaysia to Indiana electronically, then the clearinghouse reduces the account for the Malaysian bank and adds the amount of the wire transfer to the Indiana's bank. Consequently, banks and central banks clear checks and wire transfers similarly.

Changes in the Monetary Base

If the Fed's balance sheet changes, subsequently, both the monetary base and money supply change. At first, this process seems complex, but economists use a trick. First, we list the Fed's total assets in Equation 2 and total liabilities in Equation 3.

$$\text{Total Assets} = \text{U.S. gov. securities} + \text{discount loans} + \text{gold certificates} + \text{SDRs} + \text{CIPC} \quad (2)$$

$$\text{Total Liabilities} = \text{Currency outstanding (C)} + \text{deposits by depository institutions (D)} +$$

$$\text{U.S. Treasury deposits} + \text{Foreign and other deposits} + \text{DACI} \quad (3)$$

Next, we substitute the monetary base formula into Equation 3 because the monetary base equals deposits held by depository institutions plus currency in circulation, or $B = D + C$. After substituting the monetary base into Equation 3, we yield Equation 4.

<div align="center">149</div>

Total Liabilities = Monetary base (B) + U.S. Treasury deposits + Foreign and other deposits +

DACI + Capital   (4)

Subsequently, we use the accounting identity as defined by Equation 5 to relate the Fed's assets, liabilities, and capital.

Total Assets = Total Liabilities + Capital   (5)

Finally, we substitute the total assets and total liabilities into the accounting identity, and we solve for the monetary base, which becomes Equation 6:

Monetary base (B) = U.S. gov. securities + discount loans + gold certificates + SDRs +

(CIPC – DACI) – U.S. Treasury deposits – Foreign and other deposits – Capital   (6)

Equation 6 shows how a change in the Fed's balance sheet affects the monetary base. For instance, if the Fed purchases an asset, then the monetary base increases and expands the bank reserves. When banks have more reserves, they grant more loans, potentially increasing the money supply. Of course, the opposite could occur. If the Fed sells an asset, subsequently, both the monetary base and bank reserves drop, and money supply potentially shrinks. Moreover, if the Fed acquires a liability in Equation 6, then the monetary base, bank reserves, and the money supply all fall. On the other hand, if the Fed reduces a liability, subsequently, both the monetary base and bank reserves rise, and the money supply potentially increases.

Consequently, many things alter the Fed's balance sheet. Unfortunately, the Fed cannot control many items on its balance sheet. For example, the Fed has no control over the Treasury deposits, the float (CIPC - DACI), gold certificates, SDRs, and foreign government deposits. As these items can change, the Fed must use open-market operations to maintain a stable monetary base.

Does U.S. Treasury Affect the Monetary Base?

The U.S. federal government has experienced persistent budget deficits for the last 40 years because the U.S. government spends more than what it collects in taxes. Government finances budget deficits in three ways. First, the U.S. government can decrease its spending, which is not politically popular. People demand benefits and social programs from their government. Second, the U.S. government can raise taxes, which could anger the taxpayers. Finally, the U.S. can sell U.S. government securities. Thus, the U.S. government chose to finance budget deficits by selling more U.S. government securities.

Could the U.S. federal government affect the monetary base by financing budget deficits? For example, the U.S. government increases taxes; you pay a total of $2,000 in taxes, and you

send the U.S. government a check for $2,000. We record the T-account transactions below for you, your bank, the Fed, and the U.S. Treasury Department.

You

Assets	Liabilities
–$2,000 Deposit	–$2,000 Taxes due

Your Bank

Assets	Liabilities
–$2,000 Reserves	–$2,000 Deposits

The Federal Reserve

Assets	Liabilities
	–$2,000 Reserves
	+$2,000 U.S. Treasury deposits

The U.S. Treasury Department

Assets	Liabilities
–$2,000 Taxes due	
+$2,000 Deposits at the Fed	

The U.S. Treasury, subsequently, spends your $2,000 to buy more paper for a government agency. A company receives $2,000 and deposits the funds into the company's bank account. Although you paid higher taxes, the U.S. government returns your money to the economy. Thus, when a government raises taxes and immediately spends it, the taxes have no impact on the monetary base and money supply. Nevertheless, the government does transfer funds from one party to another.

For the next example, the U.S. Treasury finances a budget deficit by selling T-bills. You buy a $20,000 T-bill. We record the T-account transactions below for you, your bank, the Fed, and U.S. Treasury.

You

Assets	Liabilities
– $20,000 Deposit	
+ $20,000 T-bill	

Your Bank

Assets	Liabilities
–$20,000 Reserves	–$20,000 Deposits

The Federal Reserve

Assets	Liabilities
	− $20,000 Reserves
	+$20,000 U.S. Treasury deposits

The U.S. Treasury Department

Assets	Liabilities
+$20,000 Deposits at the Fed	+ $20,000 U.S. T-bill

The U.S. Treasury collects your $20,000 and buys something with it. When the Treasury pays for a product or service from the public, then the U.S. government pays $20,000 to a company, and the company deposits the $20,000 into its bank account. Consequently, the U.S. government returns $20,000 to the economy, causing zero changes in bank reserves. Thus, when the U.S. Treasury issues new securities, the new securities do not affect the monetary base and money supply.

If the U.S. Treasury sold government securities directly to the Fed, subsequently, the Fed is financing budget deficits, called ***monetizing the debt***. Media refers this to printing money. For example, the Fed directly buys $100,000 in T-bills from the U.S. government. Consequently, we show the impact on the Fed's and U.S. Treasury T-accounts below:

The Federal Reserve

Assets	Liabilities
+$100,000 T-bills	+$100,000 U.S. Treasury deposits

The U.S. Treasury Department

Assets	Liabilities
+$100,000 Deposits at the Fed	+ $100,000 T-bills

The Fed purchasing securities directly from the U.S. Treasury do not increase the monetary base as long as the money sits into the account. However, once the U.S. Treasury spends the money in its account, then the Fed's assets increase, expanding both the monetary base and money supply.

The Federal Reserve is not required to buy U.S. government securities or help the U.S. Treasury finance budget deficits. The Fed and U.S. Treasury are independent. However, the Fed can finance budget deficits indirectly. For instance, if the Fed stabilizes interest rates, then the Fed could monetize the debt indirectly. For example, the U.S. Treasury issues new securities, decreasing the securities' market price and raising the interest rate. If the Fed maintains the original interest rate, subsequently, the Fed must buy the U.S. government securities to return the interest rates to the same level.

Central banks are not independent from their finance ministries in developing countries. Unfortunately, the finance ministry forces the central bank to finance budget deficits. When a

central bank monetizes the debt, it increases in the money supply, creating inflation. Consequently, many developing countries suffer from high inflation rates.

A Central Bank Intervenes with its Currency Exchange Rate

The United States financial system is linked to the international financial markets. Investors, savers, households, businesses, and governments in foreign countries can influence the financial markets in the United States, while the U.S. financial markets similarly affect foreign financial markets. Consequently, governments intervene into the international markets to affect their financial markets.

The Federal Reserve tries to manage the value of the U.S. dollar in the international markets. However, governments and central banks have difficulties in influencing the exchange rate of their currency because over $1 trillion in transactions occur daily in the foreign-exchange market. Foreign-exchange market is the largest international market in the world. As countries engage in international trade, goods move in one direction while money moves in the opposite direction. When a central bank tries to control the foreign-exchange rate of its currency, economists call this *foreign-exchange market intervention*.

The Federal Reserve and U.S. Treasury Department intervene in the foreign-exchange markets, manipulating the U.S. dollar exchange rate. Usually the Federal Reserve and Treasury coordinate their policies together. For example, the Federal Reserve holds foreign currencies, such as British pounds, European euros, and Japanese yen. Foreign currencies are an asset to the Federal Reserves, which are called *international reserves*. The Federal Reserve can sell or purchase U.S. dollars on the international markets that impact the U.S. exchange rates and U.S. money supply. Table 2 summarizes the impact of a strong or weak U.S. dollar on the U.S. economy.

Table 2. Impact of a Strong or Weak Dollar on the U.S. Economy

Strong U.S. Dollar	Weak U.S. Dollar
Foreign-produced goods are cheaper.	Foreign-produced goods are more expensive.
U.S. customers benefit.	U.S. customers are hurt.
U.S. produced goods become more expensive.	U.S. produced goods are cheaper in foreign markets.
U.S. export businesses are hurt in foreign markets.	U.S. export businesses benefit in international markets.
Trade deficit worsens.	Trade deficit becomes smaller, or becomes a trade surplus

The Fed believes the dollar is too weak and strengthens the dollar. The Fed will sell foreign currencies and buy U.S. dollars. The Fed sells $10,000 in foreign currency, and we record the transaction in the T-account below.

The Federal Reserve

Assets	*Liabilities*
–$10,000 Foreign currencies	–$10,000 Currency in circulation

This transaction removed $10,000 of U.S. currency out of the international market because the Fed holds the U.S. dollars. Consequently, the monetary base decreases by $10,000 while the money supply contracts. Unfortunately, the Fed's international reserves decline by $10,000. The Fed does not buy U.S. currency. Instead, the Fed could accept a check for the foreign-currency sales. When the Fed cashes a check, the Fed decreases the bank reserves as it removes money from the banking system. We record the transaction below:

The Federal Reserve

Assets	Liabilities
–$10,000 Foreign currencies	–$10,000 Bank reserves

In this case, the monetary base still decreases by $10,000 while the money supply contracts. It makes no difference whether the Federal Reserve accepts a check or cash denominated in U.S. dollars. Both transactions impact the monetary base the same. If the Federal Reserve believes the U.S. dollar is too strong, then the Fed can weaken or depreciate the dollar by selling U.S. currency and buying foreign currencies. For example, the Fed buys $30,000 of foreign currency. We record this transaction in the T-account below.

The Federal Reserve

Assets	Liabilities
+$30,000 Foreign currencies	+$30,000 Currency in circulation

The Federal Reserve's assets increase by $30,000, increasing the monetary base by $30,000 and expanding the money supply. World's economy has $30,000 more U.S. dollars in circulation. If the Fed let these foreign exchange transactions change the monetary base, then we call this *unsterilized foreign-exchange intervention*.

The Federal Reserve can prevent changes to the monetary base, when it influences the U.S. dollar exchange rates, called *sterilized foreign-exchange intervention*. For example, the Fed believes the dollar is too strong and wants to weaken it. The Fed buys $30,000 in foreign currencies and sells $30,000 in U.S. currency, boosting the monetary base. However, the Fed performs an open-market operation by selling $30,000 in T-bills for cash. These two transactions cancel changes to the monetary base. Consequently, the change in the Fed's assets and liabilities are zero, and we record the transaction in the T-account below.

The Federal Reserve

Assets	Liabilities
+$30,000 Foreign currencies	+$30,000 Currency in circulation
–$30,000 T-bills	–$30,000 Currency in circulation

Key Terms

securities

mortgage-backed securities

discount loans

Items in the Process of Collection (CIPC)

gold certificates

Special Drawing Rights (SDRs)

coins

Central Bank Liquidity Swap

bank premises

Federal Reserve notes

deposits by depository institutions

U.S. Treasury deposits

Foreign and other deposits

Deferred Availability Cash Items (DACI)

capital account

Federal Reserve float

monetizing the debt

foreign-exchange market intervention

international reserve

unsterilized foreign-exchange intervention

sterilized foreign-exchange intervention

Chapter Questions

1. Identify the Fed's assets, liabilities, and capital.

2. Explain how the Federal Reserve clears a check between two banks.

3. Which factors influence the reserve float?

4. Identify the changes to the monetary base and money supply if bad weather causes the float to increase.

5. Identify the changes to the monetary base and money supply if the U.S. Treasury increases its deposits at the Federal Reserve.

6. Identify the changes to the monetary base and money supply if the commercial banks reduce the amount of discount loans from the Fed.

7. Which assets and liabilities the Fed cannot control?

8. Identify the changes to the monetary base and money supply if the U.S. Treasury changes the taxes or changes its borrowing behavior.

9. Explain how the Federal Reserve can monetize the U.S. debt if the Fed and the U.S. Treasury Department are independent.

10. Why do central banks and governments intervene in the foreign-exchange markets?

11. Distinguish between a "weak" dollar and "strong" dollar. How would a strong U.S. dollar affect the U.S. economy?

12. Distinguish between unsterilized and sterilized foreign-exchange intervention.

13.   The Central Banks of Europe and the United States

We explain the structure of the world's two largest and most powerful central banks in this chapter: The Federal Reserve System (Fed) and the European Central Bank (ECB). The Fed has an unusual structure because Congress and the President decentralized the power of its central bank, where each central bank branch can tailor services for its unique region of the United States. Moreover, the Board of Governors manages the Fed, while the Federal Open Market Committee handles the purchase and sale of the U.S. government securities and other assets. Keeping it straight, the Board of Governors devises monetary policy, while the Open Market Committee puts monetary policy into action. Then we shift focus to the structure of the European Central Bank, whose structure mirrors the United States. The Executive Board devises monetary policy while the Governing Council implements it. Finally, a central bank should remain independent of its government because a self-governing central bank can focus on price stability and low inflation.
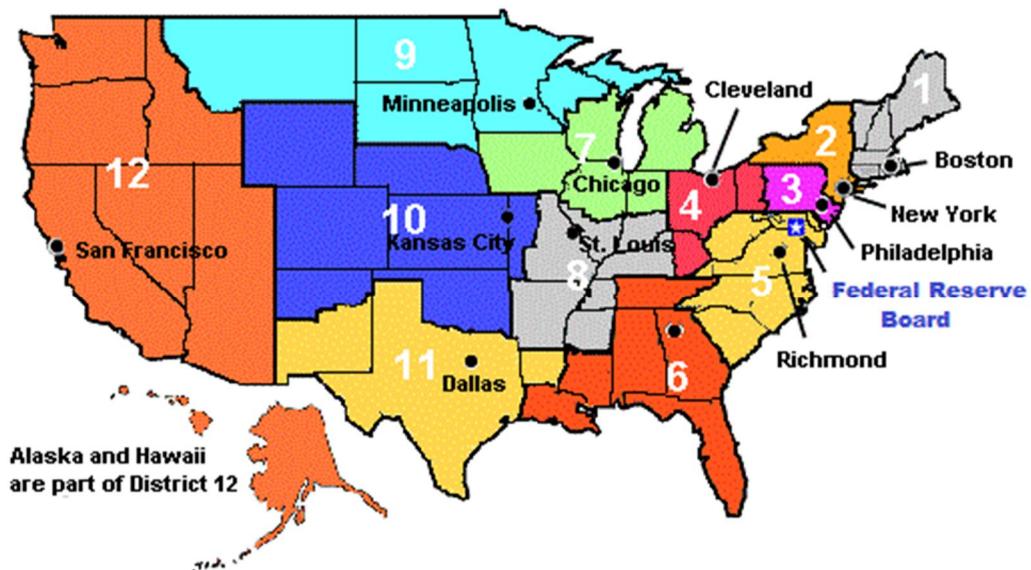
Why the U.S. Government Created Federal Reserve System

The United States was a late comer to the world when it created its central bank. The U.S. government permanently established a central bank in 1913 and named it the ***Federal Reserve System***. Congress, government officials, and the public did not want to create a powerful financial institution, so the U.S. government created the Federal Reserve System to have many checks and balances. Most European countries formed their central banks in the 17, 18, and 19th centuries. They converted a large private bank into a central bank. For example, Great Britain established the Bank of England in 1694, and France founded the Bank of France in 1800.

The Federal Reserve System comprises of 12 Federal Reserve banks. The United States is decomposed into 12 regions, and each region has a Federal Reserve Bank as shown in Figure 1. The Board of Governors is located in Washington D.C. while the dots show the headquarters for each Federal Reserve bank within its region. The Fed is spread across 12 banks because each section of the country is economically different. For example, Michigan originally manufactured U.S. cars while Texas and Oklahoma supplied oil and natural gas. Therefore, a Federal Reserve Bank can provide services to its unique region. Originally, each Federal Reserve Bank provided the following functions:

❖ A Fed bank clears checks for banks.

❖ A Fed bank regulates member commercial banks.

❖ A Fed bank manages the currency by issuing new currency and removing old, worn-out currency.

❖ A Fed bank prevents financial panics by being a source of liquidity or emergency loans for banks during an economic crisis. Each Fed Bank had the power to set the discount rate, or the interest rate on the loan.

❖ A Fed bank collects and publishes data for the public. Each Fed bank employs staff of economists, researchers, and PhDs, who conduct research for the public interest.

Figure 1. The Map of the Federal Reserve Banks

The President and Congress created the Federal Reserve System to prevent financial panics, such as the Panic of 1907. The New York Stock Exchange plummeted nearly 50% while many banks teetered on bankruptcy as people began bank runs. Consequently, a Federal Reserve Bank is a "lender of the last resort." It provides emergency loans to banks and helps restore confidence in the banking system. Moreover, the Fed loans were originally discount loans. For example, a bank needs $9,500, and it asks the Fed for a loan. If the Fed agrees, the bank gives collateral to the Fed, such as a $10,000 T-bill. Then the Fed increases the bank's reserves by $9,500, the loan. The difference between the loan and T-bill is the discount, which reflects the interest rate the Fed charges for the loan. Economists call this interest rate the *discount rate.* Furthermore, the government did not create the Fed to alter the money supply, manipulate interest and currency exchange rates, or manipulate the financial markets to achieve economic goals. Nevertheless, the Fed learned to do this during the 1920s.

The Federal Reserve System's Structure

Unique feature of a Federal Reserve Bank is each bank is a federally chartered corporation. Each bank has its own stockholders, directors, and a president. Furthermore, every national

commercial bank is required to purchase stock of the Federal Reserve Bank in its district, equaling to 6% of the commercial bank's net equity (capital). National commercial banks are banks whose charter comes from the U.S. government. These national banks are also called member banks, and they earn a fixed 6% dividend on their shares of Federal Reserve stock.

Each Federal Reserve Bank has nine directors. Member commercial banks elect six directors: Three directors are bankers while the other three are from business. **Board of Governors,** which holds the power at the Fed, appoints the last three directors. In turn, the nine directors elect the president of the Fed district bank. Of course, this is not a free election because the Board of Governors must approve the bank president.

Commercial banks have no control over their Fed district banks, although they privately own them. A Fed bank does not operate like a corporation where the stockholders can freely elect the board of directors, who vote on the major corporate policies. Congress created this odd structure because it did not want the Fed to be part of government or controlled by the banks, but somewhere between them. Nevertheless, the Fed is a part of government or quasi-government. When Congress created the Fed in 1913, it dispersed the Fed's power over the 12 Fed Banks. Over time, the Board of Governors consolidated the central bank's power.

Board of Governors is the entity that controls the Federal Reserve System. It determines monetary policy, reserve requirements, and discount policy. Board consists of seven members, who serve a 14-year term. Most board members will not finish their term because they resign and work for the financial firms on Wall Street for five times their Fed salary. A board member earns roughly $150,000 per year. A U.S. president with Senate approval appoints the members and appoints the chairperson and vice-chairperson of the board. Chairperson and vice-chairperson serve a four-year term. The Comptroller of the Currency and Secretary of the Treasury cannot be members of the board because the Federal Reserve must remain independent of the U.S. federal government. If the U.S. government is accumulating a massive debt, and the Treasury cannot increase taxes or borrow, then the Treasury could resort to printing money to cover deficits by forcing the Fed to buy its securities. Unfortunately, printing money always leads to inflation.

Board of Governors is independent of the U.S. federal government in three ways. First, Board of Governors earns its revenue from the 12 district banks. The Fed does not ask Congress for money. Whoever controls the money is directly or indirectly in command. Second, the terms of the board members are staggered. Every two years, the U.S. President appoints one member to the Board of Governors, or 14 years divided by seven members. This prevents a newly elected President from appointing all members at once, who become loyal to the President. Third, the government cannot completely audit the Fed. Less government knows; the less it can tamper with things. Please do not think the Fed is entirely independent! If the Federal Reserve angers Congress too much, Congress could rewrite the laws that created the Fed.

The **Federal Open Market Committee (FOMC)** is a special committee within the Fed that makes decisions about open-market operations. Although the Board of Governors determines monetary policy, the Federal Open Market Committee puts the policy into action. After the FOMC makes a decision, the committee sends a **directive** to the manager at the New York City Federal Reserve Bank to buy and sell U.S. government securities.

The FOMC consists of the Board of Governors, plus five Fed district bank presidents. President of the Federal Reserve Bank of New York City is a permanent member of the FOMC and is always the FOMC vice-chairperson because New York City is the financial center of the United States. The Fed buys and sells government securities through the New York Fed Bank. Remaining four positions for the FOMC are rotated among the other 11 Fed district bank presidents. Moreover, the Fed buys securities from the secondary markets. If the Fed bought securities directly from the primary market, then it would be buying directly from the U.S. Treasury. Thus, the Fed would not be independent from U.S. Treasury if it buys new securities in the primary market.

Chairperson of the Board of Governors is also chairperson of the FOMC. This person is a powerful man because he or she could advise the President, informs Congress of the Fed's actions, and is the spokesperson of the whole Federal Reserve System. When he or she speaks, everyone in the financial world listens. Current chairperson is Janet Yellen, and many consider her the second most power person in the United States after the U.S. President.

The European Central Bank

The European Union (EU) created a common market among European countries. Many countries eliminated customs between EU countries as they erected common customs to the outside world. Thus, capital, goods, labor, and services can move anywhere within the EU freely. Furthermore, the EU has improved efficiency in other areas. Many EU countries reduced or eliminated their purity and labeling laws that stopped imports from other EU members. For example, the Greek government removed regulations for ice cream while Belgium removed its chocolate laws. Even Germany removed its beer purity law that was passed in 1516. That law required all German beer producers must make beer from only four ingredients: barley, hops, water, and yeast.

The EU allows new countries to join, but they must overcome many obstacles for membership. Both Turkey and Croatia want to join the EU, despite the 2012 European Debt Crisis. EU membership requires a member country be a democracy, where the citizens elect the government officials. Furthermore, governments must respect human rights and have a functioning market economy. As of 2012, the EU has 27 members.

The European Union had created new institutions, such as the European Parliament and European Court of Justice. These institutions are not concentrated in one country but spread across EU members. Most institutions are located in Brussels, Luxembourg, and Strasbourg. One drawback to the European Union was the EU created new bureaucracies, as the top level of government. The EU employed approximately 33,000 government officials and bureaucrats in 2012.

Seventeen EU members use the common currency, the euro that we refer to as the *Eurozone*. The Eurozone replicates the United States by forming the world's largest market with a single currency. As a large number of countries shares one currency, it creates four benefits. First, a single currency has no exchange rate risk. Citizens from different countries can sell and buy goods with one another, and they do not worry about changes in the exchange rate. Second, a single currency reduces the transaction costs because the parties do not convert one currency

into another. Third, a single currency helps align political interests. The Eurozone members work and cooperate with each other as they strive for peace and stability. Finally, a single currency promotes competition and regions within the Eurozone begin to specialize.

Specialization can occur across many industries and countries. For instance, the financial institutions within the Eurozone can specialize and reduce their lending costs. Furthermore, countries can specialize. Germany specializes in automobile and machinery production while France specializes in pharmaceuticals, chemicals, and aerospace. As countries within the Eurozone specialize, the producers experience higher efficiency and greater productivity, and they have access to more consumers. Consequently, the zone helps integrate European countries, spurring economic growth and unleashing the competitive market forces. Over time, the Europeans should see their living standard rise and their unemployment rate fall.

The *European Central Bank (ECB)* manages the euro and is located in Frankfurt, Germany. ECB was modeled after the Bundesbank, which was Germany's central bank. Primary goal of the ECB is to achieve price stability, keeping the euro stable with a low inflation rate. Euro is successful while the Eurozone rivals the United States in terms of GDP. Furthermore, the euro was appreciating against the U.S. dollar as it strove to become the new international currency because Europe's financial markets and international trade rival the U.S.

Euro did well until the 2008 Financial Crisis struck the world's economy. Euro began losing ground against the U.S. dollar. Subsequently, several EU member countries, such as Greece, Ireland, Portugal, and Spain were plagued with severe budget problems that led to the European Debt Crisis in 2012. We discuss the crisis at the end of the chapter.

Structure of the European Central Bank is similar to the structure of the Federal Reserve System. The *Governing Council* decides and formulates monetary policy for the European Central Bank and is similar to the Board of Governors of the Federal Reserve System. The council is composed of the Executive Board and 17 Governors. The Governors are the heads from their country's central bank that are members of the Eurozone.

The *Executive Board* implements monetary policy and manages the day-to-day operation of the ECB, similar to the Federal Open Market Committee (FOMC). Board has a president, vice president, and four additional members, whom the European Council selects. The *European Council* consists of heads of state of the EU member countries. The European Council appoints members to the Executive Board for an eight-year term that is not renewable. Furthermore, the board members' terms are staggered. Consequently, the European Council cannot change the board members all at once. President of the Executive Council also becomes the president of the Governing Council. The ECB president is selected from a central bank whose country is a member of the Eurozone. Winn Duisenburg, from the Netherlands, was the first ECB president.

EU countries retained their central banks, even countries that have adopted the euro. Country's central banks remain independent of the EU, and the top official of a central bank in the Eurozone is a governor and a member of the Governing Council. Currently, 17 EU countries adopted the euro, which means the Governing Council has 17 Governors. Country's government selects the governor who serves at least a five-year term. Furthermore, the governors have more influence on monetary policy within the European Central Bank than the presidents of the

twelve Federal Reserve banks have over the Board of Governors. Consequently, Board of Governors centralizes the power within the Federal Reserve and controls it.

All central banks of the European Union buy stock into the European Central Bank, even countries that are not members of the Eurozone. Thus, the EU central banks own the European Central Bank. Similarly, the national commercial banks buy the Federal Reserves' stock in its district within the United States. Amount of stock, a central bank buys, depends on a country's population and GDP. Germany owned 18.9% of the ECB's stock in 2011 while France owned 14.2%, and Great Britain had 14.5%. The ECB returns 80% of its profits to the stockholders, which are the central banks of member countries.

The European Central Bank is the most independent central bank in the world. No EU country or EU institution can hold it accountable. Even the European Parliament, the highest representative body of the EU, cannot audit or dictate policy to the ECB. Moreover, the ECB does not receive funding from any EU body or government, and the terms are staggered for the Executive Board. Thus, the European Council cannot manipulate the ECB by appointing the whole Executive Board at once. Consequently, the ECB concentrates on price stability, which they define as a 2% or less inflation rate per year. Other countries, such as the United States can pressure the central bank to pursue several goals, such as lowering the unemployment rate or manipulating interest and currency exchange rates.

The Eurozone created three problems among its EU members. First, the countries surrendered control of their monetary policy. If a country experiences financial problems, it cannot use its central bank to help finance the government's deficit. For instance, a central bank could devalue its currency to stimulate economic growth because a devalued currency boosts exports and reduces imports, creating jobs in the export industries. Second, prices soared in Southern Europe while wages fell behind, impoverishing many people. Finally, the ECB cannot legally buy bonds from EU governments. However, the Europeans were worried about the Greek Debt Crisis, and it bought Greek government bonds to keep the Greek government operating. We discuss the Greek debt crisis in the next section.

Is the Federal Reserve Independent of the U.S. Government?

Two viewpoints describe whether the Fed serves the public interest or acts in its own self-interest. **Public interest view** states the Fed serves the public by implementing monetary policy that causes stable prices, low unemployment, and strong economic growth. Many economists argue the Fed does not serve the public interest because it does not emphasize price stability and economic growth. Furthermore, many experts criticized the Fed's role in the 2008 Financial Crisis. Unfortunately, the Fed kept interest rates low artificially. Low interest rates encourage people and speculators to buy houses, inflating both the housing bubble and housing prices.

Principal-agent view is government bureaucracies do not serve the purpose the political leaders created them for. Bureaucrats become concerned about maximizing their power, influence, and prestige. For example, a new computer corporation is founded, and it creates new computers for a low price. If consumers buy this computer, then the corporation earns profits. However, if the corporation builds computers that nobody wants, subsequently, the corporation will bankrupt. Profits ensure businesses will produce goods and services that consumers want.

On the other hand, profits do not guide the government agencies, and no mechanism keeps a government agency in check. Every year, government agencies receive more funding, regardless of the agencies' performance. Over time, bureaucrats become more concerned with funding, job security, and prestige, instead of following its original function. This explains why the public poorly rates its dissatisfaction of government agencies. Principal-agent view for the Fed is the chairman worries over his or her own self-interest and protects his friends, such as the large commercial and investment banks.

The Fed is independent of the U.S. Treasury Office, even though some Presidents tried to influence it. However, a government budget deficit could lead to money creation. If the Fed maintains a constant interest rate, and the U.S. government operates a budget deficit, the U.S. Treasury department can finance the deficit by issuing T-bills. Nevertheless, the T-bill supply rises, causing the market price of T-bills to fall. Thus, market interest rates rise. If the Fed maintains a fixed interest rate, it must buy the T-bills the Treasury issued, expanding both bank reserves and money supply. Consequently, a government budget deficit leads to inflation if a central bank focuses on the interest rate.

Foreign countries differ in their degree of independence between government and their central banks. For example, the Eurozone and Switzerland have the most independent central banks in the world. Thus, these countries experience the lowest inflation rates in the world. On the other hand, the central banks in Russia, Kazakhstan, Thailand, and Turkey have less independence from their governments, and these countries experience greater inflation rates.

A national government's financial health determines the level of independence between the government and the central bank. Political leaders boost government spending to win favors with the public, but hesitant to raise taxes. Consequently, a government would suffer from a budget deficit that its treasury can finance by selling government bonds. As a government's debt continually grows, investors will reach a point when they stop buying bonds. Unfortunately, political leaders refuse to cut government programs and subsidies or raise taxes. Only solution is the government forces its central bank to buy its bonds that investors do not want, even though it creates inflation.

Many Americans and experts believe the massive $17 trillion U.S. government debt will lead to inflation as the U.S. government forces the Federal Reserve to buy its bonds. Subsequently, the Federal Reserve would lose its independence.

The European Union experienced a similar situation. Greece, Spain, Ireland, and Portugal reached their debt limits, and investors no longer want to buy these governments' bonds. The European Central Bank is independent of the member countries' governments, and these countries cannot force the central bank to buy their bonds. Instead, the governments imposed austerity measures, where they increased taxes and reduced government programs and subsidies, sparking massive protests and demonstrations against the governments. Furthermore, increasing taxes or decreasing government spending hinders economic growth. Consequently, many European countries had entered a recession in 2012.

The Greek government cannot control its budget deficit, and it forced bonds holders to take a huge loss on the Greek bonds in 2010. Consequently, Greece lost its investors, and it will likely leave the Eurozone and reintroduce its currency, the drachma. The Greek citizens and

163

businesses know the Greek government will force its central bank to buy its bonds, causing the inflation rate to increase while the drachma depreciates against the euro. Public has started bank runs on Greek banks, withdrawing their euros and creating more financial hardship for Greece. Then Greece's financial problems trickled into Cypress in 2013.

Cypress is an offshore banking center that attracted sizeable deposits from British and Russians. However, Cypress banks suffered huge losses from their Greek bonds. The EU refused to bail Cypress out and convinced the Cypress government to tax all bank accounts over $100,000. Tax would cause depositors to withdraw their money and flee the country, called capital flight. We discuss capital flight in Chapter 15.

Key Terms

Federal Reserve System
discount rate
Board of Governors
The Federal Open Market Committee
    (FOMC)
directive
Eurozone

European Central Bank
Governing Council
Executive Board
European Council
public interest view
principal-agent view

Chapter Questions

1. How many district banks does the Federal Reserve have?

2. Why did Congress and the President create the Federal Reserve System with several independent bank branches?

3. Please describe the structure of the Federal Reserve System? For example, who owns the Fed stock? Who makes the decisions regarding monetary policy?

4. Identify the functions of the Board of Governors, and who appoints members to this board?

5. Which factors help the Fed be independent of the U.S. federal government?

6. Identify the functions of the Federal Open Market Committee, and who appoints members to this board?

7. Explain why the chairperson of the Board of Governors is such a powerful person.

8. Identify the economic consequences if an EU member of the Eurozone withdraws from the euro and reintroduces its currency.

9. Distinguish between the Executive Board and the Governing Council of the European Central Bank.

10. Identify the benefits and problems for EU countries that are members of the Eurozone.

11. Distinguish between the public interest view and principal-agent view.

12. Explain why the degree of independence between the central bank and its government is very important.

14. Monetary Policy Tools

This chapter introduces the Federal Reserve's three significant tools for conducting monetary policy: open-market operations, discount policy, and reserve requirements. Furthermore, the Fed uses monetary policy to influence the important macroeconomic variables in society including the GDP growth rate and indirectly the unemployment rate, interest rates, currency exchange rates, and asset prices such as stock and bonds. Thus, many people, especially in the financial markets scrutinize the Fed's actions to determine monetary policy. Accurately predicting the Fed's actions, financial companies can reap large profits. Unfortunately, a central bank using monetary policy may create more instability for an economy because of time lags, so we discuss several problems of monetary policy.
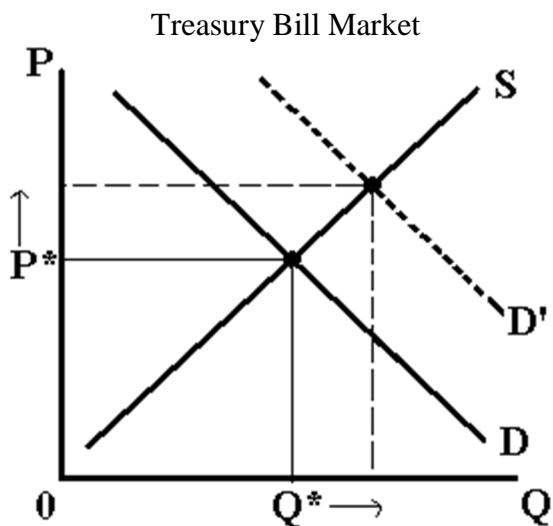
Open-Market Operations

The Fed can use expansionary or contractionary monetary policies. ***Expansionary monetary policy*** is the Federal Reserve expands the money supply and indirectly reduces the short-term interest rates while ***contractionary monetary policy*** is the Federal Reserve contracts the money supply that raises short-term interest rates. Moreover, the Fed can use Open-Market Operations, Discount Policy, and Reserve Requirements to implement a monetary policy. ***Open-Market Operations*** are the Fed's purchase and sale of U.S. government securities, and its most important tool. Open-market operations have the same effect if the Fed purchased any short-term, liquid securities. However, the Fed usually buys and sells U.S. government securities. We also discuss Discount Policy and Reserve Requirements in their sections in this chapter.

The Fed, for example, wants to expand the money supply by using expansionary monetary policy. In the T-bill market as represented in Figure 1, the original market price and quantity for T-bills are P* and Q*. Then the Fed buys T-bills, creating a greater demand for T-bills, shifting the demand function rightward. The Fed pays for the T-bills using a "Fed check." After the seller deposits the check at his bank, then his or her bank's reserves increase, boosting the money supply as banks grant loans to borrowers. Consequently, both the market price and quantity of T-bills rises. Then the market interest rate falls for T-bills, when we calculate it using the present value formula.
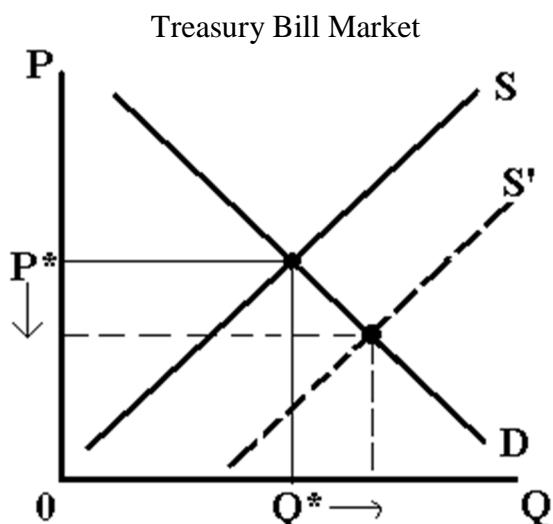
Noticing one thing, open-market operations affect the interest rates because the T-bill is a short-term credit instrument. When the Fed purchases the T-bills, the T-bill's price rises while the T-bill interest rate falls. Consequently, the decrease in the short-term interest rates spreads to other markets, including the federal funds rate, commercial paper, and banker's acceptances. Therefore, short-term interest rates on all short-term credit instruments will rise and fall together.

Contractionary monetary policy works similarly to expansionary monetary policy. Figure 2 depicts market price and quantity for T-bills as P* and Q*. The Fed sells T-bills, increasing the supply of T-bills and shifting the supply curve for T-bills rightward. Consequently, the market price of T-bills falls while the market interest rate for T-bills rises by using the present value

formula. Furthermore, the short-term interest rates for other credit instruments rise. Finally, the banks' reserves fall, and bankers grant fewer loans that shrink the money supply.

Treasury Bill Market

Figure 1. The Federal Reserve increases the money supply by purchasing T-bills

Treasury Bill Market

Figure 2. The Federal Reserve decreases the money supply by selling T-bills

The Fed can only control the growth rate of the money supply or short-term interest rates, but not both at the same time. For example, the Fed increases the M1 money supply by 3%. Consequently, the Fed keeps buying T-bills until the M1 money supply expands by 3%. However, short-term interest rates fall. The Fed cannot prevent the falling interest rates because it focused on the money supply. On the other hand, the Fed wants to reduce the short-term

interest rates to 4%. If the current interest rate equals 6%, subsequently, the Federal Reserve keeps buying T-bills until the interest falls to 4%. Nevertheless, as the Fed continually buys T-bills, both the banks' reserves and the money supply expand. The Fed has no control over the money supply because it focused on the interest rates. Thus, the Fed can either affect short-term interest rates or the money supply, but not both at the same time.

Federal Open Market Committee

The Fed formed the *Federal Open Market Committee (FOMC)* to implement monetary policy by buying or selling assets like U.S. government securities. The FOMC meets eight times per year and issues a *general directive* that states the objective for the monetary aggregates and interest rates. Furthermore, the Federal Reserve Bank of New York is responsible in carrying out the general directive. The Fed Bank of New York deals with about 40 dealers who specialize in U.S. government securities (i.e. secondary market). The New York Fed and dealers are connected electronically. When the Fed is ready to buy or sell government securities, the Fed ask these dealers to bid. Then the Fed buys or sells to the dealers with the best offer. The *Open Market Trading Desk* is the department within the New York Fed Bank that buys and sells the government securities.

When the trading desk at the Fed conducts monetary action, the trading desk can use dynamic or defensive transactions. A *dynamic transaction* is the Fed uses a transaction to meet the monetary policy as specified in the general directive. A *defensive transaction* is the Fed uses open-market operations to offset fluctuations in bank reserves. The Fed uses defensive transactions more than dynamic transactions. For example, the banks' reserves fall, as people withdraw money from their bank accounts to buy presents at Christmas or when people pay their taxes in April. Consequently, the money supply decreases around Christmas and April. Furthermore, natural disasters and employees' strikes can delay the delivery of the mail. A mail delay slows the Fed's check clearing process. Thus, the float rises, expanding both banks' reserves and money supply. Accordingly, the Fed uses defensive transaction to offset temporary fluctuations in bank reserves to stabilize the money supply.

The Fed can use outright purchases and sales or use repurchase agreements. First, the Fed uses *outright purchases and sales*, when it sells or buys a security, and the transaction is permanent. Dealer who bought the security has no obligation in the future to sell the security to the Fed or vice-versa. Second, the Fed uses the *Federal Reserve repurchase agreement (REPO)* to buy securities from a dealer, and the dealer agrees to repurchase the securities for a specific price and on a particular date in the future. This is similar to a bank repurchase agreement. Usually, the dealer buys back the government security within 15 days. Consequently, the REPO injects temporary reserves into the banking system. For example, people around Christmas time withdraw enormous amounts of currency from the financial institutions because they buy Christmas presents with cash. Accordingly, the Fed uses a REPO to inject reserves temporarily in the banking system to offset the currency drain. After Christmas, the currency returns to the financial institutions. Then the REPO expires, and the temporary reserves are removed from the banking system, when the dealer repurchases the REPO.

The Fed can do the opposite of a REPO, called the **Reverse REPO**. The Fed sells securities to the dealers, and the dealers sell the securities back to the Fed for a specific price and on a particular data in the future. Thus, the reserve REPO temporarily lowers excess reserves in the banking system.

The Fed has four reasons why open-market operations are its most popular and important tool. First, the Fed can completely control how many securities it buys or sells. Second, open-market operations are very flexible. The Fed can influence bank reserves by a little amount by buying few U.S. government securities or by a large amount by buying many securities. Third, if the Fed makes a mistake by buying too many U.S. government securities, then it can turn around and sell them to correct its mistake. Finally, the Fed can implement open-market operations very quickly.
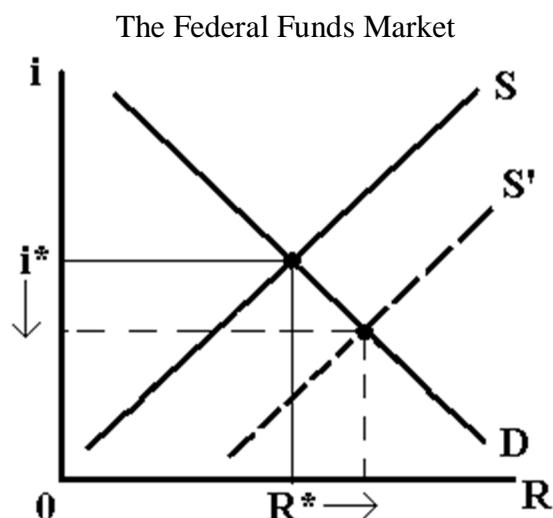
Many people scrutinize the Fed, and they read the Fed's directives for its open-market trading desk. However, these directives are vague and not precise, creating the principal-agent problem. If the directives are vague, then the outcome does not matter. The Fed can deem any outcome as a success, making the Fed unaccountable for errors.

Many central banks across the world, including the European Central Bank use open-market operations similarly to the United States. Although some countries have a small market for government securities, central banks can buy and sell any assets.

Discount Policy

Fed's second monetary policy tool is the **discount policy**. The Fed can grant loans to financial institutions. For example, a bank experiences financial problems and needs reserves. Consequently, the bank sells a $10,000 T-bill to the Fed, and the Fed boosts bank's reserves by $9,000. The discount is the difference while the T-bill becomes the collateral of the loan. Eventually, the bank repays the Fed loan, and afterwards, the Fed returns the T-bill for $10,000 to the bank. The $1,000 difference reflects the interest rate the Fed charges for the loan, called the **discount rate**. Traditionally, the Fed only loaned to banks that were members of the Federal Reserve System. Currently, any bank in the U.S. can borrow from the Fed, and the Fed may not require collateral for the loan.

Each Fed district bank provides loans, known as the "**discount window**." Furthermore, the Fed could use discount policy to influence the money supply and interest rates. For example, Figure 3 shows the Federal Funds Market, where banks lend their reserves at the Fed to other banks. Consequently, the banks electronically transfer these funds through the Fedwire. Demand function constitutes the banks' demand for federal funds. These banks borrow funds to ensure they hold enough reserves to meet depositors' withdrawals or satisfy the Fed's reserve requirements. Demand curve is downward sloping because banks borrow more funds if the interest rate decreases (i.e. the loans are cheaper). Supply function represents the banks' supply of federal funds to the market because these banks hold excess reserves. These banks temporarily lend out excess reserves, so they can earn interest income. Supply function is upward sloping because banks lend more funds for a greater interest rate (i.e. they earn higher profits). Intersection of the demand and supply curves determines the equilibrium interest rate (i*) and amount of reserves (R*).

The Federal Funds Market

Figure 3. The Federal Reserve uses the discount rate to increase money supply
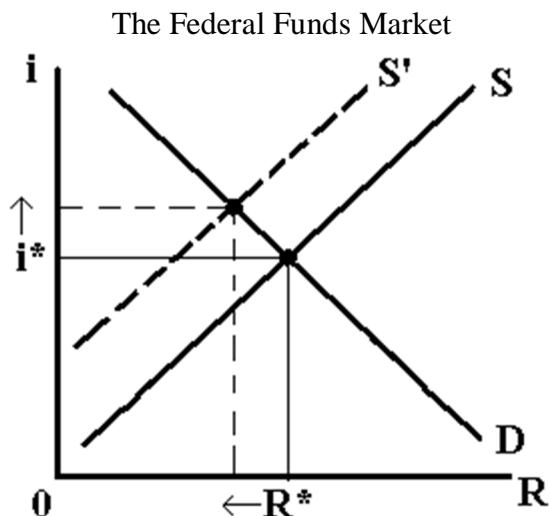
The Fed could use the discount rate for expansionary monetary policy. For instance, the Fed decreases the discount rate, depicted in Figure 3. Then the banks borrow cheaply from the Fed, boosting the reserves in the banking system. Thus, banks have more reserves to lend. Supply function for the federal funds market increases and shifts rightward. Consequently, the interest rate for federal funds fall and both the monetary base and money supply expand.

Contractionary monetary policy works similarly to expansionary monetary policy. Figure 4 shows the Federal Funds Market. Market interest rate is i* while the equilibrium reserves are R*. For example, the Fed raises the discount rate. Banks borrow less from the Fed because loans have greater interest rates. Thus, banks have fewer reserves, causing reserves in the banking system to fall. Consequently, the banks have fewer reserves to lend, shifting the supply for Federal Funds leftward. Interest rate rise while both the monetary base and money supply shrink.

The Fed can grant adjustment, seasonal, or extended credits. *Adjustment credit* is a short-term loan to help banks, experiencing short-term liquidity problems. *Seasonal credit* is a loan to help small banks, located in agriculture areas or tourist destinations. These areas experience wide fluctuations in income because farmers harvest crops once or twice a year, and tourists visit an area during high season. Finally, the Fed could grant an *extended credit*. For instance, a large bank is on the verge of bankruptcy and has severe liquidity problems. Thus, the Fed grants a long-term loan to this bank, preventing a bank failure.

The Fed along with FDIC could extend loans to restore the financial health of the bank. For example, Continental Illinois Bank, the 8th largest U.S. bank, failed during the 1970s because it granted too many bad loans. The FDIC purchased 80% of the bank's stock and elected new management. Thus, the U.S. government nationalized the bank because the bank became too big to fail while the Fed provided $3.5 billion in loans to the FDIC. During the 2008 Financial

Crisis, the Fed had granted up to $2 trillion in loans to prevent some of the largest banks and financial companies in the United States from failing.

The Federal Funds Market

Figure 4. The Federal Reserve uses the discount rate to decrease money supply

Banks can abuse the discount window. For example, a bank could borrow funds from the Fed at 2% and lend these funds out at 5%, earning 3% interest on the Fed loans. The Fed counters this problem by investigating and auditing the bank more, ensuring the bank is complying with regulations. Moreover, the Fed can impose fines or publicly criticize the bank. A bank borrowing from the Fed indicates financial weakness. Finally, the Fed may stop lending to the bank because borrowing from the Fed is a privilege and not a right! Many economists argue the Fed should set the discount rate greater than a comparable short-term interest rate. That way, borrowing from the Fed becomes a penalty because a bank borrows at a higher interest rate than the market. The European Central Bank uses the penalty interest rate to prevent its banks from abusing its loans.

The Fed implemented the ***Term Auction Facility (TAF) Program*** after the 2008 Financial Crisis. Fed specifies the total amount of discount loans that it is willing to provide to the banks while the banks competitively bid for these funds. Then the Fed uses the bidding process to set the interest rate for loans.

Fed's discount policy provides four benefits to the banking system. First, the Fed is the "lender of the last resort." If a bank has trouble with liquidity or needs reserves, and it cannot borrow from other banks, subsequently, the Fed is the last place to go to ask for a loan. Second, the Fed creates the ***announcement effect***, when the discount rate unexpectedly changes. Rate change provides information to the financial markets because the Fed conducts monetary policy secretly. For example, the Fed raises the discount rate. Press, politicians, and financial analysts think the Fed is tightening monetary policy, i.e. contracting the money supply. Third, the Fed uses moral suasion, which means the Fed uses its power to persuade depository institutions to do

what the Fed wants. A loan from the Fed is a privilege, and not a right. If a bank needs a loan from the Fed, and the bank did not do what the Fed wanted, then the Fed could refuse to loan to the bank. Finally, the Fed uses the discount policy to prevent a financial crisis. The Fed can lend as much as the banks need. Thus, the Fed calms the financial markets by stating its discount policy.

Discount policy is not a good tool to control the money supply. For instance, if the Fed wants to increase the money supply, the Fed must grant more discount loans to banks. However, the Fed cannot force banks to accept its loans. Then if the Fed pursues contractionary monetary policy, the Fed must call in loans from the banks, causing hardship. These loans mean banks are experiencing financial problems, and the Fed could harm them by taking the loans away.

Public and financial analysts scrutinize the federal funds market to predict monetary policy. For example, when the public and financial analysts see the federal funds interest rate fall, they infer the Fed is using expansionary policy. On the other hand, if the federal funds rate rises, the public believes the Fed is using contractionary monetary policy. As you know from this chapter, the Fed cannot control the federal funds rate, but can only influence it. Other factors can cause the Federal Funds rate to rise or fall.

Reserve Requirements

Fed can use reserve requirements as a monetary tool. ***Reserve requirements*** are the ratio of reserves to deposits that banks must hold to satisfy depositors' withdrawals. Banks store reserves as vault cash or deposits at the Fed. The Fed has the power to set reserve requirements for banks within the limits set by Congress. The Fed rarely changes the reserve requirements because changes in the reserve requirements have a significant and disruptive impact on the banking system. Table 1 shows the current reserve requirements and the date the Fed last changed them. Consequently, the Fed has not changed reserve requirements since 1990.

Table 1. The Federal Reserve Required Reserve Requirements

Bank liability	Required Reserve Ratio (%)	Effective date
Checking accounts		
$0 to $10.3 million	0	1-09-90
More than $10.3 million to $44.4 million	3	1-09-90
More than $44.4 million	10	1-09-90
Nonpersonal time deposits	0	12-27-90

The Fed can use reserve requirements to alter the money supply. If the Fed believes banks are holding too many excess reserves, then banks would create high inflation in the future.

When banks start lending their excess reserves out as loans, these loans return as deposits, expanding the money supply, creating the multiple deposit expansion. Consequently, the Fed can increase the reserve requirement ratio, switching some excess reserves to required reserves.

Money multiplier ($1 \div r_r$) increases if the Fed reduces the reserve requirement, and vice versa. For example, if the required reserve ratio equals 10%, and the Fed buys a $10,000 T-bill using a Fed check, subsequently, the money supply could potentially expand by $100,000 (or $10,000 \div 0.10). If the Fed lowered the reserve requirement to 5%, and it purchased a $10,000 T-bill, then the money supply can potentially increase to $200,000 (or $10,000 \div 0.05). Thus, the Fed rarely changes the reserve requirements because this tool is too powerful. Small changes in the reserve requirement could have an enormous impact on the banking system and the money supply.

Economists and policymakers believe reserve requirements are not an effective monetary policy tool because the following reasons:

❖ Changing the reserve requirements is too powerful because small changes in reserve requirements have a great impact on the money multiplier and the money supply.

❖ Required reserves impose a cost to the banks because they cannot lend these reserves to borrowers, and therefore, do not earn interest income on required reserves. Instead, the reserves sit in a vault as cash or as deposits at the Fed.

❖ Purpose of reserve requirements is to make deposits safe and maintain a stable banking system. However, if the majority of the depositors came to their bank to withdraw their deposits, then the bank would still fail. Unfortunately, the banks hold fewer than 10% of the deposits as vault cash and/or deposits at the Fed. Thus, reserve requirements would not prevent bank runs and does not stabilize the banking system. Only deposit insurance can help prevent bank runs.

❖ Reserve requirement ratios are components of the money multiplier. Thus, the Fed must maintain a constant money multiplier and reserve requirements in order for the Fed to control the money supply. No empirical evidence indicates reserve requirements improve the stability of the money multiplier. Moreover, banks would still hold reserves to meet depositors' withdrawals if a central bank did not impose reserve requirements.

Milton Friedman, a Nobel laureate, suggested the central bank should impose a 100% reserve requirement on banks. Accordingly, the banks would hold all deposits either at the Fed and/or vault cash. Banking system could not create multiple deposit expansion, and the money multiplier would be one. For example, if the Fed purchased a $10,000 T-bill, both the monetary base and the money supply would expand by exactly $10,000. Consequently, the Fed has complete control over the money supply with a 100% reserve requirement. Banks would hold all deposits as reserves, so they could meet depositor's withdrawals. Moreover, the U.S. government could eliminate federal deposit insurance and substantially reduce bank regulations. However, banks could not lend under this system, causing the financial intermediation process

to break down. Banks link savers to the investors. Thus, the whole economy would need restructuring, and another financial institution would evolve into something similar to a bank that would lend to businesses and households.

Monetary Policy Goals

Goal of monetary policy is to increase the well-being of society. Economists measure well-being in terms of the quantity and quality of goods and services that people consume. The Fed has six *monetary policy goals*, which are:

Price stability: Product prices communicate information to households and businesses. Households determine how many goods to buy while businesses determine how many goods to produce. Inflation is a continual increase in prices of goods, and services, and it erodes the value of money. Furthermore, a high inflation rate becomes more variable, thus, creating uncertainty for businesses, consumers, and workers. The uncertainty leads to adverse effects on decisions and hinders economic growth. If the inflation rate soars, then money's functions of a "store of value" and "medium of exchange" breaks down.

High employment: The Federal Reserve and the federal government reduce unemployment as much as possible because massive unemployment causes human misery. As workers remain idle, factory space and equipment become underutilized. When a society does not use all its resources, an economy's GDP grows at a slow rate or even decreases. Government cannot reduce the unemployment rate to zero. In some cases, unemployment occurs when workers quit their jobs and look for new ones, or students graduate and enter the labor market. The Fed tries to lower the unemployment rate to the natural rate of unemployment. Currently, economists estimate the natural rate of unemployment to be 6% for the United States. If the Fed strives for an unemployment rate below 6%, then the Fed's policy creates inflation.

Economic growth: A growing economy has an increasing real GDP because society produces more goods and services. A high real GDP growth rate lowers the unemployment rate while businesses earn profits. Then they raise their investment, producing more goods and services. Furthermore, strong economic growth causes increasing incomes for businesses and households. When businesses and households have higher incomes, the local, state, and federal governments collect more tax revenues. Thus, the Fed uses monetary policy to spur strong economic growth.

Financial market and institution stability: Financial panics, bank runs, stock market crashes, or bankruptcies of large financial institutions could trigger a chain reaction that causes other financial institutions to bankrupt. Unfortunately, a financial panic disrupts the link between savers and investors. Then businesses do not receive loans they need to invest while customers do not receive loans to buy homes, cars, and other assets. If the financial markets and institutions break down, then the economy can enter a severe recession, causing high unemployment and slow or negative GDP growth rates. Consequently, the Fed stabilizes the financial system by being a "lender of the last resort," preventing financial panics.

Interest rate stability: The Fed stabilizes the interest rates because fluctuating interest rates create uncertainty in the economy, and businesses, and households experience difficulties planning for the future. Businesses become uncertain about investing in new buildings,

machines, and equipment while consumers are unsure about long-term investments, such as buying a house or car. Interest rate stability is related to the stability of the financial markets. Large swings in interest rates can cause sizeable capital gains and losses in the financial markets. Consequently, some investors earn profits while others earn losses.

Foreign-exchange market stability: The Fed tries to stabilize the U.S. dollar's value against the major currencies, such as the Japanese yen and European euro. A strong U.S. dollar causes U.S products to become relatively more expensive to foreigners while foreign-made products become cheaper to U.S. citizens. Thus, consumers buy more foreign products, raising imports while U.S. businesses sell fewer products abroad, shrinking exports. If the U.S. dollar weakens, then U.S. imports and exports do the opposite. U.S. products become cheaper to foreigners while foreign-made goods become more expensive. Thus, U.S. exports rise while imports fall.

Some of these goals conflict with each other. For example, if the Fed pursues monetary policy that expands the money supply, boosting national output and lowering the unemployment rate. However, expansionary monetary policy can trigger inflation. Then the nominal interest rates begin to increase because of the higher expectations of inflation, the Fisher Effect.

The European Central Bank, on the other hand, has only one policy goal – price stability. The ECB defines price stability as an inflation rate of 2% or less. Thus, this extremely low inflation rate causes the exchange rate of the euro to strengthen relative to other currencies, which we discuss in Chapter 16.

Time Lags and Targets

The Fed cannot influence the monetary policy goals directly. The Fed uses its tools, open-market operations, discount rates, and reserve requirements, to influence indirectly its policy goals. Unfortunately, three time lags hinder monetary policy. First, the Federal Reserve or government needs data and information before it can do anything, the **information lag**. For instance, government calculates the unemployment rate monthly and estimates GDP data quarterly. The government requires nine months to know whether the economy has entered a recession because economists define a recession as two consecutive quarters of negative real GDP growth. Thus, a government knows the economy is in a recession by the end of the third quarter. Second, the Federal Reserve or government must study the data, and then they devise and approve a policy, the **administrative lag**. Finally, a monetary policy does not impact the economy immediately. It takes time when the Fed implements a policy until it shows up on the economy, the **impact lag**.

Time lags can amplify the business cycle. For example, the economy entered a recession that lasted only one year. Then the economy returned to the full-employment level. Unfortunately, the government takes three months to collect quarterly GDP data. The GDP needs two consecutive quarters of negative GDP growth before a recession is declared. Thus, the Fed must wait nine months to determine whether the economy has entered a recession. If the administrative lag is one month while the impact lag equals six months, then the Fed's policy takes hold after one year and four months to influence the economy, or 9 + 1 + 6. If the Fed counteracted this recession, subsequently, the Fed makes the economy more unstable. After the

economy returns to the full-employment level, the Fed's policy kicks in, expanding the economy and creating inflation.

The Fed uses operating targets and intermediate targets to reduce the problems with time lags. The Fed uses its tools to influence the intermediate targets, and the intermediate targets directly affect the price level, unemployment rate, and economic growth rate. Moreover, the Fed has more control over the intermediate targets, and the time lags are shorter. *Intermediate targets* include the M1, M2, and M3 definitions of the money supply and short-term interest rates.

Fed has more control over *operating targets* than intermediate targets. Operating targets are the federal funds rate and non-borrowed reserves. Federal funds rate is the interest rate that banks charge for lending their excess reserves to other banks. When the Fed uses open-market operations, changes discount policy, or alters reserve requirement, the Fed's monetary policy has an immediate impact on the federal funds rate and non-borrowed reserves. When the Fed implements monetary policy, such as a creating a greater GDP growth rate, the Fed's policy immediately affects the operating targets, and, in turn, influence the intermediate targets, such as GDP growth rate. Accordingly, the Fed monitors changes in the intermediate and operating targets, determining whether monetary policy is affecting the economy correctly.

The Fed uses three criteria to select an intermediate target. First, the Fed must easily measure the intermediate target in order to overcome information lags. Second, the Fed must have control over the intermediate target to overcome the impact lag. For example, the Fed can influence the money supply, but not the GDP growth rate. Many factors influence the GDP growth rate, and the Fed cannot influence all of them. Thus, the Fed would never select GDP as an intermediate target. Finally, the Fed selects intermediate targets that influence the policy goals predictably. For example, the Fed influences the M1 definition of the money supply, and M1 sometimes influences the unemployment rate, while at other times, it does not. Therefore, M1 would not be a good intermediate target.

Before the 1990s, the Fed alternated back and forth between interest rate and money supply targets. This strategy was not successful because the Fed's monetary policy caused more instability in the economy. Economists refer this to *procyclical monetary policy*, which means the Fed amplifies the business cycle. Monetary policy further expands a growing economy creating inflation, or it strengthens a severe recession. For example, the Fed selected interest rates as its intermediate target. A growing economy causes interest rates to rise. For the Fed to lower the interest rates, it must buy more U.S. government securities. Consequently, the bond's prices increase, causing the interest rates to drop. Nevertheless, the bank reserves expand the money supply, expanding the economy faster. On the other hand, as an economy enters a recession, then interest rates fall. If the Fed wants to boost the interest rates, subsequently, the Fed must sell U.S. government securities. Thus, the price of the securities decreases, increasing the interest rates. However, bank reserves falls, contracting the money supply and worsening a recession. Since the 1990s, the Fed has emphasized a low inflation goal, and this policy has been successful. Europe and Japan also emphasize price stability and low inflation rates.

Economists suggested the Fed use other intermediate targets, such as the following:

❖ *Nominal GDP:* If an economy produces more goods and services, then both real and nominal GDP increase. If inflation causes higher prices, subsequently, the greater prices increase nominal GDP, but have no effect on real GDP. Some economists believe the Fed cannot influence real GDP, but it can affect the inflation rate, which in turn affects the nominal GDP. If the Fed selected nominal GDP as an intermediate target, then the Fed would be focusing on price stability indirectly.

❖ *Yield Curve:* Some economists suggested the Fed use the yield curve as an intermediate target. Although the Fed examines the yield curve, the yield curve's shape depends on investors' expectations of inflation and real interest rates.

❖ *Commodity prices:* Some economists suggested the Fed focus on commodity prices. However, commodity prices do not accurately predict inflation well.

❖ *U.S. dollar exchange rate:* Exchange rates can predict inflation and real GDP growth rate. Nevertheless, the exchange rate could respond to changes in the interest rate between countries. International investors invest in countries with high real interest rates.

Monetary policy can become ineffective in some cases. For instance, Japan entered a perpetual recession, starting in the 1990s. Businesses and consumers became very pessimistic; when the Japanese central bank lowered the interest rate, but it had no impact on the economy. After the housing bubble popped in 2007 in the United States, the Federal Reserve has pursued expansionary monetary policy. However, the U.S. economy is faltering and sputtering still in 2013, even with a discount rate close to zero!

Japanese and U.S. struggling economies lead to the idea of *cyclical asymmetry*, which is the contractionary monetary policy is always effective, while expansionary monetary can be impotent at times. Thus, the low interest rates do not change consumers' and investors' behavior, but high interest rates do. Consequently, some experts believe a central bank should concentrate only on one target - inflation. Thus, a central bank should not focus on the economy but maintain low inflation. Central banks in Canada, Eurozone, New Zealand, Sweden, and United Kingdom maintain low inflation rates, causing appreciating currencies. If an economy has over a 10% inflation rate, then most likely the central bank is increasing the money supply too quickly while the central bank pursues other targets not related to price stability. Finally, a country with an independent central bank from government could experience low inflation rates because the central bank can focus on price stability and not help its government finance its budget.

Key Terms

expansionary monetary policy   Term Auction Facility Program
contractionary monetary policy   announcement effect
open-market operation   reserve requirement
Federal Open Market Committee   monetary policy goal
general directive   price stability

Open Market Trading Desk	high employment
dynamic transaction	economic growth
defensive transaction	financial market and institution stability
outright purchase and sale	interest rate stability
Federal Reserve repurchase agreement	foreign-exchange market stability
Reverse REPO	information lag
discount policy	administrative lag
discount rate	impact lag
discount window	intermediate target
adjustment credit	operating target
seasonal credit	procyclical monetary policy
extended credit	cyclical asymmetry

Chapter Questions

1. What happens to bank reserves, interest rates, bond prices, and the money supply if the Fed bought U.S. Treasury securities?

2. What happens to bank reserves, interest rates, bond prices, and the money supply if the Fed sold U.S. Treasury securities?

3. Explain why the Fed concentrates on the growth rate of the money supply or short-term interest rates, but not both at the same time.

4. Distinguish between REPOS and reverse REPOS, and identify their purpose.

5. Distinguish between dynamic and defensive transactions.

6. Explain why open-market operations are such an important monetary tool.

7. What happens to the short-term interest rates, bank reserves, and the money supply if the Fed changes the discount rate?

8. Identify the three credit-loans that the Fed can grant to banks.

9. Explain how the Fed prevents banks from abusing their privilege in receiving Fed loans.

10. Identify the problems in using discount policy as a monetary tool.

11. Why do the financial analysts and the public scrutinize the federal funds market?

12. Explain why reserve requirements are such a powerful monetary tool.

13. Identify the costs and benefits by imposing a 100% reserve requirement for banks.

14. Identify the Fed's six monetary policy goals.

15. What are the time lags, and why do they cause problems for monetary policy?

16. Explain why the Fed uses targets.

17. Distinguish between an operating target and an intermediate target.

18. Identify the criteria for selecting intermediate targets.

19. Explain pro-cyclical monetary policy, and explain why it occurs.

20. Which intermediate targets have economists suggested the Fed use?

15.   The International Financial System

Governments and central banks often intervene in the foreign-exchange markets. Developed countries like the United States and Europe tend to maintain strong currencies while China and the Asian Tigers tend to weaken their currencies. Thus, international investors prefer to hold strong currencies, while the Asian countries weaken their currency to boost their export industries, creating jobs and wealth. This chapter examines a central bank's intervention in its currency exchange markets, and the impact of a country's balance-of-payments upon its exchange rate. Moreover, the world has used three exchange rate regimes: the gold standard, Bretton Woods System, and flexible exchange rates. We discuss these exchange rate regimes in detail along with the international institutions: International Monetary Fund and World Bank.

Balance of Payments

Balance of payments records all transactions between the households, businesses, and government of one country to the rest of the world. It is a cash flow statement and not a balance sheet. Economists use balance-of-payments accounts to compare the total flow of money between one country and the rest of the world, and economists always measure it in a country's currency. We show the 2011 balance of payments for the United States in Table 1.

Table 1. U.S. Balance of Payments for 2011

Category	Amount ($ millions)	Amount ($ millions)
Current Account		
Total Exports, Services, and Income	2,847,988	
Total Imports, Services, and Income	-3,180,861	
Unilateral Transfers	-133,053	
Total		-465,926
Financial Account		
U.S. Owned Assets Abroad	-483,653	
Foreign Owned Assets in the U.S.	1,000,990	
Financial Derivatives	39,010	
Capital Account	-1,212	
Total		555,135
Statistical Discrepancy		-89,208
Grand Total		1

Source: Bureau of Economic Analysis (2012)

Balance of payments uses the accounting double entry system, where total debits equal total credits. A payment by U.S. resident, business, or government to another country represents a

deficit item or negative because money is leaving the United States. Several examples of deficit items include a U.S. resident buys imported goods, sends money to relatives in foreign countries, or travels abroad. A country's residents or government receiving money for transactions is a surplus item, and the number is positive because money enters the United States. Several examples of surplus items include U.S. firm exports goods to another country. U.S. residents receive money from foreigners, or foreigners travel to the United States.

Current account summarizes the purchases and sales of goods and services between the United States and the rest of the world. The first item is the trade balance, which equals total exports minus total imports, and it is usually the largest item. If the trade balance is positive, then more money flows into the country than leaves because money moves in the opposite direction of goods and services. If the trade balance is negative, subsequently, more money flows out of the country than in as the country buys more products and services from the world. Furthermore, the current account includes the items for shipping, brokerage, and insurance for the ships and airplanes that deliver the cargo. Then economists add investment income to the current account. We must be careful because investments are financial transactions that economists record under the financial account. However, economists record the income from those investments under the current account. Finally, the current account includes unilateral transfers between nations such as foreign aid, private gifts, and money sent to relatives living in another country.

For the United States, the current account balance equaled -$465.9 billion in 2011. Current account is negative because more money left the United States than entered, causing a current account deficit. Subsequently, the United States finances this deficit by borrowing from foreigners. Current account deficit is large because the United States imported more goods than exported. The U.S. trade balance was -$494.7 billion in 2011.

Financial account equaled $555.1 billion in 2011, and it records all transactions for stocks, bonds, and real estate between the United States and the rest of the world. If the financial account is positive, then more money flowed into the United States than left, called a financial inflow. Consequently, the United States borrows from foreigners because they invested more assets in the United States than the amount the U.S. residents bought foreign assets. If the financial account is negative, then more money is flowing out of the United States than flowing in, called a capital outflow. Thus, a country is lending to foreigners because the value of foreign assets bought by residents exceeds the amount of assets foreigners bought inside the country.

The U.S. businesses, for instance, bought $483.7 billion in foreign stocks, bonds, and real estate while foreigners bought $1,001.0 billion of financial and property assets within the United States. Furthermore, approximately $39.0 billion flowed into the United States for purchasing of financial derivatives. Finally, the capital account experienced a net outflow of a negative $1.2 billion. Capital account represents the purchase of assets used in manufacturing and production, and the production has not started yet. For example, a U.S. firm buys a coalmine in a foreign country, and it has not started to extract coal yet. Then economists record this transaction under the capital account.

If a country has a current account deficit, then a financial surplus finances this deficit. For example, the United States has operated current account deficits for the last 45 years. It imports

more goods and services than it exports, causing an outflow of U.S. dollars into the foreign exchange markets. International investors obtain U.S. dollars and use it to buy assets in the United States, creating a financial account surplus. Foreigners invest in government securities, stocks, bonds, and real estate in the United States. *Balance-of-payments equation* shows this relationship in Equation 1, which is the current account plus the financial account should equal zero.

Balance of Payments (BOP) = current account + financial account = 0 　　　　　　(1)

We use Equation 1 as an equilibrium equation to predict changes in a country's exchange rate. If a country's balance of payments equals zero, then that country's exchange rate may not change. For example, the United States has a current account deficit, causing U.S. dollars to flow into the foreign-exchange markets. Foreign countries collect these U.S. dollars and invest them in the United States. What happens if the foreign investors do not want to invest in the United States? Consequently, balance of payments becomes negative, causing the U.S. dollar to weaken or to depreciate because the international markets have a surplus of U.S. dollars. Subsequently, a weaker U.S. dollar causes the current account to shrink over time as imports fall while exports rise until restoring equilibrium.

If the Federal Reserve does not want the dollar to weaken, then it can buy these U.S. dollars by using official reserve assets. The Federal Reserve can finance a balance-of-payment deficit or reduce U.S. dollars on the international market by doing one or more of the following:

❖ The Fed could sell gold to buy U.S. dollars.

❖ The Fed could sell foreign currencies and buy U.S. dollars.

❖ The Fed could borrow from foreign central banks.

❖ The Fed could use its reserves at the International Monetary Fund or ask the International Monetary Fund for a loan.

❖ The Fed could use Special Drawing Rights (SDRs). We discuss them further under the Exchange Rate Regimes.

Economists record official reserve assets under the Financial Account as the *U.S. Official Reserve Assets*. In 2011, the official settlements balance was a minus $15.9 billion, and we already included this balance in the financial account in Table 1. The Federal Reserve paid $15.9 billion by selling assets to foreign countries, which we itemized in Table 2.

Economists add a non-zero amount called *statistical discrepancy* to force the current account plus financial account to equal zero. Discrepancy arises from measurement errors, and some people and businesses do not report revenue from illegal businesses, evade taxes, or hide their money from their government in another country. People hiding money is a form of capital

flight that we discuss further in this chapter. Statistical discrepancy was a minus $89.2 billion in 2011.

Table 3. The U.S. Official Reserve Assets

U.S. official reserve assets	Amount ($ million)
Gold	0
Special drawing rights	1,752
Reserve position in the International Monetary Fund	-18,079
Foreign currencies	450
Total	-15,877

China and the Asian tigers weaken their currencies because they boost their exports. Consequently, these countries experience trade surpluses, causing more money to flow in than out. The governments can use this money inflow to purchase U.S. government debt, real estate, and stocks and bonds in U.S. corporations. Thus, the U.S. debt and trade deficits go together, and we discuss them under the Hegemony section in this chapter. Furthermore, the Asian countries can use this money inflow to buy machines and equipment from developed countries, boosting their investment even further.

The Exchange Rate Regimes

Nations implement a regime or system to settle international payments arising from international trade and finance because nations must use a system to settle payments between themselves. This system is the *exchange rate regime*.

First and oldest exchange rate regime is the gold standard that started with the Greek and Roman civilizations. Then, the world used the gold standard between 1876 and 1913 before World War I plunged the world into war. A *gold standard* is a central bank sets an exchange rate of their currency to gold. Subsequently, the central bank agrees to convert their currency to gold on demand. For example, the United States, Japan, and Britain establish the following exchange rates as Equations 2.

2,000 U.S. dollars = 1 ounce of gold　　　　　　　　　　　　　　　　(2)

200,000 Japanese yen = 1 ounce of gold

4,000 British pounds = 1 ounce of gold

If the U.S. central bank wants a money supply of $40 million, it must buy and hold 20,000 ounces of gold, which is $40 million ÷ $2,000 per ounce. For a central bank to boost the money supply or grant emergency loans to banks, it must buy and store more gold.

Gold standard forces fixed exchange rates, which economists call a *fixed exchange rate system*. Consequently, one U.S. dollar equals 100 yen or 2 pounds. We calculate the exchange rates in Equations 3. First, we set all currencies equal to one ounce of gold. Then we divide by one currency's coefficient, yielding the exchange rates, which in this case, we divide all numbers by 2,000:

1 ounce of gold = \$2,000 = 200,000 yen = 4,000 pounds (3)

$$\frac{\$2,000}{2,000} = \frac{200,000\ yen}{2,000} = \frac{4,000\ pounds}{2,000}$$
$$\$1 = 100\ yen = 2\ pounds$$

A gold standard helps countries maintain a zero balance of payments. For example, the U.S. experiences a payments deficit with Japan, where the current account plus the financial account is negative. Consequently, U.S. dollars are flowing out of the United States and into Japan. On the other hand, Japan accumulates U.S. dollars, and the Japanese central bank exchanges the U.S. dollars for gold from the U.S. central bank. Then gold begins flowing out of the United States and into Japan. Once the U.S. central bank possesses less gold, it must contract the money supply. Remember, the money supply fixes the ratio between gold the government is holding and the currency in circulation. When the money supply declines, the prices in the economy will decrease, called *deflation* or negative inflation. Thus, U.S. products become cheaper than other countries' products. Then the U.S. businesses export more goods abroad while the lower U.S. prices cause foreign products become more expensive. Hence, the U.S. consumers buy less imported goods. U.S. exports became larger while imports smaller, increasing the current account until it equals zero and gold stops flowing out of the United States. Exact opposite would occur in Japan. Consequently, a gold standard automatically eliminates trade deficits and surpluses.

Gold standard has four benefits:

Benefit 1: High inflation rates were rare under the gold standard because central banks had little control over the money supply. If a central bank wants to increase the money supply, then the central bank must buy gold. For example, the inflation rate averaged less than 1% in U.S. under the gold standard. Consequently, a gold standard constrains a central bank's ability to expand the money supply.

Benefit 2: International investors have a lower risk because exchange rates do not fluctuate. All exchange rates become fixed that eliminates the exchange rate risk.

Benefit 3: Gold standard greatly constrains a government's power. For instance, central banks have little power to influence the money supply, and hence, they cannot pursue policies to influence their economies. Thus, gold goes hand to hand with free markets, strong property rights, and limited government, but this benefit depends on the reader's viewpoint because this could be a problem (Gold Standard, pp. viii-ix). During the 2008 Financial Crisis, the Federal Reserve granted \$2 trillion for emergency loans to banks, which would be impossible under a gold standard.

Benefit 4: Gold standard restricts commercial banks and government. If banks create too much credit, the credit expands the money supply, leading to inflation in the long run. People would convert their currency into gold, restricting credit expansion and hence reducing inflation. Moreover, government could print money to finance budget deficits, but this causes inflation. Then the public counteracts the inflation by converting money into gold (Gold Standard, p. xi).

Gold standard, unfortunately, can export a country's recession to other countries. However, all exchange rate regimes share this problem. For example, the United States and Japan engage in trade, and both use the gold standard. We outline the steps for a country to export a recession:

❖ If the United States enters a recession, the U.S. consumers reduce their demand for imports or Japanese products. If the U.S. exports remain the same while imports fall, the U.S. experiences a trade surplus, leading to a gold inflow from the Japan to the United States.

❖ Japan exports fall to the United States because lower demand causes the export industries to contract, and they lay off workers. Furthermore, the Japanese central bank must reduce its money supply because it had shipped gold to the United States. Consequently, the unemployed workers buy fewer goods because they earn lower incomes and deflation causes Japanese products to become cheaper. Furthermore, contractionary monetary policy would raise interest rates that reduce investment. Falling investment would contract the economy further.

❖ All exchange rate regimes allow one country to export a recession to another country. Nevertheless, a flexible exchange rate allows a country to manipulate the exchange rate to reduce a recession's impact.

After World War II, 44 countries implemented a new international system, the ***Bretton Woods System***, where the delegates met at a vacation resort, Bretton Woods, in New Hampshire. The Bretton Woods System established fixed exchange rates between nations that lasted between 1945 and 1971. All countries except the United States fixed their exchange rates to the U.S. dollar. Then the United States government established the official exchange rate of $35 for 1 ounce of gold because the United States held much of the world's gold supply. The U.S. government accumulated gold from the sale of supplies and weapons to Europe for both World Wars. However, the gold-dollar exchange rate applied to foreign governments because U.S. citizens could not legally own gold between 1933 and 1974. Consequently, the Bretton Woods System transformed the U.S. dollar into the international reserve currency

The Bretton Woods system was more flexible than the gold standard because countries could adjust their currency exchange rates relative to the U.S. dollar. Consequently, countries used a system resembling a gold standard, but a government can intervene with its exchange rate to correct a balance-of-payments deficit. Then U.S. President, Richard Nixon, ended the Bretton Woods System on August 15, 1971 because the United States experienced trade deficits that would lead to a gold outflow.

The Bretton Woods system created two institutions: International Bank of Reconstruction and Development, or simply World Bank and the International Monetary Fund. ***World Bank***

grants long-term loans to developing countries. They use the loans for economic development and build a country's infrastructure, such as highways, bridges, power plants, and water supply systems. World Bank sells bonds in the international markets to raise funds for its projects.

Countries created the *International Monetary Fund (IMF)* to be the lender of the last resort. The IMF grants loans to countries that experience balance-of-payment deficits. Consequently, the IMF is similar to a central bank because a central bank can grant emergency loans to its banks during a financial panic or crisis. Thus, the IMF should stabilize international payments and promote international trade. Moreover, the IMF collects and standardizes international economic data. The IMF has 181 members and opens membership to any independent nations. If a country wants to join the IMF, then this country contributes capital based upon a formula. A country pays one-fourth of the capital in gold and three-fourths in that country's own currency. IMF relaxed it gold requirement, and countries can pay using strong currencies such as euros, pounds sterling, Special Drawing Rights, U.S. dollars, or yens. Consequently, the IMF gains financial capital because the IMF possesses gold and a pool of foreign currencies that it can lend to countries.

The IMF helps countries that are experiencing balance-of-payments deficits. For example, Britain has a balance-of-payments deficit, and it borrows from the IMF. The British government needs U.S. dollars, so the British government or central bank gives pounds and receives dollars from the IMF to finance its balance-of-payments deficit. Thus, the U.S. dollars decrease while British pounds increase in the IMF's currency pool. When Britain repays the loan with interest, it repays in a currency that is acceptable to IMF, and then the IMF returns the British pounds.

The IMF created *Special Drawing Rights (SDRs)* in 1969 because IMF officials believed a gold and reserve asset shortage would cause an international crisis. Each member country of the IMF receives a proportion of new SDRs. Between 1968 and 1971, the IMF created $10 billion worth of SDRs. By 2010, the IMF has issued 204 billion of SDRs, approximately worth $308 billion. When a country experiences a balance-of-payments deficit, it can use its SDRs as money to obtain foreign currencies from the IMF.

Are SDRs money? Originally, the IMF priced a SDR based on gold's weight. Then the IMF officials switched the SDR's value to a basket of strong currencies, containing the euro, British pound, Japanese Yen, and U.S. dollar. Consequently, the IMF defines the SDR as a "unit of account," which comprises one function of money, and it establishes exchange rates with the four currencies. Moreover, the countries can use SDRs to obtain foreign currencies from the IMF that suggests the SDR is money. However, the IMF considers SDRs to be a credit instrument. Many governments and international investors are worried about the depreciating U.S. dollar and the depreciating euro. Some people suggested the SDR should become the new international currency. Thus, international trade would not collapse if the United States or European enters a severe economic depression.

The U.S. Treasury accepts the new SDRs on behalf of the United States. Then it issues certificates that are claims to the SDRs and sells these certificates to the Federal Reserve. Consequently, SDR certificates become assets to the Federal Reserve.

Although the countries abandoned the Bretton Woods system in 1971, the World Bank and IMF still live. Subsequently, governments use a variety controls, measures, and standards for

their country's currency. Governments specify the rules and limits how people and businesses can exchange its currency for other currencies. Furthermore, governments impose controls on imports, exports, international investment, and foreign ownership of real estate, indirectly influencing its currency exchange rates.

Government could implement a flexible exchange rate system, allowing the supply and demand in the foreign-exchange markets to determine its currency exchange rate. Investors refer to this as a *free float* or *clean float* because, government does not interfere with its exchange rates. Although Canada, Eurozone, Japan, South Korea, and United States allow their exchange rates to change, these countries occasionally intervene with their exchange rates. Unfortunately, fluctuating exchange rates could hinder international trade and investment.

Most countries use a *managed float*, where a government allows supply and demand to determine its currency's exchange rate, but it intervenes to achieve economic policy goals. Of course, if investors are pessimistic about a government's ability to manage its exchange rate, they call this *dirty float*. Usually, a government maintains either a too strong or a too weak currency relative to the other currencies. Unfortunately, government intervention could lead to depreciation. For example, if investors believe a country's currency will depreciate, then they either cash out of that currency or buy derivative contracts. Consequently, investors can overwhelm a government, forcing it to devalue its currency. Then investors' expectations turn into a self-fulfilling prophecy.

Some governments use a *pegged exchange rate*, where the government fixes its currency exchange rate to a strong currency, such as the U.S. dollar or euro. For example, the United Arab Emirates (UAE) set its exchange rate to one U.S. dollar to equal three UAE dirhams before 2008. Once the 2008 Financial Crisis struck the world, UAE devalued its currency to one U.S. dollar to 3.67 dirhams. Other countries like Bahamas, Barbados, and Hong Kong peg their currencies to the U.S. dollar while Bosnia and Herzegovina and Bulgaria fix their currency to the euro. Unfortunately, a government must intervene in the currency market to maintain its exchange rate. Countries like Uzbekistan and some African countries maintain exchange rates that are too strong, but their central banks rapidly expand the money supplies, creating inflation. Inflation can weaken a currency. Consequently, black markets form for their currencies because the black market price reflects the true market value. A government can use a pegged exchange rate to keep inflation in check if its central bank helps government finance its budget by expanding its money supply.

Several countries use *dollarization*, where a country uses the U.S. dollar or euro as its own currency. For instance, El Salvador, Ecuador, and Panama use the U.S. dollars as their own currency. Furthermore, U.S. territories, such as Guam, Marshall Islands, U.S. Virgin Islands, and Puerto Rico also use U.S. dollars. A territory is a country that was not admitted as a state to the United States. Other countries, Kosovo and Montenegro, use the euro as their currency even though they are not European Union members. Consequently, dollarization allows a country to integrate its economy with United States or the Eurozone by tying its inflation rate to that country. Dollarization also removes the exchange rate risk, but that country loses control over monetary policy. Its central bank cannot collect revenue from *seigniorage*, when a government earns a profit from printing money. For example, the Federal Reserve pays approximately 14

cents ($0.14) to manufacture a one-hundred dollar bill. Thus, the Federal Reserve earns $99.86, when this bill enters circulation. Unfortunately, dollarization severely limits a central bank's power.

Countries using the current exchange rate regimes encourage world-wide inflation. For example, if a country's currency is depreciating from a rapid expanding money supply, then another country could counteract its currency appreciation by rapidly expanding its money supply. Consequently, these countries would maintain stable exchange rates, although these countries are afflicted with high inflation rates (Gold Standard, p. xii).

Financing Balance-of-Payments Deficits and Surpluses

Exchange rate regime determines which strategies a country must undertake to finance a balance-of-payments deficit or surplus. Surpluses are easier to finance than the deficits. Some call a "deficit with tears" because a central bank or government must use its resources to finance it. On the other hand, a balance-of-payments surplus allows a government or central bank to accumulate foreign assets.

Fixed rate regime is the most difficult to maintain because a government must maintain a balance-of-payments (BOP) deficit or surplus close to zero. Unfortunately, this regime weakens a central bank's power for monetary policy. For instance, if the central bank expands the money supply, then the country's interest rate falls. Next, the international investors cash out of the country because they invest in other countries with higher interest rates. Consequently, the demand for that country's currency weakens and depreciates. For the government or central bank to maintain the fixed exchange rate, it must enter the international market and buy its currency, causing its currency to appreciate. Unfortunately, a central bank must focus on its exchange rate, reducing its focus on other goals.

A country with a fixed exchange rate can use two strategies:

Strategy 1: If a country has a balance-of-payments deficit, it has an excess supply of currency on the foreign exchange markets. Thus, a central bank buys its currency using official settlements reserves, such as foreign currencies, gold, SDRs, or a loan from the IMF. As a country removes its currency from the international markets, its balance-of-payments deficit falls. If the central bank has no reserve assets, then it must devalue its currency, or a black market could form.
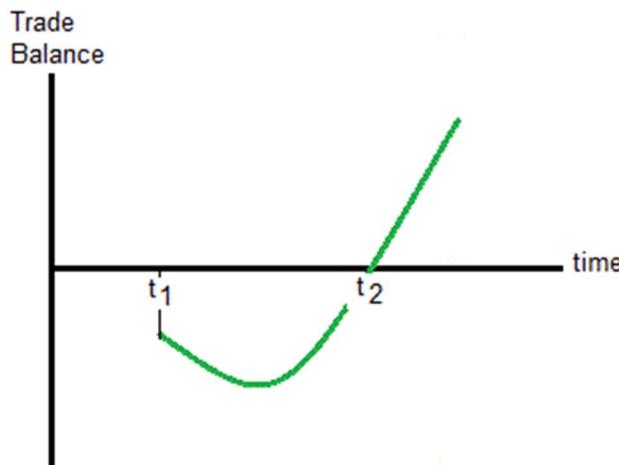
Strategy 2: If a country experiences a balance-of-payments surplus, subsequently, that country has a shortage of currency on the foreign exchange markets. A central bank can easily finance a surplus because it sells its currency to buy foreign currencies, accumulating official reserves.

Floating exchange rate regime is the easiest to maintain because a government does not intervene with its currency exchange rate. Government or central bank allows the exchange rate to correct any surpluses or deficits. If a country experiences a balance-of-payment deficit, then its currency tends to depreciate over time, causing exports to increase while imports decline. On the other hand, a balance-of-payment surplus does the exact opposite.

A country could experience the ***J-curve Effect***, when the trade deficit becomes worse temporarily as its currency depreciates as shown in Figure 1. For example, a country allows its

currency to depreciate starting at time period t_1. Unfortunately, the trade deficit initially worsens before improving. Time span ranges from three to six months, denoted as t_1 and t_2 on the graph.

If a country experiences a balance-of-payment surplus, then it allows its currency to appreciate. Consequently, its exports decrease while its imports increase while the balance-of-payments approaches zero.

Figure 1. The J-curve Effect

Most countries use a managed float, where a government or central bank varies the interest rate to intervene in the foreign exchange market. For instance, a country is experiencing a balance-of-payments deficit. Consequently, the central bank contracts the money supply, boosting the interest rate. Next, the international investors invest in a country, earning the greater interest rate and causing the financial account to rise until the balance of payments equals zero again.

A central bank or government can finance a balance-of-payments surplus easily under a managed float system. Central bank expands the money supply, lowering the interest rates. Hence, the international investors reduce their investments in the country because they can earn higher returns elsewhere. Consequently, the financial account falls until the balance-of-payments surplus approaches zero.

A country can have difficulties financing a balance-of-payments deficit for all exchange rate regimes. Consequently, a government might impose foreign-exchange rate controls to correct the imbalance. A government can alter the rules and regulations, especially for foreigners such as prohibiting the foreigners from transferring their money out of the country. A government can impose special taxes and fees on interest earnings and dividends. Then government collects revenue, instead of money flowing out of the country.

A country could experience *capital flight*, when the foreign investors become spooked, and they quickly withdraw investments from a country. They believe they will lose their investments

and they rapidly cash out, causing a massive financial account outflow. A capital flight is similar to a bank run, where all the depositors appear at their bank to withdraw money from their accounts, but capital flight is a bank run on a whole nation. Unfortunately, capital flight causes problems for a government because it could depreciate a currency rapidly. For example, the Asian Financial Crisis started in Thailand in 1997. The Thai government no longer could support the fixed exchange for the baht, and it devalued the baht. International investors panicked and quickly withdrew their investments, sparking a crisis. Then the crisis sparked a contagion. Investors questioned their investments in other countries, spreading the crisis to Hong Kong, Indonesia, Laos, Malaysia, South Korea, and the Philippines as massive capital flows left the countries. Other countries devastated by capital flight included Mexico in 1994-1995, and Russia in 1998.

Causes of capital flight vary. Usually an event or government policy triggers the capital outflow. For example, France imposed a new tax on the wealthy in 2006, causing the wealthy to transfer their investments out of France. Although the French government collected $2.6 billion per year in new taxes, it lost more than $125 billion in capital as the wealthy avoided the tax. Illustrating another example, the Thai government devalued the baht that harmed investments denominated in bahts. Thus, international investors panicked, started capital outflows from Thailand that sparked the Asian Financial Crisis. Finally, a government nationalizing industries could trigger capital flight as investors worry about governments seizing their investments.

International investors use several methods to cash out investments from a foreign country, which include:

❖ International investors transfer their cash out of the country via bank transfers. Once the capital outflow becomes severe, then government may impose capital controls on the banks to limit outflows.

❖ Investors could smuggle currency out of the country. Then they deposit it into banks in their home country or to an offshore account. A government can tighten security at airports and seaports, and customs can seize currency if they catch any traveler who carries too much cash.

❖ Investors could convert their currency to precious metals, such as gold, silver, or platinum. Then they smuggle the metals outside of the country.

❖ Investors could utilize money laundering that uses many techniques to structure cash deposits into the banking system, hiding the investors' activities.

❖ Investors could utilize false invoices if they deal with an importer. For example, an investor could falsify invoices that over price imported items, or underprice the exported items. Thus, they transfer more money out of the country by paying more for imports and receiving less money from selling exports.

Hegemony

A nation can exert relational and/or structural power over other nations. ***Relational power*** is one nation can force another nation to do something or not do it. Many sports, like football, soccer, or chess, are forms of relational power. For countries, a nation's military strength determines its relational power. On the other hand, ***Structural power*** represents a nation's ability to shape and influence the international institutions. All nations, political institutions, businesses, and people operate under the international institutions. Some nations possess structural power to affect the international institutions and change the rules in its favor.

The United States possesses both relational and structural powers. It gained both powers after World War II. The United States leads countries in technology, has the world's largest economy, and possesses a strong military. Furthermore, the U.S. has the structural power to influence the World Bank and the International Monetary Fund. Of course, the United States helped create these institutions and became a large financial contributor.

A ***hegemony*** exceeds relational and structural powers. A hegemony is one country dominates other countries in international commerce. Hegemony is the richest and most powerful nation that establishes the institutions of international trade. Hegemony is a leader in industrial and agricultural production, has a strong financial system, and dominates international trade. Hence, the hegemony becomes a source of wealth, power, and economic growth. Modern world has seen three modern hegemonies. The United Provinces (or Holland) ruled international trade in the 18th century; Great Britain ruled the world during the 19th century, and the United States has dominated the world after World War II.

A hegemony is critical for free trade because international markets and institutions are public goods. Hegemony fosters free trade, ensures peace and security by protecting trade from pirates and rogue nations, balances nations' powers, creates the system of international payments or the money system, and establishes the international institutions. These public goods are expensive to provide, and many nations can free ride on the international system without contributing to it. A free rider is a country that opens itself to international trade and benefits from trade without paying for the public goods that establish and maintain free trade.

A hegemony provides the international public goods, even supporting the free riders because the benefits outweigh the costs. When a hegemony rises, the world economy grows and prospers. Thus, the markets create wealth for all participating nations. For example, the United States supports a system of free trade. After World War II, the U.S. became the largest industrial producer because the European factories lay in ruins. Then the United States greatly benefited from international trade after creating the Bretton Woods System. The U.S. experienced a strong world demand for goods produced in its manufacturing industries during the 1950s and 1960s, leading to goods wages with a high living standard.

Costs of a hegemony, unfortunately, rise over time, weakening the hegemony's wealth and power. If the hegemony fails, then the public goods for international trade disappear, causing world trade to break down. Then the world's economy stagnates and begins declining. An interesting twist for a hegemony is a rich and powerful nation gains control after a large war.

Over time, the hegemony begins declining, and harmonious relationships break down. Then a war follows, and, in the aftermath, a new hegemony rises.

Some people argue the United States grew into a selfish hegemony. The U.S. dollar became the international currency that the U.S. government abuses. The U.S. government accumulated a large public debt, and the U.S. economy suffers from sizeable trade deficits, causing an outflow of U.S. dollars into the international markets. Some foreigners and central banks hold onto to these dollars. For example, the U.S. buys petroleum from Russia. As Russia sends oil to the U.S., the Russians retain the U.S. dollars, which are pieces of paper. Furthermore, many foreigners save their earnings in U.S. dollars while others invest in the U.S. government's debt. Again, they are buying U.S. Treasury Securities, which are pieces of paper. For now, these pieces of paper have value, but some question whether the U.S. government can finance the dual deficits over a long time period. If the U.S. dollar collapses in value, then foreigners will possess worthless pieces of paper. Consequently, countries that are not hegemonies cannot accumulate a large government debt by getting foreigners to invest in it.

As the United States grew into a hegemony, it cannot have a current account surplus because the surplus could devastate the world's economy. International businesses, banks, and governments use U.S. dollars to settle international payments. If the U.S. current account approached zero, then a liquidity crisis would strike the world because people, businesses, and the government have no means to settle international payments. A hegemony's trade deficits become a money source for the world's economy.

Key Terms

current account	free float
financial account	clean float
balance-of-payments equation	managed float
U.S. Official Reserve Assets	dirty float
statistical discrepancy	pegged exchange rate
exchange rate regime	dollarization
gold standard	seigniorage
fixed exchange rate system	J-curve Effect
deflation	capital flight
Bretton Woods System	relational power
International Monetary Fund (IMF)	structural power
World Bank	hegemony
Special Drawing Rights (SDRs)	

Chapter Questions

1. Explain the purpose of the balance-of-payments accounts.

2. Please define the following terms: current account, trade balance, financial account, and official settlement balance.

3. Why does a statistical discrepancy occur in the balance-of-payments accounts?

4. Please define and distinguish the three exchange rate regimes.

5. Identify the functions of the World Bank.

6. Identify the functions of the IMF.

7. If a country has a fixed rate regime and experiences a balance-of-payments deficit, please explain how the country must maintain this exchange rate. Furthermore, what happens if the government runs out of reserves and refuses to let the official exchange rate change?

8. Explain the J-curve Effect.

9. If a country has a managed float exchange rate regime and experiences a balance-of-payments surplus, please explain how the country must maintain this exchange rate. In your answer, include the actions of the central bank.

10. Why is capital flight disruptive to a country, and which four methods could an investor use to transfer his financial capital from a country experiencing a crisis?

11. Many foreign investors are worried over the U.S. government's large trillion-dollar deficits, and the U.S. economy is plagued by massive trade deficits. What happens to the U.S. hegemony's power if the U.S. dollar collapsed in value?

16. The Foreign-Currency Exchange Rate Markets

Many countries across the world use a flexible exchange rate regime. Consequently, this chapter builds upon a market's currency exchange rates, and explains how investors can calculate a cross exchange rate for two countries that rarely engage in trade. Moreover, investors can profit from arbitrage, when currency exchange rates differ between two or more markets. Then, students learn the supply and demand analysis to predict changes in a currency's exchange rate because a country's income, inflation, interest rates, etc. influence exchange rates. Finally, we expand the supply and demand analysis to include a pegged exchange rate and explain how a central bank devaluing its currency can trigger capital flight and a financial crisis.

Foreign Exchange Rates

Foreign-currency exchange market is traders exchange currency of one country for another country's currency. Consequently, five parties need foreign currency. First, international banks specialize in foreign currencies. They transfer billions in foreign currencies with other banks. Second, any person or business engaged in international trade and commerce, especially imports and exports. Third, international travelers need foreign currency to pay for food, lodging, and entertainment in a foreign country. Fourth, central banks and governments use a cache of foreign currencies to finance balance-of-payments deficits or to manipulate their exchange rate. Finally, international investors invest in foreign countries, seeking greater profits in foreign countries.

Some international investors use *hedging*, where they invest in several countries to reduce their risk, while other investors use *speculation*, where they buy currency for a low price and sell for a high price. Speculation is a form of gambling because speculators gamble on future prices. Furthermore, investors could use *arbitrage*. Investors see a price difference of the same currency in two separate markets; thus, they buy currency for a low price and sell it for a higher price in the other market, reducing the price difference to zero between the markets.

Foreign exchange market is the largest market in the world, and traders exchanged nearly $3.2 trillion daily in 2007. Most transactions are electronic transfers between international banks, whereas transactions occur 24 hours per day, 7 days per week. Foreign exchange market has retail and wholesale markets. Retail market is a small market, where agents buy and sell foreign currencies, usually at booths at shopping malls, airports, and train and bus stations. Retailers display two exchange rates: Selling and buying price. Retailer always sells currency for a higher price than the buying price. Hence, the price spread reflects the retailers' commission. On the other hand, the wholesale market comprises of a network of about 2,000 banks and brokerage firms. They buy and sell currencies with each other or with large corporations. Wholesale market uses an international clearing system where they exchange electronic deposits. International clearing system is similar to a clearinghouse for checks.

Supply and demand analysis for foreign currencies assumes no government interference and flexible exchange rates. For example, one U.S. dollar equals 3.0 Malaysian ringgits (or $1 = 3

rm). How much would a one-liter of Coca-Cola costs in dollars if Coca-Cola costs 1.5 rm? Just multiply the ringgit price by the ratio ($1 / 3 rm) in Equation 1, which equals $0.50.

$$1.5rm\left(\frac{\$1}{3.0rm}\right) = \$0.50 \tag{1}$$

Investors and bankers can calculate an exchange rate for currencies that investors rarely trade. They calculate the ***cross rate*** to determine the exchange rate for these currencies. For example, the Mexican peso to U.S. dollar exchange rate is well established, while the peso-euro exchange rate is not. Since euros and U.S. dollars are widely traded, we can calculate the peso-euro exchange rate. If the peso-U.S. dollar exchange rate equals 12.9 pesos per $1, and the euro-U.S. dollar is €0.77 per $1, subsequently, we calculate the peso-euro exchange rate in Equation 2 as 16.8 per € We use a trick – we retain the currency units; thus, the correct calculation has one of the currency units drop out, which is U.S. dollars in this case.

$$\left(\frac{12.9\,p}{\$1}\right)\left(\frac{\$1}{€0.77}\right) = 16.8p\Big/€ \tag{2}$$

Using another example, a cross rate is the exchange rate between the Myanmar kyat and U.S. dollar. If one Malaysian ringgit equals 282.6 Myanmar kyats, then we use the U.S. dollar-exchange rate to calculate the rarely traded exchanged rate. Consequently, we calculate the U.S. dollar-kyat exchange rate in Equation 3 as 847.8 kyats per $1.

$$\left(\frac{282.6\,k}{1\,rm}\right)\left(\frac{3\,rm}{\$1}\right) = 847.8k\Big/\$1 \tag{3}$$

Currency exchange rates are continually fluctuating, and a banker or investor can profit from price differences, called ***intermarket arbitrage***. For example, a trader at Citibank has $100,000 and observes the following banks' exchange rates. We denote the British pound by the symbol £.

Citibank $1.54 / 1 £

Credit Suisse   €1.6 / 1 £

Deutsche Bank $0.97 / 1 €

First, we calculate the cross rate between Citibank and Credit Suisse in Equation 4, which equals $0.9625 per one euro. Then we compare this exchange rate to Deutsche Bank, equaling $0.97 per one euro. Since the exchange rates differ, then arbitrage exists, and we can profit from

195

the exchange rate differences. It does not matter which exchange rates we calculate the cross rate from.

$$\left(\frac{\$1.54}{1\pounds}\right)\left(\frac{1\pounds}{€1.6}\right) = \$0.9625 \Big/ {€1} \tag{4}$$

Step 1: Trader converts the U.S. dollars to British pounds at Citibank, yielding 64,935.06 £. We calculate the result in Equation 5.

$$\$100,000\left(\frac{1\pounds}{\$1.54}\right) = 64,935.06 \pounds \tag{5}$$

Step 2: Trader converts the British pounds into euros at Credit Suisse, yielding 103,896.10 € We compute the amount in Equation 6.

$$64,935.06\pounds\left(\frac{€1.6}{1\pounds}\right) = 103,896.10 € \tag{6}$$

Step 3: Finally, the trader converts the euros into U.S. dollars at Deutsche bank. Trader has $100,779.22 and gains a $779.22 profit. We calculated the results in Equation 7. As the trader converts money from one currency to another, he simultaneously creates demand and supplies for currencies. Over time, the price differences between exchange rates disappear. In the modern age, the international banks use computers to spot differences in exchange rates and quickly execute transactions to profit from arbitrage.
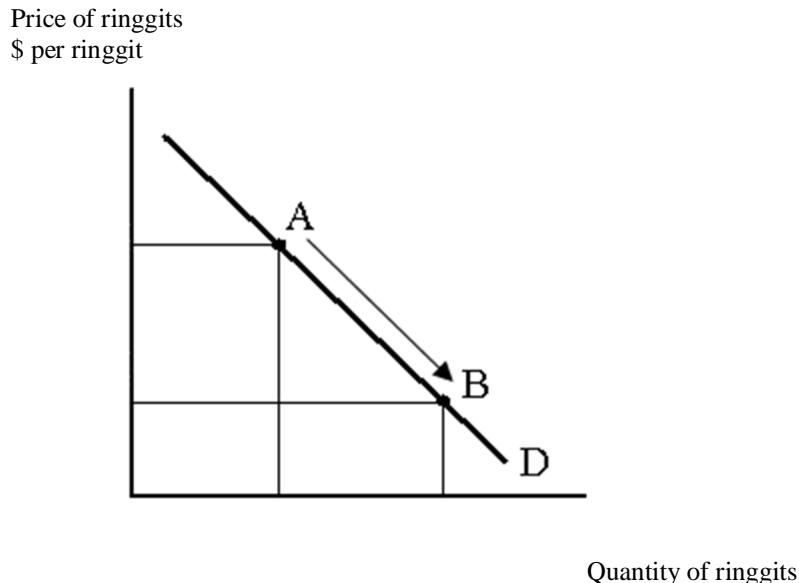
$$103,896.10 €\left(\frac{\$0.97}{1 €}\right) = \$100,779.22 \tag{7}$$

Demand and Supply for Foreign Currencies

Demand function for a currency originates from international trade between Malaysia and the United States. Price for Malaysian ringgits is the exchange rate of U.S. dollars per one ringgit. We always show the currency price in the denominator of the currency exchange rate because a price decrease reflects a currency depreciating while a price increase is an appreciating currency. Demand for ringgits originates from U.S. consumers who want to import goods and services from Malaysian companies. Thus, U.S. consumers need ringgits to pay for the Malaysian goods. As U.S. consumers convert dollars into ringgits, the demand for ringgits simultaneously creates a supply of U.S. dollars on the foreign exchange market.

We show the demand for ringgits in Figure 1. As we move from Point A to Point B, the ringgit exchange rate falls. Thus, the ringgit depreciated because one ringgit buys fewer U.S.

dollars while the U.S. dollar appreciated because one dollar buys more ringgits. Price of U.S. goods became more expensive while Malaysian goods became cheaper. Malaysian imports decrease while exports increase. Accordingly, U.S. exports and imports move in opposite directions. The U.S. exports fall while imports rise.

Price of ringgits
$ per ringgit

Quantity of ringgits

Figure 1. Demand function for Malaysian ringgits
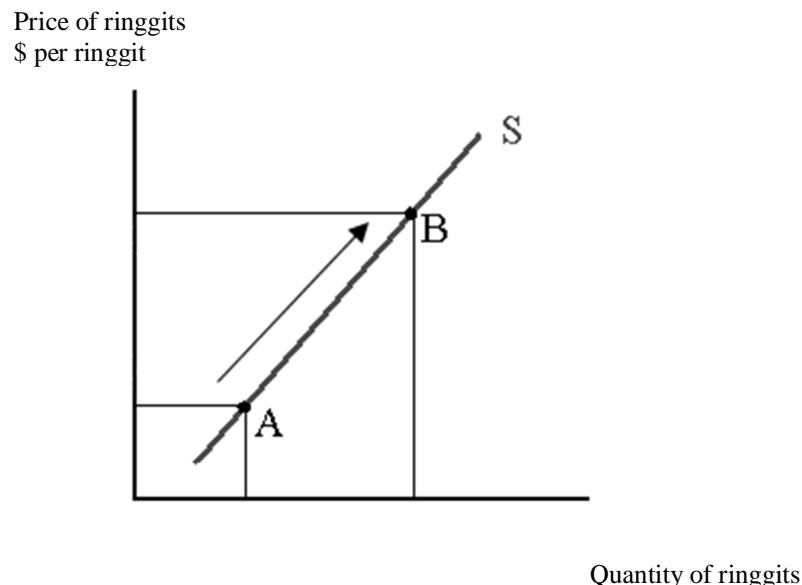
We show the exchange rates for Points A and B in Equations 8. We write the currency price first while the standard exchange ratio is in brackets. As we move from Point A to Point B, the Malaysian ringgits depreciate while the U.S. dollar appreciates.

Point A: $0.333 per 1 ringgit   or   [$1 = 3.0 rm]   (8)

Point B: $0.25 per 1 ringgit   or   [$1 = 4.0 rm]
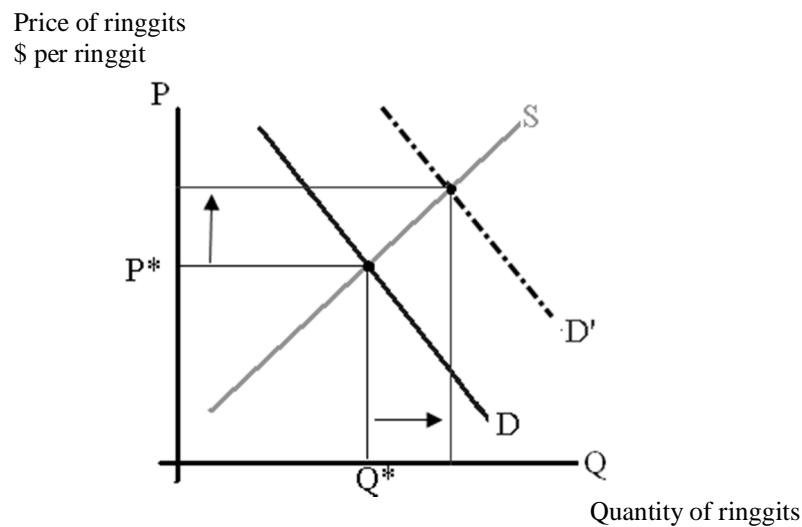
Supply function for ringgits originates from the Malaysian consumers who buy U.S. products. U.S. firms sell products and services to Malaysian consumers, which are U.S. exports. The Malaysian consumers need U.S. dollars to pay for it. Consequently, they have a demand for dollars, converting ringgits to U.S. dollars supply ringgits on the exchange market. Demand for ringgits in one market simultaneously creates a supply of U.S. dollars in another market, and vice-versa.

We show the supply function for Malaysian ringgits in Figure 2. As we move from Point A to Point B, the ringgit exchange rate rises. Consequently, the ringgit appreciated while the U.S. dollar depreciated. Price of U.S. goods became cheaper while Malaysian goods become more expensive. The U.S. imports decrease while U.S. exports increase. Malaysia experiences the opposite pattern. Its imports rise while its exports fall.

197

Price of ringgits
$ per ringgit

Quantity of ringgits

Figure 2. Supply function for ringgits

We show the demand and supply functions for ringgits in Figure 3. We represent the equilibrium exchange rate as P* and equilibrium quantity as Q*. As an illustration, Americans increase their demand for more Malaysian products, ceteris paribus. Thus, the demand function increases and shifts rightward. Price of ringgits increases. Consequently, the U.S. dollar depreciates while the ringgits appreciates. U.S. products become cheaper to Malaysians. U.S. exports rise, and U.S. imports decrease while the exact opposite occurs to Malaysian imports and exports.

Price of ringgits
$ per ringgit

Quantity of ringgits

Figure 3. Demand increases for the Malaysian ringgits

Exchange rate fluctuations alter prices of all goods, services, and assets that businesses, people, and government trade on the international markets. Analysts use appreciation and depreciation to compare two currencies. As one currency appreciates, the other must depreciate because these terms are relative to one another. When analysts refer to a weak or strong U.S. dollar, analysts compare the U.S. dollar to a basket of currencies from industrialized countries. A weak U.S. dollar means the value of the dollar decreased relative to a basket of other currencies, such as the British pound, euro, and Japanese yen. A strong U.S. dollar is the opposite.
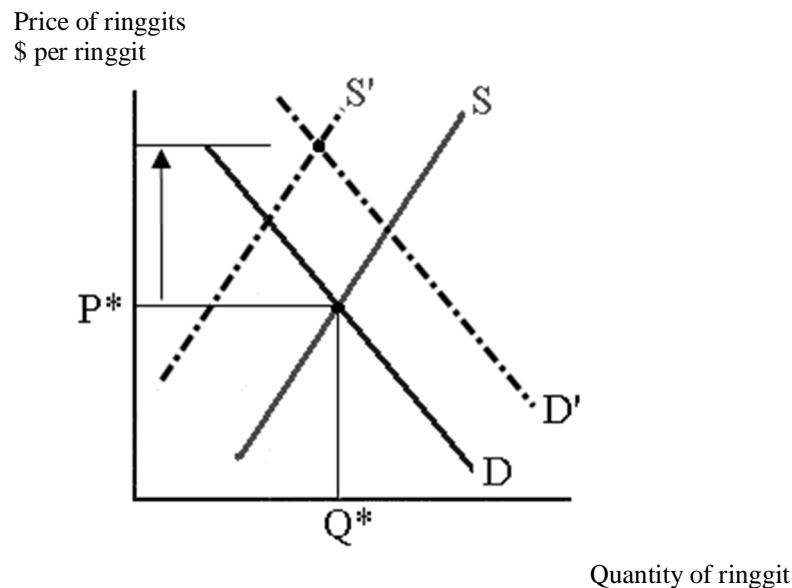
Factors that Shift Demand and Supply Functions

Many factors influence supply and demand functions for foreign exchange rates. Several factors include interest rates, inflation, income, and actions by central banks. For instance, interest rates affect investment and financial capital inflows and outflows for a country, while inflation affects a country's prices and hence its trade flows. Inflation is a continual increase of prices. Furthermore, a growing economy creates higher incomes, and greater demands for normal goods, which are most products. Finally, central banks could influence exchange rates by buying and selling currencies.
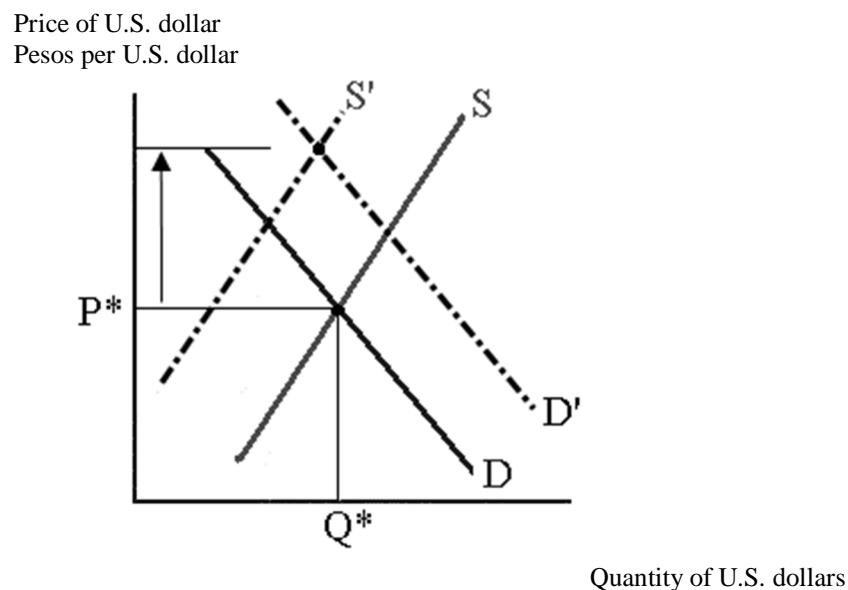
Real interest rate affects the currency exchange rates. Real interest rate means economists subtracted the country's inflation rate from the nominal interest rate. For example, we show the Malaysian ringgit exchange market in Figure 4, and the original market price and quantity are P* and Q*. If Malaysia has a greater real interest rate than the United States, then U.S. investors increase their demand for ringgits; they want to earn the greater interest rate. Demand for ringgits rises and shifts rightward. Furthermore, Malaysian citizens invest more within their country, decreasing the supply of ringgits on the international markets. When the supply and demand both shift, either the market quantity or price becomes indeterminate. In this case, market price increases while market quantity becomes indeterminate. Consequently, the U.S. dollar depreciates while the ringgit appreciates.

We can use a trick to determine which variable becomes indeterminate. First, shift the demand function. Then draw three supply function shifts, where the first one shifts a little, the second shifts a little more, and the third shifts a lot. Consequently, one variable always moves in one direction while the other can increase and decrease, making it indeterminate.

Inflation rates of countries could impact the foreign exchange market. For example, Mexico experiences a greater inflation than the United States. We depict the U.S. dollar exchange market in Figure 5. Market price and quantity are P* and Q*. Higher inflation rate causes the prices of Mexican goods to become expensive while prices for U.S. goods become relatively cheaper. Therefore, Mexicans increase their demand for U.S. goods, increasing the demand for U.S. dollars. On the other side of the border, the U.S. citizens buy more domestic goods, decreasing their demand for Mexican goods. Hence, the supply for U.S. dollars decreases and shifts leftward. Consequently, the U.S. dollar appreciates while the peso depreciates. In this case, the equilibrium quantity for U.S. dollars becomes indeterminate.

Price of ringgits
$ per ringgit
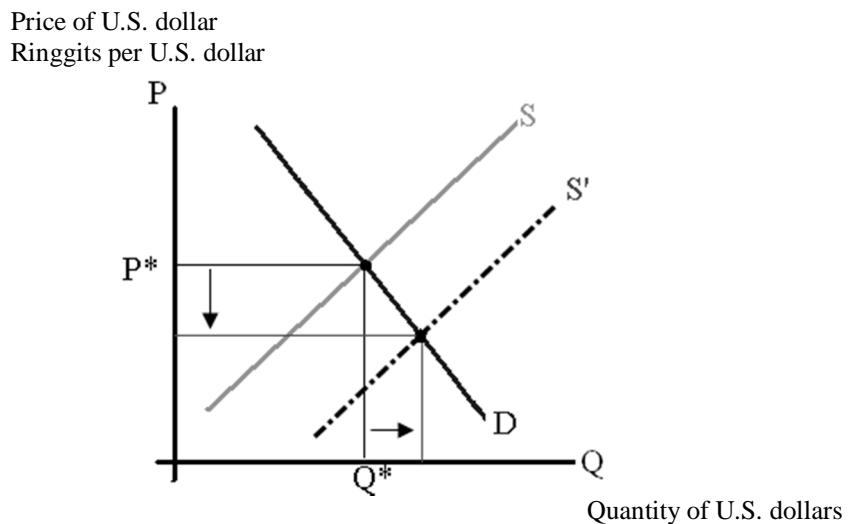
Figure 4. Impact of higher interest rates on the ringgit exchange market

Price of U.S. dollar
Pesos per U.S. dollar

Figure 5. Impact of inflation on the U.S. dollar exchange market

A central bank can increase or decrease the supply of its currency on the foreign exchange markets. For example, we show the U.S. dollar exchange market in Figure 6. Market price is P* while Q* represents market quantity. The Federal Reserve System, the U.S. central bank, increases the U.S. dollars on the international exchange market. Consequently, the supply

function increases, shifting rightward, decreasing the market price. Thus, the U.S. dollar depreciates while Malaysian ringgit appreciates.

Price of U.S. dollar
Ringgits per U.S. dollar
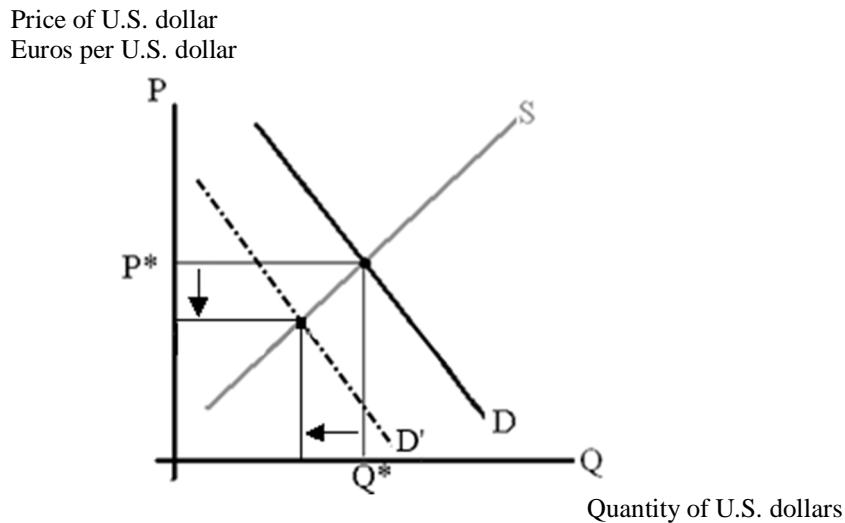
Figure 6. The Federal Reserve increases the supply of dollars on the exchange market

A central bank holds foreign currencies. If a central bank wants to strengthen its currency, it must buy its currency using a foreign currency. Consequently, a central bank's cache of foreign currencies would decrease. If a central bank weakens its currency, subsequently, it buys foreign currencies using its own currency. Hence, a central bank accumulates more foreign currencies. The key is scarcity. If the exchange market has little of a country's currency, then the currency becomes more scarce. Consequently, investors, central banks, and people value it more.

If investors believe a currency will depreciate, then their beliefs become self-fulfilling prophecies. For example, we depict the international currency market for U.S. dollars in Figure 7. Unfortunately, the investors believe the U.S. dollar will depreciate. Consequently, the investors reduce their demand for U.S. dollars and shift the demand leftward, decreasing the exchange rate. Thus, the U.S. dollar depreciates while the euro appreciates. Investors' beliefs turned into reality. In a worst-case scenario, a depreciating currency triggers a capital flight. International investors withdraw their investments from a foreign country, collapsing its currency and creating a severe financial crisis for the country.

Supply and demand analysis could be ambiguous in some cases. For example, Malaysia's GDP grows faster than U.S. GDP. Malaysian citizens experience growing incomes and would increase their demand for all products, including imports. Thus, Malaysian citizens increase their demand for U.S. dollars, increasing the supply of ringgits on the currency exchange market. U.S. dollar appreciates while the ringgit depreciates. A rapidly growing country experiences greater inflation, which causes its currency to depreciate. However, a prospering country tends to have higher interest rates, which has the opposite effect on the market.

Price of U.S. dollar
Euros per U.S. dollar

Figure 7. Investors decrease their demand for U.S. dollars

In the real world, many factors influence exchange rates. A country could impose trade barriers like tariffs and quotas. A tariff is a tax on imports, while a quota limits the quantity of imports. Both trade barriers reduce a country's imports. Furthermore, some countries could impose strict regulations. Extensive regulations and taxes reduce trade and financial capital flows. Finally, investors' expectations and uncertainty can impact trade flows.
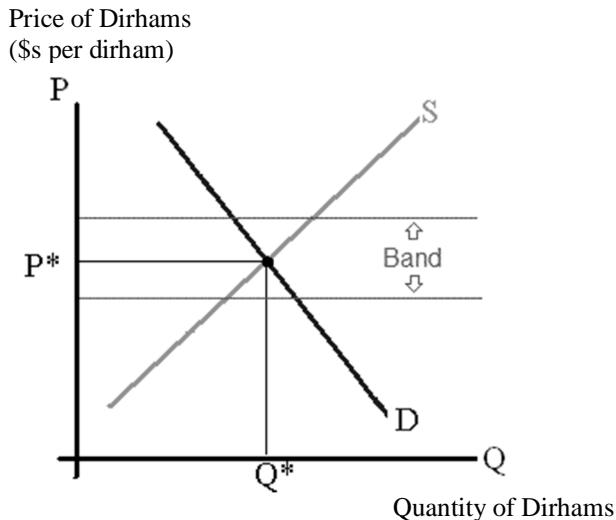
Fixed Exchange Rates

Central banks in several countries established a *fixed exchange rate* with a strong currency, such as the U.S. dollar or euro. A fixed exchange rate is a *pegged exchange rate*. Usually a government or central bank established a currency board that maintains the exchange rate. For example, Argentina, Bermuda, and Hong Kong pegged their currencies to the U.S. dollar while Bosnia and Herzegovina, Bulgaria, and Estonia fixed their currencies to the euro. Furthermore, a central bank must hold a cache of currency reserves to buy or sell currencies to balance its currency flows that maintain the fixed exchange rate.
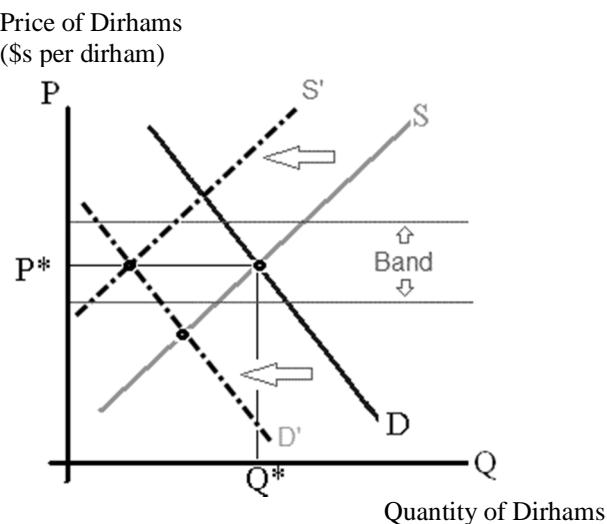
We expand the supply and demand analysis to include a fixed exchange. A central bank does not specify an exact price, but it allows its currency to fluctuate within a band, depicted in Figure 8. Consequently, a central bank allows the market to change the exchange rate within the band. If the exchange rate falls outside of the band, then the central bank must intervene in the currency market to return the exchange rate back within the band. Thus, a central bank requires a cache of currency reserves.

The United Arab Emirates (UAE) pegged its currency exchange rate to U.S. dollars, where one U.S. dollar equals three dirhams. As an illustration, the international investors reduce their demand for the dirhams, decreasing the exchange rate below the band. Consequently, the UAE central bank must buy dirhams from the currency exchange market. It exchanges U.S. dollars or

euros for dirhams, decreasing the supply function and shifting it leftward. Thus, the exchange rate returns within the band.

Price of Dirhams
($s per dirham)

Figure 8. The Currency Exchange Market for Dirhams

Price of Dirhams
($s per dirham)

Figure 9. A central bank intervenes in the currency market

Two important terms are associated with a pegged exchange rate. If a central bank allows its currency to appreciate permanently outside the band, then we call it a ***revaluation***. A central bank may not strengthen its currency too often because the central bank accumulates capital from the surplus inflow. On the other hand, if the central bank allows the currency to depreciate

permanently outside the band, subsequently, we call it a *devaluation*. A country experiences a continuous outflow of capital, and the central bank does not have the reserves to buy its currency from the currency exchange markets. Thus, this country could devalue its currency to reduce its balance-of-payments deficit.

Devaluation can trigger *capital flight* and a severe financial crisis. Moreover, devaluation lessens the investors' faith in a government's leaders. For example, international investment fund managers invested approximately $45 billion in Mexico to earn the higher interest rate before 1994. Influx of foreign capital appreciated the Mexican peso, which reduced exports and boosted imports. Furthermore, Mexicans reduced their savings and increased their consumption. Unfortunately, the Mexican government could not finance the large trade deficits as it depleted its reserve funds. Then Mexico devalued the peso on December 20, 1994, triggering capital flight. International investors cashed in their Mexican stocks and bonds and began massive capital withdrawals from Mexico. Peso depreciated at least 40% by January 1995. Unfortunately, capital flight can lead to a contagion, when investors question their investments in other countries, spreading the crisis. The Bank of International Settlements and International Monetary Fund (IMF) bailed out Mexico with a $53 billion package, which stabilized the world's financial markets.

For another example, the investors were attracted to the Asian countries because their economies grew rapidly, and they could earn high investment returns. The Thai government pegged the baht to the U.S. dollar. Then the Thai government devalued the baht on July 2, 1997. Next, the investors panicked and suddenly withdrew their investments from Thailand. Subsequently, the crisis became a contagion, spreading to Indonesia, Malaysia, the Philippines, and South Korea as investors questioned their investment in those countries. Crisis continued to spread until it reached Russia and Brazil. Unfortunately, all the countries experienced large devaluations of their currencies. Companies and corporations that accepted loans denominated in foreign currencies quickly defaulted. Once their home currency began depreciating, they could not afford to repay their foreign debt.

The IMF bailed out Indonesia, South Korea, and Thailand. As part of loan conditions, the countries imposed austerity. *Austerity* is the government must reduce government spending and/or raise taxes. The IMF also wanted the countries to raise the interest rates to stop capital flight. International investors are attracted to high interest rates. Unfortunately, Thailand and Indonesia experienced declines of 20% or more of their industrial production. Austerity in this case worsens their economies. According to Keynesian economics, during a downturn in an economy, a government must increase spending and/or reduce taxes to boost the economy. Unfortunately, austerity does the opposite, which slows down the economy. Furthermore, for a country to boost its interest rates, a central bank must reduce the money supply, which again, slows down the economy, increasing the severity of the crisis.

The *Rule of Incompatible Trinity* states a central bank can only control two out of the three variables: Fixed exchange rate, free international flow of capital, and independent monetary policy. For example, Hong Kong allows the free flow of capital and pegs the exchange rate to the U.S. dollar. Thus, it cannot support an independent monetary policy because the central bank must maintain the fixed exchange rate. On the other hand, China and India impose capital

controls that prevent investors withdrawing from their economies. Consequently, both countries could impose a fixed exchange rate while the central bank can pursue an independent monetary policy.

Key Terms

foreign-currency exchange market

hedging

speculation

arbitrage

cross rate

intermarket arbitrage

fixed exchange rate

pegged exchange rate

revaluation

devaluation

capital flight

austerity

Rule of Incompatible Trinity

Chapter Questions

1. United Arab Emirates uses the dirham as its currency. How much does a Pepsi costs in dirhams if Pepsi costs $0.75 with an exchange rate $1 = 3 dirhams?

2. Please calculate the cross-rate exchange rate for the convertible mark (KM) and U.S. dollar for the following exchange rates:

    KM to euros: KM 2 / 1 €
    Euros to U.S. dollars: €0.714 / 1$

3. A trader at Citibank has 500,000 Bosnian convertible marks (KM) and observes the following exchange rates:

    Citibank: €1 /2 KM
    National Westminster: kuna 100 / €1
    Deutsche Bank   kuna: 46 / 1 KM

    Please note the kuna is the Croatia's currency. Please calculate the cross rate to determine if arbitrage exists. If intermarket arbitrage exists, how much profit could the Citibank trader earn?

4. As you examine the demand and supply of U.S. dollars in a market, where does the supply of U.S. dollars originate from?

5. Please draw a supply and demand function for Mexican pesos. What would happen to the market if the 2008 Financial Crisis causes Americans to reduce their demand for Mexican made products?

6. Please draw the demand and supply for the U.S. dollar exchange market with the euro as the other currency. How can the Federal Reserve strengthen the U.S. dollar relative to the euro? Could the European Central Bank oppose this?

7. The Federal Reserve reduces the U.S. interest rate to jump-start the U.S. economy. What would happen to the U.S. dollar exchange market if the Fed pursues a low "real" interest rate policy?

8. Please draw the international market for the Uzbek som. The Uzbek government established a fixed exchange rate between the Uzbek som and the U.S. dollar. What would happen if people have less demand for this currency? What should the Uzbek government do to maintain the pegged exchange rate?

9. The Japanese government has a government debt to GDP ratio approximately 200%. The Japanese government and the Japanese citizens hold most of the debt. Does Japan have a risk of capital flight if investors believe the Japanese government will default on its debt?

17. International Parity Conditions

Supply and demand analysis allows investors and economists to predict directional changes in a country's exchange rate. Unfortunately, the analysis cannot answer quantitative changes. Consequently, this chapter builds on the supply and demand analysis and uses several theories to predict quantitative changes in a country's currency exchange rates. We will study the random walk, Purchasing Power Parity Theory, the Relative Purchasing Parity Theory, Interest Rate Parity Theorem, and International Fisher Effect. Furthermore, we study the Big Mac Index from the *Economist* because we can easily determine whether a country's currency is over or undervalued relative to the U.S. dollar. Then we can predict which direction the exchange rate should move over time.

A Random Walk

Currency market exchange rates could exhibit a random walk in the short run. Statisticians define a ***random walk*** whose current value is the previous period's value plus a random disturbance. We show a random walk in Equation 1. Value of the spot exchange rate today is s_t, which equals yesterday's exchange rate, s_{t-1}, plus a random disturbance, e_t. We assume the random disturbance is distributed normally with a mean of zero with a fixed standard deviation. For example, if the U.S. dollar-euro exchange rate equals $1.3 per euro today, then we expect the exchange rate to be $1.3 per euro tomorrow plus a random fluctuation.

$$s_t = s_{t-1} + e_t \tag{1}$$
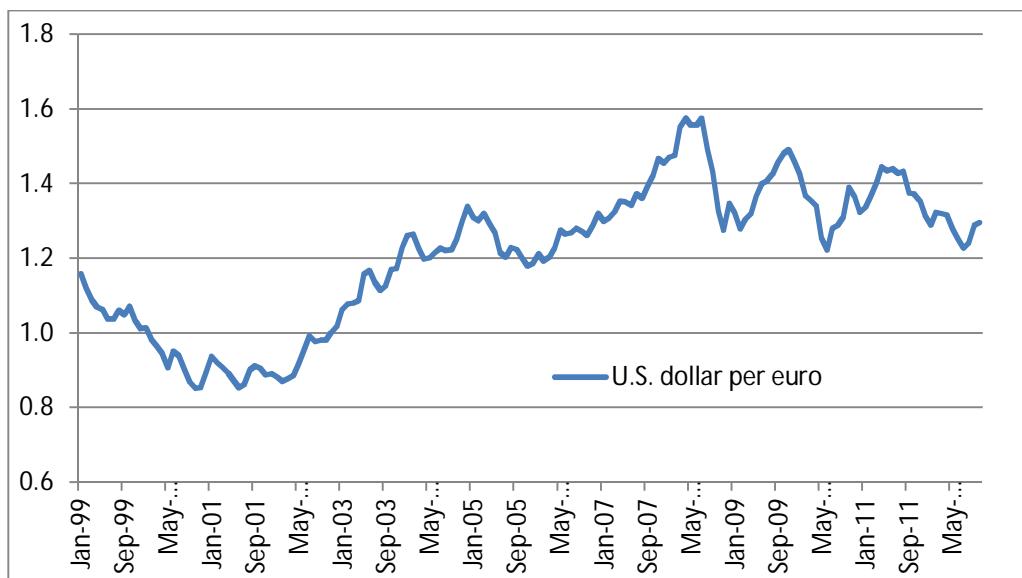
We show the monthly U.S. dollar-euro exchange rate in Figure 1. A random walk has an unique characteristic – the variable drifts in a particular direction before changing direction. If we take a first difference of the exchange rate, then the difference equals the random disturbance, illustrated in Equation 2. A first difference is we take today's spot exchange rate and subtract the previous period, which is monthly for our case. We show the first difference for the U.S dollar-euro exchange rate in Figure 2. Line indicates the randomness of the exchange rate, but it is not completely random. Moreover, statistical tests indicate the U.S. dollar-euro exchange rate is almost a random walk[1]. However, these statistical tests are beyond the scope of this book.

$$s_t - s_{t-1} = e_t \tag{2}$$
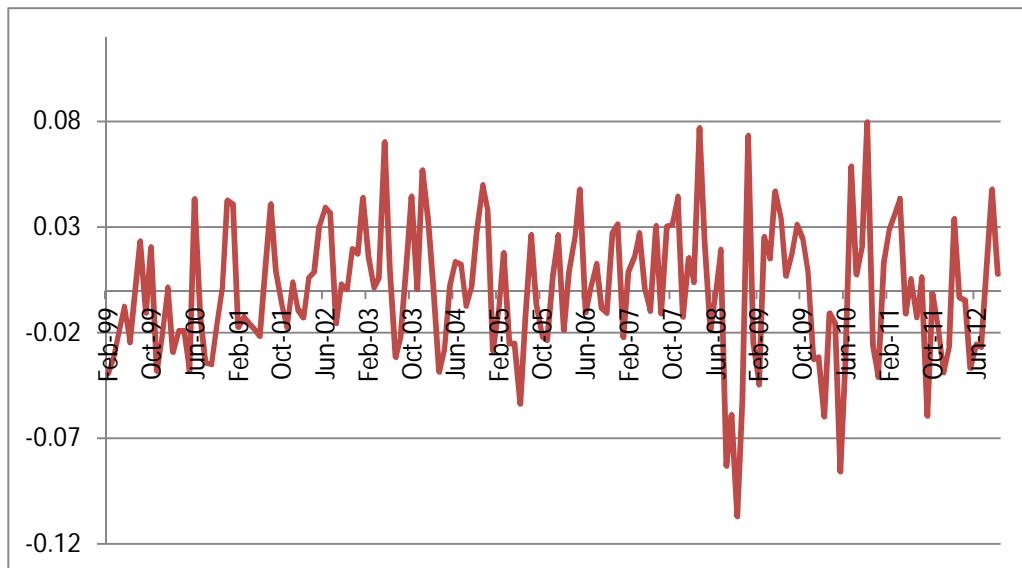
Although currency exchange rates exhibit a random walk in the short run, economists and financial analysts use several theories to explain long-run movements.

---

[1] The U.S. dollar-euro exchange rate has the structure, $s_t = p_1 s_{t-1} + p_2 s_{t-2} + e_t$, where p_1 is close to one while p_2 has a significant second lag. Unfortunately, this is not an anomaly. Many exchange rates exhibit this structure or exhibit a pure random walk.

Figure 1. The U.S. dollar-per euro exchange rate

Figure 2. First difference of the U.S. dollar per euro exchange rate

Purchasing Power Parity (PPP) Theory

Purchasing Power Parity (PPP) Theory is based on the Law of One Price. Goods and products denominated in the same currency should have the identical price between markets

after adjusting for transportation costs. If a price difference exists between two markets, then arbitrage is possible. Traders would buy products from the low-price market and sell products to the expensive market. Consequently, prices would converge to one price across all markets as traders shifted supply from the low-price market to the high-price market. The high prices would fall while the low prices would rise over time.

Price could differ between markets because the price difference reflects the transportation costs of shipping the product from one market to another. Nevertheless, the Purchasing Power Parity helps predict changes in exchange rates. For example, the petroleum price equals $90 per barrel in the United States and 850 pesos per barrel in Mexico. Implied exchange rate equals one U.S. dollar equals 9.444 Mexican pesos (or pesos 850 ÷ $90). If the actual exchange rate is $1 = 10 Mexican pesos, then the U.S. dollar is overvalued while the peso is undervalued. Actual exchange rate means a $90 per barrel of petroleum costs $85 per barrel in Mexico. Consequently, the traders could buy petroleum from Mexico, and they ship and sell petroleum to United States. Over time, the petroleum price rises in Mexico because the traders reduced petroleum supply while the petroleum price decreases in United States because the petroleum supply increases. Eventually, arbitrage stops, when the prices converge between both countries. Thus, Purchasing Power Parity estimates the equilibrium exchange rate.

Economists expand the Purchasing Power Parity to include many products in a society. Then economists can compare a basket of goods of one country to another country. *Consumer Price Index (CPI)* is a measure of a basket of goods in the United States. The CPI is an aggregate measure of prices, and economists use it to measure inflation. The Absolute Purchasing Power Parity states the foreign exchange rate between two currencies is the ratio of the two countries' general price levels. We define the notation as:

❖ Domestic price level for home country equals P_d.

❖ Foreign price level equals P_f.

❖ Spot exchange rate between countries equals S.

We define the absolute PPP exchange rate by Equation 3.

$$S = \frac{P_f}{P_d} \tag{3}$$

For example, the CPI for the United States equals $755.3 while the CPI for Switzerland is 1,241.2 francs. Thus, the absolute PPP predicts the exchange rate should be 1.64 francs per U.S. dollar that we calculated in Equation 4.

$$S = \frac{P_f}{P_d} = \frac{1{,}241.2\ francs}{\$755.3} = 1.64\ francs\Big/\$1 \tag{4}$$

If the spot exchange rate is 1.4 francs per $1, subsequently, traders use arbitrage. The CPI in the United States in francs is 1,057.42 (or $755.3 × 1.4 francs per $1), which is smaller than the CPI of Switzerland. Thus, traders could profit by purchasing a basket of goods from United States and selling it to Switzerland. Thus, they potentially earn 1,241.20 – 1,057.42 = 183.78 francs per basket of goods.

The Economist publishes the ***Big Mac Index***, based on the Purchasing Power Parity. McDonald's sells Big Macs in over 123 countries around the world. The Big Mac requires many ingredients like beef, buns, lettuce, tomatoes, onions, and its special sauce. Furthermore, restaurants pay labor, retail space, and utilities like water, electricity, and natural gas. Consequently, a Big Mac's price correlates to the prices of its inputs, and the inputs represent a variety of sectors in a country's economy. Thus, the price of a Big Mac reflects a country's PPP that we show for 10 countries in Table 1. Finally, some analysts designed a Starbuck's Index similarly to the Big Mac Index.

Table 1. The Economist's Big Mac Index for 2005

Country	Big Mac Price U.S. $	Implied PPP currency per U.S. $	Exchange Rate currency per U.S. $	Over Valued (+) Under Valued (-)
United States	4.33	-	-	-
Argentina	4.16	4.39	4.57	-4%
Australia	4.68	1.05	0.97	+8%
China	2.45	3.62	6.39	-43%
Europe (Eurozone)	4.34	1.21	1.21	0%
Japan	4.09	73.95	78.22	-5%
Malaysia	2.33	1.71	3.17	-46%
Mexico	2.70	8.55	13.69	-38%
Russia	2.29	17.33	32.77	-47%
Switzerland	6.56	1.05	0.99	+52
Venezuela	7.92	7.86	4.29	+83%

Source: The Economist Big Mac Index. July 2012. Available from http://www.scribd.com/doc/102253973/Big-Mac-Index-July-2012 (Access date 9/28/2012).

The Big Mac price is denominated in U.S. dollars, and we convert it to U.S. dollars using the spot exchange rate. Moreover, the implied PPP is the ratio of a Big Mac's price in the foreign currency divided by the average U.S. price in dollars. Finally, the exchange rate is the spot exchange rate on July 25, 2012. Consequently, we could earn a profit by buying Big Macs in Malaysia for $2.33 and selling the hamburgers in the United States for $4.33. However, we must pay transportation costs and would experience problems bringing numerous hamburgers through customs. Furthermore, the Big Macs would not be fresh, and they would quickly spoil before they reached their destination.

We can calculate the Big Mac easily. For example, the price of a Big Mac in Malaysia averaged 7.4 ringgits, which is the spot exchange rate multiplied by the Big Mac's price in U.S. dollars (or 2.33 × 3.17). If the costs are identical for both Malaysia and the United States, then the implied PPP value is the Big Mac's price in ringgits divided by the U.S. price, which equals

1.71 ringgits per U.S. dollar. However, the spot exchange rate equals 3.17 ringgits per U.S. dollar. Consequently, we estimate in Equation 5 that the Malaysian ringgit is undervalued to the U.S. dollar by approximately 46%. Dot above the Big Mac's price is the percentage change in price. Thus, analysts predict the ringgit will appreciate against the U.S. dollar over time.

$$\dot{P}_{Big\ Mac} = \frac{P_{Malaysia} - P_{U.S.}}{P_{U.S.}} \cdot 100 = \frac{\$2.33 - \$4.33}{\$4.33} 100 = \text{-46\%} \tag{5}$$

In general, the PPP tends to hold in the long run, but not the short run because of the following reasons:

❖ Countries impose trade restrictions, such as tariffs and quotas. Moreover, many governments impose trade restrictions on agricultural products. Countries use trade restrictions to protect their industries from bacteria, viruses, insects, or a damaging plants or species. For example, United States, Canada, and other countries ban importing British beef to stop the spread of hoof-mouth disease.

❖ PPP emphasizes only price levels and exchange rates. The PPP does not include *transportation costs* and transaction costs.

❖ PPP will not hold if governments define different baskets for their CPIs. Furthermore, some goods and services are not tradable, such as haircuts, medical services, and real estate. For example, land and housing construction are expensive in developed countries, and relatively cheap in developing countries. Unfortunately, high-priced real estate hurts a great cost on businesses, when they rent, buy, or lease buildings and space. Subsequently, the businesses pass the greater cost onto products' prices.

The *Relative Purchasing Power Parity Theory* is changes in products' prices between countries vary the exchange rate. Furthermore, the relative PPP assumes the legal system does not change, and we define the notation as:

❖ We define the change in the domestic exchange rate as the foreign currency per one unit of domestic currency.

❖ Foreign country's inflation rate between now and time period T is π_f.

❖ Domestic country's inflation rate between now and T is π_d.

❖ S_T and S_0 are the domestic exchange rates measured at times 0 and T. Thus, the exchange rate at Time 0 is $S_0 = \frac{P_f}{P_d}$, and Time T is $S_T = \frac{P_f(1 + \pi_f)}{P_d(1 + \pi_d)}$.

Change in the currency exchange rate is the percent change in the spot exchange rates. Then we substitute the relative price levels into the equation, shown in Equation 6.

$$e = \frac{S_T - S_0}{S_0} = \frac{\dfrac{P_f(1+\pi_f)}{P_d(1+\pi_d)} - \dfrac{P_f}{P_d}}{\dfrac{P_f}{P_d}} = \frac{1+\pi_f}{1+\pi_d} - 1 \tag{6}$$

We use a linear approximation to yield Equation 7.

$$e \approx \pi_f - \pi_d \tag{7}$$

For example, the annual U.S. inflation rate equals 3% while Mexico's inflation rate is 25%. If we defined the domestic currency as the peso, then the Mexican peso depreciates approximately 22% per year while the U.S. dollar appreciates roughly 22% per year. International investors prefer to hold currencies with low inflation rates because inflation erodes the value of currency. Thus, consumers and businesses would hold U.S. dollars and would sell their Mexican pesos. Consequently, the relative PPP usually holds in the long run for countries with large inflation rate differences. Countries experiencing high inflation experience depreciating currencies.

We modify the relative PPP to allow analysts to determine whether a country has a competitive export industry. We begin with Equation 6 and rewrite it as Equation 8.

$$e = \frac{1+\pi_f}{1+\pi_d} - 1 \tag{8}$$

Then we add a positive one to both sides of the equation and then divide by $(e - 1)$ to yield Equation 9.

$$1 = \frac{1+\pi_f}{(1+\pi_d)(1+e)} \tag{9}$$

Then we replace the one with a k that represents the competitive ratio. For example, Malaysia, experiences a 5% inflation rate, and we defined Malaysia as the domestic currency. Meanwhile, the United States experiences a 2% inflation rate. If the ringgit had depreciated against the U.S. dollar by 1%, subsequently, we calculated the competitiveness ratio for Malaysia, where k = 0.981 in Equation 10. Consequently, our calculation does not equal one, and the higher inflation rate and the depreciating currency keep Malaysian manufacturing competitive, boosting its export industries.

$$k = \frac{1 + \pi_f}{(1 + \pi_d)(1 + e)} = \frac{1 + .02}{(1 + .05)(1 - .01)} = 0.981 \tag{10}$$

Rule for the competitiveness ratio is a k greater than one indicates a country's export industries are not competitive, while a k less than one means the country's industries are competitive internationally.

Quantity Theory of Money

We can use the ***Quantity Theory of Money*** to expand the Purchasing Power Parity Theory. The Quantity Theory of money begins with Equation 11, and we define every term as:

❖ Demand for money equals M^D.

❖ We denote the price level by P.

❖ A country's real income is Y, and economists measure real income by a country's real GDP. Moreover, $P \times Y$ represents a country's nominal GDP.

❖ Unique term is the velocity of money, V.

$$M^D \cdot V = P \cdot Y \tag{11}$$

People's demand for money must equal the supply of money. We denote the supply of money by M^S and substitute it into the equation. Supply and demand for money must equal each other because a central bank injects money into the economy that the public uses. Public cannot use money that the central bank does not supply. The interest rate ensures the supply and demand of money equal each other. Furthermore, we solve for the velocity of money, shown in Equation 12.

$$V = \frac{P \cdot Y}{M^S} \tag{12}$$

For example, if the nominal GDP of the United States equals $15 trillion or $P \times Y$, and the money supply is $1 trillion, then the velocity of money equals 15. Consequently, each U.S. dollar is circulated in the economy 15 times during the year.

We can substitute the Quantity Theory of Money into the Purchasing Power Parity Equation, yielding Equation 13. Price level for the United States is in the numerator while the price level for the Eurozone is in the denominator. Thus, the exchange rate equals U.S. dollars per euro.

$$S = \frac{P_{US}}{P_{euro}} = \frac{M_{US}^{S}V_{US}Y_{euro}}{M_{euro}^{S}V_{euro}Y_{US}} \tag{13}$$

Economists utilize a mathematical trick to convert the absolute levels of Equation 13 into percentage change, yielding Equation 14. We switched the variables to lower case with a dot above each one to indicate a percentage change for that variable.

$$\dot{s} = \left(\dot{m}_{US}^{S} - \dot{m}_{euro}^{S}\right) + \left(\dot{v}_{US} - \dot{v}_{euro}\right) + \left(\dot{y}_{euro} - \dot{y}_{US}\right) \tag{14}$$

Economists can apply Equation 14 to many situations. For example, the real GDP is growing in Eurozone by 4% per year while the United States is experiencing a 3% real GDP growth. Furthermore, the European Central Bank expanded the money by 2% while the Federal Reserve expanded the money supply by 3%. If the velocities for money do not change (i.e. equal zero), subsequently, the euro should appreciate by 2% against the U.S. dollar. Consequently, the higher real income and a slower expanding money supply strengthen the euro. Remember, the denominator of the fraction defines the domestic currency.

International Fisher Effect

The **Fisher Effect** relates the nominal interest rate to the rate of inflation and real interest rate. We define the terms as the following:

❖ Real interest rate equals r.

❖ Nominal interest rate equals i.

❖ Expected inflation rate equals π.

We define the Fisher Effect by Equation 15:

$$i + 1 = (1 + r)(1 + \pi) \tag{15}$$

Many economists use algebra to reduce the Fisher Effect to Equation 16, which becomes an approximation. They set the cross term, $r \times \pi$, to zero.

$$i = (1 + r)(1 + \pi) - 1 = 1 + r + \pi + r\pi - 1 \approx r + \pi \tag{16}$$

As long as the expected inflation and real interest rates are small, then the approximation will be accurate. For example, if the expected inflation, π, is 10% and nominal interest rate, i, equals 5%, subsequently, the real interest rate is approximately -5%. Cross term, $r \times \pi$, is roughly 0.5%. Consequently, all prices in a society rise by 10% while your nominal investment

only grew by 5%. Unfortunately, a person facing this scenario would lose nearly 5% of his or her purchasing power every year.

The ***International Fisher Effect*** relates the real interest rate to a nominal interest rate in a foreign country. We build upon the Law of One Price for financial transactions. For instance, international investors should earn comparable returns in foreign countries as compared to their home country after we adjust their returns to a currency's exchange rate. Thus, the currency exchange rates reflect interest rate differences the international investors can profit. We must be careful because investors are not trading commodities. They choose whether to invest in a foreign country. We define the mathematical notation as the following:

❖ Domestic nominal interest rate in APR is i_d, while r_d represents the domestic rate of return of the investment in T days.

❖ Foreign nominal interest in APR rate for an investment for T days is i_f.

❖ Percent change in the exchange rate from the beginning of the investment period to the time period T is e.

We derive the International Fisher Effect with Equation 17. Domestic return is the interest rate earned by a $1 investment in a foreign bank account after T days of maturity converted into the domestic country's currency. If the domestic currency is appreciating, a positive e, then this weakens the return on the foreign investment, making r_d smaller. On the other hand, if the domestic currency is depreciating, a negative e, subsequently, the returns to the foreign investment become greater. Thus, both the foreign interest rate and change of currency exchange rate determine an investor's real return.

$$(1 + r_d)(1 + e) = \left(1 + i_f \frac{T}{360}\right) \tag{17}$$

Investor can invest in his home country for T days. We calculated his return on his home bank deposit in Equation 18.

$$r_d = i_d \frac{T}{360} \tag{18}$$

An international investor is indifferent between investing within his home country or investing in a foreign country. Consequently, arbitrage drives the rate of returns together. First, we solve Equation 17 for r_d. Then we set Equations 17 and 18 equal to each other because international arbitrage causes both investment returns to converge to the same rate, shown in Equation 19.

$$r_d = i_d \frac{T}{360} = \left(1 + i_f \frac{T}{360}\right) \frac{1}{(1+e)} - 1 \tag{19}$$

Then we solve for e, yielding Equation 20.

$$e = \frac{1 + i_f \dfrac{T}{360}}{1 + i_d \dfrac{T}{360}} - 1 \tag{20}$$

If the interest rates are low, then we can use a linear approximation that yields Equation 21.

$$e \approx \left(i_f - i_d\right)\frac{T}{360} \tag{21}$$

The International Fisher Effect lets analysts and economists solve for equilibrium exchange rates. Equilibrium occurs when no capital flows from one country to another. Once investors have exhausted their arbitrage opportunities, they stop moving their capital to the foreign country. If the International Fisher Effect holds, subsequently, the expected cost and expected return of lending funds becomes identical across currencies.

For example, the domestic interest rate for United States is i_d = 3% while the foreign interest rate for Japan equals i_f = 12%. If an investment period is 90 days, subsequently, we use the International Fisher Effect to predict the exchange rate changes. The U.S. dollar should appreciate approximately 2.25% that we calculated in Equation 22.

$$e \approx \left(i_f - i_d\right)\frac{T}{360} \approx (0.12 - 0.03)\frac{90}{360} \approx 0.0225 \tag{22}$$

Result seems counterintuitive because we expect the country with the greater interest rate to experience an appreciating currency. Usually, international investors want to earn the higher interest rate, causing a strong demand for that country's currency. Consequently, that country's currency should appreciate in the short run. However, a country with a greater interest rate would experience higher inflation, and the central bank cannot sustain the high interest rate. Thus, that country's currency would depreciate in the long run as the central bank expands the money supply. Hence, Equations 20 and 21 are long-run equilibrium equations.

For the second example, the Mexican Peso Crisis struck Mexico during the early 1990s, when the Mexican peso depreciated roughly 5% per year. Interest rate differential between Mexico and the United States ($i_{MEX} - i_{US}$) ranged between 7% and 16%. A country with a greater interest rate relative to another country has a depreciating currency over time. Consequently, the Mexican peso had depreciated in December 1994, triggering Mexico's financial crisis.

Fidelity utilized this financing strategy to earn profits from the large interest rate difference.

❖ Fidelity borrowed funds from the United States at $i_d = 5\%$ and invested in Mexican funds and earned the interest rate, $i_f = 12\%$. Thus, the interest rate differential ($i_{MXN} - i_{US}$) is 7%, while the investment period equals one year.

❖ Fidelity converted U.S. dollars to Mexican pesos on the spot market at time t to invest in Mexico and then converted pesos back into U.S. dollars after the investment had matured. Meanwhile, the U.S. dollar appreciated approximately 5% or e = 5%. Remember, we defined Mexico as the foreign country while the United States is the domestic country.

We compute Fidelity's expected return from Mexican investment in Equation 23.

$$r_d = \left(1 + i_f \frac{T}{360}\right)\frac{1}{(1+e)} - 1 = \left(1 + 0.12 \frac{360}{360}\right)\frac{1}{(1+0.05)} - 1 = 0.067 \tag{23}$$

Fidelity borrowed funds from a U.S. bank at 5% that we calculated in Equation 24.

$$r_d = i_d \frac{T}{360} = 0.05 \frac{360}{360} = 0.05 \tag{24}$$

We calculate the expected profit by subtracting investment earnings from the cost of borrowing, or 6.7% – 5% = 1.7% per year. Fidelity utilized this strategy during the early 1990s and earned profits between 1.5% and 11%. Unfortunately, Fidelity lost all its profits in December 1994 after the Tequila Devaluation. Fidelity used a strategy called an ***uncovered position*** because Fidelity exposed itself to an exchange rate risk because it relied on a future spot exchange rate. Fidelity should have used a ***covered position***, where it uses derivatives contracts to protect its future cash flows from a foreign investment.

Interest Rate Parity Theorem

Investors use ***Interest Rate Parity Theorem*** to price forward contracts. A forward contract's price originates from interest rate difference between countries. Consequently, international investors move financial capital into countries with higher interest rates. We can examine price derivatives contracts and predict future exchange rates. We list the mathematical notation below:

❖ Domestic nominal interest rate in APR equals i_d while the rate of return is r_d.

❖ Foreign nominal interest rate in APR is i_f while the foreign rate of return equals r_f.

❖ Currency spot exchange rate at time t is S. We write the exchange rate as a ratio, such as $ per euro.

❖ Forward contract issued today at time t for currency delivery on a future specific date on T is F.

International investors use arbitrage to price a forward contract. An investor invests $1 within the United States for T days and earns the domestic interest rate. We compute his or her rate of return in U.S. dollar in Equation 25.

$$r_d + 1 = \left(1 + i_d \, \frac{T}{360} \right) \qquad (25)$$

Investor believes Malaysia offers better investment opportunities and invests in Malaysia for T days, earning the foreign interest rate. Consequently, the investor exchanges the U.S. dollars for Malaysian ringgits at the spot exchange rate. Exchange rate equals U.S. dollars per Malaysian ringgit, denoted by S. Rate of return of the Malaysian investment yields Equation 26 because the interest and principal are denominated in ringgits.

$$\left(1 + i_f \, \frac{T}{360} \right) \cdot \frac{1}{S} \qquad (26)$$

At time t, the investor buys a T-day forward contract to exchange the ringgits back into U.S. dollars, once the investment has ended. Investor exchanges the ringgits for U.S. dollars at the U.S. dollar-ringgit exchange rate, F. Thus, the investor locks into a forward contract today for a fixed exchange rate protecting the investor from the exchange rate risk. We calculated the rate of return in U.S. dollars of the Malaysian investment in Equation 27.

$$r_f + 1 = \left(1 + i_f \, \frac{T}{360} \right) \cdot \frac{F}{S} \qquad (27)$$

Investor is indifferent between investing in the United States and Malaysia. Consequently, the investors use arbitrage to invest in United States and Malaysia until the rates of return for both countries converge to the same rate. Thus, we can set the two investments equal to each other, yielding Equation 28.

$$r_f + 1 = r_d + 1 \qquad (28)$$
$$\frac{F}{S} \left(1 + i_f \, \frac{T}{360} \right) = \left(1 + i_d \, \frac{T}{360} \right)$$

Solving for the forward contract yields Equation 29:

$$F = S \frac{\left(1 + i_d \frac{T}{360}\right)}{\left(1 + i_f \frac{T}{360}\right)} \tag{29}$$

We can use an approximation to simplify the equation in Equation 30.

$$F \approx S\left[1 + \left(i_d - i_f\right)\frac{T}{360}\right] \tag{30}$$

We can derive another equation to solve for the interest rates, yielding Equation 31.

$$\frac{F - S}{S} \approx \left(i_d - i_f\right)\frac{T}{360} \tag{31}$$

For example, the interest rate in the United States is 5% and 3% for Malaysia. If the spot U.S. dollar-Malaysian ringgit exchange rate equals $0.3333 per ringgit, then we price a six-month forward contract for $0.3366 per ringgit. Thus, investors believe the Malaysian ringgits will appreciate roughly 1% while the U.S. dollar will depreciate. This sounds counter intuitive because investors are attracted and want to earn the greater interest rate. However, this analysis assumes arbitrage brings the two investments into equality. If the interest rates differ between two countries, the country with a higher nominal interest rate must greater inflation that would depreciate its currency. Therefore, this analysis assumes a country with a higher interest rate possesses a depreciating currency.

We can reverse our logic to yield an identical equation to Equation 29. At time t, we borrow from a foreign bank one unit of a foreign currency for T days. When we repay the bank loan on Time T, we pay the foreign bank the following units of the foreign currency in Equation 32.

$$\left(1 + i_f \frac{T}{360}\right) \tag{32}$$

At time t, we exchange one unit of foreign currency for the domestic currency; therefore, we multiply by the spot exchange rate S. At time t, we deposit the domestic currency, S, into a domestic bank for T days and earn the domestic interest rate, shown in Equation 33:

$$S\left(1 + i_d \frac{T}{360}\right) \tag{33}$$

At time t, we buy a T-day forward contract to exchange the domestic currency for foreign currency at F. Thus, we exchange the domestic currency for the foreign currency, using the contract, F. Then we obtain the following units of foreign currency, calculated in Equation 34.

$$\frac{S}{F}\left(1+i_d\frac{T}{360}\right) \tag{34}$$

This strategy is not profitable if at time T, the amount we receive in foreign currency is less or equal to than we pay for the foreign currency. Thus, arbitrage ensures we set the source of funds from the foreign country equal to the use of the funds for the domestic country, yielding Equation 35.

$$\frac{S}{F}\left(1+i_d\frac{T}{360}\right)=\left(1+i_f\frac{T}{360}\right) \tag{35}$$

We solve for F to obtain Equation 36, which is the same as Equation 29. Consequently, two different scenarios yield the same equation.

$$F = S\frac{\left(1+i_d\frac{T}{360}\right)}{\left(1+i_f\frac{T}{360}\right)} \tag{36}$$

Arbitrage adjustment process can be slow, and rates of returns can differ between countries. Thus, international investors can exploit these differences to earn a higher rate of return. For example, a U.S. investor can invest in the United States to earn 2% interest or invest in Japan to earn 5%. He plans to invest for one year. Spot exchange rate is \$0.0127 per yen while a one-year forward contract equals \$0.0120 per yen. Although the domestic country is the United States for this investor, we reversed the exchange rate to conform to this analysis.

Investor calculates the rate of return to invest in the United States in Equation 37. Expected rate of return equals 2%, which is identical to the U.S. interest rate.

$$r_d =\left(1+i_d\frac{T}{360}\right)-1=\left(1+0.02\frac{360}{360}\right)-1=0.02 \tag{37}$$

Investor calculates the rate of return for his Japanese investment in Equation 38. An investor would earn a negative return of 0.8. Although Japan has a greater interest rate, the depreciating yen wipes out any gains from the higher interest rate. Hence, the investor should invest in the United State where his or her return is greater.

$$r_f = \left(1 + i_f \frac{T}{360}\right) \cdot \frac{F}{S} - 1 = \left(1 + 0.05 \frac{360}{360}\right) \cdot \frac{0.0120}{0.0127} - 1 = -0.008 \qquad (38)$$

Key Terms

random walk	Quantity Theory of Money
Purchasing Power Parity Theory	Fisher Effect
Consumer Price Index	International Fisher Effect
Big Mac Index	uncovered position
transportation costs	covered position
Relative Purchasing Power Parity Theory	Interest Rate Parity Theorem

Chapter Questions

1. You believe the Malaysian ringgit-U.S. dollar exchange rate follows a random walk. If the exchange rate equals 3 rm per U.S. dollar yesterday, what is your best forecast for the exchange rate today?

2. Identify the problems with the Purchasing Power Parity.

3. Using data from Table 1, how could you earn the highest profit by transportation Big Mac between countries if it were theoretically possible?

4. According to the Big Mac Index, estimate whether the Japanese yen is overvalued or undervalued relative to the U.S. dollar?

5. Distinguish between Purchasing Power Parity (PPP) and Relative PPP.

6. Russian has a 7% inflation rate while the United States has a 3%. Using both the exact and the approximation, estimate the level of currency depreciation?

7. The United States experiences a 3% inflation rate while Europe has a 2%. If we define the United States as the domestic country and the U.S. dollar is appreciating 2% against the euro, estimate the U.S. competitiveness ratio.

8. Malaysia experienced a strong GDP growth rate of 7% per year while the United States experienced 3%. If Malaysia's central bank expands the money supply at 5% while the Federal Reserve expands the money supply 2%, estimate the change to the U.S. dollar-ringgit exchange rate.

9. Using the approximation, how much should the exchange rate change if the home interest rate is 10%, the foreign interest rate equals 5%, and you plan to invest for 180 days?

10. You invested money into a foreign country for two years. Foreign interest rate equals 16%, and the exchange rate is appreciating at 4% per year. Estimate your return on the foreign investment.

11. Domestic interest rate for Europe is $i_d = 7\%$ while the United States interest rate equals $i_f = 5\%$. If the spot exchange rate is $S = 0.7$ €/ $1, estimate the approximate price of a forward contract due in six months.

18.　　　Derivative Securities and Derivative Markets

We explain the derivatives market in this chapter. Up to this point, we assumed all transactions were spot transactions. Buyers and sellers exchange money and the financial instrument immediately. In a derivatives market, investors can buy and sell contracts today that specify future purchases of financial securities and commodities. This chapter explains the derivative forms: futures and options contracts, credit default swaps, and currency swaps. Finally, we distinguish the role between hedging and speculation. Although derivative contracts allow investors to protect themselves from future price volatility, speculators can buy and sell derivatives to earn large profits or suffer massive losses.

Forward and Spot Transactions

Financial derivatives received bad publicity from infamous bankruptcies during the 1990s and from the 2008 Financial Crisis. In 1995, Orange County, California, experienced the largest bankruptcy for a municipal government with losses nearly $2 billion. Press concentrated on derivatives as the cause of the bankruptcy, but the fund manager made poor decisions. Another famous case was Barings PLC. Barings was a London investment firm that was founded in 1763. One trader, Nick Leeson, lost roughly $1.3 billion in the derivatives market, bankrupting Barings. Finally, commercial and investment banks created a variety of new securities, called Credit Default Swaps (CDS) that played a role in the 2008 Financial Crisis. CDS is similar to insurance for investors. The 2008 Financial Crisis created hardship on many financial firms and investment banks. These institutions guaranteed payment on pools of mortgages that bankrupted. Thus, these firms paid billions of dollars in payouts to honor these CDS contracts. We discuss CDS contracts in this chapter.

Derivatives are a contract, a piece of paper. Farmers and merchants invented derivatives in the Middle Ages to protect themselves from price fluctuations. Buyers and sellers agree to a price today, but they exchange the good for money at a future date. Financial derivatives protect investors from price uncertainty. Previous chapters focused on *spot transactions*, where a buyer and seller complete a transaction by immediately exchanging money for the commodity. However, *forward transactions* delay the exchange of money and assets to a future date. For example, a bread company needs six tons of flour in six months. Many things could occur within six months. A drought causes the wheat's price to soar, or heavy rains could cause a bumper crop, causing the wheat's price to plummet. Bread company wants to protect itself from fluctuating prices. Consequently, the bread company enters into contracts with wheat farmers, where the bread company and farmers negotiate a price of wheat today. However, the bread company will pay the farmers for the wheat when the farmers harvest the wheat six months from now. Contract protects both the bread company and farmers from price fluctuations.

Price of derivatives receives or "derives" their value from the underlying assets. Assets could be commodities such as coffee, corn, petroleum, pork bellies, and wheat, or financial assets such as stocks, bonds, currencies, Eurodollars, and other financial instruments.

Derivatives are contracts, and buyers and sellers exchange the contracts in the ***derivative markets***. They do not trade assets. Common ***derivatives*** are futures, forwards, options, Credit Default Swaps, and currency swaps.

Investors use two strategies to invest in the financial markets: Speculation and hedging. Some investors use ***speculation*** when they buy or sell securities because they believe they can sell the securities for a higher price in the future. Speculators search for quick profits and are gamblers. As you guessed, a speculator can gain or lose massive amounts of money from the derivatives market. Speculators are vital to the market because their presence increases the liquidity of the securities.

Investors use ***hedging*** to buy and sell securities to reduce risk or use long-term investment strategies. Hedger protects himself in three ways by using derivatives. First, he locks in a future price today, protecting himself from price fluctuations. Second, derivatives are liquid assets. If an investor needs money now, he easily can sell his futures contract in a derivatives market. Finally, investors buy and sell derivative on organized exchanges, and they can monitor and gather information on market prices of derivatives.

Hedgers use financial derivatives for the following three cases:

Case 1: Hedger uses a financial derivative to reduce price uncertainty because a derivative locks in a future price today.

Case 2: Hedger could reduce the interest-rate risk. If a banker knows he or she will grant a loan on a specific date in the future, subsequently, he or she can buy a derivative that locks in the future interest rate. Interest rate becomes the price on the financial derivative. Thus, the banker borrows at a low interest rate and lends at a high interest rate.

Case 3: Hedger could reduce the exchange rate risk. Currency exchange rate is the price in a currency derivative. For example, a corporation operates in a foreign country. If that country's currency depreciates, then a corporation could experience gains or losses in profits from that country.

Futures and Forward Contracts

First class of derivatives is *futures* and *forward contracts*. They specify size, maturity date, and price. Size indicates the number of units in each contract, while the maturity date is the day the parties complete the transaction. Finally, the futures price is the selling price of the asset on the maturity date. However, futures differ from forwards. A forward contract is tailor made that banks or dealers issue. Issuer's reputation and collateral guarantee the contract. On the other hand, a futures contract is standardized. Maturity, size, and collateral are the same for all contracts. Standardized contracts allow investors to buy and sell futures contracts on organized exchanges. For example, the Chicago Board of Trade allows futures for agricultural products and precious metals, while the New York Mercantile Exchange allows the exchange for energy commodities like petroleum and electricity.

Futures and forward contracts allow the buyer and seller to agree on a price for a commodity today, and the exchange of money for the commodity will occur on a specific date in the future. For example, you buy a government bond one year from now. You could enter a futures contract where you and the seller agree on the price today, but you pay for the

government bond one year from now. Futures contract is a legal document that assigns rights. A buyer's right obligates you to buy the government bond, called the ***long position***. Seller's right obligates him or her to sell you the government bond, called the ***short position***.

Derivatives market determines the price of the futures contract. Futures price reflects the expectations of investors and savers. For example, you bought a futures contract for petroleum, and you negotiated a price of $80 per barrel. Seller will deliver the oil within six months. You could sell your futures contract on the derivatives market if you no longer want the contract. If investors and savers believe that oil will be $90 per barrel, then the market value of your futures contract rises. You could either sell your futures contract for a higher price or wait until you receive the oil and sell the oil for $10 per barrel profit. However, the opposite could occur. If investors and savers believe the price of oil will be $70 per barrel, then the market value of your futures contract drops. You must buy oil for $80 per barrel that costs $70 in the future.

Speculators buy derivatives because the market value of the derivatives could experience wide swings. As the date of the delivery approaches for a futures contract, the futures contract market price will converge to the spot price. On the day of delivery, the market value of a derivative must equal the spot price. A buyer never purchases a futures contract if the market price of the futures contract exceeds the spot price. For example, if petroleum costs $90 per barrel today, then a buyer would never buy a contract today for a petroleum price of $91 or higher. Furthermore, a seller would never sell a futures contract, when the market price of the futures contract is lower than the spot price. For instance, if the spot petroleum market price were $90 per barrel today, then no one would sell a derivatives contract that matures today for a price below $90.

Buyers and sellers do not know each other when they buy or sell a futures contract through an exchange. Consequently, a buyer or seller deposits money with a broker to cover possible losses from a futures contract. As the spot market price changes for a commodity daily, either the buyer or seller will lose money if the exchange occurs today. However, the loser deposits money into a margin account. A ***margin account*** helps guarantee the parties will honor the contract. Usually the market price must exceed some threshold before a buyer or seller must deposit money. (A forward contract may not have a margin account).

Example 1: A petroleum refinery buys 10 futures contracts of petroleum that matures in six months. Contract size is 10,000 barrels of petroleum with a contract price of $75 per barrel.

Who pays the margin if the spot petroleum price equals $90 per barrel today? Seller deposits $10 \cdot 10,000 \cdot (\$90 - \$75) = \$150,000$ with his broker. If this contract matured today, then a buyer would purchase this oil for $75 and sell it for $90, earning a large profit of $15 per barrel. If a speculator bought 10 petroleum contracts, he or she could earn $150,000 if the derivatives contracts matured today.

Who pays the margin if the petroleum price falls to $60 per barrel? Buyer deposits $10 \cdot 10,000 \cdot (\$75 - \$60) = \$150,000$ with his broker. If this contract matured today, then the seller would buy oil on the spot market for $60 per barrel and sell it to the buyer for $75, earning a large profit of $15 per barrel. If a speculator bought 10 contracts, subsequently, he or she would earn a $150,000 loss if the contracts matured today. Thus, speculators could earn enormous profits or experience massive losses from the derivatives markets.

Derivatives can protect investors from interest rate risks. Interest-rate risk is a bank borrows funds for a greater interest rate than the bank earns on its loan. Remember, banks lend money for a greater interest rate than the funds they borrow, earning profits. Unfortunately, the interest-rate risk could reverse this, imposing losses on a bank.

Example 2: You manage a money-market mutual fund and it is June 2012. A money-market fund is a fund filled with financial securities with maturities of a year or less. Moreover, you expect an inflow of $1 million in funds in June 2013. You can buy a futures contract today that earns a 10% return for your funds in June 2013, and you begin earning interest after June 2013. If the interest rate falls, the derivatives contract guarantees you a 10% return, protecting your fund. A futures contract could be for Certificates of Deposit (CDs). A CD is customer deposits money into a bank account for a fixed time period and is similar to a savings account. If customers close and withdraw their CDs before maturity, then they forfeit the CDs interest. Many countries call CDs as time deposits.

On the other side of the CD derivative, a bank grants a loan for $1 million to a customer next year. Bank would transfer the funds in June 2013 at 12% interest rate. Bank could issue a Certificate of Deposit on the futures market at 10%. Subsequently, the bank has guaranteed a funding source next year for this loan. If interest rates rise next year, then the futures contract protects the bank from interest-rate risk because the bank "locked" into a funding source at 10% that ensures a profit of 2%.

Futures and forward contracts can reduce exchange rate risk. If a corporation operates in a foreign country, that corporation can use derivatives contracts to protect itself from currency exchange rate fluctuations.

Example 3: Exxon is a U.S. corporation that uses U.S. dollars to purchase petroleum from Malaysia. Consequently, Exxon needs Malaysian ringgits and enters into a futures contract because Exxon must pay 3,000,000 ringgits in 90 days. A Malaysian bank issued a derivatives contract that specifies the exchange rate as $1 = 3 ringgits.

Exchange rates between countries fluctuate continually. Who pays the margin if the exchange rate changes to $1 = 4 ringgits? The U.S. dollar appreciated while the ringgit depreciated. Unfortunately, Exxon has U.S. dollars, and it contracted to pay a lower exchange rate. Thus, Exxon must deposit money into the margin account because Exxon "locked" into a depreciating contract. On the other side of the contract, the bank benefits from this contract.

Easy way to determine whom benefits is to convert the ringgits into U.S. dollars for both the spot and futures market. We computed the spot transaction in Equation 1 and the futures contract in Equation 2.

$$\text{Spot market:} \qquad 3{,}000{,}000 \; rm \, \frac{\$1}{4 \; rm} = \$750{,}000 \qquad\qquad (1)$$

$$\text{Futures market:} \quad 3{,}000{,}000 \; rm \, \frac{\$1}{3 \; rm} = \$1{,}000{,}000 \qquad\qquad (2)$$

Exxon loses on the futures contract because it must pay one million U.S. dollars to pay its contract in Malaysia. If a speculator bought this contract from the Malaysian bank, then he or she loses approximately $250,000 on this contract if the contract matured today. Malaysian bank profits by buying 3 million ringgits for $750,000 and selling them for $1 million to Exxon.

Who pays the margin if the exchange rate changes to $1 = 2 ringgits? Ringgits appreciated while the U.S. dollar depreciated. The Malaysian bank must deposit money into a margin account. In this case, Exxon benefits from the exchange rate because its ringgit contract has appreciated. Easy way to determine whom benefits is to convert the ringgits into U.S. dollars for both the spot and futures market. We calculate spot transaction in Equation 3 and the futures transaction in Equation 4.

$$\text{Spot market:} \qquad 3{,}000{,}000 \; rm \; \frac{\$1}{2 \; rm} = \$1{,}500{,}000 \qquad\qquad (3)$$

$$\text{Futures market:} \quad 3{,}000{,}000 \; rm \; \frac{\$1}{3 \; rm} = \$1{,}000{,}000 \qquad\qquad (4)$$

Exxon gains from the derivatives contract because it pays one million U.S. dollars. However, if Exxon exchanged its U.S. dollars on the spot market, then Exxon would exchange one and a half-million U.S. dollars pay its ringgit contract in Malaysia. For this case, a speculator could earn a profit of a half-million U.S. dollars if the futures contract matured today. Speculator buys 3 million ringgits for $1 million and sells them for $1.5 million.

Options Contract

Options contract represents the second class of derivatives. Options contract differs from a futures contract because the option holder has the choice to buy or sell an asset. For example, you entered into an options contract, giving you the right to buy petroleum for $80 per barrel in 6 months. On the day of delivery, if the price of oil equals $70 per barrel, you do not exercise the options contract. That is your option! If oil is $90 per barrel on the day of delivery, then you will exercise your options contract. Investor who sold you this contract must sell the oil for $80 per barrel to you. Options contracts are defined as either call or put options. *Call option* gives the holder the right to buy an asset for a specific price in the future. On the other hand, the *put option* gives the holder the right to sell an asset for a specific price in the future.

All options have an *exercise* or *strike price*; the price listed on the option. Option has an *expiration date,* which is the date the right to buy or sell expires. Furthermore, options are either American or European. *American options* allow the option holder to exercise the option any time before the expiration date, while the *European options* restrict the right to exercise the option on the expiration date. Furthermore, options are not free. Option holders must pay a fee, called the *option premium*. Calculating premiums and exercising options are different between American and European options. Keeping the chapter simple, we use the European options for all examples.

Amount paid for an option premium depends on the probability the buyer of the option will exercise his right. Thus, options contracts are insurance. For example, a driver with a history of car accidents usually haves a greater probability of having future accidents. Hence, this driver pays a greater premium for his car insurance company.

We list five factors that influence an option premium:

❖ If the spot market price rises, subsequently, the option's premium for a European call option increases while the premium decreases for the put option. Remember, the option holders would exercise an option if they can buy low and sell high. Investor would more likely exercise the call option to buy at the strike price and sell at the spot price. Put option is the opposite.

❖ If the strike price increases, then the option's premium for a European call option decreases while the premium increases for a put option. Investor would not exercise the call option if the strike price exceeds the spot price. Otherwise, he would buy high and sell low. On the other hand, an investor would exercise a put option if the strike price exceeds the spot price. He or she buys low using the spot price to sell to the option holder using the strike price.

❖ If a commodity's price is highly volatile, subsequently, the commodity's price fluctuates greatly, and an option holder is likely to exercise both the call and put options. Consequently, the option issuer charges a greater option premium for both calls and puts. For example, the market price of Asset A fluctuates between $20 and $100 while Asset B fluctuates between $60 and $70. Therefore, the option premium for Asset A is greater because the large swings in the price boosts the likelihood the investor exercises the option.

❖ An option with a longer time maturity has a greater option premium. For example, Option A has a maturity of one year while Option B has a maturity of one month. Thus, Option A has a larger option premium because investors experience more uncertainty in its asset's prices. Dramatic events could happen during the year that ensures the investors exercise the option.

❖ Interest rates affect options just like bonds and stock. A higher interest rate reduces the present value of the option, increasing the value of the call option and decreasing the value of the put option.

Example 1: Strike price for petroleum is $80 per barrel, and the European's option premium equals $0.1 per barrel with an option size of 10,000 barrels. A company buys 10 call options with a total quantity of petroleum of 100,000 barrels. Thus, the company pays $0.1 \cdot 10,000 \cdot 10 = \$10,000$ for the premium.

Two scenarios occur with an options contract:

Scenario 1: If the spot market price exceeds the $80 strike price, then the company exercises the call options. Company buys petroleum at $80 and resells the petroleum on the spot

market to earn a large profit. For example, if the spot price for petroleum is $90 per barrel, we computed the company could earn $990,000 in profits in Equation 5:

$$profit = (spot\ price - strike\ price) \cdot quantity - premium \qquad (5)$$
$$profit = (\$90 - \$80) \cdot 100{,}000 - \$10{,}000 = \$990{,}000$$

Scenario 2: If spot market price falls below $80 per barrel, subsequently, the company does not exercise the option. However, the company has paid the $10,000 premium.

Example 2: Strike price for a European put option is $40 per ton of corn, and the premium equals $0.07 per ton. Each option contract specifies a quantity of 10,000 tons. A farmer buys five put options, insuring 50,000 tons of corn. Consequently, the farmer pays $0.07 × 10,000 × 5 = $3,500 in premiums.

A farmer will experience two scenarios:

Scenario 1: If the spot market price exceeds the $40 strike price, then the farmer does not exercise put option because he or she could sell corn for a greater price on the spot market. Nevertheless, the farmer has paid the option premium of $3,500.

Scenario 2: If spot market price falls below the $40 per ton strike price, subsequently, the farmer exercises the put option. Accordingly, the farmer could buy corn from the spot market and sell to the holder of the put option. For example, the spot corn price is $25 per ton. Consequently, we calculate the farmer earns $746,500 in profit in Equation 6.

$$profit = (strike\ price - spot\ price) \cdot quantity - premium \qquad (6)$$
$$profit = (\$40 - \$25) \cdot 50{,}000 - \$3{,}500 = \$746{,}500$$

Currency options are similar to commodity options, but the strike price is an exchange rate. Furthermore, Currency options have two markets. First, Interbank (OTC) market is located in London, New York, and Tokyo, and the OTC options are tailor-made for size, maturity, and exercise price. Second, Philadelphia, United States has a market for currency options with fixed maturities at 1, 3, 6, and 12 months.

Although currency options are more complicated to understand, the trick is to calculate both scenarios: exercise or not exercise the option. Then choose the scenario that yields the greater benefit to the option holder.

Example 3: An investor buys a six million ringgit European call option, and he or she has U.S. dollars. Call option has a strike price of $0.3 US / ringgit. Did you notice the ringgit is in the denominator of the strike price? Thus, we know this option is for ringgits. Premium equals $0.01 per ringgit, and the contract size is 100,000 ringgits. Investor needs 60 contracts and pays $60,000 for the premium, calculated in Equation 7.

$$premium = \frac{\$0.01}{ringgit} \cdot 6\ million\ ringgits = \$60{,}000 \qquad (7)$$

Investor faces two scenarios on the expiration date:

Scenario 1: If the exchange rate exceeds $0.3 US per ringgit, then the investor exercises the call option. For example, if the exchange rate equaled $0.4 US / ringgit, subsequently, the ringgit appreciated while the U.S. dollar depreciated. Investor needs $1.8 million (0.3 × 6 million) to purchase the six million ringgits using the call option, or he or she pays $2.4 million (0.4 × 6 million) if the investor buys the ringgits on the spot market. We calculated a speculator's profit of $594,000 in Equation 8. Speculator can buy at the exercise price and sell on the spot market.

$$profit = (spot\ price - exercise\ price) \cdot quantity - premium \qquad (8)$$
$$profit = \left(\frac{.4}{ringgit} - \frac{.3}{ringgit}\right) \cdot 6{,}000{,}000\ ringgits - \$6{,}000 = \$594{,}000$$

Scenario 2: If the exchange rate drops lower than $0.3 US / ringgit, then the investor does not exercise the call option. For instance, if the exchange rate equals $0.2 US / ringgit, subsequently, the ringgit depreciated while the U.S. dollar appreciated. Investor pays $1.2 million for the six million ringgit (0.2 × 6 million), or he or she could exercise the call option and pay $1.8 million (0.3 × 6 million). Thus, this investor would not exercise the call option, but a speculator would earn a loss, which equals the premium.

Example 4: An investor has U.S. dollars and wants to sell 500 thousand euros using a European put option. Strike price is $0.8 US / euro. Premium equals $0.02 US per euro while the contract size is 25,000 euros. Investor needs 20 contracts and pays $20,000 for the premium, calculated in Equation 9. Investor needs 20 contracts.

$$premium = \frac{\$0.02}{\text{€}} \cdot 500{,}000\ \text{€} = \$10{,}000 \qquad (9)$$

Investor observes two scenarios on the expiration date:
Scenario 1: If the exchange rate exceeds $0.8 US / euro, then the investors do not exercise the put option. Euro appreciated while the U.S. depreciated. For example, if the exchange rate rises to $0.9 US / euro, subsequently, the investors sell 500,000 euros for $450,000 on the spot market. Investors could sell those same euros for $400,000 if they had exercised the option. Thus, the investors do not use the put option. Speculators would earn a loss, equaling the option's premium.
Scenario 2: If the exchange rate drops lower than $0.8 US / euro, then the investor exercises the put option. For instance, if the exchange rate is $0.7 US / euro, subsequently, the investor sells the 500,000 euros for $400,000 by exercising the put option. Instead, if the investors sell the euros on the spot market, they receive $350,000 for those same euros. Thus, investors exercise put option. Speculators would earn $40,000 in profits that we calculated in Equation 10.

$$profit = (exercise\ price - spot\ price) \cdot quantity - premium \qquad (10)$$
$$profit = \left(\frac{.8}{\text{€}} - \frac{.7}{\text{€}}\right) \cdot 500{,}000\ \text{€} - \$10{,}000 = \$40{,}000$$

Did you notice something strange about the call and put options? Investors exercise call and put options "as opposites" when an investor exercises an option. Furthermore, we switched the exercise and spot prices in Equations 8 and 10.

Special Derivatives

Several financial institutions offer futures and options that are based on a market index, such as the Dow Jones Industrial Average and S&P 500. For example, the Chicago Board of Options Exchange (CBOE) offers options on the Dow Jones Industrial Average, which it calls DJX. Technically, the derivatives are not tied to a commodity. A financial company does not invest in a mutual fund that mirrors a stock index. For example, a fund manager could buy 1,000 shares each of every company listed in the Dow Jones Industrial Average and let investors buy into the fund. Instead, the financial companies base the stock market index on a computed stock market index and settle accounts in cash. Since no commodities are exchanged, the financial companies offer call and put options on the stock market indices. These companies cannot offer futures and forwards because buyers and sellers cannot trade a commodity.

Issuers of index derivatives could suffer large losses to rapid market changes. For example, one investor, Nick Leeson, bankrupted Barings, P.L.C. Nick Lesson observed the stocks on the Tokyo stock market fluctuated over a narrow range. The Nikkei stock index fluctuated around 20,000 points in 1995. Nick Leeson used a *straddle* and issued an equal number of call and put options with identical maturities for the Nikkei stock index. Hence, the investors rarely exercised the options because the stock prices fluctuated over a narrow range. Thus, the option premiums became pure profits to Barings. As profits were soaring, the top management at Barings let Nick Leeson continue his speculation. Then an earthquake struck Kobe, Japan, and both the stock prices and Nikkei average fell rapidly on the Tokyo stock exchange. Leeson speculated the stock prices would increase and bought futures contracts to protect his position. Subsequently, the stock prices continued plummeting, resulting in a $1.4 billion loss for Barings. Unfortunately, Barings was forced to settle with option holders who bet the Nikkei average would fall.

The Chicago Board of Options Exchange (CBOE) offers put and call options for the *Volatility Index (VIX)*, calculated from Standard & Poor's (S&P) 500-stock index. The VIX represents a measure of risk and volatility, otherwise known as the investor's fear gauge. Similar to a stock index derivative, the options are not tied to an asset or commodity. On maturity, a holder receives payment as the CBOE settles the obligation in cash. Furthermore, the VIX suffers from exposure if the VIX increases or decreases dramatically. Then CBOE could suffer large losses as it pays out for exercised options.

One must be careful with the meaning of the VIX number. For example, if the VIX equals 20, subsequently, the investors expect the S&P 500-stock index to swing by 20% over the next 12 months. If the VIX increases, then investors become more pessimistic and the financial markets become more volatile. Some economists and analysts use the VIX as a recession indicator, shown in Figure 1. During the 2008 Financial Crisis, the VIX peaked at 60, and the stock markets lost roughly half their market value during 2009.

Figure 1. The Volatility Index (VIX) between 1990 and 2012

Insurance companies and investment banks created *Credit Default Swaps (CDS)*. This financial instrument is similar to insurance. Some investors would like to purchase speculative grade (i.e. risky) bonds because these bonds pay greater interest rates than safe investments. However, if the business bankrupts, then these bonds become worthless and the investors lose their investment. Thus, CDSs were born. Investors could buy both risky bonds and CDS contracts. Furthermore, investors would pay premiums on CDSs as if they were paying for insurance to the investment banks or insurance companies. If a company did bankrupt and its risky bonds collapsed in value, subsequently, the investment bank or insurance company would pay the investors their loss specified under the CDS contract. If the company with the risky bonds did not bankrupt, then the investment bank kept the premium payments as profits. Subsequently, investors can buy and sell credit default swaps on the derivatives market.

CDSs have two severe drawbacks. First, CDS contracts are not transparent. Many investors did not understand how to use CDS except the analysts at the large investment banks. Second, investors rarely buy CDS contracts for bonds or other debt from financially strong companies with AAA ratings. These companies are not likely to bankrupt, and investors have little reason to purchase insurance for an unlikely event. Investors are likely to purchase insurance for probable events. Thus, investors are likely to purchase CDSs for speculative grade bonds or debt. Furthermore, companies rarely file for bankruptcy during good economic times, even risky businesses that issued risky bonds. Consequently, the investment banks would collect CDS premiums as pure profit. During good times, AAA rated companies have a zero default rate while speculative grade bonds have a default rating less than 4%. However, during the 2001 Recession, AAA rated companies still had close to a zero default rate while the default rate soared to 10% for speculative investments. As bankruptcies climb, companies can accumulate staggering losses during a downturn in the economy.

Investors trade CDSs contracts in the derivatives markets. Anyone can buy them, even if the investors do not own the risky bonds that are specified under the CDS contract. Therefore, speculators can enter the market and gamble on outcomes. For example, gamblers believe Company XYZ will bankrupt. These gamblers do not hold any bonds for this company, but they buy CDS contracts. Gamblers only pay the CDS premiums. However, if this company does indeed bankrupt, then the gamblers receive a payout from the issuer of the CDS contract. If Company XYZ does not bankrupt, subsequently, the gamblers lose their bet, the CDS premiums. Imagine the money people could earn if they had inside information about a company's finances.

Some investors bet the housing market would collapse and bought CDS contracts on risky mortgage pools. Investors bought CDS contracts on mortgage asset-backed securities because they predicted the collapse of the housing bubble in 2007 and purchased CDS contracts as a bet. As the mortgage asset-back funds bankrupted, the holders of CDS contracts requested their payouts. If you are experiencing trouble understanding CDS contracts, then think of this analogy. You bought insurance on your neighbor's house, and you pray for the house to burn down to collect the insurance.

The CDS contracts have a flaw. A company can stack CDS contracts upon other CDS contracts. For example, Company X buys a CDS contract from an insurance company and pays 2% of the contract's value as a premium. Unfortunately, the financial health of the company, specified in the CDS contract, deteriorates, increasing the risk on its bonds. Company X can exploit this situation, and create and sell a new CDS contract to Company Y for a 6% premium, earning 4% commission on the deal. If that company does bankrupt, then the insurance company pays Company X its CDS insurance, and in turn, Company X transfers its payout to Company Y, earning a quick 4% commission on the deal. Thus, multiple CDS contracts insure the same debt. Unfortunately, the CDS contracts depend on one important assumption. Issuing companies can indeed pay out the CDS contracts if the companies fail.

The CDS market in the United States quickly grew into $47 trillion market by June 2008, covering a debt of roughly $34 trillion. Putting this number into perspective, the size of the U.S. economy was roughly $14 trillion in Gross Domestic Product (GDP) in 2012. Consequently, the potential losses if the investment banks and insurance companies must pay out all CDS contracts would exceed three times the size of the U.S. economy. Commercial and investment bankers used CDS contracts to guarantee an AAA rating for Collateralized Debt Obligations, which contained securities tied to the mortgage market. They used the CDS contracts to cancel the impact of subprime mortgages contained in the mortgage securities. We had discussed the Collateralized Debt Obligations in Chapter 10 under Securitization.

During the downturn of the U.S. economy in December 2007, AIG quickly accumulated billions in losses as investors requested the payouts from the CDS contracts. AIG's losses exceeded $60 billion in 2009 and grew by the day. This became the largest loss in U.S. corporate history. The U.S. federal government bailed out AIG by purchasing 80% equity into the company. Furthermore, it promised AIG four bailout loans worth a total of $163 billion. Unfortunately, AIG worked with several investment banks like Goldman Sachs and Lehman Brothers, which also experienced severe financial troubles.

The U.S. government bailed out the investment banks and insurance companies except Lehman Brothers. After the public had learned Lehman Brothers was insolvent, and the government would not help it, the financial markets plummeted in September 2008. Furthermore, the credit markets froze as all financial institutions stop granting loans. Roughly 350 banks and investors would lose their CDS insurance because Lehman Brothers issued approximately $400 billion in CDSs on debt that was valued $155 billion. Unfortunately, Lehman Brothers issued more CDS contracts than the amount of debt by 2.5 times. Finally, Lehman Brothers bankrupted and began liquidating its assets. Lehman Brothers was the greatest casualty of the 2008 Financial Crisis and the largest bankruptcy in U.S. history. Barclays, the second-largest bank in England, bought Lehman Brother's U.S. core assets for $1.3 billion, including Lehman Brother's skyscraper in Manhattan. Excessive greed doomed a 158-year-old company.

Evaluating Currency Swaps

A *currency swap* is a periodic exchange of foreign currencies between two parties, viewed as a swap of two forward currency contracts. One party is a swap dealer, usually a banker while the other is an investor. Each payment to the counter-party is called a "leg." Swaps allow companies to invest in foreign countries. Company borrows from its local bank at a low interest rate, and then swaps its loan with another company in the other country, where it invests. Thus, the company has access to the foreign currency at a low interest rate. Swap contracts specify the following:

❖ Frequency of the payments between two parties.

❖ Duration of the swap.

❖ A method to calculate the swap payments or legs. One leg is a fixed payment while the other leg is a floating payment. Fixed payment has a fixed rate, called the coupon of the swap.

We define swaps in four ways, and they differ in how the payments of legs are indexed. This book only discusses a currency swap, where both legs of the swap are denominated in different currencies. At time period 0, the value of a swap to both parties should be 0 or close to 0. No one would enter a swap with a large negative present value for them. We list the notation as:

❖ Present value of discounted cash flows from the foreign currency cash flows is $PV_{foreign}$.

❖ Current spot exchange rate is S_0, the time we calculate the swap's value.

❖ Present value of discounted cash flows from the domestic currency cash flows is $PV_{domestic}$.

We calculate the swap value in Equation 11.

$$Swap\ Value = PV_{foreign} \cdot S_0 - PV_{domestic} \tag{11}$$

For example, Company XYZ enters into a 10-year swap agreement with a dealer. Nine years have passed, and two semi-annual payments are remaining. Investors valued the swaps at $200 million and 210 million euros with coupon interest of 4% for U.S. dollars and 5% for euros. Therefore, coupon payments are $4 million and 5.25 million euros. Furthermore, the implicit exchange rate is $4 million divided by 5.25 million euros, or $0.762 per euro. However, the current spot exchange rate equals $S_t = \$1.25$ per euro. Current discount rates are 5% APR for the United States and 6% APR in Europe.

We compute the present value of cash flows for the European swap in Equation 12.

$$PV_{foreign} = \frac{5.25\ million\ €}{1+0.03} + \frac{210\ million\ €+5.25\ million\ €}{(1+0.03)^2} = 208.0\ million\ € \tag{12}$$

We compute the value of cash flows for the U.S. swap in Equation 13.

$$PV_{domestic} = \frac{million}{1+0.025} + \frac{million+\ million}{(1+0.025)^2} = \$198.1\ million \tag{13}$$

We computed the swap's present value in Equation 14.

$$Swap\ Value = PV_{foreign} \cdot S_0 - PV_{domestic} \tag{14}$$
$$Swap\ Value = 208.0\ million\ € \cdot \frac{.25}{1\ €} - \$198.1\ million = \$61.9\ million$$

If Company XYZ liquidates the swap, the company must receive $61.9 million to sell the swap. Company XYZ benefited because the company is exchanging dollars for appreciating euros. Thus, the currency swap has a credit risk. Unfortunately, the other party, the dealer, has a large negative present value and could default on the swap.

Why does the value of a currency swap change? Although terms of the swap are fixed, fluctuating interest rates and changing exchange rates alter the swap's value. If a company holds a foreign currency while the domestic exchange rate appreciates, then value of swap decreases. Remember the company entered into a contract for a foreign currency. If the domestic interest rate increases, subsequently, the present value of the swap rises. Moreover, if the foreign interest rate rises, then the present value of the swap must fall. Opposite is true for the issuer of the swap.

Key Terms

spot transaction   call option

forward transaction	put option
derivative	exercise price
derivative market	strike price
derivative security	expiration date
hedging	American option
speculation	European option
futures	option premium
forward contract	straddle
long position	Volatility Index (VIX)
short position	Credit Default Swaps (CDS)
margin account	currency swap
options contract	

Chapter Questions

1. Distinguish between spot and forward transactions.

2. Where do derivatives get their value?

3. Distinguish between hedging and speculation.

4. Distinguish between long and short positions.

5. Define a margin account.

6. A company buys 10 contracts for petroleum that specifies a price of $75 per barrel. Each contract specifies 1,000 barrels. Who pays and how much into the margin account if the price of petroleum shoots up to $150 per barrel?

7. An investor buys a currency futures contract for $1 = 1.5 euros from a bank for 150,000 euros. Who pays and how much into a margin account if the exchange rate changes to $1 = 1 euro?

8. Distinguish between a futures and options contract.

9. Distinguish between a call option and a put option.

10. Which factors determine the value of an option's premium?

11. You are holding 10 call options for petroleum with a strike price of $75 per barrel. Option premium equals $0.5 per barrel, and each contract specified a quantity of 1,000 barrels. Compute the premium, and whether you will exercise this option if the market price is $50 per barrel?

12. A farmer bought 100 put options for corn. Strike price of corn equals $5 per bushel; the option premium is $0.01 per bushel, and each contract specified a quantity of 100 bushels. Calculate the farmer's premium, and whether he will exercise this option if the market price of corn equals $6 per bushel?

13. Can you identify any problems for a finance company to issue derivatives that are not based on a commodity, but on a stock market index?

14. What are Credit Default Swaps (CDS)?

15. Could the Federal Reserve or U.S. government have prevented the 2008 Financial Crisis?

16. Company XYZ enters into a 5-year swap agreement with a dealer, and four years have passed. Payments are semi-annual, and two payments are left. Swap's face values are $100 million and 110 million euros with a coupon interest of 3% for U.S. dollars and 4% for the euros. Current discount rates are 5% APR for the U.S. and 6% APR in Europe while the current spot exchange is $S_t = \$1.2$ / euro. Calculate the swap's present value.

19. Transaction and Economic Exposures

As a business invests or operates in a foreign country, a changing exchange rate causes gains or losses on international business activities. We define these gains or losses as transaction exposure, economic exposure, translation exposure, and tax exposure. Consequently, this chapter defines the types of exposures and outlines the strategies an international company can use to reduce its losses from the transaction and economic exposures. Unfortunately, the translation and tax exposures are beyond the scope of this book.

Exposure Types

Firms are subjected to currency risk, called *exposure*. Exposure changes a company's profits, net cash flow, and market value. Every international corporation or business can experience four exposures, originating from their international activities. We explain each exposure in detail.

Transaction exposure comes from the risk of transactions denominated in different currencies. Consequently, a change in an exchange rate alters the value of outstanding financial obligations, such as accounts receivable and accounts payable. Unfortunately, a change in an exchange rate impacts cash flow and alters a company's current contractual obligations. For example, Swiss Cruises, a Swiss company, buys U.S. supplies and sells cruises to U.S. customers. Hence, it prices its supplies and vacation cruises in U.S. dollars. Any fluctuations in the U.S. dollar-Swiss franc exchange rate will alter its financial obligations.

Economic exposure is how a firm's expected cash flows are affected by unexpected changes in currency exchange rates. Exchange rate alters future sales, prices, and costs. We also call it operating exposure, competitive exposure, or strategic exposure. For example, Swiss Cruises pays most its costs in francs and receives 50% of its revenues in U.S. dollars. Unfortunately, Swiss Cruises cannot raise its price because vacation cruises are highly competitive, and it would lose customers by raising the price. If the Swiss franc is appreciating while the U.S. dollar is depreciating, subsequently, its cash flows will worsen. Unfortunately, its revenues are in U.S. dollars that are losing value while its costs are in francs that are strengthening in value. Keeping them straight, economic exposure is how a change in an exchange rate influences a company's finances over time, while transaction exposure is a change in exchange rates impact current assets and liabilities.

Translation exposure, referred to as accounting exposure, is fluctuations in currency exchange rates affect a firm's consolidated statements. For example, Swiss Cruises has inventories of U.S. dollars and U.S. dollar loans of an equal amount. Then accountants convert balance sheet items into francs. A depreciating U.S. dollar causes the value of loans to decrease because its liabilities are decreasing. However, the value of current assets is decreasing from the dollar inventories. Nevertheless, due to Swiss accounting rules, accountants use different exchange rates to convert U.S. dollar inventories and the U.S. dollar loans into francs. Consequently, accountants generate accounting gains or losses by using the various exchange

rates to calculate a company's financial statements. Company must consider the accounting rules among different countries, and how cash flows will impact a company's financial statements.

Tax exposure is fluctuations in currency exchange rates affect a company's cash flow, and hence its taxable income. Thus, losses from transaction exposure can reduce taxable income, whereas losses from economic exposure reduce taxable income over future years. On the other hand, translation exposures are not related to cash flows and do not reduce taxable income. Thus, companies could gain profit from favorable changes in the exchange rates.

Measuring and Protecting against Transaction Exposure

We can identify and measure transaction exposure. Firms sell products or purchase resources by entering contracts. Firms can even buy and sell contracts on the derivatives markets to hedge against price uncertainty. If firms do not have contracts, then they must forecast future spot prices, and spot prices can fluctuate wildly.

For example, Swiss Cruises sold cruise packages to a U.S. wholesaler for $2.5 million U.S. dollars and bought fuel oil for $1.5 million in U.S. dollars. Both transactions will occur in 30 days, giving a predictable cash flow. If today's spot exchange rate is 1.45 Swiss francs equal $1, then we calculated the profit, 1.45 million francs by using Equation 1.

$$profit = \frac{1.45 \ franc}{\$1}(\$2,500,000 - \$1,500,000) = 1,450,000 \ francs \tag{1}$$

However, the transaction occurs in 30 days, and the spot exchange rate can fluctuate. Consequently, Swiss Cruises profits in francs will fluctuate along with the exchange rate. A large company would employ a specialist who predicts and forecasts prices and exchange rates. In Swiss Cruises' case, the specialist has determined the franc-U.S. dollar exchange rate fluctuates ±10%. Thus, the net transaction exposure could fluctuate between 1,305,000 and 1,595,000 francs, which we calculate by multiplying the profit by 1±0.10, or by 0.9 for the lower number and 1.1 for the upper number. In this case, Swiss Cruises has a favorable transaction exposure because revenues in dollars always exceed the costs in dollars.

A company can use strategies to protect its revenues and expenses in a foreign country. For example, a U.S. company, Trident, sold equipment to a British company for 3 million pounds due in 90 days as an accounts receivable. Although Trident sold the equipment, it must wait 90 days for its revenue, and anything could happen within 90 days. An analyst at Trident views four strategies to reduce any losses from this international transaction. Strategies are:

1. Spot exchange rate equals $1.762 per 1 pound, and the company will use the spot exchange rate in 90 days.

2. Trident Company can use a derivatives contract. Trident can buy a 90-day forward contract with an exchange rate of $1.785 / 1 pound from a large bank.

3. Trident Company can buy a 90-day put option for pounds. Put option grants Trident the right to sell British pounds at the strike price of $1.75 / pound with a premium of 1.5%. On the other hand, Trident could buy a 90-day call option for U.S. dollars, which would achieve the same thing.

4. The Trident Company could borrow funds from a British bank. The 90-day loan rate in pounds is 14% Annual Percentage Rate (APR).

Strategy 1: Trident does nothing, and it exchanges funds using the spot exchange rate. If the exchange rate does not change, then Trident will receive $5.286 million, computed in Equation 2. Nevertheless, Trident has an exchange rate risk. If the British pounds appreciate, subsequently, Trident will gain more U.S. dollars. On the other hand, if the British pounds depreciate, then Trident receives fewer U.S. dollars.

$$amount(\$) = 3 \; million \; pounds\left(\$1.760 \middle/ 1 \; pound\right) = \$5.28 \; million \quad (2)$$

Strategy 2: Trident enters a forward contract. A forward contract is better than a currency futures because the forward contracts are tailor made for amounts and do not require a margin call. Consequently, Trident does not have any exchange rate risk because it locked into an exchange rate today. Trident will receive $5.355 million in 90 days, calculated in Equation 3. Forward contract is better than the future spot exchange rate.

$$amount(\$) = 3 \; million \; pounds\left(\$1.785 \middle/ 1 \; pound\right) = \$5.355 \; million \quad (3)$$

Strategy 3: Trident buys the put option. It pays a premium, $78,750, calculated in Equation 4 and insured its transaction for an exchange rate of $1.75 per pound. Thus, Trident does not have an exchange rate risk, and the option guarantees at least $5.25 million, computed in Equation 5. Trident will only exercise the put if the British pounds depreciate, and the exchange rate falls below $1.75 per pound. Although the put option yields less revenue than the forward, Trident would buy the put option if it strongly believes the British pound will appreciate. If the pound does indeed appreciate, subsequently, Trident sells its pounds in the spot exchange market. However, if the pounds depreciate, then Trident uses the put option to sell its pounds, preventing a loss.

$$premium(\$) = 3 \; million \; pounds(0.015)\left(\$1.750 \middle/ 1 \; pound\right) = \$78,750 \quad (4)$$

$$amount(\$) = 3\ million\ pounds \left(\$1.750 \middle/ 1\ pound \right) = \$5.25\ million \qquad (5)$$

Strategy 4: Trident could borrow from a British bank. This strategy is more involved and entails no exchange rate risk. First, Trident borrows 2.899 million pounds today, calculated in Equation 6. Accordingly, the British bank charges 14% interest and Trident will owe the bank 3 million pounds in 90 days. Consequently, we use the present value formula to calculate the present value that grows into the amount the British company will pay in 90 days.

$$funds\ to\ borrow(£) = \frac{future\ value}{1+i\frac{T}{360}} = \frac{3\ million\ pounds}{1+0.14\frac{90}{360}} = 2.899\ million\ pounds \qquad (6)$$

Then Trident immediately transfers the bank loan in U.S. dollars today using the spot exchange rate. Consequently, Trident receives $5.107 million today. Once the British company pays its accounts receivable, subsequently, Trident repays the British bank loan. This transaction differs from the first three strategies because Trident receives funds today for an accounts receivable that the British company pays in 90 days. Although Strategy 4 yields the lowest amount, Trident receives money today that it could invest and earn interest while Trident would wait 90 days until receiving money for the first three strategies.

$$amount(\$) = 2.899\ million\ pounds \left(\$1.762 \middle/ 1\ pound \right) = \$5.107\ million \qquad (7)$$

A company could use various strategies to reduce the exchange rate risk. For example, the U.S. company, Caterpillar, bought a South Korean company for 6,030 million wons, due in 6 months. In this case, Caterpillar has an accounts payable. A specialist at Caterpillar observes the following strategies:

1. Caterpillar could use the spot exchange, 1,200 wons per $1.

2. Caterpillar could enter a 180-day forward contract with the exchange rate set at 1,260 wons / $1.

3. Caterpillar could buy a 180-day call option for wons with a strike price of $1 / 1,200 wons and a premium of 3%.

4. Caterpillar could deposit funds into a Korean bank and earn interest for 180 days. The Korean interest rate is 16% APR.

Strategy 1: Caterpillar decides to do nothing and pay its obligation using the spot exchange rate in six months. Unfortunately, this strategy comes with an exchange rate risk. If the Korean

won appreciates, subsequently, Caterpillar would pay more U.S. dollars to satisfy this obligation. If the spot exchange rate remains the same, then Caterpillar would pay $5.025 million for the company, calculated in Equation 8.

$$amount(\$) = 6{,}030 \ million \ wons\left({\$1}/{1{,}200 \ wons}\right) = \$5.025 \ million \qquad (8)$$

Strategy 2: Caterpillar could use a forward contract to lock in a future exchange rate. Consequently, this strategy has no exchange rate risk, and Caterpillar would pay $4.785 million, computed in Equation 9. Clearly, Strategy 2 is better than Strategy 1 because Caterpillar knows the exact future value of its legal obligation.

$$amount(\$) = 6{,}030 \ million \ wons\left({\$1}/{1{,}260 \ wons}\right) = \$4.786 \ million \qquad (9)$$

Strategy 3: Caterpillar could buy a call option to buy wons at a fixed price, and this strategy has no exchange rate risk. Thus, Caterpillar would pay the premium of $150,750, calculated in Equation 10. Then Caterpillar will exercise this call option if the won appreciates relative to the U.S. dollar. Caterpillar would pay $5.025 million at most, computed in Equation 11. Although this Strategy is worse than Strategy 2, Caterpillar would use this strategy if it believed the Korean won would depreciate, which reduces Caterpillar's obligation. Then, if the Korean won appreciates, Caterpillar will exercise the call option.

$$premium(\$) = 6{,}030 \ million \ wons(0.03)\left({\$1}/{1{,}200 \ wons}\right) = \$150{,}750 \qquad (10)$$

$$amount(\$) = 6{,}030 \ million \ wons\left({\$1}/{1{,}200 \ wons}\right) = \$5.025 \ million \qquad (11)$$

Strategy 4: Caterpillar could transfer funds today into South Korea using the spot exchange rate. Then it deposits funds into a Korean bank and earns interest for six months. Although this strategy has no exchange rate risk, it does have a country risk. Company deposits funds in a foreign country for six months, and in some countries, this would not be wise. We discuss a country's risk in Chapter 20.

Caterpillar needs 6,030 million wons in six months. We work backwards to determine the amount Caterpillar needs to deposit today, so the interest allows the balance to grow into 6,030 million wons. We calculated the present value of 5,853.3 million wons in Equation 12. Consequently, Caterpillar uses today's currency exchange rate to transfer $4.65 million to Korea, calculated in Equation 13. This strategy yields the lowest costs to pay that accounts payable

because Caterpillar deposits funds in a Korean bank. In theory, it could deposit these funds in a U.S. bank to earn interest for six months, and then uses the other strategies.

$$funds\ to\ deposit = \frac{future\ value}{1+i\frac{T}{360}} = \frac{6{,}030\ million\ wons}{1+0.16\frac{180}{360}} = 5{,}583.3\ million\ wons \qquad (12)$$

$$amount(\$) = 5{,}583.3\ million\ wons\left(\$1/_{1{,}200\ wons}\right) = \$4.65\ million \qquad (13)$$

In another example, Seattle Scientific sold equipment for 12.5 million yen to a Japanese firm. Accounts receivable is due in 30 days. An analyst at Seattle Scientific observes the four strategies:

1. Seattle Scientific uses today's spot exchange rate, 111.40 yen per $1 today.

2. Seattle Scientific buys a 30-day forward with a fixed exchange rate of 111.00 yen per $1.

3. Seattle Scientific uses a 90-day forward rate with an exchange rate of 110.40 yen per $1.

4. The Japanese firm pays cash today if Seattle Scientific would grant a 4.5% discount.

Strategy 1: Seattle Scientific does nothing and uses the spot exchange rate. Unfortunately, this strategy entails an exchange rate risk. If the spot exchange rate does not change, then Seattle Scientific receives $112,208.26, computed in Equation 14. If the yen depreciates relative to the U.S. dollar, subsequently, Seattle Scientific would receive fewer U.S. dollars.

$$amount(\$) = 12.5\ million\ yen\left(\$1/_{111.40\ yen}\right) = \$112{,}208.26 \qquad (14)$$

Strategy 2: Seattle Scientific uses a 30-day forward contract and locks in the future exchange rate. This strategy carries no exchange rate risk and is better than Strategy 1. Thus, Seattle Scientific receives $112,612.61, calculated in Equation 15.

$$amount(\$) = 12.5\ million\ yen\left(\$1/_{111.00\ yen}\right) = \$112{,}612.61 \qquad (15)$$

Strategy 3: Seattle Scientific uses a 90-day forward contract. Again, this strategy has no exchange rate risk. Hence, Seattle Scientific receives $113,224.64 in ninety days, computed in Equation 16. Although this strategy seems odd, Seattle Scientific would deposit the money in a Japanese bank for an extra 60 days, earning interest. Although Strategy 3 is better than the first two strategies, the analyst should consider the time value of money, which was removed from

these examples making them easy to understand. For example, once Seattle Scientific received funds from Japan in Strategies 1 and 2, it would deposit the funds at a U.S. bank to earn interest for two months. Thus, all these strategies would have the same time horizon and thus be comparable.

$$amount(\$) = 12.5\ million\ yen\left(\$1/_{110.40\ yen}\right) = \$113{,}224.64 \tag{16}$$

Strategy 4: Seattle Scientific granted the 4.5% discount and receives its funds today. This strategy has no exchange rate risk because the firm transfers the funds to the U.S. today using the spot exchange rate. Consequently, Seattle Scientific receives $107,158.89, calculated in Equation 17. This strategy yields the smallest amount for the accounts receivable. Nevertheless, Seattle Scientific receives its funds today. Next, it could invest these funds into a U.S. financial institution and earn interest for 90 days. An analyst would need to adjust the time horizon for this strategy, so it matches the time horizons for the other strategies. Strategy 3 set the greatest time horizon at 90 days.

$$amount(\$) = 12.5\ million\ yen(0.955)\left(\$1/_{111.40\ yen}\right) = \$107{,}158.89 \tag{17}$$

For the last example, a company, Farah Jeans, plans to construct a new factory in Guatemala, and it owes 8.4 million quetzals in six months, creating an accounts payable. Farah Jeans wants to reduce its exposure for this transaction. A specialist faces with the following strategies.

1. Spot exchange rate equals 7.0 quetzals per $1. Analyst believes the Guatemalan Central Bank will devalue the quetzal to 8.0 quetzals per $1. However, the analyst believes a small chance that the quetzal could strengthen to 6.4 quetzals per $1.

2. Farah Jeans could enter a 180-day forward contract with an exchange rate of 7.1 quetzals / $1.

3. Farah Jeans immediately transfer the funds to Guatemala and earn the interest rate 14% APR for 180 days.

4. Farah Jeans could invest in the United States and earn 6% APR for 180 days and then use a forward contract to transfer funds to Guatemala.

Strategy 1: Farah Jeans could use the spot exchange rate to pay its account payable. Unfortunately, the spot exchange rate entails an exchange rate risk. In some cases, a currency forecast is not accurate because unanticipated events cause wild fluctuations in currency

exchange rates. If the quetzal does depreciate, then Farah Jeans would pay $1,050,000, calculated in Equation 18. However, if the quetzal appreciates, subsequently, Farah Jeans would pay out $1,312,500, computed in Equation 19.

$$amount(\$) = 8.4 \; million \; quetzals \left({}^{\$1}/_{8.0 \; quetzals} \right) = \$1,050,000 \qquad (18)$$

$$amount(\$) = 8.4 \; million \; quetzals \left({}^{\$1}/_{6.4 \; quetzals} \right) = \$1,312,500 \qquad (19)$$

Strategy 2: Farah Jeans uses a 180-day forward contract to hedge against the exchange rate risk, thus ensuring no exchange rate risk. Farah Jeans would pay $1,183.098.59, calculated in Equation 20.

$$amount(\$) = 8.4 \; million \; quetzals \left({}^{\$1}/_{7.1 \; quetzals} \right) = \$1,183,098.59 \qquad (20)$$

Strategy 3: Farah Jeans could invest money in Guatemala today and earn interest for six months. Then the company uses the funds to pay its accounts payable. Although this strategy does not have an exchange rate risk, the company could experience country risk. We work backwards and calculate the amount we need to deposit in the bank today, so it can grow into 8.4 million quetzals in six months. We calculated 7.85 million quetzals in Equation 21.

$$funds \; to \; deposit = \frac{future \; value}{1 + i\frac{T}{360}} = \frac{8.4 \; million \; quetzals}{1 + 0.14\frac{180}{360}} = 7.85 \; million \; quetzals \qquad (21)$$

Then Farah Jeans transfer $1.121 million today to Guatemala using the spot exchange rate, computed in Equation 22. Unfortunately, this good strategy has a different time horizon than the previous two strategies. If Farah Jeans has $1.121 million in its accounts, subsequently, it could earn interest by depositing it in a U.S. financial institution and then use Strategies 1 or 2.

$$amount(\$) = 7.850 \; million \; quetzals \left({}^{\$1}/_{7.0 \; quetzals} \right) = \$1.121 \; million \qquad (22)$$

Strategy 4: This strategy addresses the time horizon and has no exchange rate risk or country risk. Farah Jeans invests funds in the United States today, and subsequently, uses a forward contract to transfer money to Guatemala in six months. Farah Jeans need $1,183,098.59 in six months for the forward contract, computed in Equation 20. Then working backwards, the company must invest $1,148,639.41 in the U.S. to earn the 6% interest for six months, calculated in Equation 23. Consequently, Farah Jeans would earn interest in the United States

245

for six months and use a forward contract to transfer funds to Guatemala to pay off its obligation.

$$funds\ to\ deposit = \frac{future\ value}{1+i\frac{T}{360}} = \frac{,183{,}098.59}{1+0.06\frac{180}{360}} = \$1{,}148{,}639.41 \tag{23}$$

An international company could hedge naturally and protect its current contractual contracts in a foreign country by using different strategies. First, a company has both accounts receivables and accounts payable in the same foreign country. If they are roughly equal with similar maturities, then the company uses the proceeds from the accounts receivable to pay its accounts payable with no exchange rate exposure. Second, a company could require payment in its home currency. For example, U.S. firms would require all payments are made in U.S. dollars while companies in the Eurozone would require payments in euros. Thus, the companies force the exchange rate risk upon the other parties. Finally, a company could require payment in Special Drawing Rights because the International Monetary Fund sets the value of the SDRs to equal a currency basket of British pounds, euros, U.S. dollars, and Japanese yen.

Measuring and Protecting against Economic Exposure

Analysts have difficulties measuring economic exposure. A firm must accurately forecast cash flows and exchange rates because the transaction exposure alters future cash flows as the currency exchange rates fluctuate. If a subsidiary sees positive cash flows after correcting for the currency exchange rates, then its net transaction exposure is low. Analysts can estimate economic exposure accurately if currency exchange rates display a trend, and they know future cash flows with certainty.

Some companies, for example, have an unfavorable exposure. For example, PEMEX, Mexico's National Petroleum Company, has a monopoly in the extraction, refining, and distribution of petroleum in Mexico. Furthermore, PEMEX sells petroleum to the international markets. However, PEMEX does not have a favorable exposure because it pays costs, denominated in pesos while receives petroleum revenues, priced in U.S. dollars. As the U.S. dollar depreciates, PEMEX's exposure causes its revenues to fall and its costs to rise, squeezing profits.

An analyst measures the economic exposure by estimating a regression equation, shown in Equation 24. Using a simple example, our home country is the United States while Europe is the foreign country. Thus, the price, P, is the foreign asset's price in U.S. dollars while S indicates the spot exchange rate, defined as U.S. dollars per euro. Regression equation measures the association between the asset's price and the exchange rate. We assume the random error term, ε, equals zero with a constant variance while α and β are the estimated parameters. Consequently, this equation estimates a straight line between P and S with an intercept of α and a slope of β. We refer the parameter β as the *Forex Beta* or *Exposure Coefficient*, and it indicates the exposure level.

$$P = \alpha + \beta \cdot S + \varepsilon \tag{24}$$

We can estimate the regression equation easily, and we calculate β by using Equation 25. Covariance measures the variation of the asset's price to the exchange rate while the variance shows the variation of the exchange rate. Consequently, two factors influence β: the fluctuations in the exchange rate and the sensitivity of the asset's price to changes in the exchange rate.

$$\beta = \frac{covariance(P,S)}{variance(S)} \tag{25}$$

You, for example, own and rent out a condominium in Europe. You hire a property manager who can vary the rent, ensuring someone always rents and occupies the property. We keep the example simple and assume you receive 1,800 €, 2,000 €, or 2,200 €per month in cash for rent, shown in Table 1. We refer to each rent as a state, and each rent could occur with a 1/3 probability. We also forecasted the exchange rate for each state, which is S. Then we calculated the asset's price, P, in U.S. dollars by multiplying that state's rent by the exchange rate.

Table 1. Renting out your Condo for Case 1

State	Probability	Rent (€)	Exchange Rate (S)	Rent (P)
1	1/3	1,800 €	$1.00 / 1 €	$1,800
2	1/3	2,000 €	$1.25 / 1 €	$2,500
3	1/3	2,200 €	$1.50 / 1 €	$3,300

We calculate 800 for β in this case. A positive β indicates your cash rent varies with the exchange rate fluctuations, and you have a potential economic exposure. Did you notice, as the euro appreciated, the rent in dollars also increased? You could buy a forward contract for 800 € at a contract price of $1.25 per 1 €to hedge against the exchange rate risk. This example works out nicely because we evenly spaced out the exchange rates, and the middle exchange rate determines the forward contract price.

In Table 2, we show β is the correct hedge for Case 1. The Forward Price is the exchange rate in the forward contract while the Exchange Rate is the spot exchange rate for a state. We purchased a forward contract with a price of $1.25 per euro. If State 1 occurs, we gain from the exchange rate because the euro depreciated against the U.S. dollar. By exchanging 800 €into dollars, we gain $200, and we compute it in the Yield column in Table 2. If State 2 occurs, the forward rate equals the spot rate, so we neither gain nor lose anything. Finally, if State 3 occurs, the euro appreciated against the U.S. dollar, so we lose $200 on the forward contract. Since each state is likely to occur, we, on average, break even by buying the forward contract.

We continue with the same example. However, your rents have changed in Table 3. In Case 2, you could receive 1,667.67 €, 2,000 €, or 2,500 €per month in cash, and any rent is equally likely. Although your rent fluctuates greatly, the exchange moves in the opposite direction of the rent. Do you notice when you calculate the rent in dollars, the rent amounts equal the same

number, $2,500, and β equals -1,666.66? A negative β indicates the exchange rate fluctuations cancel out the changes in rent. Consequently, you cannot use a forward contract in this case because you do not have economic exposure.

Table 2. The β is the Correct Hedge for Case 1

State	Forward Price	Exchange Rate (S)	Yield
1	$1.25 / 1 €	$1.00 / 1 €	(1.25−1.00)×800 € = $200
2	$1.25 / 1 €	$1.25 / 1 €	(1.25−1.25)×800 € = $0
3	$1.25 / 1 €	$1.50 / 1 €	(1.25−1.50)×800 € = -$200
Total			$0

Table 3. Renting out your Condo for Case 2

State	Probability	Rent (€)	Exchange Rate (S)	Rent (P)
1	1/3	2,500 €	$1 / 1 €	$2,500
2	1/3	2,000 €	$1.25 / 1 €	$2,500
3	1/3	1,666.67 €	$1.5 / 1 €	$2,500

We, finally, examine the last case in Table 4. You charge the same rent, 2,000 € per month for Case 3 regardless of exchange rate changes. Once you calculate the rent in U.S. dollars, the exchange rate and rent amount move in the same direction. However, the β equals 0 in this case because the rent in euros does not vary. Consequently, you could hedge against the exchange rate risk by purchasing a forward for 2,000 € and not the amount for the β. By deciding to charge the same rent, you can use a forward to protect this amount.

Table 4. Renting out your Condo for Case 3

State	Probability	Rent (€)	Exchange Rate (S)	Rent (P)
1	1/3	2,000 €	$1.00 / 1 €	$2.000
2	1/3	2,000 €	$1.25 / 1 €	$2,500
3	1/3	2,000 €	$1.50 / 1 €	$3,000

Condominium example was simple but difficult to do in practice. Thus, international firms can use five techniques to reduce its economic exposure.

Technique 1: A company reduces its manufacturing costs by shifting production to low-cost countries. For example, the Honda Motor Company produces high-quality cars, trucks, and motorcycles in factories, located in Brazil, Canada, China, India, Indonesia, Japan, Pakistan, Thailand, United States, and other countries. If the Japanese yen appreciates relative to the other currencies and raises Honda's production costs, subsequently, Honda can shift its production to its other facilities, scattered across the world.

Technique 2: A company outsources its production or uses low-cost labor. For instance, many hotels and restaurants operate in extremely competitive markets as they compete in prices to attract consumers. Consequently, hotels and restaurants, located in countries with an appreciating currency rely on immigrants or even undocumented workers to reduce both its costs and prices. In another example, Foxconn, a Taiwanese company, is the largest electronics company in the world, and it produces electronic devices for some of the world's largest corporations, such as the Ipad, Iphone, Ipod, Kindle, PlayStation 3, and X-box.

Technique 3: A company can diversify its products and services by selling to consumers around the world. For example, many U.S. corporations produce and market fast food, snack food, and sodas in many around the world. Although the weakening U.S. dollar reduces the companies' profits inside the United States, their foreign operations offset the depreciating dollar and sustain their profits.

Technique 4: A company continually invests in research and development. Subsequently, it offers innovative products that consumers want. For instance, Apple Inc. set the standard for high-quality smart phones and tablet computers. Although Apple sells its products in a country with a depreciating currency, it possesses some monopoly power to raise its products' prices without reducing its sales.

Technique 5: A company can use derivatives and hedge against exchange rate changes. For example, Porsche completely manufactures its cars within the European Union and sells between 40 to 45% of its cars to the United States. The U.S. dollar was depreciating against the euro until 2008. Consequently, the depreciating U.S. dollar reduced its U.S. sales while its costs rose. Thus, the Porsche financial managers hedged or shorted against the U.S. dollar, and some financial analysts estimated 50% of Porsche's profits came from its hedging activities.

Key Terms

Exposure	tax exposure
transaction exposure	Forex Beta
economic exposure	Exposure Coefficient
translation exposure	

Chapter Questions

1. Define the four types of exposure.

2. You are expanding a resort business in Mexico. You accept pesos for payment but purchase all your supplies from the United States. Identify your company's exposure if the U.S. dollar appreciates against relative to the Mexican peso.

3. You operate a hotel in Europe. You market your hotel to Americans who pay in dollars, but you purchase all your supplies in Europe. These transactions will occur in 30 days, and the spot currency exchange rate equals $1.25 per euro. Moreover, you expect the U.S. dollar-

euro exchange rate to fluctuate 15%. Identify your net transaction exposure if you sold hotel packages to a U.S. wholesaler for $1 million in U.S. dollars and bought supplies from Europe that cost 500,000 euros.

4. Your company will receive 5 million Canadian Dollars (CD) in three months for selling a shipment of tractors. You are concerned about this transaction exposure and investigate four methods to protect your company. You have the following data:

❖ Your company uses the spot exchange rate, which equals $0.9 / 1 CD.

❖ Your company enters a three-month forward rate that fixes the exchange rate to $1 / 1 CD

❖ Company plans to borrow against the accounts receivable in Canada, and the three-month loan rate in Canada is 5% APR.

❖ Company would pay immediately if your company granted a 3% discount rate.

5. Your company will purchase tomatoes from Mexico for 500,000 pesos in 30 days. You are concerned about this transaction exposure and investigate four methods to protect your company. You have the following data:

❖ Your company decides to use the spot exchange rate, which equals $1 / 11 pesos.

❖ Your company enters a forward contract that fixes the exchange rate to $1 / 12 pesos.

❖ Your company invests in Mexico for thirty days, earning 11% APR interest rate.

❖ Your company buys a thirty-day call option for pesos. Strike price equals $1 / 13 pesos while the premium is 1.5%

6. Please define the Forex Beta and identify the sources of variation.

7. Your company manufactures and sells backpacks across the world. Identify two methods to reduce economic exposure.

20.   Political, Country, and Global Specific Risks

Political risk originates from government because a government can impose its authority over an enterprise's operations within a border or even outside its borders. Once an international company or investor establishes a business within a foreign country, the host government enforces its own laws, rules, regulations, and taxes. Some governments view the foreign businesses or international investors unfavorably, and they punish the business or expropriate the business's assets.

This section examines the numerous risks a foreign business or investor could experience, and predict whether to invest in a particular country. Some countries are pro-business, and international investors and businesses can invest there with little danger. Unfortunately, other countries are dangerous because a government can interfere with business investment, impose excessive taxes and regulations, or even nationalize investors' and businesses' assets. Thus, we examine a country's risk in detail, and the methods the international investors use to minimize their exposure to a country's risk level. Furthermore, we study the methods to calculate a country's risk and the risk premium that we need to compensate investors for the greater investment risk.

Political, Country, and Global Specific Risks

Political risk comes in many forms. For instance, *firm specific risk*, also called micro risk, is a foreign business and the host government encounters a conflict. Different firms experience distinctive risks. For example, a restaurant chain would experience a different risk level than an electronics manufacturing company. A restaurant chain leases its space and competes with numerous local businesses, whereas an electronics manufacturing facility requires billions of U.S. dollars for investment. Moreover, the officials in a foreign government will know about the electronics company well, but the restaurant chain may not appear on the government's radar. Furthermore, a firm has a currency exchange rate risk, which we discussed in Chapter 19. Although the exchange rate risk is a firm specific risk, a government does not directly impose the risk onto a business.

A government and foreign company could experience conflicts over control of key industries or a foreign company infringes on national sovereignty. For example, a Dubai state-owned company, Dubai Ports World, wanted to buy six U.S. ports in 2006 that caused a political uproar in the United States. President Bush wanted to proceed with the deal while Congress blocked the deal. Although a British company owned the ports, Americans worried about Dubai's association with the Arab world, and Arab ownership would lead to a rise in terrorism. Subsequently, Dubai World sold its interest in the ports to an American company, AIG.

A government and foreign company could clash over local interests versus a foreign company's self-interests. Consequently, a government retains control over its defense industries and restricts ownership of production for military equipment and supplies. If a government relied on a foreign country for military supplies, then that foreign country could withhold

exports as a means of control or as a bargaining chip. Moreover, a government restricts control over energy, communication, and agricultural industries. For example, Europe and the United States heavily protect its agricultural markets because the political leaders are afraid a foreign country could withhold food exports as a means of control.

A government could prevent international investment or stop foreign companies from entering and operating within the country. A government could use the Infant Industries argument to protect its new, young domestic industries. For instance, the United States protected its manufacturing industries during the 18th century, allowing them to thrive and grow until they could compete with Europe. Consequently, a government hinders foreign investment or restricts foreign enterprises from operating within its borders as a government protects its own industries and companies.

A government might impose tariffs on its imports. A tariff boosts the product's market price while it reduces its imports. In some cases, governments in developing countries impose high tariffs because the governments need the tax revenue. Governments in developing countries usually have tax evasion problems, but they retain tight controls over their air and seaports. Thus, they can collect tariff revenue as products move through the ports. Some foreign companies might invest within a country to circumvent the trade barriers.

A country could join a *trade bloc* with other countries, forming a free trade zone. Accordingly, members of a trade bloc allow free trade between members while non-members face trade protection. Hence, a foreign company invests within a country to not only circumvent a trade barrier, but also gain more access to consumers who live within the trade bloc. For example, the North American Free Trade Association (NAFTA), a free trade zone between Canada, Mexico, and the United States, allows free trade among members, but each country erects its own customs to the outside world. The European Union (EU) is a common market, allowing the free flow of labor, products, services, capital, and money between members, but the EU government erects a single customs to the non-EU members. Consequently, foreign companies have an incentive to invest inside the trade bloc gaining more consumers.

A government can impose many conditions on foreign companies, which are:

Condition 1: A government forces foreign firms to use local companies, purchase local resources and supplies, and hire local labor. Furthermore, a government could restrict or limit the number of expatriates a foreign firm can hire. Usually, the foreign company hires expatriates from its home country for upper management and highly technical positions at the firm.

Condition 2: A government could be in a position where a foreign company has a pipeline, highway, or electrical wires pass through the government's territory. Consequently, a government bargains for control by threatening to shut down operations. For example, Sudan split into two countries. South Sudan possesses and extracts petroleum while the petroleum pipelines pass through North Sudan to the seaports. Thus, North Sudan can threaten to shut down the pipeline and bargain for a portion of profits from South Sudan.

Condition 3: A firm or government strives for control over the international markets. For instance, the members of the Organization of Petroleum Exporting Countries (OPEC) nationalized and seized the petroleum companies that operated within their country. Then OPEC

operates as a cartel that imposes production quotas on its members. Production quotas reduce the petroleum supplies, boosting petroleum prices and profits.

Condition 4: A government requires the foreign companies to form joint ventures with the government or state-owned firms. Western firms bring investment, technology, and efficient management practices while the government retains control over the business activities. Joint venture is common in national defense, agriculture, banking, or the minerals industries, and governments in post-Soviet states, Japan, Mexico, China, India, and South Korea use it or have used joint ventures.

Although political risk can be difficult to predict, a country could exhibit characteristics that endangers investment. Characteristics include:

Characteristic 1: A country often experiences changes in government leadership or a country has too many political parties. Unfortunately, government policies and laws quickly change. For example, many South American countries alternate between pro-business and socialist governments. During the pro-business phase, government relaxes taxes and regulations, and subsequently, the governments change their positions during its socialistic phase as they begin punishing businesses. Moreover, political leaders with a strong nationalistic leaning may view foreign investment unfavorably.

Characteristic 2: International investors and business people can collect information about a foreign country's political leaders or a country's economic environment. Political leaders who believe in free markets and limited government are likely to pass favorable government laws and regulations to foreign investment. Some organizations such as the Heritage Foundation collect statistics on countries and attempt to measure the level of economic freedom. Consequently, economic freedom corresponds directly to business freedom and the level of interference by government.

Characteristic 3: Some countries are composed of fractious and contentious ethnic groups or plagued with religious fanaticism. These countries are poor choices for international investment. For example, Bosnia and Herzegovina has three ethnic groups: Bosnians, Croats, and Serbs. Each ethnic group occupies a specific region in Bosnia, and they do dislike each other. Furthermore, the Bosnians are Muslims; the Croats are Catholics while the Serbs are Orthodox Christians, and they fought the fierce Bosnian War during the early 1990s after Yugoslavia had broken up into several countries.

Characteristic 4: Enterprises relocate to countries with uneven income gaps. Enterprises take advantage of the cheap labor force. Furthermore, enterprises hire the highly educated workers who become the high-income group, widening the income gap. However, foreign investors avoid investing in a country with deteriorating economic conditions. A country plagued with high levels of poverty and massive unemployment breed protests, riots, and revolutions. Protestors could associate the foreign investors with the government leaders, whom the protestors want to overthrow. Subsequently, the protestors and rioters could damage the foreign investors' assets. In extreme cases, the rioters and protestors could murder foreigners and tourists. As tourists and foreigners flee, a government would see its revenue plummet.

Investors could face *country risk* that extends beyond political risk when they invest in a foreign country. We also call it macro risk. Government could impose rules, laws, and

regulations that hamper or interfere with free enterprise. For instance, a government could restrict a firm's ability to move funds into and outside of the country, called *transfer risk*. For example, a government restricts capital outflows because it cannot attract investors to buy its government bonds. Thus, a government could block funds and prevent foreign firm from transferring funds outside of a country, keeping the investment within a country. A government could also prevent the convertibility of its currency. Financial analysts could view transfer risk as a micro firm risk at the firm level, but macro risk that applies to all firms in the country. Unfortunately, blocked funds reduce the present value of investments because a firm could have trouble selling its investment and assets, or transferring profits outside of a country.

Religion could pose a problem for investing in some countries. For example, all Muslim countries following Sharia Law, except Turkey allow the state and religion to overlap. Thus, they impose restrictions on banking that differs from the Western banking systems. Furthermore, some Muslim countries discourage women from holding high manager positions in government and companies.

Some countries are afflicted with severe corruption, and a business can experience corruption in four ways. First, businesses and people bribe government officials for business licenses and permits or overlook violations in the law. Second, government officials and enforcement officers may extort payments from businesses. They use threats, assess excessive fines, or penalize a business until the person pays their demand. Third, government officials and leaders may demand kickbacks from businesses. A kickback is a bureaucrat or politician secretly receives a portion of a government contract that they awarded to a business. Thus, the kickback rewards a person for granting the contract. Finally, nepotism is usually a severe problem in corrupt countries because government agencies hire relatives and friends for high posts in government and state-owned companies.

Transparency International publishes the Corruption Perception Index, where it attempts to measure a country's corruption level. Investors and business people should research a country thoroughly before investing because investors could experience large losses from highly corrupt countries. Every international investor should remember these five suggestions.

Suggestion 1: Investors and business people should avoid investing in a highly corrupt country because they could lose their whole investment.

Suggestion 2: Investors and business people should avoid paying bribes. Unfortunately, if a company pays a bribe, then the bureaucrat or politician could return with greater demands. Subsequently, other agencies may demand bribes and kickbacks, once they discover a company had paid bribes.

Suggestion 3: Court systems are usually weak in corrupt countries, and the judges could be just as corrupt as the bureaucrats and politicians. Even if a businessman and corrupt politician form a verbal contract, judges might not enforce the contracts because corruption is illegal. Thus, the businessman has no legal recourse if the corrupt politicians change the terms of the contract.

Suggestion 4: A company or investor could experience bad public relations if a news reporter publishes the corruption.

Suggestion 5: Corruption is illegal within the corrupt country and usually a business's home country. Some countries like the United States could pursue criminal charges if it catches a U.S. businessman involved in corruption in a foreign country.

If businessmen or investors ignore the five suggestions and still want to invest in a highly corrupt country, subsequently, they should use a local advisor to handle the government officials and form friends and connections at high places.

Multinational enterprises can use eight strategies to minimize political and country risk, which are:

Strategy 1: A multinational company can use *fronting loans* to reduce its transfer risk. For example, a parent company deposits U.S. dollars (or euros) into an international bank in a safe country. Then the international bank lends to the subsidiary, located in the foreign country. Usually, a government allows a foreign business to repay loans to international banks. If a government prevents repayment, then the government hurts its image, and the international investors could avoid investing in the country.

Strategy 2: An international corporation or investor can use *leverage*. Unfortunately, leverage has several meanings in finance. In our case, leverage means a firm or investor acquires loans without increasing its equity. Simply, a firm borrows heavily within the foreign country. If a firm experiences a conflict with the foreign government and exits the country, subsequently, the firm could default on its loans and obligations. Default could spark a backlash against the government, and this strategy is effective if a government seizes or nationalizes an industry. Thus, the firm leaves the country and stops paying its loans.

Strategy 3: A firm artificially creates exports to transfer its funds outside the country, minimizing transfer risk. For instance, the military in Burma had overthrown the government, and it had imposed strong currency controls, preventing the outflow of currency from the country. Unfortunately, Pepsi produced sodas within the country and could not transfer its profits outside because of government restrictions. Instead, it bought beans with its profits; then it exported and sold the beans to foreign consumers recouping its profits in U.S. dollars.

Strategy 4: Some firms have bargaining power with government, called *special dispensation*. Thus, a firm could convince a government to transfer funds outside the country or to demand exemptions. Companies specializing in high tech industries, pharmaceuticals, and electronics have special dispensation. Many governments want these industries to operate within their borders because these industries create spillover effects. For example, these industries use skilled labor and strengthen a country's image and prestige. Moreover, the political leaders view these industries vital for economic development, and they relax rules, regulations, and taxes to attract these industries to their country. For example, the United States is suffering from a jobs crisis since the 2007 Great Recession. Economic recovery is slow, and job growth has been weak. Some firms threatened to leave a state and take the jobs with them unless the state government reduces their taxes.

Strategy 5: A business could buy investment insurance from the home country or receive a government guarantee. Insurance covers any profits that an investor loses from a project located in a foreign country. Insurance could pay claims where a foreign government has expropriated the business, or the business experienced a loss from a war, revolution, or riots.

Strategy 6: A business enterprise could locate a small piece of manufacturing within a country. Subsequently, the business produces goods in facilities spread across countries. Although this method increases the transportation costs, a company reduces its risk. If the business loses its factory in one foreign country, then the business only loses a piece of the business. For example, companies extract petroleum in Middle East and refine the petroleum products in the U.S. and Europe. Refineries cost billions of U.S. dollars in investments, and many Middle Eastern governments could nationalize the industries. The Middle Eastern governments nationalized the petroleum industries in the 1960s when they created their state petroleum companies.

Strategy 7: A firm could use intellectual property rights to protect its investment and assets in a foreign country. For instance, a firm controls its technology by owning rights to patents, trademarks, and brand names. In theory, a foreign government cannot operate the facility without permission from the holders of the intellectual property rights. This strategy is effective when a company continually upgrades technology. Even if a government stole the technology, the technology becomes obsolete quickly. Although some countries do not enforce intellectual property rights, countries such as the Europe Union and the United States are forcing countries to comply with intellectual property rights and are cracking down on piracy and violations.

Strategy 8: A government could impose capital and exchange controls, preventing the outflow of capital. Companies or investors can reinvest their funds within the country if they cannot transfer funds outside the country and have no other options. Then they wait until they can transfer its funds out of the country. Usually, international businesses do not invest in countries with exchange controls, and the exchange control could hamper future investment.

For the last type, *global specific risk* originates at the global level. Firms have no control over this risk, and it could be difficult to predict. For example, the terroristic attack on the United States on September 11, 2001 raised awareness of terrorism. Unfortunately, terrorists can attack multinational enterprises in any country because terrorists associate them with their home country. Businesses do not have the resources to fight terrorism, and they must depend on government. Nevertheless, terrorists are not the only global problems. Violent riots and protests erupted in Greece, Spain, and the Middle East in 2011 as protestors and rioters destroyed property and assets of multinational enterprises.

Just in time inventory system that many businesses have adopted forms another global risk. Businesses hold low inventories because they pay costs to store parts and products. Consequently, businesses produce parts just in time as they are needed. Unfortunately, just in time inventory systems are susceptible to supply disruptions if parts come from many countries around the world. For example, the United States government closed borders and grounded airplanes on September 11, 2001, and Ford and other companies shut down because they could not get parts. After a tsunami and earthquake had struck Japan in 2011, Japanese steel and auto parts companies shut down, disrupting the parts supply for the Japanese companies. Manufacturing plants across the world shut down because they could not get the necessary parts from Japan.

Protests cause another global risk. For example, the protestors formed anti-globalization movements against multinational corporations and governments because they are at the center of

globalization. Protestors are angry over the loss of jobs and increased competition with other countries. Finally, a cyber attack is similar to protests against governments and corporations. Governments and business enterprises use large networks of computer systems to store the data. Computer hackers can break into these computer systems and steal or destroy the data.

Environmental issues create a global risk because environmental regulations and programs raise a business's costs. Hence, a business could relocate to countries with weak environmental laws, such as China to reduce its production costs. Then the enterprises could pollute more while some of the pollution drifts to other countries through the air and water.

Many corporations implemented corporate responsibility to appease the protestors and critics. Consequently, corporations claim they do more than earn profits; they benefit the communities where they operate. They claim they improve the social, environmental, and economic conditions that surround the business. For example, Starbucks pays a greater market price for coffee because the company wants to help the small struggling coffee farmers in third world countries. Of course, Starbucks advertises this activity, enhancing its image.

Measuring Country Risk

Firms investing in foreign markets are exposed to a risk associated with that country. Thus, the investors and corporations must keep watching a country's ever changing political and economic conditions. For instance, voters had elected socialists or nationalists into a government that begins seizing property. Consequently, the value of foreign investment and foreign assets could plummet in value as international investors and businesses flee the country. After the people had elected Hugo Chavez as president in Venezuela, his government began nationalizing industries, causing an exodus of foreign capital. Furthermore, a government could weaken property rights or impose new taxes on foreign businesses. Finally, the Russian debt crisis in 1998 and Argentina's international loan default in 2002 triggered the rapid decline of Russian and Argentina's assets after both crises.

International investors, buying foreign bonds, can experience a currency exchange rate risk, an interest-rate risk, a borrower default, and/or a country risk. An investor experiences an exchange rate risk because a country's exchange rates are constantly fluctuating, changing an investment's value. For example, an investor's investment would greatly plummet in value if a country's currency had depreciated greatly.

For an interest-rate risk, investors observe the interest rate rises as the bond's market price falls. Therefore, the market value of a bond investment decreases. Furthermore, the bondholders do not earn the greater interest rate because they have already purchased the bonds and locked in an interest rate.

Investors protect themselves from credit risk by increasing the borrower's interest rate. Consequently, the interest rate is comprised of the risk-free interest rate and risk premium. ***Risk-free interest rate*** reflects the market interest rate with a zero default rate. For instance, the investors consider U.S. government securities to be risk free because the U.S. government has never defaulted on its debt, or at least not yet. However, many investors are becoming alarmed after the U.S. government debt surpassed $17 trillion during 2013. Investors believe the U.S. government debt is risk-free because the U.S. government can increase taxes or print money to

repay the bonds. Finally, the ***risk premium*** reflects a borrower's credit risk. If the borrower is likely to default on a loan, subsequently, the borrower pays a greater interest rate, compensating the investor for lending to a risky borrower.

A credit risk is a borrower does not repay the principal and/or interest of a loan. Consequently, credit-rating agencies measure a borrower's risk. For instance, Moody's and Standard & Poor's assign the risk level for corporate and government's bonds with a letter grade. Thus, a higher grade implies a smaller default risk, and consequently, the bondholders would earn a lower interest rate.

Analysts and economists measure a country's risk similarly, applying the same credit rating rules. Investors earn smaller interest rates for projects and investments in a foreign country with a higher letter credit grade. Consequently, a project's rate of return is the country's risk plus the rate of return to a comparable U.S. Treasury security. A comparable financial security has an identical maturity. Thus, a country's risk influences the interest rate on the debt issued by that country's government.

For example, we add a risk premium to calculate the yield on Mexican government bonds. In this case, the risk premium reflects the creditworthiness of the Mexican government and not the country's risk for investing in Mexico. A country's risk embodies an entire country's legal and economic environment while this example only applies to the Mexican government. Accordingly, the yields on Mexican government debt should equal the return of a comparable U.S. government security plus a risk premium. Furthermore, a credit-rating agency rated the Mexican government a letter grade of BBB that equals a spread of 140 ***basis points (bps)***. Spread becomes the risk premium, and the 140 basis points equal 1.40%, or 140 ÷ 100. If a comparable U.S. government bond has a 4% interest rate, subsequently, the yield for a comparable Mexican bond would be 5.40%, or 4% + 1.40%.

We show a country's credit rating and spread in Table 1. As a bond's maturity lengthens, the basis points spread rises. Consequently, the investors want an additional reward for waiting for the longer time. Financial analysts and investors consider a country's rating of BBB or better to be "investment grade," while they rate a BB or lower as "junk." Usual spread of junk debt ranges from 400 to 600 basis points over one-year U.S Treasury bills. Range could be extremely wide with spreads over 2600 basis points.

Country risk reflects the risk to a particular country by virtue of its location. Consequently, a country's risk differs from a currency exchange rate risk. A country's risk could be zero, but that country has a large currency exchange risk. Reverse could happen but occurs rarely. Thus, a country's risk reflects the negative influences of a country's economic and political environment.

Financial analysts use qualitative and quantitative approaches to measure country risk. Qualitative includes a country's data and experts' opinions, who are politicians, union members, and economists. Furthermore, financial analysts monitor local radio, TV, newspapers, and embassy publications for information. Unfortunately, expert opinions are subjective, but an analyst can use experts' consensus to obtain a credit grade. Analysts would consider a country's historical stability and political turmoil. On the other hand, the quantitative approach includes a country's data, and analysts compute a score from data. Quantitative approach "appears" being more objective because analysts calculate it from data.

Table 1. A Country's Rating and Spread over U.S. Treasuries

Overall Grade	Rating	Spread (basis points)	Average (basis points)
Excellent			
91 -100	AAA	10 -70	50
81 – 90	AA	50 – 100	70
71 – 80	A	80 – 130	100
Average Risk			
61 – 70	BBB	110 – 220	160
51 – 60	BB	190 – 300	240
41 – 50	B	270 – 410	350
Excessive Risk			
31 – 40	CCC	360 – 490	450
21 – 30	CC	450 – 700	570
10 – 20	C	Above 700	800
0 – 10	In Default		

Risk Rating Method, a quantitative approach, mixes qualitative and quantitative measures. Using this method, we compute a weighted average of grades for four aspects of a country. An analyst grades each factor from zero to 100. A high score indicates a low country risk while a low score implies high risk. Four factors are:

❖ *Economic Indicators (EI)* are easy to obtain and indicate a country's financial condition. Economic Indicators include GDP per capita, GDP growth rate, inflation, and interest rates. Investors are likely to invest in a country with a strong GDP growth rate, low inflation rate, and stable interest rates.

❖ *Debt Management (DM)* indicates a country's ability to repay a debt and includes money growth, trade balance, foreign and domestic debt, and a government's budget deficit. A country rapidly accumulating debt or experiencing massive trade deficits indicates future instability. Thus, investors would avoid investing in this country because the government could impose taxes on investment, impose capital controls, or seizes assets if a crisis erupts.

❖ *Political Factors (PF)* are grades of political stability. A high grade indicates a politically stable country, while a low grade indicates coups, violent protests, and even a revolution. This grade includes experts' opinions because analysts do not have good quantitative measures for political stability. However, if the measure were good, a forecast could be wrong because an election or revolution brings new leaders into power who radically change the rules, regulations, and economy.

❖ *Structural Factors (SF)* are socioeconomic conditions, such as education level, healthcare, and poverty rate.

We calculate a country's score, x, by using Equation 1. Variable, w_i, indicates a weight while the score is one of the factors listed above. A weight is positive and ranges between zero and one. For example, if an analyst weighs all factors equally, then every weight is set to 0.25, and a country's score equals the average of its four factors. Furthermore, the weights must sum to one, which we show in Equation 2. After an analyst calculates a country's score, the score always ranges between zero and 100 because the weights sum to one. Finally, an analyst could adjust the weights to reflect his or her preferences. For instance, some analysts view debt management as an extremely important factor. Thus, they could assign a greater weight to this factor and reduce the weights to the other factors.

$$x = w_1 Score(EI) + w_2 Score(DM) + w_3 Score(PF) + w_4 Score(SF) \tag{1}$$

$$w_1 + w_2 + w_3 + w_4 = 1 \tag{2}$$

A country's score lies between 0 and 100. If a country possesses a low score, then analysts and economists would add a large risk premium to the risk-free interest rate. Thus, a country's basis points (bps) are greater for lower scores. Moreover, investors could adjust the weights and grades to reflect different time horizons. Therefore, the different weights yield distinctive risk forecasts for short term, medium term, and long-term investment. For example, some analysts assign more weight to debt management and political factors for short-term investments while they assign more weight to economic indicators and structural factors for long-term investments.

The Risk Rating Method appears objective because an analyst calculates a country's risk rating from economic data. However, the formula weights are subjective because an analyst selects the weights arbitrarily. Consequently, this method is an art rather than a science.

International Credit Rating Agencies

International credit-rating agencies do not focus on risk for particular companies but assess investment risk associated with countries. Risk reflects the overall danger to international investors in investing in a particular country because every country has a variety of institutions, laws, and customs. For example, you transferred money to a Jamaican company for a coffee shipment. Company eagerly accepted your money, but it had failed to deliver your coffee. In developed countries, you could sue a company to enforce a contract, but Jamaica has weak institutions, and, unfortunately, judges and magistrates may not enforce contracts. Investor's legal options vary by country. Some countries, their governments impose harsh rules, regulations, and taxes on businesses, imposing hardship on any business venture.

Two well-known credit agencies are A.M Best and Coface. A.M. Best is an international credit agency that classifies country risk into five tiers. Scale uses Roman numerals and ranges from I to V with I being the lowest risk while V being the highest risk. Table 2 shows a country's rating for 2012. A.M. Best assesses country risk by analyzing outside factors that can affect an insurer's control and a country's ability to meet its obligations to its policyholders.

A.M. Best examines local accounting rules, government policies and regulations, a country's economic growth, and social stability.

Table 2. A.M. Best's Five-Tier Scale for Country Risk for 2012

Rating	Country
Tier 1	Australia, Austria, Canada, Denmark, Finland, France, Germany, Gibraltar, Guernsey, Isle Of Man, Jersey, Luxembourg, Netherlands, Norway, Singapore, Sweden, Switzerland, United Kingdom, and United States
Tier II	Barbados, Belgium, Bermuda, British Virgin Islands, Cayman Islands, Chile, Hong Kong, Ireland, Italy, Japan, Liechtenstein, Macau, New Zealand, Slovenia, South Korea, Spain, and Taiwan
Tier III	Anguilla, Bahamas, Bahrain, Brazil, China, Cyprus, Israel, Kuwait, Malaysia, Malta, Mexico, Netherlands Antilles, Oman, Poland, Qatar, Saint Kitts and Nevis, Saudi Arabia, South Africa, Thailand, Trinidad and Tobago, and United Arab Emirates
Tier IV	Antigua and Barbuda, Argentina, Brunei, Colombia, Costa Rica, El Salvador, India, Indonesia, Jordan, Kazakhstan, Mauritius, Morocco, Panama, Peru, Philippines, Russia, Tunisia, and Turkey
Tier V	Algeria, Belarus, Bolivia, Bosnia and Herzegovina, Dominican Republic, Ecuador, Egypt, Ghana, Guatemala, Honduras, Jamaica, Kenya, Lebanon, Libya, Nicaragua, Nigeria, Pakistan, Syria, Ukraine, Venezuela, and Vietnam

Source: A.M. Best. 2012. Available from http://www3.ambest.com/ratings/cr/crisk.aspx (accessed on 10/16/2012)

Coface, France's export credit underwriter, is another international credit-rating agency. Table 3 shows Coface's 2012 rating of countries. The A1 category includes the lowest risk countries while the D category entails highly risky countries. Coface offers insurance to companies that deal with foreign companies. If a foreign business defaults on a payment to the insured company, then Coface would pay the insurance claim. Unfortunately, a foreign company could suffer financial troubles from bankruptcy, violent protests, revolution, or an international war. Consequently, companies pay greater insurance premiums for insuring business transactions with foreign companies located in high-risk countries. Finally, Coface compiles a similar ranking scale for countries' business climate.

Key Terms

political risk	special dispensation
firm specific risk	global specific risk
trade bloc	risk-free interest
country risk	risk premium
transfer risk	basis points (bps)
Transparency International	Risk Rating Method
fronting loans	international credit-rating agencies

leverage

Table 3. Coface's Seven-Tier Rating of Countries for 2012

Country	Rating	Definition of Rating
Australia, Canada, Hong Kong, Japan, Luxembourg, New Zealand, Norway, Singapore, Sweden, Switzerland, and Taiwan	A1	Steady political and economic environment has positive effects on an already good payment record of companies. Very small default probability.
Austria, Belgium, Chile, Denmark, Finland, France, Germany, Kuwait, Malaysia, Malta, Netherlands, Qatar, South Korea, and United States	A2	Default probability is still small even in the case when one country's political and economic environment or the payment record of companies are not as good as A1-rated countries.
Brazil, China, Czech Republic, Estonia, India, Israel, Mauritius, Namibia, Oman, Poland, Slovakia, Slovenia, South Africa, Thailand, Trinidad and Tobago, United Arab Emirates, and United Kingdom	A3	Adverse political or economic circumstances may lead to a worsening payment record that is already lower than the previous categories. Probability of a payment default is still low.
Algeria, Bahrain, Botswana, Colombia, Costa Rica, Iceland, Ireland, Italy, Lithuania, Mexico, Morocco, Panama, Peru, Saudi Arabia, Spain, Tunisia, Turkey, and Uruguay	A4	An already patchy payment record could be further worsened by a deteriorating political and economic environment. Nevertheless, the probability of a default is still acceptable.
Benin, Bulgaria, Cape Verde, Croatia, Dominican Republic, El Salvador, Gabon, Ghana, Hungary, Indonesia, Jordan, Kazakhstan, Latvia, Papua New Guinea, Philippines, Portugal, Romania, Russian Federation, Senegal, and Tanzania	B	An unsteady political and economic environment is likely to affect an already poor payment record.
Albania, Angola, Argentina, Armenia, Azerbaijan, Bangladesh, Bolivia, Burkina Faso, Cameroon, Congo, Cyprus, Djibouti, Ecuador, Egypt, Ethiopia, Georgia, Greece, Guatemala, Honduras, Jamaica, Kenya, Lebanon, Macedonia, Madagascar, Mauritania, Mongolia, Montenegro, Mozambique, Nicaragua, Niger, Paraguay, Sao Tome and Principe, Serbia, Sierra Leone, Sri Lanka, Timor-Leste, Togo, Uganda, Venezuela, Viet Nam, and Zambia	C	A very unsteady political and economic environment could deteriorate an already bad payment record.
Afghanistan, Belarus, Bosnia and Herzegovina, Burundi, Cambodia, Central African Republic, Chad, Congo, Cuba, Equatorial Guinea, Eritrea, Guinea, Haiti, Iran, Iraq, Ivory Coast, Kyrgyzstan, Lao, Liberia, Libya, Malawi, Mali, Moldova, Myanmar, Nepal, Nigeria, Pakistan, Rwanda, Sudan, Syria, Tajikistan, Turkmenistan, Ukraine, Uzbekistan, Yemen, and Zimbabwe	D	High-risk profile of a country's economic and political environment will further worsen further a generally very bad payment record.

Source: Coface. 2012. Rating Table. Available from
http://www.coface.com/CofacePortal/COM_en_EN/pages/home/risks_home/country_risks/rating_table?geoarea-country=&crating=&brating= (accessed on 10/16/2012)

Chapter Questions

1. How could a firm protect its business in a foreign country by using facility location, intellectual property rights, and leverage?

2. Which industries does a government usually protect?

3. How does a firm use export creation to reduce a country risk?

4. Define special dispensation.

5. You had purchased bonds from a country with a CCC credit rating. Calculate the expected interest rate you would charge if a comparable U.S. Treasury security has an interest rate of 5%, and you use the average bps for this grade level.

6. What is the Risk Rating System, and which four factors are included in this system? Please explain whether or not the Risk Rating System is objective?

7. Distinguish between qualitative and quantities measures for measuring a country's risk?

8. How would you rate Hong Kong using A.M. Best and Coface?

9. How would you rate the Ukraine using A.M. Best and Coface?

Answers to Chapter Questions

Answers to Chapter 1 Questions

1. Purpose of financial markets and financial institutions is to connect the savers to the borrowers. Wealthy countries have developed financial markets. If the savers hide their money under the mattress, then they remove this money from the economy. Then banks cannot inject the savings into an economy by lending to households and businesses.

2. Financial institutions accumulate and analyze information about borrowers and their ability to repay loans, which lower the lending risk to a variety of borrowers, and increases liquidity. Savers can easily convert their deposits into cash.

3. Many assets are technically not money, but the public can easily convert them into money. Thus, some assets are good as money.

4. A central bank uses the money supply to affect its economy. Goal is to keep an economy growing at a sustainable rate with a low unemployment rate and low inflation rate.

5. Three variables are inflation, GDP, and interest rates.

6. Inflation is continual increases in the average prices; GDP measures the total amount of production of all goods and services within the economy. Finally, interest rates reflect the borrower's cost, but a benefit to the saver.

7. Real means economists removed the impact of inflation from the variable while nominal means inflation still influences a variable.

8. Barter is inefficient because it does not allow people to specialize in the production of goods and services. Furthermore, it requires a large number of exchange ratios. People would have considerable search costs to find each other, and people could not store perishable products.

9. Money becomes a medium of exchange, store of value, unit of account, and standard of deferred payment. Each function of money overcomes a problem with barter and allows people to specialize in the production of goods and services.

10. Seigniorage allows governments to create value out of thin air by minting coins. Seigniorage occurs when the face value of a coin exceeds the cost of minting the coin.

11. Debit cards are electronic. They allow customers access to their deposits from anywhere within the United States and developed countries around the world. Checks allow people to exchange money through exchanging deposits at a bank. Checks are useful for large

transactions. Fiat money is paper money and is more convenient to carry around than gold coins. However, a central bank can print as much fiat money that it needs. Finally, commodity money retains its value and has other purposes than as money.

12. Transaction approach focus on any assets that are used as money in a transaction, while the liquidity approach defines any liquid assets as money. People can convert some assets to money easily, so they are almost money.

13. M2 differs from M1 by the small denomination time deposits and savings accounts. Differences between L, M3, M2, and M1 indicate the size of a country's financial system. Large differences imply a country has more developed financial markets.

14. Credit cards are loans from a bank or finance company. Of course, many people use credit cards as money, further complicating the money definition even more.

Answers to Chapter 2 Questions

1. Bank deposits are liquid. Banks diversify their loans as a way to reduce the risk. Finally, banks collect information about borrowers, so banks know whom to lend, reducing the default risk.

2. Stocks are ownership of a corporation, while bonds are a loan to a corporation.

3. Primary market is for newly issued stocks and bonds, while the secondary markets allow investors to buy or sell their existing stocks or bonds. Dealers usually operate in the primary market, while the secondary market is an exchange.

4. Presence of a secondary market increases liquidity. Thus, investors can sell their securities easily if they do not want to hold them anymore.

5. Financial disintermediation is depositors withdraw their deposits from financial institutions and invest directly into the financial markets because the financial markets offer a better return and/or reduce risks.

6. Money market instruments include: U.S. Treasury bills (T-bills), commercial paper, banker's acceptances, negotiable bank certificates of deposit (CDs), repurchase agreements, Federal Funds, and Eurodollars. Capital market instruments are Treasury notes (T-notes), Treasury bonds (T-bonds), general-obligation bonds, revenue bonds, and mortgages.

7. Money market is for securities with a maturity less than one year, while the capital market includes securities with maturities over one year.

8. Stock has no maturity date because a corporation can theoretically live forever.

9. A state bank has a charter from a state government, while a federal bank has a charter from the U.S. federal government.

10. The Comptroller of the Currency, FDIC, and the Fed regulate the national banks. A state bank could be regulated by one or more regulatory agencies, depending upon the state where the bank is located.

11. The U.S. government wants a stable financial system that protects banking customers, encourages homeownership, promotes efficiency in the intermediation process, and controls the money supply.

12. The FDIC insures bank deposits up to $250,000 per person and not by the account.

13. The FDIC liquidates a bank's assets and refunds the deposits to the depositors, or the FDIC finds another bank to merge with the failed bank. Then the FDIC will grant low-interest loans or buy the bad loans to make a bank merger more attractive.

14. A bank run is depositors show up at their bank at once and demand their deposits back. A contagion is one bank run leads to other bank runs, even for financially healthy banks. A financial panic is a wave of bank failures that push a society into a severe recession.

15. Countries repealed laws that allow international businesses to operate within their borders. Furthermore, growing incomes allow people and businesses to invest more funds into international markets. Finally, corporations and banks are global as their activities spread across borders.

16. A government wants a stable financial system and financial institutions to disclose accurate information. Regulations help a central bank exert more control over monetary policy.

17. First, a bank acquires stock in another bank, allowing it to cross a state line. Second, bank can issue commercial paper on itself and transfer funds between subsidiaries. Finally, banks could acquire nonbanks and enter other spheres of activity.

18. A nonbank bank stops one function like accepting deposits or granting loans, thus it is no longer a bank. Furthermore, Automated Teller Machines allow customers to bank at some distance from the bank, even in foreign countries.

19. Banks offer MMDA while financial companies offer MMMF. Thus, the MMDA is covered by deposit insurance.

Answers to Chapter 3 Questions

1. One person, the owner, is limited in the level of capital he or she can raise. However, corporations can issue stocks and bonds and raise millions or billions of dollars. Partnerships could raise some capital because two or more partners pool their funds together.

2. Corporations can raise a substantial amount of capital, have limited liability, easily transfer ownership, continuity of life, and free from the mutual agency relationship.

3. Corporation could issue preferred stock or corporate bonds because it does not dilute the shares of the common stockholders.

4. A common fraud is a subsidiary hides a corporation's debt and excludes the debt from the corporation's financial statements.

5. Unfortunately, this was a bad investment. Your rate of return is:

$$return = 100 \cdot \frac{\$0.5}{\$25} + 100 \cdot \frac{\$15 - \$25}{\$25} = -38\%$$

6. If you had read the chapter carefully, the U.S. experienced a massive financial crisis in 2008. If you examined the U.S. financial system, many business leaders became ingenious at circumventing regulations.

7. A bank as part of a Keiretsu can cause problems. When the Japanese economy entered into a two-decade recession in the 1990s, the bank kept lending to its partners, even though it should not have.

8. You need to examine the incentives. Counselors want to maximize their salaries, so they enroll as many students as possible, even students who should not enroll. University's management wants the best, who possess the drive and ability to finish their education.

9. This is a case when investors use a euphemism to describe investment opportunities. Emerging economies were third-world countries. Would you invest in an emerging market or a third-world country?

10. A country could produce within the interior of a production possibilities curve. It means a society is not using all of its resources, such as unemployment.

11. Company can circumvent trade barriers, has access to resources in China, could ask the Chinese government for tax breaks and subsidies, reduce economic exposure, and diversify its business. Furthermore, both labor and transportation costs are cheaper. Finally, a business in China could branch to other cities if the business experiences a strong demand for its products and services.

12. Free trade is one country specializes in production of a good and then exports it to its trading partner. Trading partner does the opposite; so free trade is the mutual exchange of products. Outsourcing is one firm sends part of its production outside the country to reduce costs. However, the firm sells the cheaper product in its home country. A mutual exchange of products does not occur, and thus, outsourcing is not free trade.

13. Bosnia would produce 500 units of tobacco, and 250 units of coffee. Colombia grows 250 units of tobacco and 500 units of coffee. Thus, total coffee and tobacco production are 750 units each. If they engage in trade, Bosnia produces 1,000 units of tobacco while Colombia produces 1,000 units of coffee. Consequently, both countries gain 250 units in production for both commodities after trade.

Answers to Chapter 4 Questions

1. Banks can structure their business to circumvent regulations or lower taxes. Furthermore, banks can accept deposits in one country and lend to borrowers in another country.

2. An offshore market is banks are located in countries with lax regulations, low taxes, and strict consumer confidentiality.

3. A U.S. bank can open a branch bank or forms a holding company with another bank in another country. A U.S. bank can become an Edge Act corporation or international banking facility.

4. A foreign bank forms an agency office, opens a foreign bank branch in the U.S., or acquires an existing U.S. bank, converting it into a subsidiary.

5. Exchange rate risk is the change in the asset's value that is denominated in another currency. When the exchange rate changes, investors can gain or lose.

6. Value of the loan is $100,000 or one million pesos. However, the loan drops in value to $66,666.67. Remember, the dollar appreciated while the peso depreciated. Thus, the investors come out ahead for investments denominated in appreciating currencies.

7. Spot market is when the buyer and seller immediately exchange a commodity for money, while a derivative market is the buyer and sell agree upon a price today, but exchange the commodity for the money on a future date.

8. A forward contract is a tailor-made contract that a bank usually issues. Buyer and seller agree to a price and quantity today, and they exchange the commodity and money on a future date.

9. A spot against a forward is a particular currency swap. An investor buys currency today from a bank on the spot market and sells the currency back to the bank on a specific date in the future.

10. A currency swap allows a corporation to invest in a foreign country by borrowing from its local bank. Then the company swaps its debt obligation with a foreign company to get the currency it needs for investing in another country.

11. An exporter and importer do not know each other, but can enter a transaction. A bank creates credit on behalf of the importer, guaranteeing payment.

12. Eurodollars are U.S. dollars held in foreign bank accounts, while Euroloans and Eurobonds are debt instruments denominated in dollars. The U.S. dollar is the international currency and is relatively stronger than other currencies. Dollars have little exchange rate risk.

13. Banking system connects all countries, but a government is limited in their regulatory power, when a bank's business crosses a border. Countries have different deposit insurance, and regulations, and banks became skilled at circumventing regulation when entering the international markets.

Answers to Chapter 5 Questions

1. Brokers, investment bankers, and organized exchanges. For example, the New York Stock Exchange is an organized exchange, while bond dealers buy and sell government and corporate bonds. Finally, Lehman Brothers was an investment bank that bankrupted during the 2008 Financial Crisis.

2. The Dow Jones Average is an average of the top, blue-chip stocks on the New York Stock Exchange. Some stocks rise while other stocks fall. However, a market index shows a trend of stock prices.

3. A stock market crash occurs when stock prices reach a peak and quickly plummet. People and investors hold stock as wealth. If stock prices fall too, then people's wealth disappears. Furthermore, some investors borrowed to buy stock, and they cannot repay the loans. Thus, a stock market crash could lead to a financial crisis.

4. Mutual funds and finance companies. For example, Vanguard offers mutual funds, while GMAC offers financing for automobiles.

5. Adverse selection is a person knows he drives recklessly and buys insurance to protect his car. Moral hazard is a driver become more careless, like leaving his keys in the car.

6. Insurance companies and pension funds. For example, AIG is a large insurance company, while TIAA-Cref is a pension company for teachers and professors.

7. Commercial banks, savings institutions, and credit unions.

8. Common U.S. government institutions referred in this book are Federal Deposit Insurance Corporation, Fannie Mae, Freddie Mac, and Sallie Mae.

9. College bubble is not likely to affect France. Once French students graduate or drop out, and they cannot find employment, subsequently, they have no debts to repay. The French students only lose the value of their time at the university.

Answers to Chapter 6 Questions

1. Net income is $50,000 + $60,000 - $100,000 - $30,000 - $30,000, which equals -$50,000.

2. Retained earnings are $20,000 +$50,000 - $60,000 = $10,000. Do not include the sales of stock because stock transactions are recorded under the common stock account.

3. Cash balance equals $10,000 - $70,000 +$100,000 - $10,000 = $30,000. Do not include the accounts receivable because these are credit sales and the business did not collect cash.

4. We calculated $PV_0 = \dfrac{PV_T}{(1+i)^T} = \dfrac{\$1,000,000}{(1+0.05)^{100}} = \$7,604.49$

5. We calculated $PV_T = PV_T(1+i)^T = \$5,000(1+0.1)^{50} = \$586,954.26$

6. Substitute which variables you know into the equation, and then use algebra to solve for the interest rate, i, equaling 9.54%.

$$FV_2 = PV_0(1 + i)^T$$
$$\$1,200 = \$1,000(1 + i)^2$$
$$i = 0.0954$$

7. Using the Rule of 72, your bank account doubles in 24 years, or $72 \div 3$.

8. Using the Rule of 72, the U.S. economy doubles in 14.4 years, or $72 \div 5$.

9. We calculated $PV_0 = \dfrac{\$1,000}{(1+0.07)^0} + \dfrac{\$1,000}{(1+0.07)^1} + \dfrac{\$1,000}{(1+0.07)^2} = \$2,808.02$

10. We calculated $2928.54 below. Question was not clear because we do not know when the deposit was made. Consequently, we showed deposits being made at the beginning of the period.

$$FV_3 = \$700(1+0.03)^3 + \$700(1+0.03)^2 + \$700(1+0.03)^1$$
$$FV_3 = \$1,464.72$$

11. We calculated the present value of

$$PV_0 = \frac{\$100}{(1+0.01)^1} + \frac{\$100}{(1+0.01)^2} + \frac{\$100}{(1+0.01)^3} = \$294.10$$

12. We calculate the growth in the savings account for each compounding frequency.

$$FV_{30} = \$500(1+0.05)^{30} = \$2,160.97$$
$$FV_{30} = \$500\left(1+\frac{0.05}{12}\right)^{12\cdot30} = \$2,233.87$$
$$FV_{30} = \$500 \cdot e^{0.05\cdot30} = \$2,240.84$$

13. We calculate the effective annual interest rate of 12.55% below.

$$EFF = \left(1+\frac{0.12}{4}\right)^4 - 1 = 0.1255$$

14. Using the formula for an ordinary annuity, we calculate the annuity value of $81,990.98 below:

$$FV_T = \$2,000\left[\frac{(1+0.07)^{20}-1}{0.07}\right] = \$81,990.98$$

15. Using the formula for an ordinary annuity, we calculate your annual payments as $4,817.11 below:

$$P = \frac{0.05 \cdot \$50,000}{1-(1+0.05)^{-15}} = \$4,817.11$$

16. We calculate monthly mortgage payment of $3,326.51 below:

$$P = \frac{0.005833 \cdot \$500,000}{1-(1+0.005833)^{-30\cdot12}} = \$3,326.51$$

17. We calculate the net present value of 43,126.54 rm below:

$$NPV = -2,000€\left(4.00\,^{rm}/_€\right) + {}^{3,}\frac{€\left(4.25\,^{rm}/_€\right)}{(1+0.04)^1} + {}^{4,}\frac{€\left(4.50\,^{rm}/_€\right)}{(1+0.04)^2} + {}^{5,}\frac{€\left(5.00\,^{rm}/_€\right)}{(1+0.04)^3}$$

$$NPV = 43,126.54\,rm$$

Answers to Chapter 7 Questions

1. Both a notes payable and corporate bond are loans to the corporation. However, a bond is standardized and allows investors to buy and sell them in the secondary markets, while a bank usually grants a notes payable.

2. Bonds are a liability that could lower a corporation's tax burden. Furthermore, the bondholders do not vote at a corporation's stockholders meeting and thus, do not compete with the stockholders over control of a corporation. Consequently, stockholders could earn a higher dividend if a corporation uses bonds to expand operations.

3. We adjusted the calculation already for the annual yield to maturity of the discount bond, which is: $PV_0 = \dfrac{FV_1}{\left(1 + r \cdot T/_{360}\right)} = \dfrac{\$20,000}{\left(1 + 0.03 \cdot 270/_{360}\right)} = \$19,559.90$

4. We calculated: $PV_0 = \dfrac{FV}{i} = \dfrac{\$100}{0.06} = \$1,666.67$

5. We calculated: $PV_0 = \dfrac{\$100}{\left(1 + 0.025\right)} + \dfrac{\$100}{\left(1 + 0.025\right)^2} + \cdots + \dfrac{\$2,100}{\left(1 + 0.025\right)^6} = \$2,275.41$

6. We calculated: $PV_0 = \dfrac{\$100}{\left(1 + 0.1\right)} + \dfrac{\$100}{\left(1 + 0.1\right)^2} + \cdots + \dfrac{\$2,100}{\left(1 + 0.1\right)^6} = \$1,564.47$

7. Money market securities have maturities less than a year. Thus, when the interest rate changes, the money market securities swing less in market value as compared to the capital market securities.

8. When the interest rate decreases, subsequently, the value of bonds becomes greater. Thus, you should buy bonds now and resell them for a higher price when the interest rate decreases. However, if you are wrong, then you lose money, or you could be holding onto the bonds for a while.

9. You set up the equation as $\$4,500 = \dfrac{\$5,000}{\left(1 + YTM\right)^3}$. Then you use algebra to solve for the YTM, equaling 3.57%.

10. We computed $P_0 = \dfrac{D}{r-g} = \dfrac{\$1}{0.04 - 0.03} = \$100.00$.

11. First, you set $D_1 = D_2 = 0$. Second, you calculate the stock price as $P_2 = \dfrac{D_3}{r-g} = \dfrac{\$1}{0.10 - 0.05} = \$20.00$. However, this is for Year 3. Then you discount the cash flow back to Year 0, yielding $P_0 = \dfrac{\$20.00}{(1+0.10)^2} = \$16.53$

Answers to Chapter 8 Questions

1. Six factors are wealth, expected returns, expected inflation, risk, liquidity, and information costs.

2. Four factors are expected profits, business taxes, expected inflation, and government borrowing.

3. Demand for bonds decreases and shifts leftward. Thus, both the bond price and quantity decrease. Furthermore, the bond interest rate should rise.

4. Supply for bonds decreases and shifts leftward. Thus, the bond price increases while quantity decreases. Furthermore, the bond interest rate should fall.

5. Demand for bonds increases and shifts rightward. Thus, both the bond price and quantity rise. Furthermore, the bond interest rate should decrease.

6. During a business cycle, both supply and demand for bonds increase and shift rightward. During a recession, both the supply and demand for bonds decrease and shift leftward. Quantity is determinate while bond prices, and thus bond interest rates are indeterminate.

7. Real interest rate is -5% while the approximation yields -10%, which causes a large error.

$$(0.90 + 1) = (1 + r)(1 + 1.00) \qquad r = -5\%$$
$$0.90 \approx r + 1.00 \qquad\qquad r = -10\%$$

8. If investors, businesses, and government expect higher inflation, then the supply for bonds increases while investors purchase fewer bonds because inflation erodes the value of their investments. Businesses and government supply more bonds because they can repay the bonds with cheaper dollars. Thus, the nominal interest rate rises.

9. Loanable funds and bond market are opposites of each other. Loanable funds indicate the direction the money flows while the bond is the good. If investors buy a bond, they are

supplying money, i.e. loanable funds. If a business issues bonds, then it demands money, i.e. loanable funds.

10. World's interest rate is higher. Thus, investors would loan their surplus funds abroad to earn the greater interest rate.

11. World's interest rate is lower. Thus, businesses and the government would borrow the cheaper funds from foreign investors.

Answers to Chapter 9 Questions

1. Investors are usually risk averse. Thus, investors increase their demand for the low-risk bonds and decrease their demand for the high-risk ones. Consequently, bond prices increase for the lower-risk bonds but decrease for the higher-risk bonds. Furthermore, the interest rates are lower for the low-risk bonds and higher for the high-risk bonds.

2. Investors prefer to hold liquid securities. Thus, investors increase their demand for the highly liquid bonds and decrease their demand for the low liquid ones. Consequently, bond prices increase for the liquid bonds but decrease for the non-liquid bonds. Moreover, the interest rates are lower for the liquid bonds and higher for the non-liquid bonds.

3. Investors prefer to invest in securities that entail low information costs. Thus, investors increase their demand for the low information cost bonds and decrease their demand for the high information cost ones. Consequently, bond prices increase for the bonds with low information costs but increase for the high information cost bonds. Furthermore, the interest rates are lower for the bonds with low information costs and higher for the other bonds.

4. Investors prefer to invest in securities that have lower taxes. Thus, investors increase their demand for the tax-exempt bonds and decrease their demand for the taxed ones. Consequently, bond prices increase for the tax-exempt bonds but decrease for the taxed bonds. Moreover, the interest rates are lower for the tax-exempt bonds and higher for the taxed bonds.

5. Term structure of the interest rates is an entity offers a large variety of securities with different interest rates. Thus, the securities have the same risk, liquidity, information costs, and taxes. However, the interest rates still differ with long maturity interest rates tend to be higher than shorter maturities.

6. Three theories are segmented markets theory, expectations theory, and preferred habitat theory. Segmented markets theory is investors prefer to invest in specific bond markets, and each bond market has its own supply and demand. Expectations theory is for investors to invest in longer-term securities; they expect the interest rate to be greater, causing a positively sloping yield curve. Preferred habitat theory is investors prefer a certain bond.

However, they are persuaded to invest in a longer-term security if they receive a higher interest rate, the term premium. Preferred habitat theory does the best in explaining the yield curve.

7. When a yield curve has a negative slope, the investors are pessimistic about the future, and the economy usually enters a recession a year later.

Answers to Chapter 10 Questions

1. Liabilities are demand deposits, savings accounts, small and large-denomination time deposits, borrowings, discount loans, and federal funds (if the bank borrowed funds). Assets include vault cash, deposits at other banks, deposits at the Federal Reserve, loans, and bank's physical assets like its buildings and computers. Capital reflects a bank's net worth.

2. A bank's net worth equals bank's total assets minus total liabilities. Investors want a positive net worth because the stockholders receive assets if the bank is liquidated.

3. Liquidity risk is the risk that depositors show up at the bank and withdraw too much at one time. Consequently, the banks must use good management to meet depositors' withdrawals.

4. Something severe happens to a bank that causes total liabilities to exceed total assets.

5. Banks use credit risk analysis, collateral, credit rationing, and restrictive covenants to reduce adverse selection. Furthermore, banks could foster a long-term relationship with their customers.

6. Housing bubble popped, causing housing prices to plummet. If a bank forecloses on a home that is losing value, then too many foreclosures cause total liabilities to exceed total assets.

7. Banks split their assets and liabilities into long term and short term. Then banks scrutinize the short-term assets and liabilities because if the interest changes, subsequently, it immediately impacts these assets and liabilities. Banks can develop strategies, whether a bank manager believes interest rates will rise or fall.

8. Floating rate debt is loans with a variable interest rate. If the interest rate increases, then borrowers must pay more interest on their payments.

9. Securitization is the bundling of illiquid assets like mortgages into a fund. Then this fund allows investors to invest in it. A fund offers different tranches with different credit ratings and rates of return.

10. This is really a tough question. If banks retained their rigid lending standards and the credit-rating agencies accurately rated the CDOs and ABS, then the housing bubble would still

form but at a slower rate. The Great Recession would still have occurred, but the effects would not have been as harmful and severe.

Answers to Chapter 11 Questions

1. The Fed's assets are the discount loans and holdings of U.S. government securities while its liabilities are bank reserves and currency in circulation.

2. Money multiplier shows how the money supply changes, when the monetary base changes. Consequently, the public, banks, and the Fed all influence the money multiplier.

3. We calculated:

$$\Delta \text{Deposits} = \Delta \text{Reserves} \times \frac{1}{r_r} = \$50,000 \times \frac{1}{0.05} = \$1 \, million$$

4. We calculated:

$$\Delta \text{Deposits} = \Delta \text{Reserves} \times \frac{1}{r_r} = -\$10,000 \times \frac{1}{0.20} = -\$50,000$$

5. We calculated this below. Do not include the first $1,000 because the person converted a $1,000 of currency into a bank deposit.

$$\Delta \text{Deposits} = \Delta \text{Reserves} \times \frac{1}{r_r} = \$900 \times \frac{1}{0.1} = \$9,000$$

6. We calculated this below. Do not include the first $5,000 because the person withdrew $5,000 from his checking account and converted it into cash.

$$\Delta \text{Deposits} = \Delta \text{Reserves} \times \frac{1}{r_r} = -\$4,500 \times \frac{1}{0.1} = -\$45,000$$

7. Currency-to-deposit ratio represents the portion of money held by the public as currency. An increase in wealth, higher interest rates, lower risk from bank failures, and an increase in illegal activities will decrease this ratio.

8. This occurred during the 2008 Financial Crisis. The Federal Reserve granted $2 trillion in loans. However, the banks held onto this money and did not increase loans. Thus, the multiple deposit creation ceased to work. Purpose of the bailout was to get the U.S. banking system to start lending again.

9. Banks and the public can thwart a Fed's action by changing their behavior. Banks can hold excess reserves while the public influence the currency to deposit ratio.

10. We calculated both the M1 and M2 money multipliers below:

$$m_2 = \left[\frac{C/D + 1}{C/D + R/D} \right] = \left[\frac{0.55\overline{5} + 1}{0.55\overline{5} + 0.77\overline{7}} \right] = 1.667$$

$$m_2 = \left[\frac{C/D + T/D + 1}{C/D + R/D} \right] = \left[\frac{0.55\overline{5} + 1.33\overline{3} + 1}{0.55\overline{5} + 0.77\overline{7}} \right] = 2.167$$

Answers to Chapter 12 Questions

1. The Fed's assets include securities, discount loans, Items in the Process of Collection (CIPC), Gold Certificates, Special Drawing Rights (SDRs), coins, buildings, and foreign-currency reserves. The Fed's liabilities are currency outstanding, deposits by depository institutions, U.S. Treasury deposits, foreign and other deposits, Deferred Availability Cash Items (DACI), Federal Reserve float. The Fed's net worth equals total assets minus total liabilities.

2. Go through the T-account transactions for the checking writing process by changing the amount of the check.

3. Float changes in December and April. People buy Christmas presents in December and pay their taxes in April. Anything could affect the float if it slows down the mail, such as bad weather or a transportation strike.

4. A rise in the float increases both the monetary base and money supply.

5. The Treasury Deposit increases the Fed's liabilities, shrinking both the monetary base and money supply.

6. If the banks reduce the amount of discount loans, then the Fed's assets fall, decreasing both the monetary base and money supply.

7. The Fed cannot control the U.S. Treasury deposits, the float (CIPC - DACI), gold certificates, SDRs, and foreign government deposits.

8. The U.S. Treasury does not influence the monetary base or money supply by changing taxes or issuing more U.S. securities, as long as it sells the securities to the public.

9. The Fed tries to stabilize interest rates. If the U.S. Treasury issues too much debt, then the interest rate increases. Thus, the Fed must purchase these U.S. securities to lower the interest rate.

10. Developed countries like the United States and Europe want strong currencies. It attracts foreign investors. China and the Asian tigers maintain weak currencies, boosting their export industries. A weak currency creates jobs and wealth.

11. A weak dollar means $1 can purchase fewer foreign currencies, while a strong dollar means $1 can buy more foreign currencies. If the U.S. dollar is strong, subsequently, the U.S. customers buy more imports while the U.S. export industry ships and sells fewer goods to foreign countries. Strong dollar makes foreign products cheaper, and U.S. products become more expensive. Consequently, the U.S. trade deficit worsens.

12. As the Federal Reserve buys or sells foreign currencies, the Fed's assets and liabilities change. Thus, the monetary base and money supply changes. Unsterilized transactions do not offset the change in the money supply when the Fed intervenes in the foreign exchange market, while sterilized transactions, the Fed uses open-market operations to offset any potential change in the money supply as it intervenes in the foreign exchange market.

Answers to Chapter 13 Questions

1. The Federal Reserve has 12 Federal Reserve banks.

2. Each region of the country is economically different. Thus, each Federal Reserve Bank tailors its services for each unique region. Furthermore, the power of a central bank is dispersed among the 12 Fed banks.

3. The Federal Reserve System has 12 Fed banks. Every national bank must purchase stock in its regional Fed bank and can vote for three directors from the banking. Furthermore, the Board of Governors can choose three directors and approves the choice of the Fed's bank president. Finally, businesses can elect the last three directors.

4. The Board of Governors manages the Federal Reserve System. The Board has seven members whom the U.S. President appoints with Senate approval.

5. The Fed raises its own funding independent of the U.S. government. Moreover, the members of the Board of Governors have staggered terms, so one President cannot change the entire board at once. Finally, the U.S. government cannot completely audit the Fed.

6. The Federal Open Market Committee puts monetary policy into action. They determine open-market operations, while the Board of Governors controls the FOMC.

7. Chairman advises the President and informs Congress on Fed's actions. Finally, the financial analysts pay close attention to the chairman's policies and speeches.

8. Consequences could be disastrous because the country reverses the gains for a single currency. For example, the Greek government has severe budget problems, where the

government cannot balance its budget, and investors do not want to invest in Greek bonds. Public believes if the Greek government reintroduces the drachma, then the government will devalue as it creates money to cover budget deficits. Consequently, the Greek citizens started a run on the banks to withdraw their savings in euros before the Greek government converts currency to drachmas.

9. The Executive Board implements monetary policy, while the Governing Council determines monetary policy.

10. Euro reduces exchange rate risk, reduces transaction costs, and promotes competition within the Eurozone. However, an EU country loses control of its monetary policy. Moreover, the prices are high relative to incomes in southern Europe, and the European Central Bank is prohibited to help EU countries, such as buying a country's bonds.

11. Public interest view is a government agency actually solves a problem that it was created to solve. Principal-agent view is a bureaucracy serves its own self-interest and may not perform the actions a government created it for.

12. Countries with independent central banks usually have very low inflation rates.

Answers to Chapter 14 Questions

1. The Fed creates a higher demand in the bond market. Thus, the bond's market price rises while the interest rate falls. The Fed injected reserves into the banking system, expanding the money supply.

2. The Fed increases the supply in the bond market. Thus, the bond's price falls while the interest rate rises. The Fed removed reserves from the banking system, contracting the money supply.

3. If the Fed increases the money supply by 3%, it must buy enough U.S. Treasury securities to achieve this goal. However, the Fed buying the securities from the bond market decreases the interest rate. If the Fed concentrated on the interest rate, it must buy or sell bonds to achieve the target interest rate. Nevertheless, the buying or selling of bonds changes the bank reserves, and hence, the money supply.

4. A REPO is a repurchase agreement. The Fed temporarily buys a U.S. government security, and the seller will buy it back on a specific date in the future. A reserve REPO is the Fed sells a U.S. government security and agrees to repurchase it on a particular date in the future. REPOS inject reserves into the banking system while reverse REPOs remove reserves temporarily.

5. A defensive transaction offsets unexpected changes in the money supply like bad weather slowing down the check clearing process. A dynamic transaction is the Fed implements monetary policy as specified in the general directive.

6. The Fed has complete control over the quantity of securities it can buy or sell. Thus, it can change the money supply by a little or a lot, easy to correct mistakes, and implement monetary policy quickly.

7. If the Fed decreases the discount rate, then the Fed encourages banks to borrow more from the Fed. A lower discount rate is expansionary monetary policy because it could inject more funds into the banking system, expanding the money supply. If the Fed raises the discount rate, subsequently, it implements contractionary monetary policy.

8. The Fed could grant adjustment credit, seasonal credit, or extended credit.

9. The Fed could audit the bank more, could impose fines on the bank, or stop lending to a bank.

10. The Federal Reserve cannot force banks to accept loans. The Fed could lower the discount rate, but banks might not increase their borrowings from the Fed.

11. When the Fed conducts monetary policy, the policy affects the federal funds rate first. If the federal funds rate rises, then the Fed may be pursuing contractionary monetary policy. If the federal funds rate drops, subsequently, the Fed may be using expansionary monetary policy.

12. Changing the reserve requirements changes the money multipliers. Thus, even a small change in the reserve requirement could have a large impact on the money supply.

13. One benefit is the government could eliminate deposit insurance. Banks would hold all deposits. Furthermore, the money multipliers will be one, and the Fed has exact control over the money supply. However, this stops banks from being financial intermediaries. They connect savers to borrowers. Banks are critical to finance mortgages and lend to businesses and households.

14. The Fed's goals are price stability, high employment, economic growth, financial market and institution stability, interest rate stability, and foreign-exchange market stability.

15. Information, administrative, and impact time lags. Economy could be leaving a recession. By the time monetary policy influences an economy, the economy is already growing, and the monetary policy causes the economy to grow quickly, creating inflation.

16. Although the Fed has six goals, it cannot control them. However, the Fed uses targets because it has better control over them and in turn, the targets influence the goals.

17. Monetary policy has an immediate impact on operating targets like the federal funds rates and non-borrowed reserves. Over time, monetary policy influences the intermediate targets. Operating and intermediate targets differ by Fed control and time lags.

18. The Fed must accurately measure the targets and exert control over them. Furthermore, the target must respond to monetary policy predictably, and the target influences the Fed's goals.

19. The Fed's monetary policy coincides with the business cycle. Thus, monetary policy causes the economy to grow faster during a boom cycle, and slower during a recession. Monetary policy is supposed to do the opposite and smooth out the business cycles.

20. Economists suggest other targets, such as nominal GDP, yield curve, commodity prices, and U.S. dollar exchange rate.

Answers to Chapter 15 Questions

1. Purpose of the balance-of-trade accounts is to account for money flows between one country and the rest of the world. Economists classify money flows into categories that allow them to analyze patterns in the cash flows.

2. Current account includes exports and imports, services and insurance for transportation, and gifts. Financial account keeps track of investment into real estate, stocks, and bonds. Finally, the official settlements account represents the intervention of the central bank.

3. Statistical discrepancy account occurs from errors, omissions, and unreported activities. Unreported activities include tax evasion, hiding money from government, or profits from illegal activities.

4. Three exchange rate regimes are the gold standard, the Bretton Woods System, and flexible exchange rates. Gold standard creates a fixed exchange rate system by setting a weight of gold to a currency's value. The Bretton Woods System was a gold standard that allowed countries to adjust their exchange rate relative to the U.S. dollar while the U.S. dollar became fixed at $35 = one ounce of gold. Finally, the flexible exchange rate regime allows supply and demand of currencies to determine exchange rates.

5. World Bank lends to developing countries, helping them invest in their infrastructure, such as new roads, dams, electric power plants, etc.

6. The IMF helps countries finance a balance-of-payments deficit. The IMF has a cache of gold and foreign currencies that it can lend.

7. Balance-of-payments deficit causes a surplus of currency on the international exchange markets. Thus, that country's central bank must buy its currency using official asset

reserves. If the country refuses to use reserves or devalue its currency, then black markets would form for its currency.

8. If a country devalues it currency, subsequently, the impact does not immediately reduce a trade deficit. A country's imports continue rising while its exports fall after a devaluation and then improves after a time lag.

9. Country has too much money flowing into the country. Consequently, the central bank increases the money supply and reduces the interest rate. International investors slow down their investments in the country that reduces the financial account.

10. Capital flight is similar to a bank run on a foreign country. International investors cause a massive outflow of capital as they cash in their investments. A capital flight could lead to the collapse of a country's currency. Investors use four methods to transfer money out of the country: bank transfers, money laundering, false invoicing for imports and exports, or converting money into precious metals.

11. This will be a very bad day indeed. If the U.S. dollar collapses in value, then the paper wealth of anyone holding dollars will disappear. Furthermore, the foreigners would stop investing in the U.S. economy and the U.S. government debt. Then trade could halt as nations and people stop accepting dollars for payment unless investors find a replacement international currency.

Answers to Chapter 16 Questions

1. The Pepsi costs 2.25 dirhams.

2. We calculated: $\left(\dfrac{2\,\text{km}}{\text{€}1} \right)\left(\dfrac{\text{€}0.714}{\$1} \right) = 1.428\,{km}\!\!\Big/\!{\$1}$

3. We calculated the cross exchange rate below. Did you notice the trick when I calculated the cross rate? Consequently, arbitrage is possible.

$$\left(\frac{2\,\text{km}}{\text{€}1} \right)\left(\frac{\text{€}1}{kuna\,100} \right) = 1\,{km}\!\!\Big/\!{kuna\,50}$$

Step 1: Trader converts the convertible markets into euros, calculated below:

$$500{,}000\,km\left(\frac{1\,\text{€}}{2\,km} \right) = 250{,}000\ \text{€}$$

Step 2: Trader converts the euros into Croatian kunas, shown below:

$$250,000 \, \text{€} \left(\frac{\text{kuna} \, 100}{\text{€} 1}, \right) = 25,000,000 \, \text{kunas}$$

Step 3: Trader converts the kunas back into Bosnian convertible marks, calculated below. Consequently, the trader earns 43,478.26 km in profits.

$$25,000,000 \, \text{kunas} \left(\frac{1 \, \text{km}}{\text{kunas} \, 46} \right) = 543,478.26 \, \text{km}$$

4. Supply for U.S. dollars comes from people holding U.S. dollars, and they trade those dollars for another currency. A demand for currency in one market automatically creates a supply of currency in another market as people exchange currencies. Finally, a central bank could expand the supply of U.S. dollars.

5. Americans buy fewer Mexican made goods. Thus, the demand for pesos falls and shifts leftward. Consequently, the peso depreciates while the U.S. dollar appreciates, causing Mexican imports to decrease while exports increase.

6. The Federal Reserve must reduce the supply of U.S. dollars. It can trade euros for U.S. dollars, causing the U.S. dollar to appreciate and the euro to depreciate. However, the European Central Bank can nullify this by purchasing the supply of euros with U.S. dollars. Hence, the Federal Reserve bought U.S. dollars off the currency exchange markets while the European Central Bank injects new U.S. dollars in their place.

7. Foreign investors reduce their demand for U.S. currency, shifting the demand function leftward. Furthermore, U.S. investors invest in other countries for a higher interest rate. As they convert their U.S. dollars into another currency, the supply function for U.S. dollars increases. Consequently, the U.S. dollar depreciates while the market quantity of U.S. dollars becomes ambiguous.

8. Lower demand for the Uzbek som causes the som to depreciate against the U.S. dollar. The Uzbek central must reduce its som on the currency exchange markets by purchasing som with its official reserves. Supply for som decreases and shifts leftward, returning the som to the original exchange rate.

9. Japan has a low risk of capital flight. Most of the Japanese debt is held internally, and international investors have few investments in Japan. Consequently, if the Japanese government defaulted on its debt, the crisis would most likely remain inside of Japan.

Answers to Chapter 17 Questions

1. Best forecast for a random walk is the previous period's value, 3 rm per U.S. dollar.

2. First, countries erected trade restrictions and barriers that prevent the free flow of goods entering or leaving a country. Second, PPP does not include transportation and transaction costs. Third, some services are not internationally traded, such as haircuts and real estate. Finally, countries define their basket of goods differently.

3. Buy the Big Macs from Russia for $2.29 and ship them to Venezuela for $7.92.

4. The Japanese yen is undervalued approximately 5.5% relative to the U.S. dollar.

$$\dot{P}_{Big\ Mac} = \frac{P_{Jaoan} - P_{U.S.}}{P_{U.S.}} \cdot 100 = \frac{\$4.09 - \$4.33}{\$4.33} 100 = -0.055$$

5. The PPP only includes the absolute price levels, while the relative PPP allows different price levels between countries because the inflation rates cause the exchange rate to change predictably.

6. Using the approximation, the U.S. dollar appreciates approximately 4% per year relative to the Russian ruble (or 7% - 3%). Using the exact formula, the U.S. dollar appreciates 3.9% relative to the ruble.

$$e = \frac{1 + \pi_f}{1 + \pi_d} - 1 = \frac{1 + 0.07}{1 + 0.03} - 1 = 0.039$$

7. We calculated the U.S. competitive ratio below:

$$k = \frac{1 + \pi_f}{(1 + \pi_d)(1 + e)} = \frac{1 + .02}{(1 + .03)(1 + .02)} = 0.971$$

8. We assume the change in the velocity of money is zero because the problem did not refer to them. If the ringgit is defined at the home currency, the ringgit should appreciate approximately 1% per year, calculated below:

$$\dot{s} = \left(\dot{m}_{US}^{S} - \dot{m}_{Malay}^{S} \right) + \left(\dot{v}_{US} - \dot{v}_{Malay} \right) + \left(\dot{y}_{Malay} - \dot{y}_{US} \right) = 0.02 - 0.05 + 0.07 - 0.03 = 0.01$$

9. Home currency should depreciate approximately 2.5%, calculated below:

$$e_{f,T} \approx \left(i_f - i_d \right) \frac{T}{360} \approx \left(0.05 - 0.10 \right) \frac{180}{360} \approx 0.025$$

10. Appreciating currency boosts your investment. Thus, we computed the return below:

$$r_d = \left(1 + i_f \frac{T}{360}\right)(1+e) - 1 = \left(1 + 0.16 \frac{720}{360}\right)(1 + 0.04) - 1 = 0.3728 \, .$$

11. We used the approximation formula. Thus, the forward contract expects the U.S. dollar to appreciate with an exchange rate of 0.707 €/ $1.

$$F \approx 0.7 \, €\!\!\Big/_{\$1} \left(1 + (0.07 - 0.05)\frac{180}{360}\right) \approx 0.707 \, €\!\!\Big/_{\$1}$$

Answers to Chapter 18 Questions

1. Spot transactions occur when a buyer and seller agree to an exchange, and they exchange immediately. A forward transaction is a buyer buys a contract today for an asset that is sold in the future for a fixed price. Then the seller is obligated to sell the buyer the asset for the contract price.

2. Derivatives obtain their value from the asset that is specified in the contract.

3. Investors use hedging to protect themselves from future volatile prices. Speculators, on the other hand, buy and sell securities to earn quick profits. As you guessed, speculators can earn large profits or massive losses from the derivatives market.

4. Once an investor buys a futures contract, the buyer is obligated to buy the asset at the specified price (i.e. long position), while the seller is obligated to sell the asset at the specified price (i.e. short position).

5. Asset's price will fluctuate daily on the spot market. If the difference between the asset price and contract price exceeds a threshold, either the buyer or seller must deposit money with the broker. Margin helps guarantee parties will honor the contract.

6. Issuer deposits $10 \cdot 1{,}000 \cdot (\$150 - \$75) = \$750{,}000$ with the exchange because the holder can buy petroleum via the futures and sell it on the spot market for a massive profit if the futures matured today.

7. Value of the contract on the spot market equals $150{,}000 \, euro \, \dfrac{\$1}{1 \, euro} = \$150{,}000$. Value of the futures contract is $150{,}000 \, euros \, \dfrac{\$1}{1.5 \, euro} = \$100{,}000$. Investor pays only $100,000 by using the contract, instead of $150,000. Thus, the issuer deposits money into the margin account.

8. Futures is a contract. Both the buyer and seller are obligated to carry through with the transaction. With the options contract, the holder chooses to exercise it or not.

9. A call options give the right to the contract holder to buy an asset at the stated price, while the put option gives the holder the right to sell at the price in the contract.

10. An option's premium is affected by the volatility of an asset's price on the spot market, the magnitude of the strike price, the maturity of the option, and interest rates.

11. Your premium equals: $\$0.5 \cdot 1{,}000 \cdot 10 = \$5{,}000$. You could exercise the option and pay \$75 for petroleum or buy the petroleum from the spot market at \$50. Consequently, you would buy the oil from the spot market.

12. Premium equals: $\$0.01 \cdot 100 \cdot 100 = \$100$. Farmer could sell his corn for \$6 per bushel on the spot market, or exercise the put option and sell his corn for \$5 per bushel. Thus, farmer would sell his corn to the spot market.

13. Problem with the derivatives based on the stock market index or the volatility index is no commodity, or financial instrument is traded. Instead, the investor gambles on future index numbers. Unfortunately, the company issuing the index derivative could have a massive exposure if the stock market rapidly drops during a financial crisis.

14. Credit Default Swaps are a form of insurance. Issuer guarantees payment if a mortgage fund or company bankrupts, causing their bonds to plummet in value. Thus, risk-averse investors commit to speculative grade investments if they can buy this insurance.

15. We could not avoid this crisis. However, the impact could have been less severe. Government could tighten laws that forced mortgage companies to verify homeowners' income. Government could pass laws that prevented the layering of CDS contracts.

16. Coupon payments are \$1.5 million and 2.2 million euros respectively. Implicit exchange rate is \$1.5 million ÷ 2.2 million euros, which equals \$0.682 per euro. Present values of the cash flows are:

$$PV_{foreign} = \frac{2.2 \text{ million } \text{€}}{1+0.03} + \frac{110 \text{ million } \text{€} + 2.2 \text{ million } \text{€}}{(1+0.03)^2} = 107.9 \text{ million } \text{€}$$

$$PV_{domestic} = \frac{.5 \text{ million}}{1+0.025} + \frac{\text{million} + .5 \text{ million}}{(1+0.025)^2} = \$98.1 \text{ million}$$

We calculate the Swap's present value as:

$$Swap\ Value = PV_{foreign} \cdot S_0 - PV_{domestic}$$
$$Swap\ Value = 107.9 \text{ million } \text{€} \cdot \frac{.2}{1\ \text{€}} - \$98.1 \text{ million} = \$31.4 \text{ million}$$

Answers to Chapter 19 Questions

1. Transaction exposure is the impact on current transactions, such as accounts receivable and accounts payable in a foreign country when the exchange rate changes. Economic exposure is fluctuating exchange rates affect expected cash flows over time. Translation exposure is the change in a company's consolidated financial statements because accountants use different exchange rates to convert accounts into the domestic currency. Finally, changes in exchange rates influence a firm's cash flows, revenues, and costs, and thus, it affects a company's taxes.

2. This is not a good situation because you earn revenue from sales in pesos while you pay costs in dollars. Thus, the transaction exposure is your costs rise while your revenues fall. Economic exposure is the impact of an appreciating U.S. dollar on your business over time, and in this case, you would expect your profits to fall over time.

3. You calculated your gain from this transaction below:

$$profit = \$1 \; million\left(\frac{1\,€}{.25}\right) - 500{,}000\,€ = 300{,}000\,€$$

A fluctuating exchange only impacts the revenue while your hotel's costs remain constant. Thus, your profit would fluctuate between 180,000 and 420,000 euros, computed below:

$$exposure = \$1 \; million(1 \pm 0.15)\left(\frac{1\,€}{.25}\right) - 500{,}000\,€ = [180{,}000\,€,\; 420{,}000\,€]$$

4. First, the company has an exchange rate risk. If the exchange rate does not change, then the company receives $4.5 million.

   Second, the company eliminates the exchange rate risk and pays $5 million.

   Third, the company borrows 4,938,271.60 CD today, and it would transfer $ 4,444,444.44 today using the spot exchange rate.

   Fourth, the company receives $4,365,000 today.

5. First, the company has an exchange rate risk. If the exchange rate does not change, then the company receives $45,454.54.

   Second, the company eliminated the exchange rate risk, and it will pay $41,666.67.

   Third, the company needs 495,458.30 pesos to deposit today, and it would transfer $45,041.66 today using the spot exchange rate.

   Fourth, premium equals 576.92 while the company is guaranteed a minimum of $38,461.54.

6. The Forex Beta measures the economic exposure and is a parameter estimate of a linear regression equation. It has two sources of variation: Fluctuations in the exchange rate and the sensitivity of the asset's price to changes in the exchange rate.

7. First, company could locate its production in countries where it sells it backpacks, trying to equal accounts payable and accounts receivable. Then it uses accounts receivables to offset its accounts payable. Second, company can shift its production to low-cost countries, especially in countries that weaken its currency.

Answers to Chapter 20 Questions

1. A firm only invests and operates a small portion of its production in a foreign country. If a firm has a conflict with the government, then only that portion of the production facility is in jeopardy. Furthermore, if a company continually updates its technology, subsequently, it could use intellectual property rights to protect its technology. In theory, the firm could deny the government to use its technology. Finally, a firm could use leverage, where it heavily borrows from banks within the foreign country. If the firm has a conflict with the government, it can exit the country and default on its bank loans.

2. A government protects its agricultural, defense/military, energy, and communication industries. These industries are critical for a modern, functioning society, and a supply disruption could cause a severe crisis within the country.

3. A firm cannot transfer its profits outside a country because the country imposed capital controls. Thus, a firm could buy a local product and export the product to recoup its profits abroad.

4. Special dispensation is government grants exceptions and favors to industries it wants, such as pharmaceutical, high-tech, electronics, and computers. These industries are prestigious and lead to a rise of skilled and educated labor force.

5. Average basis points for the CCC grade are 450. Thus, you add 4.5% to the 5%, yielding 9.5%.

6. The Risk Rating System is a method to measure a country risk. The Rating System uses four measures: Economic Indicators, Debt Management, Political Factors, and Structural Factors. We measure each factor on a scale from zero to 100. A country's score is a weighted average of the four factors. Although this method appears to be objective, the weights and measures of some factors are subjective.

7. Qualitative measures rely on experts' opinions. Unfortunately, experts have biases and opinions that taint their opinion. Quantitative measures use a variety of statistics and demographics of a country. Then an analyst computes a country's score.

8. Hong Kong is politically stable, and A.M. Best rated it Tier II while Coface rated it A1.

9. Ukraine is a former republic of the Soviet Union that implemented little market reforms. A.M. Best rated the Ukraine as a Tier V while Coface rated it a D.

References

A.M. Best. 2012. Available from http://www3.ambest.com/ratings/cr/crisk.aspx (accessed on 10/16/2012)

Australian Securities Exchange. 2007. "Australian Securities Exchange – Stock Market Information, Stock Quotes – ASX." Available at http://www.asx.com.au (access date: 11/30/07).

Bolsa Mexicana de Valores. 2007. "Bolsa Mexicana de Valores." Available at http://www.bmv.com.mx (access date: 11/30/07).

Board of Governors of the Federal Reserve System. February 7, 2014. Assets and Liabilities of Commercial Banks in the United States (Weekly) - H.8. Available at http://www.federalreserve.gov/releases/h8/current/default.htm (access date: 02/12/14).

Borsa Italiana. 2007. "Finanza Quotazioni Azioni Eft Obbligazioni Fondi Notizie." Available at http://www.borsaitaliana.it/homepage/homepage.htm (access date: 11/30/07).

Bureau of Economic Analysis. 2012. "U.S. International Economic Accounts." Available at www.bea.gov (access date: 9/31/2012).

Coface. 2012. Rating Table. Available from http://www.coface.com/CofacePortal/COM_en_EN/pages/home/risks_home/country_ris ks/rating_table?geoarea-country=&crating=&brating= (accessed on 10/16/2012)

Economist, The. July 26, 2012. "Big Mac Index." Available at http://www.economist.com/blogs/graphicdetail/2012/07/daily-chart-17 (access date: 9/26/2012).

Educational Service Bureau. 1992. How to Read Stock Market Quotations and The Dow Jones Averages: A Non-professional's guide. Dow Jones & Company, Inc.

Federal Reserve Statistical Release. March 9, 2006. "Discontinuance of M3." Available at http://federalreserve.gov/releases (accessed on 7/3/2007).

Frankfurt Stock Exchange. "Deutsche Borse Group." Available at http://deutsche-boerse.com/dbag/dispatch/de/kir/gdb_navigation/home (access date: 11/29/07).

Haubrich, Joseph G. and Millington, Sara. January 31, 2014. "The Yield Curve and Predicted GDP Growth, January 2014." Federal Reserve Bank of Cleveland. Available at http://www.clevelandfed.org/research/data/yield_curve/ (access date: 02/12/2014).

Hong Kong Exchange. 2004. "Hong Kong Exchanges and Clearing Limited." Available at http://www.hkex.com.hk/index.htm (access date: 11/29/07).

London Stock Exchange. 2007. "London Stock Exchange." Available at http://www.londonstockexchange.com/en-gb/ (access date: 11/29/07).

NYSE Euronext. 2007. "Euronext.com, the official website of the Amsterdam, Brussels, Lisbon, Paris stock exchanges." Available at http://www.euronext.com/index-2166-EN.html (access date: 11/30/07).

Pemex. 2006. 2005 *Annual Report*. Mexico, DF: Direccion Corporativa de Finanzas. Available at http://www.pemex.com/index.cfm?action=content&sectionID=11&catID=149&subcatID=2711 (access date: 8/6/2006).

Shanghai Stock Exchange. 2007. "Welcome to Shanghai Stock Exchange." Available at http://www.sse.com.cn/sseportal/en_us/ps/home.shtml (access date: 11/29/07).

Tokyo Stock Exchange. 2007. "Tokyo Stock Exchange." Available at http://www.tse.or.jp/english (access date: 11/30/07).

Toronto Stock Exchange. 2007. "The Stock Market, Canadian Stock Exchange | TSX Group." Available at http://www.tsx.com/ (access date: 11/30/07).

Wikipedia. September 2007. "List of stock market crashes." Available at http://en.wikipedia.org/wiki/List_of_stock_market_crashes (access date: 9/28/06).