

Section I.B. - Financial Markets and Interest Rates

- 1) The Basic Financial Instruments: Stocks and Bonds
 - a) Bonds
 - b) Stock
 - c) How securities are issued
- 2) The Capital Market
 - a) Overview
 - b) Equity markets
 - c) Reading stock quotations
 - d) Bond markets
- 3) Other Financial Markets
 - a) The money market
 - b) Derivatives markets
 - c) The foreign exchange market
- 4) The Supply and Demand Approach to Interest Rates
 - a) Supply and demand
 - b) Risk premia
 - c) How to adjust interest rates for inflation
 - d) Putting it all together

When making a financial decision, you need to know what your options are. Whether you are a business trying to raise funds, or an investor saving for your retirement, you should know what the different kinds of stocks and bonds are, how they differ in terms of the interest rates they pay and the risk they carry, and how the markets they are bought and sold in work.

This section begins by looking at the basic financial instruments: stocks and bonds. We will then go through the various kinds of stock and bond markets. Finally, we end with one of the key tools in understanding interest rates - supply and demand.

1) The Basic Financial Instruments: Stocks and Bonds

Most businesses need to raise funds to expand their operations. The two main ways of doing this are by issuing either debt or equity. This chapter looks at both of these securities in more detail

Debt and Bonds

Bonds are an example of a **debt** contract. A debt contract is simply a promise to repay an amount in the future in exchange for funds now. Examples of a debt contract are an IOU or a loan from a bank. A bond is a kind of a debt contract that is marketable, that is it can be bought and sold in a market. For example, to raise funds, General Motors might sell a bond, which is a promise to repay the money plus interest some time in the future.

While a bond is very much like a loan, what makes it different is that whoever buys the bond initially can turn around and sell it to someone else (that is, a bond is *negotiable* debt, it can be bought and sold).

Bonds generally offer two kinds of payments, a regular payment (generally made every six months) called a **coupon payment** and the **principal** or **face value** that is paid when the bond matures (The date when the bond makes its final payments is called the **maturity date**). Some kinds of bonds do not have coupon payments and are called zero coupon bonds or discount bonds. The coupon rate is expressed as a percentage of the face value.

Example: To raise money to build a plant, General Motors issues a bond that has a coupon yield of 5%, paid semiannually, and a face value of \$10,000 with a maturity of 10 years. What payments will be made on this bond?

It will pay a coupon of \$250 twice a year for the next 10 years along with the payment \$10,000 at the end of the 10 years when the bond matures. The coupon payments are found by taking 5% of \$10,000 (= \$500) and splitting it into two equal parts

Once the bonds are sold, the initial investors can turn around and sell the bond to someone else. When someone else buys the bond, the coupon and the face value payments remain the same; General Motors pays that amount to whomever owns the bond. However, the price the investor gets for the bond is determined in the market and could be different from what the investor initially paid for it, if the desirability of this bond from GM has changed.

Example (continued): After you bought the General Motors bond, you decide to turn around and sell it to someone else. Unfortunately, in the mean time, people have become concerned that it may not be able to pay the money back. Because of this, they are less willing to hold GM bonds. In order to sell your bond you need to offer a lower price. When you sell the bond, the coupon (\$250) and face value (\$10,000) remain the same, but the new investor is getting a higher return (if GM doesn't default) because they paid a lower price.

Many different kinds of organizations issue bonds. Bonds are divided up into three main types. When a business issues a bond it is called a **corporate bond**. When the US Federal Government issues a bond it is called a **government bond** or a Treasury Security (Called Treasury Bonds, Notes, or Bills, depending on the particular type). If a local government, such as a city or state, or a public utility or organization, such as a power plant or a school board issues a bond it is called a **municipal bond**. In addition, one can buy bonds from foreign governments or foreign corporations.

Stocks and Equity

To raise money, General Motors could have also issued stock. In some sense, the process is pretty much the same. GM offers a piece of paper in exchange for a payment; when bonds and stock are first offered they both raise money for GM. However, stock differs in two major ways from bonds. Stock represents ownership in the company so that stockholders can vote on who manages the company. However, stock does not offer fixed payments like debt, and because of this, there is higher risk

The Process of Creating Securities

Securities markets actually reflect two different processes. First, when firm first issues the security to raise funds, and second, when investors trade the security among themselves.

While many business are incorporated, and so have stockholders, a majority of them are not publicly available for sale. For example, imagine that you are starting up a new computer company with two friends, each of you provide financing of \$10,000 and so each get 1/3 ownership of the company and so 1/3 of the shares. Even though the company may be structured as a corporation, the shares are owned by just a few people, and there are limits on the buying and selling of shares.

At some point, the company may want to raise additional funds by selling shares in the company to outsiders. A firm that has approval to offer its shares to the general public is known as a public company. The process of switching from a private to a public company, and issuing shares, is called “going public”. The shares are issued in an **Initial Public Offering**, or IPO. Firms are generally aided by an investment bank in this. Often, institutional investors buy the shares initially and then may resell them to the general public. After the shares are initially sold, they can be resold in to other investors. Resale markets are called **secondary markets**, and are what we usually think of as stock markets.

2. The Capital Market

Sometimes we want to refer to the entire financial sector where demanders and suppliers of funds get together. We call this the capital market. This is a very general term that gets its name from the fact that firms are raising funds to make capital projects. It is also a very broad term since the capital market includes bond markets, stock markets, and the banking system.

Security Exchanges

Once the stocks have been purchased in the IPO, the institutions may want to resell them. In fact, most sales of stock take place after the IPO, in two different kinds of markets.

Securities can either be listed in a **stock exchange** or sold in an **over-the-counter** market.

When you buy a stock listed on the New York Stock Exchange (NYSE) typically you would talk to a stock broker at a brokerage firm. Brokerage firms are companies that specialize in handling purchases and sales of stock, along with offering financial advice, and have people on the floor of the exchange. You would place your order with a broker who would relay the order to a floor broker (someone who buys and sells on the trading floor). The floor broker would buy the stock from another floor broker, executing a sell order from another individual.

In the US, the largest over-the-counter market is the NASDAQ, which stands for the National Association of Security Dealers Automated Quotation system. This market handles the stocks of a large number of businesses; mostly small firms, but some very large and famous firms such as Microsoft and Intel. NASDAQ is known for handling many of the new technology companies. Recently, a similar system in Europe has been established called EASDAQ.

Capital markets around the world have been increasing in importance. In most countries, banks play a more important role in financing than in the US although this has changed somewhat in recent times. Most rich countries, such as England and Japan, have well established equity markets. In addition, smaller, poorer countries have been developing their own equity markets. These are sometimes called emerging markets.

Reading stock quotes

Stock prices are reported in the Wall Street Journal, the main financial paper in the US, in the business sections of the major daily newspapers, and online. While most people get their information online these days, you need to be familiar with the basic terms and abbreviations used in the financial press as they will show up in a variety of contexts. When the Wall Street Journal gives stock quotes, it also provides some historical information to help the reader put the price into context.

The following abbreviations are used:

YTD %CHG: The percentage change in the price of the stock from one year ago to date.

52-week HI LO: To get an idea of the range that the price of stock has covered, we look at the highest the stock has sold for (HI) and the lowest the stock has sold for (LO) over the last year.

STOCK (SYM): This is the (abbreviated) name of the company along with its ticker symbol. Stock information used to come on a “ticker tape” a long thin piece of paper (You can often see the modern equivalent of a ticker tape running at the bottom of the

screen on financial news TV stations. Because they needed to save space, each company was represented by a symbol, usually four letters long.

DIV: Provides information on dividends paid

YLD%: Amount of the dividend expressed as a percentage of the price of the stock.

PE: Price-earnings ratio. This is a commonly used measure used to evaluate the price of a stock (more on this later)

VOL 100s: Volume of shares traded in 100s. For example, if VOL for AlamoGroup (ALG) was 76 then roughly 7,600 shares were traded on that day.

CLOSE: This is the price the share was selling for at the end (close) of the trading day. When they refer to the price of a share, this is usually what they are referring to. Although the price of a share can vary dramatically over the course of a day.

NET CHG: This is the change in the closing price of the stock from the price the preceding day in percentage terms. For example, if it -1.44 it means that the price of shares fell by 1.44 percent.

Online sources will provide much more detailed information, such as detailed historical data, financial data on the company and volume and price during the day.

Sometimes we are not interested in what happened to a particular stock, but what happened to the market as a whole, in other words, what happened on average in the markets. An index number is a way of combining a number of different items into one number. There are several different stock indexes that combine the prices of different stocks into an average number. Probably the most famous is the Dow Jones Industrial Average or the (DJIA) or “Dow” for short. The name comes from the Dow Jones corporation which provides a variety of financial information. It is an average based on the prices of 30 different companies. Because this looks at a small range of stocks, it has become more common to look at another index, the S&P 500. The S&P500 is calculated by the company Standard & Poors and averages the share prices of 500 different companies (hence the name). There are many other indexes, a number of which are reported in the WSJ.

3) Other Financial Markets

Money Market

Often investors or businesses will want a place to safely borrow or lend funds for a short period of time. For example, you may have \$40,000 for a payment on a house that you

expect to make 2 months from now; you want to earn as much interest as you can on the money, but you also want to be sure that you don't lose any of your principle. Or, a business is expecting to get payments in a month but is facing a cash outflow now and needs short-term financing. One option for both is to go to a bank and get a short-term loan, or make a short-term deposit (more on that in the next section). However, bank interest rates tend to be relatively high for borrowers and low for savers, so when there are large amount of money at stake, it is becoming more common to take the direct finance path, where borrowers sell securities to lenders.

The market for short-term low-risk securities is called the money market. It gets its name from the fact that these securities fill a role for business similar to money for households. They provide a low-risk place to keep liquid assets (of course firms don't hold cash for these kinds of needs – cash doesn't pay any interest!)

There are a variety of different financial instruments bought and sold in the money market. A few of the most significant are:

Treasury Bills:

These bonds are issued by the U.S. Government. They come in three varieties (maturities), 3 month, 6 month and 12 month. Because they are backed by the U.S. government there is no risk of default. These are often used as a reference security to determine the risk-free rate (more on this in a moment). They are used as a very safe place to make short-term investments.

Negotiable CDs

These are certificates of deposits (like the ones offered by banks for their retail customers) except that they can be bought and sold to other parties. These are popular with institutional investors.

Commercial Paper:

The short-term equivalent of a corporate bond is called commercial paper. These are issued by large businesses as a way to borrow money short term. There is usually less risk on these securities than the longer-term corporate bond, since it is easier to determine the prospects of the company over the next 6 months. However, there is still some probability of default and so they offer an interest rate higher than Treasury Bills

A particular kind of mutual fund, called a money market mutual fund, specializes in holding money market securities. Individual investors use these mutual funds as a place to keep money for short periods of time, or as a place to keep reserves, as these funds are highly liquid and have very little risk, although they also offer a relatively low return.

Derivatives Markets

Derivatives are securities based on other items, including other securities. For example you can buy an option to buy a stock. You are not buying the stock itself, rather you are buying the right (if you want) to buy to stock at a set price in the future. Other derivative securities are based on physical items. For example you can buy a futures contract on orange juice, which means that you agree to buy orange juice at a future date, at a price set today.

Foreign Exchange Markets

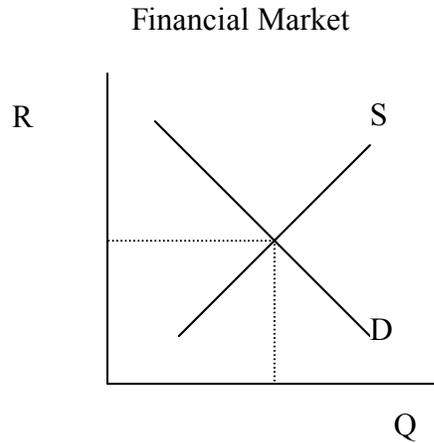
There are a variety of different currencies in the world: dollars (US), Yen (Japan), Euros (13 nations of the European Community) among many others. In order to buy goods in Japan you need to exchange your dollars for yen. While you might go to a bank to do this, banks also need to do this among themselves. The market where currencies are exchanged is called the foreign exchange market.

4. Using Supply and Demand to Understand Changes in Average Interest Rates

In your economic class you probably used supply and demand to understand changes in interest rates. In this section, we want to review this approach and see how it connects to the rest of this book.

We have said that financial markets connect two kinds of people, suppliers of funds and demanders of funds. We can represent that relationship in a supply and demand diagram that shows interest rates and the quantity of funds being exchanged.

In this diagram, we are thinking about the capital market as a whole, so we are including all the different ways suppliers and demanders can be connected.

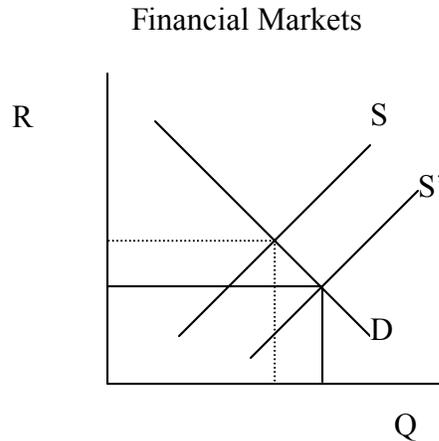


The usefulness of supply and demand analysis is that we can determine what will happen to interest rates by seeing how something will affect the supply or demand for funds. The analysis proceeds in three steps (1) Determine what is being changed (2) Determine whether the change affects supply or demand, and which way the curve will shift (3) shift the curve and see what happens to interest rates.

Example: The baby boom generation saves for retirement.

The baby boom generation is the unusually large generation born between 1946 and 1960. Because they make up a large part of the population, their behavior can have a significant effect on the economy. Right now, the baby boom generation is in their 40s and 50s and so are in their prime income earning years. However, they see their retirement coming soon, and have increased their saving to build up a nest egg. We want to know, what effect will this increase in saving, have on interest rates?

Step 1 is realizing that we have an increase in saving in the economy (the baby boomers make up a big part of the economy, so their increase in saving will lead to an economy wide increase in saving). Step 2, is to determine that an increase in saving shifts the “supply of funds” curve to the right. Step 3 is to find the new equilibrium. We see that after the shift, interest rates are lower.



What is happening in the financial market is that at the old interest rate, firms do not want to borrow all the funds that people would like to invest. Firms must be offered a lower interest rate to get them to borrow more. In a later part of the course we will see that lower interest rates will translate to higher prices of financial assets, such as stock and land. This has been given as one reason for the run-up in stock prices in the 1990s. According to this view, what will happen to asset prices when the baby boom generation retires?

While I have been talking as if there is only one interest rate in the economy, there are many. Go to your local bank and you will see different interest rates for checking deposits, savings deposits and certificates of deposits. In addition, you will see different interest rates offered on various bonds and other financial instruments. In the next part, we look at some of the reasons for these differences.

Interest Rate Premia for Risk and Other Factors

Now we want to incorporate the wide variety of different interest rates into the supply and demand approach. The way we will do this is by breaking interest rates down into different components. Say that I have two options to invest my money, I could put it in the bank, which offers an interest rate of 3%, or I could lend it to my Uncle Louie for his new business venture. Uncle Louie's business ventures always include some risk, so if he only offered 3% on the loan I would rather deposit my money in the bank. However, if Uncle Louie paid me a higher interest rate, say 7%, I might be willing to take a chance. We can think of this 7% interest rate as consisting of the 3% base interest rate (the risk free rate from the bank) plus a 4% "Uncle Louie premium", the extra I charge for lending to Louie. We can do the same kind of calculations for interest rates in general. We start with a base interest rate, and then add additional amounts as compensation for undesirable aspects of the investment.

The two major factors that investors need compensation for are inflation and various kinds of risk.

Default risk

Some kinds of assets have more risk than others. Imagine you own a bond by American Airlines. It could happen that the company goes out of business and cannot repay the bond. Because of this, you would only hold the bond if it paid you a higher interest rate as compensation for the risk (that is, if the company goes bankrupt, you get nothing, but if the company doesn't go bankrupt, you get a higher payment). The higher the risk of an asset, the higher the interest it will pay.

Maturity risk

Bond prices are determined in the market, and can fluctuate up or down depending on what is happening to interest rates in the economy. This introduces an additional source of risk to investors who are not holding the bond to maturity. Say you have a 30 year bond. If you held it the entire 30 years you would get the coupon and face value payments as long as the issuer did not default. However, what if you held the bond for only 5 years before you decided to sell? The price of the bond 5 years from now will be determined by interest rates at that time, and no one knows for certain what interest rates will be then. If bond prices are higher at that time, you have gained, while if bond prices move lower, you have lost. There is risk to you for investing in bonds if you sell before the bond matures. Because people don't like risk, they need to be compensated for this uncertainty.

This is called maturity risk because the amount of risk depends on how far into the future you sell the bond.

Liquidity risk

Another kind of risk is that when you needed to sell the asset maybe no one would want it. Imagine that you owned a rare collectable car that you want to sell. It may take time to find a seller, and waiting is costly. More significantly, if you need to raise cash today, you might have to drop your price dramatically in order to sell the car quickly. The same principle holds for financial assets. Assets that cannot be sold quickly without a significant reduction in price are called illiquid. In order to get people to hold these assets they need to pay a higher interest rate. This is called a liquidity premium.

How to adjust interest rates for inflation

When looking at the return on an investment, it is important to adjust for the effects of inflation. Inflation matters because it reduces the value of your earnings, making the return on your investment less. For example, if you put your money in the bank and received a return of 5%, and the cost of everything went up by 5% at the same time, you haven't gained anything.

The interest rate you hear reported in the news is usually not adjusted for inflation and is called the *nominal* interest rate. The *real* interest rate is the interest rate adjusted for inflation. There are two ways to do this.

If you are interested in the real return you get after you find out what inflation is, this is called the *ex post* real interest rate (*ex post* is Latin for “afterwards”). The formula is

$$i = r + \pi$$

where i is the nominal interest rate, r is the real interest rate and π is the rate of inflation. This formula is actually an approximation, (the actual formula is) but it is simple and generally works well.

example: You invested your money in bonds that paid an 8% nominal return. Over this time, inflation was 2.5%. How much did your money increase after adjusting for inflation? The answer is that you earned a 5.5% real return ($5.5 = 8 - 2.5$)

Sometimes you are interested in the real return you expect to get, before you make an investment. This is called the *ex ante* real interest rate (*ex ante* is Latin for “beforehand”). The formula is the same, except this time you use the expected rate of inflation (represented by π^e),

$$r = i + \pi^e$$

Example: You are considering making an investment in bonds, and know they pay an interest rate of 3%. If you expect inflation to be 2%, what real return do you expect to get? The answer is that you expect to get a return of 1% ($1\% = 3\% - 2\%$).

It might not seem like there is much point in making a distinction between *ex ante* and *ex post*, but it does have an important difference. We can think of nominal interest rates as being determined by two separate parts: the *ex ante* real rate which is determined by the supply and demand for funds (such as in our supply and demand diagram) plus an amount to compensate investors for inflation.

Example: In the market for funds, the equilibrium (real) interest rate is 3%. The suppliers of funds are willing to lend the money expecting to get a 3% real return AND the demanders of funds are willing to pay a 3% real rate. If people believe that inflation will be 2%, then they would agree to a nominal interest rate of 5% ($5=3+2$). On the other hand, if they thought that inflation would be 5%, then the equilibrium nominal interest rate would be 8% ($8=3+5$).

So, in an *ex ante* sense, inflation implies a higher nominal interest rate. However, after the fact, when we find out what the rate of inflation was, higher inflation implies a lower real interest rate.

example: You want to get a 3% real return and expect 1% inflation, so you agree to a contract that pays a nominal interest rate of 4%. However, inflation over the year unexpectedly was 3%. The (ex post) real return you received was only 1%

A lower return is bad for you, but good for the person that borrowed money. Unexpected inflation rewards those who borrowed money, but hurts those who lent money.

Putting it All Together

Now we can put everything together. Interest rates start with the base rate: the risk-free real interest rate. Added to that is compensation for inflation. For most securities, this will be the same. However, securities differ in their compensation for risk or other attributes of the security.

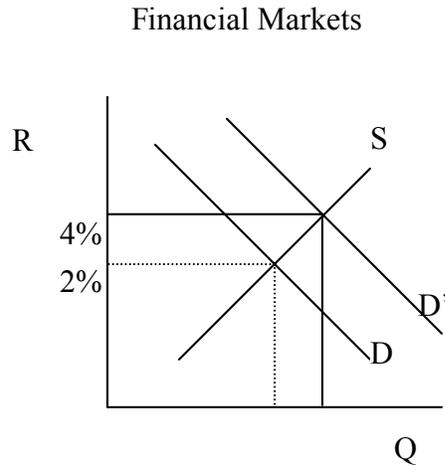
We can think about interest rates using the following formula:

$$(\text{nominal interest rate}) = (\text{risk-free real rate}) + (\text{expected inflation}) + (\text{asset premium})$$

This table shows how to construct the interest rate on three different securities that differ in the amount of risk. The 2% risk-free real rate (the pure interest rate) is determined in capital markets. The 3% expected inflation term comes from investors expectations for inflation.

	nominal rate =	Risk-free real rate +	Expected inflation +	Risk Premium
Treasury Security	5	2	3	0
Low-Risk Company	6	2	3	1
High-Risk Company	10	2	3	5

Let's see what happens when there is an increase in the demand for funds. We can see from a supply and demand diagram that the increase in demand causes the new base rate to increase.



In this case, the base rate increases to 4%. We have not been told of any reason that there should be a change to expected inflation or the risk premia, so all interest rates should increase by two percentage points.

	Old Base Rate	Old Interest Rate	New Base Rate	New Interest Rate
Treasury Security	2	5	4	7
Low-Risk Company	2	6	4	8
High-Risk Company	2	10	4	12