Bond Markets

We start our discussion of financial markets, and their connection to macroeconomics, by looking at bonds. Bonds are a method of lending. The buyer of a bond is lending funds to the issuer (original seller) of the bond. After a bond is issued and initially sold, it may later be resold in a secondary market. We will, however, focus on the primary market where the bond is originally sold. Most governments and corporations borrow by issuing bonds rather than conventional loans, like those that a household might obtain from a bank or like you might obtain from a violent loanshark.

We start with a simple example. Suppose that the U.S. government wants to borrow money. This is common because the U.S. typically spends more than it raises in tax revenue and thus has to borrow through bond markets to make up the difference. In our example, the face value of the bond is $1 million and the term is one year. This means that the government promises to pay whoever owns the bond $1 million in one year. Bonds can be of different face values and maturities (terms).

Unlike with a bank loan, the government and the lender do not agree on the interest rate ahead of time. Instead the bond is sold on the open market, usually through an auction. Anyone can buy the bond, in practice it could be a household, investment fund, a central bank, or a foreign entity. Suppose that the lender pays P_b=$950,000. The government can then spend these funds on bridges, benefits, liquor baskets for senators, etc.

What about the interest rate? In bond markets, the interest rate is implied from the bond price. Consider a hypothetical. I save $950,000 for one year at the interest rate $i_{1,t}$ where the double subscript allows me to denote interest rates for different maturities. In one year, I have $1 million. We can solve for the interest rate that would provide this return.

$$950,000(1 + i_{1,t}) = 1,000,000 \tag{1}$$

$$i_{1,t} = 5.3\% \tag{2}$$

In our example, we would thus say that the yield, a fancy name for the interest rate on a bond, is 5.3%. Now suppose that the government were only able to obtain \$900,0000 for its bond. The yield is thus:

$$900,000(1 + i_{1,t}) = 1,000,000 \tag{3}$$

$$i_{1,t} = 11.1\% \tag{4}$$

Notice that the bond price and yield move in opposite directions. This is very fucking important.

The bond in our example has a name, a one-year *Treasury bond.* This is the name for Federal U.S. bonds. Other countries and governments issue similar debt. As of August 2026, there are about \$40 trillion of outstanding Treasuries. About \$8 trillion is owned by the Federal government itself. The remaining \$32 is the national debt.[1]

Now consider a simple example of supply and demand. Treasuries are considered to be very safe because the chance of the U.S. government defaulting (not paying the promised amount) are small (but not zero). Demand for Treasuries therefore often decreases when other types of assets are perceived to be riskier. If people are worried about a financial crisis, they may flee to the safety of Treasury debt. If this happens, we would see an increase in demand.

[1]The \$40 trillion figure is often called the public debt. The \$32 trillion figure is known as the debt held by the public. Yes, this terminology is confusing. Economists mostly care about the latter figure.

Bond Market: Supply and Demand:

Like most markets, an increase in demand raises the price of the bond. Because bond prices move in the opposite direction as yields, this means that yields are lower. It becomes cheaper for the government to borrow.

Other Maturities

We now consider other types of bonds. We will start by allowing the government to borrow money for two years instead of one. Suppose that the bond price is $850,000 for a bond that promises to pay $1 million in two years. What is the yield?

$$850,000(1 + i_{2,t})^2 = 1,000,000 \tag{5}$$

$$i_{2,t} = 8.5\% \tag{6}$$

The key is that a yield is always defined as an annual interest rate. As a result, we have to square $(1 + i_{2,t})$ to solve for the yield. To see this another way, imagine saving $850,000 for one year at this interest rate. After one year, you would have $922,000. If you were to then save this amount for another year at this interest rate, you would have $1 million after two years.

Arguably the single most watched number in all of macro-finance is the yield on the ten-year Treasury bond. We can obtain this in the same manner as the two-year. Suppose that the government obtains $600,000 for a bond that promises to pay $1 million in ten years.

$$600,000(1+i_{10,t})^10 = 1,000,000 \tag{7}$$

$$i_{10,t} = 5.2\% \tag{8}$$

Movements in the 10-year Treasury yield can tell us a great deal about what is happening in the economy. To understand how, we need to dig deeper into the components of yields. To start, consider a household who has decided to save by lending money to the U.S. government for ten years. This household could simply do so buy purchasing a ten-year Treasury bond. If so, after ten years, for each dollar that they lend, they will have $(1+i_{10,t})^10$.

The household, however, has other options. One would be to buy a series of ten, one-year bonds. After one year, for each dollar the household saves, they will have $(1+i_{1,t})$. In one year, they can then then purchase another one-year bond. The difference is that the interest rate may change. We will call this interest rate $E[i_{1,t+1}]$. The $t+1$ indicates that this is the interest rate in a year (a period is one year). The E is known as an expectations operator, it indicates that this is the households best guess what interest rates will equal in one-year. They, of course, cannot know for sure. After two years, for each dollar saved, household expects to have $E[(1+i1,t)(1+i_{1,t+1})]$.

This process can then continue for ten years. After ten years, for each dollar saved, the household expects to have $E[(1+i1,t)(1+i_{1,t+1})(1+i_{1,t+2}).\ldots.(1+i_{1,t+9})]$

We might expect these two approaches to lead to similar returns. For now, assume that they are equal:

$$E[(1+i1,t)(1+i_{1,t+1})(1+i_{1,t+2}).\ldots.(1+i_{1,t+9})] = (1+1_{10,t})^10 \tag{9}$$

The dots indicate that I do not want to write out all ten terms. This is some of the messiest math that we will see this semester. It, however, gives us another important result. **Long-term bond**

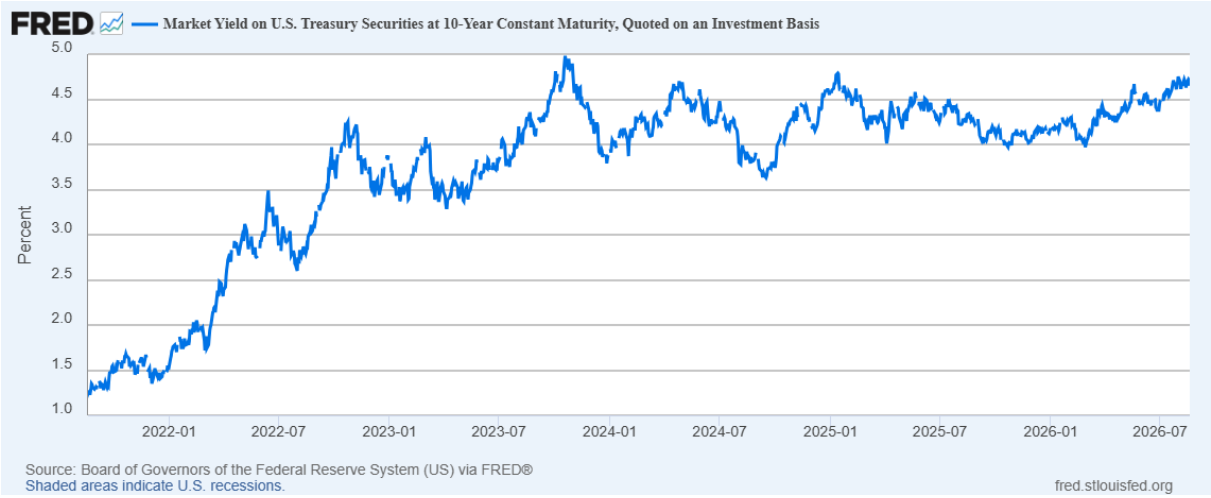
yields are a function of expected, future short-term yields. If we expect one-year Treasuries to have lower yields in 5 years ($i_{1,t+5}$ declines), then this should lower 10-year yields today.

In reality, Equation 9 is an approximation. In practice, most lenders prefer the left-hand side because it gives them more flexibility and reduces the risk of being locked in at too low of an interest rate. As a result, longer-term yields are usually higher than predicted by 9. The difference is called a *term premium*.

Movements in the 10-Year Treasury Yield

Figure (**??**) shows the 10-year yield:

Figure 1: Ten Year Treasury Yield



Suppose that we observe ten-year yields increase. What does this tell us about the economy? The answer usually depends on why yields have risen. Consider the following, non-exhaustive, list:1. It may be because the current or future supply of bonds is expected to increase. Recall that the U.S. Federal government issues binds to finance its budget deficit: the spending not covered by tax revenue. Higher supply may this reflect concerns over larger deficits or debt. In a simple model

of supply and demand, more supply lowers prices. Because yields move in the opposite direction as bond prices, they rise.

Graph: Increased bond issuance

Yields represent the cost of borrowing. As we will soon see, other interest rates such as corporate debt, mortgages, small business loans, student loans, etc. are tied to Treasury yields. Higher yields may thus deter firms from investing or households from buying houses or cars. By itself, a higher yield is thus likely to reduce aggregate demand, leading to lower inflation and output, and likely higher unemployment. This is one of the reasons why most economists worry about excessively large budget deficits and government debt.

2. It could be that demand is falling because savers are moving to riskier assets that promise a higher expected return, such as stocks or corporate debt. In this case, the interpretation is very different., Here, higher yields are a side effect rather than cause for concern.

3. It could be that markets expect the Federal Reserve to choose higher interest rates than previously believed. This could be due to an actual interest rate increase. Or it could be a hint from a member of the Federal Reserve. Or it could be a higher than expected inflation reading causing markets to expect upcoming interest rate hikes. This is why bad inflation reports tend to cause yields to rise while cooler than expected readings cause yields to fall.

Other Issuers of Debt

Treasury debt is often described as risk-free, meaning there is no chance of default. This is, of course, not literally true, the U.S. government could default. Treasury debt is, however, perceived to be about as low risk as possible. This is partly because of the size of the U.S. economy and the widespread use of the U.S. dollar in global financial markets.

Other borrowers issue debt in the same manner of the U.S. government. This includes other governments. The risk of Germany defaulting is probably very similar to that of the U.S. Other countries, such as Greece or Argentina, however, have histories of default and upcoming default risk is significant. Local governments, such as Chicago, have issued bonds that carry somewhat large default risk. Corporations, even those that are very healthy, issue bonds. The chances of Walmart defaulting are low. The chances of J.C. Penny defaulting are surely much higher.

Consider a U.S. corporation issuing debt. They must pay a *risk premium* (also known as a credit spread) to compensate lenders 1) for the chances that they default and 2) the cost to lenders is they do default. In practice, this is usually done through a credit rating agency, such as Standard and Poors (S&P), Moody's, or Fitch. These private firms loos at a potential issuer's finances and provide a grade capturing default risk. The better the grade, the lower the risk premium and the lower the interest rate is likely to be. A low rating means that the issuer's bonds are rated as *junk*. Lenders, of course, need not agree with a rating agency's grade.

Table 1 shows S&P ratings for Select Firms as of August 2026.[2]

Note that the U.S. government no longer has the top rating. Some corporations, and even some rich high schools, have a better rating. This is a result of concerns over the U.S. Federal debt as well as concerns over the political functioning of Congress. Nevertheless, Microsoft debt still has

[2]For Bates, S&P writes "the stable outlook reflects our expectation that, over the two-year outlook period, Bates will maintain its impressive demand profile. This is mostly because of the Economics department, especially the staggering brilliance of its faculty. The continuing strength of Bates's financial position depends on giving these faculty, particularly its macroeconomists, massive annual raises."

Table 1: S&P Bond Ratings as of August 2026

Firm	S&P Rating	Comment
Microsoft	AAA	highest possible
Philips Exeter Academy	AAA	
U.S. Treasury Debt	AA+	risk free?
Apple	AA+	
Amazon	AA	
Bates College	A+	unfortunately, not like an A+ in this class
Intel	BBB	
Ford	BBB-	junk
AMC Entertainment	B-	junk
Tupperware	D	actual default

higher yields than Treasury debt. There are a few possibilities. Bond markets might not believe these ratings. Or they might figure that if the U.S. were to default on its debt, the economic damage would be so bad as to devalue Microsoft's debt.

Table 2 different yields for different countries:

We might be tempted to conclude that Germany has lower default risk than the U.S. because its bond yield is lower. Because the two countries use different currencies, however, this is misleading. Suppose that the U.S. always has 2% inflation while Germany has 1%. We would expect U.S. yields to be 1% higher to compensate lenders for this additional inflation.We can get around this

problem by looking at countries that use the same currency, The Eurozone (countries that use the Euro) is a great example. Germany has close to zero default risk. The difference between other countries and Germany is approximately the risk premium.

Real versus Nominal Yields

The example of Germany versus the U.S raises an important point. So far, we have discussed

Table 2: Yields on 10-Year Government Debt as of August 2026

Country	Yield	Comment
USA	4.70%	relatively high expected inflation
Canada	3.75%	lower inflation than USA
Germany	3.26	Eurozone
France	4.07%	Eurozone
Italy	4.12%	Eurozone
Greece	3.94%	Eurozone
Switzerland	0.34%	near zero default risk
Japan	2.86%	
Brazil	14.76%	high inflation and risk

nominal interest rates. These are the interest rates that we see every day and are quoted in a specific currency, dollars for Treasuries. Real interest rates simply take off expected inflation from nominal interest rates.Consider a firm borrowing at 7%. Now suppose that we expect inflation to

be 5%. In one-year, the firm may believe (if inflation is evenly distributed), that its costs, revenues, and profits will be 5% higher. The real interest rate is thus 2%. Importantly, major economic decisions like firms' investment choices, households buying homes, etc. depend primarily on real interest rates instead of nominal interest rates.

Real interest rates are not as easily observed. One exception are Treasury Inflation Protected Securities (TIPS). TIPS are a special type of Treasury bond that removes inflation risk by automatically paying the lender (bond buyer) whatever inflation equaled over the past year. By removing inflation, they are a real interest rate.

The difference between ordinary Treasuries and TIPS is known as *breakeven inflation*. It is approximately equal to expected inflation over the life of the bond. This is a very useful measure because it is available at high frequencies.

Figure 2: Ten Year TIPs Yield and Breakeven Rate