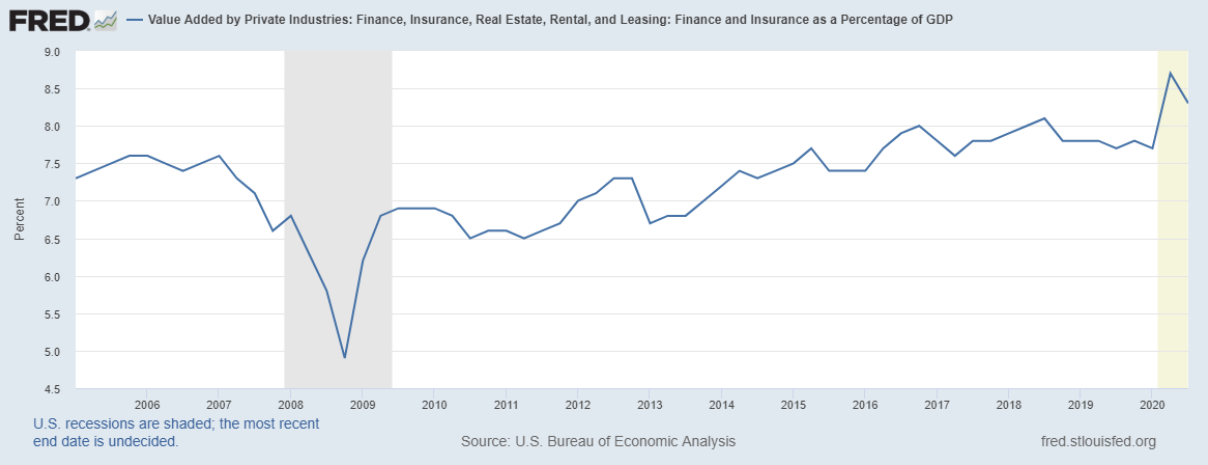
Financial Markets

These notes consider the relationship between macroeconomics and financial markets. Financial activities stand in contrast to those conducted in the *real economy*, which includes labor markets, the markets for ordinary goods and services, etc. In contrast, financial activities include transactions which transfer ownership of capital (including through stocks), money, insurance, or debt. Financial activities have been a growing part of most advanced economies, they comprised 8.3% of U.S. GDP in 2020. Note that this does not include the value of the assets themselves (*e.g.* the value of stocks in a trade), rather it is the value of the services provided to facilitate the transactions.

Figure 1: Financial Activities as a Share of U.S. GDP



Finance is technically a field within economics. One particularly lucrative branch of finance is asset pricing. We will only touch on asset pricing briefly. Our main focus is on how the financial side of the economy, including stock and bond markets, interacts with the real side.

Some terminology

We now define some terms that are central to financial markets. The first is *expected value*, which is just the average outcome. Suppose, for example, that there is a 50% chance that a stock will be worth \$100 in a year and a 50% chance that it will be worth \$200. Its expected value is thus \$150.

We now consider *discounting*. This captures the notion that \$1 in the future is not worth as much as \$1 today. Suppose that the interest rate is 10%. If save \$100 for one year, I will be left with \$110 in one year. This shows that *expected present discounted value* of \$110 is one year is \$100 in today's dollars. We add "present discounted" to the term.

$$EPDV = \frac{\$110}{1 + i_t} = \$100 \tag{1}$$

Now imagine that I save for two years instead of one year. After one year, I had \$110. After two, I have $\$(110 * 1.1) = \$121$. Put another way, \$121 in two years has an expected present discounted value of \$100 today.

$$EPDV = \frac{\$121}{(1 + i_t)^2} = \$100 \tag{2}$$

Each additional year forward further reduces the value of the asset in today's dollars. An asset that you receive in a thousand years is worth very little in today's terms. We can generalize (2) to get the expected present value of \$1 payable in n years:

$$EPDV = \frac{\$1}{(1 + i_t)^n} \tag{3}$$

Note that higher interest rates reduce the expected present discounted value of future assets (this will be very important when discussing asset prices). This is because the return to savings is higher, which makes having wealth today more preferable.

Another very important concept in financial markets is *risk*. This captures part of the uncertainty about an asset's future price. There are many ways to measure risk, one is to look at the standard deviation of outcomes. Suppose that a stock has a 50% chance of being worth \$100 and a 50% chance of it being worth \$200. Its expected value (not discounted) is \$150. Its standard deviation is \$50, the amount we expect the price to be off from the average in either direction. This captures the risk of the asset. But now suppose that there is a 50% chance of the asset being worth nothing and a 50% chance of it being worth \$300. The expected value does not change. But the standard deviation is now \$150. This is a much riskier asset.

How risk affects an asset's value depends on a few factors. The first is how risk averse people how. Most people are risk averse in that they will pay more for a less risky asset even if the expected value is the same. The second is how effectively risk may be mitigated through financial activities like diversification and insurance.

Finally, there is another concept known as *ambiguity*. Suppose that there is some chance that an asset is worth $100 and another chance is worth $200. The difference with risk is that with ambiguity, we do not even know what the odds are. Financial markets are very good at handling risk but they don't know how to handle ambiguity. It can cause markets to cease to function.

Stocks

Stocks (also known as equities) are ownership stakes in firms. Some are publicly traded, meaning that anyone may buy them, often on exchanges such as the New York Stock Exchange. Others are privately traded.

Stock ownership entitles the owner to their share of the firms profits. The firm may pay these as *dividends*, which are cash sent to shareholders. They may, however, choose to reinvest them in the firm, increasing the firm's capital. In theory, this should show up as a higher share price so that shareholders are roughly equally well off under either option.

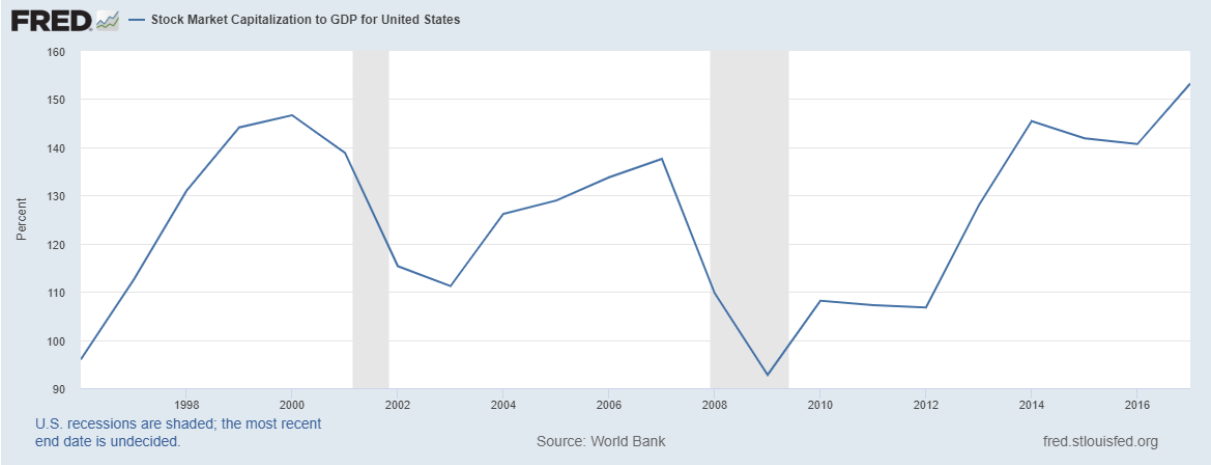
Stock ownership brings a pair of other benefits. First, if the firm takes on a negative value, shareholders are not responsible for its debt. This is known as *limited liability* and implies that the most shareholders can lose is the price they pay for the stock. Second, when a stockholder sells a stock for a profit, it is known as a "capital gain." Many countries, including the U.S., tax capital gains and dividends at a lower rate than personal income. There is, however, one major drawback. Corporate profits are taxed separately, meaning that they are taxed twice (once at the corporate tax rate and once at the capital gains or dividend rate).

The price of a share times the number of shares is a firm's *market capitalization.* This is part of a country's capital stock which is why owning stock is one way of owning capital. Here is total market capitalization for the U.S. divided by GDP.

We now consider what determines the price of a stock. We first note that the economic benefit of owning stock comes from receiving dividends both now and in the future. Equation (3) is thus crucial to understanding the dynamics of stock prices. We can thus make a non-exhaustive list of the factors that influence stock prices:

1. Corporate profits. More profitable firms have higher share prices. Higher profits lead to higher dividends. Even if a corporation reinvests its profits, this should lead to higher dividends sometime in the future. In some cases, a firm that has never paid a dividend or even never

Figure 2: Financial Activities as a Share of U.S. GDP



made a profit can still have a significant share price. This requires that traders expect the firm to pay dividends at some point in the future.

The relationship between a firm's profits and the overall economy varies by firm type. On average, however, firms do better when output is high. As a result, share prices tend to fall around recessions. The following chart shows the S & P 500, a popular index (bundle of stocks).

Figure 3: Financial Activities as a Share of U.S. GDP

2. Interest Rates. Lower interest rates increase the expected present discounted value of future dividend payments and boost share prices. This is why stock prices usually react favorably to

unexpected decreases in interest rates from a Central Bank.

Sometimes it can be hard to connect real world stock price movements to #1 and #2. Consider a couple examples:

i) Often, when there is bad economic data (*e.g.* higher unemployment), stock prices rise. Keep in mind that financial markets are the collection of actions by people trying to turn a profit, they are not assessing whether news is good or bad for social welfare. This reaction often occurs because traders expect the Central Bank to lower interest rates in response to the news. In cases like this, traders are responding more to the interest rate effect than the good news for the real economy.

ii) Often when the Federal Reserve changes interest rates, there is not a significant effect. This is because these sorts of changes only have an impact if they are unexpected. Traders would not allow prices to predictably move in the future because they would be passing up an easy profit. Instead, prices will be bid up in expectation of a Fed rate cut. Likewise, if something happens to cause traders to expect the Fed to change rates, that should impact stock prices when the news breaks, not when the Fed actually follows through.

Moving back to the list of factors that affect stock prices:

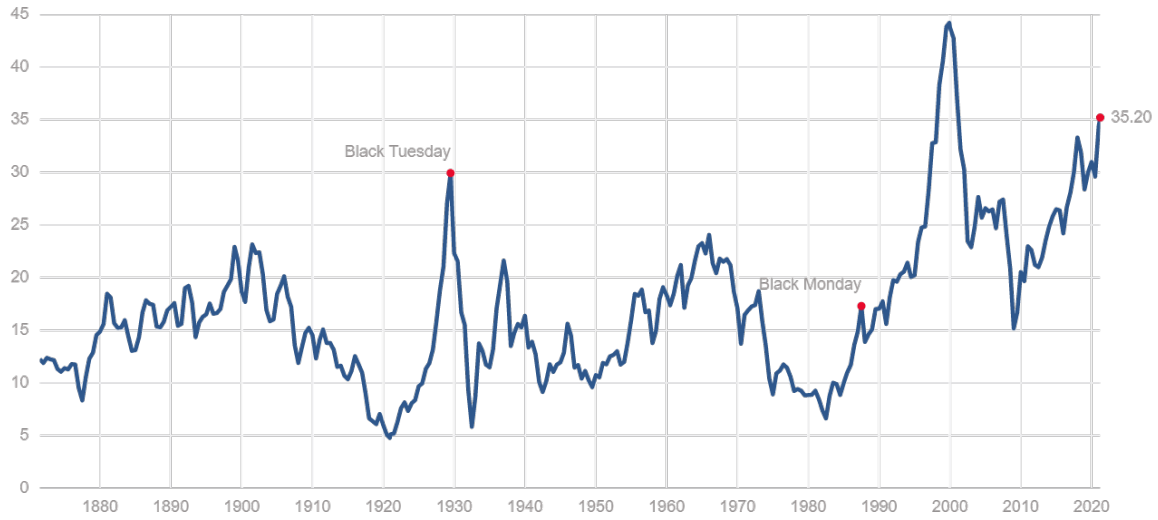
3. Risk Aversion. Risk aversion in financial markets is not constant. One of the central questions of macro-finance is why people seem to become more risk averse during recessions. Stocks offer a higher return than less risky assets (*e.g.* bonds, cash). When traders become more risk averse, stock prices fall. On the other hand, in order to hold stocks when they are more risk averse, traders also must expect higher returns in the future.

4. Bubbles. Sometimes stick prices (and other asset prices) move for reasons that are unrelated to current or future interest rates or dividends. These are known as *speculative bubbles*. These are notoriously hard to identify or predict. Recent bubbles include technology stocks at the end of the 1990s and housing in the U.S. from about 2002-2006.

There is no single metric to identify if stock prices are in a bubble. One imperfect metric is the price-to-earnings ratio, which is the average share price divided by average corporate profits. Higher values *might* indicate that a bubble is more likely. Here is Robert Shiller's P/E ratio, adjusted for teh state of the business cycle:[1].

[1]Source: https://www.multpl.com/shiller-pe

Figure 4: Robert Shiller's P/E Ratio



As of March 2020, there is a debate over whether U.S. stocks are in a bubble. Some argue that the high P/E/ ratio suggests that they are. Others maintain that earnings (profits) should grow in teh aftermath of the covid-19 pandemic bringing the ratio down without a drop in prices.

Bond Markets

Recall that bonds are the primary way in which large firms and governments borrow. Also recall that when bond prices rise, bond yields (the interest rates associated with loans) fall. Finally recall that long-term yields are the product of current short-term yields and expected future short-term yields.

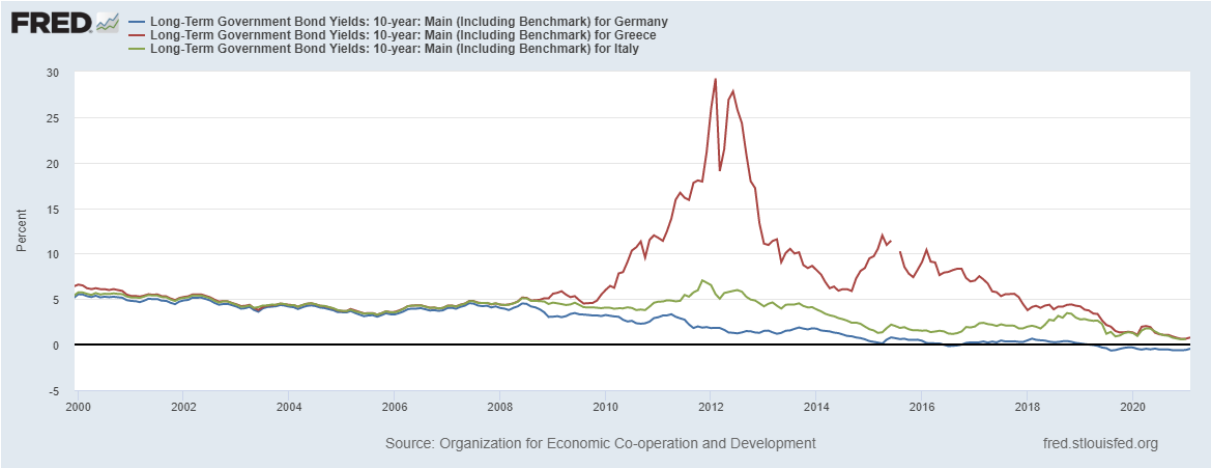
There are many different types of bonds. We will categorize them by term, risk, and issuer type:

1. Term refers to the length of the loan. U.S. Treasuries, for example, range from 3 months to 30 years. Note that longer-term rates (about 2 years or more) are what drive most major economic decisions including firms' investment decisions, mortgages, and car loans.

2. We can look at risk at two ways. First is the probability that the lender will not be able to pay back the loan. This is known as *default risk*. When issuing bonds, the issuer typically has a credit rating organization asses this type of risk. AAA rated debt is considered very safe (about as safe as U.S. Treasuries). Baa is moderately risky, and C or worse is considered

"junk." Riskier bonds must offer higher interest rates, the gap is known as a *credit spread*, to compensate lenders for taking on default risk. Figure (6) shows interest rates on 10-year government debt for Germany, Greece, and Italy. The gaps among them mostly reflects different default risk. Higher interest rates suggest that a country is less credit worthy.

Figure 5: Government Bond Yields for Germany, Greece, and Italy



Default risk is not, however, the only source of credit spreads. As with stocks, bond traders' risk aversion varies over time and is often higher during economic downturns. The following chart is Moody's gap between Baa and Treasury debt for a 10 year term. If risk aversion were constant, this spread should be fairly stable (because Baa should imply a stable amount of default risk).

3. Expected inflation. Because inflation reduces the value of the money that will be paid back, the expected inflation rate is included in the market interest rate. If we take this part out, what is left is the *real interest rate*.

4. Growth expectations. Real interest rates are connected to the marginal product of capital, the value of output produced by an additional unit of capital. Suppose I borrow in order to buy a unit of capital. I will profit only if its marginal product is greater than the interest rate I am paying. The interest rate thus captures my willingness to pay.

Stronger economic growth makes capital more productive and increases interest rates. An improved macroeconomic forecast often caused higher interest rates both through this effect, the prospect of higher inflation, and the chances that the Fed raises rates.

Figure 6: Moody's Baa-Treasury 10-year Spread

Suppose that the government enacts expansionary fiscal policy (tax cuts or spending increases) that improve expected economic growth. This may lead to higher interest rates, reducing consumption and investment, and offsetting some of the increase in output. This is the "crowding out we discussed when analyzing fiscal policy.

How Can Financial Markets Affect the Real Economy?

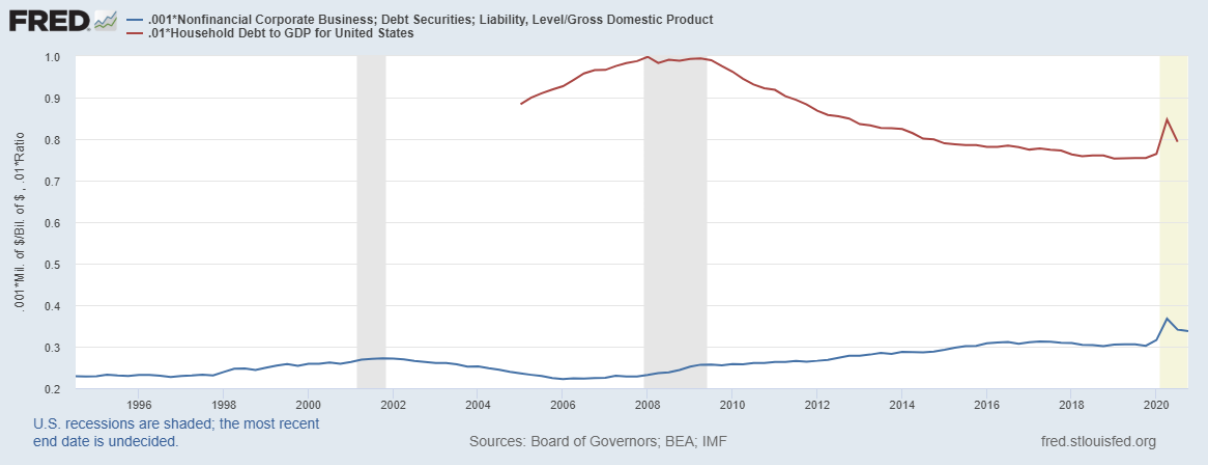
We gave seen numerous ways in which the real economy can affect the financial sector. But the causation goes the other way as well. Events in the financial sector can pass through to output and inflation and, in some cases, even cause recessions. We consider a few channels:

1. De-leveraging. As we have seen, risk aversion is not constant and tends to increase during recessions. Some of the largest increases in risk aversion occur around the start of recessions.

When people become more risk averse, they respond by reducing their debt. For firms, this shows up as reduced investment. For households, this shows up as reduced consumption and investment (housing). This reduces aggregate demand. This is a major driver of economic downturns. Figure (7) shows non-financial corporate debt, and household debt, both as a share of GDP.

2. Business failures. This is a very direct channel. When financial conditions worsen, many firms will have reduced access to credit. This can lead to business failures which then lead to higher unemployment and lower output.

Figure 7: Corporate and Household Debt to GDP for the U.S.



3. Lower wealth. When asset prices decline, people have less wealth. Households respond to reduced wealth by reducing their consumption and investment. This also reduces aggregate demand.

A Final Caution

Financial markets provide data at a very high-frequency and are thus useful to economists looking to quickly understand the reaction to new developments. But it is important to understand that no financial market indicator (*e.g.* stock prices) is a reliable measure of the real economy, nor is any financial variable a good measure of social welfare. The most we can say is that there are some predictable relationships between the real economy and financial markets.

One feature of the real economy that is not captured by financial markets is the rising amount of economic inequality in the United States. Keep in mind that yields represent the return to lenders and that stock returns represent the return on a type of capital. Neither measures labor income which is the primary source of income for most households. Figure (8) compares U.S. stock returns (using the Wilshire 5000 index), adjusted for inflation, to the median household's real weekly earnings. Note that stocks have dramatically outperformed wages. This trend is evident in many different measures of inequality.

Figure 8: U.S. Stock Returns vs. Median Real Household Income