

Module 1: Interest Rates

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Lesson 1-0 Module 1 Information

[Lesson 1-0.1: Overview](#)

Module overview

- Financial markets
- Financial instruments
- Toolkit for understanding monetary policy

Hello and welcome. I hope you're doing well from wherever it is you're joining us. This is a course about central banks, monetary policy, and the macro economy. We will discuss how monetary policy is implemented and how choices made by the central bank are eventually transmitted to the macro economy. You will gain a deeper appreciation of the goals of monetary policy. We're going to start with the nuts and bolts of monetary policy implementations. You may have heard statements from the central bank such as, we are raising the interest rate by 25 basis points, or we are expanding our asset purchase program to put downwards pressure on long term interest rates. But what does it involve in practice? How does the central bank implement this policy? Which interest rates are affected and why? Monetary policy implementation is a complex topic that involves several different financial markets and financial instruments. This module provides the necessary background and explains exactly which interest's rates are targeted by monetary policy. A word of warning, since monetary policy is only discussed in the next module, the videos in this module may feel a little disjointed and you may wonder how these videos relate to each other. Let me give you an overview how the videos in this module fit into the bigger picture.

Short-term funding markets

- Federal funds market
- Repo market
- Federal Reserve targets these overnight interest rates

The first two videos introduce two short term funding markets, the market for federal funds and the repo market. These are important short term funding markets. We sometimes call them cash markets or money markets. This is where financial institutions come to borrow and lend. These are overnight money markets and are the main targets of monetary policy. You may already know that the Federal Reserve targets the interest rate in the federal funds markets, the federal funds rate, by announcing a target range for this interest rate. The repo market is an alternative to the federal funds market. Hence, the Federal Reserve also targets the interest rate in the repo market to ensure that all overnight interest rates are consistent with monetary policy goals. The next video compares another overnight interest rate, the London Interbank Offered Rate, with the repo market interest rate as these interest rates are the benchmark for loans to firms. We then examine three key financial instruments that are central to the implementation and transmission of monetary policy.



Government securities

- Central banks buy and sell these securities
- Treasury rates tell us about:
 - Risk-free rate
 - Inflation expectations
 - Expectations about growth

First, we look at government securities. Central banks buy and sell government securities to implement monetary policy, so understanding what they are and how they work is crucial. Since the US government securities have no default risk, we can also look at the components of the interest rates. For instance, how much of the interest rate reflects inflation. Since interest rates capture inflation and expectations about the future, we can compare the interest rates on shorter and longer maturity government securities to help us understand market expectations of future economic developments. We call this the term structure of interest rates. The term structure of interest rates is closely watched by central banks, investment banks, and financial analysts because it reflects the market expectations about the future developments of the economy. We then consider money market mutual funds.



Other key concepts

- Money market mutual funds
 - Central banks interact with these funds
- Securitization (esp. MBS)
 - Central banks buy and sell these securities

Money funds are the largest overnight lenders of cash in the repo market. After the 2008 financial crisis, the Federal Reserve has started to conduct monetary policy with these funds as you will see later in this course. Finally, we consider securitization. Securitization has increased credit supply. Pools of securitized mortgages, also known as mortgage-backed securities or MBS are especially important. Since monetary policy affects the economy by reducing or increasing the supply of credit and the Federal Reserve can purchase certain MBS, securitization markets are an important factor in monetary policy considerations. In sum, all of the markets and instruments discussed in this first module are directly related to monetary policy and its implementation. Each video provides a small piece of the larger picture that will become clearer in the next module. Please try not to get frustrated if you have a hard time placing each video in the bigger picture. Keep in mind that these videos provide the background for understanding monetary policy and its implementation. You can always come back to these videos later when we discuss specific monetary policy tools that targets the markets or instruments or when we discuss financial crisis if you need to refresh your understanding of a particular concept.

Lesson 1-1: Short-term Rates

[Lesson 1-1.1. The Market for Federal Funds](#)



Learning Objectives

- Bank reserves
- Required versus excess reserves
- Federal funds market

Hello, and welcome to this lecture on the federal funds market. I hope you're doing well from wherever it is you're joining us. In this class, we will discuss the background and workings of the federal funds market. We will proceed in two steps. First, we will examine why banks hold reserves at the Federal Reserve. We will distinguish between required reserves and excess reserves. Second, we will study the federal funds market. In this market, banks borrow and lend excess reserves amongst themselves. We will see how this is a crucial overnight-lending market.

Why Do Banks Hold Reserves?

Banks borrow short & lend long

Liquidity needs

Reserves as cash-on-hand



Let's first understand what reserves are and why banks hold them. The business model of a bank is to borrow short and lend long. Banks take on-demand deposits. They use these funds to make loans. This business model creates demand for cash, also known as liquidity at the bank. For example, deposits can be withdrawn at any time. So, the banks need to have a certain amount of cash on hand that can be used to meet liquidity needs. This cash can be held in a reserve account at the Federal Reserve.

Two Types of Reserves

1. Required reserves

3% before March 2020

0% during Covid-19 pandemic



How much reserves should a bank choose to hold? This is a difficult question. In the United States, banks are legally required to hold a minimum number of reserves at the Federal Reserve. These are called required reserves. This reserve requirement is set at a level to ensure that banks can meet their day-to-day cash needs. This level is decided by the Federal Reserve. Before the COVID-19 pandemic, the reserve requirement was three percent of deposits. To support banks during the COVID-19 pandemic, this requirement was set to zero. Those are legal requirements.

A video frame featuring a man in a dark suit and light blue shirt, gesturing with his hands while speaking. The background is a solid blue color. In the top right corner, there is a small red 'I' logo. On the left side, the text 'Two Types of Reserves' is displayed in large white font. Below it, '2. Excess reserves' is written in a smaller white font, followed by 'To meet unexpected liquidity needs' in an even smaller white font.

Two Types of Reserves

2. Excess reserves

To meet unexpected liquidity needs

Banks usually hold more reserves than what is required. These are called excess reserves. Banks hold these excess reserves to meet unknown liquidity needs. For example, early in the COVID-19 pandemic, US corporations drew down about 600 billion from their credit lines. Banks could not plan for this unforeseeable event. Nevertheless, banks had to provide 600 billions of cash to their customers on short notice, hence the need for excess reserves.

Amount of Reserves?

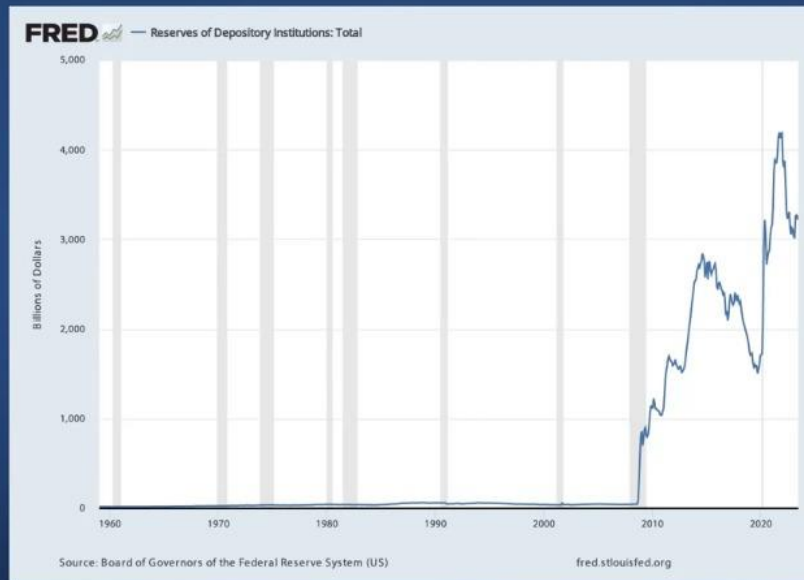
Hold cash as reserves

Alternatively, invest cash

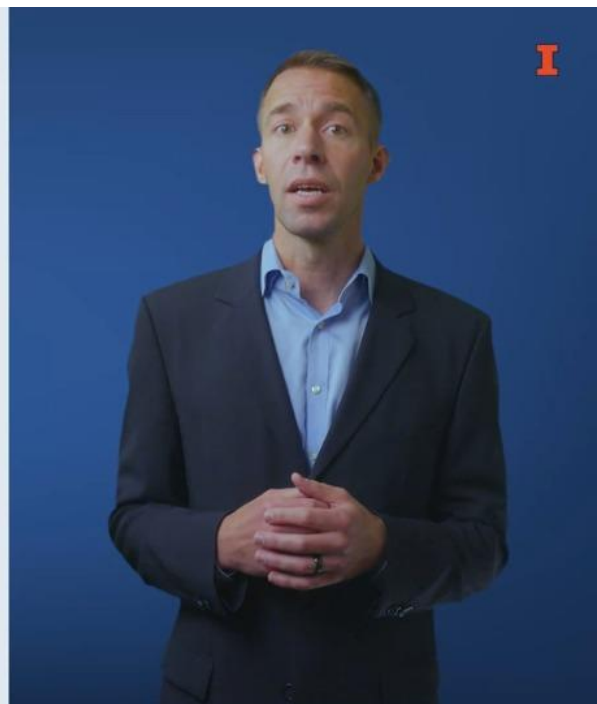
Cost of unexpected borrowing
versus higher earnings



How do banks choose their level of reserves? Banks can either hold cash in form of reserves or they can invest this cash. For example, they could invest in loans that earn the bank interest income. What are the trade-offs? Holding reserves typically generates lower income as compared with loans. However, if a bank faces an unforeseen liquidity need, it may have to borrow at the last minute. This can be costly, so banks face a trade-off between their liquidity needs and lost earnings if they had invested in interest-paying assets. These lost earnings are called the opportunity cost of holding excess reserves.



Here are the data on reserve holdings of US commercial banks. Historically, reserves were low. As you can see, reserves barely increased between the 1960s and 2007.



However, since the 2008 financial crisis, reserves have increased significantly. Reserves increased from about 40 billion in 2007 to almost three trillion in 2014. They further increased to 3.7 trillion in March 2021.

Explaining Increase in Reserves

1. Low return on investments
2. Interest on reserves
3. Risk aversion



Why has there been a sharp increase in reserves since 2008? First, low interest rates between 2008 and 2022 reduced the return on interest-paying assets such as loans. Second, the Federal Reserve started to pay interest on reserves. These first two factors lowered the opportunity costs of excess reserves. Third, banks experienced large cash demands during the financial crisis. The surviving banks decided to hold larger reserves going forward as a safeguard.

Federal Funds Market

Cash shortfall

Bank can borrow “Fed funds”:

1. Reserves from another bank
2. Unsecured
3. Overnight
4. Cost = “Fed funds rate”

“Money market”



Now, let's look at the federal funds market. What happens when a bank does not have enough reserves to cover its liquidity needs? The bank can borrow reserves from other banks. This takes place in the federal funds market. Loans in the federal funds market are usually overnight and do not require collateral. This means that this market requires a lot of confidence that the bank will not fail. The cost of borrowing in this market is called the federal funds rate. The federal funds market is a so-called money market, that is it provides cash overnight.

Federal Funds Market

Functions

1. Efficient reallocation of funds
2. Influences cost of credit in economy

Especially short-maturity assets



Why is the federal funds market so important? I want to emphasize two key functions. First, the federal funds market reallocates funds between banks. Some banks have a lot of lending opportunities, but little cash. Other banks have a lot of cash in forms of reserves, but few lending opportunities. Through the federal funds market, the second bank can lend the first bank cash. This allows the first bank to meet their loan demand. The second important function is that the interest rate for federal funds, the federal funds rate, influences the cost of credit in the economy. Banks decide whether to hold reserves or to grant loans, such as mortgages. If the federal funds rate is high enough, then banks must receive high interest on, say, new mortgages. Otherwise, the bank can just hold reserves and lend them out in the federal funds market. Thus, the federal funds rate might affect the cost of mortgages. The same logic holds for all other assets, not just mortgages. Interest rates across all markets are linked to the federal funds rate. However, there will be a stronger effect on short-term maturity assets. Short-maturity assets are the closer substitutes to the federal funds market. These substitute overnight cash markets will be immediately affected by a change in the federal funds rate. Later in this course, we will see that the Central Bank of the United States, the Federal Reserve, controls the federal funds rate to achieve its policy goals. The Federal Reserve does this by controlling the supply of reserves in the federal funds market. These are called open market operations.

Summary

Banks must hold required reserves

Excess reserves meet unforeseen cash needs

Federal funds market reallocates cash among banks

Fed funds rate is a key benchmark



What have we learned in this lesson? First, banks hold reserves because they are required to do so by law. Second, banks hold additional excess reserves to meet unforeseen liquidity needs. Third, the federal funds market reallocates cash across the banking system. Fourth, the interest rate for federal funds influences all other interest rates.

Lesson 1-1.2. The Repo Market

Learning Objectives

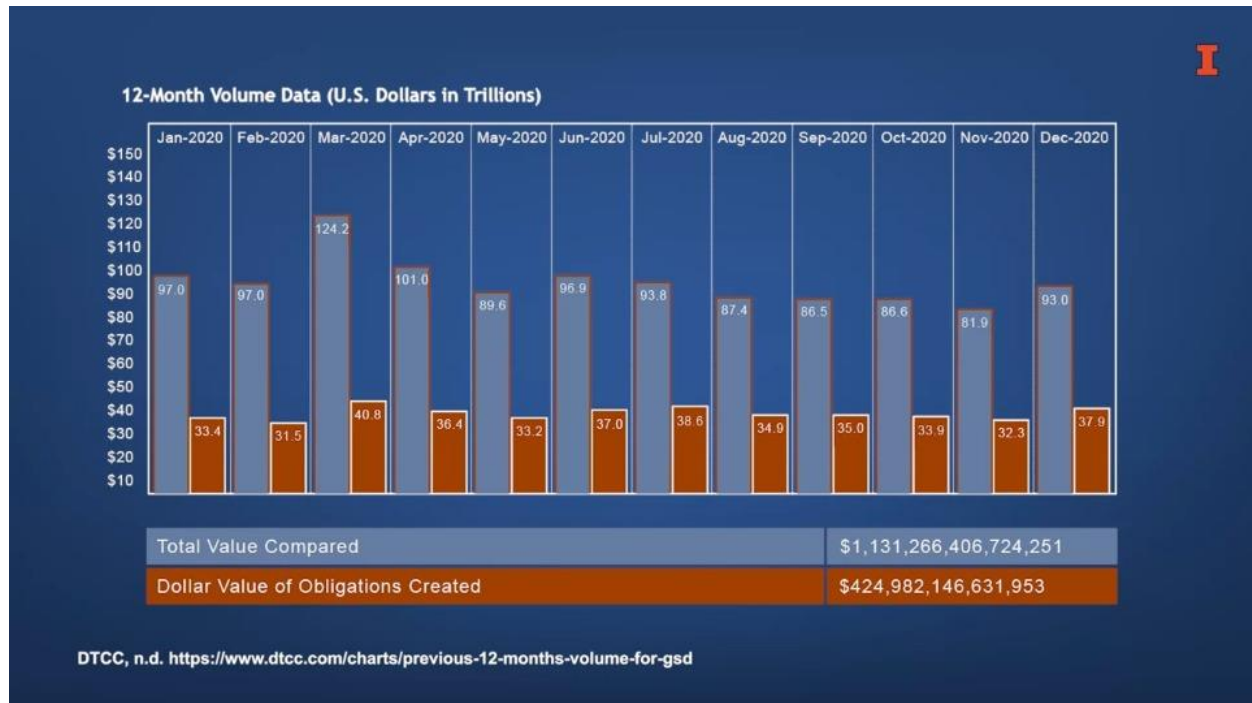
Repurchase agreement (repo)

How do repos work?

Understand repo market



Hello and welcome to this lecture on the repo market. I hope you're doing well from wherever it is you're joining us. In this class, we will discuss the market for repurchase agreements. We will introduce what a repurchase agreement is. These are called repos. The repo market is a key overnight lending market. Our goal is to understand how this market works. Let's get started. Before I define a repo, I want to describe the size of the market. I've already said this is a key market for overnight borrowing and lending. Let's see some data on the size of this market for the US economy. By size, I mean total dollar borrowing. The repo market started to gain traction in the early 1980s. The growth of this market accelerated through the 2000s.



Here is some data showing the size of the repo market in the recent years. By the end of 2020, more than \$4 trillion worth of repo loans were outstanding. That's 4 trillion with a "t". Why is this repo market so popular? The repo market is the largest cash market. All types of financial institutions can participate in this market. This is the main difference to another important overnight funding market, the federal funds market.

Why Is the Repo Market Popular?

- Largest cash market
- Banks and non-banks

The federal funds market can only be accessed by banks.

Why Is the Repo Market Popular?

Largest cash market

Banks and non-banks

Money market mutual funds



Money market mutual funds are one of the largest lenders in the repo market. Instead of buying and holding long term assets, money market mutual funds purchase short term repos. At the end of 2019, they held about 1 trillion of outstanding repos.

Repo Transaction: Why?

Need cash, own treasury bond

Option 1: sell bond

Option 2: borrow via repo




Let's discuss how the repo market works. Remember, this is a cash market. A borrower will approach a lender and borrow cash overnight. In the repo market this will be a

secured transaction. Suppose you need cash today to pay a bill and you have a treasury bond on hand. Assume that you will be cash rich tomorrow, so you have a cash shortfall today. You could sell the treasury bond today, pay your bill and purchase a new treasury bond tomorrow. However, buying and selling bonds can be costly. Alternatively, you could borrow the cash you need.

Repo Transaction: How?

- Repo seller borrows cash
- Repo buyer lends
- Secured transaction
- Higher price tomorrow compensates lender



The diagram illustrates a repo transaction between two stylized figures. On the left, the 'Repo seller' (a grey figure) holds a green rectangular card labeled 'TREASURY' and a yellow card with '100' on it. On the right, the 'Repo buyer' (a yellow figure) holds a stack of green banknotes. The figures are positioned to show the exchange of the treasury bond for cash.

Let's discuss how to do this using the treasury bond in a repo transaction. In a repo transaction, you sell the treasury bond in exchange for cash and agree to buy it back tomorrow. This is called selling a repo. The repo seller is borrowing from the other party. The other party, the repo buyer, supplies the cash loan. In exchange, the buyer becomes the new owner of the treasury bond for the length of the transaction. In other words, this is a secured transaction. The buyer usually buys the treasury bond back for a slightly higher price. That way, the seller is compensated for the cash loan.

Repo Risks

Borrower fails to repurchase

When? After collateral price falls



What is the key risk to lenders in the repo transaction? The borrower might fail to repurchase the treasury bond tomorrow. In this case, the lender might be stuck with a worthless bond. This is more likely to happen when the value of the collateral falls while the lender is in possession.

Repo Risks

Initial Market Price = \$200
Repo Contract = \$200.02
Current Market Price = \$199

?



Repo seller



Repo buyer

Let's consider a concrete example of a repo transaction. Suppose you sell a treasury bond worth 200 today with the promise to repurchase it for \$200.02 tomorrow. What

happens if economic conditions change, and the market price drops to 199? You could repurchase at 202 cents as promised or you could break your promise and simply buy another treasury bond on the open market for 199. What about the lender? They are holding a treasury bond worth 199 but had lent out 200. They are probably going to lose out. To reduce this risk, repo transactions usually have a haircut. The lender applies this haircut to the loan amount. Rather than lending the full amount of the collateral, only a fraction goes out. Indeed, haircuts make most repos essentially risk free for the lender.



In our example, let's say the lender imposes a haircut of two percent. So, the borrower only receives 196 for the treasury bond that is worth 200. How does this help? Well, if the market price drops to 199, the borrower will still want to repurchase the bond.



So, if the bond price stays above 196, we are good.

The slide features a dark blue background with the title 'When Is Risk/Haircut Lower?' in large white font at the top. Below the title are three factors, each with an icon and text: 'Credit quality' with a credit card icon, 'Price volatility' with a line graph icon showing a dollar sign, and 'Market conditions' with a bar chart icon. On the right side of the slide, a man in a dark suit and light blue shirt stands with his hands clasped. A small red 'I' logo is in the top right corner.

What determines the size of the haircut? There are three main factors related to the collateral. The first factor is the credit quality of the collateral. The lower the credit risk, the lower the haircut. The second factor is the market price volatility of the collateral. Lower volatility means a lower haircut. The third factor is the overall market condition. The easier it is to sell the collateral, the lower is the haircut. Many different assets can

be used in repo transactions. However, the most common collateral consists of government backed securities. This includes the treasury bond in our example. Why are treasuries so popular? They have no credit risk. They have stable market prices. They are easy to trade. Thus, they present little risk to repo buyers and the haircuts are low.



Repo Risk Mitigation

- General collateral repo
- Any government-backed security can be the collateral
- Most common type of repo

Repo transaction involving government backed securities are low risk. In this case, lenders are less picky about the specific type of collateral. Repo transactions that are agreed upon before the collateral is specified are called general collateral repo. Here, general collateral refers to a list of eligible government backed securities. General collateral repos have the lowest haircuts. They are the most common type of repo transactions.

Summary

Repo market is key for short-term borrowing

Utilized by banks and non-banks

Haircuts reduce risk



What have we learned in this lesson? First, repos are a form of short-term secured lending. Second, the repo market is an important cash market for all financial institutions and not just banks. Third, haircuts reduce the risk of losses for lenders.

Lesson 1-1.3. Short-term Interest Rates

Learning Objectives

Short-term interest rates

London Interbank Offered Rate (LIBOR)

Secured Overnight Financing Rate (SOFR)



Hello and welcome to this lecture on short-term interest rates. I hope you're doing well from wherever it is you're joining us. In this class, we will introduce two crucial short-term interest rates from cash markets. These interest rates affect households through the cost of mortgages and credit card loans. These rates also affect businesses through the costs of business loans. We will start with the London Interbank Offered Rate, LIBOR. We will then look at an alternative interest rate, the Secured Overnight Financing Rate, SOFR. We will discuss which markets these rates come from and how they are calculated.

LIBOR

Interbank loans in London



The diagram illustrates the LIBOR market as a triangular network of three banks, each represented by a classical building icon with the word 'BANK' on its pediment. The banks are interconnected by curved arrows indicating the flow of funds. The top bank is connected to the bottom-left bank by an arrow labeled with the Euro symbol (€). The top bank is connected to the bottom-right bank by an arrow labeled with the Yen symbol (¥). The bottom-left bank is connected to the bottom-right bank by an arrow labeled with the Dollar symbol (\$). A fourth arrow, labeled with the Euro symbol (€), points from the bottom-right bank back to the top bank, completing the cycle.

I

Let's jump right in. LIBOR is the interest rate from the London interbank market. This is a market in which banks can borrow and lend amongst each other. Most loans are made in US dollars, but banks can borrow other currencies. When these are US dollar loans in Europe, they are also called Euro dollar loans.

LIBOR

Interbank loans in London

Unsecured

Up to 1 year



Professor Ralf Meisenzahl is shown from the waist up, wearing a dark suit jacket over a light blue shirt. He is gesturing with his right hand, pointing his index finger upwards. The background is a solid dark blue.

I

Loans in this market are unsecured, that is, no collateral is required. Because no collateral is required for these interbank loans, they are subject to credit risk. It is

possible that a bank does not repay its loan. Seven different loan maturities exist in this market. Overnight, one week, one month, two months, three months, six months, and 12 months.

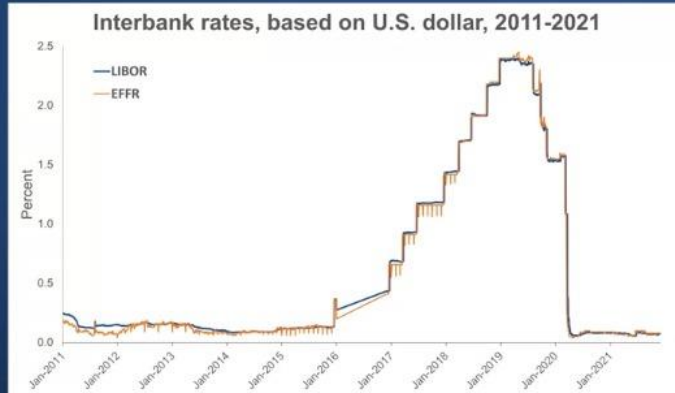


LIBOR

- LIBOR is the interest rate
- Different rate for each currency/maturity combination
- Survey of largest banks

LIBOR is the interest rate in this market. It is the London Interbank Offered Rate. There is a different interest rate for each combination of currency and maturity. The calculation of LIBOR is somewhat unique. Since not all banks are active in every market every day, LIBOR is based on surveys rather than actual transaction. Each day, the largest, highest volume banks are pooled. LIBOR is an average interest rate based on these survey results. Let's have a look at the overnight US dollar LIBOR in the recent years.

Arbitrage



Federal Reserve Bank of New York, n.d.

What does this pattern remind you of? Think about it for a second. Right. The effective federal funds rate. Remember, the effective federal funds rate is the US interbank rate. It measures how much US banks pay for unsecured US dollar loans from other banks in the US. As you can see in the recent years, LIBOR and the federal funds rate track each other. That is, the cost of borrowing US dollars in the US and abroad move together very closely. Why is this happening? If LIBOR was lower, banks could profit by borrowing dollars in London and lend out that money in the United States. This basic arbitrage ensures that LIBOR and the federal funds rate are roughly equal.

LIBOR

Reference rate

Floating rate corporate loan

Loan rate = LIBOR + markup



How does LIBOR connect with the broader economy? Well, since the LIBOR measures the cost of funding for banks, it has become the reference rate for many other loans, for instance, loans to corporations. These are often floating rate. This means the interest rate equals a floating reference rate plus some fixed mark up. Banks can cover their costs plus earn profit equal to the mark up. A specific example might help.

“The committed lines of credit....
maturing at various times
between May 2020 and May 2024,
carry interest rates generally
ranging between LIBOR
plus 10 basis points and LIBOR
plus 75 basis points.”

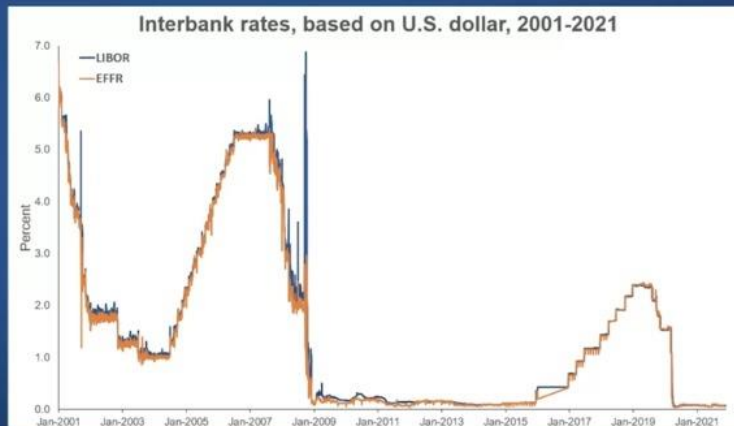
-2019 regulatory filing of Walmart

The 2019 regulatory filing of Walmart states that, the committed lines of credit maturing

at various times between May 2020 and May 2024, carry interest rates generally ranging between LIBOR plus 10 basis points and LIBOR plus 75 basis points.

Wedge between LIBOR and EFR

1. Bank Health
2. Manipulation



Federal Reserve Bank of New York, n.d.

In total, by the year 2020, LIBOR underpinned over \$250 trillion in loans worldwide. Now, let's take a closer look at the period from 2000 until 2020. Look hard and you can see that on several occasions, the LIBOR spiked and did not follow the federal funds rate. Two factors explain this. First, this is unsecured lending. The health of banks can matter. If the health of banks in the London market was in doubt, then this could drive a wedge between the interbank rates. The second factor has been far more controversial. After the 2008 financial crisis, reports alleged manipulation of LIBOR. Remember, LIBOR is based on interest rate surveys for the largest banks. These surveys require honesty. Evidence emerged that these surveys were in fact manipulated. In total, regulators fined banks more than \$9 billion for manipulating the LIBOR.

Secured Overnight Financing Rate (SOFR)

Based on repo transactions

Overnight

Secured by U.S. Treasuries



To prevent further manipulation, regulators also required that LIBOR is dropped as a reference rate on loans. Starting in 2022, a new interest rate would be mandated. This rate is called the secured overnight financing rate. It is published daily by the Federal Reserve Bank of New York. The SOFR rate is the interest rate on overnight repurchase agreements with treasury collateral. SOFR is based on transactions rather than surveys. SOFR is a secured rate, so it is viewed as risk free. In contrast, LIBOR is an unsecured rate, so it incorporates some credit risk.



Interest Rate	SOFR	LIBOR
Underlying Market	Repo	Interbank
Collateral	U.S. Treasury	None
Market Size (Daily, 2020)	\$1 tr	<\$500 bn
Maturity	Overnight	7 different rates

As of 2020, SOFR is based on a market worth about 1 trillion of daily transactions. LIBOR is based less than half of this volume.



Summary

- Short-term borrowing rates for banks
- LIBOR (unsecured) versus SOFR (secured)
- Transition to SOFR as reference rate

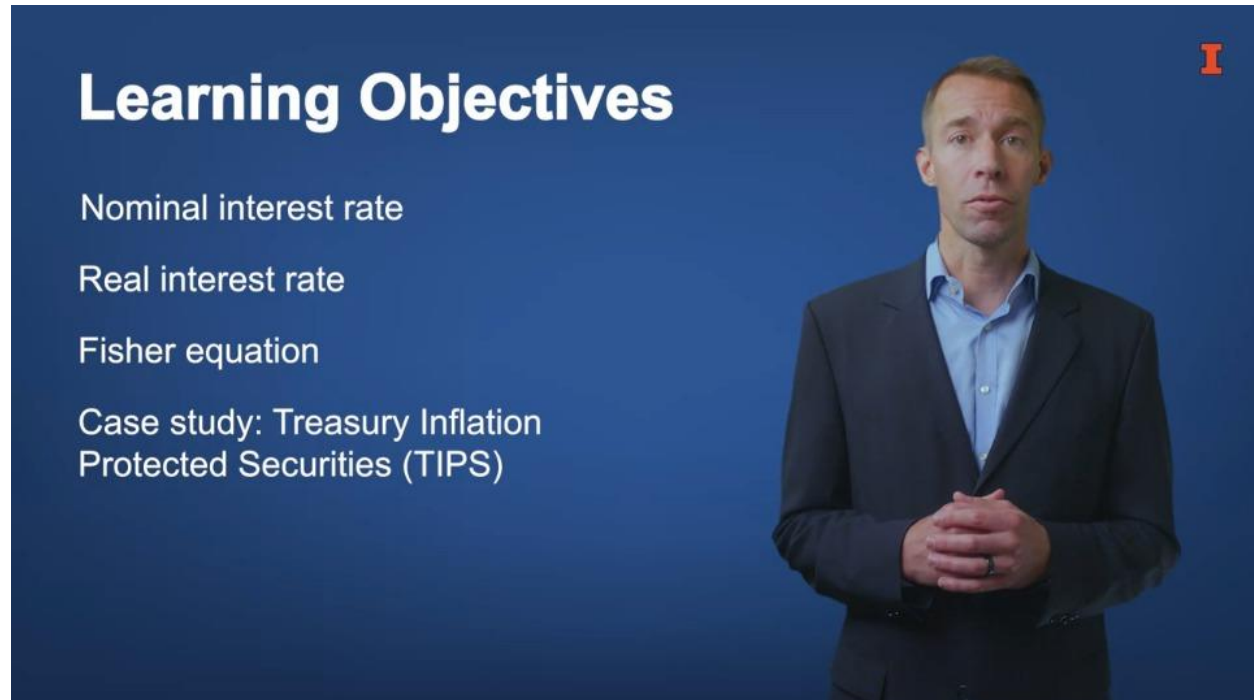


What have we learned in this lesson? First, LIBOR and the SOFR are the short-term interest rates. They represent the funding costs of banks for unsecured and collateralized loans respectively. Second, LIBOR is subject to credit risk and was

manipulated in the past. Third, regulators mandated that SOFR, which is a risk-free interest rate, replaces the LIBOR as the reference rate.

Lesson 1-2: Long-term Rates

Lesson 1-2.1. Nominal and Real Interest Rates



Learning Objectives

- Nominal interest rate
- Real interest rate
- Fisher equation
- Case study: Treasury Inflation Protected Securities (TIPS)

Hello, and welcome to this lecture on nominal and real interest rates. I hope you're doing well from wherever it is you're joining us. In this class, we will discuss nominal interest rates and real interest rates. We will examine the Fisher equation. This equation links the inflation rate with these two interest rates. Last, we will look at Treasury Inflation Protected securities, or TIPS, as a case study. TIPS are one of the few securities paying a real interest rate.

Nominal Return on Investment

Bank savings account:
10% annual interest

This year: \$100

Next year: \$100 + \$10

Nominal interest rate

Nominal return



What is the difference between a nominal rate of return and a real return on an investment? We can understand these concepts with an example. Suppose you have \$100 in a bank account. Let's assume that this account pays 10% interest annually. After one year, you gain \$10, and you have a total of \$110 in your account. This \$10 that the bank gives you is the nominal return on your \$100 investment. This 10% interest rate is also called the nominal interest rate. How much is this profit worth in terms of real goods you can purchase and consume over the year? This is what we mean by a real return on an investment.



Consider the following example. This year, you can buy gas for your car at \$4 per gallon. So today your \$100 is worth 25 gallons of gas. Now, assume that inflation, the pace at which prices increase throughout the economy, is 5%. Gas prices increase by 5%. So next year, the price of gas is \$4.20. And purchasing the same 25 gallons of gas will cost you \$105.

The equation is displayed in large white text on a dark blue background. In the top right corner, there is a small orange 'I' logo. The equation is $\$10 - \$5 = \$5$. Below the equation, the words 'Nominal' and 'Inflation' are aligned under the '\$10' and '\$5' respectively. Below 'Nominal' is the word 'Return'.

$$\text{Nominal Return} - \text{Inflation} = \text{Real Return}$$
$$\$10 - \$5 = \$5$$

So, what is the return on our investment? Well, the nominal return is \$10. The bank still


gives you \$10 for your savings. However, gas prices have gone up. This means that after buying your 25 gallons of gas, you have \$5 left over. The real return, which accounts for inflation, is therefore \$5. The nominal return of \$10 minus the price inflation of \$5 gives you a \$5 real return.

Nominal Versus Real Return

Real return (r) \approx nominal return (i) – inflation (π)

$$i \approx r + \pi$$

Fisher equation



This example shows that nominal and real interest rates are linked by inflation. In general, the real interest rate approximately equals the nominal interest rate minus inflation. This is often written with the nominal interest rate i , is roughly equal to the real interest rate r plus inflation π . This is called the Fisher Equation. It is named after the American economist Irving Fisher.

Case Study: TIPS

Treasury Inflation Protected Securities

Principal increases with inflation



Let's look at a specific case study, Treasury Inflation Protected Securities, or TIPS. This is a bond investment that takes inflation explicitly into account. How does this work? With TIPS the principal value of the bond increases with the inflation rate. Since the interest paid on a bond is a percentage of the principal value, the interest paid on TIPS increases with inflation. So, the interest rate on TIPS is a real interest rate.



Let's look at a specific example. Suppose you buy a TIPS bond that pays five percent

interest per \$100 of bond. This \$100 is the principal value of the bond. Let's say inflation runs at two percent this year. Next year, the principal of the TIPS bond will increase by two percent to \$102. So, you bought \$100 of bond, then this would increase to \$102. What is the return on the bond over the year? The total nominal return is the five percent interest plus two percent principal appreciation, so seven percent in total.



What about the real return? Remember the Fisher equation, the real return equals the nominal return minus inflation. Well, the two-percent principal appreciation offsets the two-percent inflation. So, the real return is five percent. TIPS are designed to give a constant real return.

What Can We Learn From TIPS?

Future inflation is unknown

TIPS \Rightarrow inflation expectations



Why do economists pay close attention to the market for TIPS? When we make investments today, we do not know what future inflation will be. As we have seen, inflation matters for real returns. It turns out that we can use the price of TIPS bonds to recover the market's expectations of future inflation.

Expected
Inflation:



Price: ↑

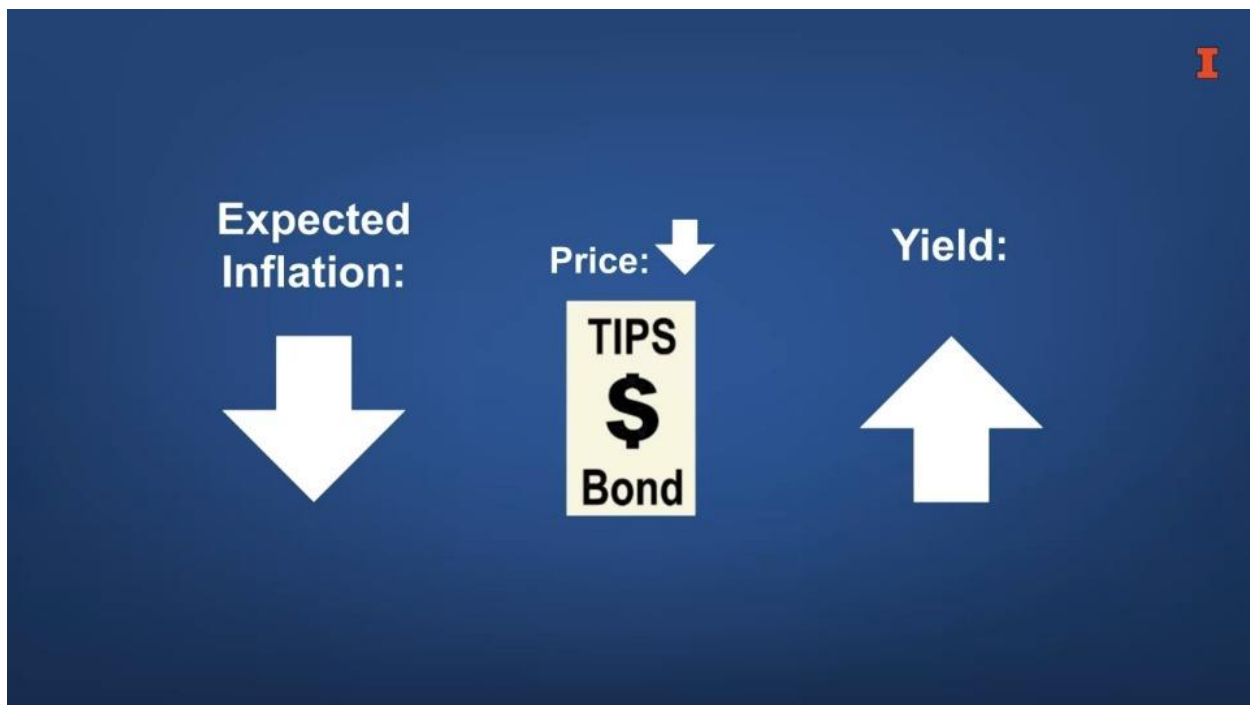


Yield:

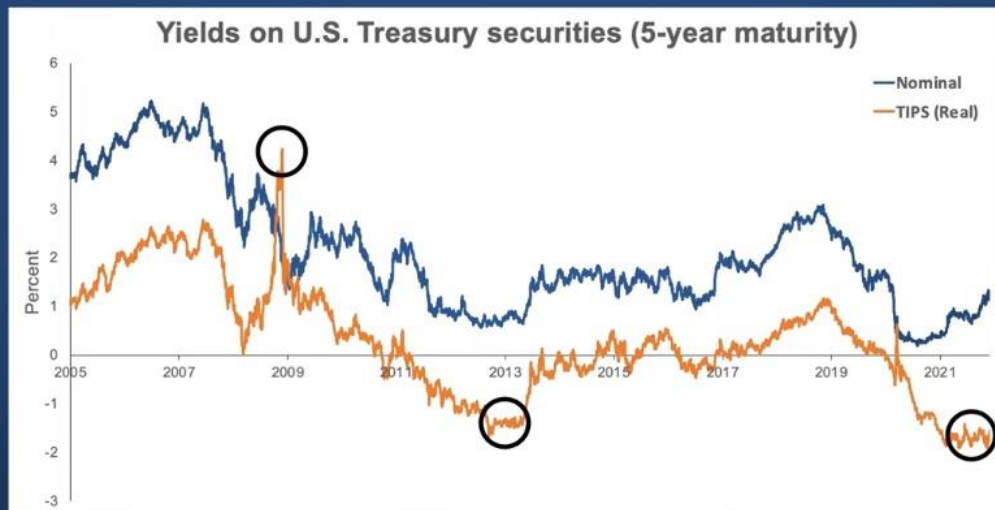


How does this work? Remember, TIPS provide a constant real return. They provide inflation protection. If expected inflation is high, then inflation protection is worth a lot.

Since TIPS bonds provide inflation protection, the current market price of TIPS will go up. Higher prices mean lower yields on TIPS.



On the other hand, if inflation is expected to be low, then inflation protection is less valuable. In this case, the price of TIPS bonds fall, and the yield on TIPS bonds goes up. Thus, TIPS prices or yields capture inflation expectations. In fact, we can compare yields on TIPS versus regular treasury bonds to measure expected future inflation.



Board of Governors of the Federal Reserve System, n.d.

Let's look at some recent data. Here is the yield on the 5-year TIPS bond over time, versus the 5-year treasury note. At times, there is a difference in yields between the two. A larger difference in yields means investors are willing to pay for inflation protection. This means that investors expect high future inflation here, 5 years into the future. As you can see, yields on TIPS were elevated in 2009. Investors expected higher inflation at this time. The opposite was true in early 2013 as well as in 2021, investors expected low future inflation. Of course, the market might turn out to be wrong in the end, but this was the expectation embedded in TIPS prices.

Summary

Nominal interest rates ignore inflation

Nominal rate = real rate + inflation

TIPS embed inflation expectations



What have we learned in this lesson? First, nominal interest rates do not account for changes in the price of goods. Second, the nominal interest rate is equal to the real interest rate inflation. This is the Fisher equation. Third, TIPS bonds capture inflation expectations.

Lesson 1-2.2. Treasury Securities and The Risk-Free Rate

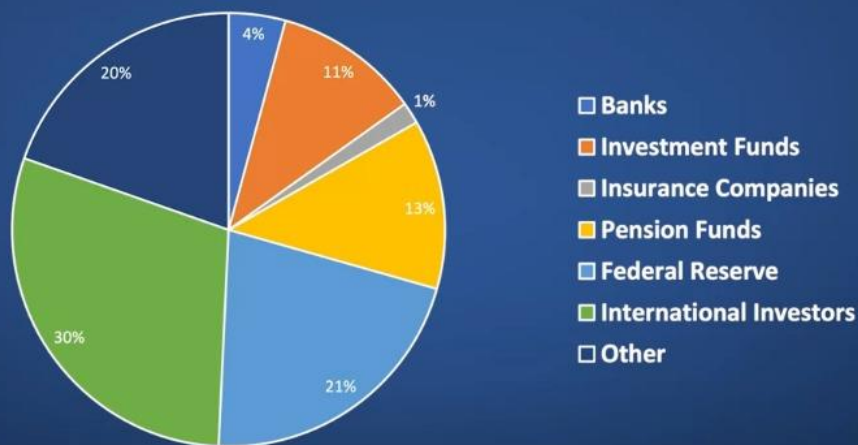
Learning Objectives

U.S. government bonds
U.S. Treasury market
Treasuries as risk-free assets



Hello and welcome to this lecture on Treasury Securities. I hope you're doing well from wherever it is you're joining us. In this class, we will discuss the prominent type of risk-free assets, the US Treasury Securities. These are bonds sold by the US Treasury. We will characterize the US Treasury Market. We will examine the distinct features of US Treasuries. We will understand the role treasuries play in global financial markets.

U.S. Treasury Ownership (2020)



Board of Governors of the Federal Reserve System, 2020 <https://www.federalreserve.gov/apps/fof/guide/l210.pdf>

As of 2020, the Treasury Securities Market is the largest debt market in the world. At this time, there were outstanding securities worth over \$24 trillion. Almost every type of US financial institution owns treasury securities. For instance, banks, mutual funds, insurance companies, pension funds, and of course the Federal Reserve. On top of that, about one-third of treasuries are owned by international investors.

The slide features a dark blue background. On the left, the title 'U.S. Treasuries' is written in large white font. Below it, the text 'Classify based on maturity' is followed by a list of three categories: 'T-Bills (<1 year)', 'T-Notes (2–10 years)', and 'T-Bonds (>10 years)'. On the right side of the slide, a man in a dark suit and light blue shirt stands with his hands clasped, appearing to be the speaker. A small red 'I' logo is visible in the top right corner of the slide area.

Let's start by looking at the different categories of US Treasuries. US Treasuries are government bonds that pay fixed interest payments over their lifetime. There are three different categories of treasuries according to their maturities. First, we have Treasury Bills or T-Bills. T-Bills have the shortest range of maturities. They go from four weeks through 52 weeks. They account for about 20% of US Treasury Securities. Second, there are Treasury Notes. Notes are securities in the middle range of maturities. They are issued with maturity terms between two to 10 years. They account for most of US Treasury securities outstanding. Third, we have Treasury bonds. Treasury bonds are essentially identical to Treasury notes except that they mature in 20 to 30 years. Treasury bonds are also referred to as the long bond.

Treasuries as Risk-Free Asset

Guaranteed repayment \Rightarrow no credit risk

Used as collateral

Treasury interest rate = risk-free rate

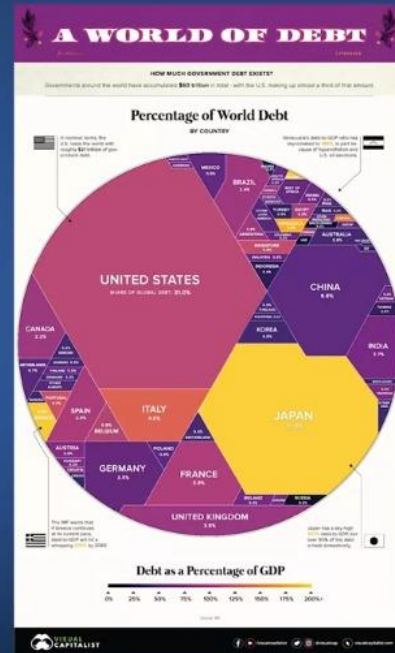


Why are US treasuries so popular with investors? The main reason is that US treasuries are considered to be free of credit risk. This means investors are guaranteed payment of both the interest and their principle as long as they hold the US treasuries to maturity. These payments are guaranteed by the full faith and credit of the US government. Because US treasuries bear no credit risk, they are often used as collateral in borrowing arrangements. For example, US treasuries are often used as collateral in the multi-trillion-dollar market for repurchase agreements or repo market. This is a crucial short-term funding market for financial institutions. Finally, the interest rate on Treasury securities is considered a good measure of the risk-free interest rate. The risk-free interest rate is used as a benchmark interest rate in many financial contracts around the world.

Why Hold U.S. Treasuries?

1. Most liquid market
2. Cash-like asset
3. Central bank demand

© 2017 Desjardins, J. / Visual Capitalist /
\$63 trillion of world debt in one visualization



You may wonder why US treasuries are preferred to government debt from other developed countries with no risk of default. For instance, Germany, China, or Japan. There are three main reasons. First, the US Treasury market is much bigger than any other market. At any time, a broad variety of investors are usually interested in buying treasuries. This means it is always easy to sell them with few transaction costs. When securities in a market can be easily traded with little cost, the market is called liquid. The US Treasury market is the most liquid securities market in the world. Second, most financial transactions worldwide are conducted in US dollars. Holding US treasuries is one way to hold US dollars. For this reason, US treasuries are often called cash-like assets. By the end of 2020, corporations and households deposited over two trillion of cash in money market mutual funds that only invest in US Treasury securities. Third, US treasuries is the most common way for central banks around the world to keep dollar reserves.

U.S. Treasuries Always Riskless?

Hold to maturity \Rightarrow yes

Sell early \Rightarrow possible loss

Risks:

1. High inflation
2. Interest rate increase



Is investing in US treasuries always riskless? If you hold the treasury until maturity, then you receive your payment. There's no risk in this case. However, if you must sell before maturity, you might take a loss. This will happen if you must sell for less than your initial investment. This can happen when the current market value of the bond falls. Treasury investors are worried about two main sources of risk. First, inflation. Second, changes in the interest rate. Let's consider each of these risks in turn. We will see how these risks can make treasuries lose value. Let's start with inflation.

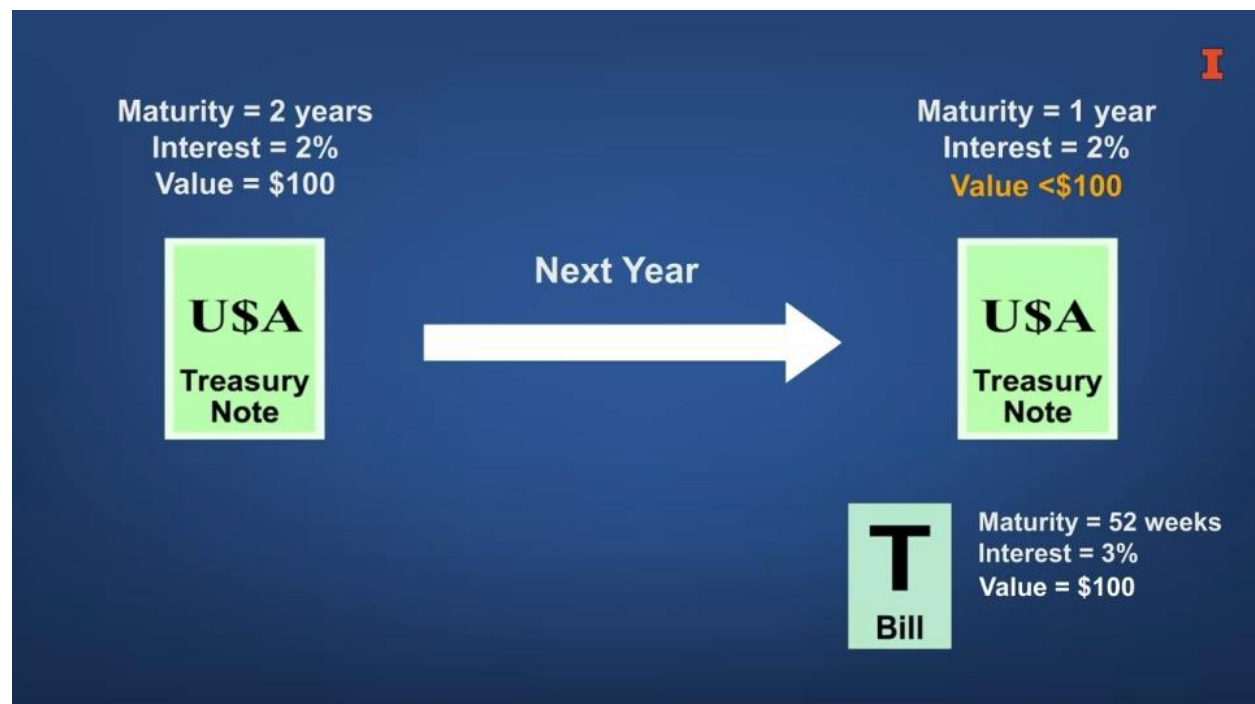


How does inflation affect the price of US Treasury? Suppose you bought a 52-week T-bill with a face value of \$100, that has a two-percent nominal interest rate. Also, let's assume you expect inflation of two percent. At maturity, you get a face value of \$100 plus \$2 interest. At the same time, goods that had cost \$100 when you bought the bill, now cost \$102 due to inflation. With the earned interest, you can still buy the same goods that you could have bought when you bought the T-bill. Now assume that this year inflation is higher, say five percent. At maturity, you still get the face value of \$100 plus \$2 interest. However, now the goods cost \$105 due to the higher inflation rate. This means you cannot afford the same goods as before.

Nominal Return:
2%

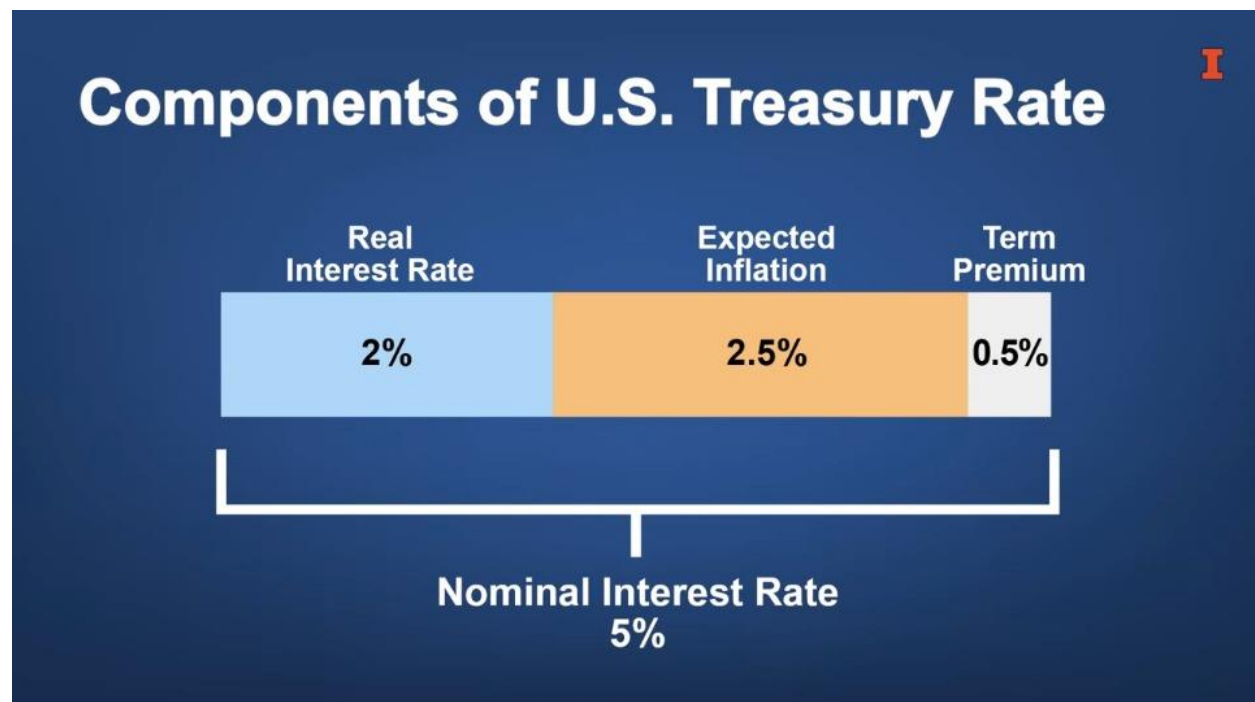
Real Return:
2% – 5% = –3%
Nominal Return Inflation

Your nominal return was two percent, but now your real return, which adjusts for inflation, is minus three percent. When inflation is higher than expected, the market value of treasuries will decline. From today's perspective, they provide less purchasing power, and therefore are worth less.



Changes in the interest rates can have a similar effect. Suppose you bought a 2-year treasury note that pays two-percent interest for \$100 dollars. Let's assume that after one

year you want to sell this investment. At the same time, your investment has a one-year maturity left. How much money can you get for this note? Well, it depends on the interest rate of the closest substitute, a newly issued 52-week T-bill. If the interest rate on the newly issued 52-week T-bill is higher, say three percent, then this is more attractive as an investment than your note that pays only two percent. If the new T-bill costs \$100, then the price for your investment will be less than \$100. When interest rates increase, the market value of previously issued long-term treasuries can decline. Longer run treasuries bear more risk that interest rates will change over the life of the bond. Compensation for this risk is called the term premium.



These risks are reflected in nominal interest rates on longer term treasuries. There are three components. First, the real interest rate. That is the interest rate after taking inflation into account. Second, the expected rate of inflation. Third, the term premium, which captures longer run risks, including interest rate changes.

Summary

U.S. Treasury market

Treasury rate = risk-free rate

Long-term Treasury rate embeds:

1. Real interest rate
2. Inflation expectations
3. Term premium



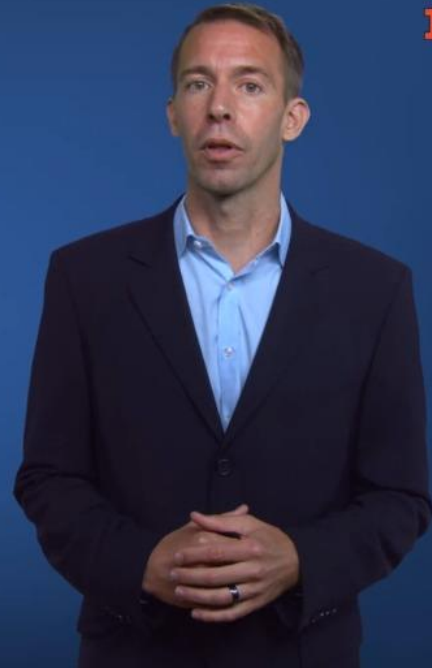
What have we learned in this lesson? First, the US Treasury market is the largest and most liquid debt market in the world. Second, US treasuries have no credit risk. This means their interest rate is a good proxy for a risk-free rate. Third, long run nominal interest rates on US Treasury Securities can be decomposed into the real interest rate, expected inflation, and the term premium.

Lesson 1-2.3. Term Structure of Interest Rates

Learning Objectives

Term structure of interest rates

Use term structure to predict recessions



Hello and welcome to this lecture on the term structure of interest rates. In this class, we will discuss what the term structure of interest rates is. We will examine why the term structure of interest rates provides important information about the macro-economy. Specifically, we will look at how the term structure behaves before recessions.

What Is the Term Structure?

Compares interest rates across maturities

Compares yields (not coupon rates)

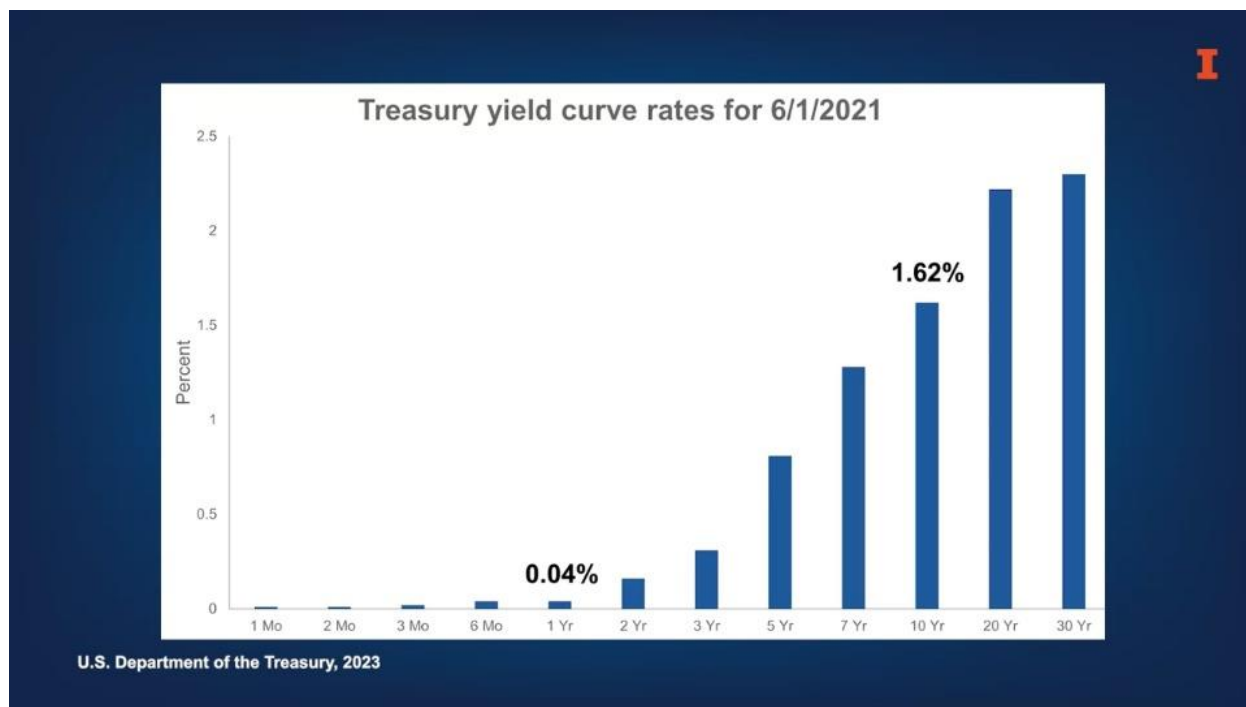


The term structure of interest rates refers to the comparison of interest rates of

securities by the same issuer of different maturity at a given day. For the term structure, we do not use coupon interest rates, the interest rates paid to bond owners, but the yields which takes the prices of bonds into account.



For example, a bond with a par value of \$100 pays five percent interest on its principle. If you buy the bond for \$99, you still receive \$5 interest payment. Your current yield is 5 divided by 99 or 5.051%. Conversely, if you buy the same 5% interest paying bond for \$101, then your yield will be 5 divided by 101 or 4.95%. The more general insight here is that bond yields and bond prices move in opposite directions. When bond prices increase, yields fall. When bond prices decrease, yields increase. We can observe daily changes in yields and therefore the term structure of interest rates, which is also commonly referred to as the yield curve. The most important yield curve is based on US Treasury Securities. There are three reasons why US Treasury Securities provide good measures of yields. First, they have no credit risk that could change over time. Second, they are issued at many different maturities. Third, they have little trading costs that would otherwise distort security prices and therefore yields. We cover more details on US Treasury Securities in a different lecture.



Now let's have a look at an actual yield curve derived from US Treasury Securities. This yield curve is from June 1st, 2021. As you can see, the yields on short maturity bonds is almost zero. Even a US node with one year maturity yields only 0.04% annually. However, a node with a maturity of 10 years yields 1.62% annually. How do you explain this difference between the yields on shorter and longer maturities? Consider two alternatives to finance a project that will take 10 years before you can repay the principal.

10 Year Project

Finance Option 1



10 Year
Maturity

Finance Option 2



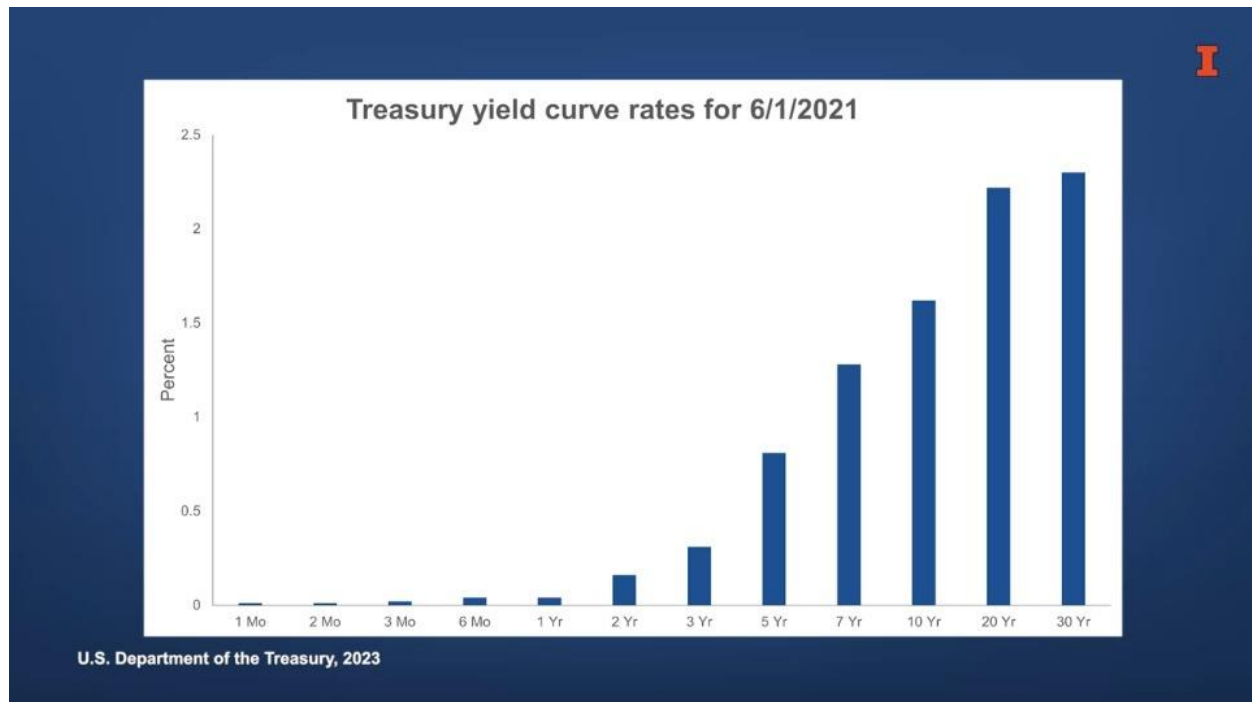
x9

The first alternative is to issue a bond with a 10-year maturity. The second alternative is to issue a bond with a one-year maturity and roll over the debt after one year with a new bond with a one-year maturity. Of course, in this case you need to roll over your debt nine times.

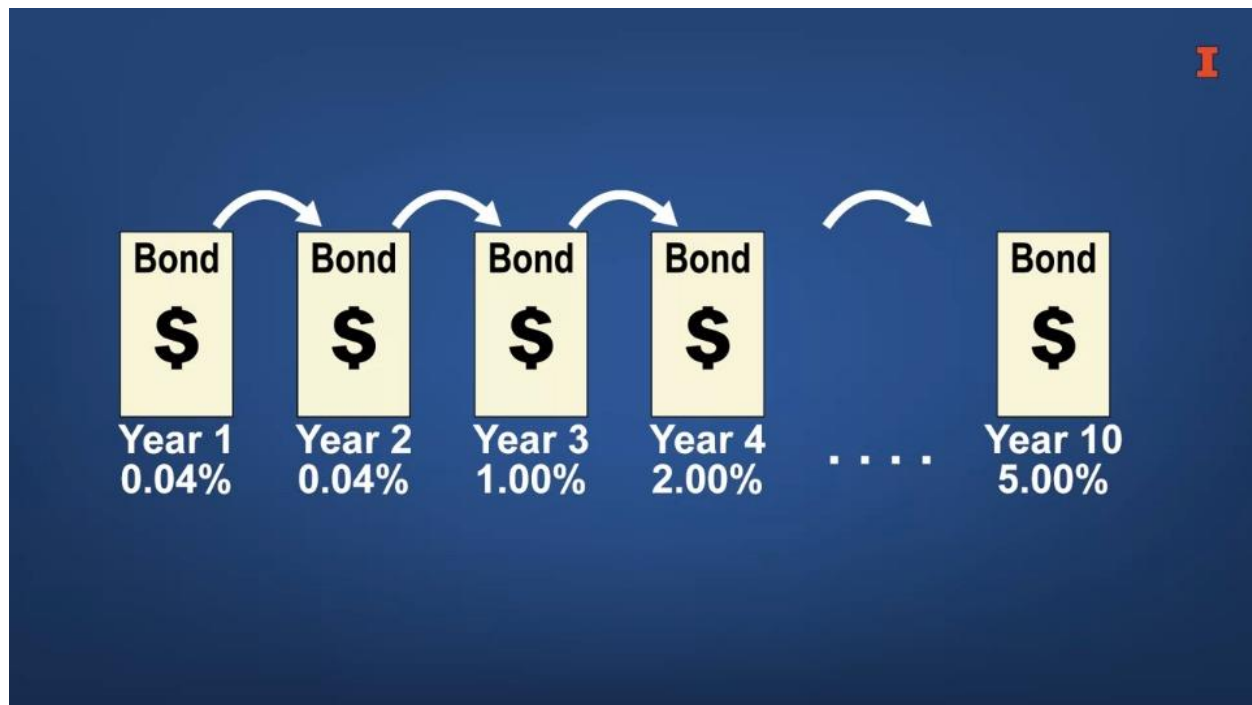


Now, suppose you would be able to roll over the debt with one-year bonds always yielding the same as the first time. In this case, issuing 10 times one-year bonds would

cost you in the same as issuing one 10-year bond, and hence, the yields would be the same. If they were not the same, you would be better off issuing whichever alternative is cheaper.



However, in the June 1st, 2021, yield curve, shorter term notes have lower yields. This means that market participants expect that the interest rates will rise at some point in time over the next 10 years.



In our example, at some point when you want to roll over the one-year bond, you will have to offer a higher yield compared to the first one-year bond you issued.

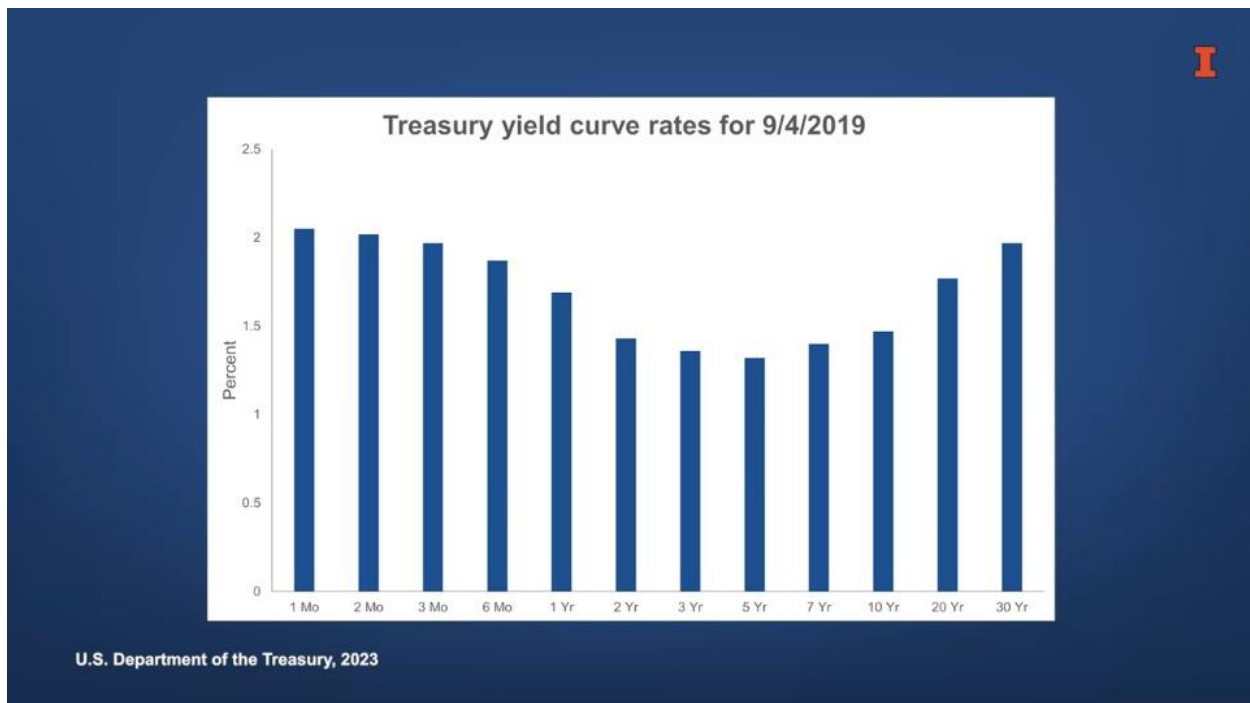
Why Does the Yield Curve Slope Upwards?

1. Monetary policy: short-term rate hikes in future
2. Inflation expected to rise
3. Debt-financed government spending

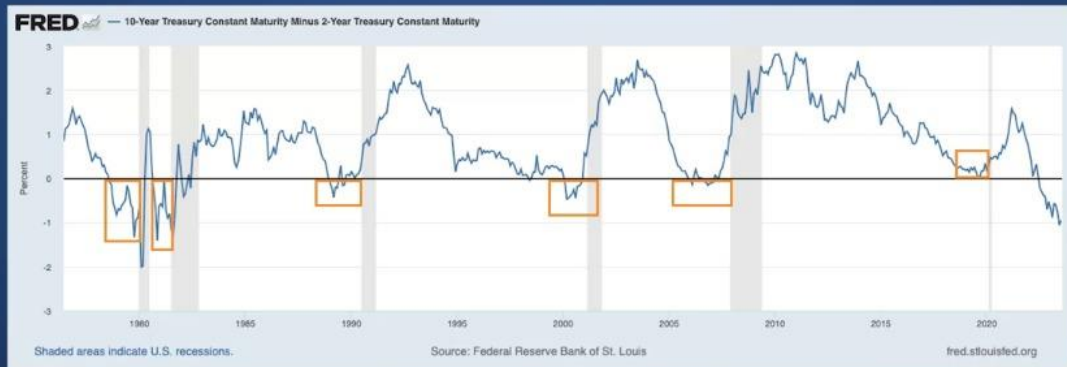


What drives the expectation of higher interest rates? First, market participants could expect that the Federal Reserve is going to increase short term interest rates. This is generally expected during economic expansions, and the yield curve is typically sloping upward. Second, market participants expect higher inflation. Since interest rates on US

treasuries are nominal, yields on longer maturity treasury securities must increase to offset the increase in inflation, to continue to attract investors. Third, fiscal policies that will increase government debt will increase the supply of US treasuries. In this case, yields on longer maturity treasury securities must increase for investors to buy the additional supply of US Treasury Securities. Now let's have a look at the yield curve on September 4th, 2019.



You will notice that the yield curve is now downward sloping or inverted at the front end of the curve. This means that market participants must expect lower interest rates in the future. And when do market participants expect lower interest rates? Right. Before recession. Let's look at a commonly used measure of the yield curve. The difference between the yields on a 10-year treasury note and a two-year treasury note over the last 40 years.



You can see that almost all of the time this difference is positive, meaning that the yields on the 10-year note is higher than on the two-year treasury note. For most of the time, market participants expect interest rates to go up. This is consistent with an economic expansion. The gray bars in the figure indicate recessions. Since in recessions demand is low, interest rates tend to fall during recessions. Now focus on what happens to the yield curve right before the gray bars. It inverts each time before the recessions of the 1980s, the recession in the early 1990s, before the dot-com bubble in 2000, before the 2008 financial crisis and before the COVID-19 pandemic. In sum, the Treasury yield curve is a strong predictor of subsequent performance of the economy and is therefore closely watched by market participants and policymakers.

Summary

Yield curve compares yields
across maturities

Yield curve embeds interest
rate expectations

Inversion predicts economic recession



What have we learned in this lecture? First, the term structure of interest rates or yield curve compares yields across different maturities. Second, the yield curve is a closely watched economic indicator. An upward sloping yield curve indicates that market participants are expecting interest rates to rise in the future, which happens during economic expansions. An inverted downward sloping yield curve, suggesting a future decline in interest rates, typically signals the end of an economic expansion.

Lesson 1-3: Other Funding Markets

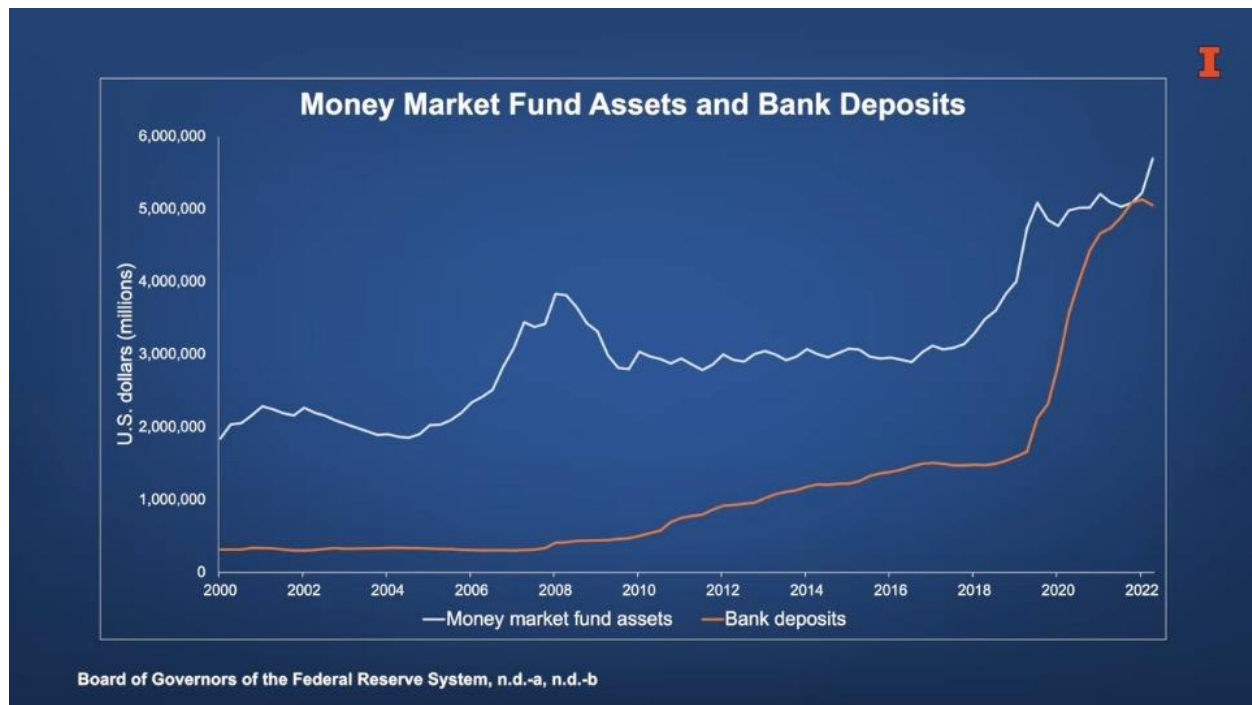
[Lesson 1-3.1. Money Market Mutual Funds](#)



Learning Objectives

- Money market mutual funds
- Crucial for short-term funding
- Case study: Reserve Primary Fund

Hello and welcome to this lecture on the money market mutual funds. I hope you're doing well from wherever it is you're joining us. In this class, we will discuss money market mutual funds in detail. These funds play a crucial role in the economy, especially providing short-term funding to banks and nonbanks. We will examine why these funds are popular with investors. We will see what happens when these funds get into trouble. Finally, we will look at the Reserve Primary Fund during the 2008 financial crisis as a case study.

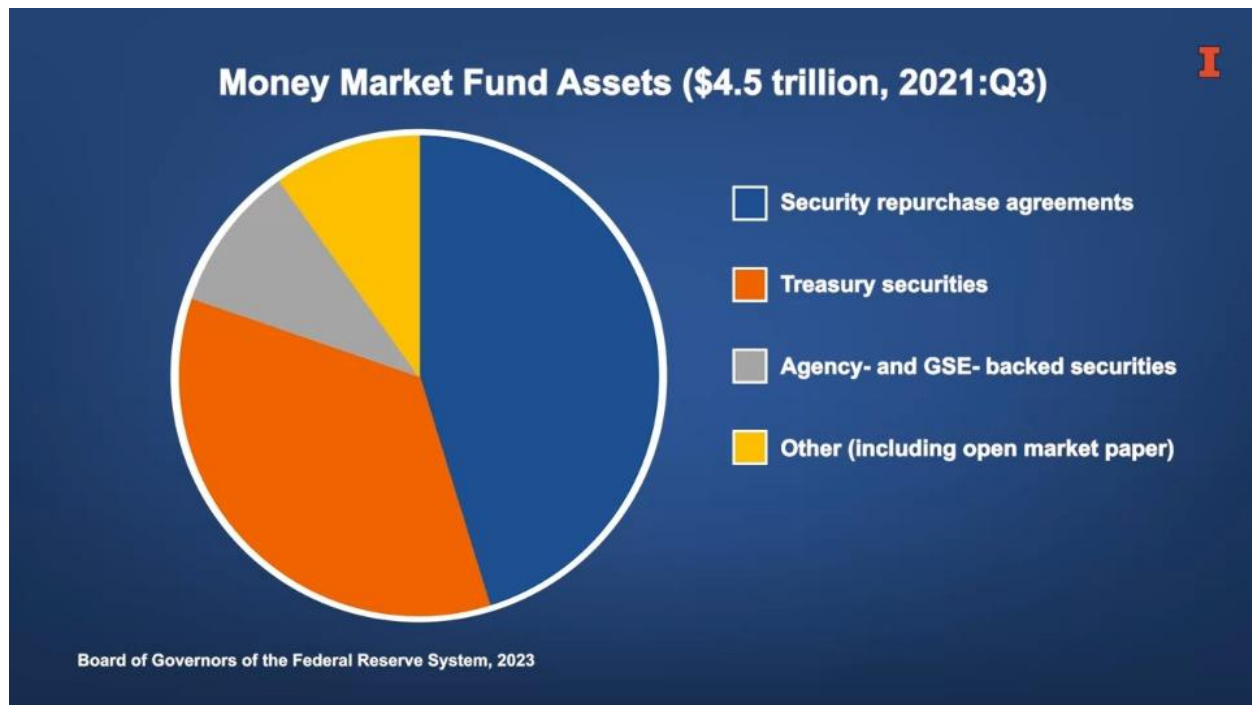


Let's look at some recent data on money market mutual funds. These are sometimes called money market funds or money market accounts. In 2021, money market funds managed over 4 trillion in assets. For comparison, the graph also shows total bank deposits of firms and households. Bank deposits are generally lower during this time frame. However, you can also clearly see the effect of the COVID-19 pandemic, in which savings increased sharply.

Origins of Money Market Funds



What are money market funds and why are they so popular? Money market funds are a type of mutual fund. They are a savings vehicle for businesses and households. They were originally created in the United States in the 1970s. They were created because of a bank regulation that limited the interest rates that could be paid on bank deposits. This bank regulation was called Regulation Q. Under Regulation Q, the maximum interest rate banks could pay customers was kept at 5.25%. That may sound like a lot today, but in the 1970s and 1980s, inflation and market interest rates were much higher than 5%. This made bank savings accounts unattractive. Money market funds, not being subject to the regulation, could pay higher interest rates.



Now let's describe the business model of a money market fund. Let's first look at the investment profile. Money market funds invest in super safe short-term debt securities. These investments have minimal credit risk. Here's a graph showing US money market fund investments in 2021. As you can see, a large share of money market fund investments is US Treasury Securities. The second largest investment is into repurchase agreements that use U.S. Treasuries as collateral.

Types of Money Market Funds

Investment profile

Treasury and government funds

Prime funds

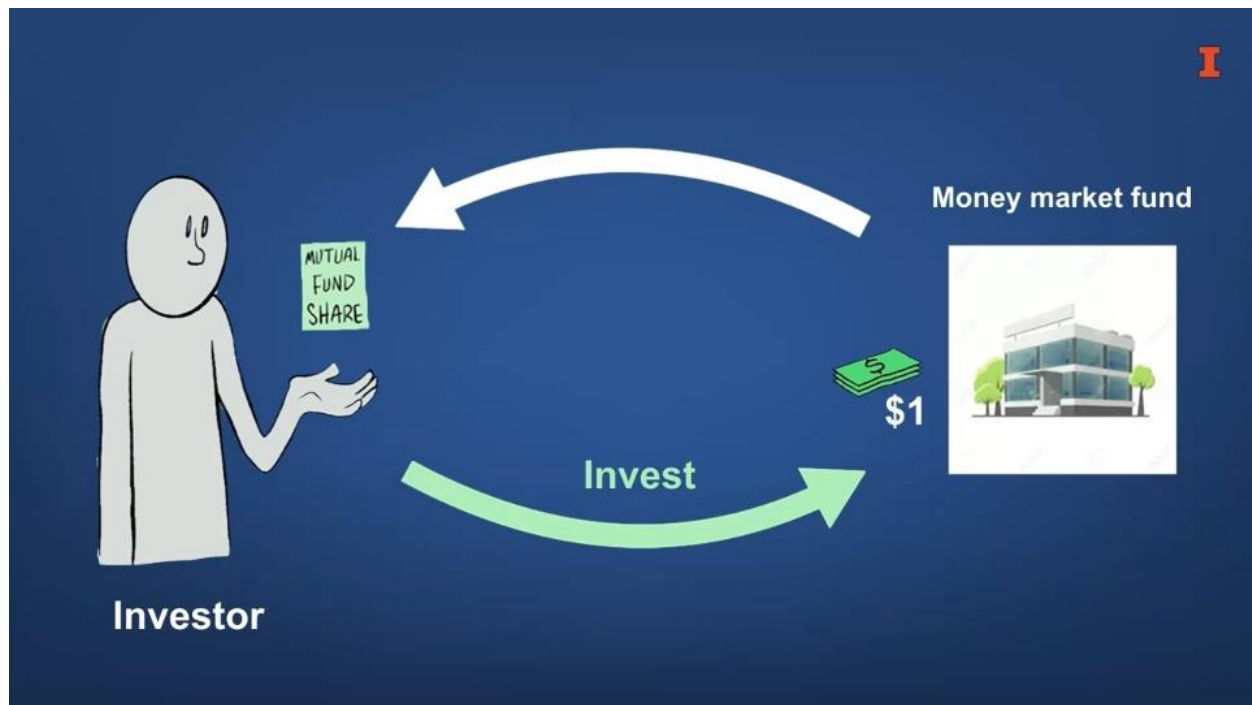
- Corporate commercial paper

- Bank CDs

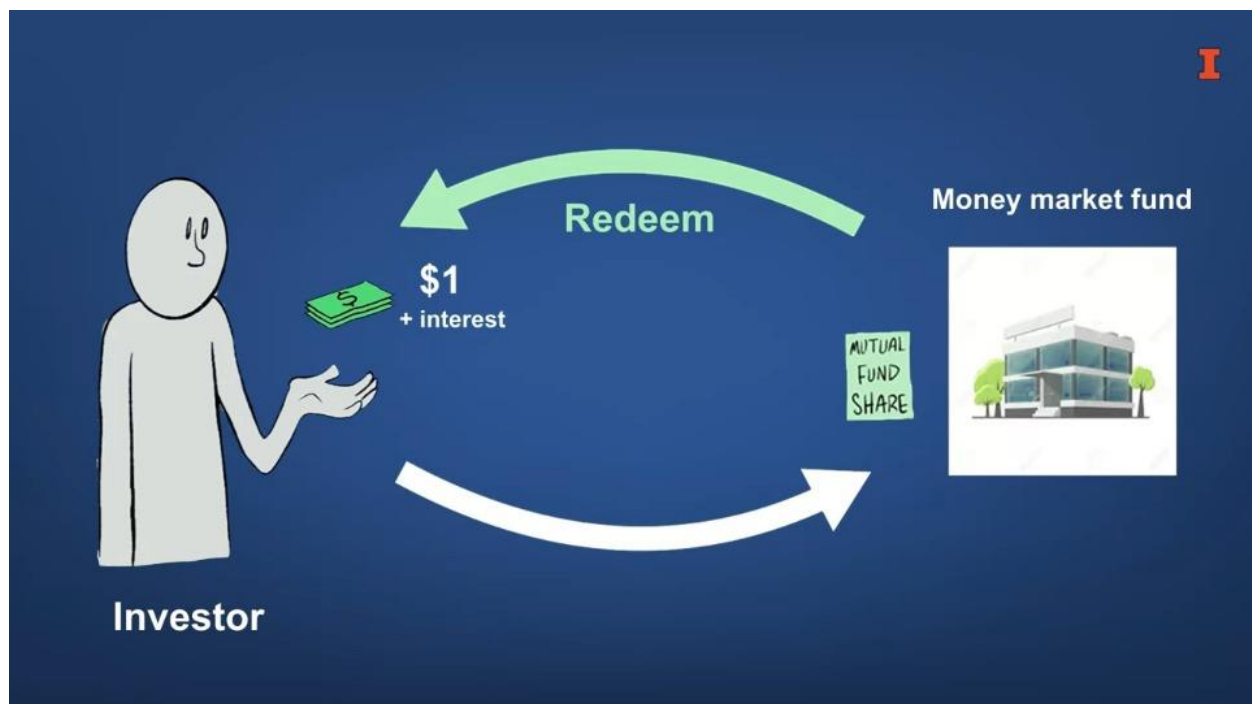
- Repos



That previous chart included all money market funds. However, some funds specialize in certain investments. Money market funds that solely invest in U.S. Treasuries are called Treasury funds. Those that also invest in other government securities are called government funds. These are arguably the safest investments, but they also have the lowest return. In contrast, prime funds are money market funds that also invest in other short-term debt securities. Prime funds buy commercial paper issued by corporations, certificates of deposit issued by banks, and purchase agreements often issued by hedge funds. These investments are little riskier, but they also have a slightly higher return.

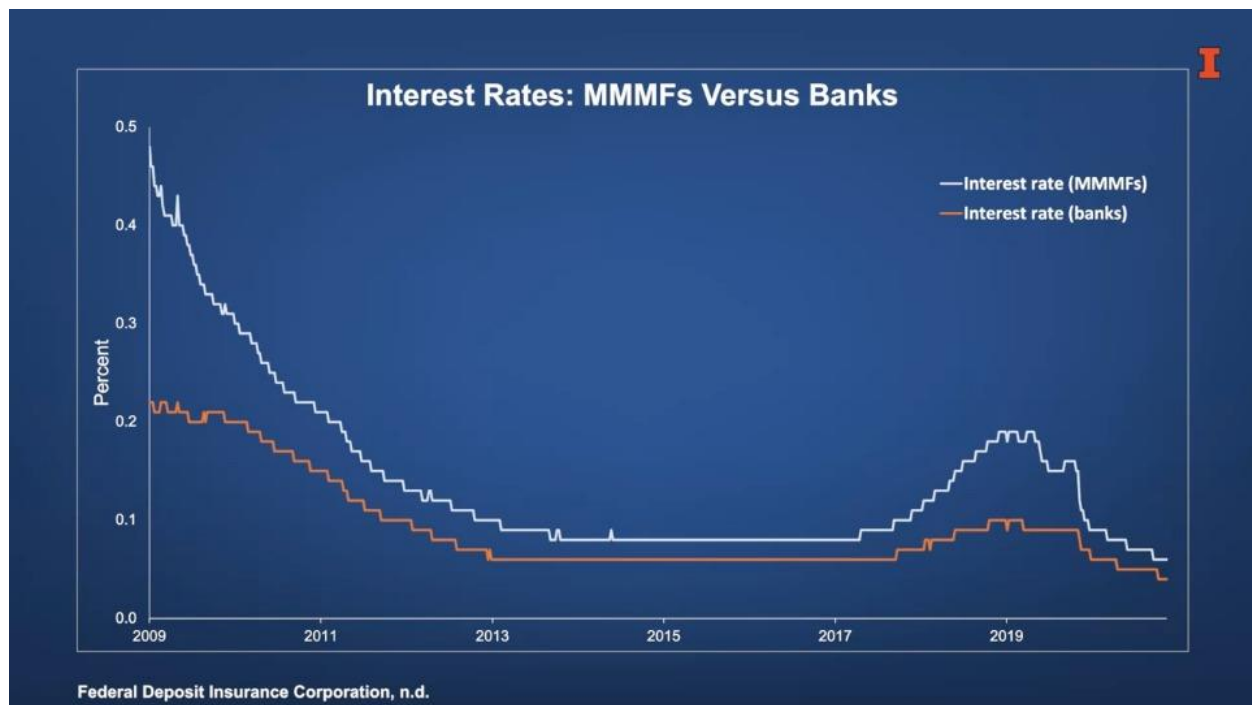


Money market funds are a type of mutual fund. When you deposit your cash into a money market account, you are buying shares in a mutual fund. Unlike other investment funds, money market funds make super safe investments and try to avoid any losses.



An investor who buys a money market fund share today at \$1 expects to be able to redeem the share tomorrow for \$1 plus interest. Money market fund shares are

redeemable on demand. You can withdraw your money at any time you want. These features make money market fund investments seem very similar to bank deposits.



However, there are two crucial differences between money market funds and bank deposits. First, the interest rate paid is different. Money market funds nearly always pay a higher interest rate. Consider a corporation managing cash for payroll. For corporations with large payrolls, small differences in the interest rates can mean a lot of money.

Money Fund Shares Versus Bank Deposits

1. Higher interest rates

2. Deposit insurance

Bank deposits insured

Money fund shares are not

Potential losses in money funds

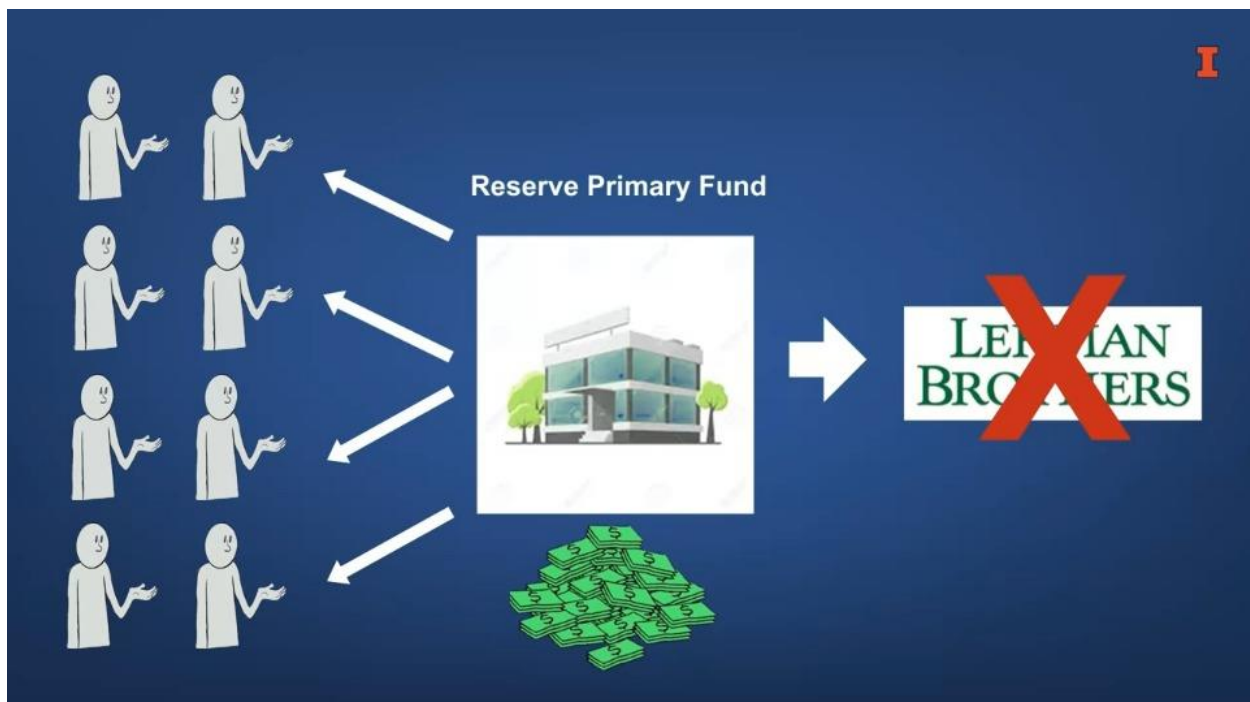


The second difference is deposit insurance. If a bank fails, government deposit insurance guarantees that depositors get all their money back. This happens when a bank fails. Money market fund investments are not insured by the government. There is a small risk of losses, especially for prime funds. Money market funds are central to the financial system. They are the cornerstones of the short-term funding markets. They lend out large amounts of cash to a wide range of financial institutions and businesses. This funding is hard to replace on short notice. Sometimes money market funds get into trouble. This happens rarely, but it can be very disruptive for financial markets and the broader economy. Let's consider the case study of the Reserve Primary Fund during the 2008 financial crisis.

Case Study: Reserve Primary Fund



As of 2008, the Reserve Primary Fund was one of the oldest and largest money market funds in the United States.



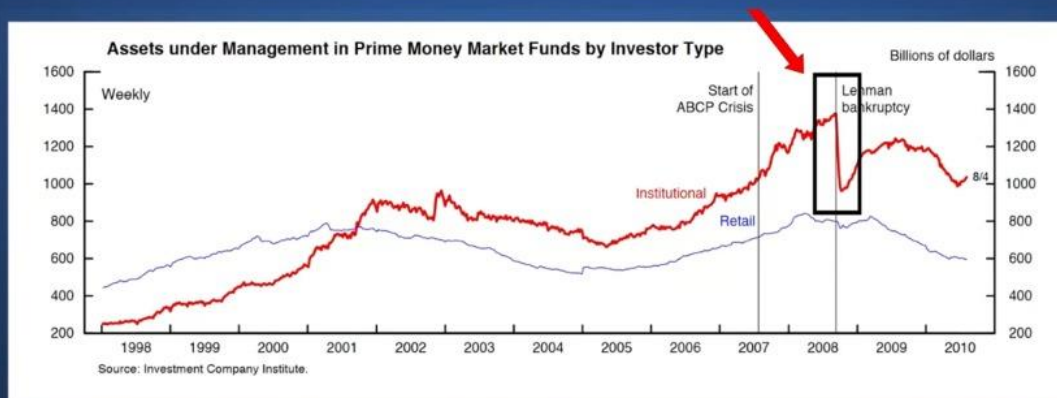
This fund was heavily invested in commercial paper of an investment bank called Lehman Brothers. Lehman failed during the 2008 financial crisis. Once this news broke, panicked investors scrambled to withdraw their money from the fund. Eventually, the fund could not meet all redemption at \$1 per investment share. It went into bankruptcy.

Case Study: Reserve Primary Fund in 2008



In the end, the Reserve Primary Fund was only able to return \$0.97 per \$1 share. This event is referred to as breaking the buck. Recall that there is no deposit insurance for money market mutual funds. When the fund breaks the buck, investors lose money.

Mass Withdrawals at Money Market Funds in 2008



This event caused a chain reaction in financial markets. After the Reserve Primary Fund failed, investors became concerned about the health of other prime funds. Safe

investments suddenly seemed risky. They withdrew about 400 billion from this fund. This was a sharp reduction in cash in the money markets. Money market funds were forced to pull back from short term funding markets. Firms and financial institutions that usually borrowed in these markets scrambled for cash or sold assets. And, in the case of banks, they reduced their own supply of credit to businesses and households. The failure of the Reserve Primary Fund showcases how central money market funds are for the financial system. When these funds experienced distress and mass redemptions, this can be very problematic. After the financial crisis, financial market regulators implemented reforms to avoid future disruptions at the money market mutual funds.

Summary

Money market funds are the largest cash lenders

Similar to bank deposits, but uninsured

Runs at money market funds can disrupt
broader economy



So, let's wrap up. What have we learned in this lesson? First, money market mutual funds are the largest short-term or cash lenders in the U.S. financial system. These funds help to efficiently allocate cash throughout the economy. Second, investor's view money market mutual funds as a substitute for bank deposits. However, these investments are not insured like bank deposits. Third, disruptions at these funds can affect large parts of the financial system through a reduction in short-term credit.

Lesson 1-3.2. Securitization

Learning Objectives

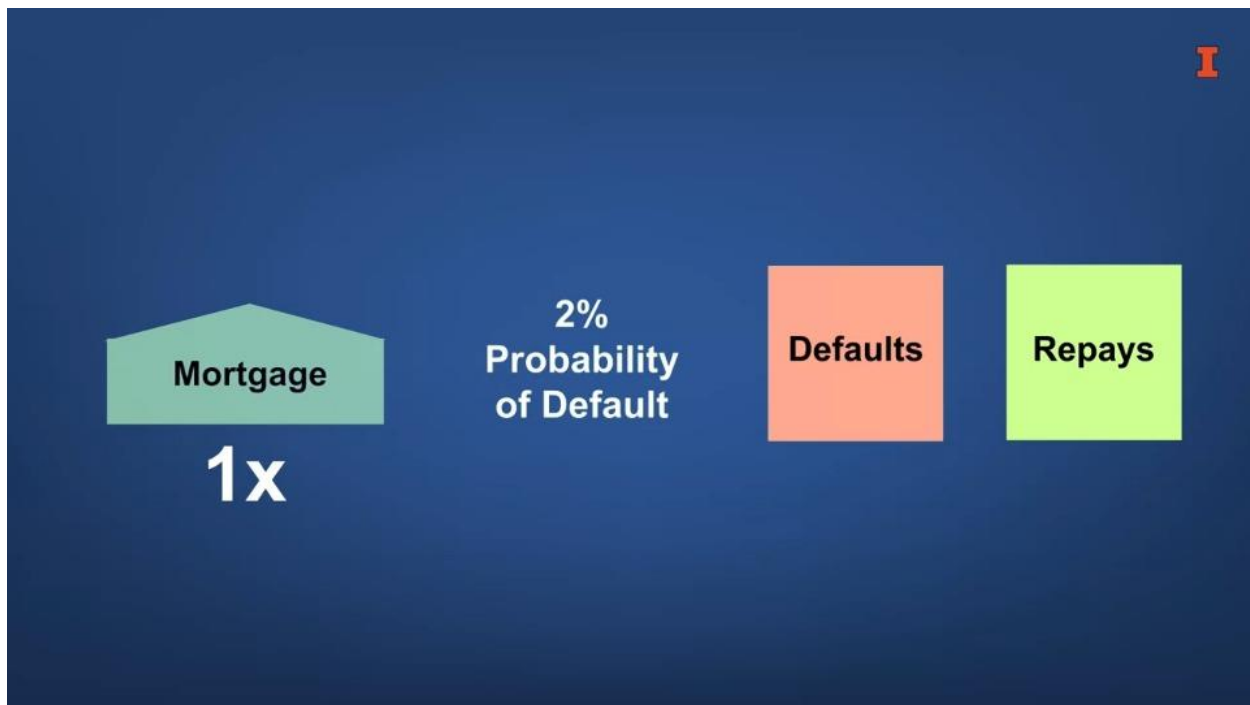
Securitization as a financial innovation

Economic importance of securitization

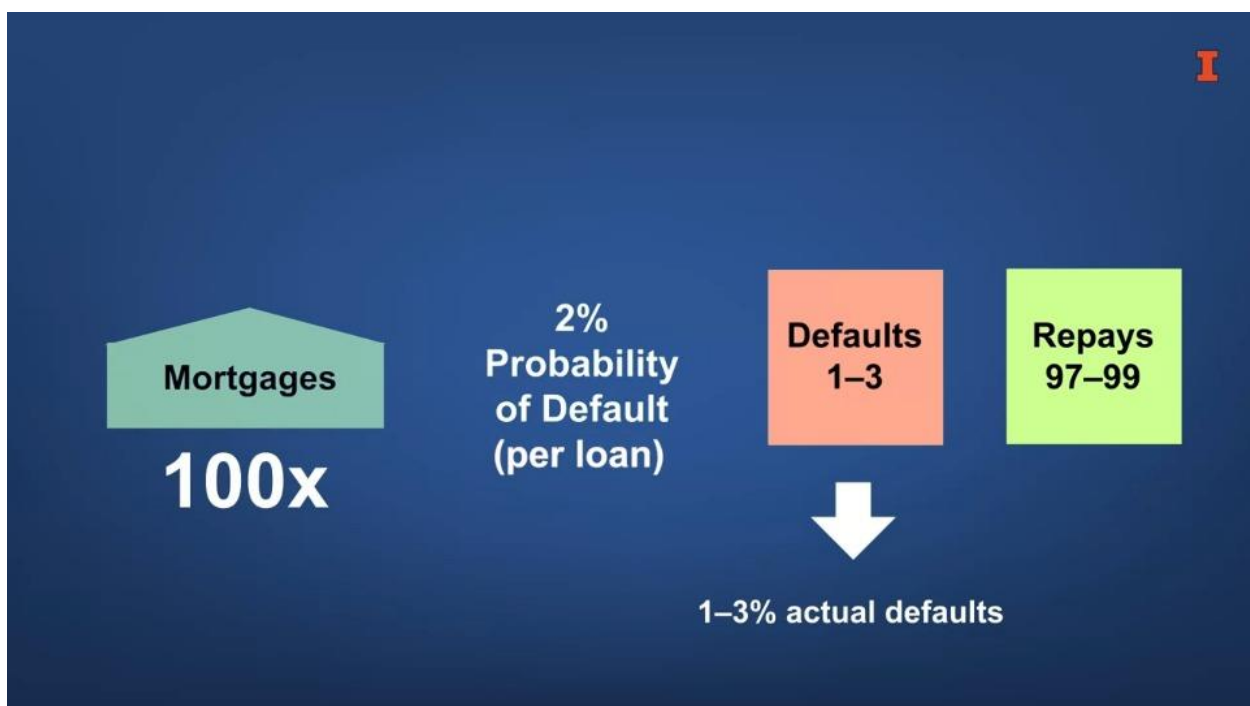
Dependence of securitization on
short-term funding



Hello and welcome to this lecture on securitization. I hope you're doing well from wherever it is you're joining us. In this class, we will introduce the idea of securitization. This is an important financial innovation that gained prominence in the 1970s. We will see how important securitization is for the US economy. Last, we will see how securitization depends on short term funding markets. Let's first have a look at how securitization works. We will understand the process and why it is profitable. The process is worth understanding, so I can recommend watching this part a couple of times.

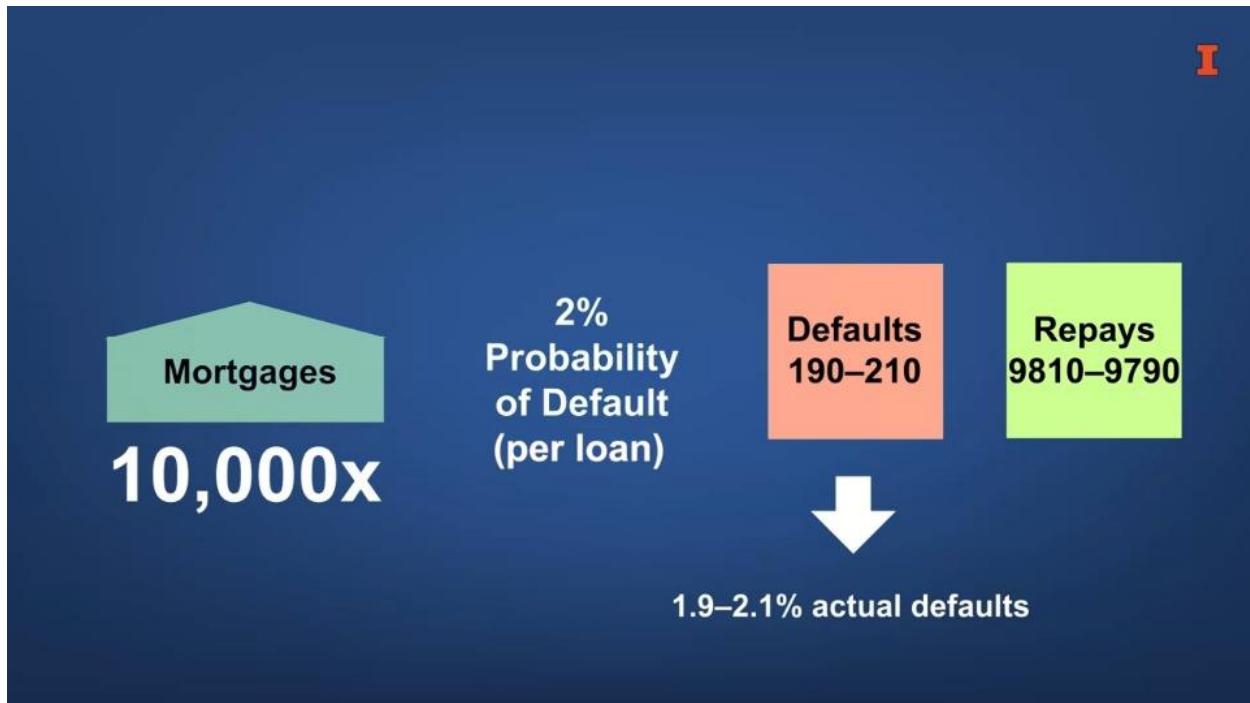


Consider one mortgage loan to one customer. Based on the customer's risk profile, suppose we expect the customer to default with a probability of 2%. With only one loan and one customer, you face one of two outcomes, the borrower either repays the loan or defaults. The losses of these loans are highly uncertain, it's all or nothing.

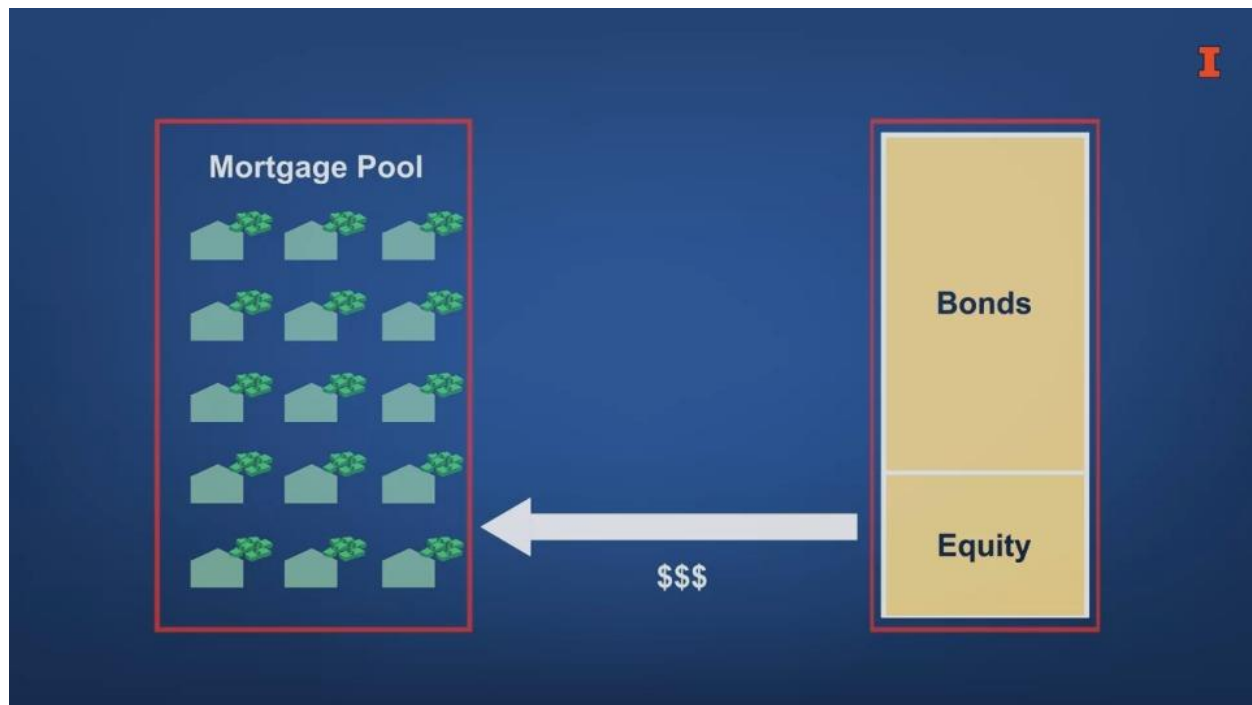


Now consider a pool of 100 of these mortgages. Let's again assume that each customer has a probability of default of 2%. Let's assume these borrowers all live in different parts

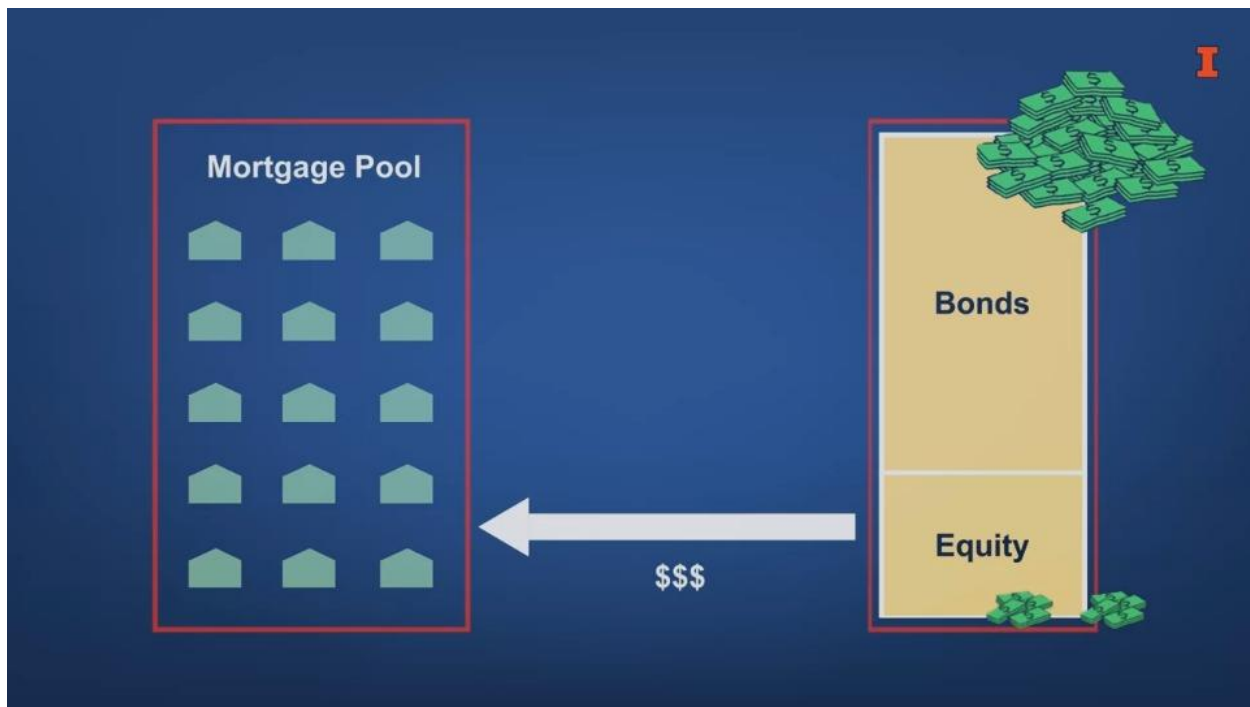
of the country. This means that they are unlikely to all default at the same time. What is the risk of default in this pool of 100 loans? You expect two out of 100 to not repay. With 100 loans, you may find that one does not repay or three do not repay. But what is important here is that it isn't all or nothing. With 100 mortgages, there's less uncertainty than in the one loan example. Now consider a pool with 10,000 of these mortgages, with the probability of 2% of default, you expect 200 defaults. This time, your expectation is likely to be fairly accurate.



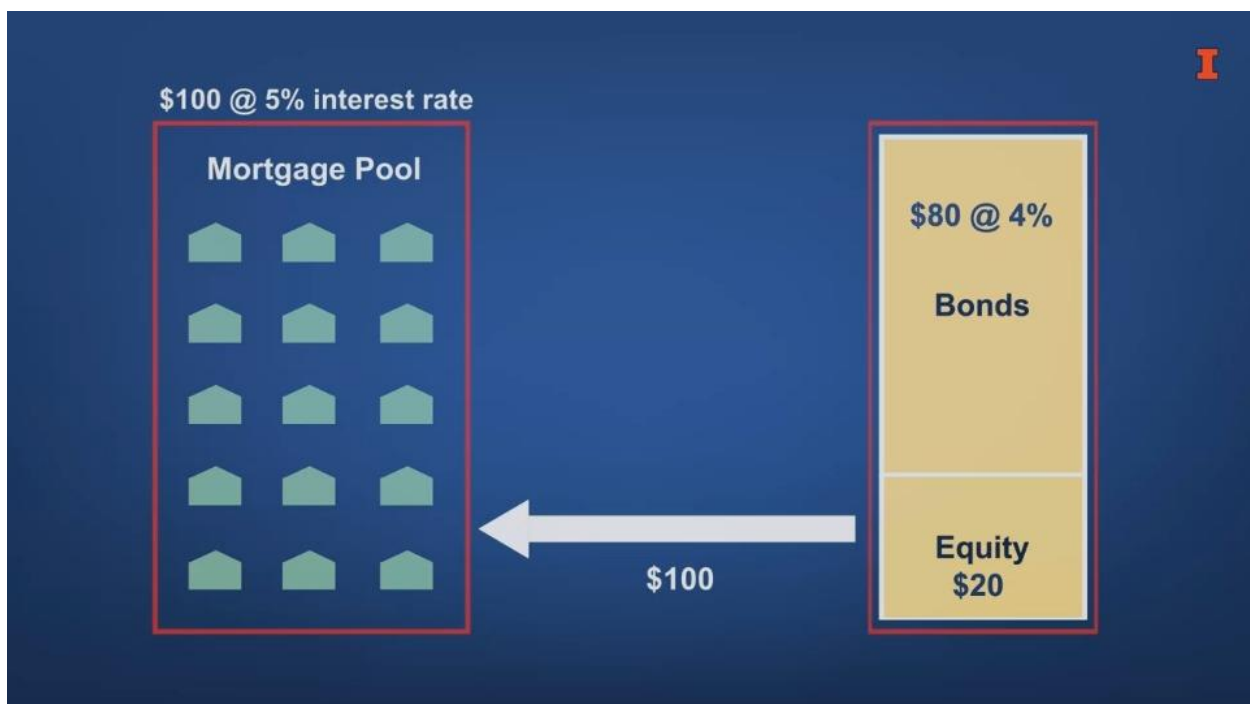
There may be 190 or 210 defaults, but this is 1.9 or 2.1%. This is very close to your expectation. What is the key takeaway? We want a large, well-diversified pool of mortgages. Then we can accurately estimate the cash flow. These are the losses and repayments on the loans. Being able to precisely forecast cash flow of pools of loans makes securitization work.



Now let's introduce the second piece of the puzzle. In a securitization, an issuer sells securities backed by the loan pool. This usually consists of bonds and equity. These securities are used to fund the mortgages. With a good estimate of the cash flow, we can issue a significant amount of bonds. The coupon payments on these bonds come from the mortgage, interest payments from the pool. The securities are designed so that the bondholders get paid first. These bonds have the first claim on the cash flow generated by the loan pool. This makes the bonds relatively safe. The equity securities also receive cash flow from the mortgage pool.

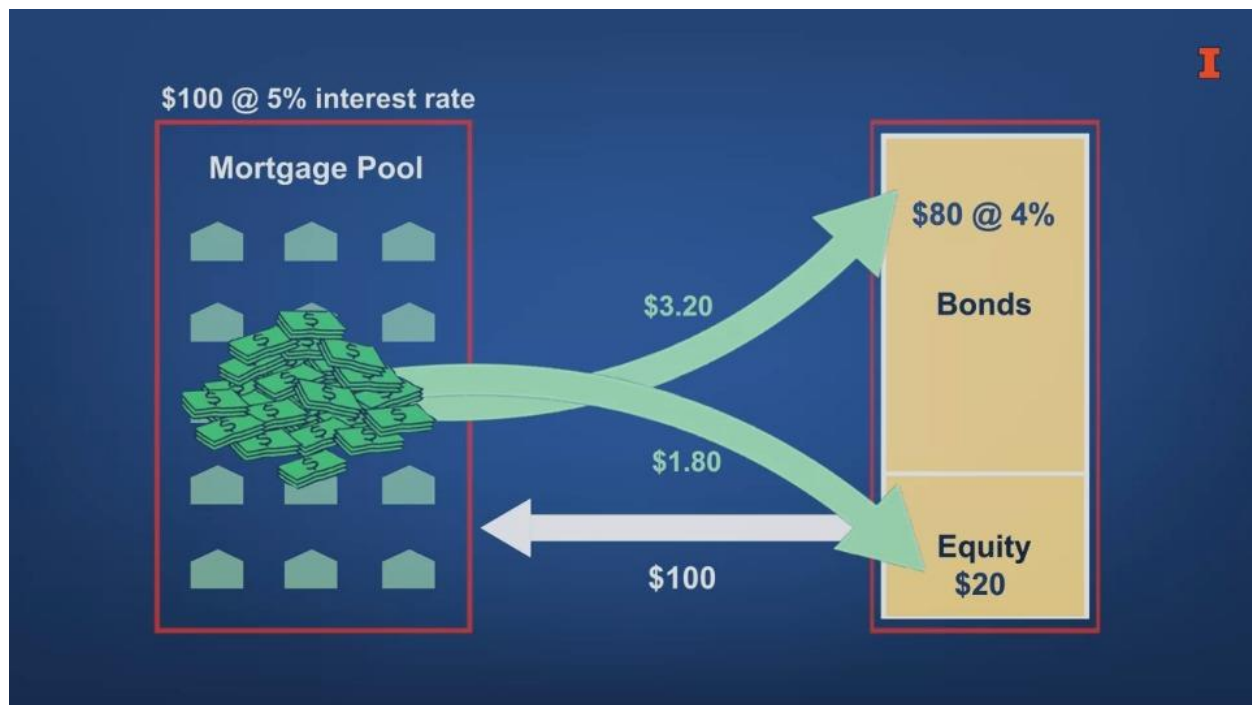


However, they are paid second. The owners of the equity portion get the remaining cash flow after all bondholders have been paid.

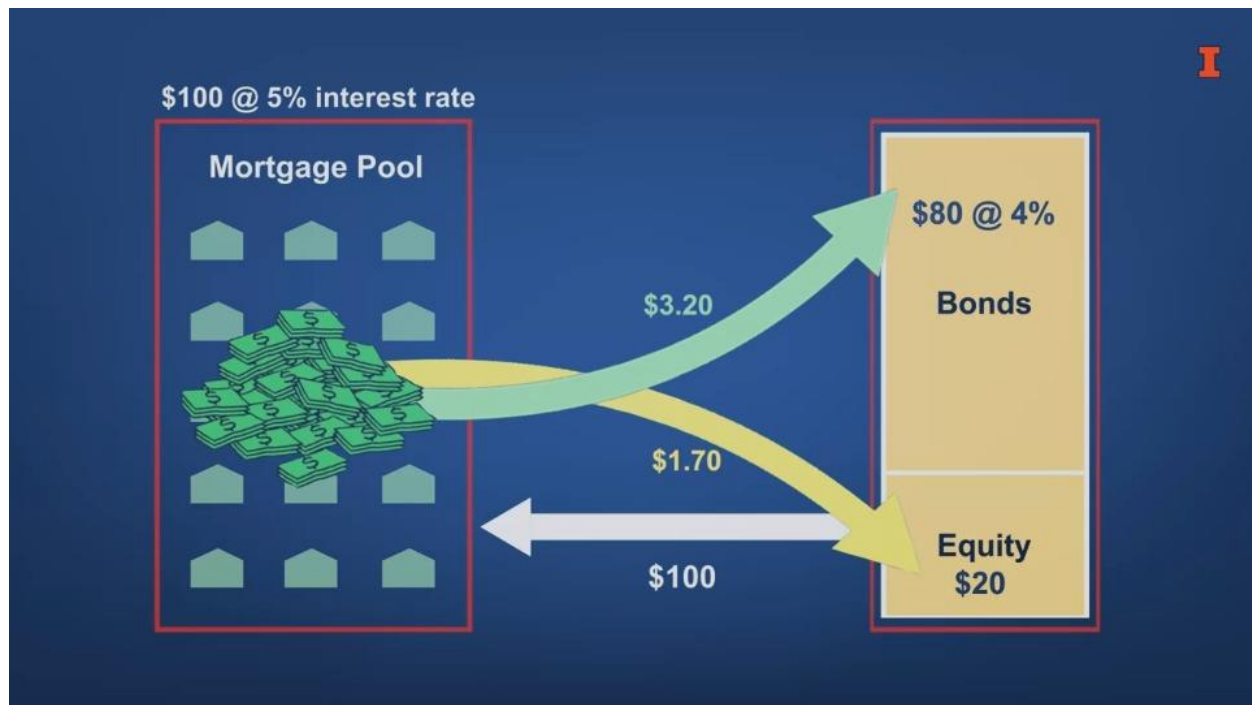


Why is securitization profitable? Let's look at a concrete example. Suppose you have a pool of mortgages worth 100. Let's say these mortgages pay 5% interest. We issued \$80 of bonds and keep the \$20 of equity for ourselves. These \$100 of securities fund \$100 of mortgages. Since the bondholders get paid first, they are relatively safe. Let's

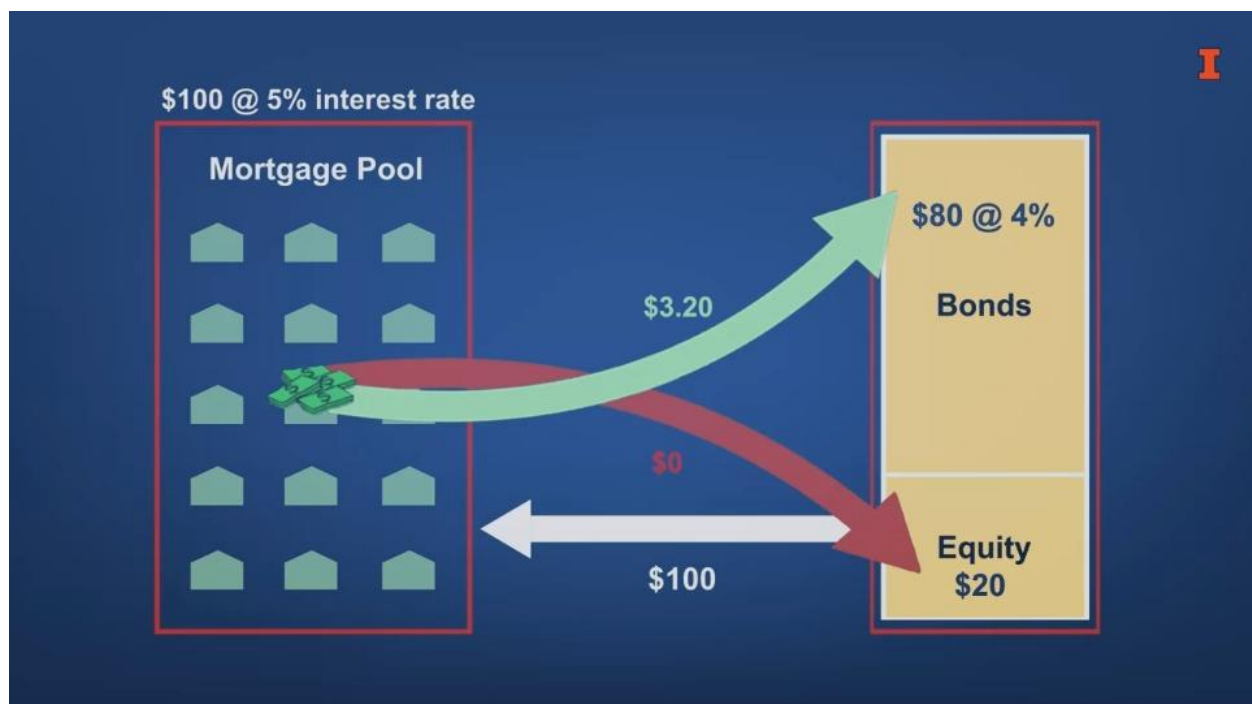
say we promise 4% interest on the bonds, then we get paid whatever is left over at the end. If no mortgages default, then the pool generates \$5 of cash.



The \$80 of bonds get a 4% return. That \$3.20. In equity holders get the remaining \$1.80.



If 2% of the mortgages default, then the pool generates \$4.90. The bondholders are fine, since they have priority, so the equity holders get \$0.10 less.



With unexpectedly high defaults, the equity holders could get nothing. The equity holders usually make a nicer return on their investment; however, they also bear the risk.

Securitization Basics

Large pool of loans \Rightarrow predictable cash flows

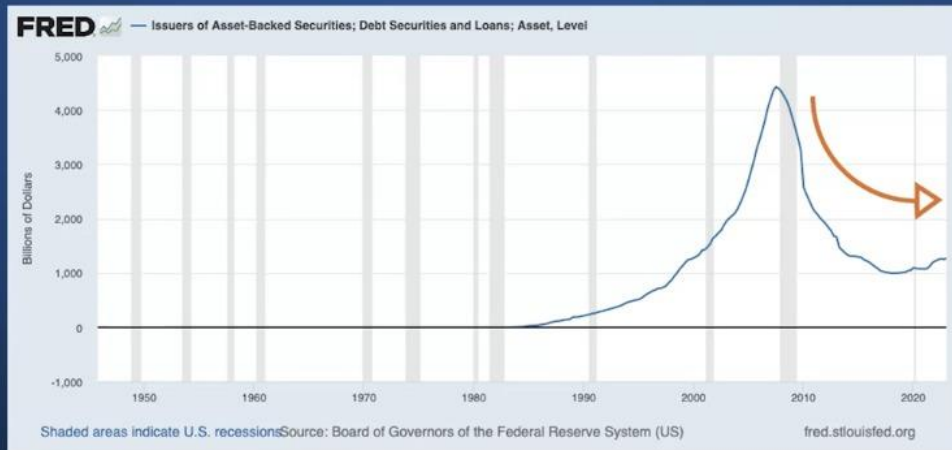
Allows for market-based financing
(bonds) funding of loans

Expands overall credit supply



This example illustrates the basics of securitization. It is arguably the most important financial innovation of the 20th century. It also shows how securitization works as a funding model. With the precise estimate of the cash flow in the securitization pool, you can use bonds to fund the loans. The lender does not need to have the cash to grant all the loans, instead they can borrow it from the market. Since the 1970s, the possibility to raise funding for loans on the securitization market has increased the supply of credit to firms and households in the United States.

Private (Non-Government-Backed) Securitization



Let's look at some data on securitization in the United States. In the US, a large amount of loans to households and businesses are securitized. This has increased dramatically since the 1980s. There was a large drop off after the 2008 financial crisis. Despite this, by 2021, the total amount of bonds that were related to securitization was about \$12 trillion. Most of these bonds, more than \$10 trillion were issued by government sponsored enterprises and guaranteed by the US government. These bonds are as safe as US Treasury Securities. The rest came from securitization of private issuers such as banks and finance companies.

Securitized Assets, Q3 2021



Recreated from data: Board of Governors of the Federal Reserve System, 2023

The vast majority of securitized loans are mortgages. These include residential mortgages for your single-family home, we can also see mortgages for multifamily homes and apartment buildings, commercial mortgages for office buildings or shopping malls. The other loan category includes order loans and small business loans.

Reliance on Short-Term Funding

Short-term funding while building loan pool

Repay short-term funding after securitization

No short-term funding \Rightarrow collapse
securitization \Rightarrow collapse credit supply
(e.g., 2008)



One final point before we wrap up. Securitization can be sensitive to conditions in short term funding markets. Why is this the case? Well, many issuers finance loans on a

short-term basis before they can be pooled and securitized. For example, they raise cash by selling commercial paper to money market mutual funds. Then they use the cash to grant loans. Once they have granted enough loans, they securitized the pool and then the issuer repays the commercial paper with the funds raised from bond investors. This is one reason why disruptions in short term funding markets can affect the wider economy. When short term funding dries up, the securitization model breaks down. When this happens, such as during the 2008 financial crisis, firms and households can struggle to access credit.

Summary

- Securitization is a key funding model for loans
- Securitization increases credit supply to businesses and households
- Depends on short-term funding



What have we learned in this session? First, securitization is an important funding model that emerged in the 20th century. It is based on statistical models, relying on many loans to reduce uncertainty. It involves pooling loans and issuing securities that are backed by the loan pool. Second, we saw how the securitization funding model has increased the total supply of credit in the United States. Third, there are potential downsides. We discussed how securitization can be sensitive to conditions in short term funding markets.