Before next class

21 short readings • Lessons 2-22

The first reading assignment

Meeting 1 is the industry introduction. We read Lesson 1 together at Meeting 2. After that class, read Lesson 2 on page 2 of this optional digital copy for Meeting 3 (student book p. 10). Allow three to five minutes and bring the closing question to class.

Find the next reading

The page number in this packet is the lesson number. If the schedule changes, read the lesson your teacher assigns.

02-04	Money, banks, and trust
05-07	Interest rates and the Federal Reserve
08-11	Risk and decisions under uncertainty
12-14	Financing businesses and projects
15-18	Mortgages, structured credit, and 2008
19-22	Models, incentives, and financial failure

Materials customized by Jason Javarone for use in the St. Mary's School Money and Banking course.

Lessons 2-22 • Planned meetings 3-23

R READ / BEFORE MEETING 3 • LESSON 02 • 3-5 MINUTES

A bank makes a loan

Imagine a fictional bicycle shop that needs a new repair stand. Its owner asks River Bank for a $2,000 loan. After approving the loan, the bank credits the owner’s checking account with $2,000. The shop now has money it can spend. It also owes $2,000. The transaction has created a deposit and a debt, not an automatic increase in the shop owner’s net wealth.

An asset is something a person or institution owns, including a claim to future payment. A liability is something it owes. From the bank’s perspective, the shop’s promise to repay is an asset. The new deposit is a liability because the bank must honor the customer’s payment instructions. These two entries appear together. In this example, River credited the borrower without debiting another customer’s deposit.

Spending the deposit creates another problem for the bank. Suppose the equipment seller uses Mountain Bank. River Bank must arrange payment to that other bank. Banks can settle such payments using reserves, balances held at the central bank. A deposit that a household holds at a commercial bank is different from the reserves the commercial bank holds at the central bank. The household normally spends its deposit, not a reserve balance.

Creating an entry on a screen therefore does not give a bank unlimited freedom. It must meet settlement obligations, absorb possible credit losses, satisfy applicable rules, and earn enough to cover funding and operating costs. A borrower who cannot repay is not a profitable customer simply because the bank can type a balance. Lending depends on both the willingness of customers to borrow and the bank’s ability to manage the resulting risks.

If the borrower later repays part of the amount borrowed (the principal) from a deposit at the same bank, both that deposit and the outstanding loan decrease. Principal repayment is different from interest, which is income to the lender before its costs. We will keep interest separate in the classroom ledger. If the shop pays the entire $2,000 to a seller at Mountain Bank, what happens to River’s reserves? Does the shop still owe River $2,000?

Consider the question. No written response is required.

R READ / BEFORE MEETING 4 • LESSON 03 • 3-5 MINUTES

Capital is not cash

Picture a fictional family that owns a house worth $400,000 and owes $250,000 on its mortgage. Ignoring all other assets and debts, it has $150,000 of net worth. That does not mean it has $150,000 available to buy groceries today. Much of its value is tied up in a house. Selling or borrowing against that house takes time, involves costs, and may require a willing buyer or lender.

Banks face a related distinction. Liquidity means the ability to meet payments as they become due. Cash and reserves are highly liquid; a loan that will be repaid over several years usually cannot be turned into its full expected value instantly. Capital, in our simplified examples, means equity: the difference between the value of assets and the liabilities owed to others. It provides room to absorb losses.

Suppose a bank has assets worth $500,000 and liabilities of $460,000. Its equity is $40,000. If a borrower defaults and the bank permanently loses $15,000 of value, equity falls to $25,000. The bank cannot solve that loss just by rearranging the remaining assets. If it borrows $15,000, it obtains cash but also creates a new $15,000 liability. Borrowing changes liquidity, not the missing net worth.

A bank may have positive equity while temporarily lacking payment funds. Conversely, it may have cash on hand while its total assets are worth less than its debts. Solvency asks whether asset value is sufficient to cover liabilities. Liquidity asks whether obligations can be met on time. The distinction is useful, but it is not a wall between unrelated problems.

If a bank must sell valuable loans quickly at a discount, its cash position can improve while its equity shrinks. The price it receives may depend on how urgently it must sell. Outsiders may disagree about what its assets are really worth. Before accepting a claim that a bank is safe, ask what evidence supports both its asset values and its access to funds. Suppose you could lend the bank enough to make today’s payment. What would you want to know before saying yes?

Consider the question. No written response is required.

R READ / BEFORE MEETING 5 • LESSON 04 • 3-5 MINUTES

A run on a bank

It is the morning of March 9, 2023. Yesterday Silicon Valley Bank announced a securities sale and plans to raise capital. Your fictional company has an uninsured balance there and payroll due tomorrow. What would you do with the balance? Which fact would change your choice? You cannot value the bank's entire portfolio in a few hours. Your decision also depends on what you expect other depositors to do.

A bank run occurs when many depositors seek their money over a short period because they fear losing access or suffering losses. The bank's assets may include loans that repay over years, while its depositors can request payment much sooner. This maturity mismatch serves a useful purpose: it can finance long-lived purchases while providing convenient payment accounts. It also creates a timing vulnerability.

Suppose a bank has $10,000 in immediately available funds and loans worth $90,000. It owes depositors $95,000. At those values, assets exceed liabilities by $5,000. But if depositors demand $30,000 today, the bank needs another $20,000 of payment funds. It might borrow or sell assets. If buyers demand a discount because the sale is urgent, satisfying withdrawals can reduce the bank's equity.

Insurance can change the depositor's calculation. If a credible insurer promises to protect a covered deposit when a bank fails, the depositor has less reason to race others solely to avoid a loss. That does not make every account or investment insured, and it does not make bad loans good. Coverage, credibility, and access to funds still matter. A guarantee can also weaken the incentive to monitor risk.

In the United States, the FDIC generally insures up to $250,000 per depositor, per insured bank, per account ownership category. Several accounts in the same category at the same bank generally share one limit. Our class will use a fictional bank, Harbor, so we can see exactly what it owns and owes. Return to the payroll decision: what would make you willing to wait, and what could the bank have to sell if you and other customers all withdraw today?

Consider the question. No written response is required.

R READ / BEFORE MEETING 6 • LESSON 05 • 3-5 MINUTES

Why a bond price changes

In 1982, U.S. savings and loan institutions, also called thrifts, faced a squeeze. They took deposits and financed home mortgages. The GAO later reported that the industry paid an average of just over 11% on borrowed funds and earned just under 11% on its mortgage portfolio. Even a performing old mortgage could earn less than the lender's new funding cost. What would a buyer offer for it? Consider a simpler promise of $110 in one year. At a $100 price its return is 10%.

If comparable investments now offer a 20% return, paying $100 for your $110 promise gives the buyer too little return relative to the alternative. Your promised payment has not changed. The price someone will pay for it can change. At a price of approximately $91.67, the $110 payment provides a 20% return. The adjustment occurs through today's price, not by rewriting the original promise.

A bond is a debt security: a claim on payments from a borrower. Many bonds promise regular interest payments, called coupons, and repayment of face value at maturity. To isolate the logic, our first examples use only one future payment. A required yield is the rate of return a buyer demands for the payment's timing and risk. A higher required yield means the buyer must pay less for an unchanged future payment.

Present value is the amount today equivalent to a future payment at a stated discount rate. If P is today's price, F is a payment one year away, and r is the required annual return as a decimal, $P(1 + r) = F$. Dividing gives $P = F/(1 + r)$. This is the same compound-growth relationship read backward. Discounting does not mean the borrower plans to pay less.

The words comparable and unchanged matter. Default risk, inflation expectations, time until payment, and other features can also influence prices. A government guarantee of promised payments does not guarantee the price an investor receives when selling early. Our numerical interest rates are hypothetical and are not current market quotes. If you will need cash tomorrow, why might owning a reliable payment due several years from now still expose you to a loss?

Consider the question. No written response is required.

R READ / BEFORE MEETING 7 • LESSON 06 • 3-5 MINUTES

Inflation and real returns

Imagine that you are saving for a bicycle. You have $500, and the bicycle also costs $500. You leave the money in an account for a year and receive 4% interest, bringing your balance to $520. Meanwhile, the bicycle price rises to $530. Your account statement shows a gain, but you can no longer buy the bicycle without adding money. This hypothetical example separates a dollar amount from what those dollars can purchase. Both measurements are useful, but they answer different questions.

A nominal value is measured in the dollars used at the time. Your $520 balance is a nominal amount. A real value adjusts for changes in prices, allowing a comparison of purchasing power. For a single purchase, the bicycle price is the relevant comparison. Economists also use price indexes that follow a broad basket of goods and services. Inflation is an increase in the general price level over a period. One bicycle becoming more expensive does not, by itself, establish economy-wide inflation.

The bicycle became 6% more expensive while the account increased 4%. Subtracting the two percentages suggests a loss of purchasing power of about 2%. For an exact comparison, divide the money growth factor by the price growth factor: 1.04 divided by 1.06 is about 0.9811. Your balance now covers about 98.11% of the price of one bicycle, a decrease of about 1.89% in purchasing power measured against that purchase. Subtraction is a convenient approximation when the percentages are modest.

Inflation also changes the meaning of a promise to repay a fixed number of dollars. A lender who expects prices to rise may demand compensation in the interest rate. Unexpected inflation can reduce the purchasing power of a fixed repayment. That does not guarantee that the borrower benefits overall: wages may fail to keep up, other costs may rise, and the borrower may struggle to make payments.

Before class, keep the bicycle story in mind. A useful comparison requires a starting date, ending date, and relevant price measure. Forecast inflation and inflation that actually occurs are different information. For a saver planning to buy this bicycle, which measure answers whether the goal is closer? Name a different goal for which the dollar balance would matter.

Consider the question. No written response is required.

R READ / BEFORE MEETING 8 • LESSON 07 • 3-5 MINUTES

Overnight money and the Fed

Two people can pay one another without using paper cash. If they bank at the same institution, the bank can change the balances in its own records. If they use different banks, the payment usually requires settlement between institutions. Banks hold balances at the Federal Reserve called reserves. Those balances are different from the deposits that households hold at commercial banks. Moving a customer payment across banks can therefore move reserves as well as change customer deposit balances.

Consider a hypothetical bank that begins the day with $60 million in reserves. Its customers send $25 million to other banks, while incoming payments bring it $10 million. It ends with $45 million. If it wants $50 million available, it needs another $5 million. The bank may borrow funds overnight, sell an asset, or use another permitted funding arrangement. Another institution might be willing to lend. The decision is about timing and available payment resources, not necessarily whether the bank owns more than it owes.

In the federal funds market, eligible institutions borrow reserve balances overnight without collateral. The Federal Open Market Committee (FOMC) sets a target range. The New York Fed summarizes actual trades with a volume-weighted median. At least half the reported dollar volume is at or below the rate, and at least half is at or above it. The Fed’s Board of Governors sets today’s single interest rate on reserve balances (IORB). In 2019 there were separate rates for required and excess reserves.

Customer payments between commercial banks move reserves from one bank to another. Tax payments move funds into the Treasury’s account at the Fed. Paying banks lose reserves, while another commercial bank does not receive them. Treasury-debt settlement also moved funds to Treasury in September 2019. On September 17, the effective federal funds rate reached 2.30%, above the 2.25% target ceiling. The New York Fed supplied reserves against securities through overnight repo.

Why does interest on reserves matter? A bank compares what it could earn on reserves with the interest offered by another borrower. A higher safe return makes a low-rate loan less attractive, other things equal. Institutions differ in their access to reserve interest, their costs, and the risks they can take. Private loan rates also reflect future expectations, competition, and possible default. If the Fed raises the rate it pays on eligible reserve balances, why might two banks still charge different rates for loans to businesses?

Consider the question. No written response is required.

R READ / BEFORE MEETING 9 • LESSON 08 • 3-5 MINUTES

Insurance and expected value

In 1752, Benjamin Franklin and fellow firefighters founded the Philadelphia Contributionship so property owners could share fire losses. A homeowner who applied for coverage could expect a visit. The company sent a surveyor to inspect the building before its directors set the rate. Pooling losses was part of the bargain. So was understanding what kind of building the other owners were being asked to insure.

Consider a fictional repair shop today. It owns a $10,000 machine. Suppose the chance of an accident that destroys it this year is 1%, and otherwise there is no damage. Its expected loss is 0.01 × $10,000, or $100. That is a probability-weighted average. At the end of the year this shop will have lost either $10,000 or nothing.

An insurer offers to cover the entire loss for a $140 payment called a premium. The shop pays the premium in either outcome. If the insurer honors its promise, the shop pays $40 more than its expected uninsured loss to avoid a $10,000 surprise. An owner might prefer a certain cost to a gamble with the same average cost. That preference is called risk aversion. The decision also depends on how much cash the shop has and how long it could stay open without a working machine.

The insurer can cover many shops. When one shop’s loss tells us little about other shops’ losses in the same policy year, the fraction with losses can become more predictable in a larger pool. A wildfire that reaches several shops presents a shared risk. Premiums must cover expenses, and the insurer needs resources for claims above expectations.

Real policies specify which losses qualify and how much the customer retains. A deductible is the part of a covered loss the customer must bear before the insurer pays under the policy. Our $140 policy has no deductible. If you were the repair-shop owner, what would you want to know about the insurer before relying on its promise?

Consider the question. No written response is required.

R READ / BEFORE MEETING 10 • LESSON 09 • 3-5 MINUTES

Diversification under stress

In a fictional town, an investor owns the outdoor swimming club and worries about a rainy summer. The owner of the indoor climbing center has the opposite worry: sunshine keeps customers outdoors. The investor buys a share of the climbing center. The weather forecast may matter less to her now. Has she made the two businesses safe, or has she protected herself against one particular problem? Combining investments that respond differently to events is one way to diversify.

A portfolio is a collection of investments. If half its initial value is in one investment and half in another, its one-period percentage return is the average of their returns, assuming no additional deposits, withdrawals, or rebalancing during the period. If one investment gains 12% while the other loses 4%, that equal-weight portfolio gains 4%. Combining them changes the possible outcomes without making the weaker investment disappear.

Correlation describes how two quantities vary together. We can explore that idea by looking at a few scenarios. On sunny days, gains at the swimming club may offset losses at the climbing center. In the rain, the roles reverse. Yet both businesses still need roads, electricity, and customers who can afford a visit. Which of those dependencies would show up in a comparison of sunny and rainy days alone?

Now the only access road closes for the season. Visitors can reach neither business. The owner who bought both still has the benefit of diversification across the two weather outcomes. She has little protection against losing the road. Imagine adding ten other businesses in the same town. Would adding their names to the account change how customers get there?

A stress test asks how a position would perform under a specified adverse scenario. It can expose vulnerabilities that an average return or a short history misses. It cannot prove that every possible bad outcome has been considered, and assigning probabilities to unfamiliar scenarios is difficult. Before class, think about two investments that look different on the surface. What single event could hurt both of them at the same time?

Consider the question. No written response is required.

R READ / BEFORE MEETING 11 • LESSON 10 • 3-5 MINUTES

Leverage and forced selling

A fictional investor has $10,000 and borrows another $40,000 to buy $50,000 of securities. The securities are assets, the loan is debt, and the difference is the investor's equity in the position. Borrowing allows the investor to hold more assets than their own funds could buy. This is financial leverage. For this course, one useful leverage ratio is total assets divided by equity: $50,000 divided by $10,000 equals five.

Suppose the securities rise 10% to $55,000. Ignoring interest and other costs, the debt remains $40,000, leaving $15,000 of equity. The investor has earned $5,000 on the original $10,000, a 50% gain. If the securities instead fall 10% to $45,000, equity falls to $5,000, a 50% loss. The same borrowing that magnifies gains also magnifies losses. The asset return and the return on the investor's own money are different percentages.

A lender wants some protection if the assets behind a loan lose value. Property pledged for repayment is collateral. A contract can require the investor to keep a minimum amount of equity in the position. If asset prices fall, the investor may have to put up cash or sell assets to repay part of the debt. The fictional contract we will calculate in class has its own terms.

In March 2021 this timing problem became urgent for Archegos, an investment firm. It had contracts with banks that gave it exposure to stock prices without having to buy all the shares itself. When prices fell, Archegos had to cover losses or provide collateral. It ran out of funds. Credit Suisse had bought shares to offset its side of the contracts and had to sell them as prices fell. A long-run opinion about those stocks could not settle the bill that came due that week.

Borrowing is not inherently a mistake. It can finance useful assets and projects, but the terms determine which risks accompany the additional purchasing power. When evaluating a position, examine not only its possible final value but also its path and the demands that can arise along the way. Before class, consider this question: what resources or contract terms would allow an investor to survive a temporary price decline without selling?

Consider the question. No written response is required.

R READ / BEFORE MEETING 12 • LESSON 11 • 3-5 MINUTES

Options and asymmetric payoffs

Imagine that a school photography business owns a camera it plans to sell at the end of the season. The resale price might fall, but the business needs enough money from the sale to buy its next camera. A dealer offers a contract: pay a fee today and receive the right to sell the camera to the dealer for a specified price later. The owner can use that right if the market price falls, or sell elsewhere if the market price rises. This is a hypothetical example of an option.

A put option gives its buyer the right to sell a specified asset at a specified price under the contract's terms. That price is the strike price. A call option gives its buyer the right to buy instead. The buyer pays a premium for the right. The seller receives that premium and accepts the corresponding obligation. The two sides do not have the same choices: the buyer may decide whether using the right is worthwhile, while the seller must perform when validly required.

Suppose a simplified put lets the camera owner sell for $600 at the end of the season. If the camera's market value then falls to $450, the right adds $150 to what the owner could otherwise receive. If its market value is $750, the owner can sell in the market and let the put expire unused. However, the premium paid earlier is a cost in both situations. A contract that pays nothing at expiration can still have served its intended protective purpose.

A share is a small ownership claim in a company. In class we will use simplified one-share contracts, exercised only at expiration, so we can focus on the arithmetic. Actual listed stock options commonly cover 100 shares, and their exercise rules vary. The payoff is the value produced by the option at expiration. Profit subtracts the premium and any other costs. Confusing these two quantities can make an unprofitable purchase look successful.

An option does not have to be used for protection. Someone with no offsetting exposure can buy one to speculate on a price change. A future purchase obligation can also create a risk worth hedging. The same contract may therefore serve different purposes in different portfolios. Before deciding whether a contract reduces risk, ask what else its owner holds. What would make paying for a put sensible even if the put eventually expires without a payoff?

Consider the question. No written response is required.

R READ / BEFORE MEETING 13 • LESSON 12 • 3-5 MINUTES

Funding a new business

A student has built a working soil sensor. A gardener at the Saturday market wants ten, but the supplier needs to be paid before the student can assemble them. The first customer's interest gets the business closer to a sale. It doesn't put money in the account today. In this fictional case, the student has two offers to cover the supplier's bill. What would each offer cost if the sensors sold poorly? What if they became a hit?

Debt financing means borrowing under an agreement to repay. The lender receives a contractual claim rather than becoming an owner merely by making the loan. A $10,000 one-year loan at 10% simple interest requires $11,000 at the end of the year under those terms. The company's actual ability to pay depends on what happens to its business. A promise is not a guarantee, and lenders may ask for collateral, restrictions, or a personal guarantee. We must read the terms before deciding who bears a loss.

Equity financing means selling an ownership interest. A share represents part of that ownership. Suppose a founder owns 90 shares and the company issues 10 additional, identical shares to an investor. The founder still owns 90 shares, but now owns 90 out of 100, or 90%, of the company. The percentage falls because the total number of shares has increased. This reduction in percentage ownership is called dilution. It need not mean that the founder's dollar wealth falls: the company also receives the investor's money.

An angel investor generally invests personal money in an early business. A venture capital fund pools investors' money to make investments, commonly in businesses with substantial growth potential. Such investors may bring experience and contacts as well as cash. They may also request influence over decisions. A founder should therefore compare more than the dollar amount offered. Payment timing, control, downside protection, and the investor's expectations can all affect the relationship.

For our classroom comparison, every equity share will have the same rights and no investor will receive special priority. Real contracts can be more complicated. The important first step is to trace what each person contributes and what each person receives in different outcomes. If you expected your business to grow slowly and unpredictably, what would you want to know before choosing between a loan and a new equity investor?

Consider the question. No written response is required.

R READ / BEFORE MEETING 14 • LESSON 13 • 3-5 MINUTES

Financing a project

Imagine a company planning a small solar installation. Panels must be purchased and installed before the first electricity is sold. The founders want a loan, but the new company has no years of past sales to show the lender. Instead, they present a construction contract, an agreement to sell electricity, estimates of maintenance costs, and a plan for repaying the loan. This hypothetical example raises a practical question: how much confidence can contracts create about cash that has not arrived yet?

Project finance organizes funding around a particular project and its cash flows. A separate project company may own the equipment, sign contracts, and borrow. Under limited-recourse financing, lenders cannot automatically collect every unpaid amount from all the sponsor’s other businesses. Their rights are limited by the agreement, although guarantees or particular failures can create additional claims. Limiting recourse does not remove the risk. It changes who bears it and makes the project’s own ability to pay especially important.

Debt service means the interest and principal payments required during a period. Suppose a project receives $90,000 from customers and spends $55,000 on operation and maintenance. It has $35,000 before paying its lenders. If the year’s debt service is $25,000, there is $10,000 left for reserves or owners. If debt service is $40,000, the project faces a $5,000 shortage even though customers paid more than the operating bills. Revenue, operating cash, and cash available to owners are different quantities.

A contract may reduce one particular uncertainty. A long-term buyer can agree on an electricity price, but might still fail to pay. A fixed-price construction contract can assign some cost overruns to a builder, but cannot make an incapable builder capable. A floating-rate loan creates another uncertainty because its interest rate changes. An interest-rate swap can exchange payments calculated at a floating rate for payments calculated at a fixed rate. Matching those payments to the loan can stabilize its interest cost.

The details matter: the payment dates, rate definitions, and amounts must fit, and each counterparty must perform. In class we will trace a simplified swap one payment at a time before combining it with a loan. Which uncertainty would you investigate first before lending to a project: construction, customers, operating costs, or financing costs, and why?

Consider the question. No written response is required.

R READ / BEFORE MEETING 15 • LESSON 14 • 3-5 MINUTES

Buying a company with debt

In October 1988, RJR Nabisco’s chief executive proposed buying the company with borrowed money. Its debt lost its A rating after the proposal. MetLife, which already held RJR debt, sued on November 17 while bids were still competing. The board accepted KKR’s bid on December 1. A lawsuit records a dispute; it does not by itself establish wrongdoing or an eventual bond default. What could MetLife check in its bond contract before deciding whether to challenge the proposed borrowing?

An acquisition transfers ownership or control of a business or its assets. A leveraged buyout uses substantial borrowing to help finance that purchase. The borrowing may ultimately be owed by the acquired business. Debt allows the equity investors to supply a smaller portion of the purchase price, but the business must generate cash for the resulting obligations. Changing ownership does not automatically increase customer demand or make equipment more productive.

Consider a simplified business purchased for $100. If it later sells for $120, an all-equity buyer gains $20, or 20%, before any operating cash or costs. A buyer who initially uses $40 of equity and $60 of debt receives $60 after selling for $120 and repaying the $60 principal. Ignoring interest and other costs just for this illustration, that is a $20 gain on $40, or 50%. The business rose by the same $20 in both cases. The different percentage reflects the smaller equity investment and its larger exposure to losses.

Private equity funds pool investors’ capital and may buy controlling interests in businesses. Their plans can include expansion, new management, better systems, or combinations with other companies. They can also include selling assets, changing staffing, or making distributions to owners. Each proposal needs evaluation: a cost reduction might remove waste, or it might reduce the capacity needed to serve customers later. A merger may create useful efficiencies, while also affecting competition or employees.

The purchase price, debt terms, operating plan, and eventual sale price all matter. A profitable exit for the owners does not by itself reveal how much came from better operations, financing, a favorable market, or costs borne by others. In class we will hold the operating business constant and change its financing first. What evidence would convince you that an acquisition improved the business rather than merely changing who received its cash?

Consider the question. No written response is required.

R READ / BEFORE MEETING 16 • LESSON 15 • 3-5 MINUTES

From mortgages to securities

Imagine a lender that has financed homes in one town. Its borrowers will make payments for years, but more families want loans next month. The lender could wait for the first loans to be repaid or sell the right to receive their payments. If a loan is sold, who has to move out of the house? Nobody. The household still owns its home and owes the debt. What changes hands is the claim on its future payments.

In everyday speech, a mortgage is a loan secured by real estate. If a borrower fails to pay, the lender may pursue the collateral through the applicable legal process. Collateral can reduce a loss, but a house cannot always be sold quickly or for enough to repay the loan. A mortgage payment usually includes interest, which compensates the lender, and principal, which reduces the amount borrowed. Taxes and insurance may also appear on a household bill; we will leave those out of our examples.

Securitization means placing financial assets into a pool and issuing securities supported by their cash flows. A mortgage-backed security, or MBS, gives an investor a claim tied to a mortgage pool. A servicer collects payments and administers loans. The servicer may be different from the institution that originally made the loan and from the investors who ultimately receive the money. Keeping these roles distinct helps us follow both the cash and the incentives.

For a simple example, suppose a pool receives $1,000 this month: $700 of interest and $300 of principal. Before fees, investors collectively receive $1,000, but only $700 is interest income. The remaining $300 repays part of the borrowers’ loan principal. What an investor paid for that claim is a separate amount. They should not count the entire payment as profit. If one household pays late, cash may arrive later; if part of a debt is never recovered, there is a credit loss. Those are different events.

Another uncertainty is prepayment: a borrower may repay early, perhaps by refinancing. Early repayment returns principal sooner but ends future interest on that principal. Pooling many loans can reduce dependence on one household, while a common economic shock can still affect many households together. The contract determines who bears these risks and whether any guarantee applies. Before class, consider: what would you want to know about a mortgage pool before buying a share of its payments?

Consider the question. No written response is required.

R READ / BEFORE MEETING 17 • LESSON 16 • 3-5 MINUTES

Who takes the first loss?

Three fictional investors want to finance the same pool of loans, but they do not want the same bargain. One wants priority in receiving repayment. Another is willing to take the earliest losses if the possible compensation is attractive. A third prefers a position between them. They can divide the pool into different claims rather than each owning the same proportional share. The borrowers' debts do not change when the investors negotiate these priorities.

Each class of claims is called a tranche. The senior tranche has priority over specified junior claims. The junior or first-loss tranche absorbs losses before protected classes do. A waterfall is the contractual rule that determines how available money is distributed. Think about an ordered line of claims, not separate buckets of loans: several investor classes can depend on the same underlying pool.

Suppose a simplified pool contains $100 of principal and issues a $70 senior claim, a $20 middle claim, and a $10 first-loss claim. Ignore interest, fees, and time. If the pool ultimately returns $95, its loss is $5. The senior investor can receive $70 and the middle investor $20, leaving $5 for the first-loss investor. The pool lost $5, and investors together lost exactly $5. Their losses are unequal because their contracts are unequal.

This arrangement can make the senior claim less exposed to moderate credit losses than a proportional share of the whole pool. It does not make the junior claim safer. It also does not guarantee the senior claim against every possible loss. Protection depends on the amount beneath it and on how badly the pool performs. A credit rating is an opinion about credit risk under a methodology, not a source of cash that pays creditors.

Correlation matters because a common shock can hurt many borrowers together. A small loss in every region is different from assuming that only one household will have trouble at a time. A larger pool can still contain concentrated exposure to house prices, jobs, or refinancing conditions. As you prepare for class, consider: what would have to happen before the senior investor in this $100 example loses any principal?

Consider the question. No written response is required.

R READ / BEFORE MEETING 18 • LESSON 17 • 3-5 MINUTES

When overnight lenders leave

On Thursday, March 13, 2008, Bear Stearns told the Federal Reserve that it expected to run short of cash or funding the next day. It had reported nearly $400 billion in assets. How could a firm that large have trouble making Friday's payments? To see one way this can happen, follow a fictional dealer that owns mortgage securities it expects to collect on for years. Its own borrowing comes due tomorrow morning.

The dealer uses a repurchase agreement, or repo. It sells securities for cash and agrees to buy them back at a specified price and time. Economically, the securities act as collateral for a loan. The lender usually advances less than the securities' assessed value. The difference, measured as a fraction of that value, is the haircut. A larger haircut gives the lender more protection and leaves the dealer to find more funding elsewhere.

Suppose collateral is valued at $100 and the haircut is 10%. A lender provides $90, leaving the dealer to finance the other $10. Tomorrow, the dealer needs to repay or renew that $90, plus any interest. If the collateral is then valued at $95 and the haircut stays at 10%, a new loan provides only $85.50. Ignoring interest, the dealer needs $4.50 from another source. No final mortgage default has to occur before this refinancing gap appears.

A lender could also demand a larger haircut or refuse to renew at all. These are distinct changes. Raising the interest rate does not necessarily persuade a lender that is unwilling to accept the collateral or the borrower's risk. The dealer might use spare cash, raise new capital, borrow elsewhere, or sell assets. If many dealers try to sell similar assets together, sale prices may fall, worsening other firms' funding conditions.

This is one way a run can occur without households lining up outside a bank. Large financial institutions can withdraw short-term financing from other institutions. However, different funding markets behaved differently during the financial crisis; not every run was a gradual increase in haircuts. As you read, consider: what information would you need to decide whether an overnight lender should renew a dealer's financing tomorrow?

Consider the question. No written response is required.

R READ / BEFORE MEETING 19 • LESSON 18 • 3-5 MINUTES

2008: intervention and tradeoffs

On September 15, 2008, Lehman Brothers Holdings filed for bankruptcy. The next day the Federal Reserve authorized emergency credit for the insurer AIG. Why would officials facing two threatened failures in two days reach different decisions? They had to weigh the value of collateral, the chance of repayment, the available deals, and the trouble a sudden collapse could cause for others. Nobody could observe both the outcome of helping and the outcome of declining to help the very same firm.

A spillover is a consequence for people beyond the original transaction. A firm's failure can impose costs on other firms, workers, or customers through disrupted payments, asset sales, and reduced credit. These costs give policymakers a reason to consider intervention. They do not automatically prove that any particular intervention is justified. The scale of the spillover, the alternatives, the authority to act, and the distribution of costs all matter.

Different forms of support solve different problems. Emergency lending supplies cash that must be repaid; adequate collateral and repayment prospects matter. A capital investment provides funds in exchange for an ownership claim and can help absorb losses. A resolution process deals with failure and allocates losses while trying to preserve useful operations. Calling all three a bailout can hide differences in who takes risk and what the institution must give up.

For example, a fictional firm with assets worth $110 and debt of $100 might need temporary cash because its assets cannot be sold quickly. A second firm has assets worth only $90 and debt of $100. Lending the second firm $10 adds $10 cash and $10 debt: assets become $100 and liabilities $110. Its $10 deficit has not disappeared. A cash loan can buy time, but by itself it does not repair a loss already embedded in the balance sheet.

Another concern is moral hazard: protection against losses can change incentives to take risks beforehand. Conditions, fees, shareholder losses, and management changes may reduce that concern, while poorly designed conditions can create other problems. Reasonable people can disagree about the best response under uncertainty. Before class, consider: which facts would most strongly change your decision between lending temporarily, demanding new capital, arranging a sale, and allowing a firm to fail?

Consider the question. No written response is required.

R READ / BEFORE MEETING 20 • LESSON 19 • 3-5 MINUTES

A trade that should converge

A trader notices two investments with similar promised payments but different prices. One costs $48 and the other costs $52. Perhaps one is temporarily unpopular. If their prices eventually become equal, buying the cheaper investment looks attractive. But buying it alone also exposes the trader to a general market decline. A convergence trade tries to profit from a narrowing price difference while offsetting some common movements. Similar promised payments do not establish that two securities are equally risky.

The trader takes a long position by buying the cheaper investment. To take the other side, the trader borrows the more expensive security from an owner, sells it, and later must buy a replacement to return. This is a short sale. Selling the borrowed security for $52 and replacing it for $50 earns $2 before expenses. Replacing it for $58 loses $6. The obligation is to return the security, not merely the original sale proceeds. Borrowing fees and collateral requirements matter.

Suppose the cheaper security rises from $48 to $50 while the expensive one falls from $52 to $50. The long side earns $2 and the short side earns $2. The combined gain is $4 before costs. Now consider a different path: the cheaper one first falls to $44 while the expensive one rises to $56. Each side loses $4 at that point. Even if both prices later reach $50, the trader needs cash to meet a collateral demand today.

A related idea is carry: income earned while a position is held, less its financing and holding costs. A bond might provide $6 of annual interest while borrowing and other costs total $4, leaving $2 of positive carry before changes in the bond price or credit losses. Positive carry is not the same thing as a safe total return. A price decline can exceed years of income, and borrowing costs can change.

A useful forecast therefore needs a funding plan and a reason the expected relationship should persist. Investors can disagree about fair value, the date of convergence, and the amount of money needed to survive the intervening path. Tomorrow we will follow both sides of one simplified trade. What must remain true for a trader to wait long enough for a promising price gap to close?

Consider the question. No written response is required.

R READ / BEFORE MEETING 21 • LESSON 20 • 3-5 MINUTES

LTCM: surviving until convergence

After Russia announced a debt moratorium in August 1998, investors sought assets they considered safer and easier to sell. Price gaps widened in several markets together. Some positions that Long-Term Capital Management (LTCM) expected to offset each other lost value together. By September 2 its partners reported a 52% loss for the year through August and sought new capital. Before deciding whether to invest, what would you need to know about its trades, borrowing, and lenders who could demand cash?

A counterparty is the person or institution on the other side of a financial contract. A fund may borrow from several banks and trade with several dealers. Each counterparty can examine its own exposure while missing how much the fund owes elsewhere. If the fund has promised collateral to many institutions, simultaneous demands can exceed its available cash. The individual contracts become connected through the same borrower.

LTCM began trading in 1994. Its traders sought to profit when price relationships moved back toward the levels they expected. To see why position size mattered, imagine a different fund with $100 of investments, $96 of debt, and $4 of equity. A $1 investment loss takes away a quarter of its owners’ money. This small example illustrates leverage. It does not estimate LTCM’s actual balance sheet.

Consider what happens if a lender demands repayment immediately. A fund with little cash may sell investments. A fire sale is an urgent sale under conditions that produce a poor price relative to an orderly transaction. When several investors sell similar holdings at once, the prices used to value other portfolios may fall too. Those losses can trigger further demands. The initial problem then spreads through both contracts and market prices.

A recapitalization changes a firm’s capital structure. In LTCM’s recapitalization, private firms supplied new equity. In other cases creditors may convert debt into shares without supplying new cash. New investors may demand control or a large ownership share. An orderly adjustment cannot erase the original losses, and intervention can affect future incentives. What information would lenders need to decide whether supplying new capital would cost them less than demanding immediate repayment?

Consider the question. No written response is required.

R READ / BEFORE MEETING 22 • LESSON 21 • 3-5 MINUTES

Enron: earnings, cash, and trust

A company announces a profitable year, yet asks its bank for more money. That is not automatically a contradiction or evidence of fraud. Imagine a repair business that finishes $1,000 of work in December but will be paid in January. It has earned revenue before receiving the cash. If it pays $700 of wages immediately, it can report a $300 profit while its bank balance falls by $700. Timing matters, and both figures tell a useful part of the story.

Accrual accounting records revenue and expenses according to the relevant recognition rules rather than simply when cash changes hands. A receivable is an amount a customer owes the business. In the repair example, the business has a $1,000 receivable until payment arrives. Estimates and judgment enter accounting, so readers should ask what supports the numbers. A disagreement about an estimate does not, by itself, establish dishonesty.

A cash-flow statement organizes cash movements by their source and use. Cash collected from customers belongs to operations in our example. Money received from a new bank loan belongs to financing. Either receipt increases the bank balance. Only the second one creates a debt that must be repaid. A manager who labels loan proceeds as customer receipts can show the correct cash total while giving investors the wrong impression about the business.

That distinction mattered at Enron. The SEC alleged in 2003 that linked contracts presented as prepaid commodity sales let Enron receive cash now and repay it later with interest. Commodity-price changes did not determine that repayment. A genuine customer can pay now for energy delivered later. A lender had to read the contracts together to identify the promise. Enron filed for bankruptcy in December 2001. Our activity uses a fictional company with simpler records.

Incentives also shape what people investigate. A manager may be rewarded for reported profit, a lender may care about repayments, and an employee may hold company shares. Information advantages are not all improper: careful analysis of public information is different from misuse of confidential information. The legal rules depend on circumstances. Before hearing the outcome of a company's story, what evidence would help you decide whether its reported success is supported by cash, enforceable claims, and candid disclosure?

Consider the question. No written response is required.

R READ / BEFORE MEETING 23 • LESSON 22 • 3-5 MINUTES

Design a system that can withstand stress

A town wants to finance projects that will benefit residents for years. Savers want their money much sooner. A financial institution can connect them, but it must make promises it can keep under several possible futures. Its design should provide useful financing and make risks understandable to the people who bear them.

Consider a fictional lender that finances home energy improvements. Its borrowers make monthly payments, while some of the lender's own creditors can demand money quickly. A cash buffer is money available for near-term payments. An equity buffer is the difference between assets and liabilities that can absorb losses. These buffers solve different problems. Keeping cash can avoid a hurried sale; having more equity can absorb a decline in asset values. Neither makes every promise safe under every circumstance.

A stress test asks what would happen under specified adverse conditions. It is not necessarily a prediction or an estimate of the probability of those conditions. We might ask what happens if borrower losses rise and funding leaves at the same time. The order matters: losses reduce the value of assets, withdrawals require cash, and discounted sales can produce additional losses. A test that considers only one step can miss the interaction.

Every safeguard has a cost or a limitation. For a fixed amount of funding, holding more cash leaves less to finance projects. Longer-term borrowing reduces immediate repayment exposure but may cost more. Better disclosure helps creditors evaluate promises but cannot remove a real loss. Insurance shifts specified losses to another party whose own resources and incentives matter. A guarantee can protect a creditor while putting a sponsor at risk. Ask whose position improves and who pays for the improvement.

In our final discussion, recommend a design, calculate its results, and identify a condition under which it could fail. Explain a defensible tradeoff using evidence. What would you want a financial institution to disclose before you trusted its promise to repay you?

Consider the question. No written response is required.