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BLAB

HANDOUTS

FINANCIAL MARKETS AND INSTITUTIONS

-GENERAL-

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Financial Markets & Institutions

General Exam

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Introduction

FINANCE has played a **crucial role** in the development of infrastructure, science, and medicine by enabling investments. The exploitation of natural and human resources in colonies contributed to economic growth, though this was not the only factor, as demonstrated by Spain, which despite vast colonial holdings did not become the wealthiest nation.

Finance is based on trust, as implied by the Latin root of the word ***credit***. It represents a **promise of future payments**.

Dutch and British merchants, in particular, relied heavily on financing and insurance to support their global trade activities.

FINANCIAL MARKETS enable the efficient allocation of capital by transferring funds from those who have excess savings to those who have profitable investment opportunities.

They also improve consumer welfare by allowing individuals to better time their consumption throughout their lives.

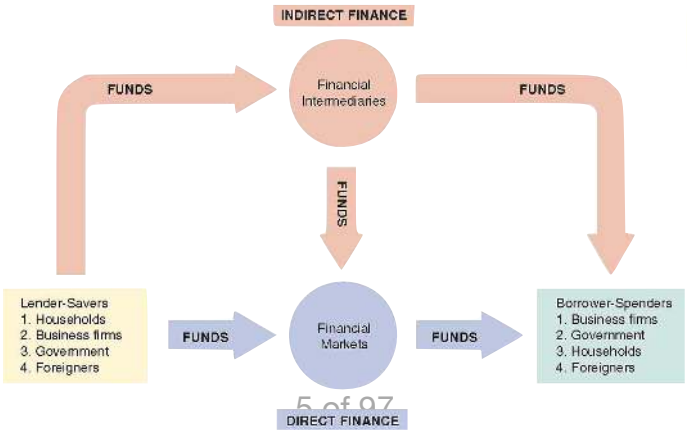
Key Concept: Asset

- **Real Asset**: tangible or intangible entities that produce goods or services.
  - Land, Plants, machinery, People, New invention, Goodwill, reputation, brand
- **Financial Asset**:
  - Contract giving its owner a claim to payments
    - Currency, bonds, stocks, deposits, loans, Insurance contracts, derivatives (futures, options)

Borrowers issue financial assets to raise funds, which they use to invest in real assets.

Segments of Financial Markets

- **Direct Finance**: borrowers raise funds directly by selling financial assets (like bonds) to lenders, creating a direct claim on the borrower's future income or assets.
- **Indirect Finance**: involves financial intermediaries (such as banks), which issue financial instruments (like loans) that represent claims on the borrower's future income or assets.



Classification of Financial Markets

- **Debt Markets**:
  - Short-Term: (maturity < 1 year)
  - Long-Term: (maturity > 10 year)
  - Intermediate term: maturity falls between short- and long-term.
  - Represented $52.4 trillion at the end of 2009.
- **Equity Markets**:
  - Pay dividends, in theory forever
  - Represents an ownership claim in the firm
  - Total value of all U.S. equity was $20.5 trillion at the end of 2009.

Further classification:

- **Money Market**: Short-Term (maturity < 1 year)
- **Capital Market**: Long-Term (maturity > 1 year) plus equities

Primary and Secondary Markets:

- **Primary Market**: Newly issued securities are sold to initial buyers, typically with the involvement of investment banks, which underwrite the offering.
- **Secondary Market**: Already issued securities are traded among investors (examples include NYSE and Nasdaq). Even though secondary markets do not directly channel funds to productive investments, they serve two important functions:
  - Providing liquidity to the market, allowing securities to be easily bought and sold.
  - Establishing prices for securities that guide transactions in the primary market.

Function of Financial Intermediaries

Financial intermediaries, such as banks, reduce transaction costs and risk for savers and borrowers. They are critical because:

- **Indirect finance** is a more significant source of funds than direct securities markets.
- They help manage **asymmetric information** problems:
  - **Adverse Selection**: Pre-contractual issues where bad borrowers are more likely to seek loans.
  - **Moral Hazard**: Post-contractual issues where borrowers may take on riskier behavior after securing a loan.

Interest Rates and Bond Valuation

Interest Rates

Interest rates are one of the most closely watched variables in the economy. They represent the amount paid on a loan or deposit, expressed annually.

For example, a $3 interest on a loan with a rate of 5% would imply that the loan pays 5% annually, though the calculation could be based on a shorter period (e.g., 3 months).

Present Value (PV) Analysis

PV is the method used to compare future cash flows in today's terms, based on the interest rate.

The **discount factor** reflects opportunity cost, risk premium, and impatience (the preference for immediate rewards over future ones).

An asset with maturity n years that pays cash flow CF_t in t years from now is valued:

$$PV = \sum_{t=1,\dots,n} \frac{CF_t}{(1+i)^t}$$

Exercise:

PV of $250 in 2 years, given that the current interest rate is 15%

$$PV = \frac{250}{1.15^2} = 189.04$$

PV of $250 in 2 years, given that the current interest rate has jumped to 20%

$$PV = \frac{250}{1.2^2} = 173.61$$

Key: **higher interest rate reduce the value of securities promising future payments**.

Yield to Maturity (YTM)

YTM is the interest rate that equates the bond's current price with the present value of all future cash flows.

$$P = \frac{c}{1+i} + \frac{c}{(1+i)^2} + \frac{C}{(1+i)^3} + \dots + \frac{C}{(1+i)^n} + \frac{F}{(1+i)^n}$$

Relationship between Price and Yield to Maturity:

- The relationship between bond prices and yields is **inverse**: when bond prices fall, yields rise, and viceversa.

- A bond trading at par (price equals face value) has a YTM equal to its coupon rate.

Coupon Bond:

It's a bond that pays (annual or semiannual) coupon C and face value F at maturity. The coupon rate:

$$i_{coupon} = \frac{C}{F}$$

Important properties:

- If $P = F \implies YTM = i_{coupon}$
- If $P > F \implies YTM < i_{coupon}$
- If $P < F \implies YTM < i_{coupon}$

If maturity is long and $P \approx F \implies YTM \approx i_{current} = \frac{C}{P}$

The value of an asset is the PV of the CF it promises based on the current interest rates.

Computing Returns

There are 2 strategies:

- **YTM**: return from holding the asset until it matures
- **Realized Return**: return when an investor buys and holds an asset, then sells it before maturity. This return is subject to **resale price risk** (g):
  - If $i \uparrow$, bond P $\downarrow$, reducing the realized return ($g < 0$).
  - If $i \downarrow$, bond P $\uparrow$, increasing the realized return ($g > 0$).

  If buy today at P, hold for 1 year and sell next year at P' a coupon bond, you obtain:

$$ROR = \frac{C + (P' - P)}{P} = i_{current} + g$$

Duration

DURATION measures a bond's sensitivity to interest rate changes. Bonds with higher duration are more exposed to interest rate risk.

Duration is calculated as the **weighted average of the times until the bond's payments are received**.

$$DUR = \sum_{t=1,\dots,n} t \cdot [\frac{\frac{CF_t}{(1+i)^t}}{P}] = \frac{\sum_{t=1,\dots,n} t \cdot \frac{CF_t}{(1+i)^t}}{\sum_{t=1,\dots,n} \frac{CF_t}{(1+i)^t}}$$

Duration of a **ZCB** that pays F 2 years from now:

$$DUR = \frac{[1*0+2*\frac{F}{(1+i)^2}]}{\frac{F}{(1+i)^2}} = 2$$

Duration of a **bond with annual coupon** C that matures and pays F 2 years from now

$$DUR = \frac{[1*\frac{C}{(1+i)}+2*\frac{C+F}{(1+i)^2}]}{[\frac{C}{(1+i)}+\frac{C+F}{(1+i)^2}]} < 2$$

Properties of Duration:

- Ceteris paribus, duration is higher for assets that have higher maturity
- Ceteris paribus, when interest rates are higher the duration of all assets fall
- Duration is additive: the duration of a portfolio of assets is the weighted average of the durations of individual assets, with the weights equaling the proportion of the portfolio invested in each
- Special property for bonds: the higher is the coupon rate C/F on the bond, the shorter is duration.

Duration and Interest-rate risk:

The greater the duration of a security, the more its price is sensitive to interest rate changes (interest rate risk)

$$\%\,\Delta P \approx -DUR \cdot \frac{\Delta i}{1+i}$$

Exercise:

Compute duration of 5 year bond with coupon \$100 and F=\$1000 when $i = 20\,\%$

Year	Cash Flow (€)	PV of Cash Flow (€)	Weight (%)	Weighted maturity (years)
1	100	83.33	11.89	0.12
2	100	69.44	9.91	0.20
3	100	57.87	8.26	0.25
4	100	48.23	6.88	0.28
5	100	40.19	5.73	0.29
5	1,000	401.88	57.33	2.87
Total		700.94	100.00	3.99

Exercise:

Take the 5 years bond of ex 3. What will be the change in its price if interest rates rise by 1% (eg from 20% to 21%)?

$$\%\,\Delta P \approx -3.99 \cdot \frac{0.01}{1+0.2} = -0.03325 = -3.325\,\%$$

Exercise:

You bought a par bond with a 10% coupon rate for $1000. You hold it for one year and then sell it when the return on this kind of bonds is 20%. What is the realized return depending on the bond's maturity?

Maturity when purchased	Initial $i_{current}$ (%)	Initial price (€)	Price next year	Capital gains (%)	ROR $(i_{current}+g)$ (%)
30	10	1,000	503	-49.7	-39.7
20	10	1,000	516	-48.4	-38.4
10	10	1,000	597	-40.3	-30.3
5	10	1,000	741	-25.9	-15.9
2	10	1,000	917	-8.37	+1.7
1	10	1,000	1,000	0.0	+10.0

Distinction between Real and Nominal Interest Rates

- **Nominal Rate**: The stated interest rate without adjustments for inflation.
- **Real interest rate**: Adjusted for expected inflation, providing a clearer picture of the cost of borrowing and the purchasing power of returns. $r = i - \pi^e$

Real interest rate more accurately reflects true cost of borrowing. This is because the return we care about is in terms of purchasing power. If inflation is 0%, the real interest rate equals the nominal rate. If inflation rises, the real interest rate decreases, which may incentivize borrowing.

We usually refer to this rate as the **ex ante real rate** of interest because it is adjusted for expected inflation. After the fact, we can calculate the **ex post real rate** based on the observed level of inflation.

If $i = 5\,\%$ and $\pi = 0\,\%$ then $i_r = 5 - 0 = 5\,\%$

If $i = 10\,\%$ and $\pi = 20\,\%$ then $i_r = 10 - 20 = -10\,\%$

Surprisingly **high inflation reduces the return of a bond investment**. Inflation=Risk.

Supply and Demand in the Bond Market

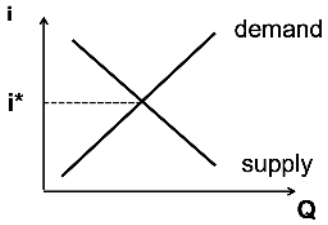
Market Equilibrium

The equilibrium interest rate is determined where **bond supply and demand** intersect.

- **Excess demand** occurs when **buyers want more bonds** than are available at a given price, **pushing bond prices up** and **interest rates down**.
- **Excess supply** has the opposite effect, **reducing bond prices** and **raising interest rates**.

Demand for a bond: ↑ in its return (↓ in P)

Supply of a bond: ↓ in its return (↑ in P)



Changes in i are determined by shifts of supply and demand.

Factors affecting Demand

- Savings/Wealth (+)
- Liquidity of the asset (+)
- Risk of the asset (-)
- Expected Inflation (-)

Digression: measuring expected return and risk

Consider an asset that pays return R_1 with probability p_1, return R_2 with probability p_2, and so on.

Expected Return: $E_r = \sum_{r=1,\dots,k} p_r R_r$

Risk (variance): $\sigma = \sum_{r=1,\dots,k} p_r (R_r - E_r)^2$

Factors affecting Supply

- Profitability of Investment (+)
- Government Deficit (+)

- Expected Inflation (+)

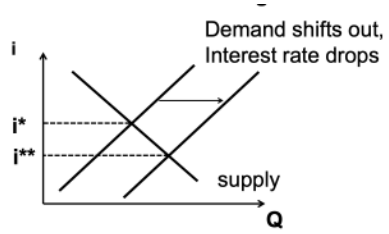
Supply & Demand in the Bond Market:

We now use some of the previous notions to determine the equilibrium interest rate from a demand & supply perspective.

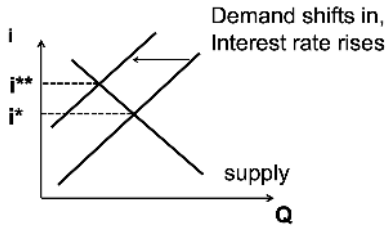
We will consider a single interest rate in the economy, but the analysis can be extended to account for many different interest rates in different credit instruments.

The market that most straightforwardly determines the interest rate is the one for one-period zero coupon bonds

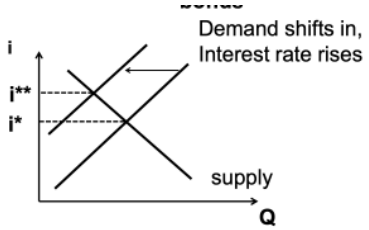
Increase in Savings/Wealth:



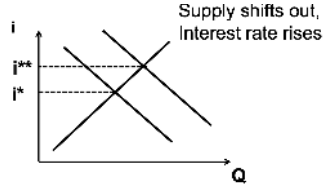
Increase in the return of alternative assets:



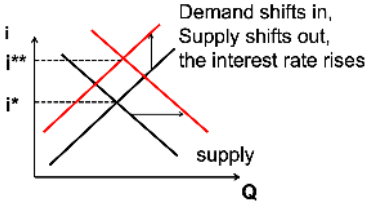
Increase in the riskiness of bonds:



Increase in profitability of investment or budget deficits:



Increase in expected inflation:



The Fisher Effect

The **Fisher Effect** describes the relationship between **nominal interest rates**, **real interest rates**, and **expected inflation**:

When expected inflation ↑ from 5% to 10%, the attractiveness of bonds, compared to real assets (like real estate or commodities), ↓. This is because bonds offer fixed nominal payments, which are eroded in value by higher inflation. As a result, the demand for bonds ↓.

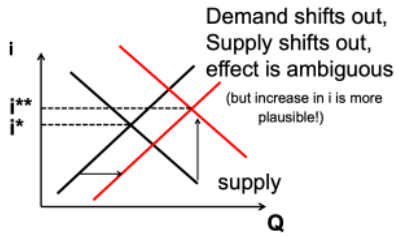
At the same time, higher expected inflation ↓ the **real cost of borrowing**. This encourages more borrowing, leading to an ↑ in the **quantity of bonds supplied**, as borrowers (governments or corporations) issue more bonds to take advantage of the lower real interest rates.

As the **demand for bonds** ↓ and the **supply of bonds** ↑, this imbalance causes the **equilibrium interest rate to** ↑. Bond prices, which are inversely related to interest rates, will consequently ↓ as the interest rate ↑.

In summary, when expected inflation increases:

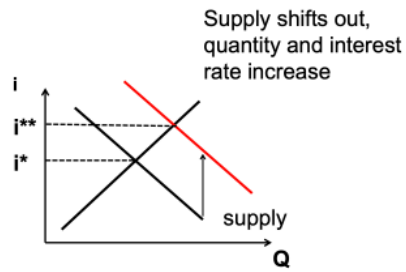
- Demand for bonds falls (due to their relatively lower return).
- Supply of bonds increases (due to cheaper real borrowing costs).
- Interest rates rise, leading to a drop in bond prices.

Economic boom:



Ex 1:

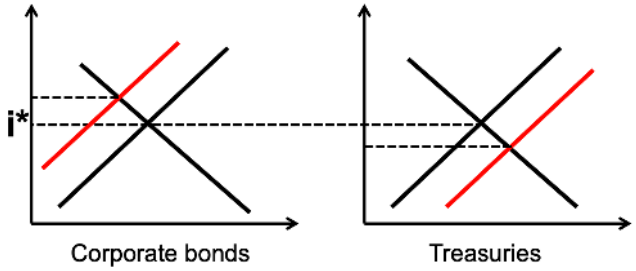
A new technology makes oil drilling more profitable. What happens to the interest rate and quantity of bonds issued by oil producing firms?



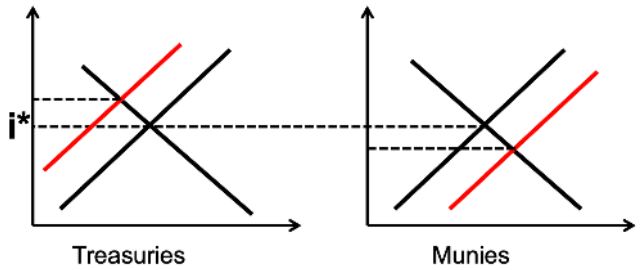
The structure of Interest Rates

So far, we considered only one interest rate. In reality, different securities have different interest rates. We now consider three reasons for such differences in **default risk**, **taxes** and **maturity**.

Default risk: Corporate bonds become riskier than treasuries. Demand for corporate drops, that for treasuries rises. Interest rates for corporate bonds become higher than for treasuries.



Taxes: Municipal bonds become less taxed than treasuries. Demand for munies rises, that for treasuries falls. Interest rates fro treasuries become higher than for munies.



Money Market

Firms need to maintain **cash reserves** for emergencies, but instead of keeping all their funds in a bank, they often invest in the **money market**. The term **money market** doesn't refer to the trading of money itself, but rather to **securities that are nearly as liquid as money**.

- **Money** is **liquid**, meaning it can be used to make purchases immediately. Similarly, the **securities** traded in the money market are **highly liquid**, allowing firms to quickly convert them into cash (euros, dollars, etc.), though they cannot be directly used to buy goods.
- **Money** is also considered **safe**: it holds value, and while prices may fluctuate, you can always use it to buy something. In the same way, money market **securities** are characterized by **low default risk**, making them a relatively safe investment.
- However, these securities differ from currencies in a few important ways. They are **typically sold in large denominations**, often $1,000,000 or more, and they **mature within a year from their issue date**, with the majority maturing in less than 120 days.

Thus, money market securities serve as a **short-term, low-risk investment** option for firms, offering liquidity and safety.

Money market securities are particularly **useful** because:

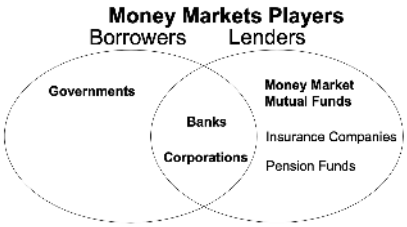
- they help **firms**, **individuals**, and **governments manage timing mismatches between cash inflows and outflows**. Often, the timing of cash receipts doesn't align perfectly with the need to make payments.

  For example, companies may need short-term cash to pay suppliers or cover operational expenses before receiving revenue from customers. Similarly, governments often face short-term funding needs to cover expenditures while waiting for tax revenues or other sources of income.

- The money market provides an **effective solution to these cash-timing challenges**. By offering highly liquid, low-risk securities, firms and governments can quickly access the short-term capital they need to bridge these gaps, ensuring smooth operations without the risk of running into liquidity issues.

The Purpose of Money Markets:

- **Demand of money market assets**: Money Markets provide a place for storing safely surplus funds for short periods of time
- **Supply of money market assets**: Money Markets provide a place for borrowing low- cost in the short run



Why do we need money markets?

Banks, while essential to the financial system, **aren't always sufficient to meet the needs for short-term financing**. In theory, banks should be able to provide both short-term loans and accept short-term deposits, but there are several reasons why they fall short and why money markets have become necessary.

- **Regulations**: Banks face size **limitations** because **they cannot take on excessive risk**. Their ability to issue deposits and loans is constrained by strict regulations designed to maintain financial stability. For example, banks are subject to **reserve requirements**, which force them to hold a portion of deposits as reserves, limiting the amount they can lend out. This restricts their lending capacity compared to money markets, which are not subject to the same regulations.
- **Costs:** Banks often charge **fees** for their services, which **can add to the cost of borrowing or depositing money**. Additionally, they cannot issue deposits freely due to regulatory frameworks. In contrast, **money markets** are far less regulated, which reduces costs and increases their flexibility, giving them a **competitive advantage** over banks.
- **Interest rate on deposit capped**: in many countries, the interest rate that banks can offer on deposits is **capped by regulation** ($\bar{i}$). This restriction limits the returns that depositors can earn through traditional bank deposits. During periods of rising interest rates, such as in the 1970s and 1980s, depositors moved their funds from banks to **money markets**, where they could earn **higher returns**. The growing trend means that people are moving away from banks and prefer using money market.

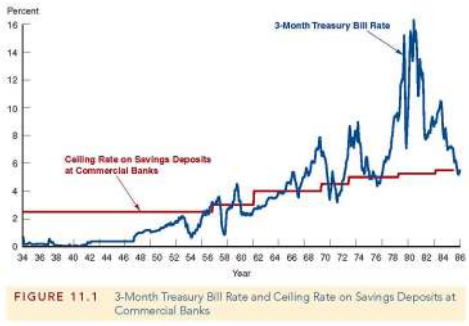
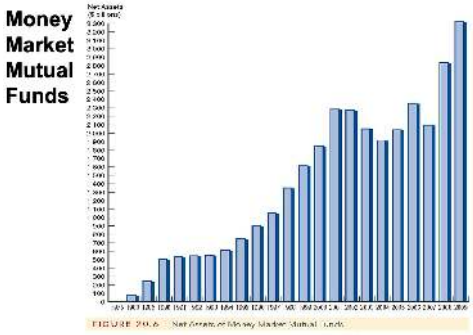


FIGURE 11.1 3-Month Treasury Bill Rate and Ceiling Rate on Savings Deposits at Commercial Banks



A **money market fund** pools money from retail investors to have access to the money market securities that are issued in big denominations.

Money Market Instruments

- **Treasury Bills (T-bills)**: Short-term government bonds issued by the U.S. Treasury with maturities typically ranging from a few days to 12 months. T-bills are sold at a discount to their face value and mature at full face value, making them a low-risk investment. These are Zero-Coupon Bonds (ZCB), meaning they do not pay periodic interest but instead generate a return through the difference between the purchase price and the face value at maturity.

$$i_x = \frac{F - P}{P}$$

$$TAEG = (1 + i_x)^x - 1 \quad \text{or} \qquad TAN = i_x \cdot x$$

- Governments use **AUCTIONS** to sell T-bills, which are held regularly. Every Thursday, T-bills are auctioned to dealers. The U.S. Treasury accepts two types of bids: **competitive** and **noncompetitive** bids.
- **Competitive bids** specify both the **quantity** of T-bills and the **price** (or yield) at which the bidder is willing to purchase.
- **Noncompetitive bids** specify only the **quantity** desired and are **guaranteed** to receive the bills at the yield determined by the auction.
- The **price everyone pays is based on the highest yield** (**lowest price**) **accepted from the competitive bids**. This auction mechanism ensures that even **those willing to bid at a higher price may end up paying less if a lower price is accepted**.

  Example Auction:

  Suppose the government is auctioning $100M worth of T-bills. Here are the bids:

  - Citi bids $30M, willing to accept any price (noncompetitive bid).
  - JP Morgan bids $50M at a price of 0.99 (competitive bid).
  - Apple bids $70M at a price of 0.98 (competitive bid).
  - Goldman Sachs bids $30M at a price of 0.97 (competitive bid).

In this case, the Treasury needs to sell $100M. It will first accept noncompetitive bids (Citi's $30M) and then move to the competitive bids. The Treasury will accept bids from JP Morgan and Apple up to the $100M threshold. The final price everyone pays will be based on the highest yield (lowest price) accepted, in this case, 0.98 from Apple, as it fills the remainder of the $100M.

Thus, JP Morgan and Citi will receive their T-bills at a price of 0.98, even though JP Morgan originally bid 0.99. This illustrates the **benefit of bidding competitively at a higher price, as JP Morgan had a chance to pay less than its initial bid**.

EX 2:

The Treasury is auctioning $2.5 billion of 91-day T-bills, and the bids from five bidders are listed along with their bid amounts and prices. Here's a breakdown of the allocation process:

Bidder	Bid Amount	Bid Price
1	$500 million	$0.9940
2	$750 million	$0.9901
3	$1.5 billion	$0.9925
4	$1 billion	$0.9936
5	$600 million	$0.9939

Step 1: Allocating the T-bills

- The Treasury needs to distribute $2.5 billion in T-bills.
- The price will be determined based on the highest yield (lowest price) accepted from competitive bids.

Bid Results:

- Bidder 1 (at $0.9940) will get $500 million.
- Bidder 5 (at $0.9939) will get $600 million.
- Bidder 4 (at $0.9936) will get $1 billion.
- Bidder 3 (at $0.9925) will get the remaining $400 million of the $2.5 billion.

The lowest price (highest yield) accepted is $0.9925, meaning all accepted bids will pay this price.

Step 2: Including Noncompetitive Bids

The Treasury has also received $750 million in noncompetitive bids. Noncompetitive bidders are guaranteed T-bills, and they will receive them at the price determined in the auction.

Now, the total quantity of T-bills that needs to be distributed increases to $2.5 billion + $750 million = $3.25 billion.

Allocation After Including Noncompetitive Bids:

- The Treasury first allocates $750 million to noncompetitive bidders, leaving $2.5 billion for competitive bidders.
- The process repeats as before, with the price determined by competitive bidding.
- This time, however, the price is $0.9936, which is the next lowest price after accounting for the noncompetitive bids.

- **Fed Funds**: short-term loans made between banks, typically **overnight**, to meet reserve requirements. The way in which banks borrow from each other in the interbank market satisfy the conditions for money market which is large denominations, short term, very low risk. It is mostly used by banks to meet in the short term reserve requirements. Commercial banks take deposits and invest in firms, people. The **federal funds rate** is the interest rate at which these loans are made, and it serves as a key monetary policy tool for the Federal Reserve, influencing broader interest rates across the economy.
  - **Fed Rate**: The rate paid by the Federal Reserve to banks that hold reserves on deposit at the Fed. This is also the target rate for monetary policy, as the Fed uses it to control inflation and influence economic growth.

  The fed fund rate is low because is pretty close to t-bills which is the risk free rate.

- **Repurchase Agreements (Repos)**: short-term collateralized loan where one party sells a security (often a government bond) and agrees to repurchase it at a higher price at a future date. The seller receives **cash now** and **repays later with interest**, and the **security** acts as **collateral**. Repos are typically used by financial institutions to **manage short-term liquidity needs**.

This is the one in which Lehman Brothers failed in September 2008.

Example: On 24/09/2024, a hedge fund sells a 3-month T-bill to an investment bank for $100. On 26/09/2024, HF buys back the T-bill for $100.50, with $0.50 being the interest. The T-bill serves as collateral, ensuring that if the HF defaults (e.g., gets hit by a "meteorite"), the IB can keep the T-bill to cover its loss. This makes repos a low-risk form of borrowing for both parties, particularly when using highly liquid and stable securities like U.S. Treasuries as collateral.

Haircut: is the difference between the market price (P) and the cash loan (100). It accounts for **risk**, and it's typically larger for riskier assets. For example, government bonds (with low risk) might have a 2% haircut, while more volatile assets would have higher haircuts to protect the lender from potential losses.

Despite their generally low-risk profile, repos can still lead to losses, as was the case with Lehman Brothers in 2008, when the failure to meet repurchase obligations led to a liquidity crisis. Repos are different from Fed Funds, which are unsecured loans, meaning they don't have collateral backing.

- **Negotiable Certificates of Deposit**: fixed-term, negotiable deposits issued by banks. Unlike regular deposits, these can be **bought and sold in secondary markets**. They generally offer higher interest rates than savings accounts due to their larger denominations and fixed terms.
  - **Fixed Maturity**: CDs typically have a fixed maturity date and cannot be withdrawn early without selling in the secondary market.
  - **Large Denominations**: Denominations range from $100,000 to $10 million, making them attractive to institutional investors like **pension funds** or **wealthy individuals**.
  - **Secondary Market**: If an institution holding a CD needs liquidity, it can sell the CD on the secondary market, allowing the original holder to convert the deposit into cash without waiting for the maturity date.

    For example, if a HF holds a CD maturing on 25/9/2025 and needs cash in October 2024, it can sell the CD to another HF at the prevailing market price, typically below face value. This provides liquidity without waiting until maturity.
- **Commercial Paper** (CP): Short-term unsecured debt issued by corporations to finance their short-term liabilities, such as payroll or accounts payable. Commercial paper typically has maturities of less than 270 days and is a popular way for corporations to raise funds without relying on bank loans.
  - **Maturity**: CP typically matures in less than 270 days, making it ideal for corporations with short-term financing needs.
  - **Unsecured**: Unlike repos, CP is not backed by collateral, so only large, highly rated companies issue it.
  - **Discount Basis**: Similar to T-bills, CP is sold at a discount to face value, meaning the buyer purchases it for less than its maturity value.

Example: General Electric (GE) needs to raise $100 million on 26/9 to pay wages. Instead of taking out a bank loan, GE issues CP to raise the money. The debt is repaid on 26/10 after GE receives

revenue from selling refrigerators. CP allows GE to borrow money short-term at a relatively low cost and without the need for collateral.

- **Eurodollars**: refer to **U.S. dollar-denominated deposits held in foreign banks outside the U.S**. These deposits are used widely in international transactions and play a key role in providing liquidity to global markets.
  - **Short-Term Deposits**: Eurodollars are generally short-term interbank deposits, often **overnight**, and they allow foreign institutions to hold U.S. dollars outside of U.S. regulation.
  - **Alternative Funding Source**: Eurodollars are an important source of short-term funding for international banks, offering flexibility outside domestic U.S. banking systems.

  The **London Interbank Offered Rate** (**LIBOR**) is a widely used benchmark for Eurodollar loans. LIBOR is calculated based on **rates submitted by large international banks** and is used to price interbank loans in various currencies, including the U.S. dollar, euro, yen, and pound sterling. LIBOR rates are calculated daily, and submissions are averaged after excluding the highest and lowest values to prevent manipulation.

LIBOR Fixing Scandal

Banks were found to be **colluding** to **artificially manipulate the rate**. This allowed them to **profit from interest rate swaps**, which are bets on variable interest rates. By controlling the LIBOR rate, banks could ensure that the **variable rate moved in their favor**, increasing profits from these swaps. Only 18 banks were involved in setting the U.S. LIBOR, making it easier for a few to influence the average rate.

Bond Market

Government Bonds

Government bonds, particularly **U.S. Treasuries**, are considered one of the safest investments due to the backing of the U.S. government. Among these:

- **T-bills** are short-term bonds (less than 1 year) and considered almost risk-free due to their short maturity.
- **T-notes** have maturities between 1-10 years
- **T-bonds** are long-term, with maturities ranging from 10 to 30 years.

The longer the maturity, the higher the interest rate, compensating for **default risk**, **inflation risk**, and **interest rate risk**.

Even if U.S. government bonds are **not entirely free of risk**, especially with regard to **inflation**, which erodes purchasing power over time, they are considered **risk-free assets** due to the government's ability to **tax** and **control currency**.

In contrast, **EU government bonds** carry **more risk** since EU countries (separately) can't print money independently (this is managed by the **ECB**). What is similar to U.S. Treasury bonds are **Eurobonds,** which involve joint borrowing by multiple EU countries.

Municipal Bonds (munis)

They're issued by **local**, **county**, or **state governments**, primarily to **finance public interest projects** like infrastructure, schools, or hospitals. These bonds offer a **tax-free interest rate**, making them attractive to investors in **higher tax brackets**. Investors must weigh their tax situation to determine whether a municipal bond is preferable to a taxable bond. Suppose I have 2 bonds:

- **US Federal Gov Bond** paying 8%. I get $8\,\%\,(1-t)$.

  if t=0.4, I get $8\,\%\,(0.6) = 4.8\,\%$

- **US Municipal Gov Bond** paying 5%. I will choose this one.

Macro implication: the equilibrium (market) will lead to $i_F > i_M$ and in particular to $i_F(1-t) = i_M$

Micro implication: The after-tax return can often make municipal bonds more appealing compared to taxable instruments, especially for those with high marginal tax rates ($t > 1 - \frac{i_{muni}}{i_{fed}}$)

Agency Debt

Agency debt refers to **bonds** issued by **government-sponsored enterprises** (GSEs), such as Fannie Mae and Freddie Mac. These institutions are not directly owned by the government but are **privately owned entities** that issue **government-backed securities**.

These institutions were created to ensure **liquidity**, **stability**, and access to **affordable financing**, particularly in sectors like housing and agriculture. Although they are private entities, they operate with government oversight and are considered crucial to the financial system. Agency debt is crucial to the financial system, especially for **home financing**. Without GSEs like Fannie Mae and Freddie Mac, banks would face liquidity issues, making it harder for individuals to access mortgages. In this way, GSEs serve a **public purpose** by ensuring **broader access to affordable loans** while maintaining the liquidity of the broader housing finance market.

Unlike U.S. Treasury bonds, which have an explicit government guarantee, agency bonds are backed by the GSEs themselves. However, there is an **implicit guarantee** that the government will not let these institutions fail, as evidenced by the U.S. government's intervention during the 2008 financial crisis. When Fannie Mae and Freddie Mac faced insolvency due to their exposure to risky mortgage-backed securities, the U.S. government stepped in to prevent a collapse by placing them into conservatorship.

Corporate Bonds

They are issued by **companies** to **raise capital**, typically for expansion, operations, or projects. These bonds usually have a face value of $1,000 (or $5,000 or $10,000) and pay interest **semi-annually**. This means that if you are promised a semiannual 6% on a $1000 investment, at the end of the first year you get $1000(1.06)^2$. The annual return is more than double due to compounding interest.

They are issued by the largest corporations (only a handful!)

Corporate bonds come with **higher default risk** than government bonds, and thus offer higher yields. Risk is assessed by **credit rating agencies** such as Moody's, S&P, and Fitch, which classify bonds as either **investment grade** (safer) or **speculative/junk** (riskier, higher yields).

Corporate bonds also feature various provisions, such as:

- **Restrictive covenants**: Conditions imposed by bondholders, such as limits on new debt or dividends.
  - The bondholders place some limits (covenants) on what the company can do (bondholders sort of acting like shareholders)
  - May limit dividends, new debt, mergers, etc
  - If covenants are more restrictive, $i\downarrow$ because the firm already accepting lots of conditions from bondholders so can lower i. Also safer for bond holders.

- **Call provisions**: Allow the issuer to repurchase the bond before maturity, often when interest rates fall.
  - A bond may be callable.
  - Issuer can force bondholder to sell back bonds (typically at par or slightly higher)
  - All else equal, i for a callable bond is higher than for non callable bond
  - If market rate drops, the firm is more likely to buyback
- **Conversion options**: Some bonds can be converted into equity, which provides flexibility for investors.
  - Debt that may be converted to equity by holder
  - Like buying a bond and a stock option
  - Hence i will be lower for a convertible bond than for a non convertible bond

Seniority: if a company defaults bondholders are senior to stockholders. Among bondholders, there is seniority too: senior bondholders get paid before junior/subordinated bondholders (who are in turn senior to stockholders).

Bond pricing: semi annual coupon:

So far we have always assumed annual coupon payments, but actually a lot of bonds pay semi-annually. So

$$P = \sum_{t=1}^{2n} \frac{\frac{C}{2}}{(1+\frac{i}{2})^t} + \frac{F}{(1+\frac{i}{2})^{2n}}$$

Where C,i are annual and n are years to maturity.

Bonds are the most popular alternative to stocks for long term investing. Even though the bonds of a corporation are less risky than its equity, investors still have risk: **price risk**, **interest rate risk** and **default risk**.

Stocks Market

The stock market is one of the two major capital markets, alongside the bond market. It attracts substantial media attention due to its potential for high gains, as people are drawn to the idea of getting rich through investments. When we hear statements like "the market is down 2%," it typically refers to the stock market. Despite short-term fluctuations, the stock market is **relatively stable over the long term** and offers **high returns**, making it **attractive for long-term investors**.

The visibility of the stock market contributes to its allure. Floor traders shouting, combined with the sight of big screens flashing numbers, create a vivid image of the market in action, often symbolizing volatility and potential profits. This is why the stock market receives so much attention, as people are enticed by the opportunity for infinite financial gain.

According to ***Soros'* theory of reflexivity**, market participants and market prices interact in a feedback loop, where investor behavior influences stock prices, and those price changes, in turn, influence investor decisions.

Equity/Stocks/Shares

A share of stock, also known as equity, represents ownership in a firm. Owning stock entitles shareholders to:

- A **percentage of the firm** based on their shares.
- **Voting rights** on corporate decisions.
- A **share of profits** in the form of dividends.

Additionally, shareholders profit when stock prices increase. However, stock investments come with greater risk than bonds because:

- **Dividends are not fixed** and depend on the company's performance.
- **Stock prices are volatile** and subject to market fluctuations.
- **Stocks have no maturity date**, unlike bonds, which have a fixed payout schedule.

Stocks vs Debt

In the event of a company's default or liquidation, stocks are considered the residual claimant, meaning shareholders are paid only after all other creditors. This is known as the **seniority of payment**:

- **Senior creditors** (secured debt).
- **Junior creditors** (unsecured debt).
- **Shareholders** (common and preferred stockholders).

This payment hierarchy explains why stocks are riskier than bonds, as bondholders get paid first in the case of bankruptcy.

Types of Stocks

- **Common Stock**:
  - **Variable dividends**.
  - **Voting rights** on corporate decisions.
  - **Junior** in payment order (paid after creditors and preferred stockholders).
- **Preferred Stock**:
  - **Fixed dividend**, similar to bonds.
  - **No voting rights** unless dividends are unpaid.
  - **Higher seniority** than common stockholders but still lower than bondholders.
- **Convertible Bonds**:
  - Standard bonds that can be **converted into stocks** under certain conditions, such as company underperformance.

Stocks vs Bonds: Taxation

Financing through equity is generally more costly than debt financing because interest payments on bonds are tax-deductible, while dividends are not. This tax treatment encourages firms to issue debt rather than equity.

Example:

A firm earns $20M in gross income and must decide whether to pay $5M in dividends or $5M in interest. Let's compare the tax implications of debt financing versus equity financing:

Debt Financed:

Debt Financed			Equity Financed	
Gross Income	**20**		**Gross income**	**20**
Interest paid	5		Interest paid	0
Taxable Income	**15**		**Taxable income**	**20**
Tax at 30%	4.5		Tax at 30%	6
Net income	**10.5**		**Net income**	**14**
			Dividends paid	5
			Net remaining	**9**

Thus, **debt financing reduces tax liability** and results in **higher net income for the company**.

Shares Terminology

Authorized Shares: The maximum number of shares a company can issue over its lifetime.

Outstanding Shares: The number of shares currently held by the public. This includes:

- **Restricted Shares**: Shares that cannot be bought or sold by the public, typically given to employees as part of compensation.
- **Floating Shares**: Shares freely traded in the market without restrictions.

Outstanding shares are commonly used to calculate a company's market capitalization:

$$\text{Market Cap} = \text{Outstanding Shares} \cdot \text{Stock Price}$$

Primary Market

The primary market is where new security issues are sold to initial buyers, such as in an Initial Public Offering (IPO). Investment banks often arrange these sales. For example, major IPOs like Facebook or Twitter garnered significant media attention when these companies went public. However, the primary market for stocks is rarely discussed outside of such high-profile cases.

Secondary Market

The secondary market involves the trading of previously issued securities. It connects buyers and sellers and includes both:

- **Organized Exchanges**: For example, the New York Stock Exchange (NYSE), where a large volume of shares is traded daily.
- **Over-the-counter (OTC) markets**: Where trading occurs electronically through market makers without a centralized trading floor.

On organized exchanges like the NYSE, **brokers represent clients and execute market orders** (at current prices) or **limit orders** (at specified prices). To be listed on the NYSE, a company must meet strict criteria, including having a market capitalization of over $100M, 1M outstanding shares, and a stock price over $4.

OTC important for thinly-traded securities (because need a market maker for trades to happen).

Stock Market Indexes

A stock market index tracks the performance of a group of stocks, giving investors a snapshot of overall market trends. Major indexes include:

- **Dow Jones Industrial Average (DJIA)**: 30 large U.S. firms.
- **S&P 500**: 500 large-cap U.S. companies.

- **NASDAQ**: Over 3,000 primarily tech-related firms.
- **FTSE 100**: Top 100 firms in London.
- **Nikkei 225**: Top 225 firms in Japan.
- **FTSE MIB**: Top 40 firms in Milan.

Indexes can be:

- **price-weighted** (like the DJIA):

  $$\frac{1}{N}\sum_{i=1}^{N} p_i$$

  For example, the Dow Divisor adjusts for stock splits and dividends, ensuring the index accurately reflects market changes.

  $$\frac{\sum_{i=1}^{30} p_i}{\text{DowDivisor}}$$

- **value-weighted** (like the S&P 500): weighted average of prices, where the weights are the market values

  $$\frac{1}{\text{market value base year}}\sum_{i=1}^{500} p_i \cdot n\_shares_i$$

Regulation of the Stock Market

The primary mission of the Securities and Exchange Commission (SEC) is to protect investors and ensure the integrity of the securities markets. To fulfill this mission, the SEC takes around 500 enforcement actions annually against individuals and firms that violate securities laws. These actions are conducted through the combined efforts of four key divisions within the SEC.

The SEC's regulatory framework focuses on addressing informational problems, such as:

- **Adverse Selection**: Occurs when investors do not have enough information to differentiate between good and bad investments.
- **Moral Hazard**: Arises when firms or individuals take risks because they do not bear the full consequences of their actions.

To combat these issues, the SEC imposes **stringent reporting requirements** on **publicly listed firms**. These requirements include:

- **Bookkeeping Standards**: Companies must follow strict accounting principles to ensure transparency and accuracy in their financial statements.

- **Periodic Inspections**: The SEC periodically reviews company records to ensure compliance with these standards.
- **Public Information**: Firms are required to disclose certain information, making it available to the public. This transparency is essential for investors to make informed decisions and for the market to operate efficiently.

Stock Prices

Valuing stocks is similar to valuing debt; it involves determining the future cash flows and discounting them to the present using an appropriate discount rate.

The **PE ratio** is a commonly used measure of how much investors are willing to pay for $1 of earnings from a company.

$$\text{Price} = \frac{P}{E_{industry}} \cdot E$$

Exercise:

If the industry PE ratio for a firm is 16 and its earnings are $1.13 per share, what is the stock's current price? Answer: Price = 16 x $1.13 = $18.08

One-Period Valuation Model

The one-period valuation model discounts the expected dividend and price over the next year. The formula is:

$$\text{Price}_t = \frac{Div_{t+1}}{(1+k_e)} + \frac{P_{t+1}}{(1+k_e)}$$

Here k_e captures also risk aversion, namely the return required to bear the risk of the stock.

Exercise:

What is the price of a stock with an expected dividend of $0.16 and a future price of $60, assuming a 12% discount rate?

Answer: $\text{Price}_t = \frac{0.16}{(1+0.12)} + \frac{60}{(1+0.12)} = \$53.71$

Generalized Dividend Valuation Model

The most general formula for calculating the price of a stock is as follows:

$$\text{Price}_t = \sum_{s=1}^{\infty} \frac{Div_{t+s}}{(1+k_e)^s}$$

This formula excludes the impact of **price bubbles** and focuses purely on the value derived from dividends.

Gordon Growth Model

A simplified version of the generalized dividend model is the Gordon Growth Model, which assumes that dividends grow at a constant rate (g) over time. In this model:

$$Div_{t+1} = Div_t \cdot (1+g)$$

This implies that dividends at any future time $t+s$ are given by:

$$Div(t+s) = Div(t)(1+g)^s \text{ for all } s > 0$$

Price of the Stock for $k_e > g$:

$$\text{Price}_t = \sum_{s=1}^{\infty} \frac{Div_{t+s}}{(1+k_e)^s}$$

This can be simplified:

$$\text{Price}_t = \sum_{s=1}^{\infty} \frac{Div_t(1+g)^s}{(1+k_e)^s} = \frac{Div_t(1+g)}{(k_e-g)} \text{ which can also be written as: } = \frac{Div_{t+1}}{(k_e-g)}$$

Key assumptions of the Gordon Growth Model:

- **Constant Dividend Growth**: Dividends grow at a constant rate (g) indefinitely.
- **Growth Rate vs. Return**: The growth rate of dividends $g$is less than the required return on equity k_e.

How to compute g and k_e?

g: Estimated using data related to firm growth, sector performance, and overall economic conditions (country characteristics).

k_e: Captures both the opportunity cost of capital and the risk associated with the firm.

These inputs are essential for calculating stock price using the Gordon model, and changes in them can have significant implications for the stock's value.

Exercise:

Suppose that the variance of future dividend growth - and thus of the future price - of a stock goes up (while the average return stays constant). What happens to the current price of the stock?

When the variance (and thus risk) increases, investors require a higher compensation for holding the stock. This means that the required return $k_e \uparrow$, which leads to a $\downarrow$ in the current stock price.

What happens if expected dividend growth also rises?

This is unclear, as higher expected growth would push the stock price upward, while higher risk pulls it dec . These forces work in opposite directions.

Exercise:

A firm's dividend is expected to grow at 10%. If the required return is 12% and the current dividend is \$1, what is the stock's valuation?

$$P = \frac{1 \cdot (1.1)}{0.12 - 0.1} = \$55$$

Exercise:

A firm stock is currently worth $\$22.42$. The required return on stocks is 10%. This year's dividend is $\$1.6$. What is the implied growth rate?

$$P_{2014} = \frac{D_2015}{(k-g)} = \frac{D_{2014}(1+g)}{k-g}$$

$$22.42 = \frac{1.6(1+g)}{(0.1-g)}$$

$$g = 2.67\,\%$$

Errors in Valuation

While stock pricing models, like the Gordon Growth Model, are useful for valuing stocks, market participants frequently encounter problems that can significantly impact the price predictions. These errors arise from challenges in:

- **Estimating Growth**: Accurately predicting the growth rate of dividends can be difficult, and small changes in growth assumptions can lead to vastly different price valuations.
- **Estimating Risk**: It's hard to precisely calculate the required return k_e , which is affected by the firm's risk, market conditions, and opportunity costs.
- **Forecasting Dividends**: Predicting future dividends is inherently uncertain, especially as market conditions, company performance, and strategies can change over time.

The tables in the image illustrate how sensitive stock prices are to small changes in key variables, such as:

- Dividend Growth Rate (Table 13.1),
- Required Return (Table 13.2).

TABLE 13.1 Stock Prices for a Security with D_0 = \$2.00, k_e = 15%, and Constant Growth Rates as Listed

Growth (%)	Price
1	\$ 14.43
3	17.17
9	21.00
10	44.00
11	55.50
12	74.67
13	113.00
14	226.00

TABLE 13.2 Stock Prices for a Security with D_0 = \$2.00, g = 5%, and Required Returns as Listed

Required Return (%)	Price
10	\$42.00
11	35.00
12	30.00
13	26.25
14	23.33
15	21.00

Stock price assessments are **probabilistic in nature**. This means that there is always uncertainty about future dividend growth, required returns, and other factors. Investors must consider different potential growth rates, required returns, and their probabilities when determining whether a stock is a good investment.

By understanding these limitations, investors can better account for the uncertainties in stock valuation and avoid making decisions based on overly optimistic or pessimistic assumptions about growth or risk.

Hedging and Derivatives

Starting in the 1970s, the world became a riskier place for financial institutions. Interest rate volatility increased, as did the stock and bond markets. Financial innovation helped with the development of derivatives. Derivatives are a mechanism to hedge risk. If improperly used, derivatives can dramatically increase the risks institutions face.

Hedging

Hedging involves engaging in a financial transaction that reduces or eliminates risk.

The idea is to enter another financial contract with a **risk that is opposite (negatively correlated) with the original risk**.

Useful to define two notions for the "sides" of risk

- **LONG position**: you profit if the price goes up. You hedge it by entering a short position. E.g. if you bought or own an asset.
- **SHORT position**: you profit if the price goes down. You hedge it by entering a long position. E.g. production input for your business or selling now an asset (bond) which is borrowed, but must be returned in the future to original owner – short selling.

Example of Hedging (non financial):

It is Sep 2021. The **spot price** (current price) is around **$80**

- **An OIL Company** has the rights to extract oil from an oil field in Texas from September 2022. Your **cost** of production is **$25/bbl**. You want to hedge the risk that the price will fall below $25. You have a long position but **you need a short one to hedge**.
- A **UTILITY Company** purchases oil to produce electricity. They are happy with the spot price of $80, but worry that geopolitical tensions may increase it. They are short in oil. They'd be happy to **enter a long position to hedge**.

We could write a contract that promises delivery to them of 10,000 barrels for $80/bbl (delivery price) in Sep 2022

- The oil company would still make a profit of $55/bbl
- The utility company locks in today's price

This is an example of a Forward contract.

FORWARDS

An **agreement to enter a transaction at some future date**. At least it should specify

- **What** item should be delivered
- **How much**
- At what **price** (delivery price)
- **Date**

It eliminates uncertainty about the future price, but…**There is always one winner and one loser**!

- If **Spot price** of oil in Sep 2022 is > \$80, the utility company has profited from the forward because it locked in a lower price, but the oil company lost because the spot price is above forward price
- Reverse is true if **Spot price** in Sep 2022 is < \$80

It is a **zero-sum game** (for every winner there's a loser), but **ex-ante it reduces risk for both**. Each party sacrifices some profits in one state of the world so each can benefit from **insurance**. They started with commodities because they were a way to **insure against production risk**. Then they have moved to the financial sector.

PROS: Not standardized, so flexible

CONS:

- **Liquidity risk**: hard to find a counter-party
- **Counterparty risk**: subject to **default** risk of the counterparty. Traded OTC

Payoff of a forward contract

John sells a forward to Mike, whereby he commits to deliver at a future date T a number $m > 1$ of treasury bonds at a preset price .

John: short treasury bonds. Mike: long treasury bonds

At date T, the market price of one bond is P_T. Payoff from the forward contract:

$$\Pi^F_{John} = (P_F - P_T) \cdot m \qquad \Pi^F_{Mike} = (P_T - P_F) \cdot m$$

Hedging with Forward Contracts

Assume John holds m units of treasury bonds. Shorting them with a forward allows him to hedge against price risk at T.

- Payoff of John at T without the sale of the forward:

$$\Pi^{NF}_{John} = P_T \cdot m$$

- Payoff of John at T with the sale of the forward:

$$\Pi^{NF}_{John} + \Pi^{F}_{John} = P_T \cdot m + (P_F - P_T) \cdot m = P_F \cdot m$$

- John's payoff at T no longer depends on the price at T!

Mutual benefits from Forwards

As payoff Π^{F}_{Mike} shows, now Mike is buying the price risk that John is shedding. What is Mike's benefit from the deal?

- P_F might be low enough
- Mike might be a **better risk bearer** (e.g. John is a bank and cannot bear much risk while Mike is a hedge fund)
- Mike might be a dealer who expects to sell m treasury bonds at T and is worried he might have to buy the bond in advance at a high price. In his case, he is also hedged!

Payoffs=Profits in this case.

Exercise 1

First National Bank owns $5 million of T-bonds that mature in 2029. It enters into a forward contract with Rock Solid Insurance company, where Rock Solid agrees to buy the bonds for $5m one year from now. What is the gain/loss of the Banks from the forward contract and overall?

If one year from now the bonds are worth $Xm

- The Banks' Gain/loss from the forward is: $5m - $Xm — Loss if X > 5, Gain if X < 5.
- The Insurance's Gain/loss from the forward is: $Xm - $5m — Gain if X > 5, loss if X < 5

Overal Gain/Loss: $5m - $Xm + $Xm - $5m = 0

Hedging Interest Rate risk with Forward

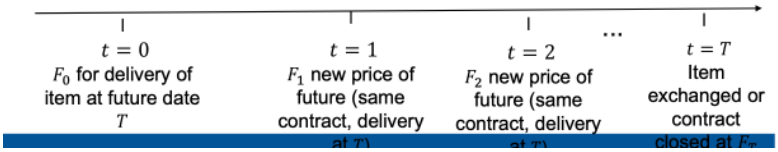
First National Bank is hedged against interest-rate increases (it sells the bonds at the current price)

Rock Solid, on the other hand, has protected itself against rate declines (it buys the bonds at the current price).

Both parties can gain or lose, since we don't know which way rates will actually go in one year. But both are better off (e.g. they can protect themselves against the risk that is more costly for them).

FUTURES

They are contracts that specify an agreement to exchange an asset a future date at a price specified today.



- **Exchange traded**: you can **get a price for the future contract even before delivery**
- **Standardization** overcomes the problem of market liquidity (i.e. find a counterparty) that forwards have. Futures standardize the:
  1. **Contract size**: e.g. $100,000 face value of T-bonds
  2. **Delivery dates**: last business days of each quarter: March, June, September, December
  3. **Quality**: very specific. e.g.: orange juice futures need to use this definition for orange juice:
- **Rare Physical Delivery**: Actual delivery of the asset is uncommon in futures markets. Instead, traders typically close their positions before the delivery date.
- **Offsetting Positions**: A trader holding a long position (buying a future) can offset it by taking a short position (selling the same future) with the exchange. The exchange cancels both positions, eliminating the need for delivery and reducing transaction costs. This mechanism provides flexibility and avoids the logistical costs associated with physical delivery.

Prices

The future price will converge to the spot price at the delivery date ($F_T = S_T$) because otherwise there is an **arbitrage** opportunity:

- if the $F_T < S_T$ we can buy a future today, get the good and sell it immediately for profit at the spot price
- if the $F_T > S_T$ buy at spot and sell futures: "Smart" traders will be quick to make arbitrage

Payoffs

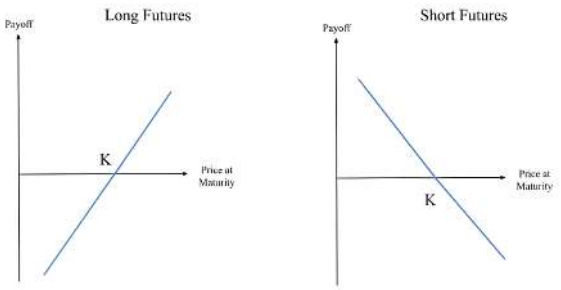
Payoff to the **long side** of a **future** contract closed at date t: $F_t - F_0$

F_0 is the price initially paid on the future and F_t is the price of the future when closing (selling).

Payoff to the short side of a future contract closed at date t: $F_0 - F_t$

F_0 is the price initially received on the future and F_t is the price of the future when closing (buying)

If the contract is kept until delivery, then $t = T$ and $F_t = F_T = S_T$



Example: Profits from Going Long on a Futures Contract

Suppose you take a long position on a futures contract at an initial price of $50. Let's analyze the potential profit or loss under two scenarios: closing the position today versus waiting until the delivery/settlement date.

1. **Closing the Position Today**:

- Today's futures price has dropped to $40.
- To close your long position, you must take an offsetting short position (sell) at this new, lower price.
- Profit/Loss Calculation: 40 - 50 = -10
- Result: You incur a loss of $10.

2. **Waiting Until the Delivery Date**:

- At the delivery/settlement date, the price of the underlying asset has further declined to $30.
- Since you have a long position, you are obligated to buy at the original price of $50, while the market value is only $30.
- Profit/Loss Calculation: 30 - 50 = -20
- Result: You incur a larger loss of $20.

If You Were Short Instead: The outcomes would be the opposite:

- Closing today: Gain of $10.

- Waiting until delivery: Gain of $20.

Futures: Exchanges & Default Risk Management

In contrast to forward contracts, futures exchanges address the issue of counterparty default risk through the use of a clearinghouse (also known as a Central Counterparty or CCP). Here's how this mechanism works:

1. **Role of the Clearinghouse**: The clearinghouse intermediates every trade, acting as the buyer to every seller and the seller to every buyer. This guarantees that all contracts will be executed, even if one party defaults.
2. **Margin Accounts**: To secure this guarantee, the clearinghouse requires traders to maintain margin accounts. These accounts contain funds tied to the value of the futures contract and act as collateral, ensuring both parties are financially committed.

Through this system, the exchange minimizes default risk, ensuring stability and reliability in the futures market.

Futures: Margin Accounts

The margin account is called so because the exchange will make a **margin call** (i.e. asking the buyer/seller to put in more money) in case the value of the future contract changes.

The key point is that **it is adjusted daily**: at each closing date, market prices determine the value in each margin account: marking-to-market. **This eliminates default risk.** At the end of every day, the exchange looks at how futures prices have moved. It credits the margin account of the party whose contract has become more valuable and debits the counterparty's account by exactly the same amount. The amount debited/credited corresponds exactly to the change in futures prices between today and yesterday. If the margin account has insufficient funds and the party does not top up funds after receiving a margin call, **the position will be automatically closed**.

Exercise: Mark-to-Market

Suppose a trader has taken a long position in oil futures at a price of $75 per barrel. The contract size is 5,000 barrels, with a 3-day expiration. The trader must deposit an initial margin equal to 4% of the contract's value.

Initial Margin Calculation: 5,000* 75 *0.04 = 15,000

The futures prices over the next three days are $80, $74, and $77. Calculate the trader's daily profits or losses and track the balance in the margin account.

The trader has a long position, meaning she profits when prices rise.

Time	Future Price	Cash Flow to Margin Account	Margin Account
0	$75.00	—	$15000.00
1	$80.00	+5*5000=+25000	$40000.00
2	$74.00	-6*5000=-30000	$10000.00

Time	Future Price	Cash Flow to Margin Account	Margin Account
3	$77.00=spot price	+3*5000=+15000	$25000.00
Total			**$10000.00**

Since the position was not closed before maturity, delivery occurs at the spot price of $77, not the original futures price of $75. This price convergence is common as futures and spot prices align at delivery.

The trader initially bought oil futures at $75 per barrel, but due to the $2 gain from the mark-to-market adjustment, her effective cost is equivalent to $75 per barrel. Here's how the profit from her futures position is calculated:

$$\Pi_{long} = +(S_T - F_0) \cdot \text{contract size} = (77 - 75) \cdot 5000 = +\$10000$$

The cash flows in the margin account confirm this gain, with cumulative cash flows of +25,000 - 30,000 + 15,000 = +10,000.

Thus, while the trader pays $77 per barrel at delivery, she also gains $10,000 in the margin account, effectively paying an adjusted rate of $75 per barrel:

$$-\$77 + \frac{\$10000}{5000(bbl)} = -75\$$$

Stock Index Future

A stock index future uses a **stock market index** as the underlying asset, making it a valuable tool for **hedging against stock market risk**. The **settlement** is in **cash** rather than in actual stocks, with the payoff based on the index value at the delivery date multiplied by a specific **multiplier**.

$$\Pi_{long} = \textbf{multiplier} \cdot (S_T - F_0)$$

$$\Pi_{short} = \textbf{multiplier} \cdot (F_0 - S_T)$$

Example: S&P500 Futures

For S&P 500 futures, the multiplier is 250. If you sell one futures contract at a price of $1,500, you agree to deliver at the future index value. ($S\ \&\ P500_T$)

- **Contract Sale Value**: $1500 \cdot 250 = 375000\$$
- **Delivery Requirement**: If the index settles at 1,000 ($S\ \&\ P500_T = 1000$), the required delivery value would be $1000 \cdot 250 = \$250000$.
- **Profit Calculation**: $\Pi_{short} = 250 \cdot (1500 - 1000) = \$125000$

In this case, you profit $125,000 by selling at $375,000 but only needing to deliver $250,000 at settlement.

Why Use a Stock Index Future?

Suppose you have a **$100M stock portfolio that tracks the S&P 500**. To protect against a market downturn, you hedge by going short on the S&P 500 for one year.

- **Current S&P 500 Index Level**: 1,000
- **Contracts Needed**: To hedge $100M, with the index at 1,000 and a 250 multiplier, you need:

$$\frac{100{,}000{,}000}{1000 \times 250} = 400 \text{ contracts}$$

Scenario 1: S&P 500 Falls to 900

- **Gain from Short Position**: (1000 - 900) \times 400 \times 250 = +10,000,000
- **Portfolio Value**: Decreases to $90M.
- **Total Position Value (Portfolio + Futures)**: $90M + $10M = $100M.

Scenario 2: S&P 500 Rises to 1,100

- **Loss from Short Position**: (1000 - 1100) \times 400 \times 250 = -10,000,000
- **Portfolio Value**: Increases to $110M.
- **Total Position Value (Portfolio + Futures)**: $110M - $10M = $100M.

In both scenarios, **your net position remains at $100M**, effectively **locking in the value of your portfolio and protecting it from market fluctuations**. While hedging with futures provides downside protection, it also caps upside potential, highlighting the trade-off in using hedges: they safeguard value but limit potential gains.

Forwards v Futures

	Forward	Future
Traded	OTC	On Exchange
Standardization	No	Yes
Customizability	Yes	No
Delivery	Usually Yes	Rarely
Settlement	At the End of the Contract	Daily (Marked-to-Market)
Credit Risk	Some	Virtually No
Liquidity	Low	High

OPTIONS

It's the **RIGHT to buy** (call option) **or sell** (put option) an asset **at the strike price** up until expiration date (**American**) or on expiration date (**European**).

Options are available on a number of financial assets, including individual stocks, stock indexes, etc.

- **Expiration Date**: T
- **Premium**: P
- **Strike Price**: S_T it's the price at which the buyer of the call can choose to buy the asset at date T or price at which the buyer of the put can choose to sell the asset at date T.

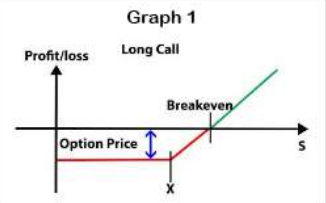
Payoff from the Call Option

Suppose that at T the price of the asset is P_T

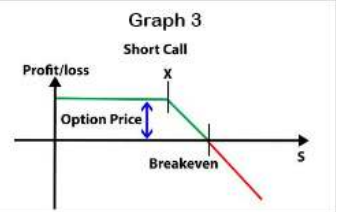
If $P_T < S_T$ option is **NOT exercised**. Profit is $-P$

If $P_T > S_T$ option is **exercised**. Profit is $P_T - S_T - P$

Total **Payoff** for the holder of the **call** option
$\max[P_T - S_T, 0] - P$



If market price is very low, loss for the buyer is bounded (unlike when one buys using a future). Call protects against high price, but no large loss for low price.



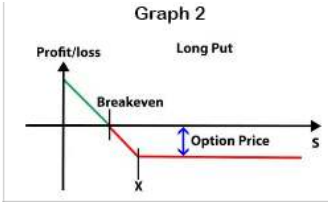
Payoff from the Put Option

Suppose that at T the price of the asset is P_T

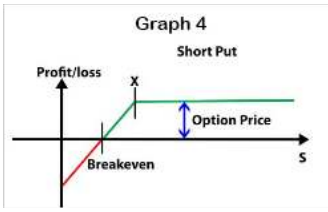
If $P_T < S_T$ option is **exercised**. Payoff is $S_T - P_T - P$

If $P_T > S_T$ option is **NOT exercised**. Payoff is $-P$

Total **Payoff** for the holder of the **put** option
$\max[S_T - P_T, 0] - P$



If market price is very high, loss for the seller is bounded (unlike when one sells using a future). Put protects against low price but limited loss from high price.



Hedging with Options

When hedging a position (e.g., bonds), a common strategy is to use put options instead of selling futures. By purchasing put options equivalent to the futures position, you protect yourself from downside risk.

- **Disadvantage**: You **must pay a premium** for the options.
- **Advantage**: You're **protected if** i **increases** since you can choose to sell at the exercise price. If i falls, you're covered through the put option but avoid losses if the option isn't exercised.

Factors affecting Premium

- **Strike Price**: **Higher** S_T result in **lower premiums for calls** but **higher premiums for puts**.
- **Time to Expiration**: **Longer durations increase premiums** for **both** calls and puts.
- **Volatility**: **Greater price volatility** of the underlying asset **raises premiums** for **both** calls and puts.

Exercise:

A stock is currently priced at \$55, and a put option with a strike price of \$55 expires today.

Since the strike price equals the stock price, the premium is \$0 because

$$\$55 - \$0 = \$55$$

If the premium is set at \$6, the exercise price must be \$61, calculated as:

$$S - \$6 = \$55 \implies S = \$61$$

At expiration, for the put option to be traded, the exercise price minus the premium must be equal to the spot price.

Exercise:

You bought a security for \$4 when the spot price of the stock was \$55. The expiration date of the security was November 7 2014. On October 8 2014, you closed your position for a total profit of \$11. The spot price of the stock on that date was \$40. What was the security that you purchased?

An American put option with strike price of \$55 or an American call option with a strike price of \$25.

It is an option because you paid a price to buy it. It is American because you exercise it before expiration.

Exercise:

Rock Solid has a stock portfolio worth \$100 million, which tracks closely the S&P500. The portfolio manager fears a decline and wants to completely hedge the value of the portfolio against any downside risk. If the S&P is currently at 1,000, how is this accomplished?

What is Rock Solid's payoff from the option assuming that at expiration S&P 500 is at 900 or at 1100? The strike price is \$950 of and the premium is \$200.

Value of the S&P 500 Option Contract = $100 \cdot index$

currently $100 \cdot 1000 = \$100000$

To hedge \$100 million of stocks that move 1 for 1 (perfect correlation) with S&P currently selling at 1000, you would buy \$100 million of S&P put options =1,000 contracts

- After the year, the S&P 500 is at 900 and the portfolio is worth \$89.8 million. Options position is up \$5 million (since 950 strike price: 50x100) and portfolio is worth \$94.8 million
- If instead, the S&P 500 is at 1100 and the portfolio is worth \$109.8 million. Options position expires worthless, and portfolio is worth \$109.8 million

Note that the portfolio is protected from any downside risk (the risk that the value in the portfolio will fall) in excess of \$5 million. However, to accomplish this, the manager has to pay a premium upfront of \$200,000.

The Efficient Market Hypothesis (EMH)

Are Asset Prices "Right"? Determining if asset prices are accurate depends on two key factors:

- **Rationality of Market Expectations**: The degree to which investors' expectations are grounded in rational analysis.
- **Ability to Act on Expectations**: Whether investors can act on these rational expectations through trading.

Expectations play a **crucial role** in the financial system, as they influence demand for assets, bond prices (through inflation expectations), and our understanding of how financial institutions function.

The Efficient Market Hypothesis Explained

The EMH posits that any information available about future events (and incorporated into rational expectations) should be reflected in current prices.

However, verifying this hypothesis with **real market data produces mixed results**, indicating occasional systematic departures from market efficiency.

Calculating the Rate of Return on an Investment

The **realized rate of return** (R) on any investment is:

$$R = \frac{P_{t+1} - P_t + C}{P_t}$$

where:

- P_t is the current price of the asset,
- P_{t+1} is the future price,
- C is any cash flow (e.g., dividends) received from the investment.

In practical terms, investors only have an expected rate of return (R^e) at time t, based on their forecast of P^e_{t+1}.

$$R^e = \frac{P^e_{t+1} - P_t + C}{P_t}$$

Core Principles of the EMH

- **Optimal Forecasting**: Expectations represent statistically optimal forecasts, given all available information. This means:

$$P^e_{t+1} = P^{of}_{t+1} \implies R^e = R^{of}$$

- **Equilibrium in Expected and Required Returns**: The expected return from an investment should equal the required return:

$$R^e = R^*$$

Putting these ideas together, the EMH asserts that the optimal forecasted return (R^{of}) equals the required return (R^*).

$$R^{of} = R^*$$

Example:

Consider an asset that can be in one of two states, "**good**" and "**bad**," each with a 50% probability.

- In the good state, the dividend is \$6, and the optimal price forecast is \$60.
- In the bad state, the dividend is \$2, and the optimal price forecast is \$40.
- The required rate of return is 10% ($R^* = 0.1$).

The EMH can help determine the "right" current price, P_t, as follows:

$$P_t = 0.5 \cdot \frac{6+60}{1.1} + 0.5 \cdot \frac{4+40}{1.1} = 0.5 \cdot \frac{110}{1.1} = 50$$

Thus, the current price (P_t) adjusts to ensure that the expected return aligns with the required return:
$R^{of} = R^*$

The price is set so that, based on all available information, no investor can achieve an abnormal return beyond what they require to bear the risk, as stipulated by R^*.

Exercise: Given:

- Required return = 10%
- Best forecast of future price = \$50
- Dividend = \$2

Find the current price :

$$0.1 = \frac{2 + 50 - P_t}{P_t}$$

$$P_t = 47.2$$

Exercise: Suppose new information emerges indicating that current reforms will result in higher economic growth for Italy two years from now. According to EMH, this information will cause the Italian stock market to rise immediately, as investors will act on the expectation of higher returns sooner, rather than waiting for two years to buy.

This reflects the EMH principle that prices adjust today based on all available information, eliminating opportunities to make returns above the required rate simply by delaying action.

EMH = Rationality + No Arbitrage

The Efficient Market Hypothesis (EMH) posits that markets are **rational**, and **unexploited profit opportunities** will **quickly disappear as investors act**. When a security offers an above-market return, investors will rush to buy it, driving the price up until returns normalize, aligning with EMH's core idea: Rationality + No Arbitrage.

Rationale Behind the Hypothesis: In an **efficient market**, **any unexploited profit opportunity is swiftly eliminated**. Not all investors need to be aware of every opportunity; even if only a few act, they will remove profit opportunities as they profit themselves.

The Three Forms of EMH

- **Strong Form**: Prices reflect all information (public and private).
- **Semi-Strong Form**: Prices reflect all publicly available information.
- **Weak Form**: Prices reflect all historical information.

Evidences Supporting EMH

- **Public Information and Stock Prices**: According to EMH, **publicly available information should already be priced in**, so it generally will not affect stock prices on average. Early evidence supports this: earnings announcements or stock splits do not, on average, cause prices to rise as expected under EMH.
- **Random-Walk Behavior of Stock Prices**: In line with EMH, **stock prices are unpredictable**. If a stock is expected to rise, investors will buy, pushing the price up now. If it's expected to fall, they'll sell, adjusting to equilibrium.
- **Technical Analysis**: EMH suggests technical analysis (studying past price trends) is **ineffective**. According to the random-walk concept, **historical data cannot predict stock price changes**, rendering technical analysis an unproductive pursuit.

Evidences Against EMH

- **The Small-Firm Effect**: Studies show that small firms tend to **earn higher-than-normal returns over time**, even when their greater risks are factored in. Theories to explain this anomaly include institutional portfolio rebalancing, tax issues, low liquidity, and information costs. Though this effect has lessened recently, it remains a challenge to EMH.
- **The January Effect**: Stock prices often show **abnormal positive returns in January**, contradicting random-walk behavior. Investors may sell in December to record losses on tax returns, then buy in January, driving prices up. However, **this does not explain why tax-exempt institutions don't take advantage of this pattern, leaving the January effect as an unresolved inconsistency with EMH**.

- **Market Overreaction**: Research indicates **stock prices may overreact to news and correct only slowly**. For example, after a negative earnings announcement, a stock may drop excessively, then gradually return to a stable level. This suggests an opportunity for profit by buying at the low and selling when prices normalize, which is inconsistent with EMH.
- **Excessive Volatility**: Stock prices exhibit **greater volatility than warranted by their fundamental values**. For example, fluctuations in the S&P 500 often exceed what is justified by underlying dividends. Furthermore, stock prices fluctuate less when markets are closed, implying factors beyond fundamentals drive market prices.
- **Mean Reversion**: Some evidence shows that **low-return stocks tend to have higher future returns and vice versa**. **Poor-performing stocks may do well in the future**, a pattern inconsistent with the random-walk theory. Though recent data is mixed, mean reversion remains a contentious point against EMH.

Behavioral Finance

Criticism of EMH, particularly in explaining events like the 1987 Black Monday crash, led to behavioral finance. This field integrates psychology, sociology, and other social sciences to understand security price behavior, challenging EMH's assumptions.

- **Short Selling and Loss Aversion**: EMH suggests that "smart money" would short-sell overpriced securities, yet short-selling volumes remain low. This gap has led to behavioral theories about "loss aversion," where investors avoid realizing losses, affecting market behavior.
- **Investor Overconfidence**: Behavioral finance also highlights how overconfidence among investors can inflate price bubbles, further diverging from EMH's rational market expectations.

Indirect Finance: Understanding the Role of Financial Intermediaries

A thriving economy relies on a financial system that channels funds efficiently from savers to borrowers, ensuring that capital reaches those with the most productive investment opportunities. **Financial intermediaries**, particularly banks, play a crucial role in this process, addressing inefficiencies that arise in direct finance. This section explores the role of intermediaries and why they are central to external financing, given the unique structure of the financial system.

Facts About Financial Structure

- **Stocks as Financing**: Stocks are not the primary source of external financing for businesses.
- **Debt and Equity Securities**: Issuing marketable debt and equity is rarely the main approach businesses use to finance operations.
- **Importance of Indirect Finance**: Financial intermediaries play a far more significant role than direct finance, where businesses raise funds directly from lenders.
- **Banks as Key Sources**: Banks provide the most critical source of external funding for businesses.
- **Regulation**: The financial sector is one of the most regulated parts of the economy.
- **Access to Securities Markets**: Only large, established corporations have ready access to securities markets.
- **Prevalence of Collateral**: Collateral is commonly used in debt contracts with both households and businesses.
- **Complexity of Debt Contracts**: Debt contracts are often complicated and include restrictions on borrowers' behavior.

A comprehensive theory explaining financial intermediaries' existence must account for all these structural facts.

THEORY 1: Transaction Costs

Impact of Transaction Costs on Financial Structure

- Small investments, such as a $5,000 purchase of 100 shares at $50/share, come with trading costs and often lack diversification.
- Bonds are less accessible for small investors due to high denominations (e.g., $1,000 minimum).

Financial intermediaries **reduce transaction costs,** making investment feasible for small savers. However, this theory does not fully explain the need for collateral or other loan terms.

THEORY 2: Asymmetric Information

Asymmetric information, where **one party has more knowledge than the other,** provides a critical explanation for why financial intermediaries exist.

Understanding Asymmetric Information:

- **Adverse Selection**: Asymmetric information **BEFORE** a transaction. For instance, **a bank may not know whether a borrower is a good or bad manager**.
- **Moral Hazard**: Asymmetric information **AFTER** a transaction. **Even if a borrower appears reliable, they may later choose to act in ways that increase their likelihood of default**.

Analyzing how these problems influence financial decisions and structures is known as agency theory.

Adverse Selection: A Challenge in Financial Markets

Adverse selection occurs **when the highest-risk borrowers are also those most likely to seek loans**. This is similar to how health insurance attracts higher-risk individuals. In financial markets, this leads to the lemons problem:

The Lemons Problem in Securities Markets:

- If investors can't differentiate between high- and low-quality firms, they will only offer a price that reflects an average firm's value.
- This undervaluation discourages good firms from issuing securities and results in an excess of low-quality securities, disrupting the market.

Example:

- If the value of a good firm's stock is $3 and a bad firm's is $1, the uninformed market offers an average price.
- Informed issuers only sell when the market price is above the value of what they offer.

This explains why **direct finance is often challenging and typically reserved for well-established firms** with less asymmetric information, hence fewer lemons problems.

Tools to Mitigate Adverse Selection

- **Private Production and Sale of Information** (e.g., rating agencies): Though beneficial, this solution may face conflicts of interest.
- **Government Regulation** to Increase Information: Annual audits of corporations, for example.
- **Financial Intermediation**: Like used car dealers, intermediaries can identify asset quality more effectively and establish trust by earning from well-informed loans.

Exercise: Banks solve adverse selection problems because:

- F: They can bear more risk than individual savers.

- F: They can manage multiple loans simultaneously.
- T: They can assess firms' quality more cost-effectively than individual savers.

Moral Hazard: Post-Transaction Risk

Moral hazard arises **when borrowers engage in high-risk behavior after receiving funds**, as **they might have little to lose in case of failure**. This is similar to increased risk-taking by insured individuals.

Example:

Suppose you invest as a silent partner in an ice cream store, providing 90% of the capital, while the manager contributes 10%. If the manager is indifferent to their smaller share of profit, they might not work as diligently, affecting returns.

Tools to Address Moral Hazard

- **Information Production and Monitoring**: (e.g., rating agencies): Though beneficial, this solution may face conflicts of interest.
- **Government Regulation to Enhance Transparency**: Annual audits of corporations, for example.
- **Financial Intermediation** (e.g., venture capital): Lenders may monitor and influence managers' behavior.
- **Debt Contracts**: These allow borrower-owners to benefit from productive efforts.

Debt Structure and Moral Hazard in Debt Markets

- While debt financing minimizes moral hazard in theory, it may encourage borrowers to undertake very risky projects if they stand to gain only in extreme success scenarios.

Example: A firm with an outstanding interest of $100 but only $90 on hand might prefer high-risk investments for potential gain, as the risk of loss is effectively borne by the lender.

Tools to Mitigate Moral Hazard in Debt Contracts

- **Net Worth and Collateral**: Collateral signals borrower confidence in their ability to repay.
- **Restrictive Covenants**: These provisions in debt contracts discourage risky behavior, preserve collateral value, and provide necessary borrower information.
- **Financial Intermediation**: Banks have distinct advantages in monitoring borrowers and enforcing contract terms.

Exercise: Banks address moral hazard because:

- F: They can finance contracts using collateral.
- T: They can monitor borrowers more effectively than savers.
- T: They can assess borrower quality more efficiently.

Banking and the Management of Financial Institutions

Commercial Banks are financial institutions that accept deposits (liabilities) and make loans (assets), making them **the largest type of financial intermediary by asset size**. Unlike investment banks, they hold **depository status**, meaning **they can accept deposits from the public**.

Bank Balance Sheet

A bank's balance sheet provides a breakdown of assets, liabilities, and capital (equity), structured as:

Total Assets = Total Liabilities + Capital (or Equity or Net Worth)

Book values (as reported on the balance sheet) may differ from **market values**, which are assessed by the market based on current prices.

Commercial Banks: Assets

- **Reserves and Cash (10%)**: **Accounts** held at the Fed, along with **physical cash** in the bank's vault.
- **Securities (30%)**: Commercial banks primarily hold **debt securities** (e.g., US government bonds and MBS) but are **generally not allowed to hold equity**.
- **Loans (49%)**: The **largest asset class**, primarily consisting of **household mortgages** (real estate) and **business loans** to firms.
- **Other Assets (11%)**: Includes **physical assets** such as buildings and IT infrastructure.

Commercial Banks: Liabilities

- **Deposits (83%)**:
  - **Checking/Demand Deposits**: Allow customers to withdraw funds at any time.
  - **Nontransaction Deposits**: Limited withdrawals (e.g., time deposits like Certificates of Deposit).
- **Other Short-Term Borrowing (7%)**:
  - **Federal Funds**: Overnight loans from other banks.
  - **Interbank Offshore Dollar Deposits** (Eurodollars).
  - **Repurchase Agreements**.
  - **Commercial Paper and Notes**.
- **Capital (10%)**: Represents the **difference between a bank's assets and liabilities**, providing a buffer against potential losses.

Off-Balance Sheet

Off-Balance Sheet (OBS) Activities refer to **financial transactions** that **generate income** for banks but **do not appear on their balance sheets**. Over the past two decades, these activities have grown as a source of fee income for banks. OBS activities include:

- **Securitization**: Banks sell loans and repackage them into securities, freeing up space on the balance sheet.
- **Loan Commitments**: Banks offer commitments to lend a certain amount to borrowers.
- **Trading and Hedging**: Involves derivatives like options, futures, and interest rate swaps for hedging purposes.

Banks are motivated to **move assets off the balance sheet** while **keeping liabilities low**, **improving their balance sheet appearance**. Although OBS items don't impact book equity, **they do affect market equity** (the market value of assets minus liabilities plus net OBS position) depending on public versus private information about OBS activities.

Basics of Banking

Banks use asset transformation to turn deposits into loans. This process involves ***borrowing short and lending long***, where banks use **short-term deposits** to **finance longer-term loans**. Here's a simplified example:

1. **Deposit Example**:
   - A customer deposits $100 in cash at First National Bank.
   - First National Bank's BS records this as a $100 increase in reserves (asset) and $100 in checkable deposits (liability).

First National Bank			
Assets		Liabilities	
Reserves (vault cash)	+$100	Checkable deposits	+$100

2. **Interbank Transfer**: If the customer's check came from Second National Bank, Second National Bank would record a $100 reduction in reserves and checkable deposits.

First National Bank				Second National Bank			
Assets		Liabilities		Assets		Liabilities	
Reserves	+$100	Checkable deposits	+$100	Reserves	−$100	Checkable deposits	−$100

3. **Reserve Requirement**: With a 10% reserve requirement, First National Bank must hold $10 as required reserves, leaving $90 as excess reserves.

First National Bank			
Assets		Liabilities	
Required reserves	+$10	Checkable deposits	+$100
Excess reserves	+$90		

4. **Loan Creation**: Since excess reserves yield minimal returns, the bank can transform excess reserves into loans, turning $90 of reserves into loans to generate more income.

First National Bank			
Assets		**Liabilities**	
Required reserves	+$10	Checkable deposits	+$100
Loans	+$90		

Through this process, the **bank efficiently utilizes deposits to make loans**, adhering to reserve requirements while maximizing profitability by minimizing low-yield reserves.

General principles of Bank Management

To operate effectively and remain financially stable, banks must carefully manage both their assets and liabilities. This management is guided by six primary concerns:

1. **Liquidity Management**: Ensuring the bank has enough liquid assets (e.g., cash or reserves) to meet immediate obligations and withdrawals by depositors. Liquidity management involves maintaining a balance between keeping sufficient cash on hand and investing in higher-yielding, less liquid assets to increase profitability.

   Reserve requirements: 10% of deposits meaning the bank needs $10M in reserves and has $10M in excess reserves.

Assets		Liabilities	
Reserves	$20 million	Deposits	$100 million
Loans	$80 million	Bank capital	$ 10 million
Securities	$10 million		

   1. **Scenario 1**: $10M deposit outflow with excess reserves.

      After a $10 million outflow, reserves drop to $10 million, but the bank still meets the 10% reserve requirement with $1 million in excess reserves. No immediate action is required as the bank remains compliant.

Assets		Liabilities	
Reserves	$10 million	Deposits	$90 million
Loans	$80 million	Bank capital	$10 million
Securities	$10 million		

   2. **Scenario 2**: $10M deposit outflow without excess reserves

      If the bank had no excess reserves, a $10 million outflow would reduce reserves to zero, resulting in a $9 million reserve shortfall.

No excess reserves

Assets		Liabilities	
Reserves	$10 million	Deposits	$100 million
Loans	$90 million	Bank capital	$ 10 million
Securities	$10 million		

Deposit outflow of $10 million

Assets		Liabilities	
Reserves	$ 0	Deposits	$90 million
Loans	$90 million	Bank capital	$10 million
Securities	$10 million		

      To **Address the Shortfall**, the Bank Can:

- **Borrow from Other Banks or Corporations**: Increases liabilities with a loan to cover the reserve requirement.

Assets		Liabilities	
Reserves	$ 9 million	Deposits	$90 million
Loans	$90 million	Borrowings from other banks or corporations	$ 9 million
Securities	$10 million		
		Bank capital	$10 million

- **Sell Securities**: Liquidates securities to raise cash, converting less liquid assets into reserves.

Assets		Liabilities	
Reserves	$ 9 million	Deposits	$90 million
Loans	$90 million	Bank capital	$10 million
Securities	$ 1 million		

- **Borrow from the Federal Reserve**: Uses the Fed as a lender of last resort to maintain reserves.

Assets		Liabilities	
Reserves	$ 9 million	Deposits	$90 million
Loans	$90 million	Borrowings from the Fed	$ 9 million
Securities	$10 million	Bank capital	$10 million

- **Call In or Sell Off Loans**: Converts loan assets into cash but may strain relationships with borrowers.

Assets		Liabilities	
Reserves	$ 9 million	Deposits	$90 million
Loans	$81 million	Bank capital	$10 million
Securities	$10 million		

3. **Asset Management**: maximizing returns on assets while controlling risk and maintaining sufficient liquidity. Banks aim to achieve these goals through several strategies:
   - **Select Creditworthy Borrowers**: Focus on borrowers with low default risk who are willing to pay high interest rates, ensuring steady income while minimizing the chance of loan losses.
   - **Invest in High-Return, Low-Risk Securities**: Acquire securities that offer high returns with minimal risk, such as government securities, to balance the portfolio's overall risk-return profile.
   - **Diversify the Portfolio**: Spread investments across different asset types and sectors to reduce exposure to any single risk, enhancing stability.
   - **Manage Liquidity**: Ensure enough liquid assets are available to meet immediate obligations, supporting overall stability and operational flexibility.
4. **Liability Management**: involves managing the bank's sources of funds to ensure financial stability and cost-efficiency. Since the 1960s, banks have moved beyond relying primarily on deposits and now actively seek to diversify their funding sources. Key strategies include:
   - **Diversification of Funding Sources**: Banks draw funds from various sources, including deposits, wholesale funding, and certificates of deposit (CDs), to reduce dependency on any single source of funds.

- **Issuing Debt for Funding**: When profitable loan opportunities arise, banks may borrow funds or issue CDs and other short-term debt to raise capital, allowing them to capitalize on lending opportunities without solely relying on deposits.

5. **Capital Adequacy Management** involves **ensuring that a bank:**
   - **holds enough capital to absorb potential losses**, protect depositors, and meet regulatory requirements, such as ***Basel III***, which sets minimum capital ratios. These regulations are designed to ensure banks maintain a sufficient capital buffer for financial stability.
   - **provides adequate returns to shareholders** (ROE): many bankers believe that holding more capital reduces ROE, as a higher capital level lowers the equity multiplier (**EM**), thus decreasing **ROE** ($ROE = ROA \cdot EM$). Although **this relationship is not absolute**, the perception leads many banks to balance their capital levels carefully.

Measuring Bank Performance

Bank performance is evaluated by analyzing the income statement, divided into three main parts:

- **Operating Income**: **Revenue from interest on loans**, **securities**, and **other** bank **investments**.
- **Operating Expenses**: Primarily includes **interest on deposits and bonds**, along with **labor costs**.
- **Net Operating Income**: Calculated as the **difference between operating income and operating expenses**. Unlike typical corporations, a bank's **main expenses are related to interest on deposits**, not production costs. It depends on the **bank's asset and liability structure** and **how changes in interest rates**, driven by central banks, **affect this structure**.

Ratio Analysis is commonly used to assess and compare bank performance across institutions. Key performance measures include:

- **Return on Assets (ROA)**: Measures overall profitability in relation to assets, calculated as:

$$ROA = \frac{\text{Net Profits}}{\text{Assets}}$$

- **Return on Equity (ROE)**: Indicates profitability relative to equity, considering leverage. Since banks also use debt, ROE is generally higher than ROA due to leverage:

$$ROE = \frac{\text{Net Profits}}{\text{Equity Capital}} = \frac{\text{Net Profits}}{\text{Assets}} \cdot \frac{\text{Assets}}{\text{Equity}} = ROA \cdot \frac{\text{Equity+Liability}}{\text{Equity}} = ROA \cdot (1 + \text{leverage})$$

Then: $ROE > ROA$ this is because of leverage: there is also debt.

- **Net Interest Margin (NIM)**: Reflects the difference between interest income and interest expenses as a percentage of assets, a crucial measure for banks given their dependency on interest-based income:

$$NIM = \frac{\text{Interest Income - Interest Expenses}}{\text{Assets}}$$

Central Banks and Monetary Policy

CBs are **governmental authorities** responsible for **managing monetary policy**. Their primary tools include setting i, controlling the M^s, and managing π. While CBs operate **independently**, much of their influence on the economy occurs through the **commercial banking system**.

CB Balance Sheet

Like other financial institutions, CBs have:

- **Assets**: CB hold **bonds**, such as US Treasury securities and **federal agency debt**, rather than traditional loans or cash.
- **Liabilities**: These include **bank reserves** (deposits held by commercial banks at the central bank) and currency in circulation (paper bills).

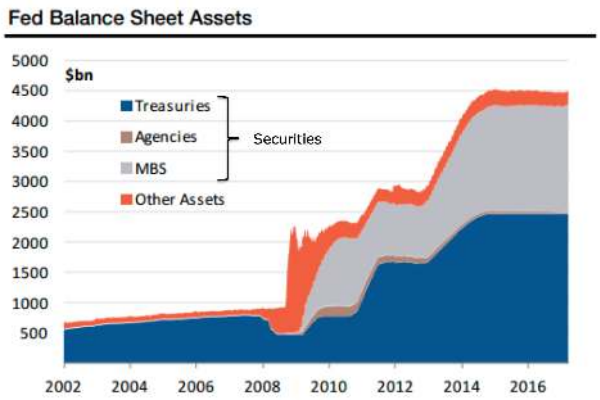
Federal Reserve Assets

Two main asset classes:

1. **Securities**:
    - **Before 2008**: Primarily short-term Treasury bills (**T-bills**).
    - **Post-2008**: Shifted focus to **long-term Treasuries** and Mortgage-Backed Securities (**MBS**) to support economic stability.
2. **Loans to financial institutions** (discount window) or **other liquidity facilities**

- The Fed offers **discount window loans** or other **liquidity facilities** to **provide credit** to financial institutions, especially during crises.
- Although these loans are typically unused during stable times, they were **crucial during the 2008-2010** financial crisis.

The Fed's approach of **quantitative easing** involves increasing the CB's assets, including **MBS** and **long-term Treasuries**, to support financial markets. This shift is visible in the chart, which shows an increase in assets from 2008 onward, with MBS becoming a significant part of the balance sheet composition.



Federal Reserve Liabilities

The Federal Reserve's balance sheet has two main types of liabilities:

1. **Currency in Circulation**:
   - Composed of **banknotes** and **coins** actively used in the economy. The amount of currency typically **grows at a steady rate in line with economic expansion**.
2. **Reserves**:
   - These are **funds that commercial banks hold in their accounts** with the Federal Reserve, making the Fed function as a ***bank for banks***. There are two types of reserves:
   - **Required Reserves (RR)**: set by law, with a minimum of 3-10% of checkable deposits in the U.S.
   - **Excess Reserves (ER)**: any reserves held by banks above the required minimum.
   - Total reserves = Required Reserves (RR) + Excess Reserves (ER).

Normal times: Open Market Operations (OMO)

The Federal Reserve's BS has expanded significantly over the last decade, but the basic structure (comprising securities, loans to banks, currency in circulation, and reserves) remains consistent.

In normal times, the Fed conducts open market operations as a primary tool of monetary policy to manage the money supply:

1. **Open Market Purchases/Sales**: The Fed **buys or sells securities** (like Treasury bonds) from **primary dealers** (a set group of banks).
2. **Discount Loans**: These are **loans offered by the Fed to financial institutions**, usually at times **when liquidity support is needed**.

The objective of these operations is to **influence** the M^s, particularly through adjusting bank reserves. Banks can exchange reserves in the **Federal Funds market**, a **short-term** (often **overnight**) **money market for safe**, **quick transactions**.

Example: If the Fed buys $100 million in bonds, it gains + $100M in assets (the bonds) and provides reserves to the selling bank, like JP Morgan. The Fed can issue these reserves freely, being the only institution with the authority to do so, thus influencing the broader M^s.

The Fed	
Assets	Liabilities
Securities +$100 m	Reserves +$100 m

Banking System	
Assets	Liabilities
Reserves +$100m	Deposits +$100m

The Public	
Assets	Liabilities
Securities −$100 m	
Deposits +$100m	

If the bonds are bought from a bank we have the left situation (banking system), if they are bought from the public, we have the right situation (the public).

Example: if the Fed lends $100M to a bank:

Banking System	
Assets	Liabilities
Reserves +$100 m	Loans +$100 m

The Fed	
Assets	Liabilities
Discount loans +$100 m	Reserves +$100 m

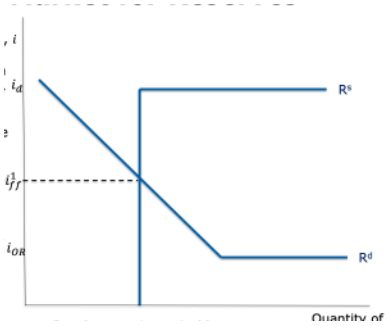
Supply and Demand in the Market for Reserves

The **Federal Funds market** is where **banks trade reserves overnight to meet their reserve requirements**. Changes in the supply of reserves affect the **federal funds rate**, the interest rate banks charge each other for these short-term loans. The Fed uses several tools to influence this rate and control monetary policy, particularly through OMO.

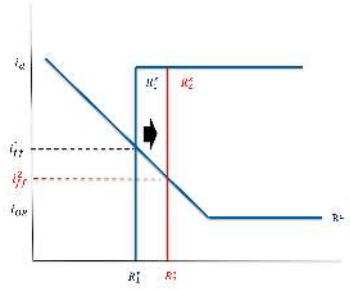
Key Interest Rates to Monitor:

1. **Discount Window Rate**: The **rate at which banks can borrow directly from the Fed**. This rate sets an **upper ceiling** (i_d) because banks would not borrow at a higher rate from other banks if they could access cheaper funds from the Fed.
2. **Federal Funds Target Rate**: This is **the rate the Fed aims to achieve in the interbank market**. The actual rate may vary slightly, but the Fed uses OMO to keep it close to the **target** (i_{ff}).
3. **Interest Rate on Excess Reserves (IOER)**: The **rate the Fed pays on excess reserves held by banks**. This rate acts as a **floor** (i_{OR}), as banks would not lend at a lower rate than what they can earn risk-free by keeping reserves with the Fed.

The **supply curve** is **vertical** because the **Fed** is **monopolist** in market for Reserves.



Response to **Open Market Purchases**: When the Fed buys securities, it ↑ the **supply of reserves**, which typically ↓ **the federal funds rate**.

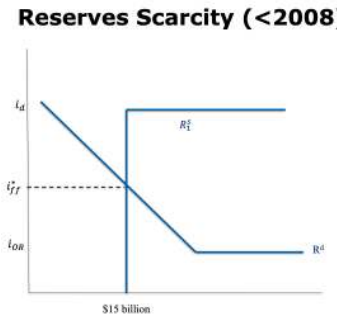


Response to **Open Market Sales**: Selling securities ↓ **supply of reserves**, which generally ↑ the **federal funds rate**.

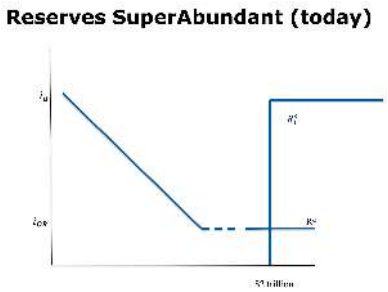
For these operations to impact the federal funds rate, **the supply curve must intersect the demand curve on its downward-sloping section**, where banks are responsive to changes in reserve levels.

Reserve Scarcity vs. Reserve Abundance

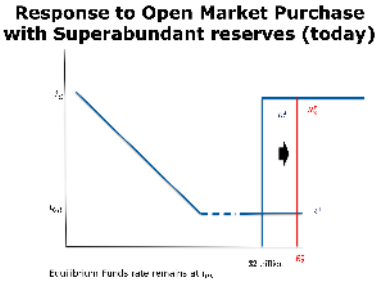
- **Reserve Scarcity (Pre-2008)**: Before 2008, reserves were relatively scarce, with around $15 billion in total reserves. In this setting, the equilibrium federal funds rate could be directly influenced by shifts in reserve supply, as seen in traditional open market operations.



- **Reserve Abundance (Post-2008)**: Since the financial crisis, the Fed has maintained superabundant reserves, totaling approximately $2 trillion or more. In this scenario, the supply of reserves is so high that the **federal funds rate remains at the IOER floor rate,** regardless of open market purchases or sales.



- **Response to Open Market Purchases Today**: With abundant reserves, additional purchases by the Fed **don't impact the federal funds rate**, as the supply curve is essentially vertical in the superabundant region, and the equilibrium rate remains at the IOER floor.



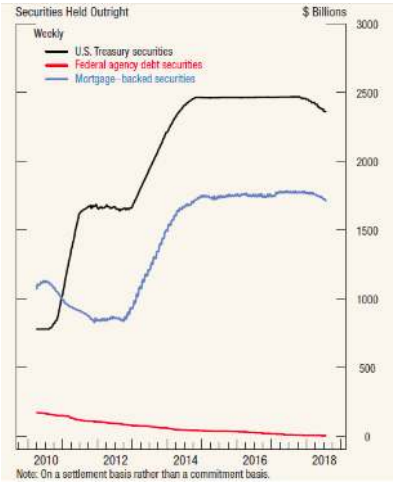
This distinction between reserve scarcity and abundance is crucial to understanding how the Fed's monetary policy tools operate differently in normal versus crisis conditions.

Monetary Policy Recently

Abundance of Reserves: Since 2008, the Federal Reserve has maintained a **high level of reserves in the banking system**, rendering **traditional OMO less effective**. As a result, the **federal funds rate** has remained **close to zero** since the crisis.

Quantitative Easing (QE): To support the economy, the Fed implemented several rounds of QE, purchasing large amounts of securities:

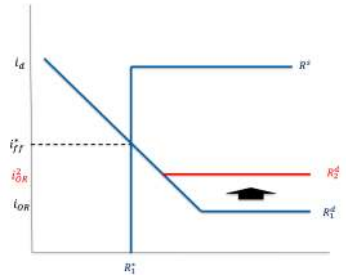
- **QE1 (Nov 2008)**: $1.25 trillion in Mortgage-Backed Securities (MBS).
- **QE2 (Nov 2010)**: $600 billion in Treasuries.
- **QE3 (Sept 2012)**: $40 billion in MBS each month until economic conditions improved.
- **Expanded QE3 (Jan 2013)**: Additional $45 billion in Treasuries per month.



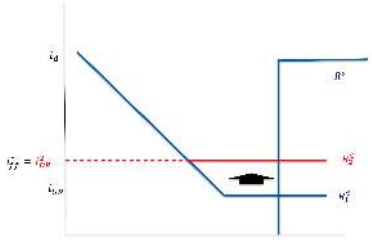
Monetary Policy Normalization: In recent years, the **Fed has started reducing its securities holdings by allowing them to mature without reinvesting in new securities (**they're not actively selling the securities). This gradual reduction is part of the normalization process following the crisis, but it will take a few years before both reserves and securities are back to pre-crisis level.

Despite high reserves, **the Fed has developed tools to ↑ the Fed Funds Rate** i_{ff}:

1. **Increase Interest on Excess Reserves (IOER)**:
   - In the **pre-crisis world**, ↑ i_{OR} would not significantly affect the i_{ff} because reserves were scarce.

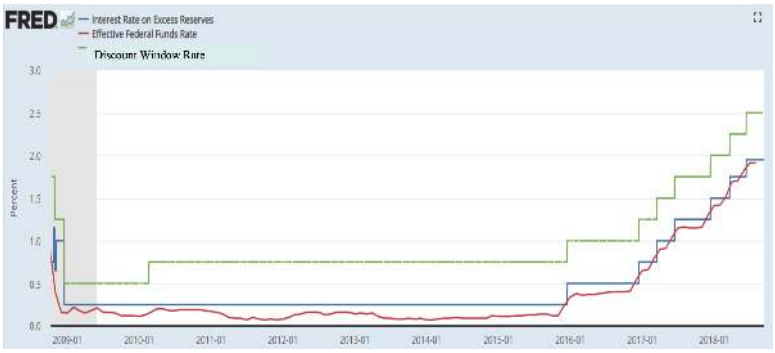


   - In the **post-crisis world**, with abundant reserves, raising IOER does influence the i_{ff}, as it sets a floor for the rate at which banks are willing to lend.

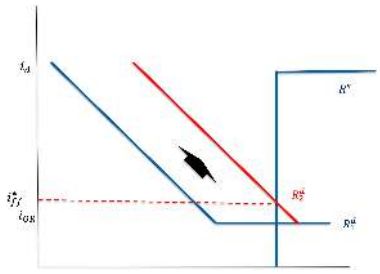


Fed Funds Rate: Discount, Effective and on Excess Reserves

Effective Fed Funds rate is lower than i_{OR} because **some non-banks** (Fannie Mae and Freddie Mac) who are not eligible to get 0.25% on excess reserves, **lend to banks who then park reserves and earn spread**.



2. **Increase Reserve Requirements**: By ↑ the percentage of deposits that banks must hold in reserve, the Fed can effectively reduce excess reserves, thus impacting the i_{ff}.



3. **Reverse Repos**: This technical tool allows the Fed to **temporarily remove reserves from the banking system** by **selling securities with an agreement to repurchase them**. It helps drain excess reserves and can support rate increases.

Other CBs - ECB and BoE

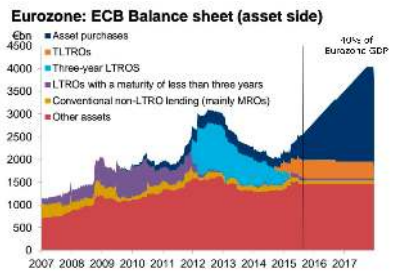
While we have focused on the Federal Reserve's operations, other CBs, like the **European Central Bank** (ECB) and the **Bank of England** (BoE), function similarly and use comparable tools to implement monetary policy.

The ECB employs several key tools to manage liquidity and control the money supply:

1. **OMO**:
   - The ECB's primary tool for monetary policy. This includes **main refinancing operations** (**MROs**), which are typically conducted as **repos** (**repurchase agreements**) through a bidding system involving credit institutions.
   - **Before 2008**, the **bidding process** for these operations was **competitive**, but it has since become **less competitive as part of broader monetary easing**.
2. **Lending to Banks and Liquidity Provision**: The ECB provides **liquidity** to banks through instruments such as **Targeted Long-Term Refinancing Operations** (**TLTROs**) and **Long-Term Refinancing Operations** (**LTROs**), which aim to support lending and stabilize the banking sector.
3. **Reserve Requirements**: The **ECB**, like the Fed, sets **reserve requirements**, which mandate that banks hold a certain proportion of their deposits with the central bank. This helps to control the amount of money circulating in the economy.

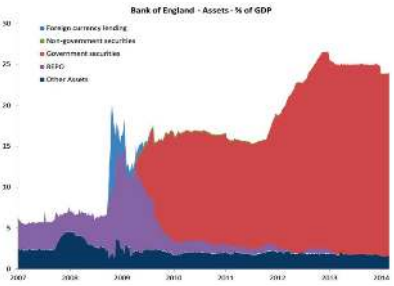
ECB and BoE Balance Sheets

The **ECB's** BS has expanded considerably, with assets reaching levels equivalent to 40% of Eurozone GDP. Key asset categories include:



- **Asset Purchases**: Includes government and private sector securities.
- **TLTROs and LTROs**: Long-term lending programs designed to boost bank lending.
- **Conventional Non-LTRO Lending**: Mostly MROs.

Similarly, the **Bank of England (BoE)** has a diverse asset portfolio, primarily composed of:



- **Government Securities**: A significant share of the BoE's assets, particularly after the financial crisis.
- **Repo Operations**: Used for short-term liquidity management.

Both the ECB and BoE have **adapted their BS** and **tools over the years** to **address changing economic conditions**, particularly in response to the 2008 financial crisis and subsequent economic challenges.

Mutual Funds

Mutual funds are financial intermediaries that **pool investors' resources** by selling them shares and using the proceeds to buy securities. Over the years, they have grown significantly in number and importance, both in the U.S. and worldwide.

- Mutual funds are now **comparable to large commercial banks** in terms Assets Under Management, **AUM**.
- By pooling resources, **they reduce transaction costs** and offer better diversification to small investors.
- The majority of mutual funds continuously **issue new shares** and allow **redemption of outstanding shares at market price**.

Advantages of Mutual Funds:

- **Diversification Benefits**: With limited funds (e.g., $1,000), it is challenging for individual investors to diversify across assets, sectors, or countries. Mutual funds pool resources, allowing investors to achieve diversification at lower costs.
- **Cost Efficiency**: Investing in larger denominations results in reduced transaction costs compared to individual investments.
- **Professional Management**: Investors benefit from the expertise of professional money managers.

The Growth of Mutual Funds

Principal benefits include:

1. **Liquidity Intermediation**: Investors can easily **convert investments into cash** while the fund continues to invest for the long term.
2. **Denomination Intermediation**: Enables investors to **participate in large equity and debt offerings** with limited capital.
3. **Diversification**: Allows **small investments** to benefit from diversified portfolios.
4. **Cost Advantages**: Negotiation of **lower transaction fees** compared to individual investors.
5. **Managerial Expertise**: Access to **professional money managers**.

Structure

Investment companies offer various types of mutual funds:

- **Open-End Funds**:
  - Investors can **buy or redeem shares at any time**, with the price determined by the Net Asset Value (**NAV**).
  - The fund size can grow indefinitely but **must maintain liquidity**.

- Represents 98% of mutual fund assets.

- **Closed-End Funds**:
  - **Fixed number of nonredeemable shares** sold via IPOs and traded in OTC/stock markets. After IPO, no other $ can be added or withdrawn.
  - Share prices are **determined by supply and demand forces**, often diverging from NAV.
  - Common for **less liquid securities** (e.g., municipal bonds, small firms).

Exercise

The total value of the mutual fund's stocks, bonds, cash, and other assets minus liabilities, divided by the number of outstanding shares.

Given:

- Stocks: $35,000,000
- Bonds: $15,000,000
- Cash: $3,000,000
- Total Value of Assets: $53,000,000
- Liabilities: $800,000
- Net Worth: $52,200,000
- Outstanding Shares: 15 million

Calculation:

$$\text{NAV} = \frac{\text{Net Worth}}{\text{Outstanding Shares}} = \frac{52{,}200{,}000}{15{,}000{,}000} = 3.48$$

Exercise 2

Consider a fund with 100 shares outstanding.

1. What is NAV? NAV Today: $12.5
2. What does NAV become tomorrow if today the fund buys one unit of Y, and the price of Y increases to $25?
   - Shares Outstanding Remain: 100
   - NAV Tomorrow: $13.55

The Organization

The **Shareholders,** or owners, of the mutual fund, are the **investors**. They rely on the fund's structure and management to oversee its operations effectively.

The **Board of Directors** is responsible for overseeing the fund's activities. This includes:

- **Approving contracts** with management companies and service providers.
- **Hiring key entities** such as the investment advisor and underwriter.
- **Ensuring** the fund operates in the **best interest** of the **shareholders**.

While the board theoretically has the power to fire and replace the fund manager, this can have significant implications. For example, if the BoD of a prominent fund like the ***Fidelity Magellan Fund*** decides to dismiss Fidelity, the fund might lose its brand identity and reputation, potentially leading to investor distrust and outflows.

Key Roles in the Mutual Fund Structure:

1. **Investment Advisor**:
   - Manages the **fund's portfolio in alignment with the fund's objectives** and policies outlined in the prospectus.
   - Makes decisions on **asset allocation**, **stock selection**, and **risk management**.
2. **Principal Underwriter**:
   - **Sells the fund's shares** either directly to the public or indirectly through broker-dealers.
   - Facilitates the **distribution** of **shares** to investors.
3. **Administrator**:
   - Ensures the fund **complies** with **federal regulations**.
   - Oversees services provided by external companies to **ensure smooth operations**.
4. **Transfer Agent**:
   - **Manages shareholder transactions**, such as **purchases** and **redemptions**.
   - Maintains transaction records, account activity, and **sends statements to shareholders**.
5. **Custodian**:
   - **Holds the fund's assets securely**, maintaining them **separately from the fund's management**.
   - Reconciles the fund's holdings to ensure they **align with shareholder interests**.
6. **Independent Public Accountant**:
   - Audits and certifies the fund's financial statements.
   - Provides an independent assessment of the fund's financial health.

Investment Objective Classes

Stock (Equity) Funds

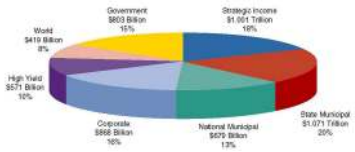
Invest primarily in **common equity**. **Objectives** vary significantly, with different fund types:

- **Capital Appreciation Funds**: Aim for **rapid share price increases**, **less focus on dividends**.
- **Total Return Funds**: Balance **current income** with **capital appreciation**.
- **World Equity Funds**: Invest predominantly in **foreign firms**.
- **Others**: Target specific industries or themes like **Value**, **Growth**, or a particular **sector**.

Bond Funds

Invest in **fixed-income securities** to provide **regular income**. Types include:

- **Strategic Income Funds**: Focus on **U. corporate bonds**, offering high yields.
- **Government Bond Funds**: Invest in **U. Treasury** and local/state bonds for stability.
- **World Bond Funds**: Include bonds issued internationally.



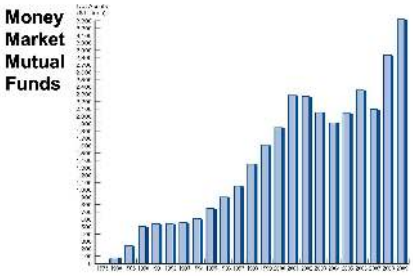
Hybrid Funds

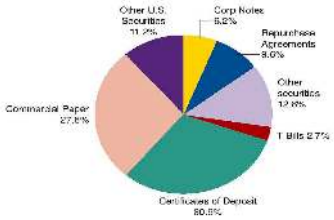
Combine **equities and fixed-income investments** into **one fund**. Account for **about 5% of total mutual fund accounts**, offering diversification across asset classes.

Money Market Funds

Invest exclusively in **money market securities** for **liquidity** and **security**. Features:

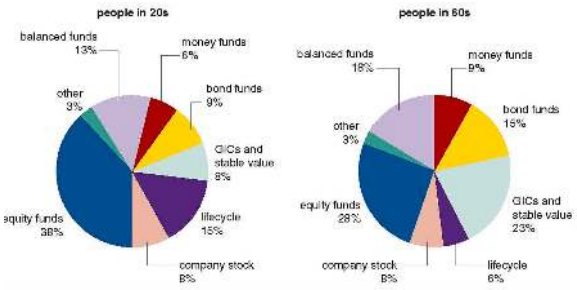
- **Open-end funds** with **check-writing privileges**.
- Dramatically **grown in net assets over recent decades**.
- Provide **higher returns than savings accounts** but **lack federal insurance**.





Assets and Ownership of Mutual Funds

- Mutual fund ownership varies significantly by demographic and age group. For instance, individuals in their 20s often invest more in equity funds, while those in their 60s lean towards balanced or bond funds. A **diversified allocation** is common across 401(k) plans.



Index Funds

A special category of mutual funds that **track a specific stock index** (e.g., S&P 500). It holds **all equities in the respective index**. Advantages:

- **Passive management** eliminates the need for active fund managers.
- Offers the benefits of traditional mutual funds with significantly **lower fees**.
- Ideal for **investors seeking to mirror market performance**.

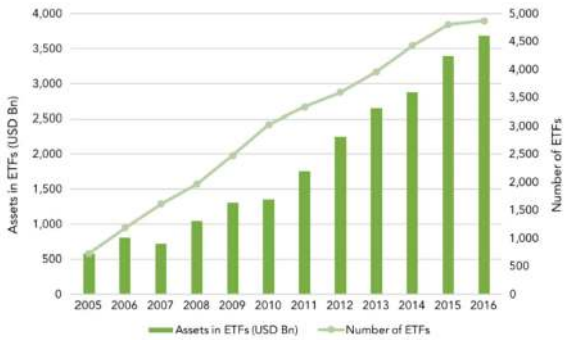
ETFs

ETFs, a **growing subset of mutual funds**, are designed to meet the investor's need for **flexibility**, **low fees**, and **liquidity**. ETFs primarily aim to **passively replicate market indices** (e.g., the S&P 500). Since their inception, they have redefined how investors access markets and manage portfolios.

The **First ETF** was the SPDR (State Street Global Advisors, 1993), tracking the S&P 500. It remains the largest ETF with $277 billion in assets as of April 2019. ETFs have gained massive traction in the past two decades due to their versatility, attracting billions of dollars in inflows.

ETF Overview

Type of ETF	*Number of distinct benchmarks*	*Assets under management in 2015 ($ millions)*
Equity		
Global equity	92	35,750
US large cap/Total cap	130	383,987
US mid cap	46	59,715
US small cap	56	61,751
US sector	204	158,923
US dividend preferred	23	68,358
US alpha strategy	14	2,109
Developed Europe	36	18,000
Developed Asia Pacific	28	32,202
Emerging/Frontier	158	155,249
International/Other	115	105,418
Fixed income		
Broad market	16	63,687
Emerging markets	11	13,417
High yield	16	32,835
Investment grade	32	60,037
Securitized	4	7,029
Municipals	29	13,690
Sovereign	17	4,867
US Government	55	58,595
Commodities	126	91,865
Currency	22	4,488
Alternatives/Asset allocation	87	8,311



Why ETFs?

They bridge the gap between Open-End and Closed-End Funds:

- **Open-End Mutual Funds**:
  - **Advantages**: Flexible in size; portfolios grow/shrink with investor inflows and outflows.
  - **Disadvantages**: Portfolio rebalancing incurs high trading costs, which are passed on to investors.
- **Closed-End Mutual Funds**:
  - **Advantages**: Shares trade on secondary markets, avoiding the need for resource-intensive liquidation/rebalancing.
  - **Disadvantages**: Fixed size results in low liquidity and reduced flexibility.

Advantages

LIQUIDITY

ETFs are traded like stocks on **secondary markets**, ensuring **continuous pricing** throughout the trading day. Superior liquidity compared to mutual funds due to:

1. **Benchmark Tracking**: ETFs replicate indices like the S&P 500, with **real-time valuation** and **minimal information asymmetry**.
2. **Creation & Redemption Mechanism**: Facilitates easy share exchange with underlying assets. Combines with **arbitrage opportunities** to eliminate **discounts/premiums over NAV,** setting **ETFs apart from closed-end fund shares**.

LOW FEES

ETFs are **passively managed**, leading to substantially lower fees than actively managed mutual funds. Tracking a benchmark is straightforward.

The **performance of ETFs** often **match** actively **managed funds before fees** and **outperform them after accounting for fees**. This is because markets are efficient.

Additionally, the creation & redemption mechanism keeps transaction costs for ETF rebalancing low, further contributing to ETFs' low fee structure.

ETFs: Creation and Redemption Mechanism

AUTHORIZED PARTICIPANTS (APS)

Every ETF designates several **APs**: **stock dealers** who already (and keep inventory of) the assets in the relevant index on their own account. They also often hold at their own risk some inventory of the shares of the ETF, creating further **market liquidity** and **smooth trading operations**.

They hold **exclusive rights** to directly interact with the ETF through specialized transactions. APs can engage in ***in-kind*** **transactions** with the ETF: they can deliver a bundle of shares of the relevant

proportions (as in the index) to the ETF and receive ETF shares in turn (or viceversa). As we'll see this enables them to exploit **arbitrage opportunities**.

ARBITRAGE, AND ETF CREATION AND REDEMPTION

At any time, some investors buy ETF shares, others sell. Balance between the 2 is found at a **market clearing price**. E.g. if the fundamental value of the benchmark which the ETF tracks is at $100, but there is **strong demand,** the market clearing price could rise to $102, above fundamental value.

Then, **force of arbitrage will induce APs to do the right thing**. They can take a bundle of shares of the relevant proportions for the ETF, valued at $100, and exchange it in an in-kind transaction with the ETF for newly created ETF shares. Then, they sell those ETF shares, pocketing the price difference. Other APs will do the same, eventually misplacing will go away. **ETF has grown and its price has returned to fundamental**.

ETFs: Efficiency

Open-end mutual funds make **all fund holders pay proportionally** for accumulated transaction cost from daily trading and rebalancing. In contrast, in **ETFs** the transaction cost are **externalized**: fund doesn't pay ant transaction cost, **buyers/sellers pay it when trading ETF shares**.

APs are dealers and therefore already have the lowest transaction cost of all market participants. They have **strong incentives to minimize costs**, particularly **to capitalize on arbitrage opportunities**.

This structure makes ETFs significantly more efficient compared to (passive) mutual funds.

ETFs: Problematic Aspects

Past decades has seen **explosion of number of indexes**, and **ETFs tracking them**. Some indexes were **artificially engineered** to demonstrate favorable historical performance, misleading investors to believe in unrealistic future trends.

ETF-managing financial entities (e.g. BlackRock, Vanguard) have become dominant shareholders in competing firms. There is also (now quite controversial) academic work which link common ownership of competing firms in the US economy (because of diversified ETF investment) to weakened product price competition, at the detriment of consumers.

Fee Structure of Investment Funds

Investment funds, such as mutual funds, impose various **fees** that directly affect an investor's returns.

1. **Load Funds**:
   - **Class A Shares**:
     - Require an **upfront fee** (sales load) at the time of purchase.
     - This fee **reduces the amount actually invested in the fund**, as a portion of the initial investment is deducted.
   - **Class B Shares**:

  - Apply a **deferred load**, meaning **fees are charged when shares are redeemed** (sold).
  - The **deferred load often decreases over time** and **may disappear entirely** after a specific holding period.
- **Class C Shares**:
  - Known as ***no-load funds***, as **they do not charge upfront or back-end fees**.
  - However, these funds may impose other **operational or management fees**.

2. **Additional Fees**:
   - **Contingent Deferred Sales Charge (CDSC)**: A back-end fee applied upon redemption of shares, which may reduce or disappear entirely after a set period.
   - **Redemption Fee**: Another type of back-end charge applied when shares are sold, often used to discourage short-term trading.
   - **Exchange Fee**: A small fee for transferring funds between different mutual funds within the same family or provider.
   - **Account Maintenance Fee**: A recurring charge imposed when an account balance falls below a required minimum.
   - **12b-1 Fee**: Covers costs for marketing, advertising, and broker commissions associated with the fund. These fees are deducted annually and can impact the fund's overall returns.

Investment Banks (IBs)

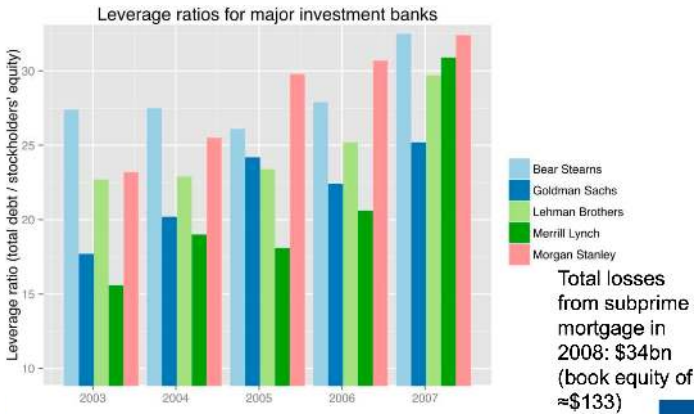
IBs play a vital role in financial markets, offering services that range from **underwriting securities** to **facilitating M&A**. These institutions are essential for the **smooth operation** of securities markets, acting as **intermediaries** between **investors** and **companies** in need of capital.

IB as a distinct industry in the US was shaped by the ***Glass-Steagall Act*** (1933), which **separated commercial and IB activities**. Before this, large money-center commercial banks engaged in both commercial and IB. In recent decades, the **legal separation** between commercial and IBs has been **removed**, leading to the rise of **universal banks** that operate in both sectors. Commercial banks can expand into IB by adding services such as underwriting and advising, as seen with Deutsche Bank in the 1990s.

Major European banks combine commercial and IB functions, including:

- Germany: DB, Commerzbank
- Switzerland: UBS, Credit Suisse
- France: BNP Paribas, Société Générale, Natixis, Crédit Agricole
- Spain: Santander, BBVA
- Italy: UniCredit, Intesa Sanpaolo
- UK: Barclays, HSBC, Lloyds, RBS
- Netherlands: ABN AMRO, ING, Rabobank

IBs operate in a **high-risk environment** due to the volatile nature of financial markets and their complex roles. Their exposure to underwriting, market fluctuations, and credit risks underscores the importance of robust risk management practices.



These are the **largest US underwriters**: JP Morgan, Barclays Capital, BofA, Citi, DB, Goldman Sachs, Morgan Stanley, Credit Suisse, HSBC, RBS

Conflicts of interest arise when institutions face competing objectives, potentially sacrificing one to benefit the other. **For IBs,** their dual responsibility to **provide accurate information to the public** while also **promoting the interests of their underwriting clients** can lead to biased actions.

E.g.lissuing overly optimistic reports that result in subsequent investor disappointment. Similar issues exist with **credit rating agencies** and **auditors**, who may favor their paying clients over objectivity. Occasionally, IBs may offer underpriced equity to company executives in exchange for promises of future business. The **reputation** of IBs is critical to maintaining trust and securing future deals. Instances of bias or unethical behavior can have long-term negative impacts on credibility and business prospects.

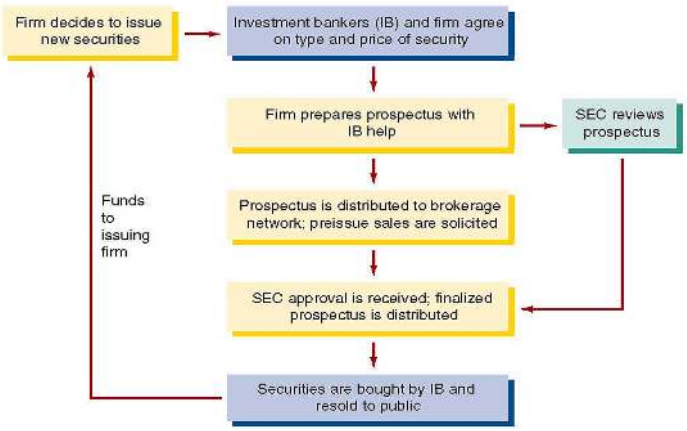
The core functions of IBs:

1. **UNDERWRITING SECURITIES**: IBs **underwrite** the **initial sale** **(IPOs) of stocks and bonds**, helping companies raise capital. They assume the **risk of buying** securities from issuers **and selling** them to the public, ensuring **liquidity** in the market.
2. **ADVISORY ROLES IN M&A**: They act as **dealmakers** in mergers, acquisitions, and spin-offs. They are **middlemen** in the purchase and sale of companies, leveraging their expertise to structure and negotiate deals. They provide **comprehensive assistance** to both **acquiring firms** and **potential target companies** (though NEVER both in the same deal). The role of the IB is:
   - **Advise on deal specifics**, including structure, valuation, and terms.
   - **Arrange financing** to ensure the acquiring firm has adequate resources.
   - **Navigate legal and regulatory issues** to facilitate the transaction.
   - In cases of **hostile takeovers**, where the target firm resists the acquisition, IB support the acquiring firm by strategizing and executing the deal.
3. **EQUITY SALES**: when a firm decides to **sell an entire division** or **even the entire company**, it often enlists the support of an IB to facilitate the process.
   - **Valuation**: The IB assists in determining the **value** of the division or company.
   - **Buyer Identification**: **Potential buyers** are identified and approached.
   - **Confidential Memorandum**: Confidential **financial statements** are **prepared** specifically for prospective buyers.
   - **Letter of Intent**: The banker helps draft a letter of intent to **formalize buyer interest** and **outline key terms**.
   - **Due Diligence & Agreement**: Support is provided to ensure **due diligence is completed**, and the process concludes with a definitive agreement.
4. **WEALTH MANAGEMENT**: they act as **private brokers** for high-net-worth individuals, offering tailored investment strategies.

Underwriting Stocks and Bonds

Underwriting involves assisting a firm in **selling its new securities to the market**. Here are the steps in doing this.

- **Decision to Issue New Securities**: A firm decides to raise capital by issuing new securities (e.g., stocks or bonds). The IB collaborates with the firm to determine the type, volume, and pricing of the securities.
- **Market Analysis and Strategic Advice**:
  - **Market Conditions**: The IB explains current market trends and conditions to guide the firm in selecting the appropriate type of security (equity, debt, etc.).
  - **Issuance Strategy**: They assist in planning the timing of the offering, determining the number of securities to issue, and establishing an optimal price. This is especially critical for Initial Public Offerings (IPOs), where uncertainty is higher compared to Seasoned Equity Offerings (SEOs).
- **Preparation of the Prospectus**:
  - The issuing firm, with IB assistance, prepares a **prospectus**, which provides detailed information about the company, its financial health, and the securities being issued.
  - For debt securities, additional steps include obtaining **credit ratings** (to ensure credibility) and engaging bond counsel for legal compliance.
  - For equity securities, the IB may also handle arrangements for listing the securities on stock exchanges.
- **Regulatory Approval**: **SEC Registration**: The IB submits the prospectus and other necessary filings to the SEC for review and approval, ensuring the offering complies with legal and disclosure requirements. This is mandatory for issues exceeding €1.5 million and maturities over 270 days.
- **Pre-Issue Marketing and Solicitation**: Once the prospectus is prepared, it is distributed to brokerage networks, and **pre-issue sales are solicited to gauge investor interest**. The IB may also announce the offering through **advertisements** like tombstones (e.g., in the Wall Street Journal).
- **Final SEC Approval and Distribution**: After the SEC approves the filing, the **finalized prospectus is distributed to investors**. This document ensures **transparency** and facilitates informed investment decisions.



- **Issuance and Selling Methods**:

- **FIRM COMMITMENT**: The IB purchases the entire offering from the issuing firm at a fixed price, reselling it to the public. This transfers the risk of unsold shares to the IB. Subscription Scenarios:
  - **Fully Subscribed**: All securities are sold as planned.
  - **Undersubscribed**: Not all securities find buyers, creating a shortfall.
  - **Oversubscribed**: Demand exceeds supply, leading to rationing (allocation based on demand).

  The IB needs to work very hard. It wants the selling price to get as high as possible.

  Exercise:

  An investment banker agrees to a firm commitment offering of 1 million shares of ABC stock. The banker purchases the shares from ABC at €49.5 per share.

  1. **Scenario 1**: Shares sold at €40.0, and only 900,000 shares are sold. Proceeds to ABC: ABC is guaranteed the agreed amount, regardless of market sales:

     $$49.5 \times 1{,}000{,}000 = 49{,}500{,}000\,€$$

  2. IB's Gain/Loss: The bank incurs a loss because it only sells 900,000 shares at €40.0:

     $$(40 \times 1{,}000{,}000) - (49.5 \times 900{,}000) = 36{,}000{,}000 - 49{,}500{,}000 = -13{,}500{,}000\,€$$

  Scenario 2: Shares sold at €55.0, and the entire issuance is sold.

  1. Proceeds to ABC: Remains unchanged:

     $$49.5 \times 1{,}000{,}000 = 49{,}500{,}000\,€.$$

  2. IB's Gain/Loss: The bank earns a profit by selling all shares at €55.0:

     $$(55 \times 1{,}000{,}000) - (49.5 \times 1{,}000{,}000) = 55{,}000{,}000 - 49{,}500{,}000 = 5{,}500{,}000\,€.$$

  This example illustrates how firm commitment underwriting transfers market risk to the investment bank, potentially leading to gains or losses depending on market performance.

- **BEST EFFORTS**: the underwriter does not purchase the securities directly from the issuer. Instead, the underwriter agrees to make their **best effort to sell the securities on behalf of the issuer**. Unlike a firm commitment, the underwriter bears no price risk and **earns a commission based on the shares sold**. This arrangement involves less due diligence by the underwriter and is typically used for seasoned offerings by established firms.

  Exercise:

  An investment bank agrees to place 10m shares for a commission of $0.5 per share. The initial offer price is $30 per share. Assume that next day the price per share is $33.

  1. What are the investment bank's and firm's revenues if the issuance is fully subscribed at the offer price?
  2. What is the IPO's underpricing?

3. What is the total stock market cap of the firm after the price increase?

1. **Revenues**:

   - Investment Bank's Revenue (Commission): The underwriter earns a \$0.50 commission per share sold:

     $$\text{Revenue (Commission)} = 10{,}000{,}000 \times 0.50 = 5{,}000{,}000 \text{ USD}$$

   - Firm's Revenue: The firm receives the full offer price for all shares sold:

     $$\text{Firm's Revenue} = 10{,}000{,}000 \times 29.5 = 295{,}000{,}000 \text{ USD.}$$

2. **IPO's Underpricing**: Underpricing is the percentage difference between the next day's market price and the offer price:

   $$\text{Underpricing} = \frac{\text{Market Price} - \text{Offer Price}}{\text{Offer Price}} \times 100$$

   Substituting the values:

   $$\text{Underpricing} = \frac{33 - 30}{30} \times 100 = \frac{3}{30} \times 100 = 10\,\%$$

   This is something that usually occurs.

3. **Total Stock Market Capitalization**: The total stock market capitalization is based on the market price after the IPO:

   $$\text{Market Cap} = \text{Shares Outstanding} \times \text{Market Price}$$

   Substituting the values:

   $$\text{Market Cap} = 10{,}000{,}000 \times 33 = 330{,}000{,}000 \text{ USD.}$$

- **PRIVATE PLACEMENTS**: The entire offering is sold to a small, select group of investors. This is rare for equity issuances but more common for debt.

- **Resale to the Public and Fund Transfer**: Securities are sold to the public through the IB's brokerage network. The issuing firm receives the funds raised from the issuance.

Risk Management

Managing financial institutions has always been challenging, but increasing economic uncertainty has made this task even harder. Risk Management is crucial to navigating this complexity, focusing on controlling, not eliminating, risks to ensure profitability and stability.

Key Risks in Financial Institutions:

- **Credit Risk**: The risk that borrowers fail to repay loans as agreed.
- **Liquidity Risk**: The risk of insufficient cash to meet obligations.
- **Duration Risk**: The risk associated with mismatched asset and liability durations.
- **Sovereign Risk**: The risk of government default on debt obligations.
- **Exchange Rate Risk**: The risk of currency value fluctuations impacting financial positions.

Credit Risk

Credit risk arises when **borrowers fail to repay loans according to terms**, either by **defaulting** or **delaying payments**. Financial managers use several strategies to mitigate this risk while maintaining profitable loan portfolios. The framework they use:

- **Adverse Selection**: Borrowers with higher credit risks are more likely to seek loans. The solution is screening before issuing loans (ex-ante) to assess risk.
- **Moral Hazard**: Borrowers may engage in risky behavior after receiving a loan. The solution is monitoring borrowers' behavior after issuing loans (ex-post).

Key tools for managing credit risk:

- **Screening**: Specialization in certain industries or sectors can enhance knowledge, improving borrower risk assessment. The challenge is the **risk of reduced diversification**.
- **Long-Term Relationships**: Building relationships with borrowers provides valuable information, aiding in risk evaluation and reducing uncertainty over time.
- **Collateral**: Requiring assets as security for loans aligns borrowers' incentives, reducing the likelihood of default. It's effective against both adverse selection and moral hazard.
- **Credit Rationing**: Limiting the amount lent to borrowers minimizes exposure to potential losses. Also effective in managing moral hazard by reducing borrowers' capacity for risky behavior. It occurs **when banks limit or deny loans**, even if borrowers are willing to pay higher i. The reasoning lies in adverse selection:
  - Borrowers who agree to **higher** i often have **riskier projects**, making default more likely.
  - Instead of compensating for this risk by increasing i further, banks find it **safer to avoid lending altogether** to such borrowers.

EX: Adverse Selection and Credit Risk: The Bank's Dilemma

In this scenario, the bank faces two types of entrepreneurs:

- **Safe Entrepreneur**: Gains a return of 1 in case of success.
- **Risky Entrepreneur**: Gains a return of 3 but with a very small probability of success.

The population is split $50:50$ between safe and risky entrepreneurs, and the investment required (loan amount) is $I=1$.

Loan Pricing and Adverse Selection:

To attract the safe entrepreneur, the bank can charge a maximum rate R such that:

$$1 \geq R \cdot 0.5 \implies R = 2$$

At this rate, the safe entrepreneur can repay the loan, and the bank earns its return.

However, at $R=2$, the risky entrepreneur is also willing to take the loan because:

$$0.001 \cdot (3 - 2 \cdot 0.5) > 0$$

The expected return for the risky entrepreneur is still positive, even with their small probability of success.

Outcome for the Bank:

- When the bank lends to both types:
  - Safe entrepreneur repays successfully.
  - Risky entrepreneur defaults in most cases (50% default rate in this scenario).
- The **bank's expected return**:
  - For half the loans (safe entrepreneurs), it recovers 2.
  - For the other half (risky entrepreneurs), it recovers only 0.5 on average.
- Combined, the bank's total return is insufficient to cover what it lent out. The loans become unprofitable, and the bank prefers not to lend to anyone to avoid losses.

Interest Rate Risk

Banks and financial institutions operate by **earning a higher return on their assets** (e.g. loans) **than the interest paid on their liabilities** (e.g. deposits). However, as i volatility has increased significantly over the past two decades, managing interest rate risk has become a critical challenge.

To effectively measure and mitigate interest rate risk exposure, financial institutions use specific tools to analyze their balance sheets. Two key methods are:

- **Income Gap Analysis**: Focuses on how Δi impact current income by **comparing rate-sensitive assets and liabilities**.
- **Duration Gap Analysis**: Examines the sensitivity of a financial institution's equity value to Δi, based on the duration of its assets and liabilities.

INCOME GAP ANALYSIS

It measures the **sensitivity of a bank's current net income to changes in interest rates**. It identifies:

- **Rate-sensitive assets (RSA)**: Assets whose interest returns adjust with changes in market rates.
- **Rate-sensitive liabilities (RSL)**: Liabilities whose interest costs adjust with changes in market rates.
- **Non-rate-sensitive items**: Assets and liabilities unaffected by market rate changes.

A bank's income is determined as:

Income = Interest rate revenues - Interest rate expenses. Here is a simple example with two assets and two liabilities:

$$(i + p_1) \cdot A_1 + (i + p_2) \cdot A_2 - iL_1 - iL_2$$

Income Gap: difference between rate sensitive assets and rate sensitive liabilities

$$INC_{GAP} = RSA - RSL$$

For banks INC_{GAP} is **typically negative**, because **bank assets are long term and illiquid** (hence, their return does not change with changed in market returns). INC_{GAP} can be:

- $INC_{GAP} < 0$: if $i\uparrow$, the bank incurs losses as liabilities reprice faster than assets.
- $INC_{GAP} > 0$: if $i\uparrow$, the bank benefits as assets rises more that the cost of liabilities.

Suppose that interest rates change by Δi. Then the change in bank income is:

$$\Delta income = INC_{GAP} \cdot \Delta i$$

Exercise:
what is this bank's income gap?

Assets		Liabilities	
Rate-sensitive assets	€50	Rate-sensitive liabilities	€80
Rate-insensitive assets	€50	Rate-insensitive liabilities	€10
		Bank capital	€10
Total	€100	Total	€100

$$INC_{GAP} = 50 - 80 = -30$$

Exercise:

What happens to the previous bank if interest rates rise by 1%?

$$\Delta income = INC_{GAP} \cdot \Delta i = -30(-0.01) = 0.3$$

$$\Delta income = INC_{GAP} \cdot \Delta i = -30(0.01) = -0.3$$

Exercise:

What happens to this bank's income if interest rates increase by 80 basis points?

Assets		Liabilities	
Rate-sensitive assets	€80	Rate-sensitive liabilities	€60
Rate-insensitive assets	€40	Rate-insensitive liabilities	€50
		Bank capital	€10
Total	€120	Total	€120

$$INC_{GAP} = 80 - 60 = 20$$

$$\Delta income = INC_{GAP} \cdot \Delta i = 20(0.008) = 0.16$$

Income Gap Analysis: determining rate sensitive items for First National Bank.

Assets:

- **assets with maturity less than one year** (i.r. sensitive)
- **variable-rate mortgages** (i.r. sensitive)
- **short-term commercial loans** (i.r. sensitive)
- **fixed-rate mortgages**

Liabilities:

- **money market deposits** (i.r. sensitive)
- **variable-rate CDs** (i.r. sensitive)
- **short-term CDs** (i.r. sensitive)
- **federal funds** (i.r. sensitive)
- **short-term borrowings** (i.r. sensitive)

DURATION GAP ANALYSIS

Duration Gap Analysis measures **how sensitive a bank's NET WORTH is to interest rate changes**, focusing on the impact on the market value of assets and liabilities.

It uses the concept of **duration**, which relates the **change in interest rates to the change in price/ value of assets and liabilities**.

Duration of an asset and **price change**:

$$\% \Delta P = -DUR \frac{\Delta i}{1+i}$$

This is applicable for individual assets or portfolio.

Duration of a portfolio: value-weighted average of the durations of individual assets or liabilities.

Duration GAP:

$$DUR_{GAP} = DUR_A - \frac{L}{A} DUR_L$$

DUR_A: duration of assets portfolio A: total value of assets

DUR_L: duration of liabilities portfolio L: total value of liabilities

Duration Gap and Net Worth:

$$NW + L = A$$

Implies

$$\frac{NW}{A} DUR_{NW} + \frac{L}{A} DUR_L = DUR_A$$

Implies

$$DUR_{NW} = \frac{A}{NW}(DUR_A - \frac{L}{A} DUR_L) = \frac{A}{NW} DUR_{GAP}$$

Hence, when interest rates change the change in bank net worth is:

$$\%NW = -\frac{A}{NW} DUR_{GAP} \frac{\Delta i}{1+i}$$

DUR_{GAP} can be:

- $DUR_{GAP} > 0$: if $i \uparrow, NW \downarrow$
- $DUR_{GAP} < 0$: if $i \uparrow, NW \uparrow$

Exercise:

What is duration gap?

Assets		Liabilities	
Rate-sensitive assets (Duration of 0.5 years)	€50	Rate-sensitive liabilities (Duration of 0.3 years)	€80
Rate-insensitive assets (Duration of 5 years)	€50	Rate-insensitive liabilities (Duration of 5 years)	€10
		Bank capital	€10
Total	€100	Total	€100

Duration of A and L:

$$DUR_A = 0.5 \cdot \frac{50}{100} + 5 \cdot \frac{50}{100} = 2.75$$

$$DUR_L = 0.3 \cdot \frac{80}{90} + 5 \cdot \frac{10}{90} = 0.82$$

Duration Gap:

$$DUR_{GAP} = DUR_A - \frac{L}{A} DUR_L = 2.75 - \frac{90}{100} \cdot 0.82 = 2.012$$

Exercise:

Interest rates go up from 10% to 11%. What happens this bank's net worth?

$$\frac{\Delta NW}{A} = - DUR_{GAP} \cdot \frac{\Delta i}{1+i} = - 2.012 \cdot \frac{0.01}{1+0.1} \approx - 1.83\,\%$$

Given that initially total assets are equal to 100, the drop in assets values is 1.82. this is about 20% of bank net worth (which was 10).

Financial Regulation

Banking regulation fundamentally revolves around **risk reduction**. While private risk management mechanisms can be effective, they are only reliable under the assumption that individuals act rationally. However, when this assumption does not hold, significant problems can arise, including:

- **Irrational Behavior**: Individuals may make decisions based on fear, misinformation, or short-term thinking, leading to suboptimal outcomes, such as bank runs or mismanagement of resources.
- **Lack of Coordination**: In decentralized systems, individuals or institutions often act in their own perceived best interest without considering the collective impact. This lack of coordination can lead to **systemic issues**, or even **tragedies of the commons**, where self-interested behavior undermines the stability of the financial system.

Banking regulation addresses these challenges by ensuring that individual actions do not destabilize the broader financial system. By fostering coordination and mitigating the impact of irrational decisions, regulation plays a crucial role in **maintaining stability and confidence in the banking sector**.

Deposit Insurance

Prior to the creation of deposit insurance, bank failures were common. **Depositors were highly cautious** about the safety of their funds and actively assessed bank risks. Depositors couldn't distinguish between **good banks and bad banks** due to asymmetric information. This led to:

1. **BANK RUNS**: firstly **depositors rushed to withdraw their funds** due to fears that the **bank might become insolvent**. This can happen even if the bank is fundamentally sound. The causes can be:
   - **Reckless risk-taking** by the bank.
   - **External shocks** affecting the bank's financial stability.

   For instance, if a bank suffers a negative shock and some of its investments fail, its assets may lose value. This can alarm depositors, prompting large-scale withdrawals. When reserves are insufficient to meet these withdrawals, the bank fails.
2. Then: **BANK PANICS**: when **fear spreads across the financial system**, impacting multiple banks (**contagion effect**). For **example** Bank of America has lent money to JP Morgan. News of JP Morgan's struggles can lead to doubts about Bank of America's stability, even if it hasn't been directly affected. This interconnection creates a risk of simultaneous runs on both banks, escalating the financial crisis.

To prevent bank these problems, in 1930 **Federal Deposit Insurance Corporation (FDIC)** was introduced: **Depositors no longer fled the banking system** at the first sign of trouble. **Bank failures dropped significantly**, with fewer than 15 failures per year between 1934 and 1981. In Italy, deposits are insured up to €100,000. In return, **banks pay an insurance premium** to the government.

Before the 1960s, only six countries had implemented deposit insurance. Then, the number of countries with deposit insurance programs surged to over 70. Deposit insurance has often been implemented in countries with weak governance, leading to potential unintended consequences.

Exercise 1

Suppose you have deposited $200 in Bank A, which has a 50% risk of failing. How much of your deposit do you withdraw under different deposit insurance scenarios?

No Deposit Insurance:

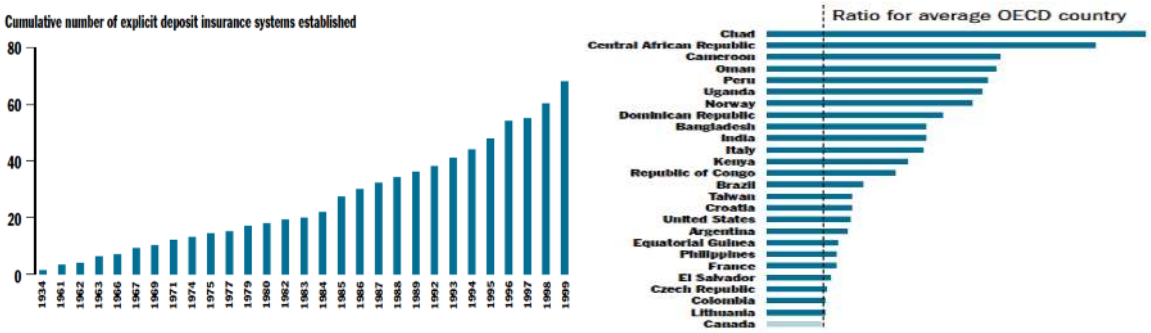
- Without insurance, you face the full risk of losing your deposit.
- You would withdraw $200, as there is no safety net to guarantee your funds.

Deposit Insurance Up to $100:

- With insurance covering only $100, you would still risk losing $100 if the bank fails.
- To minimize losses, you would withdraw $100 and leave the insured portion in the bank.

Deposit Insurance Up to $200:

- With full coverage of $200, there is no risk of losing your deposit.
- You would withdraw $0, as your entire deposit is insured.



While deposit insurance provides security for depositors, it can create a **moral hazard** problem:

- **Reduced Incentives for Risk Management**: With deposits insured, bank managers may take excessive risks, knowing depositors are protected.
- **Impact on Stability**: Instead of stabilizing the banking sector, deposit insurance can sometimes encourage reckless behavior, making the sector less stable. Empirically, it has seen that explicit government deposit insurance is linked to greater instability and higher rates of banking crises, particularly in emerging markets with weak governance.

Another significant issue in the financial system is the **Too Big to Fail** doctrine, which arises when regulators and politicians avoid letting large banks collapse due to systemic risks. Knowing they are unlikely to fail, **large banks have reduced incentives to act prudently**. Similarly, **large depositors are less motivated to monitor the bank's activities**. M&A have led to the rise of many large banks, worsening the too-big-to-fail problem. These banks often engage in activities beyond traditional banking, such as underwriting, which may inadvertently extend FDIC protections to non-banking activities.

To address the moral hazard created by deposit insurance, governments implement various regulations to mitigate risky behavior by banks. **Regulations** aim to **ensure that banks** maintain **prudent practices** despite the presence of deposit insurance. They act as a **counterbalance to the risk-taking** incentivized by safety nets like deposit insurance. Despite these measures, the 2007–2009 financial crisis demonstrated that existing regulations were insufficient to prevent systemic risks. This raises the question: Is more regulation needed?

The **lender of last resort** refers to a CB (e.g. Fed or ECB) that provides **emergency funding** to financial institutions facing **short term liquidity problems but** that are otherwise **solvent**. To ensure the CB is not taking excessive risk, the borrowing institution must provide **collateral** (securities or other assets) for the loan. The CB typically lends only to solvent institutions (those with good long term prospects) to avoid propping up fundamentally failing banks. **Lending rates** may be **higher than market rates** to discourage institutions from relying on LOLR funds unless absolutely necessary.

Game Theory Example: Bank Liquidity and Runs

Scenario: A bank has a liquidity level of 10 today and 18 tomorrow. However, a shock occurs, triggering a potential bank run.

This situation can be analyzed under two conditions:

1. **Plenty of Liquidity**: When liquidity is abundant, all outcomes result in equal payoffs for both parties, regardless of their actions:

		B	
		Withdraw	**Not Withdraw**
A	**Withdraw**	10,10	10,10
	Not Withdraw	10,10	10,10

   No matter what Player A and Player B decide, the outcome is always balanced. This reflects a stable banking environment.

2. **Low Liquidity**: when liquidity is limited, the payoffs vary based on each player's actions:

		B	
		Withdraw	**Not Withdraw**
A	**Withdraw**	**5,5**	**10**,0
	Not Withdraw	0,**10**	9,9

   Nash Equilibrium: (Withdraw, Withdraw) = 5, 5

   Both players choose to withdraw, fearing potential losses if they wait. This decision drives the bank run.

Restoring Stability: To avoid runs, the system must return to a state of plenty of liquidity. This can be achieved by implementing deposit insurance provided by the government, ensuring depositors feel secure.

		B	
		Withdraw	**Not Withdraw**
A	**Withdraw**	10,10	10,10
	Not Withdraw	10,10	10,10

The guaranteed returns eliminate fear, stabilizing depositor behavior and preventing runs.

Continuation Value: Banks often hold assets with high long-term value, but these cannot be realized if a run forces early liquidation.

Market Illiquidity: The money market fund can also face runs due to a lack of liquidity, magnifying systemic risks.

Restrictions on Asset Holdings

Regulations that restrict the types of assets banks can hold to reduce risk and ensure the stability of the financial system.

- **US Commercial Banks**: **prohibited from holding common equity** to avoid exposure to the volatility and risk associated with the stock market.
- **Pension Funds**: allowed to invest only in **high rated (AAA) securities**, which are perceived as low risk, to protect retirees' savings.

Sovereign debt in Europe has traditionally been considered low risk and often assigned a 0% risk weight for regulatory purposes. However, during crises certain countries' government bonds became much riskier.

Capital Requirements

They must hold a certain level of capital (book equity) relative to their assets. The required level of capital depends on the type and riskiness of the bank's assets. Capital serves as a **buffer** to protect against bankruptcy and absorb losses. By doing that, managers and shareholders are discouraged from pursuing excessive risk, as more of the money at stake is their own (**reduced moral hazard**).

Exercise (Little Capital is Bad)

A bank has assets worth 100 and liabilities worth 95, leaving capital at only 5. Bank managers/shareholders can choose between:

- Safe investment: Assets increase to 101 with certainty.
- Risky investment: With 50% probability, assets grow to 200; with 50%, they vanish.

Efficient Choice: The safe investment is more efficient, as it yields a certain 101, which is better than the risky investment's expected value of $[(0.5) \times 200 + (0.5) \times 0] = 100$.

- Managers/shareholders prefer risky investments: $(0.5) \times (200 - 95) = 105/2 > 101 - 95 = 6$.

- Depositors/creditors prefer safe investments: $95 > (0.5) \times 95$.

With little capital, shareholders are incentivized to gamble with creditors' money.

Exercise (Lots of Capital Helps)

A bank now has assets worth 100, but liabilities are reduced to 1, leaving capital at 99. Choices between the same safe and risky investments remain.

- Managers/shareholders now prefer the safe investment: $(0.5) \times (200 - 1) = 199/2 < 101 - 1 = 100$.
- With more capital at stake, shareholders are less willing to take excessive risks.

Higher capital requirements align shareholder interests with safer investment strategies.

Functions of higher Capital

- **Buffer Against Bankruptcy**: Capital absorbs losses and protects the bank from insolvency.
- **Reducing Risk-Taking**: Higher capital levels discourage managers and shareholders from gambling with creditors' money.

  Remark: We know that $ROE = ROA \cdot \frac{Assets}{Equity}$. As equity ↑, the leverage A/E ↓, reducing ROE.

  Risky activities less attractive to shareholders.

History of Capital Requirements

It's hard to know the exact amount for the minimum capital requirement.

- **Leverage Ratio (1980s)**: ignored riskiness of assets: a risky commercial loan would require same amount of capital as safe treasury bonds.

  $$\text{Leverage Ratio} = \frac{E}{A}$$

  $> 5\,\%$: well capitalized

  $< 4\,\%$: undercapitalized

  $< 2\,\%$: critically undercapitalized (to be shut down)

- **Basel Accords (I,II,III)**: risk weights applied to all assets and off-balance sheet activities: these weights reflect the degree of risk and are used to calculate risk weighted assets (RWA).

  $$RWA = \sum_{i=1}^{N} RW_i \cdot A_i$$

  $$CapReq = \frac{E}{RWA} \geq 8\,\%$$

Where the values of each RW are:

- 0% no capital needed on **reserves** and **government debt** of advanced economies
- 20% on **securities** from **corporates rated** $\geq$ AA-
- 50% on **municipal bonds**, **residential mortgages**
- 100% on **loans to consumers and corporations**.

Problem: banks engage in regulatory arbitrage, i.e. invest in the riskiest asset within the same risk weight class.

First National Bank

Assets		Liabilities	
Reserves	$3 m	Checkable deposits	$20 m
Treasury securities	$10 m	Nontransactions deposits	$60 m
Government agency securities	$7 m	Borrowings	$11 m
Municipal bonds	$10 m	Loan loss reserves	$2 m
Residential mortgages	$10 m	Bank capital	$7 m
Real estate loans	$20 m		
C&I loans	$35 m		
Fixed assets	$5 m		

Exercise.

$LR = \frac{E}{A} = \frac{\$7M}{\$100M} = 7\,\%$ The bank is well-capitalized according to the leverage ratio.

To compute capital/risk adjusted assets, we need risk adjustment coefficients for each bank asset

Core Capital Requirement

$= 4\% \cdot RWA$

$= 4\% \cdot \$91.4M = \$3.66M < \$7M$ of core capital. The bank exceeds this requirement.

Total Capital Requirement

$= 8\% \cdot RWA$

$= 8\% \cdot \$91.4M = \$7.31M < \$9M$ of total capital.

$= \$7M$ of core $+\$2M$ of loan loss reserves

The bank exceeds the total capital requirement.

First National Bank is well-capitalized by all measures:

- The LR ($7\,\%$) exceeds the minimum requirement of $5\,\%$.
- Both core and total capital levels comfortably surpass the required thresholds.

Exercise:

Consider Bank A:

Assets		Liabilities	
Reserves	€5	Checkable deposits	€20
German government debt	€10	Nontransaction deposits	€60
Residential mortgages	€20	Borrowings	€11
Municipal bonds	€30		
Corporate loans	€35	Bank capital	€9
Total	€100	Total	€100

Compute its RWA under the following assumptions on risk weights: reserves and german bonds 0%, mortgages and munis 50%, corporate loans 100%.

$$RWA = 0.15 \cdot 60€ + 0.5 \cdot 50€ + 1 \cdot 35€ = 60€$$

Exercise:

Bank B also has the same structure of assets and liabilities as bank A, with a 9% Capital/Assets ratio. However, bank B has risk weighted assets of 80 euros.

Which bank is riskier? A or B?

To compare risk we use the capital buffer ratio:

Bank A: $$\frac{\text{Capital}}{\text{Risk-Weighted Assets}} = \frac{9}{60} = 15\,\%$$

Bank B: $$\frac{\text{Capital}}{\text{Risk-Weighted Assets}} = \frac{9}{80} = 11.25\,\%$$

Since Bank B has a lower capital buffer relative to its risk-weighted assets, Bank B is riskier than Bank A.

Prompt Corrective Action (PCA)

It addresses 2 major issues when a financial institution's capital falls to low levels.

- ↑ **risk of failure**: low capital ↓ the bank's cushion against losses, making it more likely to fail in case of loan losses or asset write downs.
- ↑ **moral hazard**: with less capital, the institution has less "skin in the game", incentivizing excessive risk taking, which heightened the risk of failure and shifts potential losses to taxpayers.

The ***FDIC Act of 1991*** requires the FDIC to intervene early and aggressively when a bank's capital deteriorates. Banks are categorized into 5 groups based on their capital adequacy.

- **Well capitalized**: significantly exceed minimum capital requirements: **privileges** such as **securities underwriting**.
- **Adequately capitalized**: meet minimum capital requirements: no corrective actions but **lack of privileges**
- **Undercapitalized**: fail to meet minimum capital requirements. Required **corrective actions**:

  - Submit a **capital restoration plan**
  - **Restrict asset growth**
  - Seek **regulatory approval to open new branches** or launch new business lines.
- **Significantly undercapitalized**: below acceptable thresholds: **restrictions** imposed, including **limits on deposit interest rates**.
- **Critically undercapitalized**: **equity capital falls below 2% of total assets**: FDIC must take steps to close the bank and manage its resolution.

Financial Supervision: Chartering and Examination

Financial supervision aims to prevent adverse selection and moral hazard in the financial industry by regulating:

- **Who** operates financial institutions
- **How** financial institutions are operated.

Chartering

The process of granting permission to operate a financial institution, ensuring undesirable individuals do not gain control prevents adverse selection by screening proposals for new institutions and stopping high-risk or unethical individuals from running banks.

Conducted by:

  - **Comptroller of the Currency** for national banks.
  - State banking authorities for state banks.
  - Applicants must submit an application detailing their plans for operating the bank.
- **Regulatory agencies evaluate**:
  - The quality of intended management.
  - Projected earnings potential.
  - Initial capital adequacy.
- Once chartered, banks must submit regular **call reports** (usually quarterly) to disclose:
  - Assets and liabilities.
  - Income and dividends.
  - Ownership structure.
  - Foreign exchange operations.

Remark: Before 1980, the chartering agency also considered whether the community needed a new

bank to avoid competition that could harm existing banks. This anticompetitive stance is now weaker.

Examination

Regular monitoring to ensure compliance with regulations on capital requirements and restrictions on asset holdings.

- **Regular examinations** (at least annually) conducted by:
  - **Office of the Comptroller of the Currency** (for national banks).
  - **Federal Reserve** (for state member banks).
  - **FDIC** (for insured nonmember state banks)
- **Unannounced visits**: Prevent banks from hiding issues prior to examination.
- **CAMELS Rating** evaluates banks in six areas. Low CAMELS ratings can result in enforcement actions or closure of the bank
  - Capital adequacy.
  - Asset quality.
  - Management.
  - Earnings.
  - Liquidity.
  - Sensitivity to market risk.

Assessment of Risk Management

Modern supervision has evolved from focusing solely on asset quality to assessing potential future risks. Banks are now evaluated on their ability to manage and mitigate risk effectively. Key elements include:

- **Oversight**: The quality of governance by the board and senior management.
- **Policies**: The adequacy of policies designed to limit risky activities.
- **Risk Monitoring**: Systems for measuring and monitoring risks.
- **Internal Controls**: Mechanisms to prevent fraud and ensure compliance.

Regulators emphasize:

- **stress testing**: stimulates extreme economic scenarios to evaluate how well a bank can withstand severe financial shocks (e.g. 10% ↓ in GDP, 2y recession)
- **Value at Risk (VaR)**: measures the minimum potential loss a bank could face, within a certain probability, over a specific period. E.g. a 1% daily VaR of $10M means there is a 1% change the bank could lose at least $10M in a single day (or a 99% change of loosing less than $10M).

Disclosure Requirements

Address **free-rider problem** by ensuring **transparency** and enabling stakeholders to **monitor financial institutions** effectively. Regulators ensure transparency by requiring financial institutions to adhere to accounting principles and disclose portfolio quality and risk exposure.

- Promotes **market efficiency** by enabling stakeholders to monitor institutions.
- **Reduces moral hazard** by deterring excessive risk-taking.
- **Improves capital allocation** by providing better information for decision-making.

However, **Mark-to-Market Accounting** values assets at current market prices, criticized during crises for exacerbating perceived financial instability.

- **Basel II**: Focus on market discipline; disclosure of credit exposure, reserves, and capital.
- **Securities Act (1933) & SEC**: Mandate disclosure of o;-balance-sheet positions and portfolio valuation methods.
- **Sarbanes-Oxley Act (2002)**: Strengthened audits and established PCAOB and limited conflicts of interest in financial services.

Consumer Protection

It addresses **asymmetric information** in financial dealings, ensuring consumers have adequate information and are treated fairly by financial institutions.

- **Truth in Lending Act (1969)**: Requires lenders to disclose borrowing costs (ex. Annual Percentage Rate (**APR**), Total finance charges)
- **Fair Credit Billing Act (1974)**: Mandates clear disclosure of how finance charges are assessed and ensures prompt handling of billing complaints.
- **Equal Credit Opportunity Act (1974, 1976)**: Prohibits discrimination in lending based on race, gender, marital status, age, or national origin (Enforced under Regulation B by the Fed)
- **Community Reinvestment Act (1977)**: Prevents redlining (refusing to lend in certain areas): requires banks to lend in all regions where they accept deposits.

Weak consumer protection contributed to the crisis:

- Many borrowers took loans with unclear terms or unaffordable repayment structures.
- Resulted in millions of foreclosures and widespread financial distress.

Limits to Competition

They reduce moral hazard caused by excessive competition, which can lead financial institutions to take on greater risks to maintain profitability as competition reduces margins.

- **Branching Restrictions** (eliminated in 1994): Limited competition between banks by restricting the ability to open new branches.

- **Glass-Steagall Act** (repealed in 1999): prevented nonbank institutions from competing with banks by engaging in banking activities.

However, these restrictions led to numerous disadvantages:

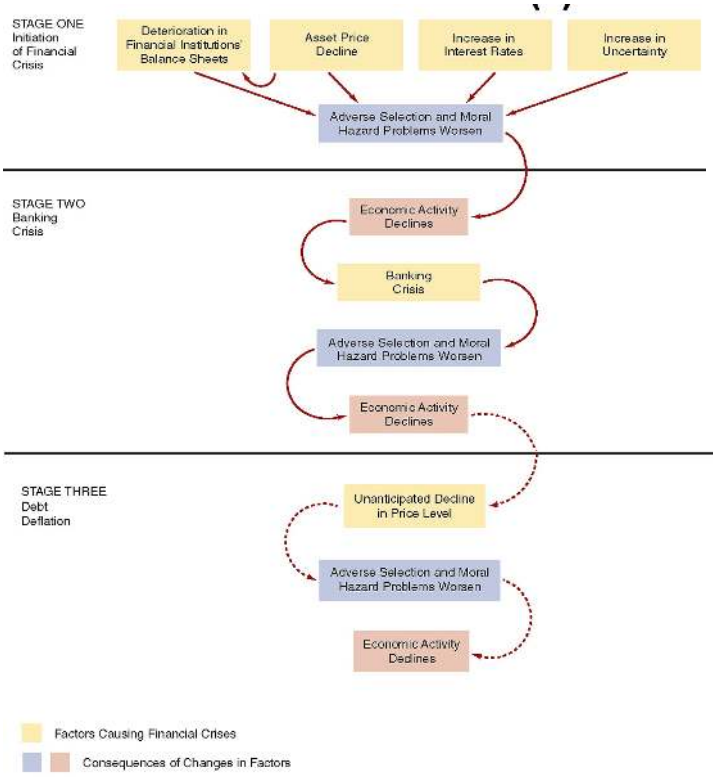
- Resulted in higher costs for consumers.
- Reduced efficiency as banks faced less pressure to innovate or operate efficiently.
- Demonstrates that asymmetric information, while a rationale for such regulations, doesn't always justify them as beneficial.

The Theory of Financial Crises

Financial crises are severe **disruptions in financial markets**, marked by **sharp declines in asset prices**, banking distress, and firm failures. These crises often lead to **economic recessions**, defined as 3-4 consecutive quarters of negative GDP growth.

Crises can arise from **adverse selection** (difficulty identifying creditworthy borrowers) and **moral hazard** (borrowers taking excessive risks). Importantly, **crises worsen these problems**, halting financial intermediation and laying the foundation for **economic contraction**.

Sequence of Events in US Financial Crisis



Stage One: initiation

A financial crisis typically begins with several destabilizing factors that disrupt financial markets and institutions. These factors often include:

- **Asset Price Decline**: Falling asset values erode collateral, reducing borrowing capacity and limiting investment opportunities.
- **Deterioration of Financial Institutions' Balance Sheets**: Losses weaken banks, reducing their ability to lend and increasing systemic vulnerability.
- **Rising Interest Rates**: Higher borrowing costs strain debt repayment and discourage borrowing, impacting economic activity.
- **Increased Uncertainty**: Events such as financial scandals, major institutional failures, or stock market crashes heighten risk aversion and market instability.

Financial crises can be caused by:

- **a** removal of restrictions or the introduction of new financial products such as securitization
- **innovation**: technological advancements like the expansion of railroads. Investors get excited about a certain sector.

These often lead to **excessive credit expansion and asset price bubbles**, where **risk management is insufficient**. When the bubble bursts, **asset prices collapse**, **reducing corporate net worth** and **increasing moral hazard** as firms take on more risk with little to lose.

As losses accumulate, **banks begin deleveraging**, cutting back on lending or selling assets to reduce liabilities. However, **this asset liquidation further depresses asset prices**, worsening financial instability and i**ncreasing the likelihood of defaults**. This process leads to a **deepening of asymmetric information**, where financial institutions are no longer able to assess borrower risk effectively. As lending contracts, the **economy slows due to a scarcity of credit**, exacerbating **adverse selection** (funding poor-quality borrowers) and **moral hazard**.

Interest rate spikes or **liquidity shortages** have historically triggered crises, especially during the 19th century. Rising rates **increase uncertainty** about loan repayment, while liquidity problems cause panic and deposit runs on financial institutions. These dynamics often culminate in declining economic activity, setting the stage for a **broader financial crisis**.

This cycle of falling asset prices, declining confidence, and constrained credit creates a self-reinforcing loop, halting financial intermediation and deepening economic contraction.

Stage Two: Banking Crisis

As economic activity declines, financial strain often escalates into a banking crisis. This phase is marked by **widespread failures of financial institutions** and a **loss of public confidence**. Deteriorating balance sheets push banks toward **insolvency**, and if the situation worsens, it can trigger a **bank panic**. They occur when depositors, unsure of which banks are insolvent, **withdraw funds en masse**. The rapid depletion of cash reserves forces financial institutions to **sell assets quickly at depressed prices**, further **eroding their balance sheets**. This amplifies financial instability and **deepens the issues of adverse selection** and **moral hazard**, disrupting financial markets.

The contraction in lending and the collapse of financial intermediation create a self-reinforcing cycle of reduced economic activity and prolonged recovery. The severity of these crises can take years to resolve, leaving long-term damage to the economy.

Stage Three: Debt Deflation

In severe cases, a financial crisis can progress to debt deflation, characterized by a **sharp and unanticipated decline in price levels**. As prices fall, the **real burden of debt increases** because debt levels are typically fixed and not indexed to inflation. This makes repayment significantly harder for borrowers, **exacerbating adverse selection** and **moral hazard**.

The rising real debt burden **reduces spending and investment**, further **contracting economic activity and deepening the downturn**. Debt deflation creates a self-reinforcing cycle of **economic**

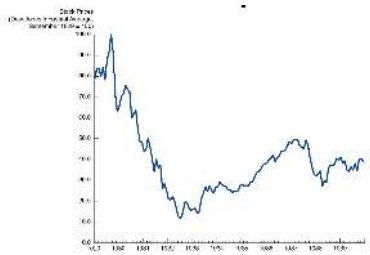
stagnation, prolonging and intensifying the crisis. This prolonged period of depressed economic activity **can leave long-lasting damage to the financial system** and the broader economy.

Case: The Great Depression

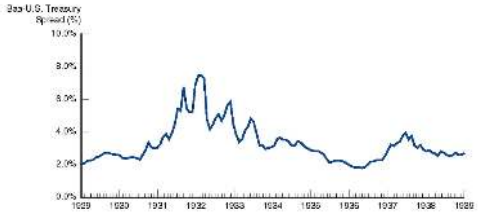
The Great Depression remains the worst financial crisis in U.S. history, with devastating economic consequences.

Between 1928 and 1929, **U.S. stock prices doubled**, fueled by **excessive speculation**. The Fed attempted to curb this speculation with **contractionary monetary policy**, which triggered a **stock market crash in October 1929,** resulting in a **60% collapse in stock prices**.

Between **1930 and 1933**, **agricultural shocks** compounded the crisis, causing **one-third of U.S.**

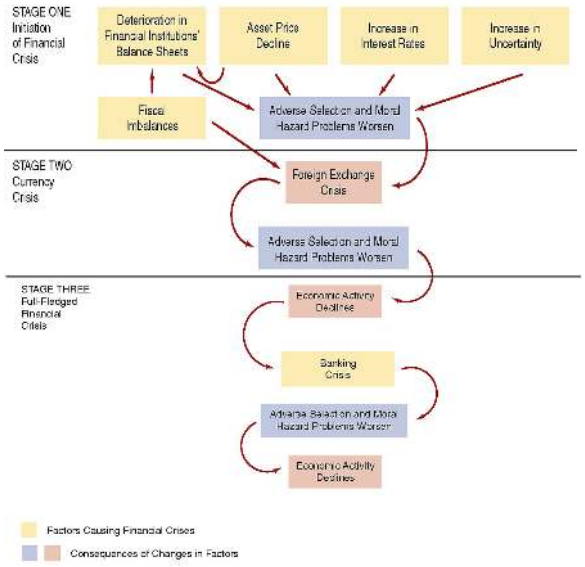


banks to fail. **Severe adverse selection and moral hazard** in **credit markets** emerged, leaving **productive firms unable to secure financing**. **Credit spreads widened drastically**, rising from 2% to nearly 8% at the height of the Depression.



The **deflationary spiral** led to a **25% decline in price levels**, significantly **increasing the real burden of debt** and deepening the economic downturn. By the peak of the crisis, **unemployment reached 25%**, making the Great Depression the most severe economic contraction in U.S. history.

Sequence of Events in Emerging Market Financial Crisis



Stage One: Initiation

Financial crises in emerging market countries develop along these paths:

- **Mismanagement of financial liberalization or globalization**: Financial liberalization often leads to excessive capital inflows and a rapid credit expansion. Weak risk management and a **lack of credit discipline** result in **risky lending practices**. As **high loan losses accumulate**, **bank balance sheets deteriorate**, and **lending is cut back**. The ensuing lending crash is particularly severe in emerging markets, where **economies are less developed** and **more dependent on bank financing**.
- **Innovation**:
- **severe fiscal imbalances**: Governments facing **large deficits** may **compel banks to purchase their bonds**. If confidence in the government declines, **investors sell off bonds**, leading to **sharp price drops**. Falling bond prices weaken bank balance sheets, triggering a lending freeze and deepening the crisis.

Additional Triggers

- **Global Interest Rate Spikes**: Rising interest rates in advanced economies **increase debt servicing costs**, rendering **local debts unsustainable**, as seen in the Mexican peso crisis.
- **Political Instability**: Unstable political systems **heighten uncertainty**, increasing agency conflicts and undermining economic confidence.

While many emerging markets start with seemingly solid fiscal policies, **weak credit cultures** and **capital inflows** often **fuel unsustainable credit booms**. Over time, risky lending practices lead to **mounting loan losses**, destabilizing the financial system and creating conditions for a full-blown crisis.

Emerging markets are particularly **vulnerable** due to **limited financial infrastructure**, **reliance on external capital**, and **sensitivity to global economic fluctuations**, making these crises more severe and harder to resolve.

Stage Two: Currency Crisis

As financial instability deepens, it often triggers a currency crisis, marked by **significant devaluation or instability in foreign exchange markets**. The value of the domestic currency declines sharply, **reducing confidence** in the economy and intensifying financial strain.

This devaluation exacerbates **adverse selection** and **moral hazard**. It further **weakens financial institutions** by **increasing the cost of servicing foreign-denominated debt**, creating a feedback loop that undermines economic stability and reduces overall confidence in the financial system.

Stage Three: Full Financial Crisis

A currency crisis often escalates into a **full-blown financial collapse**, resulting in widespread economic and financial instability. This stage is characterized by:

- **Decline in Economic Activity**: **Credit contraction** and **reduced investment slow economic growth**, leading to a significant economic downturn.
- **Banking System Failures**: The collapse of financial institutions exacerbates instability and reduces the economy's ability to recover.
- **Worsening Adverse Selection and Moral Hazard**: Financial institutions struggle to identify creditworthy borrowers, while borrowers engage in riskier behavior, further prolonging the crisis.

An additional issue in emerging markets is the problem of devaluation. **Many firms borrow in foreign currencies**, such as U.S. dollars or yen. When the **local currency devalues unexpectedly**, the **real burden of their foreign-denominated debt increases**, **reducing their net worth and amplifying financial strain**.

These interconnected dynamics drive the economy into a full-fledged financial crisis, marked by **systemic failures across banking, currency, and investment sectors**. Notable examples of such crises include:

- Mexico (1994–1995)
- East Asia (1997–1998)
- Argentina (2001–2002)

These cases illustrate how currency devaluation, financial instability, and poor policy responses can combine to create long-lasting economic disruptions.

Case: Financial Crises in Emerging Market Countries

The financial crises in **Mexico** (1994–1995), **East Asia** (1997–1998), and **Argentina** (2001–2002) demonstrate how countries with strong growth trajectories can rapidly descend into economic chaos.

A central factor in these crises was the **deterioration of banks' balance sheets** caused by **rising loan losses**, which destabilized the financial sector and magnified economic vulnerabilities.

In **Mexico**, attempts to **defend the *peso*** by ↑ **interest rates failed**, forcing a **currency devaluation that intensified the crisis**. Similarly, in **Thailand**, **speculative attacks** on the ***baht*** succeeded, triggering its **devaluation** and spreading financial contagion across the region. These devaluations **worsened the burden of foreign-denominated debt**, as local currencies lost value, straining balance sheets and undermining economic stability.

The **institutional weaknesses of debt markets** in Mexico and East Asia further interacted with the currency devaluations, **pushing these economies into full-fledged financial crises**. The impact was particularly **severe** for Indonesia and Argentina, where currency values fell by over 70%, dramatically increasing debt burdens and triggering widespread financial instability.

The **sharp decline in lending** led to a **collapse in economic activity**, with **real GDP growth plummeting**. This economic contraction, combined with the worsening **cash flows and balance sheets of firms and households**, exacerbated banking crises and deepened the downturn.

Recovery Timelines

- **Mexico began to recover by 1996**, supported by external aid and policy adjustments.
- **Crisis-affected countries in East Asia** tentatively started **recovering** in **1999**, with stronger growth in subsequent years.
- **Argentina**, however, remained in a **severe depression until 2003**, before experiencing a robust economic rebound.

These **crises highlight** the:

- **interconnected nature of financial systems**,
- **role of currency devaluations in amplifying vulnerabilities**,
- **long road to recovery following economic collapse**.

They underscore the **need for robust institutional frameworks** to **mitigate the impact of speculative attacks, debt mismanagement**, and **financial contagion**.

FOR DOUBTS OR SUGGESTIONS ON THE HANDOUTS

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