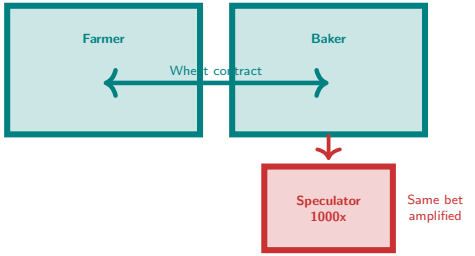
Why can a contract with no physical asset behind it create or destroy billions?

The derivative paradox:

- A derivative is a side bet on an underlying asset – you never own the asset itself
- A farmer and a baker agree on a wheat price six months forward. No wheat changes hands today. Just a promise.
- But that promise has value: it shifts risk from one party to the other
- Now scale: thousands of contracts, layered on layered, leveraged positions
- A single contract protects one party, but the same structure amplified a thousand times can bring down a bank

The tension: Derivatives are precise tools for managing risk. But precision cuts both ways – the same instrument that hedges can also amplify catastrophic losses when misused or misunderstood.

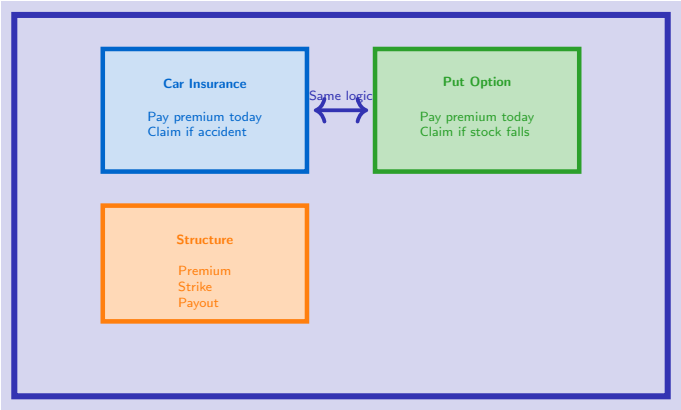


A farmer and baker shake hands over wheat. Behind them, a speculator makes the same bet a thousand times, creating systemic risk.

Derivatives transfer risk, but leverage and interconnection turn hedging tools into systemic vulnerabilities.

Global derivatives notional exceeds 600 trillion – ten times global GDP. The value is in the risk transfer, not the asset itself.

Have you ever insured something valuable – and realized that insurance itself is a derivative?



An insurance policy is a derivative: its value derives from an underlying event (accident, fire, stock crash). You pay a premium for protection you hope you never need. Options work exactly the same way.

Every insurance contract you have ever bought is training for understanding derivatives. The language changes, the structure stays the same.

Derivatives are not exotic. They are formalized versions of everyday risk-sharing agreements.

What are the main types of derivatives and how do they differ?

Four building blocks:

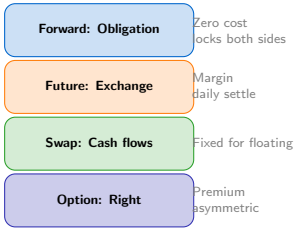
Forward: Agreement to trade at a fixed price on a future date. Both sides must perform. No upfront cost. Locks in price but eliminates upside.

Future: Standardized forward traded on an exchange. Daily settlement via margin accounts. Clearinghouse guarantees performance.

Swap: Agreement to exchange cash flows. One party pays fixed, the other pays floating. Converts a floating-rate loan to fixed (or vice versa).

Option: Right, not obligation, to buy (call) or sell (put) at a strike price. Buyer pays premium upfront. Maximum loss is the premium.

Key distinction: Forwards, futures, and swaps are obligations (symmetric risk). Options are rights (asymmetric risk, hence premium).



Four instruments, two categories: obligations versus rights.

All derivatives share one function: transfer risk from someone who does not want it to someone willing to bear it at a price.

Obligations are free upfront but bind both sides. Rights cost money (premium) but give flexibility to walk away.

How does a simple option contract pay off at expiration?

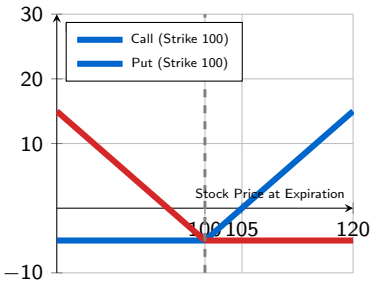
Call option (right to buy):

- You pay a premium of 5 today
- Strike price is 100
- At expiration: if stock is above 100, you exercise and keep the gain minus premium
- If stock is below 100, you let it expire. You lose only the premium.

Put option (right to sell):

- You pay a premium of 5 today
- Strike price is 100
- At expiration: if stock is below 100, you exercise and profit from the difference minus premium
- If stock is above 100, you let it expire. You lose only the premium.

Maximum loss: Always the premium paid. This is why options are "insurance" – downside is capped, upside is open.
Breakeven: Strike plus premium (call) or strike minus premium (put).



Kinked payoff diagrams are the fingerprint of options. Flat at the bottom (max loss = premium), rising to the right (call) or left (put).

Options create asymmetric payoffs: limited downside, unlimited upside. That asymmetry is why they cost money (premium).

Payoff diagrams reveal the essence of every derivative. Learn to read them and you understand the risk structure instantly.

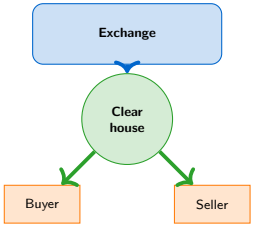
How are exchange-traded and over-the-counter derivative markets structured differently?

Exchange-traded (futures, listed options):

- Standardized contracts (fixed expiries, strike increments)
- Traded on centralized exchanges
- Clearinghouse stands between buyer and seller, guarantees performance
- Daily mark-to-market and margin requirements
- Transparent pricing, high liquidity
- Lower counterparty risk

Over-the-counter (OTC: forwards, swaps, exotic options):

- Customizable terms negotiated bilaterally
- Traded directly between parties (banks, corporates)
- No clearinghouse – direct counterparty risk
- Settlement at maturity (no daily mark-to-market)
- Less transparent, lower liquidity
- Higher counterparty risk (mitigated by collateral agreements)



Exchange: clearinghouse absorbs counterparty risk. OTC: parties face each other directly.

Exchange structure reduces counterparty risk via standardization and clearinghouse. OTC offers flexibility but concentrates risk bilaterally.

Post-2008 reforms pushed more OTC derivatives onto clearinghouses to reduce systemic risk. Customization remains bilateral.

What happens when derivatives leverage amplifies a loss beyond recovery?

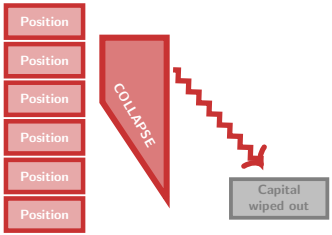
The leverage trap:

- Derivatives allow positions far larger than the capital backing them
- A small move in the underlying creates a massive move in the derivative position
- Margin calls force selling at the worst time, amplifying losses
- One counterparty's failure cascades to others holding offsetting positions

Historical examples:

- Long-Term Capital Management (1998): leveraged derivatives bets collapsed; required Fed-coordinated bailout
- AIG Financial Products (2008): sold credit default swaps (insurance on mortgage bonds); could not pay when mortgages defaulted; needed government rescue
- Archegos Capital (2021): total return swaps created hidden leverage; sudden margin calls forced banks to liquidate billions in days

Pattern: Leverage magnifies gains on the way up, magnifies losses on the way down, and eliminates margin for error.



Leveraged positions stacked high. A small shock topples the tower. Losses cascade beyond recovery.

Leverage transforms hedging tools into weapons. The same derivative that protects a modest position can destroy a leveraged one.

Derivatives amplify both direction and volatility. Undercapitalized leverage turns normal market moves into existential crises.

Where do derivatives concentrate systemic risk in the financial system?

What you see: Concentration of notional derivative exposure across market segments.

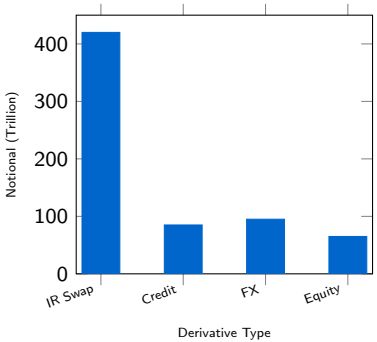
Key patterns:

- Interest rate swaps dominate (70% of notional)
- Credit derivatives concentrate in small number of large dealers
- FX derivatives widely distributed but interlocked
- Equity derivatives relatively smaller but highly leveraged

Systemic risk points:

- **Dealer concentration:** Five to ten global banks intermediate most OTC trades. Failure of one threatens the network.
- **Collateral chains:** The same collateral pledged multiple times amplifies contagion.
- **Interconnection opacity:** Bilateral netting hides true exposure until crisis.

Takeaway: Derivatives do not eliminate risk – they transfer and concentrate it. Concentration creates systemic fragility.



Interest rate swaps dominate by notional. Concentration creates single points of failure in dealer networks.

Systemic risk concentrates where derivatives volume concentrates: large dealer banks, clearinghouses, collateral chains.

Post-2008 central clearing reduced bilateral risk but created new concentration risk in clearinghouses themselves.

Who uses derivatives to reduce risk and who uses them to take on more?

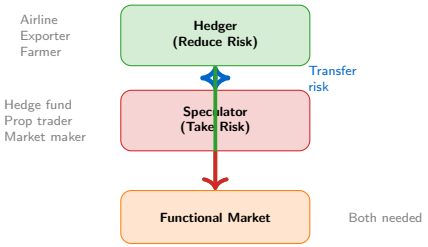
Hedgers (risk reducers):

- **Airlines:** Buy fuel futures to lock in costs, protect against price spikes
- **Exporters:** Use FX forwards to eliminate currency risk on foreign sales
- **Pension funds:** Use interest rate swaps to match liabilities
- **Farmers:** Sell crop futures to guarantee selling price at harvest

Speculators (risk takers):

- **Hedge funds:** Take directional bets on interest rates, currencies, commodities
- **Proprietary traders:** Exploit pricing inefficiencies with leverage
- **Market makers:** Provide liquidity, earn spread, manage inventory risk

The ecosystem: Hedgers need speculators. Speculators provide liquidity and absorb risk hedgers want to shed. The market fails when speculators disappear (2008 credit freeze) or when they dominate and distort prices.



Hedgers shed risk, speculators absorb it. Both are necessary for liquid, functioning markets.

Derivatives markets require both hedgers and speculators. Imbalance in either direction creates dysfunction.

Speculation is not inherently bad. It provides liquidity. The problem arises when speculation becomes disconnected from underlying economic risk.

Three questions to determine whether a derivative is hedging or gambling

The Derivative Purpose Test:

(a) Does this position offset an existing real-world risk?

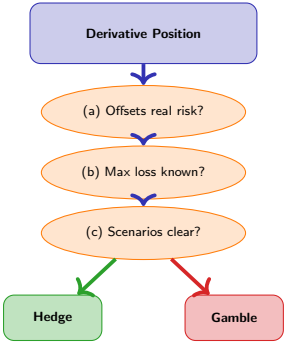
- Is there an underlying business exposure (revenue in foreign currency, commodity input, interest rate on debt)?
- Does the derivative payoff move opposite to that exposure?
- If the derivative loses money, does the underlying business gain offset it?

(b) What is the maximum possible loss?

- Is downside capped (option premium) or unlimited (naked short)?
- Can margin calls force liquidation at the worst time?
- Is the position sized to the underlying exposure or leveraged beyond it?

(c) Does the user understand all the payoff scenarios?

- Can they draw the payoff diagram?
- Do they know what happens if volatility spikes, correlations break, or liquidity vanishes?
- Have they stress-tested the position against historical crises?



Three filters separate risk management from speculation.

1. Verify the derivative offsets a real underlying business exposure
2. Confirm maximum loss is understood and affordable
3. Ensure all payoff scenarios are mapped and stress-tested

A derivative is a hedge only if it reduces total risk. If total risk increases, it is speculation – even if it looks like hedging.

Your Challenge

Scenario: A company imports goods priced in foreign currency. They expect to pay 1,000,000 in foreign currency in six months. The current exchange rate is 1.10 (1 foreign unit = 1.10 domestic). They fear the foreign currency will strengthen, making their purchase more expensive.

Task:

1. Design a hedging strategy using **options**. Specify:
   - Type of option (call or put)
   - Whose currency perspective (buy or sell)
   - Strike price (suggest 1.10 or slightly above)
   - Premium estimate (assume 2% of notional)
2. Explain what risk this strategy protects against.
3. Explain what risk remains unhedged.
4. Compare this option strategy to a forward contract: What does the company gain by using an option instead? What does it cost?

Extension: If the foreign currency weakens instead of strengthens, how do the payoffs differ between the option strategy and the forward? Who benefits more in each scenario?

Reflection: Hedging is not free. The choice between forward and option is a choice between certainty (no upside) and flexibility (pay premium, keep upside).

Derivatives transform uncertainty into choice. The company chooses which uncertainty to bear and which to pay someone else to carry.

Real corporate hedging is rarely all-or-nothing. Most firms hedge 50-80% of exposure, leaving strategic flexibility on the rest.