

# Financial Economics

## ECON2103

Lecture 4:  
*Asymmetric Information  
and Financial Contracts*

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# Introduction

- Asymmetric information, a fundamental concept in economics, refers to a situation in which one party involved in a transaction possesses more information or superior knowledge compared to the other party. This information imbalance can significantly impact the decision-making process and outcomes of various economic interactions.

# Agenda

Introduction

Topic one: Short Sales

Topic two: Debt and Equity

Topic three: Asymmetric Information

Topic four: Moral-Hazard

Topic five: Principal-Agent Problem

Summary





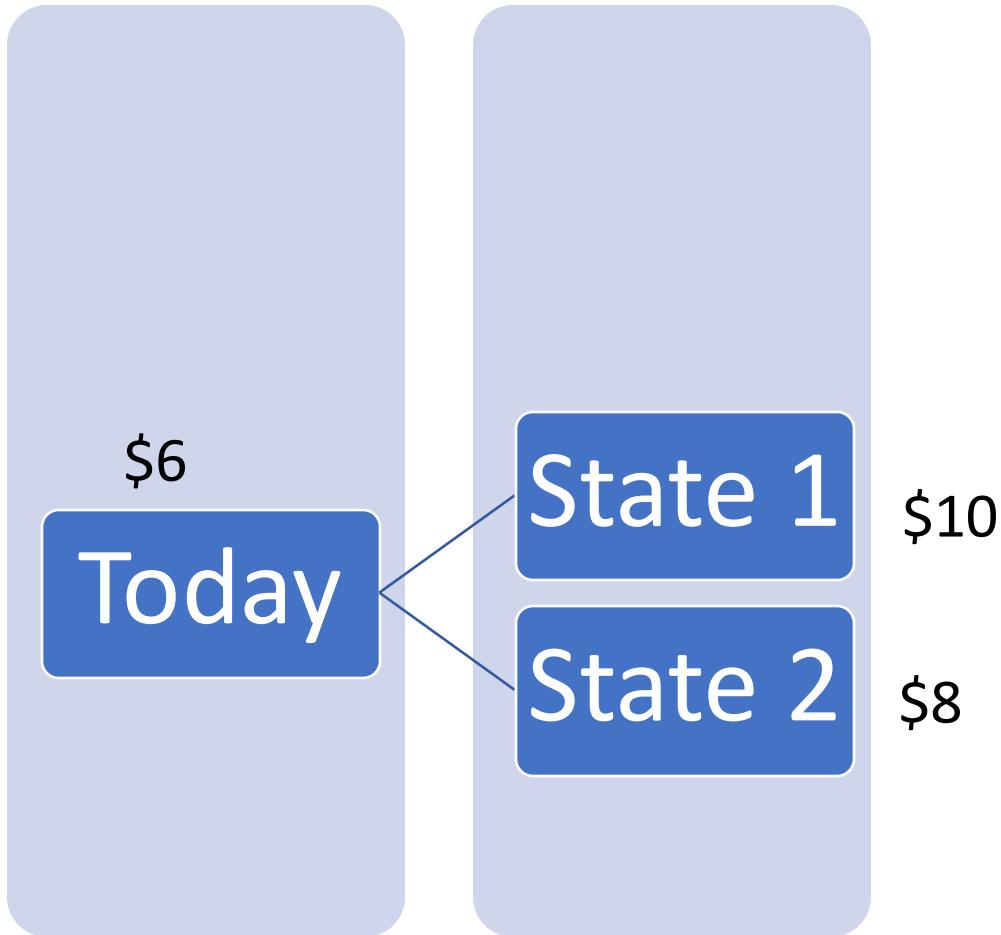
# Learning Objectives

- Go over the concept of short sales.
- Understand the “Me-First” Rule.
- Describe why asymmetric information leads to adverse selection and moral hazard.
- Recognise the principal-agent problem arising from moral hazard in equity contracts and summarise the methods for reducing it.
- Summarise the methods used to reduce moral hazard in debt contracts.
- Study about financial intermediaries and economies of scale.

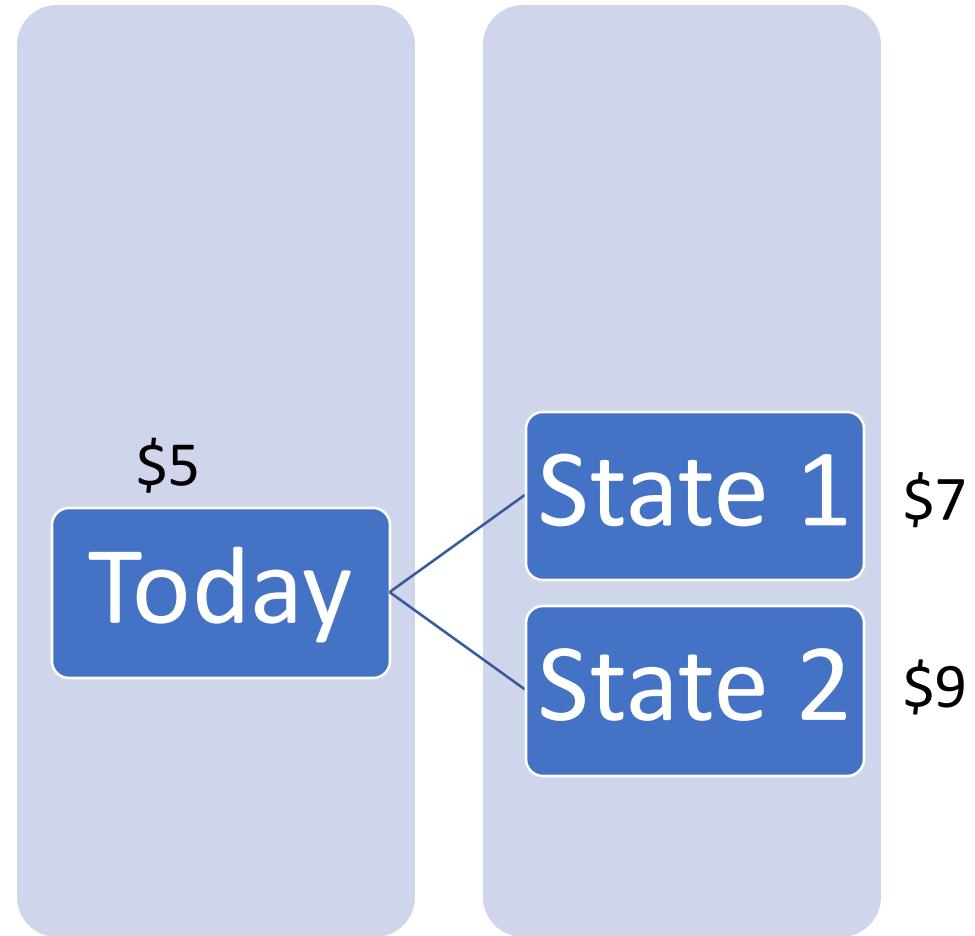
# Topic one

**Short Sales**

Stock A:  $A(1) = \$6$



Stock B:  $B(1) = \$5$



# Review

- We want to know possible combinations of claims for each state, namely  $(w_1, w_2)$  for purchasing stocks A and B by \$600.
- Let  $n_A$  be the number of shares of stock A and  $n_B$  the number of shares of stock B purchased.
- $6n_A + 5n_B = 600 \rightarrow n_B = 120 - 1.2n_A$
- $w_1 = 10n_A + 8n_B \rightarrow w_1 = 10n_A + 8(120 - 1.2n_A) = 960 + 0.4n_A$
- $w_2 = 7n_A + 9n_B \rightarrow w_2 = 7n_A + 9(120 - 1.2n_A) = 1080 - 3.8n_A$
- So  $n_A \uparrow \rightarrow w_1 \uparrow$  and  $w_2 \downarrow$
- Also when  $n_A$  increases, the change in  $w_1$  and  $w_2$  are constant.
- We write the relationship as  $w_2 = a - bw_1$ .

# Claim for Each State

- For exclusively purchasing stock A, purchasing 100 shares, and  $(w_1, w_2) = (\$1,000, \$800)$  implying

$$\$800 = a - \$1000b$$

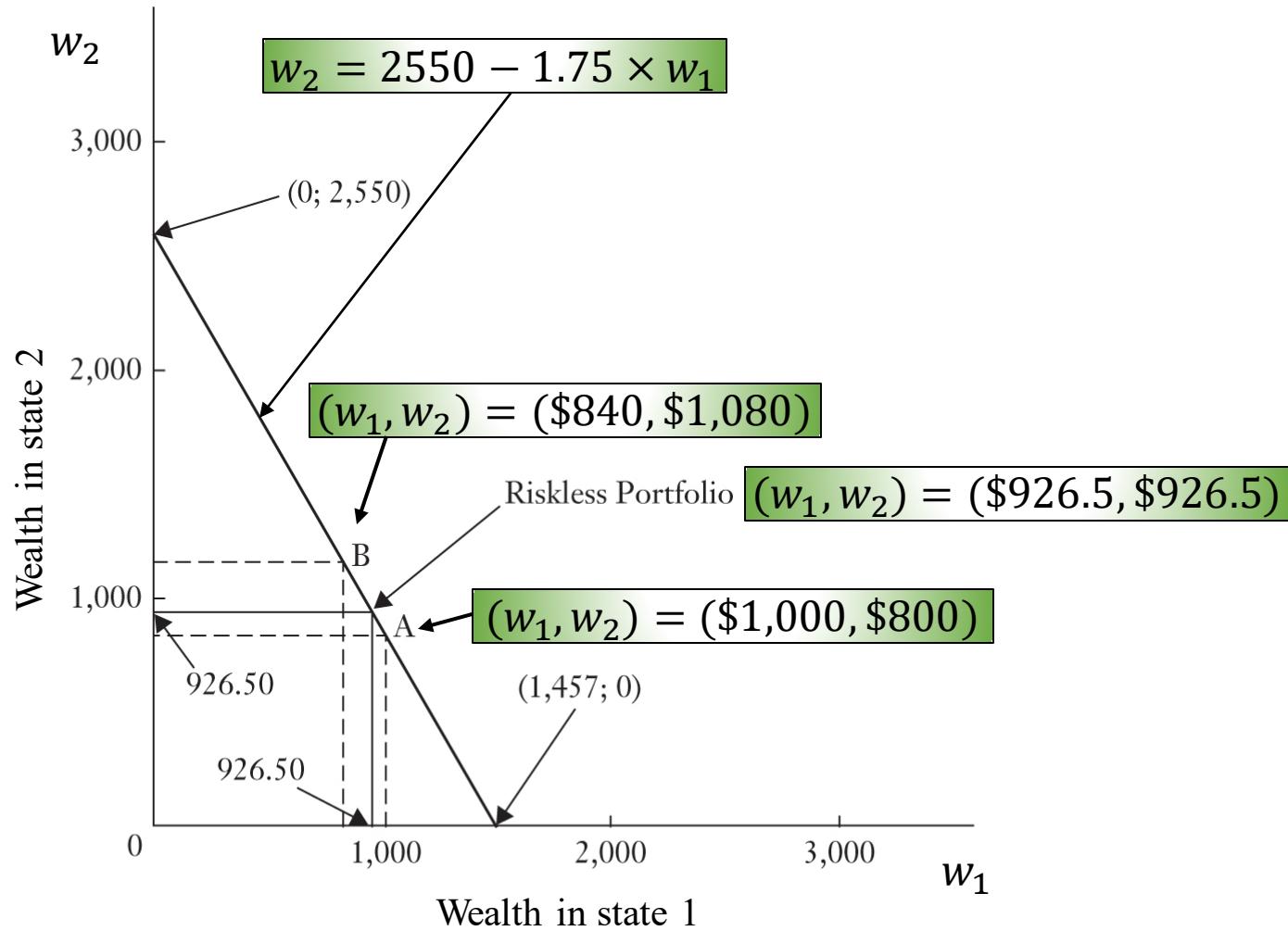
- For exclusively purchasing stock B, purchasing 120 shares, and  $(w_1, w_2) = (\$8,40, \$1,080)$  implying

$$\$1080 = a - \$840b$$

- Therefore  $a = \$2,550$  and  $b = 1.75$ .

# Figure 10.1: The Combination of Wealth

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# Short sales

- Note that in Figure 10.1 the investor's time 1 position is some point on the line from  $A$  to  $B$ .
- Points  $A$  and  $B$  represent the situations where exclusively Stocks A and B are purchased, respectively.
- How could the investor obtain a terminal wealth position lying beyond these points?
- The investor could engage in **short sales**, that is, **selling shares not currently owned**, for delivery when the unknown future state of the world is revealed.



# Illustration for short sales

- To illustrate, consider point  $w_1 = \$1,457$ ,  $w_2 = 0$ .
- If state 1 occurs, the terminal wealth will be:

$$10 n_A + 7 n_B = \$1,457.$$

- If state 2 occurs, we must have:

$$8 n_A + 9 n_B = 0.$$

- Solving these equations simultaneously, we find  $n_B = -343$ .

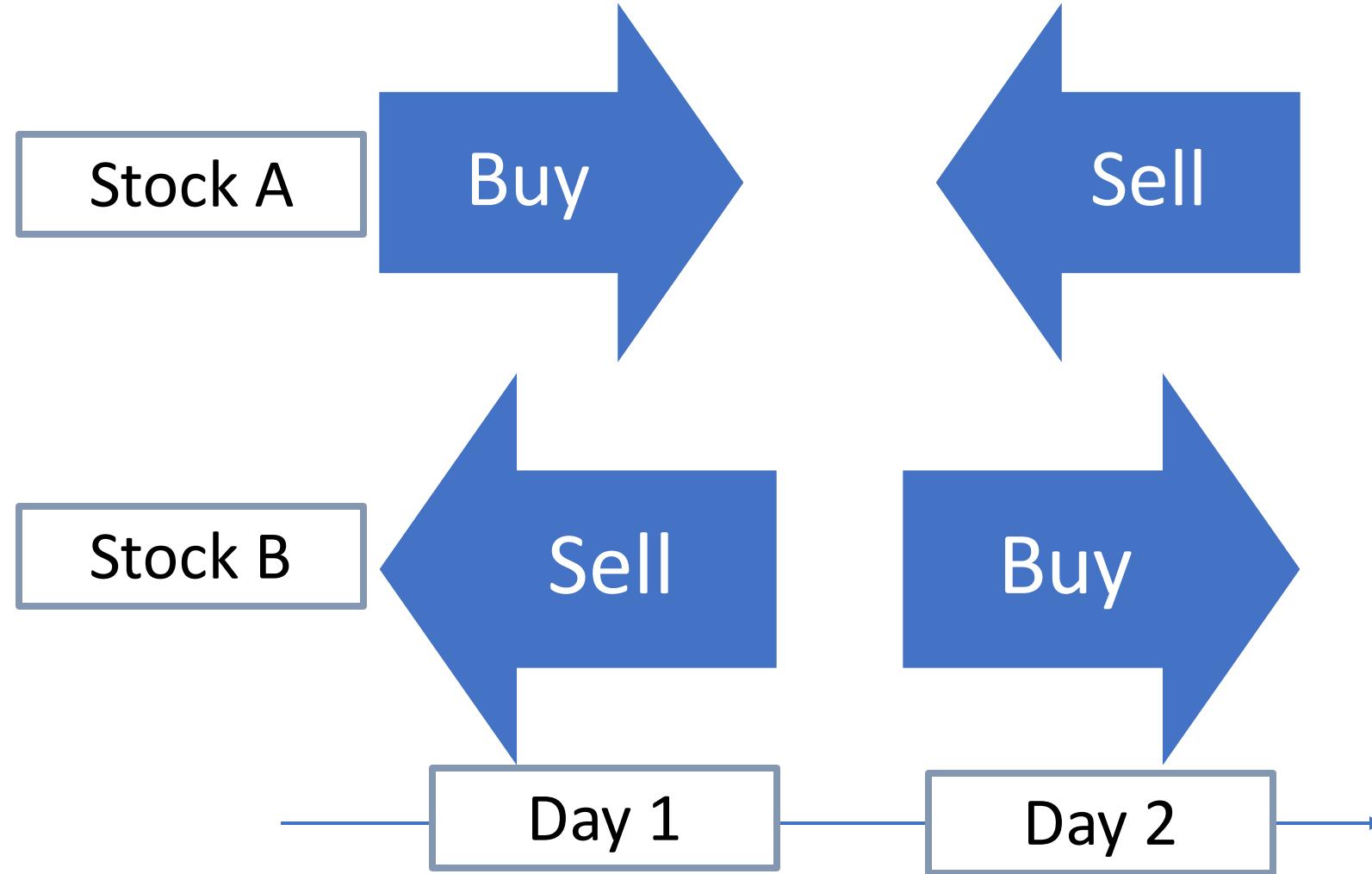
# Explanation: Short Sales

- If the investor sells short 343 shares of stock B at the current price of \$5, he will receive \$1,715.
- Combining this with the initial wealth of \$600 gives \$2,315, so this investor may buy  $\$2,315/\$6 = 386 = n_A$ .
- So,  $(n_A, n_B) = (386, -343)$ .
- In state 1, the investor receives \$3,860 (\$10 times 386 shares of Stock A) but now must pay \$2,401 (\$7 times 343 shares of Stock B) shares to cover the short position.
- The net terminal wealth in state 1 is \$3,860 – \$2,401 = \$1,459.

# State 2?

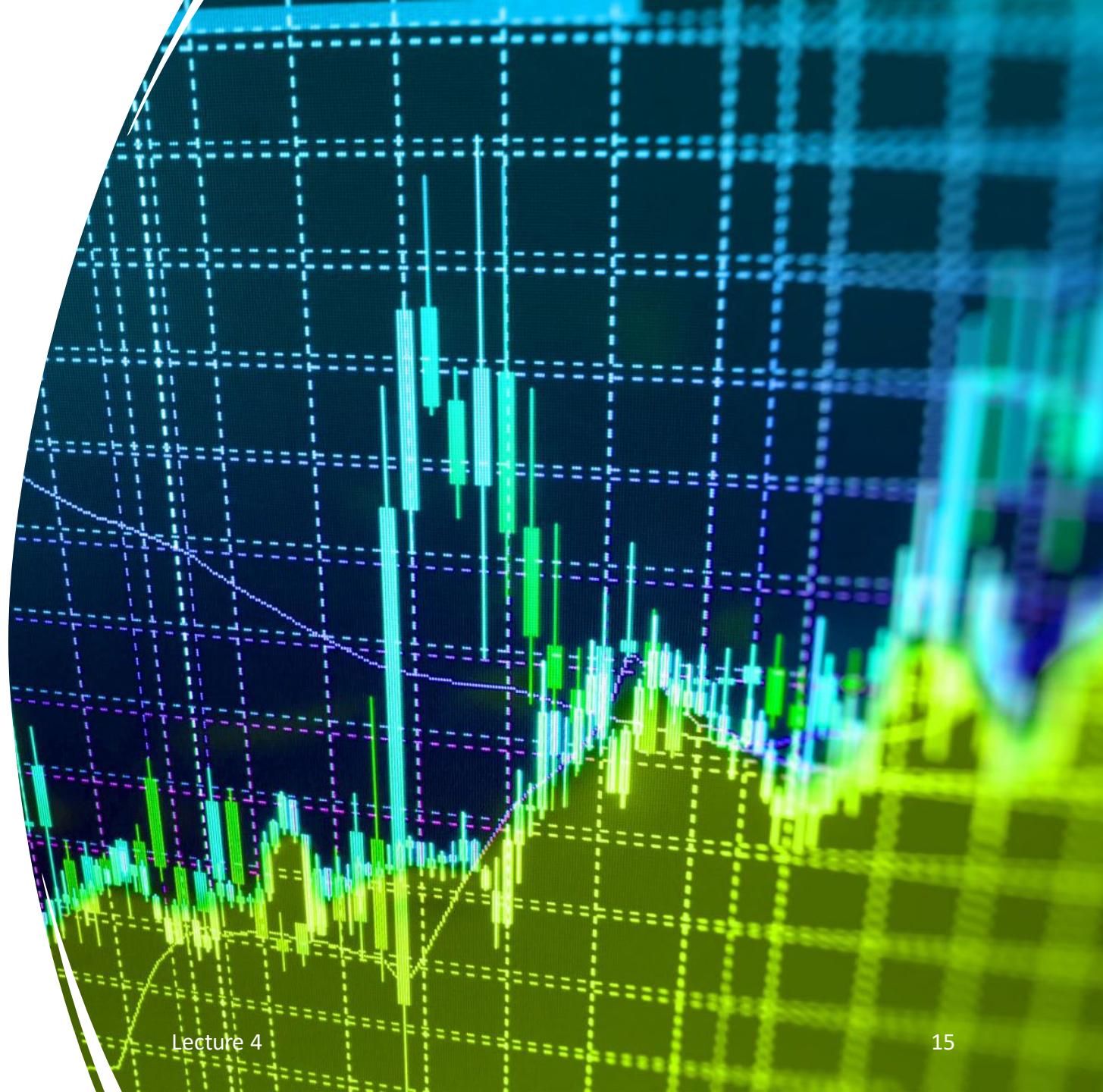
- In state 2, the terminal wealth is \$1.
- Stock A: \$3,088 (386 shares times \$8 per share of Stock A) reduced by
- Stock B: \$3087 (343 shares times \$9 per share of Stock B) gives
- \$1 ( $386 \times 8 - 343 \times 9 = 3088 - 3087$ ).

# Short Sales: Illustration For Day 1 and Day 2



# Q1. What is a short sale in the context of the stock market?

1. Buying a stock with the expectation that its price will increase; or
2. Borrowing and selling a stock with the expectation that its price will decrease.





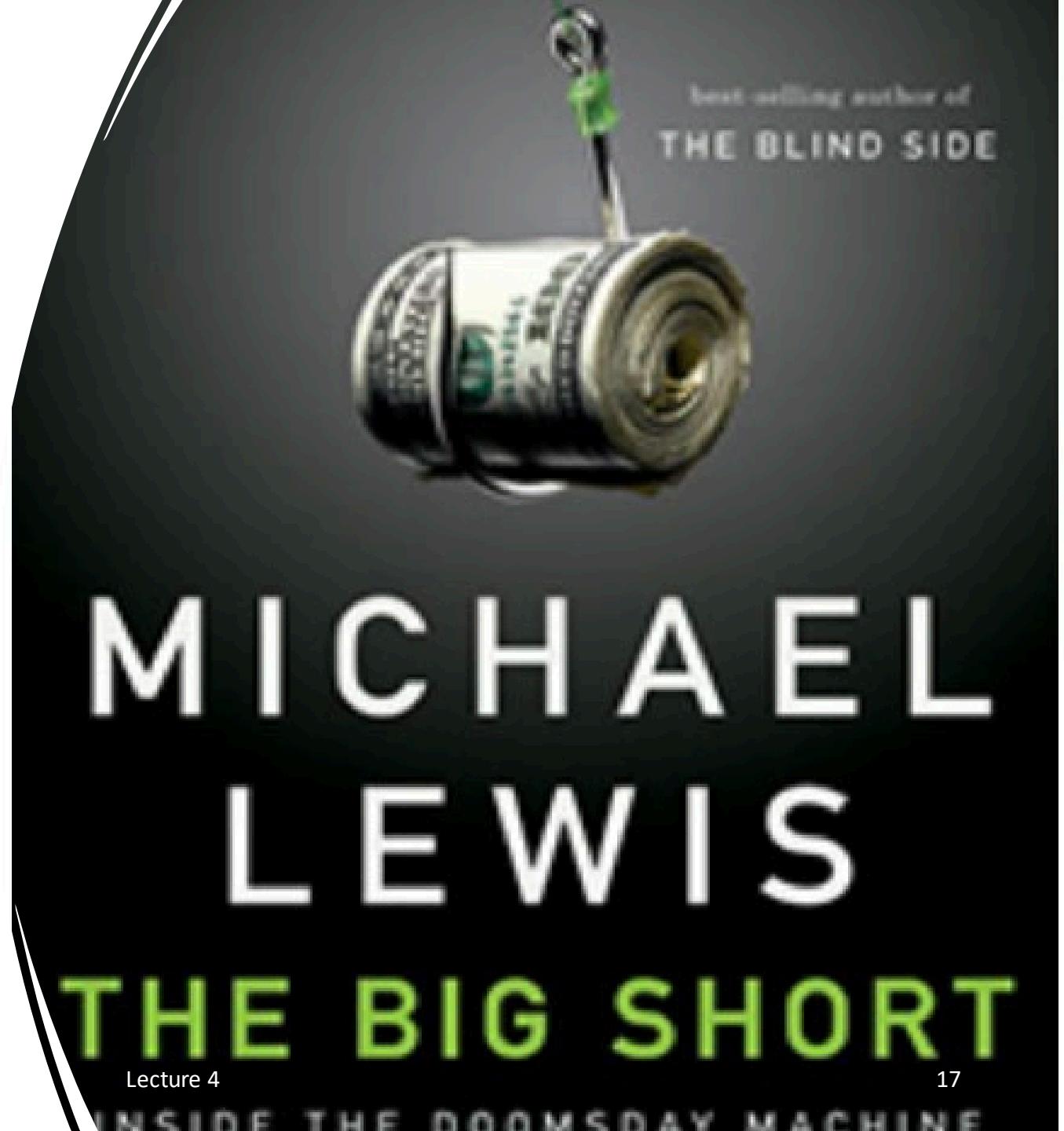
# Explanation: Q1

- Answer: 2 -- Borrowing and selling a stock with the expectation that its price will decrease.
- The investor aims to buy back the same number of shares at a lower price to return them to the broker, pocketing the difference as profit.
- This strategy is used to profit from a falling stock price.

# The Big Short: Inside The Doomsday Machine

by Michael  
Lewis

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The Big Short (Paramount Movie)  
<https://www.youtube.com/watch?v=vgqG3ITMv1Q&t=153s>



# Topic two

Debt and Equity

# Debt vs Equity

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- If management elects to finance the firm's operations with **debt**, the creditors (lenders) expect the **interest** and **principal**—fixed, legal commitments—to be paid back as promised.
- Failure to pay may result in legal actions by the creditors.
- If the firm finances its operations with **equity**, the owners expect a return in the form of **dividends**, an appreciation of the value of their equity interest (i.e., **capital gain**), or, as is most likely, some combination of both.

# Me-first rules



- The "me-first" rule is defined as a prior arrangement to protect bondholders from uncompensated shifts of wealth from bondholders to stockholders through a change in the capital structure of the firm.



# Bond Covenant

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- A **bond covenant** is a legally binding provision or condition included in the contract between the bond issuer and the bondholders.
- The specific covenant (the me-first rule) is often called a "negative pledge covenant" or "anti-dilution covenant."
- It aims at **safeguarding** bondholders from the company's actions that could negatively impact the bondholders' position in the event of a change in the capital structure of the firm.

# Issuance of preferred stock

- Preferred stockholders have a higher claim on a company's assets than common stockholders.
- In some cases, they may have **priority over bondholders** in the event of **bankruptcy** or **liquidation**.
- Therefore, the issuance of preferred stock could also negatively impact bondholders' claims.





# Important Point: Covenant

- Covenants can vary widely depending on the specific terms negotiated between the bond issuer and the bondholders.

# Topic three

Asymmetric Information

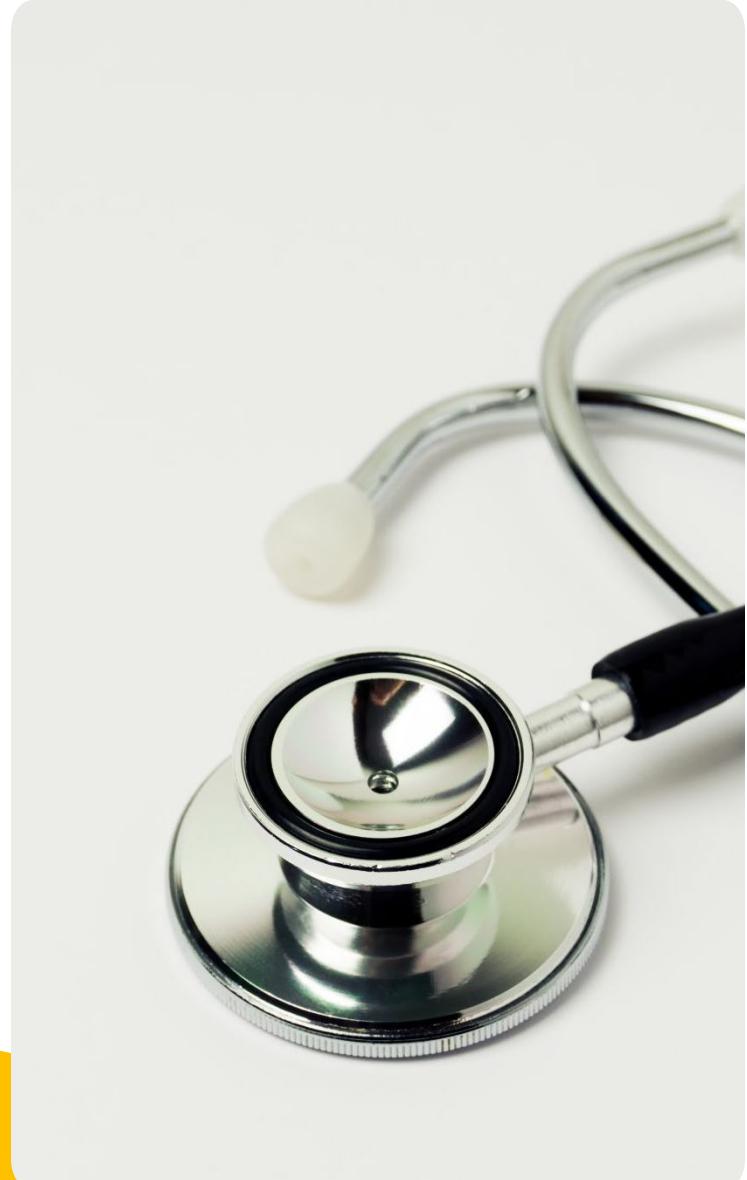
# Asymmetric Information & The Market for Lemons

Asymmetric information refers to a situation in which one party in a transaction has **more or better information** than the other party.

Asymmetric information problems:

- Adverse selection
- Moral hazard
  - Principal – agent problem





# Adverse Selection

- In the context of insurance, adverse selection occurs when individuals who are more likely to make insurance claims are the ones who are most likely to purchase insurance.
- For example, suppose an insurance company offers health insurance at a standard premium to a diverse group of individuals without considering their individual health conditions.
- In financial markets, adverse selection can manifest when there is information asymmetry between buyers and sellers.

# Moral Hazard

- Moral hazard refers to a situation where one party is more likely to **take risks or act recklessly** because they do not bear the full consequences of their actions.
- In the context of insurance, moral hazard occurs when individuals or businesses are more likely to engage in **risky behaviour** or be **less cautious** because they know they are protected by insurance.
- For example, someone with comprehensive car insurance might be less careful while driving since they believe the insurance will cover any damages in the event of an accident.





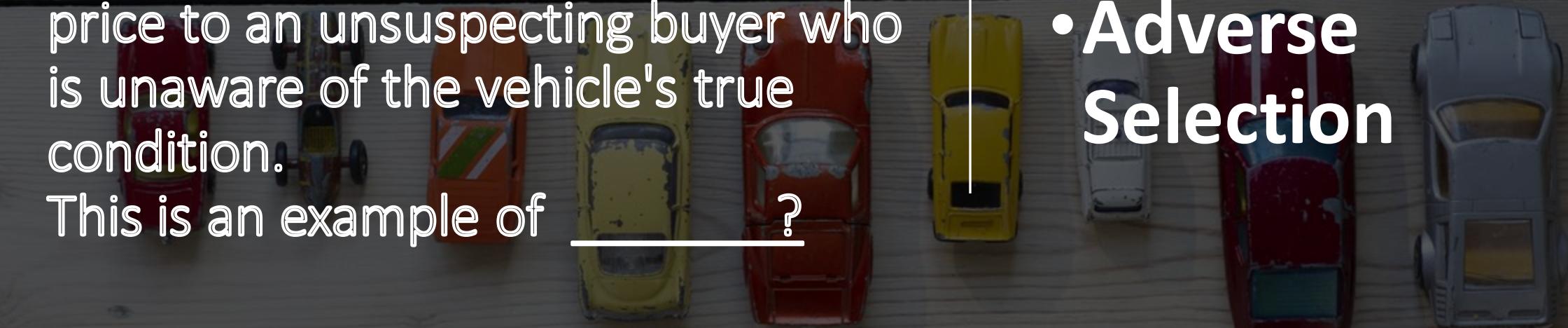
# The Difference between the Two

- Moral hazard is the asymmetric information problem that occurs **after** the financial transaction takes place.
- Adverse selection is the asymmetric information problem that occurs **before** the financial transaction takes place.

Q2. If someone is looking to sell a used car and knows that the car has significant mechanical problems, they may try to sell it at a higher price to an unsuspecting buyer who is unaware of the vehicle's true condition.

This is an example of \_\_\_\_\_?

- Moral Hazard
- Adverse Selection



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This is an example of

?

• **Adverse Selection**



- Moral Hazard
- Adverse Selection

Q3. During financial crises, governments might step in to rescue failing banks to prevent a complete collapse of the financial system. While this intervention is meant to stabilize the economy, this could create a problem such that banks might take on more risk in their lending and investment practices.

This is an example of \_\_\_\_\_?



## • Moral Hazard

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# Topic four

Moral hazard

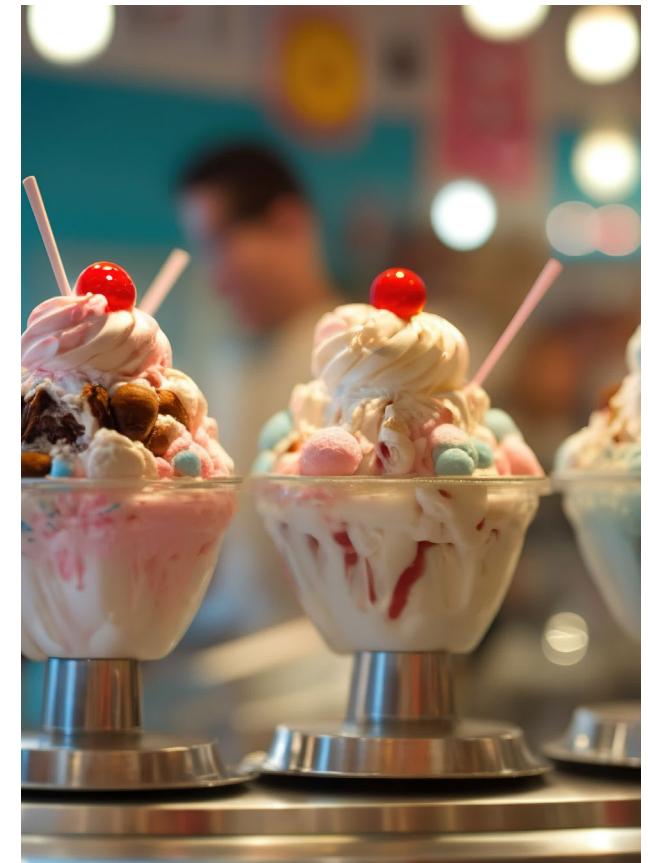
# Moral Hazard: Example

- Principal: less information (stockholder)
- Agent: more information (manager)
- Separation of ownership and control of the firm: Managers pursue personal benefits and power rather than the profitability of the firm.



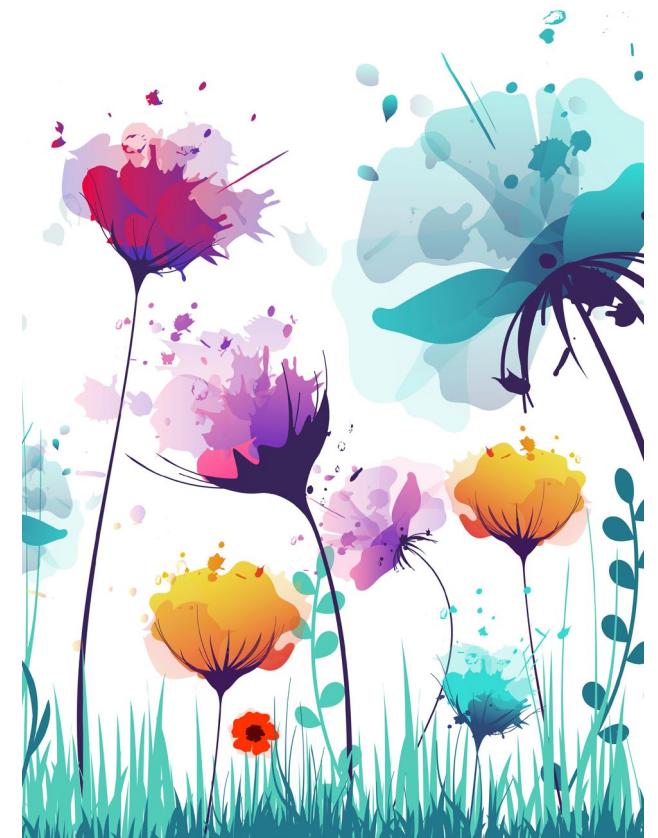
# Moral Hazard: Example - Equity

- Suppose that your friend Steve asks you to become a silent partner in his **ice-cream store**.
- The store requires an investment of \$10,000 to set up and Steve has only \$1,000.
- So you purchase an **equity stake (stock shares)** for \$9,000, which entitles you to 90% of the ownership of the firm, while Steve owns only 10%.
- If Steve makes good efforts, after all expenses (including Steve's salary), the store will have \$50,000 in profits per year.
- Then Steve receives 10% (**\$5,000**) and you receive 90% (**\$45,000**).



# Moral Hazard: Example - Investment

- If Steve doesn't do a good job and uses the \$50,000 in income to buy **artwork** for his office, the store will not earn any profit.
- Steve can earn the additional \$5,000 (his 10% share of the profits) over his salary only if he works **hard** and **forges unproductive investments** (such as art for his office).
- Because the store won't show any profits, Steve's decision not to act in your interest will cost you **\$45,000** (your 90% of the profits if he had chosen to be a good manager instead).



# Moral Hazard: Example – Worse Scenario



- A **worse scenario** is possible: Because his ice-cream store is a cash business, Steve has the incentive to **pocket \$50,000** in cash and tell you that the profits were zero.
- He now gets a return of \$50,000, but you get nothing.

# Debt Contract: Example

- Instead, you lend Steve the \$9,000 he needs to set up his business and have a **debt contract** that pays you an interest rate of 10%.
- **Risky Investment Opportunity** for Steve
  - Instead of opening up the ice-cream store, Steve might use your \$9,000 loan to invest in **chemical research equipment**.
  - If Steve is successful, he will become a multimillionaire.

# Debt Contract: Example

- You would be **unhappy** if Steve used your loan for the riskier investment, because if he were **unsuccessful**, you would lose most, if not all, of the money you gave him.
- If he were **successful**, you wouldn't share in his success—you would still get **only a 10% return** on the loan because the principal and interest payments are fixed.





## Debt Contract: Example

- Because of the **potential moral hazard** (that Steve might use your money to finance a very risky venture), you would probably not make the loan to Steve, even though an ice-cream store in the neighbourhood is a good investment that would provide benefits for everyone.
- What if Steve has \$9,000 and only needs \$1,000 from you?
- The amount Steve puts decreases the probability that Steve works poorly for the business.

# Net Worth and Debt Contract: Example

- Steve is more likely to invest in the ice-cream store, which is more of a sure thing.
- Hence when Steve has more of his own money (net worth) in the business, you are more likely to make him the loan.





## How Moral Hazard Influences Financial Structure in Debt Markets

- Borrowers have incentives to take on projects that are riskier than the lenders would like.
- This prevents the borrower from paying back the loan.



# How to Help Solve Moral Hazard in Debt Contracts

- **Incentive compatible contracts** align the incentives of the borrower with those of the lender.
- The greater the borrower's net worth, the greater the borrower's incentive to behave in the way that the lender desires.
- The smaller the moral hazard problem in the debt contract is, the easier it is for the firm to borrow.

# Monitoring and Enforcement: Restrictive Covenants

- A **restrictive covenant** is a provision that imposes **certain restrictions** on the borrower's actions during the term of the loan.
- Its aim is to **protect the lender's interests** and ensure that the borrower maintains **certain financial standards** throughout the duration of the loan.

# Restrictive Covenants: Example

- Discourage undesirable behavior (Restricted Use)
- Encourage desirable behavior (Life Insurance)
- Keep collateral valuable (Automobile Theft Insurance)
- Provide information (Right to See Firm's Book)



# Topic five

Principal-Agent Problem

# Principal-agent Problem

- You wish to hire Steve to manage your Ice Cream Shop.
- The profits from the shop depend partially on how hard Steve works, as follows.

Profit Probabilities		
	Profit = \$20,000	Profit = \$40,000
Lazy	70%	30%
Hard worker	30%	70%

# Principal-agent Problem

- If Steve is lazy, he will surf the Internet all day, and he views this as a zero-cost opportunity
- However, Steve views working hard as a “personal cost” valued at \$2,000.
- What fixed percentage of the profits should you offer Steve?
- Assume Steve cares only about his expected payment less any “personal cost.”





Q4. What is your expected payoff when Steve is lazy?

$$\begin{aligned} & \$20,000 \times 0.7 \\ & + \$40,000 \times 0.3 \\ & = \$26,000 \end{aligned}$$

$$\begin{aligned} & \$20,000 \times 0.3 \\ & + \$40,000 \times 0.7 \\ & = \$34,000 \end{aligned}$$



Q5. What is your expected payoff  
when Steve is hard-working?

$$\begin{aligned} & \$20,000 \times 0.7 \\ & + \$40,000 \times 0.3 \\ & = \$26,000 \end{aligned}$$

$$\begin{aligned} & \$20,000 \times 0.3 \\ & + \$40,000 \times 0.7 \\ & = \$34,000 \end{aligned}$$



# Q4 & Q5: Your Expected Profit

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- Your expected profit is:
  - If **Lazy**,  
$$\$20,000 \times 0.7 + \$40,000 \times 0.3 = \$26,000.$$
  - If **Hard Worker**,  
$$\begin{aligned} \$20,000 \times 0.3 + \$40,000 \times 0.7 \\ = \$34,000. \end{aligned}$$



# Incentive Compatible Contract

- Suppose you offer  $R$  portion of the profits.
- For Steve,
  - If Lazy,  
$$(\$20,000 \times R) \times 0.7 + (\$40,000 \times R) \times 0.3$$
  - If Hard Worker,  
$$(\$20,000 \times R) \times 0.3 + (\$40,000 \times R) \times 0.7 - \$2000$$
- You want Steve to Hard Work. Thus,  
$$\begin{aligned} & (\$20,000 \times R) \times 0.7 + (\$40,000 \times R) \times 0.3 \text{ (Lazy)} \\ & \leq (\$20,000 \times R) \times 0.3 + (\$40,000 \times R) \times 0.7 - \\ & \quad \$2000 \text{ (Hard Work)} \end{aligned}$$
- You should offer Steve at least **25%** of the profits.

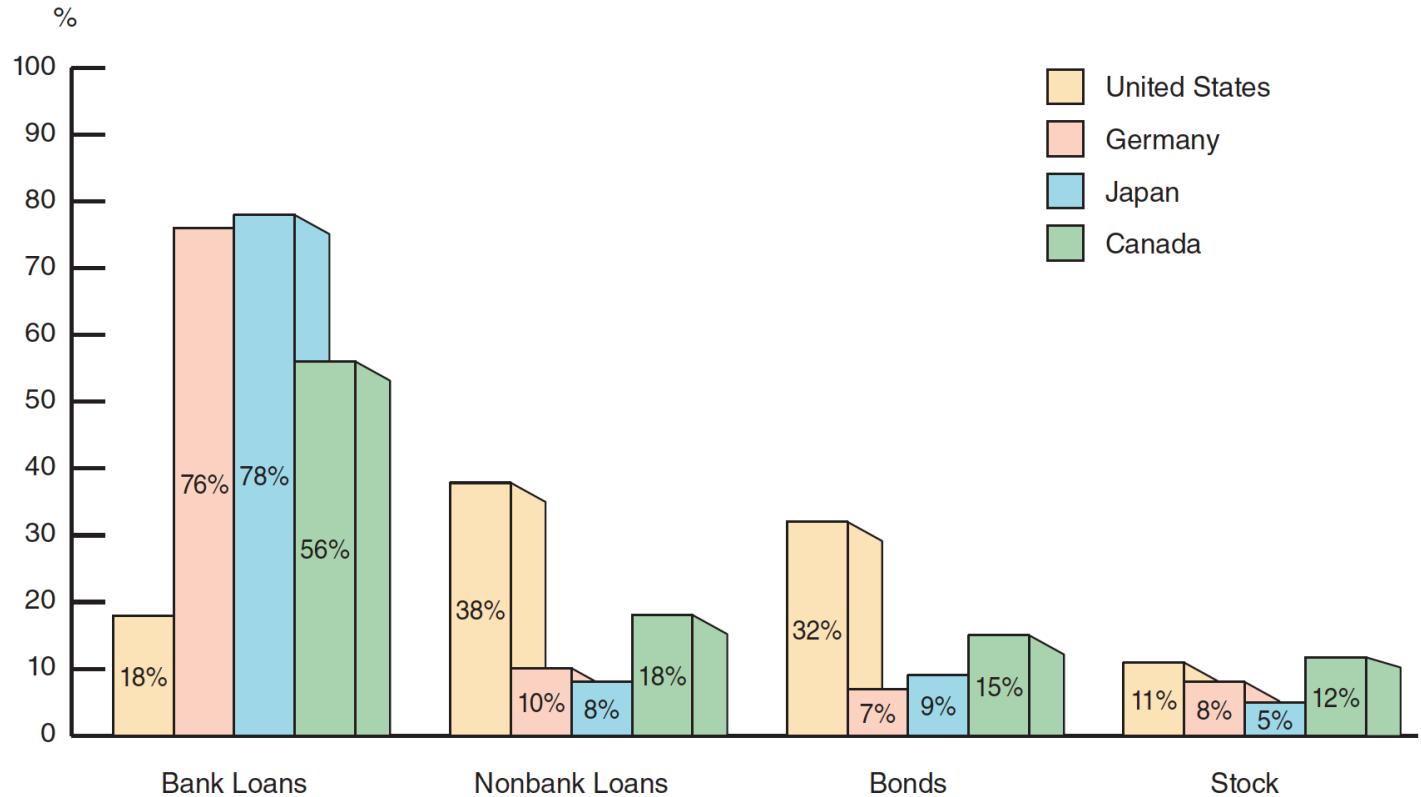


# Incentive Compatible

- You want Steve to Hard Work. Thus, if
$$\begin{aligned} & \$ (20,000 \times R) \times 0.7 + \$ (40,000 \times R) \times 0.3 \\ \leq & \$ (20,000 \times R) \times 0.3 + \$ (40,000 \times R) \times 0.7 - \\ & \$ 2000, \end{aligned}$$
then Steve should work hard.
- You should offer Steve at least **25%** of the profits, because
- $\$ 2000 \leq 0.4 \times R \times (\$ 40,000 - \$ 20,000)$ .
- $\$ 2000 \div \$ 8000 \leq R$ .

Banks are the  
most important  
source of external  
funds.

Figure 1: Sources of External Funds for Nonfinancial Businesses

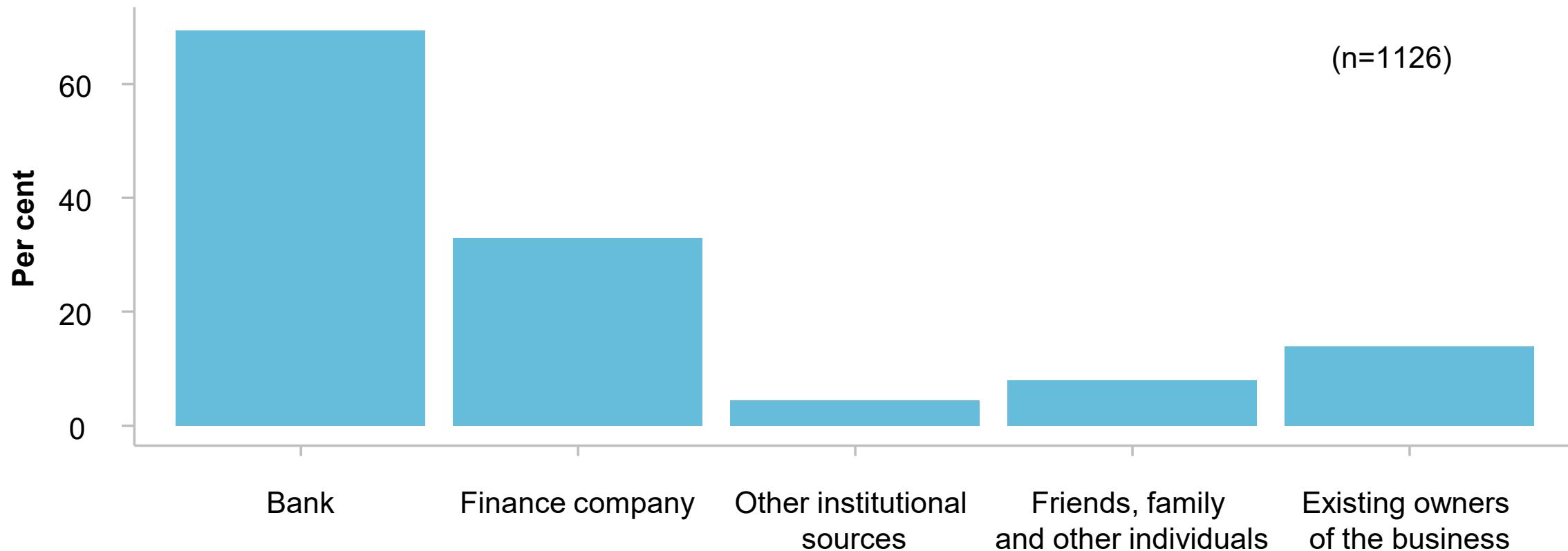


- Source: Andreas Hackethal and Reinhard H. Schmidt, "Financing Patterns: Measurement Concepts and Empirical Results," Johann Wolfgang Goethe-Universität Working Paper No. 125, January 2004. The data are from 1970–2000 and are gross flows as percentage of the total, not including trade and other credit data, which are not available.

Banks were the most frequently approached lenders in Australia as well.

- Share of SMEs that approached each lender (of all SMEs that applied for debt finance), 2017-18

From “Small business access to finance: The evolving lending market,” by Australian Government, Productivity Commission in September 2021



# Transaction Costs

- Financial intermediaries have evolved to reduce transaction costs.
- Economies of scale: Economies of scale refer to the cost advantages that arise when the scale of production or operation increases.
- Expertise: Financial intermediaries can specialize in specific financial services, such as lending, underwriting, or asset management.

# Financial intermediation

- Financial intermediaries—particularly banks—making private loans receives the benefits of monitoring and enforcement and will work to shrink the moral hazard problem inherent in debt contracts.
- The concept of moral hazard has provided us with additional reasons why financial intermediaries play a more important role in channelling funds from savers to borrowers than marketable securities do.



# Nick Leeson and the Collapse of the Barings Bank in 1995

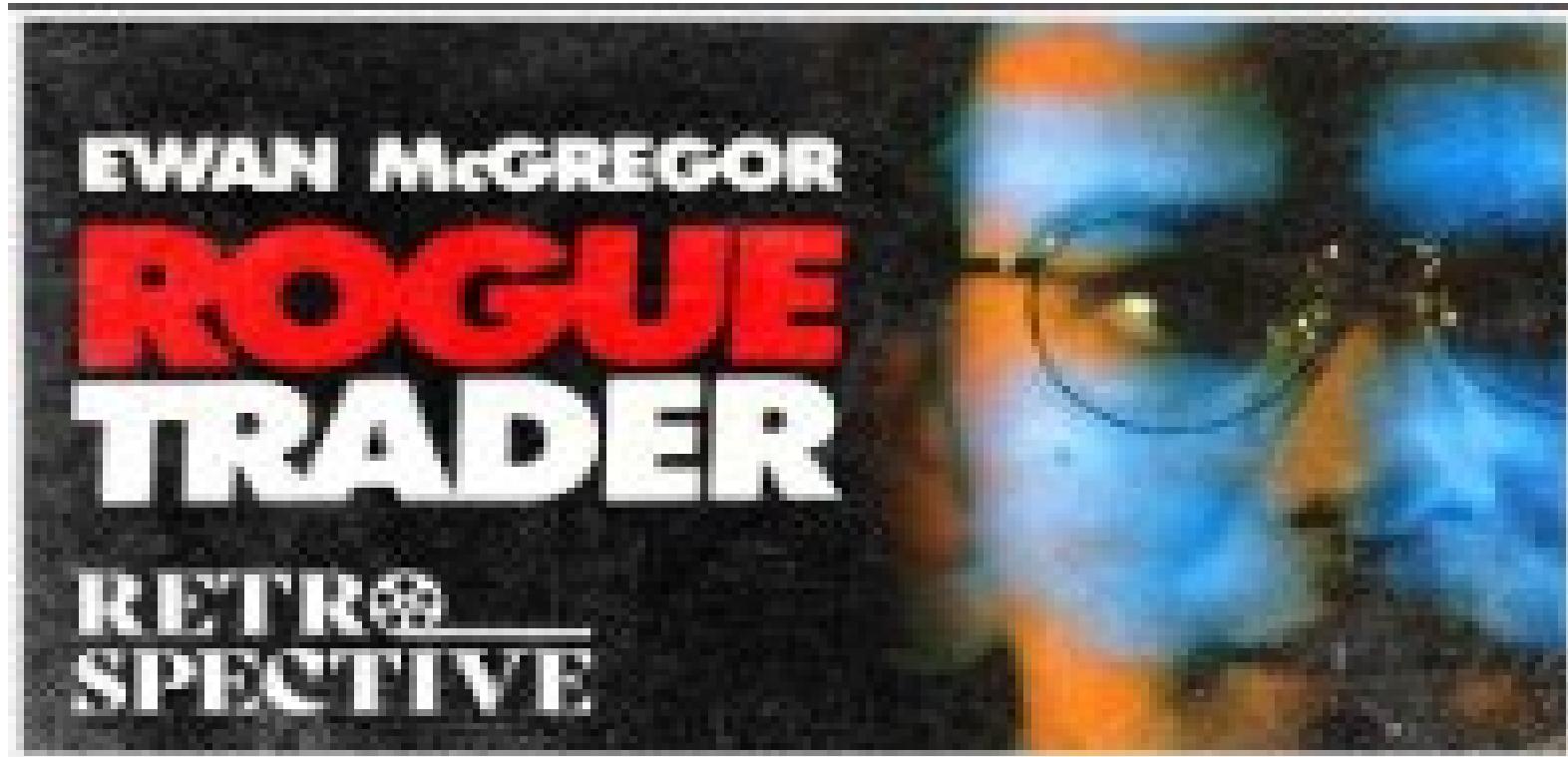


Source: *Business Insider*

# Rogue Traders and the Principal–Agent Problem

- Barings bank was founded in 1762, one of the oldest mercantile banks in England.
  - Collapsed in 1995 single-handedly due to Nick Leeson.
- In 1992, Leeson was appointed general manager of Barings' new operation in futures market in Singapore.
  - Denied a broker's license in the UK because of fraudulent application.
- Speculative trades first brought huge profit for Barings.
- Doubling strategy
  - Every time he lost money, he would bet double the amount that was lost in order to recoup the amount.
  - Hid his loss in the error 88888 account.
- 17 January 1995: Kobe earthquake → £50 million → eventual loss of £827 million

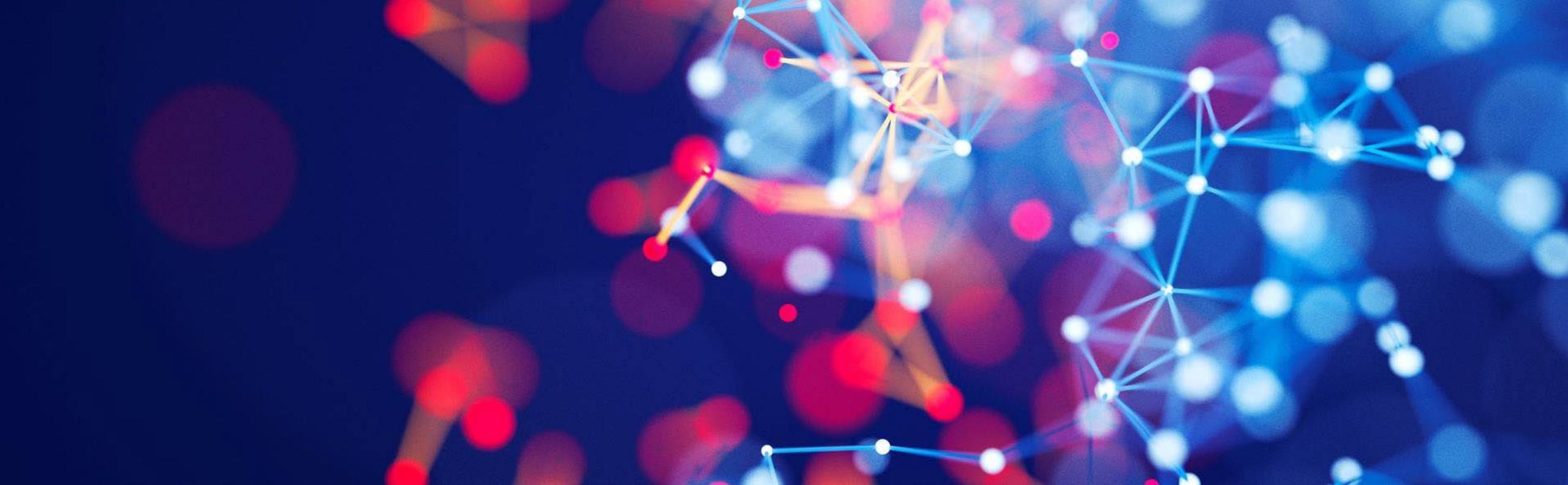
# Rogue Trader



Ewan McGregor, Anna Friel Drama Full Movie | Rogue Trader (1999) | Retrospective (1:06:03 – 1:09:01)

<https://www.youtube.com/watch?v=SclDzvDWrd>

# Summary

A complex network graph composed of numerous small, glowing nodes (red, blue, white) connected by thin lines, set against a dark blue background.

In conclusion, asymmetric information is a pervasive phenomenon in economic and financial interactions that arises when one party possesses more or better information than the other. This information asymmetry can lead to adverse outcomes, such as adverse selection and moral hazard, where the less-informed party suffers disadvantages or faces increased risks.

# Feedback for Topic 4

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- [https://padletuq.padlet.org/Shino/econ  
2103-shared-thoughts-topic-4-  
kfpz8e7d3niarw2h](https://padletuq.padlet.org/Shino/econ2103-shared-thoughts-topic-4-kfpz8e7d3niarw2h)



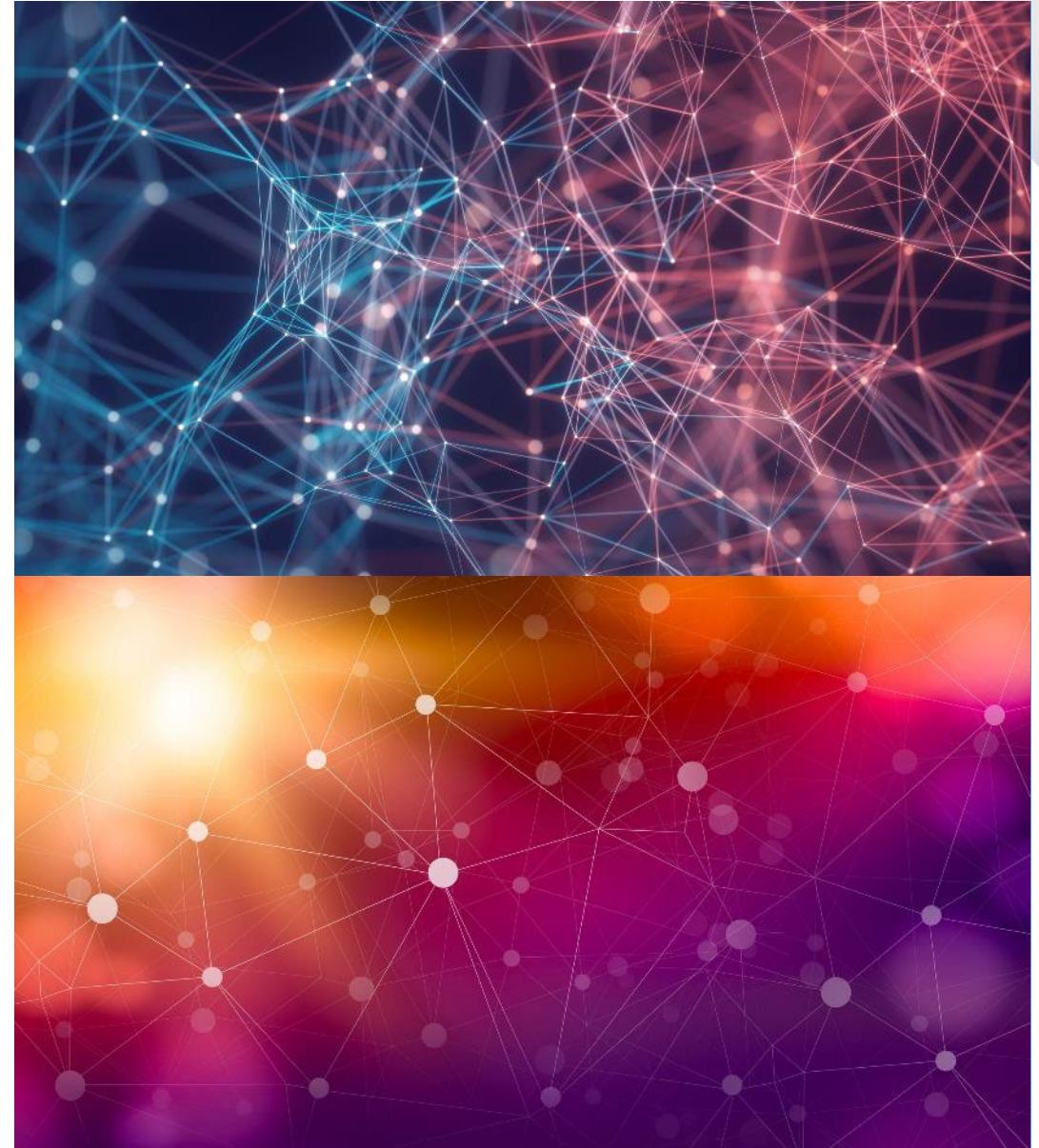
# Thank You

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# Source

- Chapter 8, “An Economic Analysis of Financial Structure,” in “*The Economics of Money, Banking, and Financial Markets*,” by F. S. Mishkin, Pearson, Twelfth Edition.
- Chapter 10, “Contingent Claims and Contingent Strategies,” in “*Financial Economics*,” by F. J. Fabozzi, E.H. Neave, and G. Zhou, Wiley.
- “Small business access to finance: The evolving lending market,” by Australian Government, Productivity Commission in September 2021
- Image sources: iStock, Commons Wikimedia and Adobe Stock.