

Financial Economics

ECON2103

Lecture 7:
Behavioural Finance
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Introduction

- Rational expectations theory assumes that individuals are rational and make optimal choices, behavioural finance acknowledges that human decision-making is influenced by cognitive biases and emotions. In this lecture, we will study the history of developments in this topic.

Agenda

Introduction

Review: CAPM and Rational Expectations

Topic one: The Efficient Market Hypothesis

Topic two: Behavioral Finance

Topic three: The Tulipmania

Summary





Learning Objectives

- Explain how individuals form expectations by using all available information in a logical manner.
- Identify the assumptions underlying rational expectations theory.
- Explore important concepts in behavioural finance including overconfidence and optimism.

Review

CAPM and Rational Expectation



$$\text{CAPM Formula: } E(r_p) = r_f + \beta_p (E(r_m) - r_f)$$

$E(r_p)$: Expected Return of security p

r_f : Risk-free return rate

$E(r_m)$: Average return on all securities

β_p : The security's beta risk factor

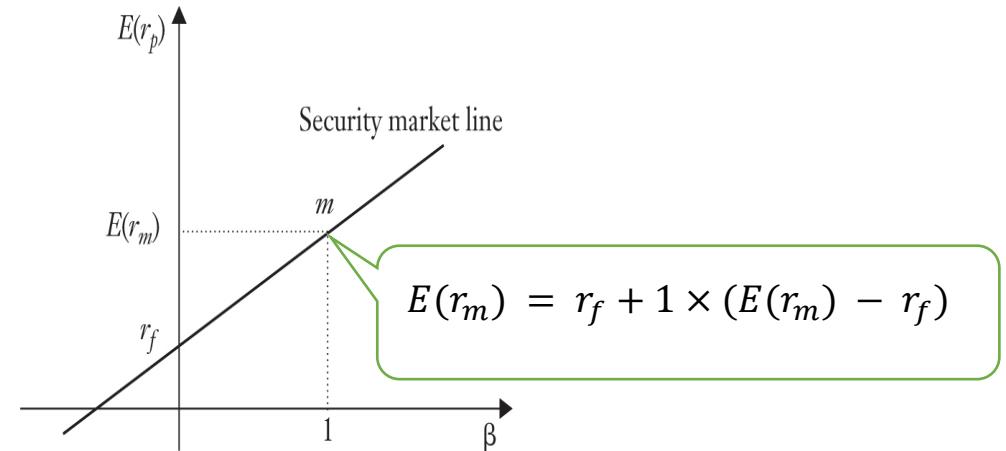
Intuition

Assets with **lower risk** have **lower expected returns**.

Assets with **higher risk** have **higher expected returns**.

Notice that if $\beta_p > 0$, security p moves with the market portfolio, while if $\beta_p < 0$, it moves in the opposite direction.

FIGURE 14.3
SECURITY MARKET LINE

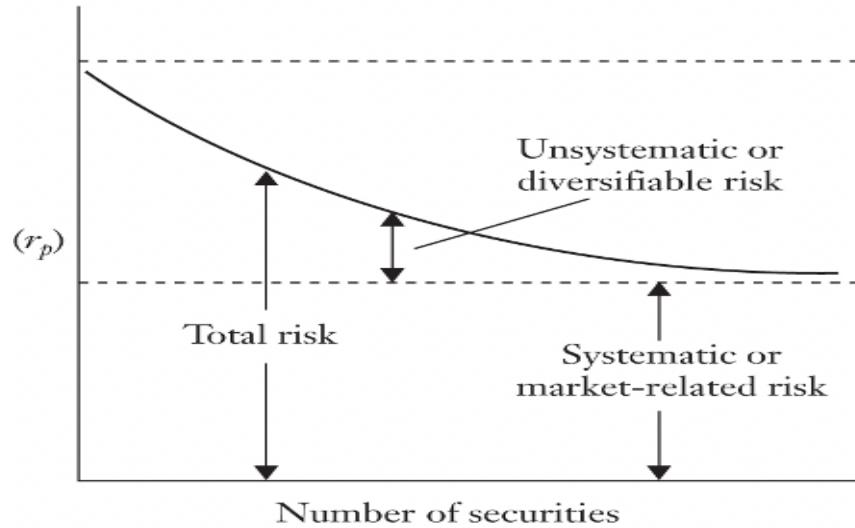




Risk

- Investment risk is defined as the probability of occurrence of losses relative to the expected return on any particular investment.
- The term $E(r_m) - r_f$ is known as the **market risk premium**.
- It is the return in excess of the risk-free return, and represents the premium required for taking on market risk.
- The possibility that investors will lose money when they invest in an asset.

Total Risk = Systematic Risk + Unsystematic Risk



- **Systematic risk**, also referred to as **non-diversifiable risk**, is the risk related to the **market** and is measured by **beta**.
- **Unsystematic risk** is the risk that can be diversified away.

- The **variance** of returns are both measures of how **dispersed** returns can be—the greater the dispersion, the greater the variance:

$$\text{var}(r_p) = \sigma^2(r_p) = E[r_p - E(r_p)]^2.$$
- $\sigma(r_p)$ is the **standard deviation** of the individual investor's portfolio return.
- Ex: When r_p is 10% with $\frac{1}{2}$ chance and -10% with $\frac{1}{2}$ chance, $E(r_p) = 0$, $\text{var}(r_p) = 0.01$ and $\sigma(r_p) = 0.1$; When r_p is 20% with $\frac{1}{2}$ chance and -20% with $\frac{1}{2}$ chance, $E(r_p) = 0$, $\text{var}(r_p) = 0.04$ and $\sigma(r_p) = 0.2$

Example: Motor and Food

- Assume that there are only two corporations, **Motor** and **Food**, and that both companies have issued **stock** and no other securities.
- Assume the total numbers of shares issued by **Motor** and **Food** are **100** and **150**, respectively, and that the market price per share of **Motor** is **\$5** and for **Food** it is **\$2**.
- The market value of **Motor** is then **\$500** and **Food** is **\$300**, so that the total market value is **\$800**.



Example: Motor and Food

- How much return should an investor expect to get out of an individual security?
- Assume their respective **beta risks** (β_p) are **1.5** and **0.8**.
- Suppose the **risk-free rate** (r_f) is **3%** and the **expected market return** ($E(r_m)$) is **11%**.
- Then, the **market risk premium** ($E(r_m) - r_f$) is **8%** ($= 11\% - 3\%$).
- Based on the CAPM, the expected returns will be:

Motor: **15%** ($= 3\% + 1.5 \times 8\%$) and Food: **9.4%** ($= 3\% + 0.8 \times 8\%$)

- This says that, in comparison with Food, Motor should have an expected return of 15% due to its higher beta risk

$$\text{Note: } E(r_p) = r_f + \beta_p (E(r_m) - r_f)$$

Criticism for CAPM

- CAPM has been criticized for its assumptions, including the assumption that all investors have the same information.
- Nevertheless, it remains a popular and widely used tool for evaluating investment opportunities and assessing portfolio risk.

Efficient Market Hypothesis

- Adaptive Expectation: Expectations are formed from past experience only.
- Rational Expectation: Expectations will be identical to optimal forecasts using all available information.
- The application of the theory of rational expectations to financial markets is called the **efficient market hypothesis (EMH)**.



Eugene Fama, the originator of EMH, and Robert Shiller, one of the founders of behavioural finance, won the Nobel prize in 2013.
Source: *The Guardian*

Formal Statement : the Theory of Rational Expectation

- The expectation of X equals the optimal forecast using all available information:
$$X^e = X^{of}$$
- Let X^e denote the expectation of the variable that is being forecast.
- Let X^{of} denote optimal forecast using all available information.

Topic one

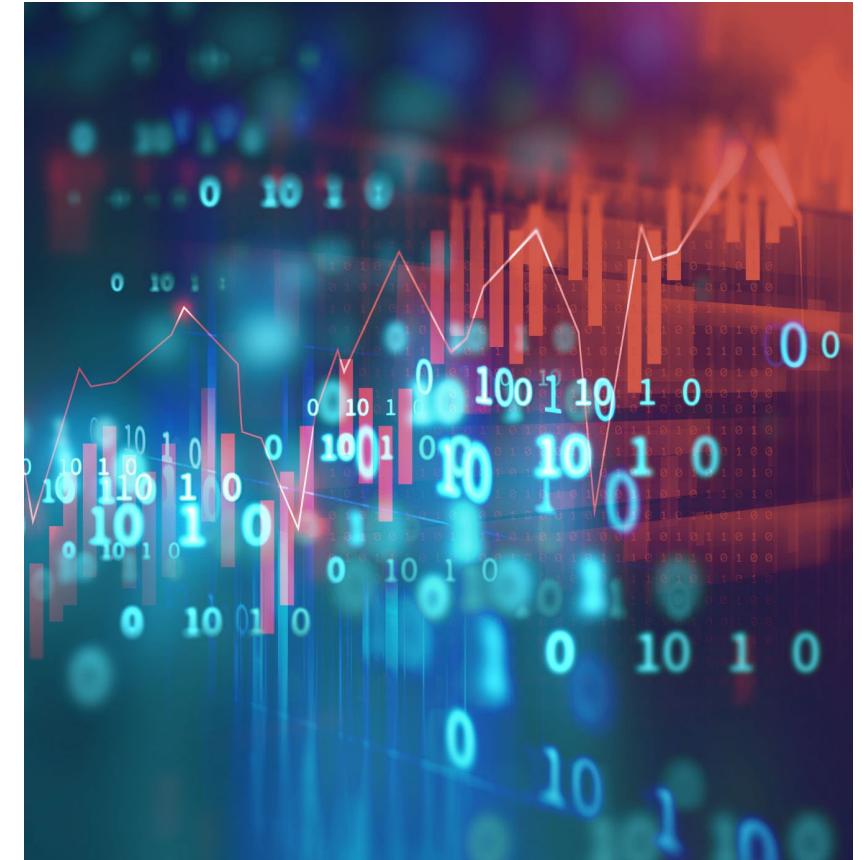
Efficient Market Hypothesis



Review: Rate of Return

- Let R denote the rate of return on the security.
- Let P_{t+1} denote the price of the security at time $t + 1$, the end of the holding period.
- Let P_t denote the price of the security at time t , the beginning of the holding period.
- The rate of return holding a security equals the sum of the capital gain on the security plus any cash payments divided by the initial purchase price of the security:

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



Equilibrium under EMH

- At the beginning of periods, we know P_t and C .
- At that time, P_{t+1} is unknown and we must form an expectation of it.
- The expected return then is

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

- Expectations of future prices equal the optimal forecast using all currently available information: $P_{t+1}^e = P_{t+1}^{of}$.
- Thus, $R^e = R^{of}$.
- Supply and demand analysis states $R^e = R^*$. Thus, $R^* = R^{of}$.



Reaching Equilibrium under EMH

- $R^{of} > R^* \Rightarrow P_t \uparrow \Rightarrow R^{of} \downarrow$
- $R^{of} < R^* \Rightarrow P_t \downarrow \Rightarrow R^{of} \uparrow$
- Until
$$R^{of} = R^*$$
- In an efficient market, all unexploited profit opportunities will be eliminated.
- Rational expectations theory suggests that individuals' ability to make informed predictions leads to more efficient economic outcomes.

Why EMH Makes Sense: Arbitrage

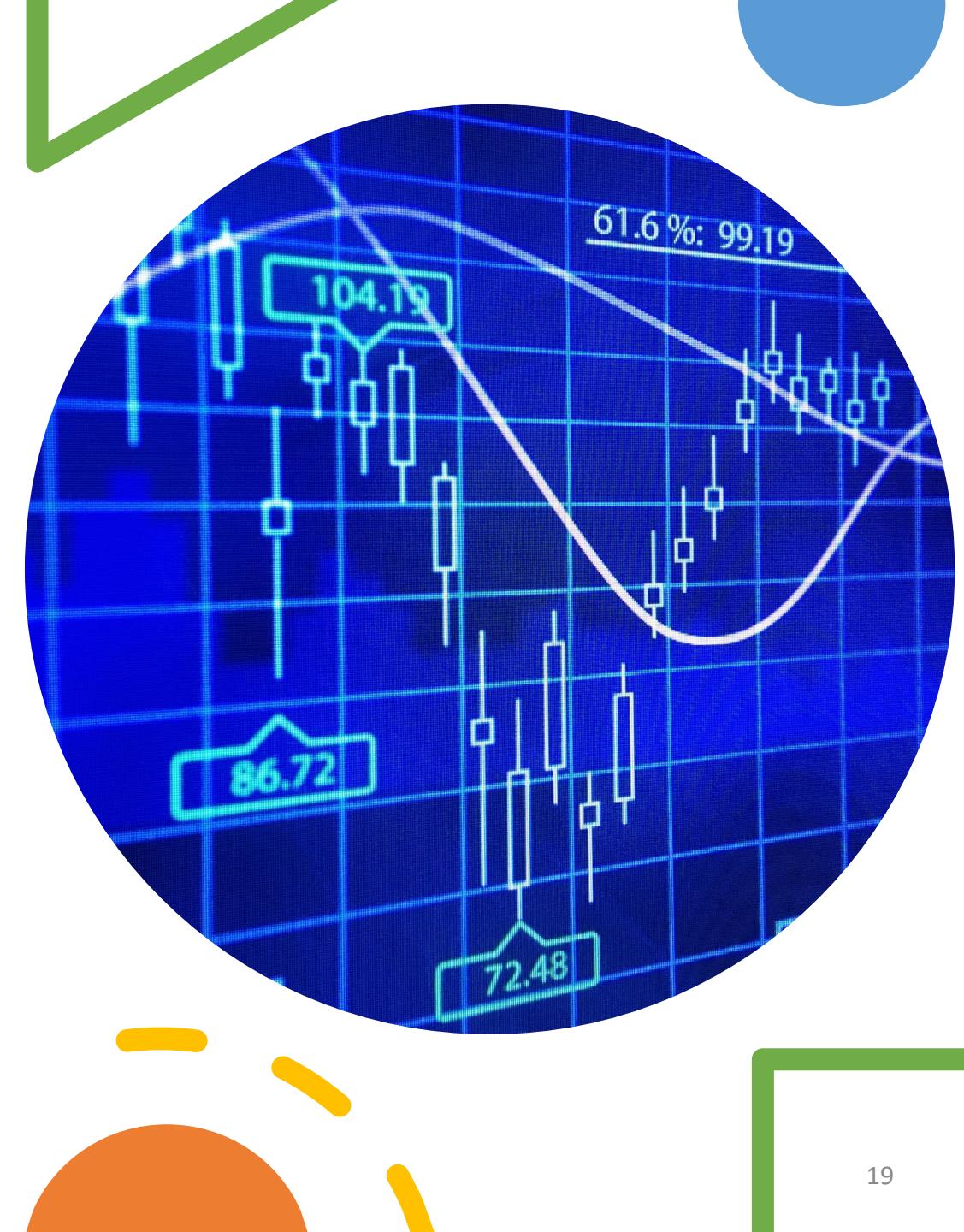
- Pure arbitrage: the elimination of unexploited profit opportunities involves no risk.
- Another type of arbitrage: The arbitrageur takes on some risk when eliminating the unexploited profit opportunities.



**Q. Suppose you're a currency trader
and you notice the following
exchange rates for the US dollar
(USD) and the Japanese yen (JPY):**

**In New York, 1 USD can buy 130 JPY.
In Tokyo, 1 USD can buy 120 JPY.**

Any arbitrage opportunity?



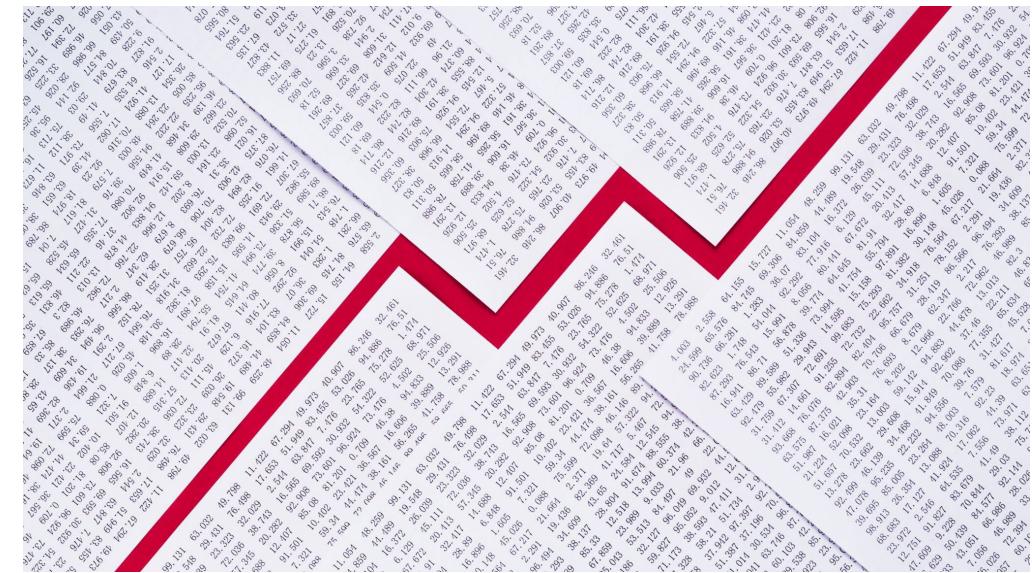
Answer: Yes

- Step 1: Buy USD using JPY in Tokyo
 - You convert 12,000 yen into USD at the exchange rate of 120 Yen per USD. You now have \$100.
- Step 2: Transfer \$100 to New York
- Step 3: Convert \$100 back to JPY in New York
 - In New York, you convert the \$100 back into JPY at the exchange rate of 130 Yen per USD. You get 13,000 yen.
- Your profit is $13,000 - 12,000 = 1,000$ yen



Random-Walk Behavior of Stock Prices

- Random walk describes the movement of a variable whose future values cannot be predicted because, given today's value, the value of the variable is just as likely to fall as it is to rise.
- An important implication of EMH is that stock prices should approximately follow a random walk, that is, future changes in stock prices should, for all practical purposes, be unpredictable.
- A “buy and hold” strategy is the most sensible strategy for the small investor.



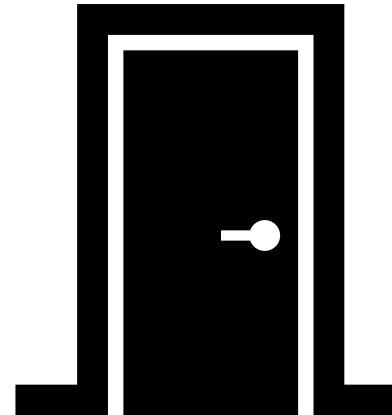
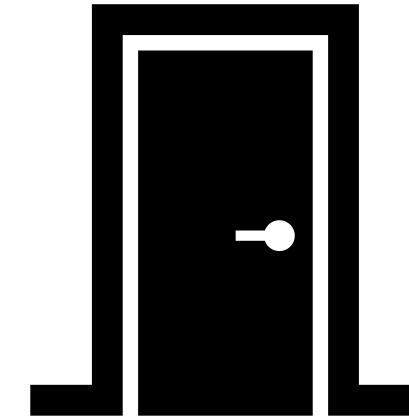
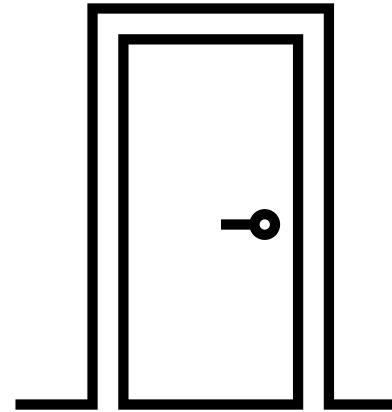
Topic two

Behavioral Finance



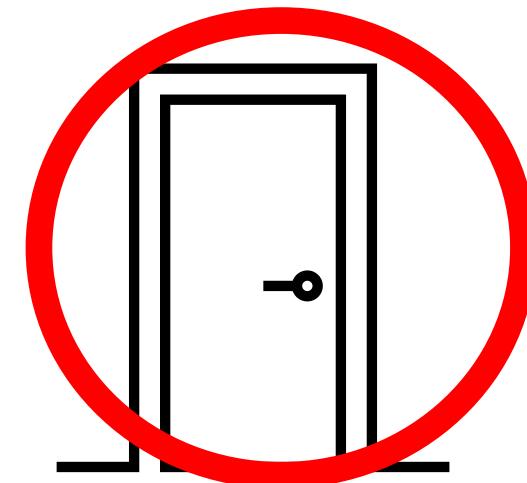
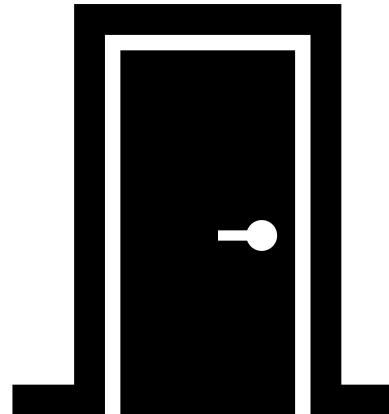
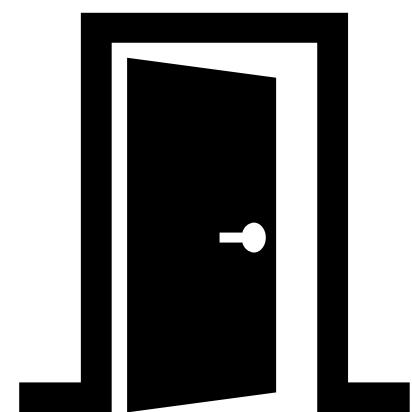
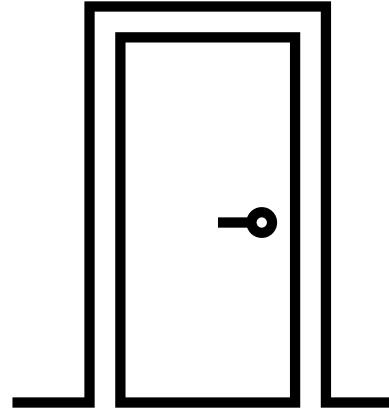
Discussion about Rational Expectation

- You are participating in a game show where you have the opportunity to choose one of four doors.
- Behind one door is a grand prize, and behind the other two doors are small prizes.
- Suppose that you have guessed that the grand prize is behind the red circled one.



Discussion about Rational Expectation

- Before you make your choice, the game show host, who knows what's behind each door, opens one of the other three doors to reveal a small prize.
- Now, you have the option to either stick with your original choice or switch to the remaining unopened door.
- What would you do in this situation, and why?



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Behavioural finance

- Behavioural finance examines how **psychology** affects the agents' decisions.
- Psychology has identified several features of how agents choose probability distributions in practice.



Overconfidence and optimism

- **Overconfidence:** In practice agents overestimate the probabilities of relatively likely events, and underestimate the probabilities with which relatively unlikely events occur.
- **Optimism and wishful thinking:** Most people display unrealistically optimistic estimates of personal capabilities.
 - People often predict that tasks can be completed much more quickly than usually proves to be the case.

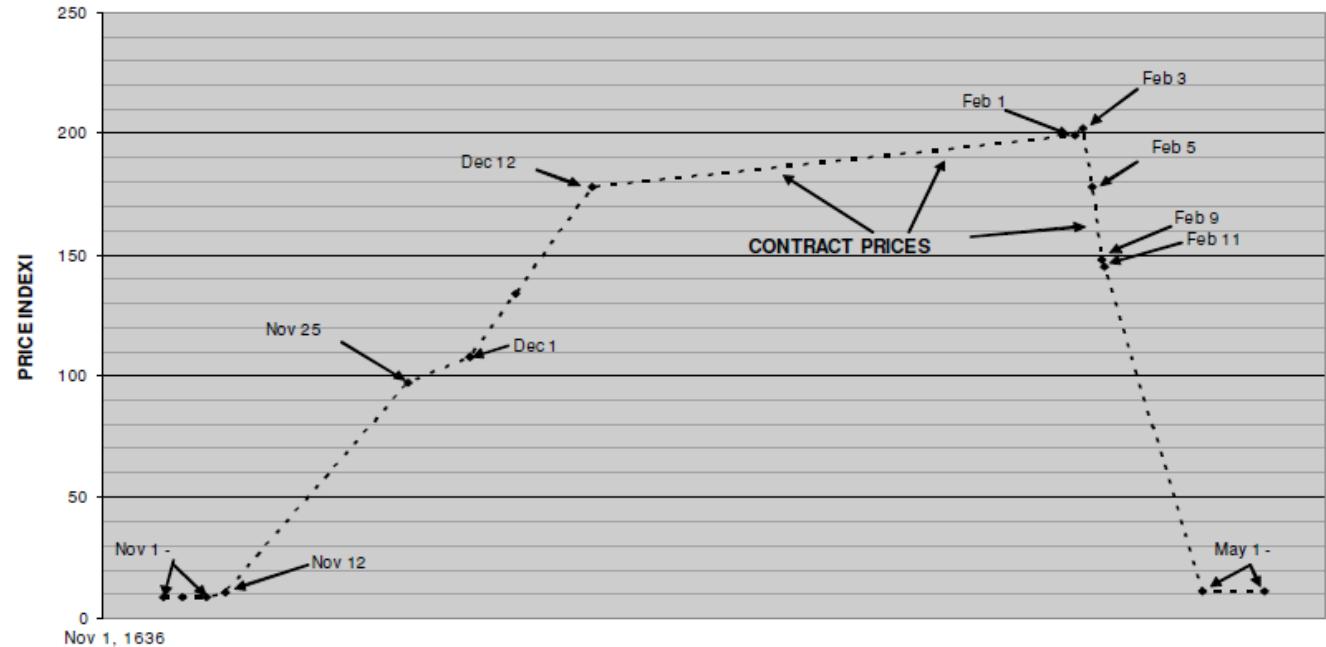


Topic three

The Tulipmania



Charles Mackay's 1841 book "Extraordinary Popular Delusions and the Madness of Crowds" popularized the story of Tulipmania, framing it as a cautionary tale of irrational financial behavior.



Source: *Thompson (2006)*



The Tulipmania (1636 – 1637)

A bulb named Semper Augustus sold for more than the cost of a mansion in a fashionable Amsterdam neighbourhood.



Source: Wikimedia Commons

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Source: Adobe Stocks

A sailor who mistook a rare tulip bulb for an onion and ate it with his herring sandwich was charged with a felony and thrown in prison.

The tulipmania: Fact or artifact? by Earl A. Thompson

- It claimed that the Tulipmania cannot be considered a bubble because bubbles require prices to exceed fundamental values.
- In **futures contracts**, buyers agree to purchase an asset at a predetermined price on a specified future date.
- In **options contracts**, buyers have the right but not the obligation to buy or sell an asset at a predetermined price within a specified time frame.
- By converting **futures contracts** into **options**, buyers were effectively mitigating their risk and locking in prices without being obligated to follow through with the purchase.

Tulipmania: Bubble or Not?

- Thomson (2006) claims that it was just a **contractual arrangement** without **mutually agreed-upon prices** exceeding fundamental values.
- Modern scholars have questioned the accuracy of Mackay's narrative, suggesting that Tulipmania may have been more complex than initially portrayed.
- Tulipmania's true nature is still debated among economists and historians.
- Was it a genuine economic bubble, or a result of exaggerated storytelling?



From 'Flora's Wagon of Fools' by Hendrik Gerritsz Pot, 1640. (Flickr/Laura Blanchard)

Discussion: Herding Behaviour

- Imagine you are an investor in the stock market, and you notice that a particular stock's price is rapidly increasing, attracting significant attention and media coverage.
- Many investors and analysts are buying into this stock.
- Among your friends, it seems to be a hot topic of discussion.
- However, you have doubts about the company's long-term prospects and believe its valuation might be inflated.
- What would you do in this situation, and why?



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

Summary

The Efficient Market Hypothesis (EMH) remains a key concept in financial economics, suggesting that asset prices fully reflect available information. While subject to debates, understanding its forms can provide valuable insights for us. We also studied a historical event related to panics in financial markets.

Feedback for Topic 7

- [https://padletuq.padlet.org/Shino/econ
2103-shared-thoughts-topic-7-
1f08dq5o13ik4krf](https://padletuq.padlet.org/Shino/econ2103-shared-thoughts-topic-7-1f08dq5o13ik4krf)



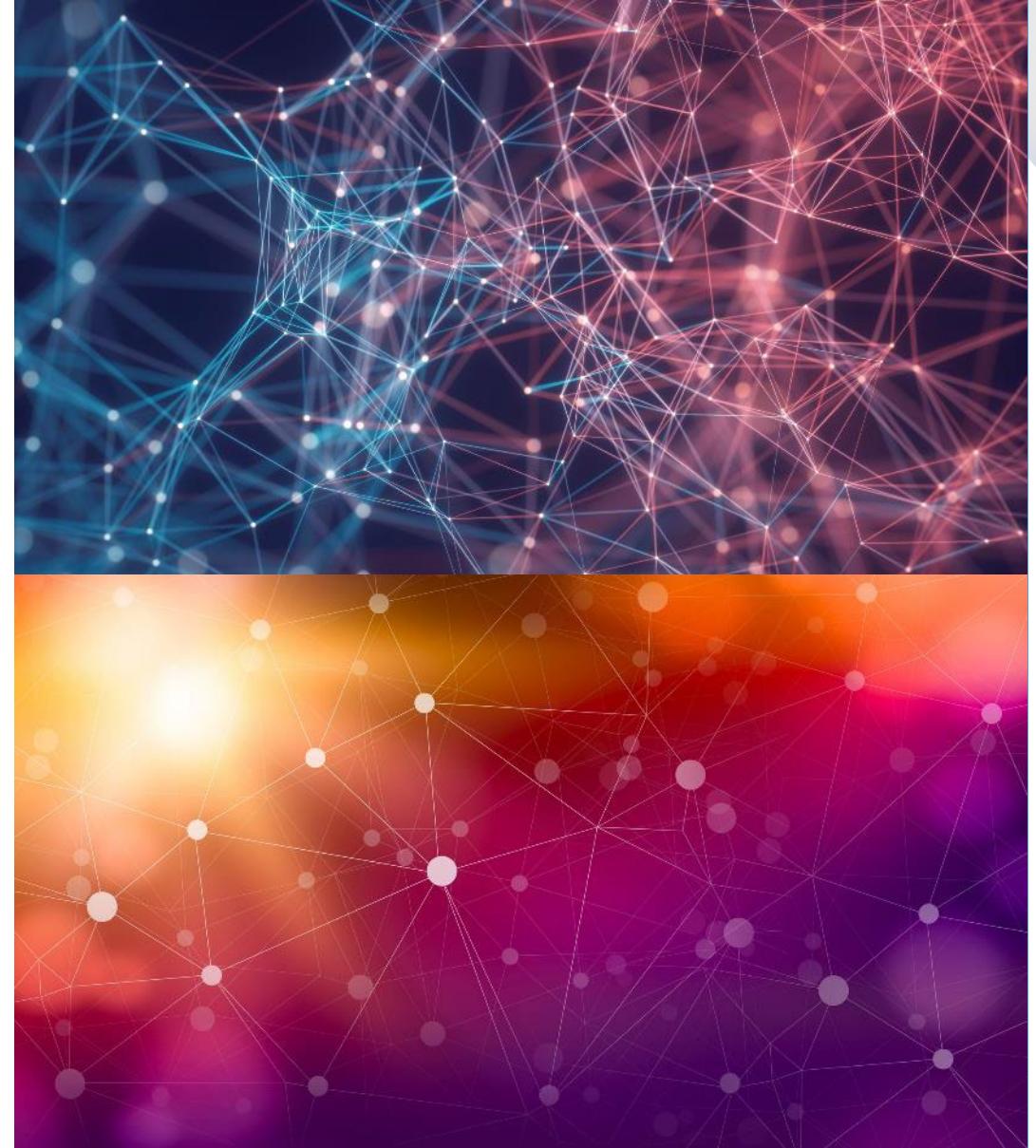
Thank You

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Source

- Chapter 7, “The Stock Market, the Theory of Rational Expectations, and the Efficient Market Hypothesis,” in *“The Economics of Money, Banking, and Financial Markets,”* by F. S. Mishkin, Pearson, Twelfth Edition.
- Chapter 9, “The Microeconomics Foundation of Financial Economics,” in *“Financial Economics,”* by F. J. Fabozzi, E.H. Neave, and G. Zhou, Wiley.
- *“Extraordinary popular delusions and the madness of crowds.”* Written by Mackay, Charles, published in 1956, by the publisher, Farrar, Straus & Giroux.
- *“The tulipmania: Fact or artifact?”* by Earl A. Thompson, published in Public Choice, 2006.
- Image sources: iStock, Commons Wikimedia and Adobe Stock.