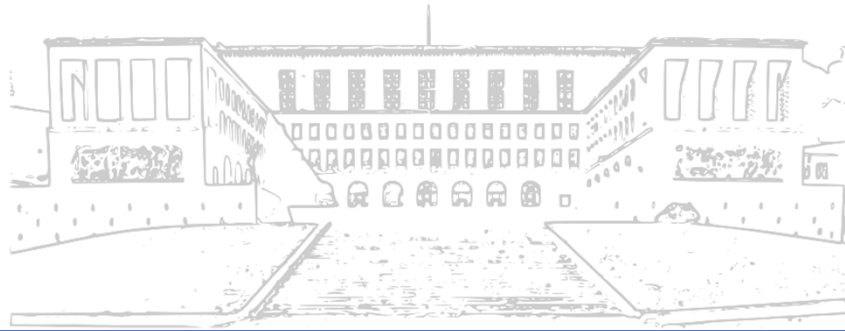


FINANCIAL MARKETS AND INSTITUTIONS

EFFICIENCY OF FINANCIAL MARKETS

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AGENDA

- The efficient market hypothesis
- Empirical evidence for EMH
- Empirical evidence against EMH
- Other evidence
- Contributions from behavioral finance

THE EFFICIENT MARKET HYPOTHESIS

Assumptions:

- prices of securities in an efficient market fully reflect all available information
- expectations are the best forecasts given all current information, providing efficiency through consistent buying/selling decisions
- risky arbitrage is possible: it eliminates all available profit opportunities in prices deviating from the optimal forecast
- all opportunities are quickly eliminated
- does not require all operators to be fully informed: just few arbitrageurs seeking “easy” profits can contribute to the overall market efficiency

Example:

You are walking inside a perfectly efficient market and you see a 50€ banknote on the sidewalk. What can you say about it?

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THE EFFICIENT MARKET HYPOTHESIS

Different forms of efficiency:

- **Allocative efficiency:** operators maximise their expected utility and grant that funds are transferred achieving the best total utility
- **Informative efficiency:** the market, as the results of the joint efforts of operators, can not be “beaten”
- **Technical efficiency:** transferring funds imply frictions, barriers, transaction costs that reduce the overall efficiency
- **Pricing efficiency:** the value of assets reflects the best forecast based on current information

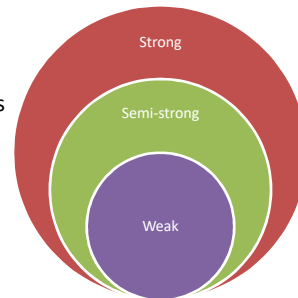
However, it is unlikely that a market is completely efficient or inefficient...

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THE EFFICIENT MARKET HYPOTHESIS

Forms of informative efficiency:

- **Weak:**
 - Prices are a function of past prices
 - Outperformers only by chance
 - Prices are random walks independent and without paths
- **Semi-strong:**
 - Prices incorporate public information
 - Insiders can outperform and increase efficiency
- **Strong:**
 - Prices reflect also private information
 - No outperformers



Nobel 2013: **Fama** (efficiency tests and asset pricing), **Shiller** (behavioural finance, irrationality, efficiency and bubbles), **Hansen** (GMM, stochastic discounting in asset pricing)

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THE EFFICIENT MARKET HYPOTHESIS

Evidence supporting EMH:

- Investment analysts, technical analysts and mutual fund managers do not perform better than randomly selected assets
- Past good performances do not support good performances in the future
- Positive announcements on publicly available information do not influence assets' performance
- Extremely good performances across time are linked with insider trading, private information or market influence
- Future changes in stock prices are unpredictable since they seem to follow a random walk



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THE EFFICIENT MARKET HYPOTHESIS

Example

If you have 5,000 £ and you want to invest them in UK stocks, who would you hire?

- Mark Goodson, expert financial advisor -2,6%
- Christeen Skiller, astrologist -5,3%
- Tia Laverne Roberts, 4 anni +0,7%

Results after one week?

(Experiment of R. Wiseman, 2001)

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THE EFFICIENT MARKET HYPOTHESIS

Evidence against the EMH:

- Small firms have higher returns in the long run than bigger firms, even controlling for their greater risk; explanations vary widely (portfolio rebalancing of investors, tax effects, liquidity effects, transaction costs)
- Recurrently, prices consistently rise between December and January, probably due to taxes (deduct losses by selling at years' end and repurchase later increasing assets' prices), but arbitrage seems slow
- Overreactions to new (especially bad) unexpected information, slow adjustments to correct prices later or with new data
- Market volatility is higher than changes in fundamentals (f.i. dividends)
- Stocks with low historical returns seem to perform better in the future and those with good past performances will do worse (mean reversion)

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THE EFFICIENT MARKET HYPOTHESIS

Market (or asset's) boom or crashes, bubbles and specific investor's good tracks are not necessarily inconsistent with EMH:

- Unexpected new information with impact on fundamentals could be more than just incremental, f.i.:
 - accounting frauds or "scandals" (Enron, Parmalat, ...)
 - unprecedented catastrophes (f.i. 9/11, earthquakes, hurricanes)
- "Rational" bubbles:
 - even if an asset is overvalued, as long as the expectation of others being ready to pay higher prices in the future holds, investors will not sell it to adjust the market
 - when expectations change, adjustments are quick and sharp
- Some institutional investors seem to overperform consistently:
 - however, ruling out private information is not always possible
 - are usually linked with huge corporations, exerting influence
 - past cases often anticipated criminal charges...

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BEHAVIOURAL HYPOTHESIS

Many assumptions of economic theory require:

- rational, perfectly informed and optimally acting operators
- whose behavior is based on optimizing functions (utility, profit, ...)
- Behavioral finance investigates human behavior in economic and financial decisions, applying concepts of psychology, sociology, etc. in the case of imperfect markets and irrational operators that act on rules of thumb

Example: you are going to watch a 10€ movie and...

- A) you lose the ticket... do you buy it again?
- B) you lose 10€... do you buy the ticket?

Y	N
46%	54%
88%	12%

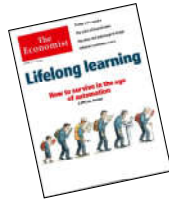


Nobel 2002: **Kahneman** (psychologist) and **Smith**, for their studies on behavioural finance.

Nobel 2017: **Thaler**, for his contribution on behavioural economics

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BEHAVIOURAL HYPOTHESIS



Example:
Paper subscription



OPTION A

- only *online*: 59\$ **16%**
- only *print*: 125\$ **0%**
- *online & print*: 125\$ **84%**

OPTION B

- only *online*: 59\$ **68%**
- *online & print*: 125\$ **32%**

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BEHAVIOURAL HYPOTHESIS

Selected findings:

- Short selling happens in the area of losses, and people are loss averse: losses are regretted more than gains are welcomed, hence little short selling is actually present, assets tend to be overvalued
- Overconfidence of people, in particular of being able to beat the market, is common
- Herd behavior, "others are doing it, it must be right"
- Irrational optimism, "BTC are the future! Strong buy!"
- Confirmation/attribution bias: "I am earning on this investment, I am good at choosing!", "I am losing on this investment, let's but more since I can't be that wrong!"
- ... and much more

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EXAMPLES

Facebook's IPO in short:

- Before going public in 2012, the company received a number of very different estimations, from 10-15 bln \$ in 2007-09, to 59 bln \$ in 2011
- The closer to 18th May, the higher the expectation: from the original offer of 5 bln \$ stocks, n. of shares sold was raised and the final amount achieved 16 bln \$
- Markets (mostly) euphoric on fixing pricing targets: from 26\$/s to 28-38\$/s, to 34-38\$/s (company), to 40\$/s up to 46\$/s (analysts, with expectations of day 1 growth up to 80\$/s)
- Day 1 of trading with technical problems: initial trading soaring to 45\$/s, soon falling back to slightly more than the target price (38\$/s).
- In less than one month, price was 30\$/s, in two months 20\$/s, setting the lowest price in September at 18,80\$/s
- Losses impacted FB's growth expectations, its employees, investment firms, retail investors, other IT companies
- Lawsuits started from FB to underwriters due to mispricing, from investors to underwriters due to misinformation and insider trading, from regulators to FB for fraud in setting prices
- Market for IT IPOs seemed to cool off, lessons were learnt (again?), until ...

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EXAMPLES

Twitter's expected IPO:

- Twitter announced IPO on 3rd September 2013 after some delay
- The battle of target prices started already: from 17\$/s in early 2013, to 20-21\$/s, to current 28-30\$/s or even higher
- Still, the company reports no profits to date...
- Growing excitement makes a case for another bubble
- On 4th October 2013, after the "code" for Twitter's IPO was set ('TWTR'), a stunning flow of funds and orders went to company Tweeter Home Entertainment ('TWTRQ'):
 - Failed (in 2007!) retailer of electronics worth <0,01\$/s
 - 1 day top performance of +1.000%, closing at +669%
 - Went from trading less than 1,000 shares per day to almost 15 million

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EXAMPLES

Consider what the efficient market hypothesis predicts on the basis of the following events:

- 1) Company X is expected to announce a 10 mln € loss:
 - What will happen on X stocks when this information is available?
 - What will happen on X stocks when the public announcement of a 10 mln € loss is made?
 - What will happen on X stocks when the public announcement of a 15 mln € loss is made?
 - What will happen on X stocks when the public announcement of a 5 mln € loss is made?
 - What will happen on X stocks when the public announcement of a 5 mln € loss is made but this was achieved by hiding another 5 mln € loss through accounting fraud? (consider also the 'insider' option)
- 2) What does the following fact suggests?
 - Top-managers outperform markets in purchasing their own company stocks
 - Even if loans are cheaper in AUD than EUR, few companies get foreign loans
 - *Halloween strategy*: most of stocks' growth happens between end-October and end-April

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EXAMPLES

Consider the following exercise:

- Imagine that the chance of selecting an over-performing stock is 50%
- The likelihood of selecting the best performer for 10 years in a row is 0.5^{10}
- What is the likelihood of beating the market every year for 10 years? And 9, 8, 7 or 6 (i.e. most of times) over 10 years?
 - 10/10: $0.5^{10} = 0.1\%$
 - 9/10: $10 \times 0.5^{10} = 1\%$
 - 8/10: $(10 \times 9 / 2) \times 0.5^{10} = 4\%$
 - 7/10: $(10 \times 9 \times 8 / 6) \times 0.5^{10} = 12\%$
 - 6/10: $(10 \times 9 \times 8 \times 7 / 24) \times 0.5^{10} = 21\%$
- The likelihood of selecting stocks that at least beat the market most of times for 10 years is almost 40%

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EXAMPLES

Exhibit 1: Performance Persistence Over Three Consecutive 12-Month Periods			
Mutual Fund Category	Fund Count at Start	Funds Remaining (%)	
	March 2012	March 2013	March 2014
Top Quartile			
All Domestic Funds	687	18.78	3.78
Large-Cap Funds	263.00	15.97	1.90
Mid-Cap Funds	95.00	9.47	3.16
Small-Cap Funds	146.00	23.97	4.11
Multi-Cap Funds	183.00	23.50	6.56
Top Half			
All Domestic Funds	1,372	41.55	18.66
Large-Cap Funds	525	37.52	14.10
Mid-Cap Funds	190	37.37	16.32
Small-Cap Funds	292	51.03	25.00
Multi-Cap Funds	365	41.92	21.37

Source: S&P Dow Jones Indices LLC. Data as of March, 31, 2014. Charts and graphs are provided for illustrative purposes. Past performance is not a guarantee of future results.

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