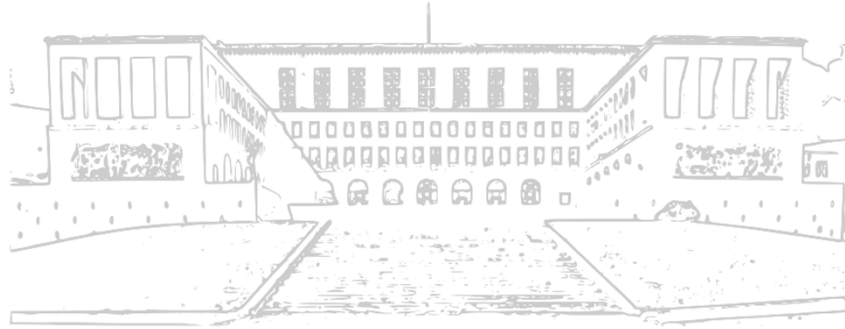


## FINANCIAL MARKETS AND INSTITUTIONS

### EFFICIENCY OF FINANCIAL MARKETS

A.Y. 2016/2017  
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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 stemming from 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

## THE EFFICIENT MARKET HYPOTHESIS

### Forms of market efficiency:

- Strong EMH:
  - all prices reflect intrinsic values through all public and private information
  - no one earns excess returns
- Semi-strong EMH:
  - only public information is considered
  - “insiders” can earn excess returns and “adjust” the market
- Weak EMH:
  - information from past prices is considered only and can not be used to predict future prices and earn long-term excess returns
  - returns are independent random walks and no “paths” are allowed

Note that the Nobel Prize 2013 in Economics went to **Fama** (measures and tests of market efficiency and challenges to asset pricing theories), **Shiller** (behavioural finance and relationship between irrationality, efficiency and bubbles) and **Hansen** (GMM, stochastic discount factor for asset pricing)

## THE EFFICIENT MARKET HYPOTHESIS

Evidence supporting EMH:

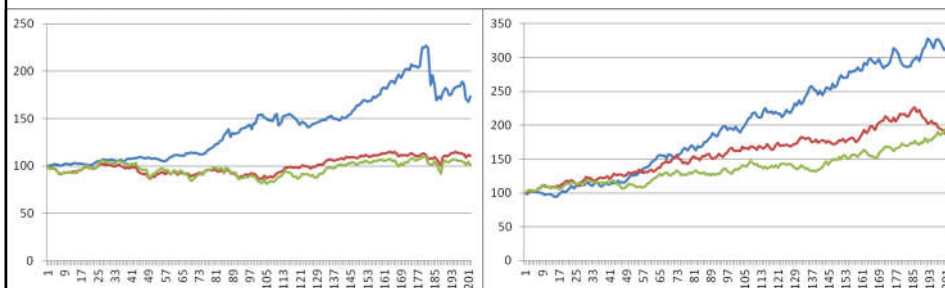
- Investment analysts and mutual funds managers do not perform better than randomly selected assets
- Past good performances do not support good performances in the future
- Positive announcements on publicly available information do not influence assets' performance
- Extremely good performances across time are linked with insider trading or private information (as courts often find out)
- Future changes in stock prices are unpredictable since they seem to follow a random walk (3 examples of random walk with daily returns of  $\pm 5\%$ ,  $\pm 10\%$  and  $\pm 15\%$  with a 50% chance)
- Technical analysis, searching for patterns in past prices, does not consistently outperform other analysts or random asset selection

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## THE EFFICIENT MARKET HYPOTHESIS

One graph shows actual stocks' performance, whereas the other three are random walks. Which is which?



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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)

## 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...

## BEHAVIOURAL HYPOTHESIS

Many assumptions of economic theory require:

- rational, perfectly informed and optimally acting operators
- whose behavior could be explained with simple maximisation 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
- 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
  - Herd behavior, irrational optimism, confirmation/attribution bias: profits are attributed to one's skills, attracting more investors with similar beliefs (promoting bubbles)

## 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 18<sup>th</sup> 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 day1 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 ...

## EXAMPLES

### Twitter's expected IPO:

- Twitter announced IPO on 3<sup>rd</sup> 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 4<sup>th</sup> 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

## 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
  - A fund outperforming the market for 5 year in a row is quite common
  - A 2001 experiment shows that a 4y-o child selects stocks better than an expert, and the worse choice is made by an astrologist

## 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%