

BEHAVIORAL FINANCE FOUNDATIONS FOR INVESTORS

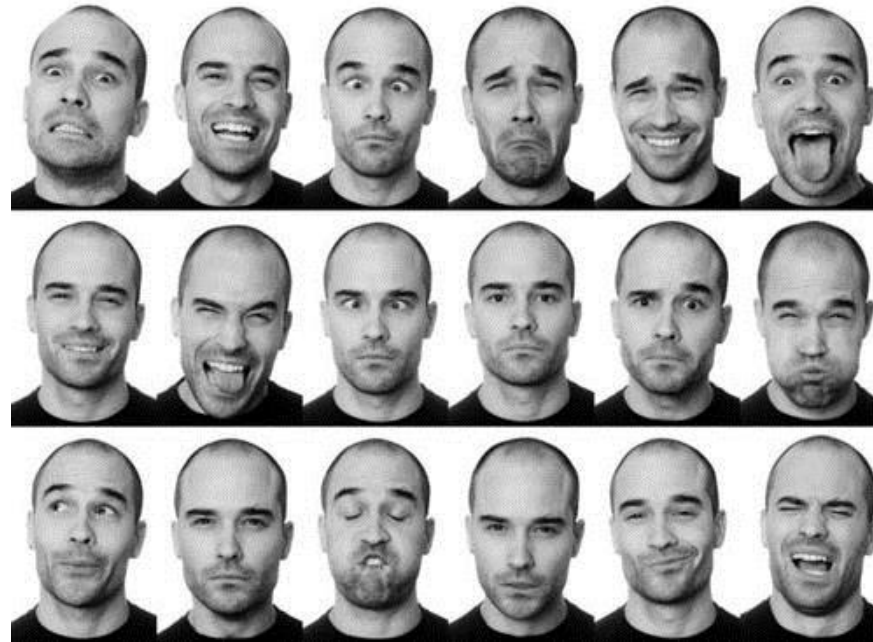


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Slovakia, April 2018

AGENDA

- ✓ **Foundations of behavioral finance**
- ✓ **Behavioral biases**
- ✓ **Behavioral corporate finance**

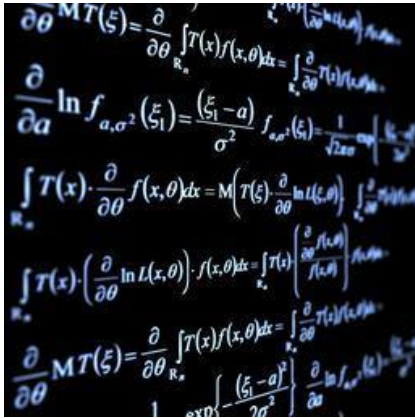


FOUNDATIONS OF BEHAVIORAL FINANCE



TRADITIONAL FINANCE VS. BEHAVIORAL FINANCE

Traditional finance



- **Normative approach** describing how real world should function
- Not able to explain real world interactions
- Homo economicus, rationality
- Continuous dynamic optimization, equilibrium
- Efficient market hypothesis, Modern portfolio theory, mean-variance analysis (expected returns, volatility of returns), CAPM

Behavioral finance



- **Positive approach** describing how real world is functioning
- Based on academic research in cognitive psychology
- (Rational) irrationality
- Emotions, optimism, pessimism, greed and fear dominates all decision-making (under risk, i.e. in real life)
- Prospect theory (Kahneman, Tversky – 1979), cornerstone of behavioral finance, behavioral biases leading to suboptimal decision-making

BEHAVIORAL FINANCE ANSWERS QUESTIONS SUCH AS...

- ✓ **Why do economic agents behave in the way which we can daily see?**
- ✓ **Why do investors achieve unsatisfactory returns?**
- ✓ **Why do investors hold undiversified portfolios?**
- ✓ **Why do investors and traders trade too often?**
- ✓ **Why do investors seek only information confirming their previous views and decisions?**
- ✓ **Why do investors tend to sell investments with paper profits too soon and hold losing positions too long?**
- ✓ **Why do sunk costs matter a lot for corporate managers?**
- ✓ **Why are corporate managers keen to continue losing (pet) projects?**
- ✓ **Why do corporate managers overpay in acquisitions?**
- ✓ **Why do economic agents do not learn from their past mistakes?**

BEHAVIORAL FINANCE – MICRO & MACRO

Micro-behavioral finance



- Analyzes **behavioral biases** which distinguish **individual investors** from totally rational economic beings – homo economicus – from neoclassical economics
- Questions totally rational decision-making
- States that behavioral biases have a profound impact on decision-making and can drive suboptimal decision-making and errors that directly contradict with traditional finance

Macro-behavioral finance



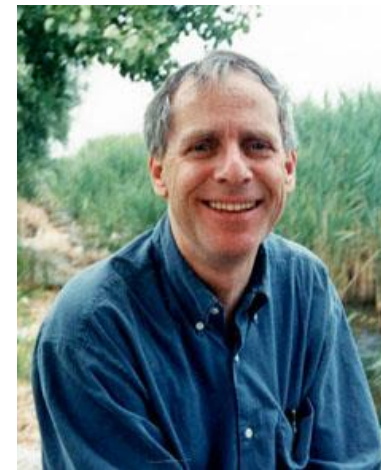
- Analyzes market anomalies that distinguish **financial markets** from efficient markets assumed by traditional finance
- At the same time questions this informational efficiency of markets
- States that financial markets are impacted by behavioral influences (market anomalies, bubbles, excess volatility, limited arbitrage)

PROSPECT THEORY – CORNERSTONE OF BEHAVIORAL FINANCE (KAHNEMAN, TVERSKY – 1979)

- Fast and successful development of behavioral finance (economics) **from 1970s**
- **Daniel Kahneman and Amos Tversky** (academic psychologists) – The most famous paper Prospect Theory: An Analysis of Decision under Risk – Econometrica, 1979
- **Prospect theory** is cornerstone of behavioral finance, behavioral economics overall – Descriptive alternative to mainstream expected utility theory
- **Framing** – Form versus substance, risk-seeking versus risk-aversion depending on losses or gains
- In **2002**, Kahneman received the Nobel Memorial Prize in Economics, despite being a research psychologist, for his work in prospect theory, decision making and judgment under risk, i.e. in real world conditions. (Amos Tversky prem. died in 1996)



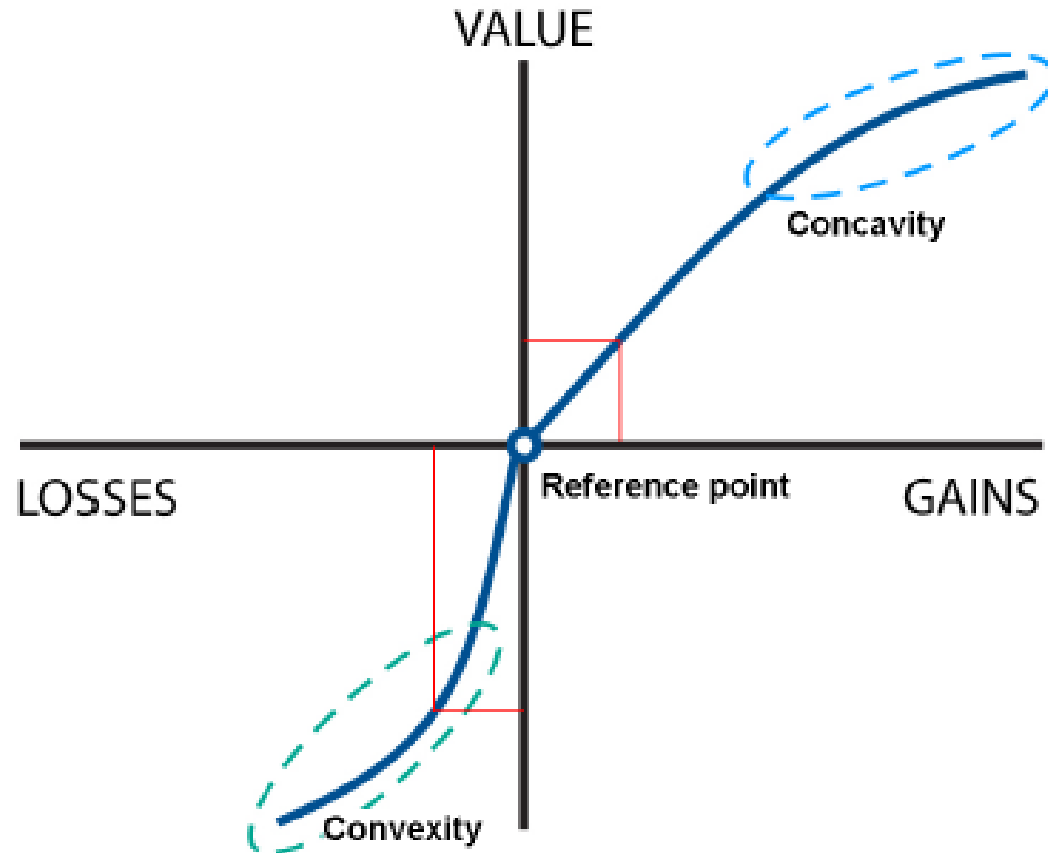
Daniel Kahneman (1934)



Amos Tversky (1937-1996)

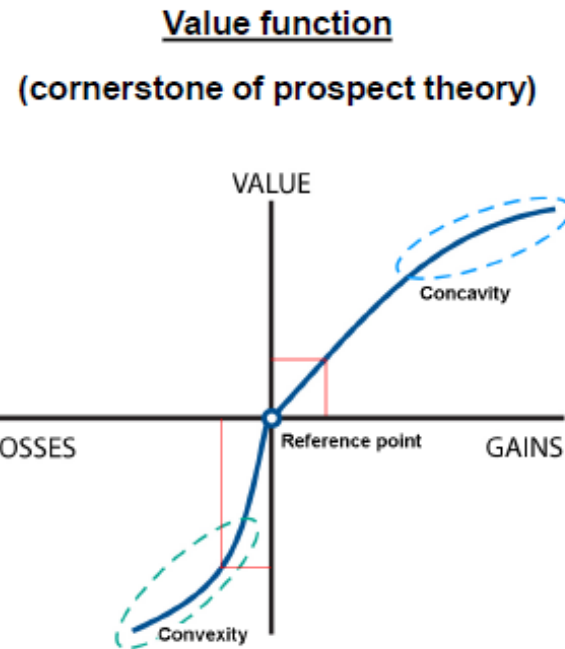
VALUE FUNCTION – CORNERSTONE OF PROSPECT THEORY (KAHNEMAN, TVERSKY – 1979)

Value function

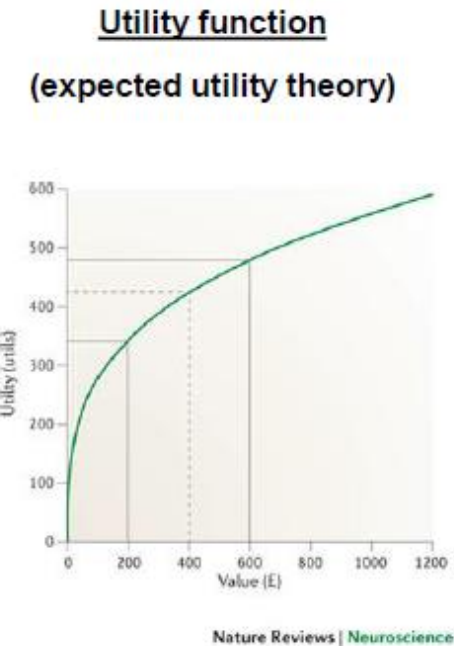


- Reference point (price)
 - Relative values (changes) are important, not absolute values
 - Concave in gains, convex in losses
- ⇒ Risk-seeking in losses, risk-aversion in gains
- 2 – 2.5 times steeper in losses, people feel losses much more than gains
 - Framing – format versus substance – frame can change your decision making completely!

PROSPECT THEORY VERSUS MAINSTREAM EXPECTED UTILITY THEORY



- Relative values (changes) matter, not absolute values
 - Concave in gains, convex in losses
- ⇒ Risk-seeking in losses, risk-aversion in gains
- Losses are felt 2 –2.5 times more than gains of the same magnitude

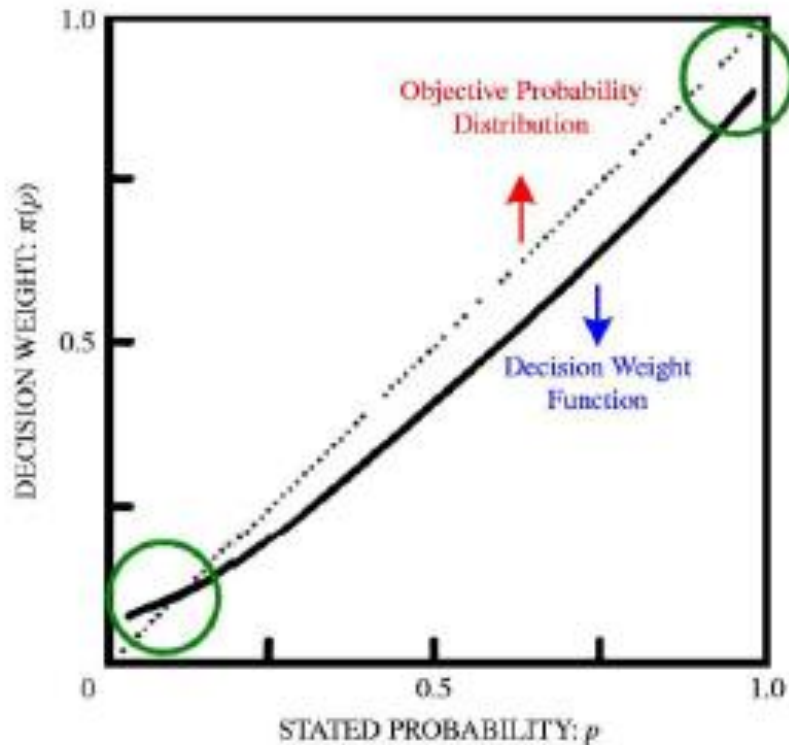


- Absolute values matter, not relative changes (in wealth)
 - **General risk-aversion due to concavity**
- ⇒ **Sure options preference in general**
- **Gains and losses are felt in the same way (magnitude)**

PROSPECT THEORY – WEIGHTING FUNCTION

Weighting function

(second cornerstone of prospect theory)



- Weighting function \Rightarrow **Real perception of probability is biased**, in contrast to mainstream expected utility theory
 - Overweighting of low (and high) probabilities
 - Underweighting of medium probabilities
- \Rightarrow Consistent diversion from expected utility theory predictions within decision-making under risk (in real life)
- \Rightarrow **People are buying insurance policies as well as lottery tickets at the same time**

MINI-CASE STUDY

⇒ PROSPECT THEORY VS. EXPECTED UTILITY THEORY, SHAPE OF VALUE FUNCTION

A friend will offer you a bet on a fair coin. If you lose, you have to pay € 50. What is the minimum sum that you need to win to make this bet attractive enough for you?

€ 0-25

€ 25-50

€ 50-75

€ 75-100

€ 100-125

€ 125-150

More than € 150

MENTAL ACCOUNTING AND DISPOSITION EFFECT

- Direct application of prospect theory (Kahneman, Tversky)
 - **Shefrin, Statman (1985)** – The Disposition to Sell Winners Too Early and Ride Losers Too Long: Theory and Evidence
 - **Disposition effect** = Predisposition of investors to hold investment positions with paper losses too long and sell investment positions with paper gains too early
 - Loss aversion bias, regret aversion bias, risk-seeking in losses domain, confirmation bias
- ⇒ In stark contrast with mainstream finance ⇒ Sub-optimal decisions
- Some investor will never sell anything with loss „Honey, come on, it will improve, it is only paper loss“
 - Fighting **mental accounting** ⇒ Magical advisor’s words „Transfer your assets“
 - Use stop-losses!
 - **Strong implications for corporate finance** – Sunk costs matter a lot, pet projects



MINI-CASE STUDY

⇒ PROSPECT THEORY VS. EXPECTED UTILITY THEORY, DISPOSITION EFFECT

A) Losses case ⇒ Think of the following investment situation. You bought 100 shares of company XYZ for € 40 per share. Therefore the value of your current investment position is € 4,000. In the following trading period the share price **declined** by 15% to € 34. Therefore the value of your current investment position after the first trading period is € 3,400. As the investor you have to now decide for one of the following two options:

Option A (sure option) – You will immediately sell your investment position with a loss of 15%.

Option B (risky option) – You will keep your position one more trading period where there are two possibilities with the same probability: Share price will come back to € 40 per share or share price will lose another 15% to € 28 per share.

B) Gains case ⇒ Think of the following investment situation. You bought 100 shares of company ABC for € 40 per share. Therefore the value of your current investment position is € 4,000. In the following trading period the share price **increased** by 15% to € 46. Therefore the value of your current investment position after the first trading period is € 4,600. As the investor you have to now decide for one of the following two options:

Option A (sure option) – You will immediately sell your investment position with a gain of 15%.

Option B (risky option) – You will keep your position one more trading period where there are two possibilities with the same probability: Share price will decline back to € 40 per share or share price will rise by another 15% to € 52 per share.

BEHAVIORAL BIASES



BEHAVIORAL BIASES

- Inborn human characteristics / errors documented by academic research in cognitive psychology
- Leading to systematically sub-optimal and irrational decisions – in contrast to standard economics of homo economicus

**Former heavy-weight
superchampion Wladimir
Klitschko**



CATEGORIZATION OF BEHAVIORAL BIASES

1) Cognitive errors, heuristics, mental shortcuts

a) Biases pertaining to rigidity of opinions (cognitive dissonance)

- i. Conservatism
- ii. Status quo
- iii. Confirmation
- iv. Representativeness
- v. Illusion of control
- vi. Hindsight

b) Biases pertaining to information processing

- i. Anchoring and adjustment
- ii. Mental accounting
- iii. Framing
- iv. Under-reaction and over-reaction
- v. Availability

2) Emotional biases

- i. Loss aversion
- ii. Overoptimism
- iii. Overconfidence
- iv. Illusion of knowledge
- v. Self-attribution
- vi. Self-control
- vii. Status quo
- viii. Endowment
- ix. Regret aversion
- x. Home bias

FRAMING BIAS

What does it mean?

- People's decisions are not based on the **substance / content** of the information, but on the **form** in which it is presented
⇒ Inconsistent decisions/choices – It has been proved that when we ask people almost the same question, only if we **formulate it differently**, people will consistently answer in a different way (Kahneman, Tversky) ⇒ Suboptimal decisions

Real life example

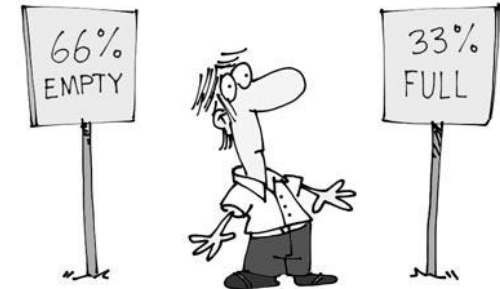
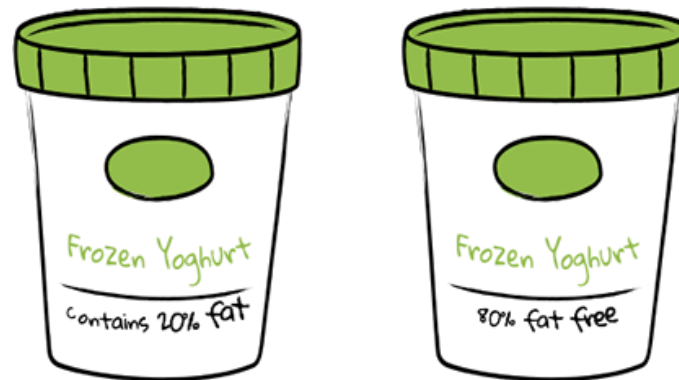
- 2 identical yoghurts ⇒ 20% fat yoghurt vs. **80% fat free yoghurt** ⇒ Much higher sales of the second – **identical** – yoghurt.

Investing

- Investment with a loss, advisor might say to a client : a) „Transfer your assets“ versus b) „Sell this losing position (mental account closed / loss aversion / regret aversion) and buy this new investment ⇒ First option represents „magical advisor's words“ not to close the mental account

How to make better decisions?

- Deep and complex analysis, try to formulate problems and questions differently



MINI-CASE STUDY

⇒ FRAMING BIAS

A) Gains frame ⇒ Sure option preference ⇒ Imagine that the Czech Republic is preparing for an outbreak of an unusual disease which is going to kill 600 people. Doctors are proposing the following two programs how to tackle the disease:

If program A is accepted, 200 people will be **saved**.

If program B is accepted, there is a third (33.3%) probability that all people will be **saved** and a two thirds (66.7%) probability that no one will be **saved**.

Which program are you going to select?

B) Losses frame ⇒ Risky option preference ⇒ Imagine that the disease from the previous example is back. It is going to kill 600 people again. Doctors are proposing the following two programs how to tackle the disease:

If program C is accepted, 400 people will **die**.

If program D is accepted, there is a third (33.3%) probability that no one will **die** and a two thirds (66.7%) probability that 600 people will **die**.

Which program are you going to select?

REPRESENTATIVENESS BIAS

What does it mean?

- People have a natural tendency to evaluate all matters based on **how they look like**, first and quick look, rather than based on **true statistical probabilities**. Human thinking is driven rather by **stories** making about matters' description rather than by **analytical logic**.
- ⇒ Consistent and predictable errors in decision-making in stark contrast with expected utility theory. **Base-rate neglect** (law of large numbers) and **sample size neglect** ("law of small numbers").

Real life example

- Conjunction fallacy, e.g. heart attack study.

Investing

- **Gamblers fallacy**, i.e. betting on a change of an illusory trend, and **Hot hand fallacy**, i.e. betting on a continuation of an illusory trend.

How to make better decisions?

- Deep and complex analysis, try to formulate problems and questions differently. Always try to discern true probabilities and use them in your analysis. Do not base your decision-making on stories-making.

MINI-CASE STUDY

⇒ REPRESENTATIVENESS BIAS

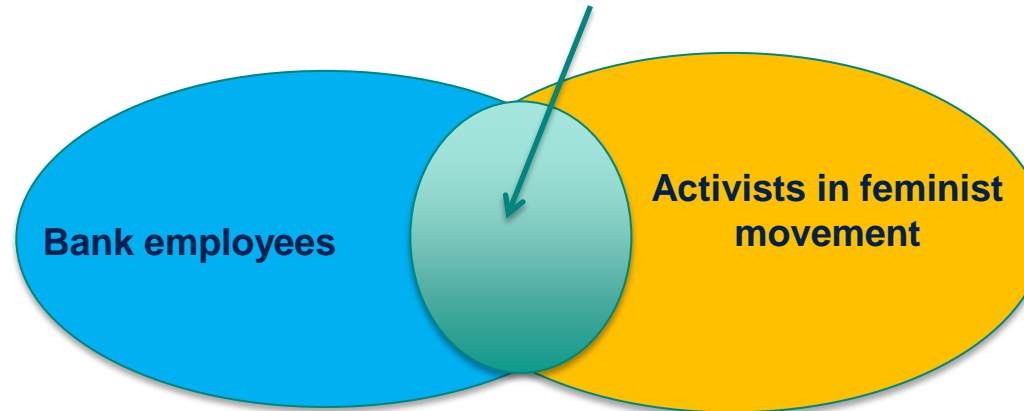
Question: Michel is single, open and very smart. She has a Master degree from philosophy. As a student she was interested a lot in topics such as discrimination and equality. What is more probable?

A – Michel works in a bank.

B – Michel works in a bank and is active in feminist movement.

Conjunction fallacy

Bank employees and at the same time activists in feminist movement



MINI-CASE STUDY

⇒ REPRESENTATIVENESS BIAS ⇒ GAMBLERS FALLACY & HOT HAND FALLACY

Question: Assume that a fair coin has been tossed three times and every time heads was tossed. If you had to stake € 1,000 on another toss, what would be your choice? Heads, tails or no preference?



GAMBLERS FALLACY & HOT HAND BIAS ⇒ “LOCAL” REPRESENTATIVENESS

- **Base-rate neglect** (law of large numbers) ⇒ **Gamblers fallacy** ⇒ Betting on a **change** of an illusory trend
- **Sample size neglect** (“law of small numbers”) ⇒ **Hot hand fallacy** ⇒ Betting on a **continuation** of an illusory trend



OVEROPTIMISM BIAS

What does it mean?

- Everybody wears „pink glasses“

Real life example

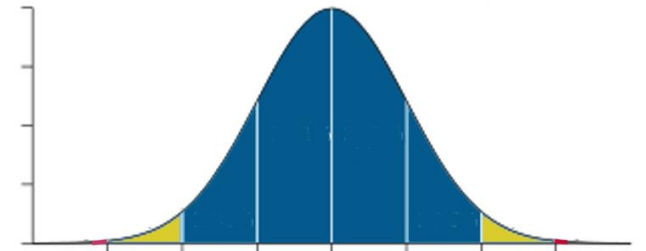
- 80% of drivers rate themselves as above-average

Investing

- „My investment performance will be ca 25% every year“

How to make better decisions?

- Think in terms of „probability distributions“
- DCF, Capital projects analysis – Be very conservative



MINI-CASE STUDY

⇒ OVEROPTIMISM BIAS

Question No. 1: What would you characterize yourself as regards your personality?

A – I am an optimist.

B – I am a pessimist.

C – I am something in between.

Question No. 2: What would you characterize yourself as regards your studying efforts?

A – I am an above average student.

B – I am an average student.

C – I am a below average student.

Question No. 3: What would you characterize yourself as regards your driving skills?

A – I am an above average driver.

B – I am an average driver.

C – I am a below average driver.

Question No. 4: What would you characterize yourself as regards your investing skills?

A – I am an above average investor.

B – I am an average investor.

C – I am a below average investor.

OVERCONFIDENCE BIAS

What does it mean?

- **Poor calibration, too narrow confidence intervals** ⇒ People are surprised more often compared to their expectations, predominantly on the downside; Connected to fat-tail problem (VaR, stress testing, sensitivity analysis) and black-swan concept

Real life example

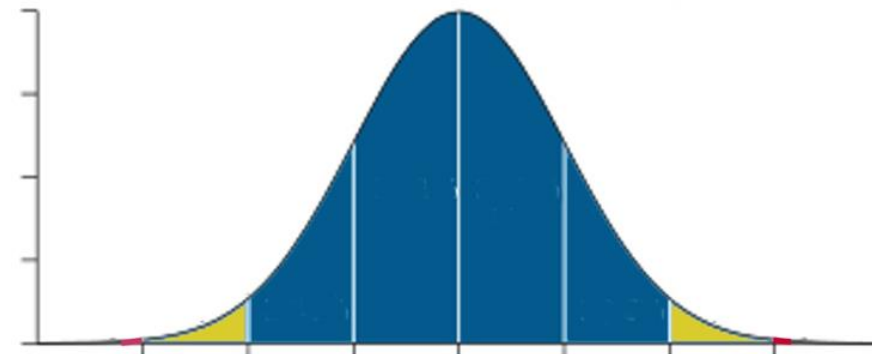
- State **90% confidence interval** of number of Africa population ⇒ Only 50% answers correct ⇒ Poor calibration, frequent surprises

Investing

- Portfolio return range in one year minus 5% - 25% ⇒ Unexpected underperformance of majority of investors
- **Too frequent trading** (Trading is hazardous to your wealth – Barber, Odean), Men vs. Women

How to make better decisions?

- **Investors should focus on long-term horizon** of at least 5 years and do not gamble / speculate, avoid short-term gambling / casino
- DCF, Capital projects analysis – Sensitivity analysis / scenarios analysis / stress testing / crash tests – Worst case scenarios should be on average even much worse



MINI-CASE STUDY

⇒ OVERCONFIDENCE BIAS

Question No. 1: State your 90% confidence band / interval of the market capitalization of the US equity index S&P 500.

Question No. 2: State your 90% confidence band / interval of the number of the European Union's inhabitants.

Question No. 3: State your 90% confidence band / interval of the nominal value of the German government debt.

ILLUSION OF CONTROL BIAS (1)

What does it mean?

- People think they can control random and / or uncontrollable events

Real life example

- **Taleb** (Fooled by Randomness, 2001) – The real world is much more unpredictable than we think. People interpret reality in such a way that they form **stories** that puts well to each other.

Investing

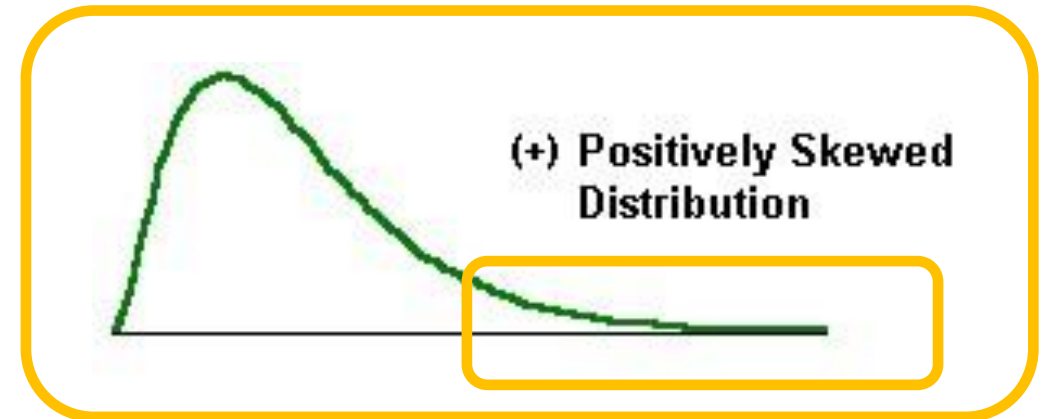
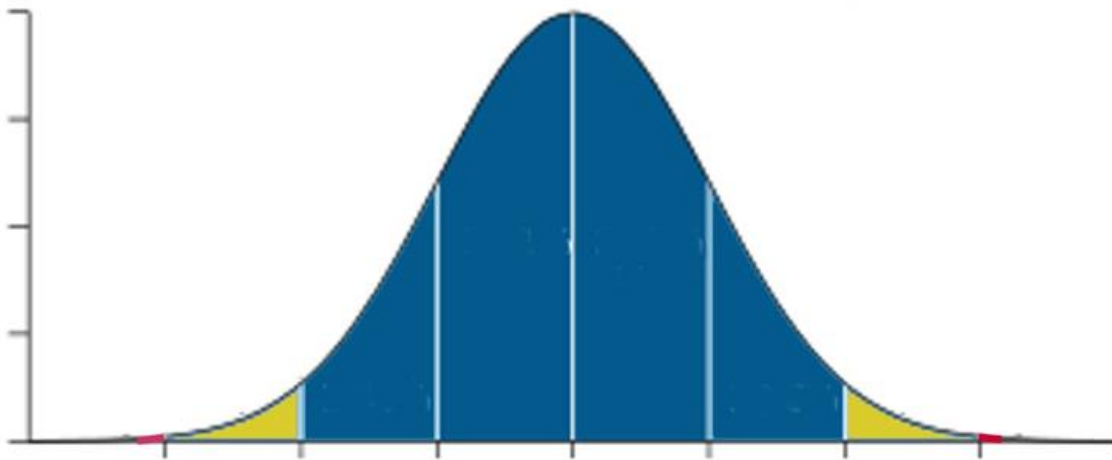
- **Internet and online trading** (marketing campaigns tell us that it will improve our performance) – Various tools should improve our analytical skills and performance (Barber, Odean) ⇒ Speculative investments, well too much trading (overconfidence, overoptimism)



ILLUSION OF CONTROL BIAS (2)

How to make better decisions?

- Realize that „Investing is a probability activity“; World is much more complex and uncertain than you think
- Business strategy / capital projects / DCF ⇒ **Pay much more attention** to risk analysis / sensitivity and scenarios analysis, stress testing, and do not base your investment decision only on simple DCF / NPV analysis



(-) Negatively Skewed Distribution



CONFIRMATION BIAS

What does it mean?

- People generally look only for **supportive** evidence and disregard any **contradictory** evidence

Real life example

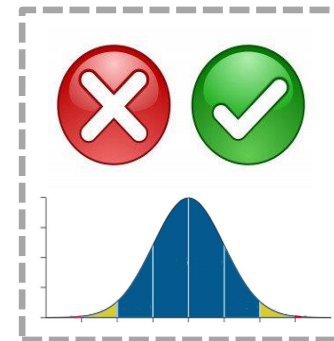
- „My car is the best because this test showed that..., but this test's bad result is not relevant / it was wrong“

Investing

- Demo-account / online trading – 300% performance in 3 months ⇒ Real investing will be also that good
- Mental accounting, disposition effect, loss aversion bias, regret aversion bias ⇒ We strongly tend to look for **confirmation** evidence that our decision (and currently big paper loss) was right and avoiding any **contradictory** evidence

How to make better decisions?

- 1) Why not invest in this asset – **Contra-confirmation**, and then 2) why invest; take into account all facts and info, only this way of thinking and decision making will allow you to learn from past mistakes
- CAPEX management – Sunk cost problem, pet projects, regret aversion bias



ANCHORING AND ADJUSTMENT BIAS

What does it mean?

- Any data, proposals, information act on us as **anchors**, despite being totally irrelevant sometimes
- When new relevant information appears, **adjustment of judgments is very slow and rigid.**

Real life example

- Kahneman and Tversky – Wheel of fortune experiment

Investing

- Sell-side analysts investment recommendations, stock target prices and their adjustments

How to make better decisions?

- Forget about price you bought the share for
- Before any business negotiation / discussion be well prepared and have your own strong view **not to be anchored by the other party's viewpoints**
- **Valuation – Reverse-engineered DCF models** ⇒ What is the current market price implying / pricing, fundamentally justified price multiples



MINI-CASE STUDY

⇒ ANCHORING AND ADJUSTMENT BIAS

1) Write down last three figures of your mobile number.

2) Is the number of general practitioners in Bratislava higher or lower than this number?

3) Write down your best estimate of general practitioners in Bratislava.

125 vs 850 ⇒ On average the first person will guess much lower figure than the second person.

SELF-ATTRIBUTION BIAS

What does it mean?

- „Our **successes** are caused by our skills, knowledge and hard work, but our **failures** are caused by someone else or bad luck“
⇒ **People do not learn from their past failures and mistakes!**

Real life example

- Failing to pass an important exam

Investing

- Successful and unsuccessful stock picks

How to make better decisions?

- Investing – **Write down detailed records** of your investment decisions and actions
- Try to be as frank as possible to yourself, try to avoid any regrets
- Analyze current decisions and results of past decisions in consistent and open way



Montier's decision matrix:

	Good result	Bad result
Good judgment	Knowledge and good analysis (might have been good luck, but lets be generous)	bad luck / noise traders' risk (irrationality of the masses)
Bad judgment	Good luck	Mistake/fault

UNDER-REACTION AND OVER-REACTION BIAS

What does it mean?

- People systematically **underestimate and under-react** to abstract, statistical and highly relevant information, and on the other hand **overweight and overreact** to striking, noisy but much less relevant information and data

Real life example

- Under-reaction to growing weight as a result of overeating, overreaction to ads on diet cocktails

Investing

- Stock market – Outperformance of losers and underperformance of winners (Werner de Bondt) – 1985 – Does stock market overreact? ⇒ Contrarian investing rocks!
- Overreaction to earnings season compared with under-reaction to long-term fundamental trends in the company (industry)
- **Noise-traders risk (irrational investors)** – Big risk to fundamental (relatively rational) investors – Market inefficiencies can even increase...yes, **mean-reversion**, but only in the very long-term horizon of several, rather many years

How to make better decisions?

- Try as much as possible to **focus on** core underlying data, information and probabilities, historical statistics and time-series, **and avoid** a too big focus on unimportant yet spectacular and attention-grabbing data, information and news

MINI-CASE STUDY

⇒ UNDER-REACTION AND OVER-REACTION BIAS

- Werner de Bondt (1985) – Does stock market overreact? ⇒ Outperformance of losers and underperformance of winners ⇒ **Contrarian investing rocks!**

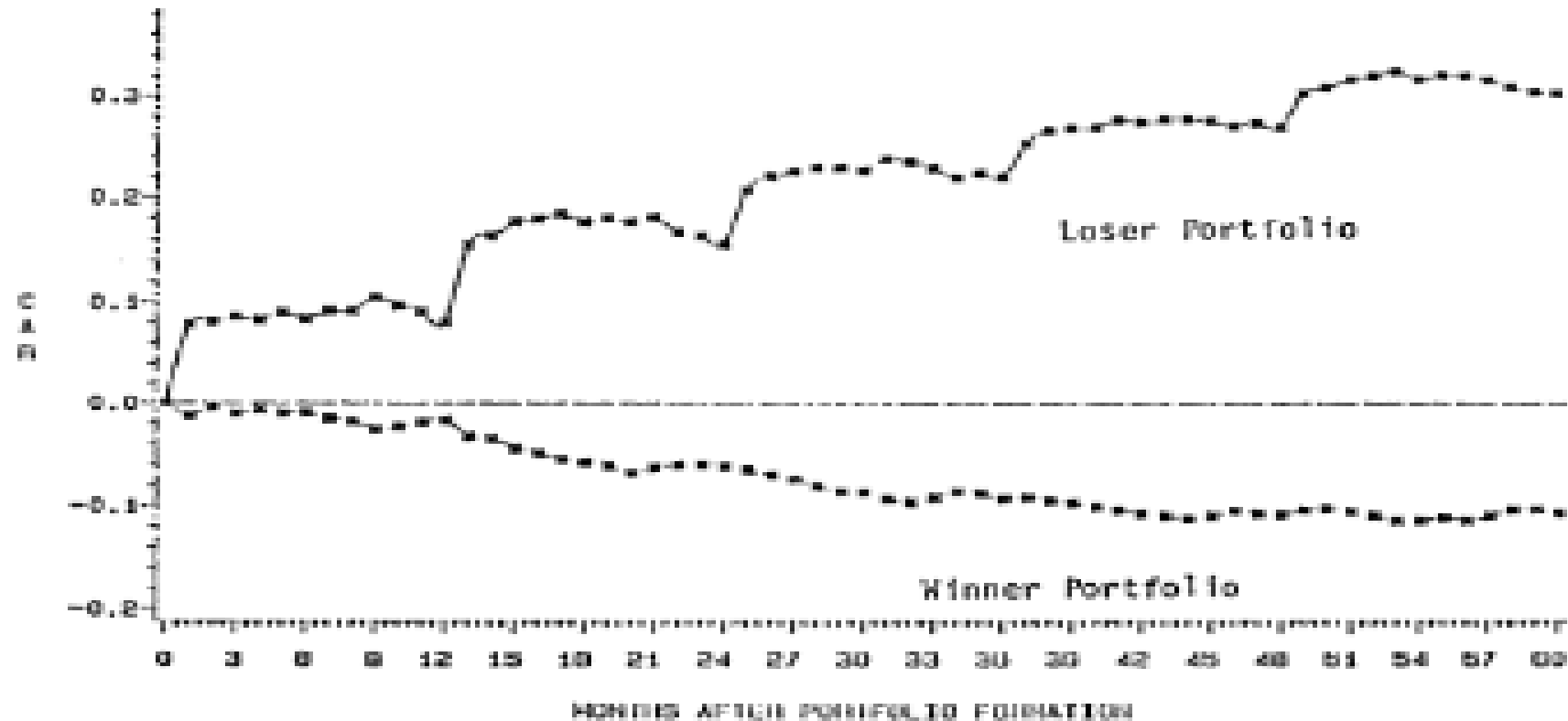


Figure 3. Cumulative Average Residuals for Winner and Loser Portfolios of 35 Stocks (1-60 months into the test period)

AVAILABILITY BIAS

What does it mean?

- People have a natural tendency to **grasp** any irrelevant and often subconscious information when they have to make decisions in real life, i.e. under uncertainty
- When people have to make any judgments, any irrelevant data and information that they receive **by chance** have a strong and consistent tendency to impact their reasoning, of course without them realizing this at all

Real life example

- Deaths in the US – Sharks or fall airplane parts? Falling airplane parts 30 times higher probability!

Investing

- Barber, Odean (2007) – All that glitters – Investors are buying stocks that are somehow **grabbing their attention**

How to make better decisions?

- When making important decisions please do try to study all key historical data, time-series and statistics



ENDOWMENT BIAS

What does it mean?

- When owning something people have a systematic tendency to value it much more than other people who do not own it ⇒ **Irrational premium**
- Causes in general much lower market traded volumes than implied by classical economics / expected utility theory

Real life example

- Professor of economics – French wine
- MBA students – Tea cups

Investing

- Causes „irrational premium“ to assets we have in our portfolio ⇒ Contributing to disposition effect

How to make better decisions?

- Ask yourself: If I did not own it (the stock), would I buy it for the price I am attaching to it now (including the “irrational premium“)
- Experience lowers endowment effect



HINDSIGHT BIAS

What does it mean?

- Hindsight bias is a very strong natural tendency to **ex-post** explain all historical developments which are quite often totally random driven by pure chance, or a tendency to state that we knew it all well in advance
- Hindsight bias supports the opinion that the world is much more predictable than it really is
- Connected to illusion of control bias
- A went up, because B went up, because C went down ⇒ **Stories making (Robert Shiller)**

Real life example

- World War II

Investing

- James Montier – Tech bubble – „They invested into it, but regard it now as a bubble“; GFC (great financial crisis)

How to make better decisions?

- Do not make stochastic forecasts only for the future, but try to make it retroactively for the past developments as well.

⇒ Do not think in terms of stories, think rather in probability distributions; BUT when making interviews, speaking on CNBC, speak rather in stories 😊



DECOY EFFECT

What does it mean?

- Decoy effect results in such a decision-making that when your counterparty (client, etc.) is in a process of picking one out of two options provided by you, she might make a **strikingly different decision** if she takes into account an additional third option – strictly disadvantageous (asymmetrically dominated) – option. This third option must be disadvantageous in all parameters vis-à-vis one of the original options (your preferred one) and at the same time disadvantageous vis-à-vis the second (counterparty's preferred) option only in several parameters. ⇒ Third option is in fact just a **decoy** that should entice your counterparty to pick one of the original two options (your preferred one). ⇒ This fact has been proved (on average) by academics and practiced many years in business fields such as marketing.
- Used a lot in retail when retailers want to get rid of some stuff.

Real life example

- Bottles of wine, etc.

Investing

- Bond funds vs. Equity funds. Equities too risky? Lets present commodities funds as well 😊

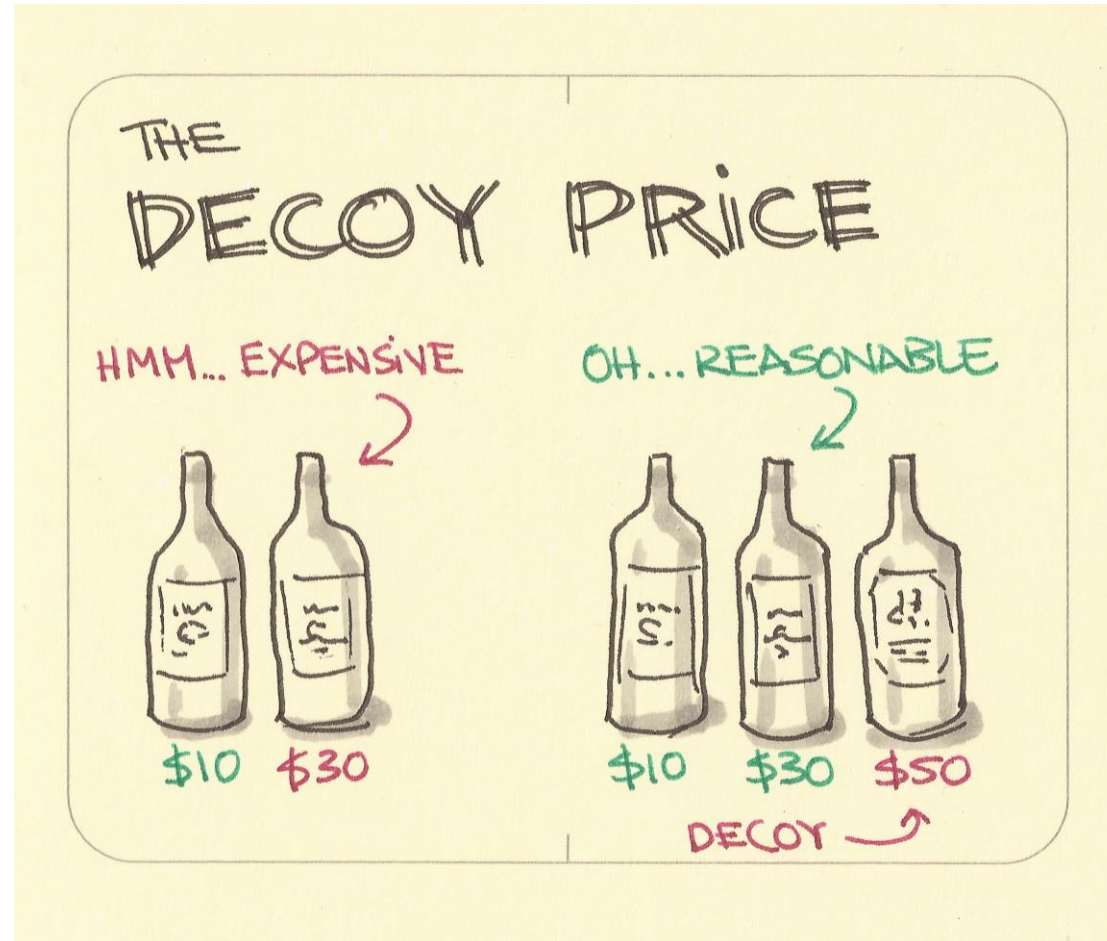
How to make better decisions?

- How to make better (investment) decisions? ⇒ Deep and complex analysis, try to formulate decision-making problems and questions in different ways from all the angles possible. And in this particular case you should in general appropriately design your own criteria / KPIs so that you will be able as much “rationally” as possible to sort the options available according to your “rational” optimum, i.e. your expected future utility stream, taking into account time value of money / (hyperbolic) discounting. And of course, please do not forget that your counterparty might use the same tactics against you as well.

MINI-CASE STUDY

⇒ DECOY EFFECT

- Bottles of wine, need to get rid of, i.e. to sell any particular bottles?



MINI-CASE STUDY

⇒ COGNITIVE REFLECTION / SYSTEM X AND SYSTEM C

Question: There is a very dangerous algae growing in the lake. Every day the space covered with algae doubles. If the algae takes 48 days to cover the whole lake, how long does it take to cover a half of the lake?



BEHAVIORAL CORPORATE FINANCE – KEY ISSUES

- **Hersh Shefrin** ⇒ Behavioral finance holds important implications also for the practice of corporate decision-making
- **Key behavioral biases in place:**
 - Overoptimism and overconfidence biases
 - Confirmation bias
 - Loss aversion bias
 - Framing bias
 - Self-attribution bias
 - Anchoring and adjustment bias
- Despite the advice offered by Brealey and Myers (Principles of Corporate Finance), corporate decision-makers very often treat **sunk costs** as relevant
- **Visibility, pet projects**, loss aversion bias
- **Group (committee) decision-making** often amplify individual errors
- **Agency costs** – Separation of ownership and managerial control
- Behavioral influences are akin to agency costs
- Behavioral biases influencing managers can dominate financial interest of shareholders (owners)

UNDER-REACTION AND OVER-REACTION OF INVESTORS

- Stock repurchases (stock buy-backs) are a signal that corporate managers feel the stock of their firm is seriously undervalued.
- Stock market appears to under-react to information inherent in corporate announcements.
- James Montier (2002, page 174):

„On thing is very clear, investors should in general be very sceptical of any firm seeking to raise funds in the market place. IPOs, SEOs (SPOs), convertible bonds, stock-finance mergers and acquisitions all bode badly for investors. Extreme caution should be exercised before investing in stocks that offer up a good story in return for further financing.“

⇒ Be contrarian investor!

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THANK YOU FOR YOUR ATTENTION! 😊

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