

# Introduction into BE & NE. Behavioral Economy. For Master Program

## **Lecture 4.1**

### **BE 4: Prospect theory. Judgment Under Uncertainty**

# Prospect theory – Cornerstone of behavioral economics (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 VS Substance, Risk-seeking VS 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 died in 1996)

# Expected Utility Theory

- Objective: to develop a theory of rational decision-making under uncertainty with the minimum sets of reasonable assumptions possible
- the following **five axioms** of cardinal utility provide the minimum set of conditions for consistent and rational behaviour
- What do these axioms of expected utility mean?
  1. all individuals are assumed to make completely rational decisions (reasonable)
  2. people are assumed to make these rational decisions among thousands of alternatives (hard)

# Expected utility theory vs. Prospect theory

- Expected utility theory - coherent and consistent weighing of the outcomes (gains or losses) of actions (alternatives) by their probabilities (with payoffs assumed to be independent of probabilities).
- The alternative which has the **maximum utility is selected**
- Expected utility theory is based on three fundamental tenets about the processes that occur during decisions made under risk and uncertainty and based on these assumptions, expected utility theory predicts that the better alternative will always be chosen
  - (1) **consistency of preferences for alternatives;**
  - (2) **linearity in assigning of decision weights to alternatives;**
  - (3) **judgment in reference to a fixed asset position**
- Expected utility theory - characteristics of the context???
- Prospect theory - provides empirical evidence from "problem studies" where preferences violated the axioms of expected utility theory (Kahneman and Tversky, 1979)

# Why care about uncertainty?

Simple answer: Because in reality, almost every decision we make involves uncertainty.

- Example:
  - Uncertainty from product quality. (e.g., used vehicle, order food before eating, any durable goods consumption)
  - Uncertainty in dealing with others. (e.g., marriage, firm's cutting price may or may not induce price war)
  - Purchase of financial assets (stocks, bonds, exchange rate changes, etc.)
    - its return depends on the future.

This is the essence of **Financial Economics**

# Prospect Theory

(Kahneman and Tversky, 1979)

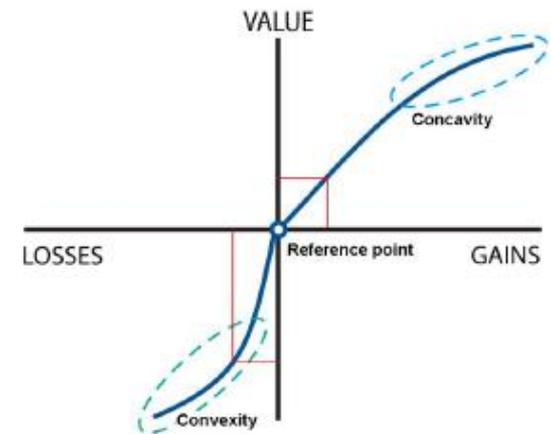
- **Normative** decision-analysis theory assumes that outcomes of decisions (**prospects**) are described in terms of **total wealth**
- In reality, however, prospects are considered in terms of **gains, losses, or neutral outcomes** relative to some *reference point* (the current state)
- In **Prospect Theory** a decision maker considers prospects using a function that values all prospects relative to a reference point.
  - Phase I is **framing** the decision problem
  - Phase II is **evaluating** the **prospects**

## Key Ideas of Prospect Theory

- Prospect theory is a competitor to EU theory – it is a theory of preference under risk (preference between gambles)
- Altered concept of risk attitude (risk aversion and risk seeking)
- Loss aversion
- Nonlinear probability weighting
- Relativity of value
  - Coding outcomes as losses and gains
  - Framing effects & mental accounting
- Next: We need to understand the concept of a risk attitude (risk aversion, risk seeking).
  - ♦ Key contribution of Prospect Theory: It predicts the conditions under which people will be more risk averse or more risk seeking.

# 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
- ⇒ In start contrast with mainstream finance; Sub-optimal decisions; Strong implications for corporate finance – Sunk costs matter a lot, pet projects
- Loss aversion, risk-seeking in losses, regret aversion bias, confirmation bias
- Some investor will never sell anything with loss „Honey, come on, it will improve, it is only paper loss“
- „Transfer your assets“
- Use stop-losses!



## Mini-case study

### ⇒ Prospect theory vs. Expected utility theory, disposition effect

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**Game No. 15:** 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 – You will immediately sell your investment position with a loss of 15%.

Option B – You will keep your investment 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.

**Game No. 16:** 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 – You will immediately sell your investment position with a gain of 15%.

Option B – You will keep your investment 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.

## D. Ariely (“P.I.”) Advise 1 “Don’t keep all doors open”

So WHAT CAN we do? In our experiments, we proved that running helter-skelter to keep doors from closing is a fool's game. It will not only wear out our emotions but also wear out our wallets. What we need is to consciously start closing some of our doors. Small doors, of course, are rather easy to close. We can easily strike names off our holiday card lists or omit the taekwon do from our daughter's string of activities.

But the bigger doors (or those that seem bigger) are harder to close. Doors that just might lead to a new career or to a better job might be hard to close. Doors that are tied to our dreams are also hard to close. So are relationships with certain people—even if they seem to be going nowhere.

We have an irrational compulsion to keep doors open. It's just the way we're wired. But that doesn't mean we shouldn't try to close them.

*Think about a fictional episode: Rhett Butler leaving Scarlett O'Hara in *Gone with the Wind*, in the scene when Scarlett clings to him and begs him, "Where shall I go? What shall I do?" Rhett, after enduring too much from Scarlett, and finally having his fill of it, says, "Frankly, my dear, I don't give a damn."*

It's not by chance that this line has been voted the most memorable in cinematographic history. It's the emphatic closing of a door that gives it widespread appeal. And it should be a reminder to all of us that we have doors—little and big ones—which we ought to shut.

We need to drop out of committees that are a waste of our time and stop sending holiday cards to people who have moved on to other lives and friends. We need to determine whether we really have time to watch basketball and play both golf and squash and keep our family together; perhaps we should put some of these sports behind us. We ought to shut them because they draw energy and commitment away keeping door s open from the doors that should be left open—and because they drive us crazy.

## **D. Ariely: Coffee experiment. Advise 2**

We kept handing out coffee for the next few days, but from time to time we changed the containers in which the odd condiments were displayed. Sometimes we placed them in beautiful glass-and-metal containers, set on a brushed metal tray with small silver spoons and nicely printed labels. At other times we placed the same odd condiments in white Styrofoam cups. The labels were handwritten in a red felt-tip pen. We went further and not only cut the Styrofoam cups shorter, but gave them jagged, hand-cut edges.

What were the results? No, the fancy containers didn't persuade any of the coffee drinkers to add the odd condiments (I guess we won't be seeing sweet paprika in coffee anytime soon). But the interesting thing was that when the odd condiments were offered in the fancy containers, the coffee drinkers were much more likely to tell us that they liked the coffee a lot, that they would be willing to pay well for it, and that they would recommend that we should start serving this new blend in the cafeteria. When the coffee ambience looked upscale, in other words, the coffee tasted upscale as well.

## Advise 2

***WHEN WE BELIEVE before hand  
that something will be good,  
therefore, it generally will be good  
—and when we think it the effect of  
expectations will be bad,  
it will bad.***

- But how deep are these influences?
- Do they just change our beliefs, or do they also change the physiology of the experience itself?
- In other words, can previous knowledge actually modify the neural activity underlying the taste itself, so that when we expect something to taste good (or bad), it will actually taste that way?

### What happened?

Telling the participants about the vinegar after rather than before they tasted the beer doubled the number of participants who decided to add vinegar to their beer.

For the participants in the "after" condition, the beer with vinegar didn't taste too bad the first time around (they apparently reasoned), and so they didn't mind giving it another try.

## D. Ariely (“P.I.”): Advise 2 “How to use framing”

**If you want to enhance the experience of your guests, invest in a nice set of wineglasses.**

Moreover, if you're really serious about your wine, you may want to go all out and purchase the glasses that are specific to

- ❖ burgundies,
- ❖ chardonnays,
- ❖ champagne,
- ❖ etc.

Each type of glass is supposed to provide the appropriate environment, which should bring out the best in these wines *(even though controlled studies find that the shape of the glass makes no difference at all in an objective blind taste test, that doesn't stop people from perceiving a significant difference when they are handed the "correct glass")*. Moreover, **if you forget that the shape of the glass really has no effect on the taste of the wine, you yourself may be able to better enjoy the wine you consume in the appropriately shaped fancy glasses.**

# **D.Ariely. Advise 3 “Placebo effect”**

Exploring the placebo effect in this chapter, we'll see not only that beliefs and expectations affect how we perceive and interpret

- ❖ sights,
  - ❖ tastes,
  - ❖ and other sensory phenomena,
- but also that our expectations can affect us by altering our subjective and even objective experiences—sometimes profoundly so.

# Advise 4 “Remind people about social norms”

As in our experiment at the Harvard Business School, some of the participants handed in their papers directly to the experimenter. They were our control group. The other participants wrote down on another sheet the number of questions they solved correctly, and then disposed of the originals. These participants, obviously, were the ones with 206 the context of our character , part the opportunity to cheat. So, given this opportunity, did these participants cheat? As you may have surmised, they did (but, of course, just by a bit).

Up to now I have not told you anything new. But the key to this experiment was what preceded it. When the participants first came to the lab, we asked some of them to write down the names of 10 books that they read in high school.

The others were asked to write down as many of the Ten Commandments as they could recall.<sup>51</sup> After they finished this "memory" part of the experiment, we asked them to begin working on the matrix task.

Look at your watch , note the time , and start searching for two numbers in the matrix below that will add up to exactly 10.

How long did it take you?

1.69	1.82	2.91
4.67	4.81	3.05
5.82	5.06	4.28
6.36	5.19	4.57

## **Advise 4 “Remind people about social norms”**

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This experimental setup meant that some of the participants were tempted to cheat after recalling 10 books that they read in high school, and some of them were tempted after recalling the Ten Commandments. Who do you think cheated more ?

When cheating was not possible, our participants, on average, **solved 3.1 problems correctly**

When cheating was possible, the group that recalled 10 books read in high school achieved an **average score of 4.1 questions solved (or 33 percent more than those who could not cheat)**.

## Advise 4 “Remind people about social norms”

- ❑ But the big question is what happened to the other group—the students who first wrote down the Ten Commandments, then took the test, and then ripped up their worksheets.
- ❑ This, as sportscasters say, was the group to watch.
- ❑ Would they cheat—or would the Ten Commandments have an effect on
- ❑ \*Do you know the Ten Commandments? If you'd like to test yourself, write them down and compare your list with the list at the end of this chapter. To be sure you have them right, don't just say them to yourself; write them down.

- ❖ Can the Ten Commandments raise one's math scores?
- ❖ We used the same two memory tasks with the control condition to test that premise.
- ❖ The performance in the control condition was the same regardless of the type of memory task.
- ❖ So the Commandments do not raise math scores. their integrity?
- ❖ The result surprised even us: the students who had been asked to recall the Ten Commandments had not cheated at all.
- ❖ They averaged three correct answers—the
- ❖ same basic score as the group that could not cheat, and one less than those who were able to cheat but had recalled the names of the books.

## Advise 4 “Remind people about social norms”

- As I walked home that evening I began to think about what had just happened.
  - The group who listed 10 books cheated. Not a lot, certainly—only to that point where their
  - internal reward mechanism (nucleus accumbens and superego) kicked in and rewarded them for stopping.
  - But what a miracle the Ten Commandments had wrought!
- We didn't even remind our participants what the Commandments were—we just asked each participant to recall them (and
  - almost none of the participants could recall all 10).
  - We hoped the exercise might evoke the idea of honesty among them.
  - And this was clearly what it did.
  - So, we wondered, what lessons about decreasing dishonesty can we learn from this experiment?
  - It took us a few weeks to come to some conclusions.