The Prospect Theory

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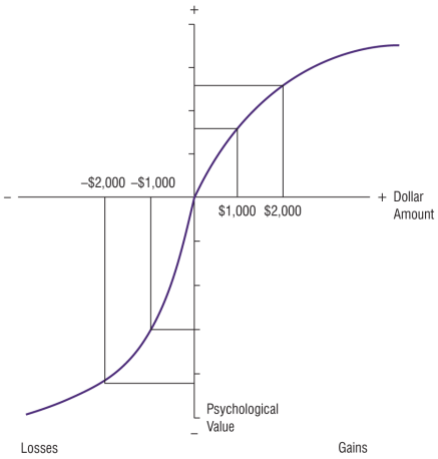
The prospect theory was developed by Daniel Kahneman and Amos Tversky between 1979 and 1992. They showed how human decisions depart from those predicted by standard economic theory in decision-making under uncertainty. The prospect theory better accounts for observed behavior, taking into account heuristic shortcuts. Contrary to the expected utility theory, which gives a mathematical optimization model, the prospect theory describes people's real behavior.



The curve shown on the left compares the psychological value we give to wins and losses to their actual value. We can clearly see that the curve is not symmetrical: it is steeper on the side of the losses than that of the wins. This is what we call "loss aversion". As an approximation, losing money is nearly twice as painful as gaining money is satisfying.

Similarly, people do not make the same decisions when it comes to choosing between a certain win/loss and a potential benefit. When people are proposed a certain gain ($1,000), they prefer to keep it rather than taking the risk to gain more (if this $1,000 becomes uncertain). Conversely, when people are submitted a certain loss, they prefer to take the risk of losing more if they have a chance to avoid the initial loss.

However, as always, things are not as simple as an equation or a tradeoff between two situations. That is where behavioral finance intervenes. The influences of the decision are greater than what we would expect in standard economic theory.

Suppose a client has invested €60,000 in a stock, and that this stock is entering a downtrend.
2 strategies are proposed to preserve our client's capital.
If strategy A is adopted, our client will conserve €20,000.
If strategy B is adopted, there is 1 chance out of 3 that the €60,000 are conserved, and 2 chances out of 3 that everything is lost.
Which strategy will you choose?

Empiric studies show that 65 % choose A, 35 % choose B.

Suppose a client has invested €60,000 in a stock, and that this stock is entering a downtrend.
2 strategies are proposed to preserve our client's capital.
If strategy A is adopted, our client will lose €40,000.
If strategy B is adopted, there is 1 out of 3 chance that nothing is lost, and 2 out of 3 chance that the €60,000 are lost.
Which strategy will you choose?

Empirics studies show that 32 % choose A, 68 % choose B.

We observe that the answers related to the two situations are diametrically opposed: while 65 % chose the first solution in the first case, 68 % chose the second solution in the other one. Yet, taking a closer look at the two situations, we realize that these are exactly the same.
Again, the concept of loss aversion comes into play. We usually make decisions to avoid losing: that is what we do in the second situation, when the first proposition makes us lose €40,000. In the first situation, when the first solution was presented as a win of €20,000, we were unwilling to take more risk and the majority of people were content with this.

Besides the loss aversion, we can also clearly observe the diminishing sensitivity of the curve, known as "diminishing marginal utility". The levelling off of the curve represents that we'll enjoy winning €100 if we only have €100, much more than we would enjoy winning €100 if we had €900. In fact, behavioral finance shows that our decisions are almost always taken from a reference point, rather than from absolute values.

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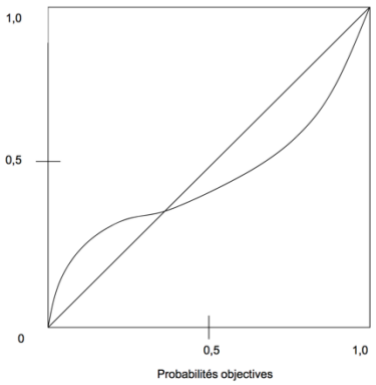

Finally, we observe a tendency for individuals to misrepresent probabilities. As we can see on the graph besides, we tend to overestimate the smallest probabilities, which explains in part the prosperity of insurance companies.

Choose between:
A. Winning €5 with certainty
B. 0.1 % chance of winning €5,000
99.9 % chance of not winning anything
Most people will choose option B.

Choose between:
A. Losing €5 with certainty
B. 0.1 % chance of losing €5,000
99.9 % chance of not losing anything
Most people will choose option A.

In the first case, we overweigh the probability of winning €5,000 (1 chance out of a 1000), which makes us willing to take risk. In the second case, we overweigh the probability of losing €5,000, which makes us unwilling to take more risk.
As we can see, the principle of risk aversion is not as straightforward as we think: adding probabilities can deform how we represent the "dilemma" to ourselves.

Three key ideas:

- Deviation from a reference point are highlighted rather than the reached levels.
- The value function shows that people are risk adverse when it comes to gains and risk-takers when it comes to losses.
- The utility intensity is different whether it comes to gains or losses. The curve is more sloping near the reference point to the side of losses than to the side of gains. Moreover, the small probabilities are overweighed in decision-making.

One practical transposition of the prospect theory leans in the attachment to the dividend (Sheffrin and Statman, 1984). When the stock of a company gains 10%, but no dividend is paid, the utility associated with this stock is u(10). However, if a €2 dividend is paid, its profitability is now 8 % and the utility associated with the stock is equal to u(2) + u(8). Since the curve is steeper near the origin, an investor will prefer the second case.
The situation stays the same if the company incurs a loss: the utilities of the two situations (no payment of dividend vs payment of a €2 dividend) will be: u(-10) vs u(-12) + u(2). Once again, since the curve is steeper near the origin, an investor will prefer the payment of a dividend.

Another implication of this theory is the disposition theory, which shows that portfolio managers tend to sell securities whose price is rising, while they tend to keep securities whose price is declining, due to their aversion to risk. This leads to underperforming portfolios, due to the lack of diversity and to poor decision-making. This has to do with the fact that our decisions are taken relative to a reference point. Underperforming portfolio managers evaluate the performance of each stock relative to the price they have paid to have it, failing to take into account the portfolio as a whole. We have shown that when a loss in incurred, we become risk-takers in order to offset this loss.

Finally, the endowment effect, developed by Barberis and Thaler (2002), has similar implications. A stock has been bought for €50, and is sold at €55; the utility associated with the operation is equal to u(5). Let's assume the investor chooses not to sell the stock, which can appreciate once again by €5 over the next period or depreciate by €5 with the same probability. The utility associated with keeping the stock then is equal to 0.5u(0) + 0.5u(10). Since the curve is concave, the investor will most likely choose to sell @ €55.
Assume the stock was bought for €50 once again, but incurred a €5 loss in the first period (the utility is u(-5)). If the investor chooses to wait one period, the utility associated with this decision is equal to 0.5u(-10) + 0.5u(0). Since the curve is convex in the side of the losses, the investor will prefer to wait. This leads to the keeping of underperforming stocks while we have sold the performing stocks.

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