Loss Aversion[†]

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Abstract: Loss aversion postulates that people prefer avoiding losses over acquiring gains of equal size. It is a central part of prospect theory and, according to Daniel Kahneman, "the most significant contribution of psychology to behavioral economics" (Kahneman, 2011, p. 300). It has powerful implications for decision theory and has been fruitfully applied in many subfields of economics. However, because the reference point is often not well defined and loss aversion interacts with other behavioral biases, there is some controversy about the concept.

Keywords: Loss aversion, reference point, prospect theory, endowment effect, decision theory, risk.

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1 A brief history of loss aversion

The concept of loss aversion was introduced by Kahneman and Tversky (1979) as a central part of prospect theory and later refined in Tversky and Kahneman (1991). Prospect theory assumes that people evaluate outcomes in comparison to a reference point. Because losses loom larger than gains, there is a kink in the utility function at the reference point. Loss aversion elegantly explains many anomalies on risk-taking behavior in experimental settings, in particular, why many people reject small favorable lotteries involving gains and losses which cannot be explained by expected utility theory (Rabin, 2000). It can also be applied to decisions under certainty, e.g. to explain the status-quo bias (Samuelson and Zeckhauser, 1988) and the endowment effect (Knetsch, 1989). Despite many criticisms, it is still widely seen as the best available model of how people make actual decisions.[1]

An important question for the application of loss aversion to economic models is how to define the reference point. The early literature equated the reference point with the status quo. In an influential paper, Kőszegi and Rabin (2006) argue that the reference point should be modeled as the decision maker's rational expectations held in the recent past about outcomes. Thus, the reference point is determined endogenously by the economic environment. It must be consistent with optimal behavior given rational expectations, i.e. behavior and expectations must form a *personal equilibrium*. If the outcome is stochastic, the decision maker will compare the actual outcome to the full distribution of equilibrium outcomes, weighted with their respective probabilities. While this model is internally consistent and gives rise to some interesting predictions (Kőszegi and Rabin, 2007), it also imposes an extreme rationality assumption on expectation formation.

2 Empirical evidence

There is a large body of empirical evidence supporting the existence of loss aversion in both risky and riskless contexts, but there are also some studies challenging these results.

A classic example is the endowment effect, i.e. the observation that the maximum price

[1] See Wakker (2010) and Barberis (2013) for excellent surveys.

individuals are willing to pay to obtain a good is typically lower than the minimum price they are willing to accept to give up the same good (Knetsch, 1989; Kahneman, Knetsch, and Thaler, 1990). While the endowment effect has been generally interpreted as evidence of loss aversion, several more recent papers have challenged the robustness of these findings (Plott and Zeiler, 2005, 2007), their validity in the field (List, 2003, 2004), and their relationship with loss aversion for risky gambles (Chapman et al., 2023). See Ericson and Fuster (2014) for further discussion.

Additional evidence of reference dependence and loss aversion come from a variety of field settings that combine rich observational data with a careful specification of reference points. For exaxmple, Genesove and Mayer (2001) and Andersen et al. (2022) find that homeowners facing nominal losses relative to the purchase price of their house tend to set list prices significantly higher than those facing nominal gains. Rees-Jones (2018) finds that taxpayers with a positive "balance due" (i.e. facing a payment on tax day) are more likely to pursue tax-reducing activities. In a high-stakes context, Pope and Schweitzer (2011) find that even highly-experienced professional golfers are significantly more likely to make a putt for par than a putt for other scores, a pattern consistent with loss aversion relative to the reference point of par.

Another big strand of the empirical literature is concerned with the estimation of structural parameters in prospect theory. Since Tversky and Kahneman (1992), these experimental studies estimate individuals' degree of loss aversion (typically represented by the λ parameter) from a series of lottery choice questions involving mixed gambles (Von Gaudecker, Van Soest, and Wengström, 2011; l'Haridon and Vieider, 2019; Gächter, Johnson, and Herrmann, 2022). See Brown et al. (2023) for a meta-analysis of empirically estimated loss aversion parameters.

There are also several studies shedding light on the neural and psychological underpinnings of loss aversion. Tom et al. (2007) find evidence for loss aversion in neural circuitry. De Martino, Camerer, and Adolphs (2010) report that two patients with damage to the amygdala area of the brain were not averse to losses. Sokol-Hessner et al. (2009) show that "thinking like a trader," a form of intentional cognitive regulation, significantly reduces behavioral loss aversion.

3 Applications

The concept of loss aversion has been fruitfully applied to many fields of economics. In the following, we briefly describe some of the most notable applications.

In finance, loss aversion has been used to explain the famous equity premium puzzle, i.e. the observation that the average return of the US stock market has exceeded the average return of treasury bills by a margin that cannot be explained by traditional consumption-based models of asset pricing. Benartzi and Thaler (1995) argue that investors look at the historical distribution of annual stock market returns. Because investors are loss averse, they require a high average rate of return to accept the high volatility of the stock market. This argument implicitly relies on an additional assumption (narrow framing) and has been theoretically refined by Barberis, Huang, and Santos (2001) and Pagel (2016). Loss aversion can also explain the non-participation puzzle, i.e. the fact that most households do not participate in the stock market despite the historically high returns. Dimmock and Kouwenberg (2010) find that survey-based measures of loss aversion can predict stock market participation. Loss aversion has also been used to explain the disposition effect, i.e. the empirical finding that investors are more likely to sell stocks that have risen than stocks that have fallen in value since purchase (Odean, 1998). If investors compare the price at which they sold to the price at which they bought, loss aversion implies that they will be reluctant to buy a stock that has fallen in value.

In insurance, loss aversion can explain why consumers insure small losses at a large cost in expected payments. For example, Sydnor (2010) shows that customers of a large home insurance company frequently choose no deductible, even though the expected cost of a deductible is much smaller than the difference in insurance premiums. Since the insurance premium has to be paid with certainty, while the deductible will be paid only in the unlikely event of a claim, this is consistent with expectation-based loss aversion (Kőszegi and Rabin, 2007).

Kőszegi and Rabin (2009) apply expectation-based loss aversion to consumption and saving behavior. A consumer facing possible income shocks in the future will engage in precautionary savings to reduce the expected pain that she experiences when finding out that she

cannot consume as much as previously planned. Pagel (2017) shows that this model can be used to explain a realistic hump-shaped pattern of consumption over the life cycle.

Some puzzling observations on labor supply can be understood through loss aversion. Camerer et al. (1997) document that the number of hours that a New York City cab driver chooses to work on a given day is higher the lower the average hourly wage on this day – the exact opposite of what traditional theory predicts. However, if cab drivers are loss averse and compare their income on a given day to their average daily income, then they want to work longer on a day with a low average wage in order to avoid the loss of earning less than average. Goette, Huffman, and Fehr (2004) provide a survey and critical discussion of this and several related studies.

In industrial organization, loss aversion has been used to explain the pricing decisions of a monopolist. For example, Heidhues and Kőszegi (2014) show that if consumers suffer from expectation-based loss aversion, it is optimal to have a high "regular" price and a lower "sale" price. Because the consumer will buy at the lower sale price, buying becomes part of her reference point, which induces her to buy at the higher regular price. See Heidhues and Kőszegi (2018) for a survey of this literature.

Loss aversion has also been used in contract Theory to explain some frequently observed contractual features that are difficult to understand in a neo-classical framework. For example, Herweg, Müller, and Weinschenk (2010) show that loss aversion of the agent implies that the principal will use a binary payment scheme (a "bonus contract") as an incentive scheme. Herweg and Schmidt (2015) show that renegotiation outcomes will be inefficient if parties are loss-averse and if the initial contract serves as a reference point. This can explain why parties sometimes do not write long-term contracts even though this would be feasible. Fryer et al. (2022) argue that incentive contracts framed in terms of losses should give stronger incentives than contracts framed in terms of gains. However, this prediction could not be confirmed by de Quidt (2018). Kőszegi (2014) offers a survey of this literature.

In summary, loss aversion offers a powerful explanation for many puzzles in behavioral economics. However, the reference point is not always well defined, and loss aversion often interacts with other behavioral biases such as mental accounting, framing, imperfect memory, and attention. Thus, additional, more careful studies are needed to disentangle these effects.

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