

BOUNDED RATIONALITY AS THE BASIS OF THE ECONOMY
BEHAVIORAL

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Summary

The theory of rationality and hence the definition of rationality is possibly the subject that accumulates more literature within the social sciences. explain the behavior of individuals when faced with different options is the main objective of these disciplines, and in an attempt to discern what are the mechanisms that underlie the decision-making two models have been postulated, that of homo sociologicus and that of homo oeconomicus. However, there are types of behavior that these models cannot explain. In this work we will focus on the homo oeconomicus model and its imitations when explaining behaviors under the principle of maximization of Utility. The different cognitive and heuristic biases that intervene in the decisional process and how these can condition the choices (up to the point of become suboptimal) through the notion of behavioral economics, which attempts to accommodate to those behaviors that the models or main currents that undertake the subject of rationality are unable to explain.

Behavioral economics is a fairly new field within science economics, which attempts to explain human behavior from the point of view of social preferences and heuristics. He bases his study on the processes of taking of decision by an individual, but unlike the model of homo oeconomicus (an expression formulated by John Stuart Mill in the mid-19th century as a useful idealization for the economic discipline) starts from a conception of rationality limited individual (fallible and biased decisions). Advances in this discipline. They are essentially nourished by field work and experiments in laboratories, as well as well as the advances of other sister disciplines such as psychology, neuroscience, cognitive science, etc. Behavioral and experimental economics were Nobel laureates in economics in 2002 awarded ex aequo to Daniel Kahneman and to Vernon Smith. Smith's experiments have focused on the recreation of artificial markets with the participation of students demonstrating that prices in these fictitious markets converge towards equilibrium. These experiments focus currently on phenomena of collective irrationality, such as the formation of bubbles. Kahneman has focused his studies on these phenomena, developing, together with Amos Tversky the prospect theory, where the decision framework exerts an impact on the assessment of potential gains and losses.

Keywords

Behavioral economics, experimental economics, bounded rationality, homo oeconomicus

1. TERMINOLOGY, ANALYSIS AND CONCEPTION OF THE ECONOMY

1.1. Rational choice theory

An attempt to systematize and model the behavior of economic agents is rational choice theory. The usefulness of this conception of economy for the simplification of problems in which it is necessary to isolate the volatile behavior of these agents. Economic science has brought new theories where this "unlimited rationality" (which presents agents as an almost infallible optimization mechanism) of the agents is questioned giving rise to more realistic economic and social models that include a fallible individual in your decision-making process. Rational choice theory is a theoretical framework that seeks to explain and predict, through a system of hypotheses and models, the choice action of individuals in their social and economic activity. Economic models based on the theory of rational choice allows us to obtain useful conclusions for the elaboration of policies economics and the study of market behavior. The economist John Stuart Mill proposed in the 19th century the figure of "Homo Oeconomicus" as a model of behavior that assumes the rational individual and that maximizes his utility, that is, has sufficient capacity to choose the best alternative against a set of these, he has perfect information, his actions are promoted by his own interest and calculates and weighs the possibilities of his choices. The individual tends to maximize the benefit of it and reduce costs or risks. In the words of R. Thaler "the Homo oeconomicus can think like Albert Einstein, he has as much memory as the computer of greater capacity and the will of Mahatma Gandhi" (Thaler, 2017,16). The principle of rational choice is the result of the capitalist system of production and exchange. The assumptions of rational choice theory deny the possibility of choices are affected by environmental and emotional factors. Therefore, the Premises of rational choice theory could be ordered as follows:

1. The individual is fully rational and knows what he wants.
2. The individual seeks to obtain the maximum utility from his economic decisions.
3. He has perfect information and unlimited cognitive capacity.
4. The individual's preferences are stable (do not change over time) and these are not influenced by external factors.

1.2. Theory of bounded rationality

It was proposed by Herbert A. Simon in 1957 as an alternative to the rational model of decision making. Part of the approach that the rationality of individuals

It is limited by three dimensions:

- I. The information available.
- II. The cognitive limitations of the individual.
- III. The time available for decision making.

These constraints prevent individuals from arriving at the optimal solution, simplifying the options available in the search for a satisfactory solution (not optimum). "The individual does

not act totally rationally in many of his actions, if not, through emotional impulses" (Simon, 1957).

In the model proposed by Simon, decision making is characterized by:

- Intuitive decisions: intuition, judgment and creativity are, basically, expressions of recognition and response capabilities based on in experience and knowledge.
- Incomplete information: the individual unable to manage the amount enormous amount of information in which he is immersed, he selects quantities manageable information for decision making.
- Satisfactory solutions: individuals will choose an option that meets with certain minimum requirements, since they do not have the capacity to handle the complexity related to following a rational process, information necessary, or of time

1.3. Prospects theory

This theory proposed by Kahneman and Tversky states that individuals think in terms of gains, losses, and neutral results. This theory is an attempt to explain what the decision-making process is like when faced with alternatives that involve risk. The authors focused their objective on documenting and explaining the systematic violations of the axioms of rationality in the choices between games.

Some of these violations are:

1. The framing effect: Presentation differences (frames) generate different choices, that is, the way of exposing the data conditions the decision.
2. The certainty effect: Individuals tend to overvalue results that they consider certain with respect to those that are only probable.
3. The isolation effect (Isolation effect): Faced with different alternatives, but with certain shared components, individuals discriminate the components that differentiate in order to simplify your choice. Kahneman and Tversky claimed that the prospect of losses has a greater emotional impact than gains. They called this "loss aversion" the preference for a small loss, although unlikely, at moderate gain.

1.4. Heuristics

In psychology, heuristics are simple and efficient rules for decision making in complex processes and/or with incomplete information. These rules work well in most of the time, but in some cases, they give rise to cognitive biases (Gigerenzer and Murray, 2015). These unconscious routines allow you to automate choices and choose alternatives faster. The investigations of Kahneman and Tversky show that, in a large number of occasions, decisions under conditions of uncertainty are based on the use of certain mental shortcuts called heuristics. Gigerenzer and Murray define the heuristic as a strategy that ignores part of the information, in order to make decisions more quickly, austerely, and accurately than other more complex (Gigerenzer and Murray, 2015). Kahneman and Frederick consider that in the decisions mediates a heuristic when an individual's appraisal of a certain specific attribute taken as object of judgment, is replaced by another property of the object that is easily retrieved by the mind (Frederick and Kahneman 2002). For these authors, the use of heuristics in solving complex problems It happens unconsciously. Shah and Oppenheimer show that really specific to a heuristic is the reduction of effort by examining of a smaller number of alternatives, the reduction of the recovery effort of these and the simplification of

the decision process. Listed below are the three heuristics considered basic (currently over a hundred have been described).

1.5. Adjustment and anchorage

It is a mental process that is characterized by the procedure that individuals follow, in making estimates, starting from an initial value and how these are adjusted as individuals obtain additional information. This initial or starting value acts like a real hard to jump anchor. The bias occurs because you are not rational use of available information.

Chapman and Johnson classify definitions regarding anchorage into three groups:

- Anchoring procedures in which a salient fact is presented, but uninformative, to individuals before they begin the decision-making process, acting as an anchor.
- The experimental outcome that a given number of events influences the decision process.
- The psychological process through which an irrelevant event realizes its effect.

1.6. Availability

Individuals tend to estimate the frequency or probability of an event based on the ease with which it is remembered. They suspend the decision process when They consider that they already have enough information to be able to carry out the action and therefore these decisions are based on the most accessible information.

1.7. Representativeness

Defined as the degree of correspondence that exists between a sample and a population, an occasion and a category, an act, and an actor, or more generally a result or a model (Tversky and Kahneman, 1983). It is therefore the tendency to evaluate the probability of an event occurring as a function of its degree of similarity to a certain mental model. Individuals estimate the probability of an event on the basis that the result must be representative of some aspect of its population originally.

The determinants of representativeness are:

- Similarity: individuals pay attention when a new event occurs, according to the degree of similarity between the new event and the stereotype.
- Insensitivity to sample size: individuals do not attach importance to the size of the sample. fact that the probability assigned to an event will be closer to the real probability of its occurrence the greater the number of observations from which.
- Misconception of chance: a sequence of events generated by a random process that appears to have no logical structure is considered product of chance and, therefore, more likely to happen.
- Insensitivity to predictability: Predictions are influenced by the favorable or unfavorable description of the events being insensitive to the information reliability.
- The illusion of validity: individuals overestimate their predictive ability when they observe a good fit between the initial information and the result of their predictions. The illusion persists, even though individuals are aware of the factors limiting the accuracy of your prediction.

- Misconceptions about regression: good or bad outcomes, high or low scores, extreme events tend to be followed by an average performance or less extreme events. This phenomenon is known as regression to the mean and states that the extreme scores in a measurement tend to approach the mean in a later measurement. The reasons that lead individuals to make incorrect judgments about this phenomenon are because regression is not expected in many contexts in which this ends up occurring, and when its presence is noticed, they often invent misleading causal explanations.

2. DUAL MODEL OF COGNITION

Daniel Kahneman, Nobel laureate in economics in 2002, establishes in his work on research, developed over decades, in collaboration with other researchers, that decision-making by individuals is not only determined by cognitive aspects, but is combined with other aspects of an emotional nature and is our brain, through its way of operating, which models the decision-making process. In his work *Think fast, think slow* (Kahneman, 2012) distinguishes two systems of thought:

- System 1 (quick thinking): operates quickly, automatically, without effort and remain active continuously. It is an intuitive system that uses "shortcuts" for its operation. Ultimately, this system is related to emotions and acts unconsciously, quickly and without effort.
- System 2 (Slow Thinking): focuses on mental processes that require effort. It is a deliberative system that uses rules to evaluate the situation. It is reflective and rational and is only activated by activities that require a mental effort.

3. COGNITIVE BIASES

At present, nearly 200 cognitive biases have been identified that govern our everyday thought classified into different types: formal fallacies, prejudices social biases, biases in probability and belief, and those of interest to us, biases in decision making and behavioral predispositions.

- Confirmation bias: the tendency to seek information that is consistent with a starting hypothesis. The individual processes the information in accordance with preconceived ideas that can determine his decision by ignoring another relevant information. Confirmation bias affects how individuals collect the information, searching for it in a biased way, encouraged prejudice and lack of judgment.
- Halo Effect: it consists of the erroneous generalization from a single characteristic of an object, a person, or an entity. This feature, positive or negative, creates a prior judgment from which the individual generalizes the rest of the features.
- Drag effect describes a gregarious behavior. This effect puts manifest the fact that an individual performs an action or has a certain belief on the grounds that the crowd performs the same action or expresses the same belief. The individual feels safe adopting the same than the environment in an attempt to simplify the decision-making process.
- Authority bias: it is the predisposition to overestimate the opinions of others. some people or institutions simply because of their preponderant role in certain areas

of the economy, culture, politics, etc. without subjecting her to critical process or prior prosecution.

- Hyperbolic Discount Bias: refers to the fact that individuals they are not able to consider the different situations that could arise in the future. These hyperboles or imaginary scenarios are ignored or discounted in the mental process that leads to decision making. Ultimately, the Individuals faced with two similar rewards will give more to the more immediate one in detriment of the future.
- Overconfidence Bias: it is the propensity to overestimate knowledge and personal experience. People tend to overestimate their abilities and subjective judgments and consider them correct. The experts in something often fall into this kind of excesses.
- Illusion of Control: the tendency to overestimate that control or possibility of influencing something over which objectively there is no control.
- Social Proof: the decision maker imitates the actions of others with the conviction that the decisions made on the basis of those actions are correct. He has a gregarious component as well as the drag effect, since the individual is released of having to choose and decide for himself by joining the group.
- Loss Aversion Bias: the individual shows a predisposition to accept a modest but sure profit rather than risk the prospect of higher profit. The satisfaction that a profit produces It is not comparable to the anxiety caused by a loss of the same amount.
- Status Quo: tendency to remain in a current situation taken as reference (considered more beneficial) and evaluate any changes as a possible loss.
- Sunk Cost Fallacy: linked to loss aversion bias and bias of overconfidence, highlights the low capacity for acceptance of the losses by individuals, added to an overestimation of the own capabilities that believe it is possible to recover from losses.

There is no consensus on how the results mentioned should influence the theory of the decision. Some researchers extend the neoclassical theory of expected utility adding the results of behavioral economics, others like Tversky and Kahneman maintains the concept of maximization of utility, although in his model the losses it is weighted twice as much as earnings. Regarding the theoretical approaches, in addition to Employing the neoclassical rational approach, behavioral economics uses the concepts of a wide variety of fields including social psychology and sociology that they differ from it in their scientific assumptions.

The behavioral economics approach places the individual as the central element of his analysis. At the ontological level, behavior is conceived in a more complex way away from the reductionism of neoclassical theory to the ideal of homo oeconomicus, which or description of his model, individual behavior is considered to be determined by desires, heuristics, moods, desires, emotions, etc. achieving the development of more precise behavior models. The theoretical explanations, within the scientific discourse, opposite and complementary between yes, they consider that the main cause of deviations from the model of homo oeconomicus at the ontological level is due to a reductionist approach to the individual isolated rather than individual in a group context. Analysis of capabilities cognitive represents an example of the reductionist approach. The authors Sendhil Mullainathan and Eldar Sharif (2013) describe that each individual has what they have called “cognitive scarcity”. Therefore, the decisions of the Individuals are limitedly rational due to limited thought human. Examples of theories consistent with the contextual approach include publications on social norms, which emphasize the influence of context on the individual decisions (for a theoretical overview, cf. Bicchieri, Muldoon 2011).

Behavioral economics research does not claim to give a universal answer about which of the two approaches, reductionist or contextual, are the most appropriate for obtain reliable results. The debate continues as to whether preferences are entrenched in human beings (methodological individualism with preferences and reactions stable to results) or if they are influenced by exogenous factors.

The scarcity of resources is considered as a central problem in the economy. behavior, being able to derive in applied behavioral research in the "design of markets" that would deal with the architecture of markets, considering certain goals.

Uncertainty is a factor in behavioral economics. people in an environment of uncertainty are not capable of rationally calculating the optimal choice for decision makers, instead, employ heuristics to make decisions. The behavioral economics attempts to analyze decisions made under conditions of uncertainty. Heuristics are not only limited to decisions under conditions of uncertainty can be applied in multiple situations related to decision making decisions.

How does behavioral economics deal with temporal sequences at the ontological? In most theories and models, they are treated as static. This means that the models aim to predict future events over time periods grouped. Time-inconsistent preferences show a certain degree of dynamism, however, the results of said dynamism are not open or indeterminate (for example, Frederick, Loewenstein, and O'Donoghue 2002). Also, other approaches such as prospect theory (Kahneman, Tversky 1979) ascribe to a conception in which past reference points dynamically influence the future behavior, but not in an open and indeterminate way.

The fundamental contribution of Tversky and Khneman derived from their analyzes of bias and heuristic is the prospective theory, formulated on the basis of behavioral experiments in which revealed flaws in the theory of expected utility. this theory postulates that the risk preferences of individuals are stable, that is, they do not they change their decisions in the face of risky options framed differently. The standard theory also recommends that the decision-maker faced with the possibility of obtaining profits or incurring losses, globally assesses the impact of this decision. Prospect theory characterizes risk preferences as changing, individuals take more risk to avoid loss than to gain profit (loss aversion). Finally, prospect theory states that individuals make their decisions based on a reference point (status quo), characteristic directly linked to the anchor and fit heuristic.

4. EPISTEMOLOGY

Behavioral economics assumes that the behavior assigned to homo oeconomicus is not adequate to describe human behavior (with respect to making decisions. The starting point of behavioral economics is experiments, performed in the real world to test their theories and hypotheses, realism epistemological (as a descriptive orientation) allows scientists to observe and describe human behavior in a simple way.

The classification of the empirical results takes as its starting point the behavior of homo oeconomicus to measure observable behavior for identify "systematic biases that separate people's beliefs and the choices they make, of the optimal beliefs and choices made in the rational agent models" Kahneman (2003, 1449). This procedure allows determine if a person behaves according to the assumptions of homo economicus and to what extent her behavior deviates from this concept (Angner 2014). The researchers still refer to the neoclassical model as an ideal normative. Thus, Richard Thaler (2016a, p. 1591) writes: "The utility theory expected remains the golden rule on how decisions should be made in the face of to risk". Colin Camerer et. to the. formulate this position even more drastically (2003): «The challenge is to find out what kind of "stupid" behaviors can arise routinely and how to prevent

them, while imposing minimal restrictions on those who behave rationally. the aspiration of reduce the difference between the observable behavior and the reference point through prescriptive theories includes constructivist elements (compare, for example, example, the push -Nudging- of Thaler and Sunstein 2008).

Regarding epistemology, behavioral economics focuses on the human behavior in economic decision-making situations, deriving hypothesis of a generalized theoretical framework. What sets behavioral economics apart from other disciplines is his approach to the analysis of human behavior in economic situations (decisions) and their theoretical affiliation to economic theories neoclassical.

5. METHODOLOGY

Behavioral economics focuses on experiments, both in the field and in the laboratories. The bases of the standardized economic experiments were established by Vernon Smith, this attempt to establish as objective a situation theoretical similar to that of a principal agent, with a fixed set of options to reveal the preferences of the participants. Other factors influencing the experiment are removed to compare model predictions with behavior observed.

Laboratory experiments were dominant in early economics behavioral, although field experiments have become increasingly important. The design of the experiment has a control group and a randomized treatment, it is intended to simulate a counterfactual situation and isolate the effect of a single measurement, or a situation change. The methodological orientation focuses on the ideal of natural Sciences. An example of these experiments would be the ultimatum game. In said game, the person in charge of the experiment gives a participant a quantity of money that he has to distribute give 10 euros (for example) to Marie and ask her to give part to a second participant, Peter. Peter is given two alternatives, he can accept the offer, or reject it. In the case of rejecting Marie's offer, the two do not they would get nothing. Economic science predicts that Marie, motivated by her own her interest, make the lowest offer. In this case she would offer Peter one euro, and if Peter is equally rational, she will accept the euro as it is better than nothing. Actually, in Avery wide spectrum of studies on the ultimatum game, the proponents (who make the offer) are much more generous and offer larger quantities and the recipients often reject offers they consider too generous. The behavioral economists explain these results by referring to our preferences that is, we experience inequality aversion in two ways: aversion to advantageous inequality, in the experiment Maria will not make the minimum offer because her reason tells him it would be unfair (advantageous inequality aversion is about not wanting seeing those around us treated unfairly) and disadvantageous aversion (we don't want being victims of inequality), in the experiment, Peter will suffer aversion to disadvantageous inequality when Marie makes him a petty offer and this can lead him to turn down relatively generous offers. The aversion to inequality disadvantageous (the one that worries us the most as individuals) such as the aversion to advantageous inequality have a strong influence on our tendency to generosity. Experiments have also been carried out to assess how We perform probabilistic calculations. In a classic example, tourists are described newcomers to a city with the intention of eating in a restaurant. come two restaurants, apparently the same, and therefore do not know which is better, one is empty and the other is full. Common sense would dictate that the empty restaurant will be quieter and comfortable, however our tourists will choose the busiest restaurant because will deduce that all those people who have preferred the restaurant full to empty know what they do and will follow their example.

Social influences are also a fertile field for experimentation. The behavioral economists to explain these social pressures resort to the concepts coined by social psychologists (Stanley Milgram, Solomon Asch) through their experiments. Stanley Milgram proposed a controversial experiment in which the experimenter ordered the participants to apply (what they believed) strong electric shocks to other people (actors) whom they could not see but could hear. A significant number of them (not all) were willing to apply what was given to them said they were potentially lethal electrical shocks. The actors pretended to be in great pain, they screamed and in some cases were eerily silent after download. Milgram explained that the fact that the participants in his experiment were willing to act in this apparently ruthless manner it proved that they were susceptible to obedience to an authority. We tend to do what we are told, especially when faced with physically and psychologically tough situations. Another set of experiments in social psychology that have influenced economists we owe these behavioral findings to Solomon Asch (Asch, 1955). He designed an experiment with lines to test conformity: participants were asked to look drawing a line and then match it with another line of the same length. It was an easy task, but Asch and his colleagues made it more difficult by teaching the participants what the others had chosen. Unbeknownst to the participants, among the groups that decided on the length of the lines were accomplices of the experimenter who had instructed him to lie about the length of the lines. To illustrate with a simple example: let us imagine that twenty participants they have to complete the task together, but nineteen of them are in cahoots with the experimenter, so there is only one genuine participant. If the rest propose wrong and absurd answer to this simple question about lines, what will the participant number twenty? Asch and his colleagues found that many of the genuine participants (although, revealingly, not all) changed their opinion about the correct answer and chose an obviously incorrect one when they saw the choice of others. In other words, many participants seemed inclined to make sure that their responses matched those of the other participants in your group, without considering the possibility that they might be wrong or lying. The emotional responses of the participants were variables. Those who defended their original responses did so with confidence. Conformists who changed their responses to fit those of the group they varied: some doubted themselves and that caused them discomfort; others blamed other participants of their mistakes. Why would you change your mind person and choose an answer that seems blatantly wrong? this experiment it does not solve the dilemma between the rational and the irrational. Choose the wrong answer alone because you see others doing it can seem irrational. The Nobel Prize in Economics Robert Shiller proposed a different explanation, consistent with decision making rational: perhaps the actual participants thought their decision was more likely to individual was wrong than that of nineteen people. They weighed the probabilities and concluded that the chances of such a number high number of people was wrong they were small and therefore it made sense imitate them (Shiller, 1995).

6. CONCLUSIONS

Social phenomena are the result of the intentions of individuals but, moreover, they are unintended consequences of the interaction of individuals. The social sciences must study the logic of individual or collective actions their causal effects as well as their rational nature. social phenomena are explained. through causal arguments, based on trends and probabilities, but also by intentional arguments that establish that something happens due to a process intentional. In economics, the neoclassical vision continues to be the basis for the study of this branch of the social sciences that establishes that there is an individual rationality and stable and balanced markets that are the result of individual maximization of

the agents involved in it. The theoretical models are the result of impossibility of carrying out experiments within economic science since we can intervene in the economic variables intentionally and observe the effects. Economists and philosophers have already warned against excessive formalization of theoretical models based on unrealistic assumptions such as the rationality of economic agents. Behavioral economics focuses its study on preferences and the treatment of these in an endogenous way, unlike the canonical model that considered exogenous, since these are marked by economic interactions and social of everyday life. There are theories that reject the concept of utility maximization. Some examples of this rejection are the theory of satisfaction (Simon 1955), adaptation theory of aspiration levels (Selten 1998), case-based decision making (Gilboa and Schmeidler 2001), as well as fast and frugal heuristics (Gigerenzer and Goldstein 1996). Ultimately, the goal of the behavioral economics is to gain greater insight into the behavior of humans in decision making and better define social phenomena. The behavioral economics is the result of the growing importance that the empirical work in economics and the combination of increasingly powerful tools and richer statistical databases. The future that this discipline holds is the complete assimilation by economic science of its postulates and the gradual abandonment of the “revolution” label. The economy now has tools that allow the elaboration of more intuitive models and in accordance with the information societies where the decision-making individual operates.

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