



Retrospective View on Reason, Emotion and Economic Theory

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The assumption about the high rationality of economic agents has been key to the construction of modern economic theory, which began to take shape, as a separate science, approximately with the neoclassical (Jevons, Walras, etc.) during the nineteenth century. In terms of Lakatos, one of the most influential epistemologists of the twentieth century, all science has a hard core, which is very difficult to refute, to modify, and in which there are certain premises that nobody usually discusses, and all accept them as basal foundation from where the current models start. And the premise of rationality that prevailed in economics is that of the hyper-maximizing human being, always tending towards quasi-perfect cost-benefit evaluations as the basis of each economic decision; this is perhaps the fundamental assumption on which the neoclassical built modern economic theory, and which is still valid today, beyond the numerous criticisms received over the past two centuries, with the School of Behavioral Economics and Neuroeconomics among the most recent critics.

Throughout this chapter, we will try to walk the evolutionary path that has transited the concept of rationality in economic theory, emphasizing some of its main critics, from JM Keynes to the Nobel prizes Simon, Thaler and Kahneman, and to modern neuroeconomists like Glimcher, Camerer, Zak, etc., to name but a few of the most important critics.

Adam smith: Reason vs passion

The first economists began their task when psychology still did not exist, which is why they acted in some way as psychologists. Hume's work [1] is largely devoted to analyzing human knowledge

from a perspective that we would consider today as a field of psychology, and it is not precisely a simplified and monolithic vision that serves as a support for the neoclassical model, but rather, applying introspection, describes a much more complex and real human being.

In this line of thought is the work of Adam Smith "Theory of Moral Sentiments" [2], which is a detailed (if basic) analysis of human psychology. Following the Platonic distinction, Adam Smith differentiates two systems in the human being, one affective, linked to the passions and the most primitive feelings, and another superior, which controls, in the manner of an impartial spectator, the first.

When I strive to examine my own behavior, when I endeavor to pronounce judgments on it, either to approve it or to condemn it, it is evident that in such cases it is as if I were divided into two different persons, and that I, the examiner and the judge, I embody a man different from the other me, the person whose conduct is examined and judged. The first is the spectator. The second is the agent, the person that I designate as myself, and from whose behavior I tried to form a feeling, as if it were a spectator's. The first is the judge, the second the person who is judged.

When we are about to act, the avidity of passion will rarely allow us to consider what we do with the dispassion of an intelligent person.

In the "Wealth of Nations", according to Nobel Prize winner Simon [3]

"...the rationality that Smith describes is that of common sense every day. This follows from the idea that people have reasons to do what they do, and that this does not depend on an elaborate calculation of utility."

But not all the outstanding classics thought the same way as Smith, at least not in regard to how to model human beings when trying to do economic theory. For example, let's take Stuart Mill and his concept of homo economicus [4]. The main ideas in this regard are the following: first, Mill recognizes that there is a part of human behavior where obtaining wealth is not the main objective. Now, there are other departments of human affairs where the acquisition of wealth is the main purpose; Economics deals with this second category, so that it abstracts from all human passions and motives except the desire for wealth and the aversion to work. The man thus described is a fictitious man and Mill himself is aware that the economic sphere is only a part of human behavior. However, he recommends that economics proceed to abstract and work with this fictitious man, who seeks to obtain "the greatest possible amount of wealth with the minimum possible work and self-denial".

And in general, it is pertinent to note that along with Stuart Mill, two other classic theorists, also important at the time, such as Senior and Cairnes, coincide in the search for maximum wealth with the least possible effort as one of the driving principles of the man. The coincidence is not accidental but responds to the influence in the England of s. XIX exercised the philosophical current of utilitarianism.

In this way, classical economists seem to have no unanimity about how human rationality should be taken when doing economics, on the one hand there were, among others, David Hume and Adam Smith, the latter called the "father of Economics", who introduced the principle of personal interest, but with the above-mentioned limitations (especially in his "Theory of the Moral Sentiments"), but on the other hand there were Mill, Senior, Cairnes, among others, closer to the utilitarian currents that were going to impact fully in the subsequent school, the neoclassical ones.

Animal spirits of Keynes

John Maynard Keynes also departs from the concept of rationality when he asks how it can be that even when the rational analysis of investment projects shows its inconvenience, economic agents

decide to invest despite the high probability that the project will not turn out to be profitable and that can bankrupt the investor. It supposes that this is due to the "animal spirits", which are something like waves of optimism and pessimism that envelop society alternately and that move us to action for the pleasure of doing things, beyond what the cold cost-benefit calculation says. In addition, the inflexibility of falling wages, the monetary illusion, the inability of businessmen to adequately formulate their expectations and the trap of liquidity - all Keynesian concepts - are manifestations of the withdrawal of full rationality on the part of the economic agents, who make economics diverge naturally from full employment and public policies that restore it are necessary.

The contribution of Keynes to economic science is very important, basically because of the degree of influence he had and still has today in applied macroeconomic policy, especially in the short term. And of course, it helped to introduce into current economic theory certain aspects that make the true rationality of man, not the ad-hoc that Robbins enthroned, and that comes from the utilitarians. That is why we are going to do a more detailed analysis of this economist.

To begin with, it is said that Macroeconomics was born as something separate with Keynes, that is, it begins to differentiate the micro from the macro. During the nineteenth century and the first decades of the twentieth century the vast majority of neoclassical economists - Jevons, Walras and Menger, and their disciples Marshall, Edgeworth and Pareto - focused mainly on the study of microeconomic issues, although it is true that some of, they were also interested in topics of a macro nature. With respect to the aggregate functioning of economics, there was a certain consensus regarding some basic principles, among which the validity of the Quantitative Theory of Money - in its Marshallian version, for example - was the validity of the price and wage flexibility guaranteed by the full employment and the effectiveness of Say's Law.

But in 1936 John Maynard Keynes published *The General Theory of Employment, Interest and Money* [5], one of the most influential economics books of the 20th century. The appearance of Keynes's book was of crucial importance due to two reasons. In the first place, this work supposes the birth of the Macroeconomics in its current form where Keynes - and from it, later the Keynesian economists - elaborates macroeconomic models proper, character-

ized by a particular way of adding markets, goods and economics agents. Second, the subsequent dissemination of the ideas contained in the General Theory by authors such as Samuelson and Hicks broke the existing agreement on macroeconomic issues referred to above (the flexibility of prices and wages, Say's law, etc.).

Two types of factors can be distinguished that contribute to the development of Keynesian thought: on the one hand, the high unemployment rates in England and the United States in the 1930s, which led economists to question the causes and remedies of this pathology. Second, Marshallian microeconomics was also being questioned by economists such as Joan Robinson, Chamberlin, Kahn, and Harrod. In short, John Maynard Keynes knew how to elaborate the theoretical framework that supported and justified, in a more or less coherent way, two beliefs that were accepted by economists and that classical economics of orthodox and hyper-rationalist tendency was not able to adequately explain

- On The One Hand, That the Observed Unemployment Was Involuntary
- On the other, that fluctuations in aggregate demand had a strong impact on income and employment.

In particular, the General Theory linked both ideas and offered a plausible diagnosis and remedy of mass unemployment: the cause of unemployment was the insufficiency of effective demand. The solution, on the other hand, was in the stimulation of the latter. Keynes supports his analytical construction on principles radically opposed to those that maintain the classics, a term with which Keynes designates, disdainfully, all those who accept the basic premises on money, prices, wages and Say's Law detailed above.

The alternative principles on which Keynes works are the following: first, he does not accept the Quantitative Theory of Money because the demand for money is not directly related to rent (for the reason transaction) but also, inversely, to the type of interest (Keynes - great speculator in the stock market - highlights the speculation motive to demand money); secondly, it postulates that there are certain rigidities in prices and wages, and in particular that the nominal salary is rigid due to institutional aspects such as the unions or the monetary illusion of the workers; and, finally, defends the invalidity of Say's Law since it is the demand that creates its own offer and not the other way round (or, in other words, nothing guarantees that the saving equals the investment at the level of full employment).

The conjunction of these premises gives rise to one of the crucial implications of the General Theory: economics can be placed for long periods of time in a situation of equilibrium with unemployment (that is, the most irrational that can be for the classics); given that nominal wages are rigid and that Say's Law is a fallacy, economics alone will not return to the level of full employment. Therefore, the active intervention of economic policy becomes necessary. However, Keynes doubts the effectiveness of monetary policy given that, in his conceptual apparatus, investment is rigid and the demand for money -at low interest rate levels- is quite elastic with respect to the interest rate, which is why the prescription of economic policy is also immediate: the impulse of the aggregate demand must be carried out by means of an expansive fiscal policy (and, therefore, opposed to the orthodox dogma of the balanced budget).

At this point we are already appreciating the way in which Keynes begins to refute the dominant hyper-rationalist/maximizing economic theory until now

- First, Using Macro Variables Instead of Micro Variables
- Second, From An Acute And Controversial Reasoning, Obviously Introspective - There Was No Neuroimaging Or EMT - about how human beings, especially businessmen and consumers, make certain decisions: prices and wages are rigid in the short term, the expansive monetary policy in extreme situations has no effect on the expectations of economic agents, entrepreneurs sometimes invest without necessarily looking at profitability in the short term; in short, a whole series of aspects that Keynes observed happened in economics (and that the traditional theory did not contemplate), and that when beginning to be debated, and inserted in the theoretical models, they began to bring a little closer to the man of economic theory the man of flesh and bone, the real human being, not Robbins.

The publication of the General Theory, and the certain air of ambiguity with which it was written, generated an enormous volume of works that tried to unravel the authentic message of Keynes. The work of Patinkin (1956) [6], which analyzes both Keynesian and Neoclassical thought in detail and depth, must be highlighted, so that, on the one hand, it provides a clear exposition of Keynes' theory; on the other hand, it shows the logical coherence of neoclassical propositions. In any case, and as we have already said,

the influence of the Keynesian contribution was immense, both in the academic field and in that of economic policy. Certainly, most economists, during the 1950s and 1960s, developed their contributions within the framework of Keynesian thought, theoretically refining or empirically contrasting some of their propositions. In the applied field, the ideas of Keynes - and in particular the prominence attributed to fiscal policy - constituted the new orthodoxy that replaced the traditional one in most of the Western countries.

The interpretation of Keynes's thought that can be considered dominant is the so-called neoclassical synthesis of Hicks and Modigliani, popularized in its graphic version by the IS-LM curves. The model accurately captured the central message of the Keynesian contribution: the fact that prices and wages adapt slowly (that is, irrationally for the classics) to the mismatches between supply and demand. On the other hand, the qualification of neoclassical was due to the fact that the economic environment was perfectly Walrasian: markets were competitive; there were no externalities or imperfections in the information available to agents. The IS-LM model soon achieved great success: in fact, it has exercised an undeniable influence on the profession and has been incorporated into the vast majority of Macroeconomics textbooks for its (apparent) simplicity, elegance and versatility; it also continues to be used in recent manuals. The model suffers, however, from certain limitations that hinder its understanding and generate confusion in those who study it in depth, as is its timeless nature since it is a model of comparative statics and, therefore, not explicitly dynamic, and also its omission of the role of expectations. In addition, it is surprising that it is a Walrasian general equilibrium model in which there are rigid prices and salaries, at least in the short term.

But beyond the limitations mentioned, it is undeniable, from Keynes, the advance of economic theory to consider in their models much more realistic assumptions about how consumers, investors, and economic actors in general reason and make their decisions, against the excessive oversimplification of the Jevons, Marshall, Robbins and all those who, for intellectual and scientific convenience, assumed machine-men at the time of building the theoretical models of economic decision-making.

Simon's bounded rationality

Simon gives account of his critics to the principle of rationality in the decisions of the entrepreneurs, from a series of works

that made him the winner of the Nobel Prize [7]. Define his idea of "bounded rationality" in the following terms.

The task, then, was to replace the classical model with one that describes how decisions could be made (and probably actually were) when the alternatives of search had to be sought out, the consequences of choosing particular alternatives were very imperfectly known both because of limited computational power and because of uncertainty in the external world, and the decision maker did not possess a general and consistent utility function for comparing heterogeneous alternatives.

Several procedures of rather applicability and wide use have been discovered that transform intractable decisions into tractable ones. One procedure already mentioned is to look for satisfactory choices instead of optimal ones. Another is to replace abstract, global goals with tangible subgoals, whose achievement can be observed and measured. A third is to divide up the decision-making tasks among many specialists, coordinating their work by means of a structure of communications and authority relations. All of these, and others, fit the general rubric of "bounded rationality".

Simon then opens a gate for the reformulation of the firm's theory and business decisions, which attempts to modify the neoclassical model. Instead of optimizing in the way that neoclassical theory assumes, economic agents set a goal. When they achieve it, even if it is not optimal, they feel satisfied with it and do not seek to optimize. The men of flesh and bone have limited capacities to acquire knowledge and to make calculations, and to predict the behavior would require the participation of psychologists and sociologists, in addition to the economists.

And in line with Simon's concept of limited rationality, we have Akerl of with his concept of cognitive dissonance, which also illustrates us about behaviors contrary to the supposed individual rationality that governs economic decision making, for example in situations where, those who make decisions, do not know their preferences well, or are too influenced when they act as part of closed groups to external points of view. The due obedience, which leads someone to do things that displease him for pleasing the superior, is an extreme example.

However, it must be recognized that, after all that has been said in previous pages about the enormous degree of current penetra-

tion of micro fundamentals and rational expectations in macroeconomics, and even though Simon has won a Nobel prize in economics, it would seem that the concept of limited rationality, in the '70 and '80, could not succeed in changing the course of traditional modeling, and therefore of the dominant paradigm at that time. But it really was a valuable attempt by Simon, and then continued by the other Nobel Prizes Kahneman and Thaler, with great success in the '90, with the Behavioral Economics, and now with the Neuroeconomics.

Kahneman, thaler and the behavioral economics

The revival of Psychology within Economics is translated into the current of thought that is mainly covered under the denomination of Behavioral Economics, which is disseminated and generalized with the awarding of the Nobel Prize in Economics in 2002 to Kahneman, who receives it in conjunction with Vernon Smith, whose branch, although related to the previous one, is called Experimental Economics. Both notables theoretical define two types of cognitive processes: System 1, which they call intuition and System 2, reasoning

“The operations of System 1 are fast, automatic, effortless, associative, and often emotionally charged; they are also governed by habit, and are therefore difficult to control or modify. The operations of System 2 are slower, serial, effortful, and deliberately controlled: they are also relatively flexible and potentially rule-governed.”

“Utility cannot be divorced from emotion, and emotions are triggered by changes. A theory of choice that complete ignores feelings such as pain of losses and the regret of mistakes is not only descriptively unrealistic, it also leads to prescriptions that do not maximize the utility of outcomes as they are actually experienced [8].”

To be rigorous, and beyond their great coincidences, the substantial difference between Behavioral Economics and Experimental Economics is that the first is based on the assumption that incorporating psychological principles will improve economic analysis, while the second presupposes that incorporating methods of psychology (for example-controlled experiments) will only improve the testing of economic theory. Then we will devote a few paragraphs mainly to Behavioral Economics, which is, of the two branches, the one that has had the most impact at the theoretical contributions level in Economics.

In a landmark book on Behavioral Economics, Camerer and Loewenstein (2004) [9] summarize the main findings of this current. The method used by economists and psychologists working in the aforementioned line is mainly the active experiment, that is to say the one that is carried out on a group of chosen people, to which they are subjected to questions related to the subject under study, it is repeatable and it can be analyzed statistically, although the other methods used by Economics in general are also used. However, what distinguishes this current is the use of knowledge that comes from psychology to analyze economic behavior.

In a very interesting work, the Peruvian economist Ernesto López [10] points out some of the current conceptual contributions of Behavioral Economics. Following Mullainathan and Thaler (2000) [11], he asserts that behaviorists criticize the neoclassical economic paradigm, since it is based, in terms of its assumptions about agents, on three attributes, at least highly debatable

- Unlimited rationality
- Unlimited will
- Unlimited selfishness.

With regard to the attribute of unlimited rationality, and making a bit of history, it is necessary that, as early as 1955, Herbert Simon, whom we mentioned in the previous section, criticized the economic models that adopted the assumption of agents with unlimited capacities for processing information, which led him to coin the term bounded rationality to describe a more realistic view of human capacity for information processing.

We have already stressed that, according to this vision, human beings face restrictions of mental capacity and time and, therefore, will not always be able to solve complex problems optimally. Consequently, a "rational" strategy against these restrictions may be the adoption of practical rules that allow people to economize in the use of time or their mental faculties. But, just as this rational strategy can facilitate complex decisions, it can also lead to systematic errors, that is, repeated ones, as shown by Kahneman and Tversky [12].

Deviations from the assumption of rationality can occur with respect to judgments -based on beliefs- of the agents, which leads to situations of overconfidence, anchoring, extrapolation and judgments about the probability of future events based on limited but

available information. They can also occur with respect to agent options, described by the prospect theory of Kahneman and Tversky. Two important concepts in this theory are those of "aversion to losses" and "mental accounting". The concept of "aversion to losses" suggests that people are more sensitive to decreases in their well-being than to increases in it, or in other words, it has been empirically verified that, in many cases, the decrease in utility associated with a loss is greater than the increase in utility associated with an equivalent gain.

For its part, the concept of "mental accounting" coined by Thaler [13], refers to situations in which agents, in the face of repetitive events with uncertain results, treat them as independent results and adopt a strategy for each of them, instead of to consider them as a single pool of events and adopt a general strategy. An example of mental accounting, collected by Camerer [14], is the behavior of taxi drivers in New York City. As in many other countries, many New York taxi drivers pay a fixed rent for the use of a taxi, and keep the rest of the income they earn. In this situation, the "rational" strategy of optimization would be to work more during the days of high demand (days with bad weather, or days when there is a big event in the city) and slightly less during days of low demand.

However, if the drivers evaluated each day independently, and compared the income of the day with a pre-established standard, they could end up working more hours, precisely in the days of low demand, something quite unsound from the neoclassical theory, but which is precisely the most usual empirical finding.

In relation to the second attribute, that of unlimited will, there are numerous examples of situations in which it can be affirmed that agents effectively know what is best for them, but do not opt accordingly due to problems of self-control. These deviations occur in the case of addictions, but also in usually less severe cases, such as bad eating habits, sedentary lifestyle or simple procrastination (leave for tomorrow what can be done today), something that usually happens to the majority of people.

Finally, the attribute of unlimited selfishness is also rebuttable and, happily, innumerable examples of altruistic behavior can be found, including the relative success of many national collections and volunteerism in charities.

Undoubtedly, it is quite clear, after all these examples, that behaviorists reason and theorize following a line of argument very similar to Simon's ("bounded rationality"), and obviously in tune with Neuroeconomics, but with the difference that their models were born based on Psychology more than Cognitive Neuroscience, unlike Neuroeconomics, which has stronger solid science foundations. However, behavioral contributions have been growing, and with a high degree of acceptance of mainstreams (two Nobel prizes), especially today that their theoretical developments are being provided with foundations in Cognitive Neurosciences, which gives them more rigor.

Neuroeconomics

While the conception of the neoclassical model starts from the idea that human beings have well-defined objectives that they try to obtain, the first findings of Neuroeconomics confirm the idea that in a person there are at least two decision centers, one from the "deliberative" system, located in the cerebral cortex, and another "affective" system, located in the inner part of the brain, that is, in its limbic part; and both systems interact permanently.

We return this way to the beginning, when Adam Smith (from introspection, not from Neurosciences) spoke of a confrontation between our passions and what he calls "impartial spectator" (Smith used a well-directed psychology, but very rudimentary). Although the neoclassical model starts from the premise that consumers optimize their utility and entrepreneurs maximize their profits, in a scenario of perfect information, this has not been the case at the beginning of economic science on the one hand (Adam Smith and others classics), and on the other there have been divergent opinions with that model for a long time (the aforementioned Hutchison, J.M.Keynes, Simon, among others mentioned throughout this chapter).

However, it is generally recognized that the neoclassical model has worked reasonably well, although we believe it must be discussed again in its fundamental premise (quasi-perfect optimizing rationality) in order to build a better economic theory. Moreover, we could say that any human decision that is theoretically modeled should be proposed in such a way as to maximize together the rational and the emotional that coexist in the human being, in order to reach a real and complete balance; where an alternative,

albeit with criticism, could be the following model, by Loewenstein and O'Donoghue [15].

In their work, both economists raise both the deliberative (rational, system 2) and affective (emotional, system 1) systems, since both underlie human behavior, and assume that the human being faces a function to minimize, which is the cost of their behavior. One part of the cost is the difference between what the deliberative system wants and what it ultimately obtains and another part of the cost is the effort that the deliberative system (led by the dorsolateral prefrontal cortex) must make to spur the impulse to act certain way (that comes from the affective system).

$$[U(x^D, c(s), a(s)) - U(x^A, c(s), a(s))] + h(W, \sigma) [M(a^A, a(s)) - M(x, a(s))]$$

where U is a utility function, x the chosen course of action, of a set X , the supra-indexes D and A indicate the optimal behaviors for the deliberative and affective systems respectively, s is a vector of stimuli, $a(s)$ and $c(s)$ are the vectors of affective states of the affective and deliberative systems respectively related to these stimuli, h is the effort necessary to correct the desire that comes from the affective system, function of the power of the will, W and elements that weaken it, σ , and M are the courses of action of the affective system.

This model tells us that the deliberative system is subject to two forces: one from the deliberative system itself and another from the affective system. If the first one totally overrides the second one, the behavior followed would be x^D , and if only the affective one prevails the behavior would be x^A . However, what usually (but not always) happens is that an intermediate point is reached between both extreme positions. And after applying this model to three different problems: intertemporal preference, risk behavior and altruism, they come to the conclusion that the affective system shares the regulation of the behavior with the deliberative system, and that the totally rational behaviors, derived from the deliberative system are not always what we find in reality.

Beyond the simple model of Loewenstein and O'Donoghue, it is encouraged to mathematize human behavior in a different way to the neoclassical, this being an alternative modeling direction in Economics; to consider the maximization of both systems (either acting in the form of conflict, as Kahneman argues, or in a unitary

way, as Glimcher argues), but not only modeling the deliberative, as has the tradition in economics from the neoclassical to now (and above an unreal deliberative system, arising from introspection, and not from Neurosciences). Perhaps, in some years, we will see many more models with proposals of this type, without too complex mathematics, and probably more refined, both at the micro level and those that support the macro. This is probably the only way for the neuroeconomic approaches to overcome the Friedman Thesis of epistemological validation, that ask for more accurately predictions with less theoretical complexity.

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