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Economic Rationality in the Era of Artificial Intelligence

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Abstract

Artificial intelligence offers new paths in economic decision-making as it augments human computational capacity. Nevertheless, the social context is problematically apprehended through AI as it overlooks the issue of social embeddedness and the interplay of the various evolving dimensions of economic phenomena. We aim to show here that economic rationality should be understood following the open system mode of thought in the sense that agents may learn and change while they evolve with their social environment.

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«Omnia mutantur, nos et mutamur in illis[1] *»*

1. Introduction

A fundamental characteristic of humans is that they live embedded within a common system of formal rules, moral values and social habits. Their individual identity is largely the consequence of their social existence. Even human "intelligence is not simply 'in the mind': it is situated and contextual" (Hodgson, 2001, 290). This view challenges the neoclassical concept of economic rationality which commonly stipulates that every person is supposed to behave as a rational maximizer, requiring the calculation of the gains and losses from every economic decision that one takes.

Artificial intelligence revolutionizes many productive sectors, and it imports new insights to economic decision making as it augments human computational capacity. Complex tasks concerning economic reasoning and problem solving as well as evaluating risk of different investment plans become more feasible as AI is able to calculate countless outcomes of numerous possible future actions and situations. Artificial intelligence can help economic agents to analyze increasing amounts of available data and applications, mainly for classification, clustering, generation, and forecasting.

The problem with AI processing, while it significantly resolves the old problem related to the "pretense of knowledge", is that it neglects the social context of decision making. More than eight decades ago, Friedrich Hayek (1943) has criticized neoclassical economists for

[1] "all things change, and we change with them". Ancient Roman proverb

overlooking the fact that humans have limited access to information and restricted computational skills. To pretend that consumers and producers know everything about present and future needs and prices and can calculate all the consequences emanating from their choices was inexcusable to Hayek. Assuming that AI decision making has the right data, calculating possible outcomes and suggesting optimum solutions, became a technical problem.

However, the social context is problematically apprehended through AI as it overlooks the issue of social embeddedness and the interplay of the various evolving dimensions of economic phenomena. A century ago, Max Weber (1922, 22) wrote that "the economic activity of an individual is social only if it takes account of the behavior of someone else". Every economic agent is connected with other agents and is part of many distinct social groups and a specific social context. Thus, economic activity is institutionally embedded by definition, and decision makers reach different outcomes if they operate within different institutional settings.

AI has an individualistic starting point. Decision making based on algorithmic generated models leaves out the impact of the constantly changing environment and the interaction of real individuals with their social context. As it is well known, institutions, both formal and informal, guarantee regularity and consistency of economic behavior over time. Therefore, economic rationality should be contextualized and for that reason North (2005, 11) suggested to "integrate insights derived from the artificially separate social disciplines". This suggestion requires for economic analysis to be enriched from the results of other disciplines for the sake of the economic analysis itself. For example, Simon (1982) called for more intense communication between all the fields that study human behavior, as Sen (2001) and Coase (2012), also suggested after him. Hoff and Stiglitz (2016) explore how culture shapes both our cognition and perception. The much-celebrated return of Psychology in Economics through the new behaviorist analysis of Kahneman, Tversky, Thaler, Shiller and others, follows the same direction, although it "seems poised into a catalog of the contingent and the local" (Mirowski 2006, 372).

Our aim here is to suggest how the notion of social embeddedness would be integrated to the concept of economic rationality, becoming thus a variable, not a parameter of economic explanation. As the community of managers and policy makers is thrilled by the effective power of AI, we aim to point out its limits and to underline that interdisciplinarity is the only way to help economics to augment its empirical content and by the same token to strengthen its policy relevance. To understand better the complexity of the matter and to support our case, we start from a short account of the evolution of the concept of economic rationality in the history of economic thought. Section 3 is devoted to the challenges that embeddedness poses to the rationality assumption and in the last section we develop succinctly the main traits of this new comprehensive economic rationality.

2. A Short History of Economic Rationality

The widespread idea about the concept of economic rationality, even among economists, is that it has a unique meaning universally accepted, from Adam Smith to the present. Our study of the historical evolution of the concept of rationality has revealed no less than twelve different meanings in the way economists represented themselves people's behaviour during their economic transactions, as consumers or producers, investors or bankers (Zouboulakis 2014). Allow us to summarize this book's findings.

At first, Adam Smith described the moral conduct of people moved by antithetic sentiments such as love of the self and sympathy for other fellow beings. Despite its universalistic aspect this behavior was historically specific since individuals produce and exchange according to a rule of conduct which is the by-product of culture and education.

Next, John Stuart Mill shared Smith's socially embedded view of rationality and its subsequent historically specific character, but diverged from him significantly as far as the method of justification was concerned. As a consistent empiricist philosopher, he asked for empirical proofs to ground the principle of rationality on firm psychological observation. But Mill's methodology of Social Sciences destined Psychology to the low level of empirical science, subordinated to the medium level science of human character or Ethology and to the upper-level deductive science of Political Economy.

William Stanley Jevons marked a new epoch in the development of the discipline presenting a genuine theoretical model in which the concept of utility maximization under constraint was the *premium mobile* of every transaction. Utility maximization was mainly relying upon introspective evidence, and it was Francis Edgeworth who attempted to incorporate the findings of experimental Psychology into Economics willing to assert its universal character and applicability.

Vilfredo Pareto inaugurated a fourth concept of rationality away from Utilitarianism and its rudimentary psychology in order to build an empirical science of Economics based on observation of the external manifestations of the acts of rational choice. His concept of instrumental rationality shared with the Marginalists the claim of universalism, only insofar as economic (or "logical") actions were concerned. But he also shared with them the assumptions of free and unlimited knowledge and computational capacity. Beyond his departure from Utilitarian Psychology, Pareto diverged from the Marginalists believing that economic knowledge explains only a small part of social phenomena, those which are the result of rational choice of means to serve a given objective. Pareto assigned to Sociology the study of the greatest part of social phenomena since they are the result of "non-logical actions".

Pareto's theory of choice paved the way to two distinct movements within the neoclassical research program, the Hicks-Allen-Arrow-Hahn-Debreu tradition of General Equilibrium and the Robbins-Samuelson-Stigler-Becker tradition of microeconomic analysis. The presence of psychological foundations is the characteristic trait that distinguishes these two movements and suggests two distinct concepts of rationality. While both movements adopt the rationality as consistency approach inaugurated by Pareto, they differ insofar as they request or not some kind of psychological motive grounded on introspection. Robbins run the half distance away from psychology in order to expel the utilitarian inheritance from economic theory. To justify the economizing behaviour under scarcity conditions he utilized introspective arguments, just like Samuelson did after him. Despite Samuelson's intention to "drop off the last vestiges of utilitarianism" his latent behaviorist revealed preference analysis was closer to Psychology than the one he criticized, i.e. the marginal rate of substitution analysis of Hicks and Allen. However, both intellectual movements shared the universalistic claim to explain every act of rational choice and their faith in the human capacity to gather and deal with all available information.

Friedrich Hayek's strongest disagreement with the entire neoclassical program was precisely this, the rejection of the "pretense of knowledge" as mentioned above. He even proposed the abandon of the icon of the omniscient individual together with the endless seek for optimality. But Hayek distinguished himself also from every other tradition in Economics regarding the nature and scope of the rationality principle. His anti-naturalistic positions

forced him to deny any possibility of causal explanation of the human motives and actions adopting a subjectivist-hermeneutic method. Similarly, his strong anti-holistic commitment prevented him from accepting any kind of social embeddedness of individual actions. In brief, Hayek suggested an original concept of rationality with no social references, forcefully anti-psychologistic and with limited capacities of agents in processing available information in decision making.

His fellow Austrian colleague at the LSE, Karl Popper shared some common elements concerning the rationality principle. Like Hayek, Popper was individualistic in his methodological starting point of analysis of social phenomena, and equally opposed to the idea of explaining individual actions through psychological motives. One of the main reasons was that social phenomena are often the "non-intentional" results of individual actions. Yet, Popper suggested a new kind of rationality. His principle of complete rationality suggested that individuals act appropriately to their situation "making the optimal use of all available information". This was Popper's conventionalist stratagem to match the "animating principle of rationality" with his genuine refutability criterion. In line with Machlup and Friedman, Popper used the same methodological strategy to defend rationality as against the harsh empirical criticism of the late 1930's. The neoclassical principle of rationality as consistency (in its various forms) being easily refuted, Popper advised to preserve it as "a good approximation" as long as the neoclassical program was alive. As to the older utilitarian principle of maximization it remained irrefutable, since no evidence can ever refute a proposition that agents seek to maximize an elusive entity such as utility (Sen 1977. Cf. Hodgson, 2012).

Four distinct new meanings of rationality were proposed after 1944, trying to overcome the epistemological problems of the standard neoclassical principle. Von Neumann and Morgenstern introduced the concept of strategic rationality, which associates utility maximization with probabilistic choice. The restrictive conditions of certainty and perfect knowledge were abandoned. To solve the problem of the indeterminacy of the maximization process, first "expected utility" and then "subjective expected utility", were created. Thus, elementary introspective psychology reappeared, and the solutions suggested by von Neumann, Morgenstern and Savage were full of paradoxes, as demonstrated by Allais and Ellsberg. Thanks to John Nash the process of market interaction was theoretically resolved since, even though rationality was still based on the consistency of preferences, choices were made by interactive individuals and were depended on the choices of others. But solving this problem gave birth to two other problems: interactive players had to share a "common knowledge" about everyone's strategy and possess infinite computational skills to predict correctly the other players' moves.

Herbert Simon provided a convincing answer to the problems of maximization indeterminacy and to those of limited information and computational skills. His concept of bounded rationality (the tenth one) helped economists to deal with uncertain, complex and incompletely informed decision-making. However, the theoretical loss was significant: abandoning maximization as a goal is equivalent of quitting the search for a socially optimum solution. Furthermore, Simon's behaviorism lacked empirical evidence. There are no empirical or experimental findings confirming "satisficing" behavior and some critics have wrongly concluded that satisficing behavior leads agents to apply 'rules of thumb' (Vriend 1996, 278) or to sub-optimal solutions (Lagueux 2010, 47). To deal with these additional problems Williamson (1985) included Simon's concept of bounded rationality in the research agenda of transaction costs analysis. Whilst a general optimum solution was no more feasible, the concept of opportunism permitted the return of self-interest seeking agents in business transactions.

Cognitive Psychologists have done great service to economists providing decisive empirical tests as against the assumption of rationality as consistency. They gave psychological evidence suggesting that individuals tend to be error prone and possibly irrational, acting inconsistently because of framing effects and preference reversals. Kahneman and Tvesrky's (1979) "prospect theory" offered a description of human behavior in situations involving risk. To foster an alternative principle capable of explaining economic decision making under uncertainty and also to integrate non-rational elements in the analysis of economic behavior, Psychologists and Economists collaborate to explore experimentally the role of intuition and emotions (Thaler 2015).

Nevertheless, the behaviorist research program faces two insurmountable objections. First, it undermines the very idea of the economic agent as a rational actor (Mirowski 2006, 372). Second, it dismisses the fact that individual behavior is more than a matter of atomistic impulse and willingness; it is fundamentally the result of social interaction between individuals as well between individuals and their institutional setting. As an emblematic neoclassical economist like Arrow has underlined, to explain economic phenomena one should recognize "the ineradicable social element in the economy" (Arrow 1994, 2). This is the cornerstone of the concept of socially embedded rationality, examined bellow.

3. Embededness and the quest for a new economic rationality

As seen above, rational choice, together with other individualistic explanations presuppose, as a rule, the institutional setting without explaining it. Consequently, initial endowments, property rights and formal institutions in general, as well as preferences, social norms and habits, culture and ideology are taken for granted and are somehow supposed to be internalized in every individual's pattern of behavior. As against this purely individualistic starting point that sustains the autarkic view of Economics, Polanyi's (1944) concept of embeddedness in non-market societies was reformulated to express a lower level of embeddedness in modern capitalist societies. Examples of how this idea of socially embedded action works in practice concern the impact of homogeneous ethnic trading networks in capitalist economies (Landa 1981, 1994); the complex role of monetary motives in social transactions in modern societies (Zelizer 1994); the role of social networks in the search for employment (Degenne and Forsé 1994); the significance of the system of rotating credit association in developing countries (Granovetter 2000); the significance of Confucian social norms of mutual aid in economizing the cost of contract enforcement (Landa and Wang 2001); the role of informal arrangements and cooperation between Greek industrial firms (Zouboulakis and Kamarianos 2002); the meaning of credit and commercial circuits among family members and other personal connections (Zelizer 2006). All these empirical findings stress the narrowness of economic analysis when significant elements of social environment are left outside the study of economic phenomena.

The trend of the New Economic Sociology came to fill the gap. Seventy years ago, Joseph Schumpeter (1954, 21) has stated that "economic analysis deals with the question how people behave at any time and what the economic effects are they produce [sic] by so behaving; economic sociology deals with the question how they came to behave as they do" (cf. Milonakis-Fine 2009, 211). Following the path of Georg Simmel, Werner Sombart and Max Weber, New Economic Sociology focuses on the cultural and institutional factors favorable to the capitalist development, as well as on the social transformation of western societies emanating from the spread of capitalism (Swedberg 1998; Trigilia 2002). Weber contributed greatly to the genesis of the new discipline named in 1904 "Social Economics" and later in 1917 "Sociology of Economics" (Weber 1951, 17 and 430; Cf. Schumpeter 1954, 21;

Swedberg 2011). Weber -following Smith and Mill as seen above- wanted to explain the nature of economic phenomena resulting from socialized individuals who have internalized in their plans the values and norms of their social environment. His ideal-type constructions aimed to understand historical phenomena, such as the genesis of capitalism, from the viewpoint of their cultural foundations. His concept of 'instrumental rationality' idealizes the goal-oriented (profit maximization) rational behaviour that captures the "spirit of capitalism" and explains one necessary condition to the rise of the entrepreneurial culture in Northwestern Europe. Hence, rationality is a social phenomenon of a particular historical structure and not the expression of the immutable human nature (Cf. Ingham 1996; Steiner 1999, 23; Nau 2005; Davis 2024, 17).

Recent works in Economic Sociology explore the institutional conditions of contemporary economic life to explain social action. Although there are differences as to the significance of holistic elements that shape individual action between Smelser (more holistic) and Granovetter (more individualistic), it is commonly agreed that every individual actor is "influenced by other actors and is part of groups and society" (Smelser and Swedberg 1994, 4). Granovetter (1985) has significantly emphasized this tension between the "oversocialized conception of man" in Sociology where people follow the norms of the social context they belong to, and the "undersocialized conception of man" which corresponds to the standard neoclassical economic view of "atomized utilitarianism" (Cf. Trigilia 2002, ch. 9). Granovetter amalgamates classical and neoclassical economics in order to undervalue the degree of social embeddedness in their writings (cf. Caillé 2005, 134). Nonetheless, his middle range analysis looks quite convincing: "Actors do not behave or decide as atoms outside a social context, not do they adhere slavishly to a script written for them by the particular intersection of social categories that they happen to occupy. Their attempts at purposive action are instead embedded in concrete, ongoing systems of social relations" (Granovetter 1985, 487. Cf. Duina 2011, 19).

4. For a comprehensive economic rationality

A rational reconstruction of economic reality holds in so far as it reveals the real causes of economic phenomena and goes beyond the occasional and the accidental. Diverse non-mainstream approaches have sufficiently shown that individual action is embedded in an evolving social environment containing values, norms and habits together with the formal institutional setting. Accordingly, North's suggestion is crucial for our purpose: "our analytical frameworks must integrate insights derived from these artificially separate disciplines if we are to understand the process of change" (2005, 11). It is about time that Coase's (2012) last warning needs to be taken seriously: "At a time when the modern economy is becoming increasingly institutions-intensive, the reduction of economics to price theory is troubling enough. It is suicidal for the field to slide into a hard science of choice, ignoring the influences of society, history, culture, and politics on the working of the economy". Interdisciplinarity comes naturally when we focus on the social prerequisites of individual decision-making. To apprehend economic rationality in its entirety we have to study both the role of formal and informal institutions and the impact of social frame that shapes and enables economic activities. The essence of interpersonal relations is based on the fact that human beings "are naturally and pre-reflectively attuned to the behaviour of others" (Wilson and Dixon 2012, 111). When we interact with other people, as we do when we exchange goods and services, we think that others will behave as expected, according to the social standards and the rules of the society we live in.

Supposing that all individuals have access to AI procedures of decision making the information problem as well the issue of limited computational capacity, pointed out by Hayek (1943) and Simon (1982), are minimized. Yet, individuals will continue to be error prone and possibly irrational suffering from decision biases like "anchoring", "belief perseverance", "misconceptions of chance", "cognitive illusions", "confirmatory bias" etc. (Rabin 1998; Kahneman 2011). Behaviorists have constructed novel models of behaviour to conceptualize those biases and psychological framing effects to explain real world shambolic decision-making, underrating the social influences (Cf. Thaler and Sunstein 2008; Primrose 2022). Moreover, economic decisions are also determined by "animal spirits –a spontaneous urge to action than inaction" as Keynes revealed decades ago (Cf. Akerlof and Shiller 2009). This explains why in many cases both consumers and investors are overoptimistic about the imminent future and do buy valuable goods and do invest in the stock market and in state bonds, while in other cases they are over-pessimistic and prefer not to act.

5. Conclusion

Taking all the above into account, economic rationality should be understood following the open system mode of thought in the sense that agents may learn and change while they evolve with their social environment (Dow 2002; Chick and Dow 2005). To represent economic rationality that recognizes the interaction between the individual actor and its social context, it is imperative to acknowledge that humans have at all times the capacity for dividing up tasks, communication, interaction and exchange while adapting to the evolving social context they lived in. Not only every individual's decision is influenced by the existence of a third part (Wilson and Dixon 2012, 75), but even the most intrinsic preferences "do not magically appear into people's minds" (Duina 2011, 55). Our individual preferences and choices are shaped by those surrounding us (Hoff and Stiglitz 2016). Moreover, the very meaning of what constitutes a 'rational choice', as the idea of efficient use of means are socially defined as well.

Decision making is thus shaped by two distinct "framing effects". On the one hand, the different semantic description of possible outcomes affects greatly the individual's choice and decision makers are inclined to reverse the order of their preferences (Hausman 1992, 227ff.). On the other hand, the social environment -including beliefs, social norms, routines and habits- as well formal rules, property rights and laws structures the actors' knowledge and makes their decision-making cognitively embedded (Hodgson 2001, 289-92; Dequech 2003; Duina 2011, 37 ff.; Bandelij and Zoeller 2019). Somehow, rational-choice explanations also reflect a certain institutional environment (Braun 2021). In that sense, "Rational deliberation is not possible except through interaction with the fabric of social institutions" (Hodgson 2003, 163; 2015).

Conversely, the frame of action itself is changeable. Individuals act upon and change their social environment individually or collectively, mostly peacefully and seldom violently (Davis 2003; North 2005, 51). There is a reciprocal causation process between individual behaviour and evolving institutions; individuals push towards institutional change and similarly, institutions shape agents' behaviour (Nau 2005; Hodgson 2006; Ambrosino et al. 2017; Davis, 2024, 30).

To sum up, by comprehensive economic rationality we mean that economic actors behave rationally to obtain their objectives according to the available information, the social constraints, the economic climate and their capacities to apprehend the complexity of their social environment inside which they act and interact actively. Accordingly, though

optimization is out of sight, with or without AI, the pursuit of individual and collective wellbeing seems more conceivable.

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