Post-Keynesian Economics: New Foundations by Marc Lavoie Chapter 2: Theory of Choice[1]

By

Stavros A. Drakopoulos

Dept. of Philosophy and History of Science

National and Kapodistrian University of Athens

University Campus 157 71, Athens, Greece

Email: sdrakop@phs.uoa.gr

Tel. 01030-2107275545

March 2023

1. Introduction

Marc Lavoie's book is a great effort at summarizing and presenting the work of post-Keynesian economics in almost all fields. As judged by the numerous citations that the first edition received, and the very positive reviews (e.g. McCombie, 2015; Bonizzi, 2016; Ehnts, 2016), the book has had a substantial impact among non-mainstream economists. The first and the second editions are an updated and expanded version of his 1992 work entitled *Foundations of Post-Keynesian Economic Analysis*. The current edition contains new material (especially on chapters 4, 6 and 7). One of the many strengths of the book is its very extensive and analytical treatment of the theory of choice from a post-Keynesian perspective. This is particularly important given the relatively neglected topic of consumer choice, as the author points out (Lavoie 2022, p. 75).[2]

This review presents and discusses chapter 2 of the book. By focusing on uncertainty and economic rationality, this chapter provides a comprehensive summary of the existing relevant literature. The notions of uncertainty and the closely related concept of rationality, are extremely important for economic theorizing. The author employs

[1] The Version of Record of this manuscript has been published and it is available in *The Review of Political Economy*, DOI:10.1080/09538259.2023.2208064

[2] All page numbers in brackets for the rest of the article refer to Lavoie, 2022.

them as foundations for the third part of the chapter which builds a coherent post-Keynesian theory of household choice. This review will follow the structure of the chapter, starting with the notion of fundamental uncertainty and proceeding to a discussion of rationality. It will close with a discussion of the theory of household choice.

2. Fundamental Uncertainty

This section of the chapter begins by providing a three-way taxonomy system of the notion of uncertainty. Under conditions of certainty, each choice invariably leads to a specific outcome, the value of which is known. Under conditions of certainty equivalence (or risk), each choice leads to a set of possible specific outcomes and each outcome can be assigned with a specific probability. Consequently, Lavoie defines the crucial notion of fundamental uncertainty: "when the value of an outcome is unknown, when the probability of an outcome is unknown, when the outcomes that can possibly result from a choice are unknown, or when the spectrum of possible choices is unknown (p.76). This type of uncertainty, sometimes called Knightian or Keynesian uncertainty, is virtually ignored by mainstream analysis. By contrast, it has played a central role in Keynes and in Post-Keynesian economics.

Next, the author proceeds to an extensive discussion of the notion of fundamental uncertainty (also called true uncertainty, radical uncertainty or irreducible uncertainty). The discussion is based on ontological versus epistemic uncertainty, terms which correspond roughly to ergodic/non-ergodic approach. Following Davidson (1996) and in very broad terms, reality in an ergodic world is predetermined, immutable and ultimately knowable. In contrast, in a non-ergodic world reality is transmutable and unknowable. Davidson (1982–83, p. 189) believes that Keynes's analysis of an uncertain future is best understood as being based on non-ergodic stochastic processes. Additionally, Davidson argues that under certain conditions, epistemic uncertainty can be removed. There is a disagreement with Davidson on this point in the sense that Lavoie believes that the two notions are conducive, given the lack of omnipotent powers of individual judgement and of the complexity of the world. By discussing the nature of chaos dynamics and black swans and their link to the framework of fundamental uncertainty, the author concludes that fundamental uncertainty can be both

of epistemological and of ontological nature. He also supports the view that both approaches can be admissible in the framework of post-Keynesian theory. Lavoie's position can also be taken as a response to criticisms regarding the consistency of the post-Keynesian conception of uncertainty (see for instance, O'Donnell, 2015). This subsection closes with a very informative table presenting the various types and different degrees of certainty (p.81). The discussion is centered on the conception of uncertainty and presents successfully these complex notions and their refined semantic differences. Lavoie's approach is quite effective not only in the sense of the clarity of presentation and categorization, but also in substantiating his own views on this important issue.

Given that the terms ergodic and non-ergodic are borrowed from physics (p.78), it would be useful to mention the approaches to probability and uncertainty that can be found in modern physics. An ergodic environment is associated with deterministic processes in statistical physics. A non-ergodic environment is associated with an environment of fundamental uncertainty. It must also be noted that the concept of irreducible uncertainty is one of the main points of departure of modern physics from classical physics (Feyerabend, 1964:202 and Werner and Farrelly, 2019). Particularly in quantum mechanics, uncertainty is conceived as aleatory and irreducible. In order to distinguish this type of uncertainty from the usual conception, it is frequently called "indeterminacy" (e.g. Bohm, 1957; Heisenberg, 1962). This conception of uncertainty among many physicists provides strength to the arguments supporting fundamental uncertainty, especially if one thinks that physics was, and still is, the methodological ideal for mainstream economic theory (see also Mirowski,1989a,b).

The following subsection on the *The Weight of an Argument or the Credibility of Information*, proceeds to examine the differences between Keynes's and Knight's accounts of uncertainty. Lavoie provides an extensive account of the notions of the weight of an argument and the probability distribution in situations of uncertainty in the writings of both Keynes and Knight. He convincingly concludes that the different terms that they use are essentially equivalent. For instance, Knight's terms *the degree of certainty or the degree of confidence*, have the same meaning as the *weight of an argument* in Keynes' analysis. The same holds true for the *probability of erro*r in Knight

with the *probable error* in Keynes. As Lavoie states: "My view is that fundamentally Keynes and Knight are in agreement." (p. 81).

The argument continues in the next section entitled *Objections to Fundamental Uncertainty*, where the author returns to the issue of the distinction between risk and uncertainty on which both Knight and Keynes insist so strongly. The core idea here is that situations of uncertainty cannot be reduced to ones of risk. This characteristic is almost commonplace in mainstream theory both at the microeconomic and at macroeconomic level. Agents are assumed to know the relevant probability distributions of all the candidate states of the world (for the basic account, see Hey, 1979). Further, the standard assumption of the representative agent found in most current macroeconomic modelling, has the same characteristics. As Hands points out: "This is the 'rational economic agent' of mainstream microeconomics—the agent who maximizes a well-behaved utility function subject to a budget constraint in demand theory and makes decisions based on maximization of expected utility in risky environments." (Hands, 2017, p.1686). Subsequently, the author examines the standard mainstream argument that the adoption of fundamental uncertainty leads nowhere and "allows only nihilistic conclusions" (p.85). Robert Lucas expressed this nihilistic view by stating that "in cases of uncertainty, economic reasoning would be of no value." (Lucas, 1981, p. 224). Lavoie is right to address this criticism given that it is frequently used as an 'excuse' for ignoring fundamental uncertainty. His answer is based on the different types of rationality that are introduced into the behaviour of agents, which is the topic of the next section.

3. Rationality

After having set the basic arguments in Chapter 1 and in the previous section, Lavoie proceeds into a deeper analysis of the notion of rationality. He is correct to assign particular importance to rationality given that its conception is one of the defining points of difference between orthodox and heterodox economics. His next step is to define four views of rationality, largely based on the work of German psychologist Gerd Gigerenzer (2008). The first type of rationality, *Unbounded Rationality*, is the one often used in macroeconomic modelling. It gained momentum with the Rational Expectations revolution and with business cycle theories. Contemporary general equilibrium theory

and DSGE models employ agents characterized by unbounded rationality. In this framework agents: a) have perfect knowledge (access to all information at no cost), b) they have unlimited computational power, c) they optimize some function (usually a utility function). Lavoie is correct to classify this approach as an example of an instrumentalist methodology advocated mainly by Milton Friedman and his followers (see also Caldwell, 1984).

The second type of rationality is termed *Bounded Optimization*, and its origins are to be found in Herbert Simon's work. In Simon's terminology, bounded rationality is used to designate rational choice characterized by cognitive limitations of both knowledge and cognitive capacity (Simon, 1955). Lavoie views this type of rationality as an attempt by orthodox theory to introduce some realistic component into its theoretical edifice. He focuses on the example of search theory where bounded rationality is taken to mean optimization under the costly constraint of information-gathering (p. 87). The way Simon's rationality is used in neoclassical models implies that agents have to be much more sophisticated. This is because the computations and the information required for the optimal resolution of their search are even more intricate. Lavoie points out that Simon had not this conception in mind. Indeed, Simon was very doubtful regarding the notion of a utility maximizing consumer. It is also relevant in this context that Simon's criticism of optimizing behaviour also applied to the central assumption of standard production theory: maximization of profits (Simon 1986: 39). Additionally, Simon believed that the most commonly observed behaviour is 'event matching', which is the result of procedural rationality. The individual examines a certain number of alternatives and chooses the best given his/her limited time and knowledge (Simon, 1959). This method is the essence of what became known as satisficing.

The third type of rationality is associated with what is known as new behavioural economics. Inspired from cognitive psychology and especially from the works of Daniel Kahneman and Amos Tversky, the roots of new behavioural economics may be traced back to the 1970s, (see also Heukelom, 2014). The heuristics and biases program or cognitive illusions as Lavoie calls it, is the main difference between new behavioural economics and the mainstream. After citing empirical research undertaken by new behavioural economists which points to the fallacious nature of the standard model of

rational behaviour, the author proceeds to an assessment from the point of view of post-Keynesian economics. His central point is that the standard neoclassical model of decision is the benchmark of new behavioural economists, and this means that the mainstream norms of rational behaviour are not questioned. Lavoie's criticism is justified given that the majority of the prominent figures in the field accept the validity of the neoclassical framework, although they realize the need to improve it by introducing more realistic psychological underpinnings. In particular, leading behavioural economists (e.g. Kahneman, Thaler, Rabin) acknowledge Simon's original contributions, but they want to distance themselves from a "radical departure" from orthodoxy (Sent, 2004; Kao and Velupillai, 2015).

The fourth type of rationality, *Environment-consistent Rationality*, is much closer to the post-Keynesian framework and radically different from the previous types. Besides Simon's procedural rationality, this type draws from the works of old institutional economics, from other strands of old behavioural economics (e.g. Katona, Leibenstein), from evolutionary economics (e.g. Hodgson), and from the works of Cyert and March, and of Nelson and Winter. Lavoie also finds great similarities with what Gigerenzer calls 'ecological' rationality. According to this type of rationality, individuals do not optimize and do not calculate utilities and probabilities. Environment-consistent rationality analyzes the actual process – the heuristics - and the actual informational environment. It is not trying to demonstrate violations of the assumptions underlying as-if models. Lavoie's next step is to elaborate further and compare procedural rationality with the other types of rationality mentioned above. In the following two subsections entitled *Fast and frugal is better than sophisticated optimizing procedures* and *Fast and frugal versus optimization procedures in macroeconomics*, the author provides an extensive discussion of how heuristic rules, by processing less information, deliver better results than some optimizing procedures that process all information. There is also an informative figure (2.1) comparing the fitness and prediction performances of the optimization versus heuristics rules. Focusing on the macroeconomic level, it is also shown that to follow simple rules in a world of complex structures might generate better results compared to the instrumental rationality assumed by mainstream macroeconomic models.

The rules of procedural rationality are discussed next. Lavoie lists various procedures which are based on the views of Keynes and Simon. These procedures can handle the complexities of decision-making, especially in situations of fundamental uncertainty. These are: 1. When a satisfactory solution has been reached, stop searching. 2. Take the present and the recent past as guides for the future. 3. Assume that the present evaluation of the future is correct. 4. Follow the opinion of the majority. 5. Look for alternative actions when existing ones are too uncertain. 6. Take actions that reduce the amount of uncertainty. 7. When uncertainty is too large, postpone the decision. 8. Proceed to a partial adjustment (p.95). Lavoie connects the analysis of these rules with the corresponding discussions found in Keynes, Shackle and also in Schumpeterian and Institutionalist approaches. Finally, there is an analytical discussion concerning their theoretical implications and their function to supply the explanation of phenomena such as mark-ups, target-return pricing, normal financial ratios, standard rates of utilization, propensities to consume, and lexicographic rules. The next stage of the argument is to apply all the above concepts in the theory of household choice which is the theme of the next section.

4. A Theory of Household Choice

Lavoie devotes the larger part of chapter 2 on discussing the theory of household choice. This topic is not very well-developed in the post-Keynesian research agenda, and in this sense, the author is right to make a conscious attempt to supply an extensive framework of its foundations. Initially, he stresses that important ideas concerning household choice can be found in many well-known post-Keynesian authors (e.g. Robinson, Pasinetti, Nell, Arestis and Eichner), and also in the work of Keynes himself. Another source of inspiration are the relevant ideas of Institutionalists, social or humanistic economists, ecological economists, marketing specialists, the literature in economic psychology, and the work of some dissident mainstream economists (p. 100). Next, there is a commendable attempt to present a coherent post-Keynesian theory of consumer choice. A considerable part of Marc Lavoie's research involves major contributions towards the theoretical synthesis and the establishment of this topic. Peter Earl is another major figure who has been researching this theme for many years, see for instance, Earl, 1986; 2022). According to the author, the main starting point of post-Keynesian theory of consumer choice theory is the lack of confidence in the principle

of substitution. This implies that price is not often a key determinant of purchasing decisions, and therefore it is the income effects rather than the substitution effects which are most important. The chapter proceeds by listing seven principles of post-Keynesian consumer theory (p.101). These are:

1. The principle of procedural rationality.
2. The principle of satiable needs.
3. The principle of separability of needs.
4. The principle of subordination of needs.
5. The principle of the growth of needs.
6. The principle of non-independence.
7. The principle of heredity.

In order to substantiate his view that post-Keynesian consumer theory is a coherent body of knowledge, Lavoie cites relevant passages from some of the prominent figures mentioned above.

The Principles of Post-Keynesian Consumer Choice

The first principle (procedural rationality) has already been analyzed in the previous section of chapter 2. In the context of post Keynesian consumer theory, the principle of satiable needs implies that satiation arises with positive prices and finite income. There are threshold levels of consumption – satiation levels –beyond which a good, or its characteristics, may bring no satisfaction to its consumer. The distinction between needs and wants is central here. Lavoie provides a brief discussion of the key concept of human needs by appealing mainly to the work of psychologist Abraham Maslow and his notion of needs hierarchy. The discussion could have been enriched by also drawing from the excellent paper by Len Doyal and Ian Gough (1984) on the theory of human needs. He also provides a brief historical account of the treatment of the concept in the history of economics, and demonstrates how the original insights of many classical and marginalist economists on this issue were neglected, and marginal utility theory became eventually dominant.

The separability of needs implies that there are categories of needs or expenditures, and the consumer divides the decision-making process into a series of smaller multi-stage decisions. Changes in the relative prices of goods within a given category of wants will

have no effect on the budget allocation between various needs, while a fall in the overall price of a group of goods corresponding to a given need will have repercussions on the budget allocation of all needs (p. 104). The important consequence of the above approach is that it limits severely the degree of substitutability between goods in different groups. Consequently, general categories of consumption expenditures have low own-price elasticities and cross-elasticities. The analysis is linked to the principle of the subordination of needs: needs are irreducible and therefore one metric (price or utility) is unable to capture their characteristics. Irreducible needs imply that they are incommensurable, and thus preferences are non-Archimedian (i.e. they cannot be substituted). The basic formal exposition of such preferences can be found in Georgescu-Roegen' work (1966). A good example of such preferences are vegetarian consumers who are not willing to engage in substitution when meat products are offered. It is clear that such preferences pose serious problems for the mainstream theory of choice, given that the utility index cannot be represented by a scalar but requires a vector instead (see also the analyses by Fishburn, 1974 and Encarnacion, 1983). The fourth principle, the growth of needs, is connected to principles two and three. It states that when a threshold level for high priority need has been attained, individuals start attending to the needs situated on a higher plane. In other words, basic needs must be satisfied first before needs of less urgent character can be considered. As a consequence, income effects are much more important in explaining the evolution of expenditure on goods than are substitution effects. Engel's curves provide a very good analytical tool to capture the evolution of demand for various goods. There also macroeconomic repercussions given that a household's pattern of consumption resembles the lifestyle of other households that constitute its social reference group. Apart from the authors mentioned by Lavoie, there are other more "mainstream" papers that have developed this important topic along the same lines. For instance, Hayakawa and Venieris connect "social interdependence" with Herbert Simon's concept of bounded rationality, which does not involve maximizing behaviour. As they point out: "Such 'heuristics' consist in taking a particular social group as a reference group and in emulating its life-style by acquiring an associate cluster of complementary wants." (Hayakawa and Venieris, 1977: 599). However, their impact on the mainstream theory is quite limited.

The principle of non-independence is the next component of the post Keynesian consumer theory. The core idea here is that decisions and preferences are not made independently of those of other agents. There is a rich literature on interdependent preferences ranging from Veblen, Duesenberry, Galbraith, Scitovsky and Leibenstein, to more modern treatments by Pollak and Hirsch, and also by many contemporary happiness economics researchers (for a review, see Drakopoulos, 2012). As Lavoie elaborates, a number of well-known notions such as "snob and bandwagon effects" (Leibenstein), "demonstration effect" (Duesenberry), "positional consumption and positional goods" (Hirsch) and "keeping up with the Joneses", are specific examples of interdependent preferences. It must also be mentioned that in the last two decades, the research potential of interdependent or social preferences has started to be realized by an increasing number of economists working into various fields. There is a growing use of notions such as reference income, target income, relative consumption and positional goods which are types of interdependent preferences. For instance, the idea that unions and workers compare income or wages with others has been expressed in a plethora of terms such as relative wage, fair wage, aspiration wage, comparison or target wage. The theoretical consequences not only at the micro, but also at the macro level are quite serious for well-established theoretical results (for a detailed discussion, Drakopoulos, 2016). The conceptually related heredity or the endowment effect is the last principle of post-Keynesian consumer theory. It states that preferences are endogenous and context-specific, and that decisions depend on a reference point. The most well-known example of the endowment effect is the notion of loss aversion. Lavoie emphasizes that this principle incorporates historical time into choice theory and this has important theoretical consequences, as in the case of Duesenberry's approach in which consumption relations are not reversible in time.

The next subsection of the chapter, *Choices of a Lexicographic Nature*, presents an extensive discussion of choice which is characterized by limited substitutability. Given their central role in the theory of consumer choice as the author points out, a detailed discussion is necessary. The presentation here attempts to supplement Lavoie's utility approach in terms of choice theory: In mainstream choice theory preferences are assumed to be as follows. Suppose that there are two bundles of goods x and x' and that x is preferred (P) to x'.

(x1, x2) P (x'1, x'2)

This can always be reversed by increasing x'1 which implies that there exists x' > x'1 such that

(x', x'2) P (x1, x2)

Usually such preferences are called Archimedian (Galaabaatar and Karni, 2013). If we drop this assumption and follow the principle of the separability of needs, we have two broad categories of hierarchical choice: strict lexicography and target setting hierarchy. The first type (Lavoie uses the term naïve lexicographic ordering), implies that there is an absolute order of preferences and thus precludes any degree of substitution. In formal terms (two goods case) we have

x = (x1, x2,) and x' = (x'1, x'2)

x P x' iff

either 1) x1 > x'1

or 2) x1 = x'1; x2 > x'2

The standard textbook example of such preferences is the case of strong addiction (e.g. dipsomaniacs), but there are other many cases in which they might be relevant (see Drakopoulos, 1994 and references therein). The second type allows for a considerable degree of substitution and reflects the principles of choice previously mentioned. It involves the setting of targets in the sense that agents must reach a target (or threshold, symbolized with S) of the first component before starting to consider the next most important one. As before:

x = (x1, x2,) and x' = (x'1, x'2)

x P x' iff

either 1) S > x1 > x'1

or 2) x1 = x'1 ≤ S; x2 > x'2

or 3) x’1 < S < x1

or 4) S < x1, x’1; x2 > x'2

In other words, good x2 is considered only when the threshold S has been met. Lavoie explains that this system of choice does not produce indifference curves but semi-indifference curves. Work in this issue has been done by Georgescu-Roegen,

Encarnacion, Little and Earl among many others (pp.110-112). The author proceeds to provide an example of the application of lexicographic choice in the field of ecological economics. The idea that some agents might be unwilling to trade for any reduction in the quality of their environment, is the key idea in this framework. There is also an extensive discussion of comparison between the standard neoclassical case with indifference curves, and with choices of a lexicographic nature with quasi-indifference curves. It is subsequently shown that there is a tight relationship between ecological and post-Keynesian economics, when it comes to methodology and choice theory. Given their wide range of relevance, it might have been better if Lavoie had used the more embracing term "hierarchical preferences" rather than "lexicographic", which for most economists implies unusual or addictive behaviour.

In the next subsections, the previous lexicographic framework is extended to include the case where the characteristics of the goods rather than the goods themselves are considered. The analyses of Lancaster and Ironmoger in terms of consumption technology (the relationship between goods and the characteristics that these goods provide) are also taken into consideration. Lavoie employs matrices to illustrate the link between irreducible needs, hierarchical choice and sets of group characteristics. The basic conclusion is that such a vision of consumer theory drastically reduces the extent and the power of price substitution. Further, the fluctuations in the price of a good, unless they are really substantial, will not have much impact on the quantities sold (with the exception is when new goods being introduced to consumer). There is also focus on the various elasticities of necessary goods and luxuries by using Shaikh' (2016) theoretical and empirical work. In the final section, the author connects the previous analysis with the classical and Sraffian analysis of basic and non-basic commodities. He finds common ground between two approaches in the lack of importance of the substitution effect in consumer behaviour. Finally, and in terms of macroeconomic implications, post-Keynesian consumer theory supports utilizing income classes rather than the representative agent or a large number of differentiated individuals in macroeconomic studies. Furthermore, and given that income changes rather than price changes are stronger in consumption expenditures, the study of income effects in macroeconomics should be given priority.

5. Concluding comments

The chapter begins with the crucial concepts of uncertainty and rationality which are used as theoretical foundations of a theory of household choice. Fundamental uncertainty and bounded rationality are the key notions. Lavoie proceeds to provide a formal basis to the post-Keynesian theory by developing a system of lexicographic/hierarchical choice and by analyzing its theoretical repercussions. Groups consume different goods depending on their respective needs, income effects are more important than substitution effects and price competition has a secondary role. In his discussion, Lavoie does not only draw from the work of Keynes and other major post-Keynesian theorists, but also utilizes contributions from other strands of heterodox economics, thus providing an agenda for a possible theoretical synthesis. In my view, chapter 2 is not only an excellent summary of the existing literature but also a significant contribution towards establishing a coherent post Keynesian theory of choice. It is an excellent piece of work which demonstrates that post-Keynesian economics is not simply post-Keynesian macroeconomics.

References

Bohm, D. (1957) *Causality and Chance in Modern Physics*, London: Routledge.

Bonizzi, B. (2016) "Book Review of Post-Keynesian Economics: New Foundations" (M. Lavoie), *Economic Issues*, Vol. 21, Part 1: 99-100.

Caldwell, B. (1984) *Beyond Positivism*, London: Routledge.

Davidson, P. (1982–83) "Rational Expectations: A Fallacious Foundation for Studying Crucial Decision-Making Processes", *Journal of Post Keynesian Economics,* 5(2), Winter: 182–98

Davidson, P. (1996) 'Reality and Economic Theory', *Journal of Post Keynesian Economics,* **18** (4), Spring: 479–508.

Doyal, L and Gough, I. (1984) "A Theory of Human Needs", *Critical Social Policy*, 10: 6-38.

Drakopoulos, S. (1994) "Hierarchical choice in economics", *Journal of Economic Surveys*, 8: 133–153.

Drakopoulos, S. (2012) "The History of Attitudes Towards Interdependent Preferences" *Journal of the History of Economic Thought*, vol.34, No.4: 541-557.

Drakopoulos, S. (2016) *Comparisons in Economic Thought: Economic Interdependency Reconsidered*, London: Routledge Publishers

Earl, P. (1986) *Lifestyle Economics: Consumer Behaviour in a Turbulent World*, Brighton, UK: Wheatsheaf.

Earl, P. (2022). *Principles of Behavioral Economics: Bringing Together Old, New and Evolutionary Approaches.* Cambridge: Cambridge University Press.

Encarnacion, J. (1983) "Social Values and Individual Choices", *Journal of Economic Behaviour and Organisation,* Vol. 4, No. 2-3: 265-275.

Ehnts, D. (2016) "Book Review of Post-Keynesian Economics: New Foundations" (M. Lavoie), *International Journal of Pluralism and Economics Education*, Vol. 7, No. 1: 97-100.

Feyerabend, P. (1964) "Problems of Microphysics", in R. Colodny (ed.), *Frontiers of Science and Philosophy*, London: Allen and Unwin

Fishburn, P. (1974) "Lexicographic Orders, Utilities and Decision Rules: A Survey", *Management Science*, Vol. 20, No. 11: 1442-1471.

Galaabaatar, T. and Karni, E. (2013). "Subjective Expected Utility with Incomplete Preferences", *Econometrica*, 81(1): 255–284.

Georgescu-Roegen, N. (1966) *Analytical Economics*, Cambridge, MA: Harvard University Press,

Gigerenzer, G. (2008). *Rationality for Mortals: How People Cope with Uncertainty*, Oxford: Oxford University Press.

Hands, W. (2017) "Conundrums of the representative agent", *Cambridge Journal of Economics*, 41: 1685–1704

Hayakawa, H. and Venieris, Y. (1977) "Consumer Interdependence via Reference Groups", *Journal of Political Economy*, 85: 599–615.

Heisenberg, W. (1962) *The Physicists' Conception of Nature*, London: The Scientific Book Guild.

Heukelom, F. (2014) *Behavioral Economics: A History*, Cambridge: Cambridge University Press.

Hey, J. (1979) *Uncertainty in Microeconomics*, London: Martin Robertson.

Kao, Y.-F. and K. V. Velupillai (2015) "Behavioral Economics: Classical and Modern," *The European Journal of the History of Economic Thought*, 22(2): 236–271.

Lavoie, M. (1992) *Foundations of Post-Keynesian Economic Analysis*, Aldershot, Hants, England; Brookfield, Vt., Edward Elgar Publishing Ltd.

Lavoie, M. (2022) *Post-Keynesian Economics: New Foundations (2nd edition)*, Cheltenham, UK and Northampton, MA, USA.

Lucas, R. (1981) *Studies in Business Cycle Theory*, Cambridge, MA: MIT Press.

McCombie, J. (2015) "Book Review of Post-Keynesian Economics: New Foundations" (M. Lavoie), *European Journal of Economics and Economic Policies: Intervention*, vol. 12(2): 243-248.

Mirowski, P. (1989a) "The Probabilistic Counterrevolution, or how Stochastic Concepts came to Neoclassical Theory", *Oxford Economic Papers*, 41:217-35.

Mirowski, P. (1989b) *More Heat than Light*, Cambridge: Cambridge University Press.

O'Donnell, R. (2015) "A Critique of the Ergodic/nonergodic Approach to Uncertainty", *Journal of Post Keynesian Economics*, Vol. 37, No. 2: 187-209.

Sent, E-M. (2004) "Behavioral Economics: How Psychology made its (limited) Way back into Economics," *History of Political Economy*, 36: 735-760.

Shaikh, A. (2016), *Capitalism: Competition, Conflict, Crises*, Oxford: Oxford University Press.

Simon, H. (1955) "*A Behavioural Model of Rational Choice*," Quarterly Journal of Economics, 69: 99-118.

Simon, H. (1959) "Theories of Decision-Making in Economics and Behavioural Sciences," *American Economic Review*, 49: 253-83.

Simon, H. (1986) "Rationality in Psychology and Economics", in R. Hogarth and M. Reder (eds.) *Rational Choice*, Chicago: Chicago University Press.

Werner, R. and Farrelly, T. (2019) “Uncertainty from Heisenberg to Today”, *Foundations of Physics*, 49: 460–491.