



Revista de Estudiantes de Economía / Volumen 2 / Número 5 / Enero-diciembre 2021

INTERCAMBIO

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E-ISSN 2619-6131

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The ethical dimension of Kenneth Arrow's Weltanschauung*

La dimensión ética de la cosmovisión de Kenneth Arrow

José Manuel Ortega Urbina**

Abstract

This paper aims to outline some ideas around the contributions of Kenneth Arrow, and to make explicit the philosophical reflection on the intersection between ethics and economics. United, economics and ethics can help to improve our understanding of socioeconomic phenomena. The field of collective choice pretend precisely that. It takes into consideration an ethical dimension of the choice process with a collectivist ontological commitment. In the first part we mention some considerations about Arrow's life, then we focus on his theory of social choice, in the third part we argue that Arrow reintegrates ethics into economic theory and finally we make some concluding remarks.

Resumen

El objetivo de este trabajo es esbozar algunas ideas en torno a las contribuciones de Kenneth Arrow, y hacer explícita la reflexión filosófica sobre la intersección entre ética y economía. La economía y la ética unidas pueden ayudar a mejorar nuestra



* **Artículo recibido:** 9 de septiembre de 2020 | **aceptado:** 20 de febrero de 2021 | **modificado:** 1 de marzo de 2021.

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comprensión de los fenómenos económicos. La teoría de la elección social es precisamente eso, esta pone énfasis en una dimensión ética del proceso de elección con un compromiso ontológico colectivista. En la primera parte mencionamos algunas consideraciones en torno a la vida de Arrow, en la segunda parte nos centramos en su teoría de la elección social, en la tercera parte argumentamos que Arrow reintegra la ética en la teoría económica y finalmente enunciamos algunos comentarios finales.

My oversimplified hypothesis is that Arrow became an economist because there is music in economics.

George R. Feiwel

Introduction

Kenneth Joseph Arrow was a prolific and important economist of the 20th century. Their contributions have suggested various research paths ranging from statistics and applied mathematics to philosophical reflections on the functioning of the market and the efficient allocation of resources.

Arrow's work has had an immediate influence and repercussion in the shaping of modern theories such as the mathematical structure of voting, welfare economics, public economics, economics of health, game theory, even moral and political philosophy, theories of justice, and the importance of the theory of social choice as a conceptual framework for the prescription of public policy.

Ken Arrow was a renowned scholar and intellectual who covered a wide variety of subjects focused on economics and politics in the light of history and philosophy. Always reminding us that economics is about redistribution, and therefore how we treat each other. Arrow has always emphasized that the intersection between economics and ethics does not only concern economists, stressing the belief that government can be a powerful force for the common good and is particularly relevant.

In 1972, at age 51, he was awarded with the 'Nobel Prize in Economics', for his fundamental contributions to the renewal of general equilibrium theory and welfare

theory, and for his pioneering contributions to the social choice theory. To date, he is the youngest (male) economist to receive this honor.

We owe to him the establishment of equilibrium as the basis of economic theory and our way of seeing the economy. But nearing the end of his career, looking back at his earlier ideas, he began to think differently about them. His enormous honesty and integrity led him to recognize that there was a gap between theory and reality. “Kenneth Arrow was rigorous not just with mathematics but with his own thinking, and he was willing to reassess his own ideas if that furthered the truth.”¹

He was one of the first to believe that economics could take advantage of complex systems, computer science and biology, to study economics as an evolving and nonequilibrium system.

Arrow is considered one of the great architects of neoclassical economic thought and at the same time one of its sharpest critics. Possibly he is the most important economist of the 20th century. No other economist, apart from John M. Keynes, was a better mentor than he. Five of his students subsequently won a Nobel Prize.

A better understanding of Arrow’s thinking will allow us to understand what Professor Sen meant when he stated that “is not only one of the greatest economist and political theorist of all time, but also an intellectual of exceptional vision, humanity, and generosity.”²

As Professor Sen says:

With his general wisdom, combined with his logical power, his mathematical skills, and his sympathetic understanding of human relations, Arrow changed the subject of modern economics in a truly profound way.³

In this paper we focus on social choice, a field that was invented by Arrow, there were precursors, of course, but the modern field is due to it. It is derived from the pioneering

1. Brian Arthur, “Kenneth Arrow and Nonequilibrium Economics”, *Quantitative Finance*, 19-1 (2019): 29.

2. Amartya K. Sen, “The Triumphs of Kenneth Arrow.” In *On Ethics and Economics: Conversations with Kenneth J. Arrow*, eds. Kristen R. Monroe, and Nicholas M. Lampros (New York: Routledge, 2017), vii.

3. Sen, “The Triumphs of Kenneth Arrow”, viii.

analyses of Jean-Charles de Borda *Mémoire sur les élections au scrutin* (1781) and Nicholas de Condorcet *Essai sur l'application de l'analyse à la probabilité des décisions rendues à la pluralité des voix* (1785) in the eighteenth century, they are known as the voting paradox.⁴

Social choice theory had an immediate influence and repercussion in economics, philosophy, and politics. The field of collective choice was nourished by the joint seminar on this subject held by Ken Arrow, Amartya Sen and John Rawls at Harvard University during 1968-89. Arrow's famous impossibility theorem (1950, 1951) has profoundly influenced matters related to collective choice and well-being.⁵

Social Choice Theory

Social Choice Theory (SCT) is derived from the search for a set of reasonable and plausible conditions for the aggregation of individual preferences in a social welfare function. It raises certain procedural inconsistencies in the choice and proposes to change the object or argument of choice. SCT is the study of how a society should make collective decisions based on the preferences of its members.

Arrow's (1950-1951) analysis begins with two things, first, a society: a group of rational individuals, and second, a set of social alternatives from which society must choose.

For example, if a community is deciding whether (or not) to build a new airport on the local lake, the society is made up of the citizens of that community and social alternatives are only the options of building the airport or not building it. Or if a union or an association that must choose a representative, society is the union, and the social alternatives are the candidates to be the representative. These are two examples that are derived from the creation of Arrow, but you can think of many more possibilities because the formulation is extremely general.

Presumably everyone has preferences over social alternatives, which means that an individual has a favorite alternative, a second favorite, a third, etc., depending on

4. Kenneth J. Arrow, *Social Choice and Individual Values*, (New York: Wiley, 1951); Amartya K. Sen, *Collective Choice and Social Welfare*, (San Francisco: Holden-Day, 1970).

5. Eric Maskin, and Amartya Sen, *The Arrow Impossibility Theorem*, (New York: Columbia University Press, 2014).

the possible options; in other words, it has a ranking or an ordering of their preferences.

What Arrow was interested in was how to move from the individuals' rankings to the social ranking. He defined a Social Welfare Function (SWF) as a rule for determining social preferences based on the preferences of individuals.⁶

One possible SWF is the majority rule, this rule consist in that an alternative A is socially preferable to another alternative B if most of the community prefers A to B, and only if these two were the only options. But, although the majority rule works like an SWF when there are only two alternatives, it can be knocked down when there are more than two options.

The way to illustrate the problem is as follows:

Suppose, for example, that a society made up of three individuals (Jack, Jill, and Joe) must choose between three alternatives of social action (A, B, C). The rational behavior of individuals implies that they are ranking in ascending order the social alternatives based on their preferences. Similarly, the community orders the three options according to the collective preferences.

	Jack	Jill	Joe
Best	A	B	C
Second best	B	C	A
Third best	C	A	B

Jack, Jill, Joe = decision group members

A, B, C = options

As we can see, Jack and Joe prefer A to B; likewise, Jack and Jill prefer B to C; finally, Jill and Joe prefer C to A. Then, majority prefer A to B, and B to C, therefore, society prefers A to B, and B to C. But in fact, majority also prefer C to A. Where such a cycle exists, it is not clear what society should do.

6. Kenneth J. Arrow, *Social Choice and Individual Values*, (New York: Wiley, 1951).

Let's see another example, imagine a group of 60 voters who must choose between three candidates A, B and C.

Number of voters	23	19	16	2
Ranking (listed vertically from best to worst)	A	B	C	C
	C	C	B	A
	B	A	A	B

(Adapted from Dasgupta and Maskin 2014, p. 103).

For 23 voters, the rankings of their preferences were $A > C > B$. Those of 19 other voters were: $B > C > A$. Another 16 voters preferred $C > B > A$. Finally, 2 voters preferred $C > A > B$.

Based on these outcomes, Candidate A will be chosen because he has received 23 votes. However, he has not obtained a majority because there are 35 voters who have preferred candidate B to candidate A. The result is the collective choice paradox.⁷

Searching for a set of reasonable and plausible conditions to aggregate individual preferences in a SWF resulted in an impossibility.

Arrow was fascinated by the mathematical logic implicit in this outcome thanks to the influence of the great Polish logician Alfred Tarski. When Arrow was a senior, he takes a course with Alfred Tarski at the Philosophy Department of The City College. Even later he helped him read the proofs of Tarski's *Introduction to Logic*.⁸ "Arrow's (1950-1951) impossibility theorem is one of those rare intellectual contributions that virtually transform entire disciplines or subdisciplines."⁹

7. Partha Dasgupta, and Eric Maskin, "On the Robustness of Majority Rule." In *The Arrow Impossibility Theorem*, eds. Eric Maskin, and Amartya Sen, (New York: Columbia University Press, 2014).

8. Kenneth J. Arrow, "The Origins of the Impossibility Theorem." In *The Arrow Impossibility Theorem*, eds. Eric Maskin, and Amartya Sen, (New York: Columbia University Press, 2014), 145; J. S. Kelly, and Kenneth J. Arrow, "An Interview with Kenneth J. Arrow", *Social Choice and Welfare*, 4-1 (1987): 44; Kristen. R. Monroe, and Nicholas M. Lampros, eds. *On Ethics and Economics: Conversations with Kenneth J. Arrow*, (New York: Routledge, 2017), 12.

9. Prasanta Pattanaik, "Introduction" In *The Arrow Impossibility Theorem*, eds. Eric Maskin, and Amartya Sen, (New York: Columbia University Press, 2014), 2.

In his Impossibility Theorem Arrow (1950, 1951, 1963) formalizes the possibility of constructing a procedure to go from a set of individual orderings to a scheme or pattern of social choice that satisfies certain conditions of rationality.

These conditions are: Unrestricted domain (condition U), Independence of irrelevant alternatives (condition I), Pareto principle (condition P), and non-dictatorship (condition D). There is no SWF that can simultaneously satisfy these four conditions (U, I, P y D).¹⁰

Unless it was Robinson Crusoe, most of the specific actions of an individual involve the joint participation of an entire society. This sort of actions are specifically of society as a whole, not of individuals, in virtue of each individual is not capable of performing non-trivial actions on their own without the actions of other individuals, such as consumer decisions, read a novel, attending a concert, moving from one place to another, raising a family, or developing a scientific theory.¹¹

The problem of social action is the aggregation of individual preferences in a single system of social preferences on the possible alternatives, where all members of the group see their interests represented in that single pattern. Possible social actions should be judged or evaluated in terms of their consequences for each individual, that is, in terms of individual preference scales.

However, on the eve of diversity and possible divergence of preferences, this basis for social action result plausible but insufficient for such aggregation, so another second-order criterion or evaluation is recognized that judges possible social actions in terms of the consequences for all individuals, it is called a welfare judgment.¹²

One of the possible solutions to the paradox is to change the object or argument of choice, that is, focus on the values dimension of the choice process, and expand the information basis on which decisions are made.

10. See Kenneth J. Arrow, *Social Choice and Individual Values*. 2nd Ed. (New Haven: Yale University Press, 1963), and Amartya K. Sen, (*Collective Choice and Social Welfare*. San Francisco: Holden-Day, 1970) for the statements of these conditions.

11. Kenneth J. Arrow, "Values and Collective Decision-Making" In *Philosophy, Politics and Society, Third Series*, eds. Peter Laslett, and Walter G. Runciman, (Oxford: Basil Blackwell, 1967).

12. Arrow, "Values and Collective Decision-Making", 1967.

The arguments in the preceding function are “sets of goods”. The arguments in the Arrovian SWF are “social states”. The choice among a set of goods is individualistic, that is, each individual makes decisions based on their tastes. Instead, a choice between a set of different social states is collectivist, because it commits the individual to his social environment. Each individual makes decisions not only based on their tastes, but also on their values: The individual orderings which enter as arguments into the social welfare function as defined here refer to the values of individuals rather than to their tastes.¹³

What Arrow proposes is to introduce value schemes into the social function, that is, to make the normative question constitutive of the choice theory, ultimately, a close relationship between economic theory and ethics. But this is not a reason for something novelty.

Ethical dimension

Economics is born precisely as a moral science. Adam Smith is one of the most important authors of the so-called Scottish Enlightenment of the 18th century. A great concern of the enlightened Scots was to build a “science of man” based on what man is and not what should be.

In his *Theory of Moral Sentiments* published in 1759, Smith begins by saying:

How selfish soever man may be supposed, there are evidently some principles in his nature, which interest him in the fortune of others, and render their happiness necessary to him, though he derives nothing from it except the pleasure of seeing it.¹⁴

His intention was to build a moral theory with scientific rigor, finding the laws, rules or natural principles of moral action both individually and socially. For Smith, the individual, under the stimulus and desire for wealth, builds the project of their

13. Kenneth J. Arrow, *Social Choice and Individual Values*, (New York: Wiley, 1951), 23.

14. Adam Smith, *The Theory of Moral Sentiments*, (London: Alex. Murray & Son, 1869), 2.

development and, in parallel, that of collective well-being. Highlighting the ethical framework of the economy, he believed that in the interest of the great community the citizen must always be ready to sacrifice his own interest.

Here is proposed a re-reading of Smith that shows a different face from that one that is commonly transmitted as the precursor of selfishness ☒ the invisible hand that directs the market.

Smith did not assign a generally superior role to the pursuit of self-interest in any of his writings. The defense of self-interested behavior comes in specific contexts, particularly related to various contemporary bureaucratic barriers and other restrictions to economic transactions which made trade difficult and hampered production.¹⁵

Thanks to his *magnum opus: An Inquiry into the Nature and Causes of the Wealth of Nations*, published in 1776, Smith is considered the father of economics. But there is a lack of understanding of the importance of his work in the field of ethics. His work is of utmost importance despite the low recognition of this aspect of his work in the schools of economics. Smith articulates a system of thought that subsumes ethics in social science.

Nowadays many of those who criticize the free market economy, associating it with neoliberalism, have repeatedly cited the following passage:

It is not from the benevolence of the butcher, the brewer, or the baker, that we expect our dinner, but from their regard to their own interest. We address ourselves, not to their humanity but to their self-love, and never talk to them of our own necessities but of their advantages.¹⁶

However, they do not appear to have gone beyond this paragraph. The doctrine of *laissez faire* is certainly subject of criticism, but nothing more imprecise than associating it with this. What Smith does here is specify why and how market transactions

15. Amartya K. Sen, *On Ethics and Economics*, (Oxford: Basil Blackwell, 1987), 25.

16. Adam Smith, *An Inquiry Into the Nature and Causes of the Wealth of Nations*, (London: Methuen & Co., Ltd, 1904), 16.

take place, and why and how division of labor works. And the division of labor, understood as the social process of specialization that allows the surplus, determines the productivity and distribution of the national product.

To Smith, the structure of human needs and desires in a given society and age is the domain of political economy. When he says “*consumption is the sole end and purpose of all production*”¹⁷ emphasizes that the foundation and purpose of any economy is the satisfaction of the needs and desires of all members of society.

The secular concept that Smith refers to with his metaphorical theological conception of the invisible hand is the social order.

To Jeremy Bentham, a notable defender of social *eudaimonia*, the highest goal of human coexistence is the greatest happiness of the greatest number. It enunciates the principle of utility elaborating it from a philosophy and a psychology. In principle, Bentham’s utilitarianism does contain moral principles of social content. “The utilitarian philosophy of Jeremy Bentham and his followers sought instead to ground the social good on the good of individuals.”¹⁸

The great enemies of public peace are the selfish and unsociable passions. Society is held together only by the sacrifices that its members can be induced to make. As Bentham says in his famous *An Introduction to the Principles of Morals and Legislation* published in 1789:

The interest of the community is one of the most general expressions that can occur in the phraseology of morals: no wonder that the meaning of it is often lost. When it has a meaning, it is this. The community is a fictitious body, composed of the individual persons who are considered as constituting as it were its members. The interest of the community then is, what is it? —the sum of the interests of the several members who compose it.¹⁹

17. Smith, *An Inquiry Into the Nature*, 159.

18. Kenneth J. Arrow, *Social Choice and Individual Values*, (New York: Wiley, 1951), 22.

19. Jeremy Bentham, *An Introduction to the Principles of Morals and Legislation*, (Oxford: Clarendon Press, 1907), 3.

Although both, Smith's inherited empiricism²⁰ and Bentham's utilitarianism, two fundamental pillars of classical political economy, present "selfishness" as an ontological and psychological conception as a fundamental principle of human nature, they are also heavily marked by moral principles of high social content.

Both, Smith and Bentham, invoke as an inspiring source the tradition of moral philosophy that would become the core of neoclassical economics, but which has tended to be lost in the writings of many contemporary economists. Not the case of neoclassical authors like Arrow:

It is the ordering according to values which takes into account all the desires of the individual, including the highly important socializing desires, and which is primarily relevant for the achievement of a social maximum. The market mechanism, however, takes into account only the ordering according to tastes.²¹

On one occasion when Arrow was asked a simple question: How did you come to be interested in ethics? His response was one of exceptional erudition: "To say that I'm interested in ethics is probably just to say I'm a human being."²²

Here we try to make a re-reading of the classics, like Smith, emphasizing their collectivist dimension above self-interest. With the aim of pointing out that this ethical-collectivist dimension prevails at the core of the Arrowian economics.

It is instructive to note that the theoretical corpus of neoclassical economics is not homogeneous, and that criticism from other schools of thought towards it presents a lack of understanding of its diversity.

20. David Hume's doctrine became the center of philosophical activity developed in the Enlightenment in England and Scotland in the late eighteenth century. Smith was one of the first to adopt the critical spirit of Hume (a great friend and mentor), broadening it with ethics and economic research. He was also influenced by Locke, Mandeville, Hutcheson, among others.

21. Kenneth J. Arrow, *Social Choice and Individual Values*, (New York: Wiley, 1951), 18.

22. Kristen R. Monroe, and Nicholas M. Lampros, eds. *On Ethics and Economics: Conversations with Kenneth J. Arrow*, (New York: Routledge, 2017), 89.

While some economists draw a clear distinction between normative issues and the “positive” science of economics that deals with facts and not values²³, as expressed by Lionel Robbins: It does not seem logically possible to associate the two studies [ethics and economics] in any form but mere juxtaposition. Economics deals with ascertainable facts; ethics with valuations and obligations.²⁴

Other positions are not as blunt. Arrowian economics does contain moral and normative premises that adhere to the collectivist philosophical notions of classics, like Smith or Bentham, focused on social welfare.

Although in some way, truly true, some critics believe that it remains attached to the positive economics centered on its predictive capacity and on methodological individualism by the deployment of its mathematical instruments. Recall that Arrow was very skilled with mathematics and was sometimes innovative in using them in a peculiar way.

The simplistic and ethically immune vision of the free market is at odds with the vision of Smith, Bentham, and especially that of Arrow. A true, deep, and serious analysis, foreign to the “textbooks”, of authors like Arrow will give us a richer and more complex conception of economics, not a simple apologia for markets, rationality and selfish behavior.

Moral insights are, to be sure, more important to some parts of economics than others. Like economics itself, moral philosophy is loaded with controversies and unresolved issues. But even if moral philosophy clarifies morality, why should it clarify economics? A better understanding of the moral philosophy of classics can help economists improve economics, and together economics and ethics can help analysts improve their policy evaluations.²⁵

23. Daniel Hausman, and Michael McPherson, *Economic Analysis, Moral Philosophy, And Public Policy*, (New York: Cambridge University Press, 2006), 8.

24. Lionel Robbins, *An Essay on the Nature and Significance of Economic Science*, (London: Macmillan, 1935), 148-149.

25. Daniel Hausman, and Michael McPherson, *Economic Analysis, Moral Philosophy, And Public Policy*, (New York: Cambridge University Press, 2006).

Final remarks

SCT is an economic theory, but that does not make it a dry and flat one. Its founder, Kenneth Arrow, was one of the greatest architects of modern economic science. Arrow (1950, 1951, 1963) expands the economic question of collective well-being beyond the sum of maximizing individual profits in a philosophical sense.

Finally, social choice in the Arrow sense is collectivist. The Arrowian welfare function is also questioned by what the welfare economics understands as justice and equity in distribution, incorporating value judgments. Thus, preference orderings depend not only on tastes but also on social values such as standards of fairness and justice. Arrow reintegrates ethics in economics and the normative dimension ends up becoming explicit. "Arrow gives a heart and a voice to economics, a field that can too often be reduced simply to a head full of numbers."²⁶

The ethical-collectivist dimension in Arrow's thinking manifests itself when it focuses on the process and not only on the consequence of social choice. It means to open the door to the interaction between individuals and moral norms. And it goes on to analyze how institutions and organizations shape our preferences. This implies that social choice has a commitment to a democratic and deliberative system between individuals with heterogeneous interests (economic, political, social, etc.), it also implies recognizing the diversity of members of society (income, capabilities, opportunities, etc.)

Arrow ends his lecture in tribute to Alfred Nobel with these words:

The philosophical and distributive implications of the paradox of social choice are still not clear. Certainly, there is no simple way out. I hope that others will take this paradox as a challenge rather than as a discouraging barrier.²⁷

26. Kristen R. Monroe, and Nicholas M. Lampros, eds. *On Ethics and Economics: Conversations with Kenneth J. Arrow*, (New York: Routledge, 2017), 2.

27. Kenneth J. Arrow, "General Economic Equilibrium: Purpose, Analytic Techniques, Collective Choice", *The American Economic Review*, 64-3 (Jun, 1974): 271.

Social choice emphasizes an ethical dimension of economics, with a collectivist ontological commitment, because it implies that, although individuals are rational, they are not identical, collective choice is the result of heterogeneous groups. Likewise, they are agents with values, and where social norms also influence their decision-making.

Understanding economics focused on its ethical and collective dimension is an important clue to understand Arrow's point of view on human interaction as a tension between individual and social values.

Arrow's socio-economic view centered on the concept of organization as an instrument to achieve the benefits of collective action where the market fails.²⁸ History places Arrow among the giant master economists of all time. Arrow's architectonic contributions, they are about music in economics.

References

1. Arrow, Kenneth J. (1950). A Difficulty in the Concept of Social Welfare. *Journal of Political Economy*, 58(4), 328-46.
2. Arrow, Kenneth J. (1974). General Economic Equilibrium: Purpose, Analytic Techniques, Collective Choice. *The American Economic Review*, 64(3), 253-72.
3. Arrow, Kenneth J. (1951). *Social Choice and Individual Values*. New York: Wiley.
4. Arrow, Kenneth J. (1963). *Social Choice and Individual Values*. 2nd Ed. New Haven: Yale University Press.
5. Arrow, Kenneth J. (2014). The Origins of the Impossibility Theorem. In *The Arrow Impossibility Theorem*, edited by Eric Maskin, and Amartya Sen, 143-48. New York: Columbia University Press.
6. Arrow, Kenneth J. (1967). Values and Collective Decision-Making. In *Philosophy, Politics and Society, Third Series*, edited by Peter Laslett, and Walter G. Runciman, 215-32. Oxford: Basil Blackwell.

28. George R. Feiwel, "The Many Dimensions of Kenneth J. Arrow." In *Arrow and the Foundations of the Theory of Economic Policy*, (New York: New York University Press, 1987a), 2.

7. Arthur, Brian. (2019). Kenneth Arrow and Nonequilibrium Economics. *Quantitative Finance*, 19(1), 29-31. <https://doi.org/10.1080/14697688.2018.1533738>
8. Bentham, Jeremy. *An Introduction to the Principles of Morals and Legislation*. Oxford: Clarendon Press, 1907. <https://oll.libertyfund.org/titles/278>
9. Dasgupta, Partha, and Eric Maskin. (2014). On the Robustness of Majority Rule. In *The Arrow Impossibility Theorem*, edited by Eric Maskin, and Amartya Sen, 101-42. New York: Columbia University Press.
10. Feiwel, George R. (1987a). The Many Dimensions of Kenneth J. Arrow." In *Arrow and the Foundations of the Theory of Economic Policy*, edited by George R. Feiwel, 1-115. New York: New York University Press.
11. Feiwel, George R. (1987b). There is Music in Economics. In *Arrow and the Foundations of the Theory of Economic Policy*, edited by George R. Feiwel, 713-24. New York: New York University Press.
12. Hausman, Daniel, and Michael McPherson. (2006). *Economic Analysis, Moral Philosophy, And Public Policy*. 2nd Ed. New York: Cambridge University Press.
13. Kelly, J. S, and Kenneth J. Arrow. (1987). An Interview with Kenneth J. Arrow. *Social Choice and Welfare*, 4(1), 43-62.
14. Maskin, Eric, and Amartya Sen. (2014). *The Arrow Impossibility Theorem*. New York: Columbia University Press.
15. Monroe, Kristen. R., and Nicholas M. Lampros, eds. (2017). *On Ethics and Economics: Conversations with Kenneth J. Arrow*. New York: Routledge.
16. Morreau, Michael. (2019). Arrow's Theorem. The Stanford Encyclopedia of Philosophy (Winter 2019 Edition), Edward N. Zalta (ed.), URL = <https://plato.stanford.edu/archives/win2019/entries/arrows-theorem/>
17. Pattanaik, Prasanta. (2014). Introduction. In *The Arrow Impossibility Theorem*, edited by Eric Maskin, and Amartya Sen. 1-21. New York: Columbia University Press.
18. Robbins, Lionel. (1935). *An Essay on the Nature and Significance of Economic Science*. 2nd Ed. London: Macmillan.
19. Sen, Amartya K. (1970). *Collective Choice and Social Welfare*. San Francisco: Holden-Day.

20. Sen, Amartya K. (1764-76). Social Choice and Justice: A Review Article. *Journal of Economic Literature*, 23(4).
21. Sen, Amartya K. (1987). *On Ethics and Economics*. Oxford: Basil Blackwell.
22. Sen, Amartya K. (2017). The Triumphs of Kenneth Arrow. In *On Ethics and Economics: Conversations with Kenneth J. Arrow*, edited by Kristen R. Monroe, and Nicholas M. Lampros, vii-x. New York: Routledge.
23. Smith, Adam. (1904). *An Inquiry Into the Nature and Causes of the Wealth of Nations*, edited by Edwin Cannan. 5th Ed. London: Methuen & Co., Ltd. <https://oll.libertyfund.org/titles/171>
24. Smith, Adam. (1869). *The Theory of Moral Sentiments*, edited by d. Joseph Black and James Hutton. 6th Ed. London: Alex. Murray & Son. <https://oll.libertyfund.org/titles/2721>

