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Allocative processes in Economics: A template for classifying economic theories

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Abstract: Economic theories, regardless of their specific type or adscription to any school of thought, typically deal with processes of resource allocation (allocative processes). It is the different visions of human nature and society (and, therefore, their schemes of interaction) specific to each theory that explain the existence of different theoretical proposals. In this article, we identify some of the basic elements of all economic theory, and for classifying purposes, we propose a straightforward template that allows us to generate a taxonomy for the study of different theories. As an extension of this exercise, we also discuss the minimum conditions for a criterion of scientific progress in economic theory.

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Resumen: Las teorías económicas, independientemente de su tipo específico o adscripción a cualquier escuela de pensamiento, suelen ocuparse de procesos de asignación de recursos (procesos de asignación). Son las diferentes visiones de la naturaleza humana y de la sociedad (y, por tanto, sus esquemas de interacción) propias de cada teoría las que explican la existencia de diferentes propuestas teóricas. En este artículo, identificamos algunos de los elementos básicos de toda teoría económica y, para fines de clasificación, proponemos una plantilla sencilla que nos permite generar una taxonomía para el estudio de diferentes teorías. Como extensión de este ejercicio, también discutimos las condiciones mínimas para establecer un criterio de progreso científico en las teorías económicas.

1. Introduction

This article aims to provide a proposal for classifying economic theories. To do that, it poses an analytical device that makes it possible to compare different economic theories in a relatively simple way. It is what is called in the paper the *template* both for classifying and comparing different economic theories.¹ For this task, we should first address the possibility of establishing an analytical structure *common to all* economic theories—at least to those which currently exist and have existed—that makes them commensurable². The departing point for this exercise is the *empirical basis* that serves as a firm foundation for any subsequent investigation.³ Fortunately, the theories produced by modern economic theory—the one that started by 1870—provide not only the empirical basis for the history of economic thought but also serve to explore the existence of the aforementioned common analytical structure.

In a detailed manner Rubio de Urquía (2000) claims that for understanding the meaning of Economics, it is necessary to establish what is the meaning of “economic” in modern theoretical economics according to how foremost economists have understood and expressed it in their key works.⁴ A survey of their definitions on the subject matter of Economics allows singling out a common element: namely, that Economics aims to investigate allocative processes, a special kind of processes within human action, consisting of the adaptation of scarce means to fulfill alternative goals of action, which include, among others, the interactions of interpersonal processes of this type and their consequences.

In other words, the modern economic theory addresses the study of the adoption of personal plans of action, both individually and in processes of mutual interaction, together with the results of attempts by people to execute those plans. Consider the following brief selection of texts by prominent economists that serves as the basis for that claim:

The theory which follows is entirely based on a calculus of pleasure and pain; and the object of Economy is to maximize happiness by purchasing pleasure, as it were, at the lowest cost of pain. (Jevons, 1871: 27)

La scienza economica consiste nelle leggi della ricchezza, sistematicamente dedotte dalla ipotesi *che gli uomini siano mossi ad agire esclusivamente dal desiderio di conseguire la maggiore possibile soddisfazione dei loro bisogni mediante il minore*

possibile sacrificio individuale. (Pantaleoni, 1889: 9; italics in the original)

3. Notre étude a pour objet les phénomènes qui résultent des actions que font les hommes pour se procurer les choses dont ils tirent la satisfaction de leurs besoins ou leurs désirs. Il nous faut donc d’abord examiner la nature des rapports entre les choses et la satisfaction de ces besoins ou de ces désirs, et tâcher ensuite de découvrir les lois des phénomènes qui ont précisément ces rapports pour cause principale. (Pareto, 1896: 3)

Economics is a study of mankind in the ordinary business of life; it examines that part of individual and social action which is most closely connected with the attainment and with the use of the material requisites of well-being. (Marshall, 1920: 1)

Economics is the science which studies human behavior as a relationship between ends and scarce means which have alternative uses. (Robbins, 1932: 15).

It is much more than merely a theory of the “economic side” of human endeavors and of man’s striving for commodities and an improvement in his material well-being. It is the science of every kind of human action. Choosing determines all human decisions. In making his choice man chooses not only between various material things and services. All human values are offered for option. ... Out of the political economy of the classical school emerges the general theory of human action, praxeology. The economic or catallactic problems are embedded in a more general science, and can no longer be severed from this connection. No treatment of economic problems proper can avoid starting from acts of choice; economics becomes a part, although the hitherto best elaborated part, of a more universal science, praxeology. (Mises, 1949: 3)⁵

In his admirable book on *The Scope and Method of Political Economy* John Neville Keynes distinguishes among “a positive science ... [,] a body of systematized knowledge concerning what is; ...” Its task is to provide a system of generalizations that can be used to make correct predictions about the consequences of any change in circumstances. (Friedman, 1953: 3-4)

What is economics? ... A more serious definition is that economics is the study of the allocation of scarce means to satisfy competing ends. ... The ends must be competing in order that value judgments or choices of different kinds are involved. When there are no alternatives,

¹ We elaborate from Rubio de Urquía (1993, 2000, 2005), Sugden (2000), Epstein and Axtell (1996), and Tesfatsion (2017, 2022). The last two references provide excellent examples, from which we adopt elements to elaborate the template proposed in this paper.

² The ‘commensurability of the theories’ consists of identifying the extent to which these theories would allow to accommodate both different and more complex economic phenomena.

³ Empirical in the sense that it contains what these prominent economists have already said about Economics.

⁴ Rubio de Urquía systematically reviews: (a) neoclassical authors, such as Jevons, Walras, Edgeworth, Pantaleoni, Marshall, Fisher,

Pareto, Amoroso, Knight, Bowley, Moore, Cassel, Bonisegni, Debreu, Friedman and Becker; (b) Austrian authors such as Menger, Mises, and Hayek; (c) Keynes; and (d) authors who, being certainly susceptible to be ascribed to what has been called modern economic theory, present singularities that, in relation to what is proposed here (developing the scheme of the synthetic representation of allocative processes) make a separate treatment more advisable: Robbins, Röpke and Simon.

⁵ Mises (1949) broadens the scope of economic research, proposing a more complete definition of economics: *praxeology*.

there is no problem of choice and, therefore, no economic problem. (Becker, 1971: 1)

Thus, one might describe economics (what I now prefer to call *catalactics* ...) as a metatheory, a theory about the theories people have developed to explain how most effectively to discover and use different means for diverse purposes. (Hayek, 1988: 98)

Departing from this empirical material,⁶ we may infer that there is something like *an analytical structure common to all economic theories* that make it possible to identify, classify and compare different economic theories, in particular theories (and models) attached to different schools of economic thought. As it will be shown throughout the next sections, all economic theories refer to and systematically analyze allocative processes (of scarce resources). Thus, the comparison between theories is a comparison between different characterizations of economic processes.

Schematically, the argument is as follows. The economy, as an activity, is what people do within social and historical contexts in which the scarcity of resources plays a central role. Under specific circumstances, economic agents (individuals, families, firms, governments, and organizations of all kinds) must allocate scarce resources to different alternatives –mutually exclusive uses of them. Thus, the fundamental assumption of Economics as a scientific discipline is that in circumstances of scarcity, economic agents allocate the resources or means at their disposal (or the actions and plans that they intend to carry out) in the best possible way to achieve their goals (uses, ends of action, objectives hierarchically ordered by agents, and so on), that are alternative to each other.⁷

Finally, the economy as a historical institutional object or outcome is the result of that sphere of human action that unfolds from allocative operations in a non-deterministic way –individuals (organizations) make decisions based on their acts of freedom of choice.

An analytical allocative process is characterized by the presence of the following necessary building blocks, whose concrete characterization will have, as we shall see, key theoretical (and practical) implications:⁸

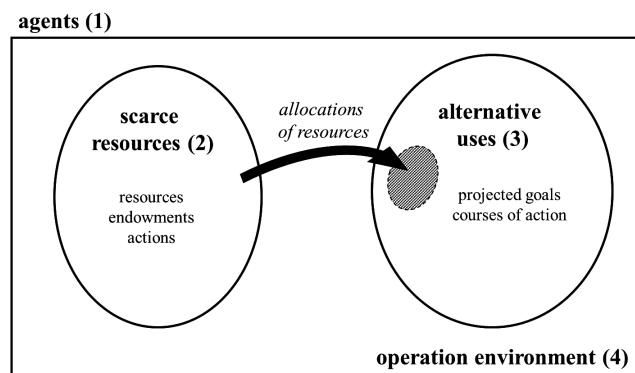
- (1) economic actors/agents: who and how they are,
- (2) the sets of agents' available (and also expected) scarce resources and actions,
- (3) the sets of (hierarchically ordered) alternative goals, ends, or uses,
- (4) a specific operational milieu of interaction: the environment.

Any theoretical-economic inquiry necessarily refers to the characterization and rational analysis of an allocative

process with the previously mentioned constitutive elements. Thus, our main claim at this point is that the object of modern Economic Theory is to investigate (and analytically develop) types of theoretical structures known as analytical allocative processes.

Figure 1 represents the idea of those relationships synthetically.

Figure 1: Synthetic representation of an allocative process.



Using this approach, the basic characteristics of the constituent elements of the allocative processes determined and analyzed by economists could be identified. Moreover, similarities and differences in these critical points make it possible to identify various clusters of theories that ultimately form schools of (economic) thought. As will be shown, the differences, although often methodological, *essentially* depend on how the characteristic constituent elements of the allocative processes under study are specifically characterized by each theory. Ultimately, they depend on the theorist's view of the world (*Weltanschauung*).⁹

Of course, other important issues arise related to the main goal of this research. For example, is it possible to ask for a criterion of theoretical progress? Might a criterion of theoretical progress be obtained based on the common structure shared by the different economic theories? Although some ideas about this and other related issues will be highlighted, the limitation of space and the focus of this paper will take us to postpone an in-depth treatment of them for further work. Here, we opt, as a previous step, for the construction of a taxonomy of theories available from the proposed template.¹⁰

The structure of the paper is as follows. Section 2 introduces the analytical template. In section 3 we apply this template to different economic theories, as an exercise both for analyzing and comparing the different explanatory capacities of different theoretical proposals. Thus, we will select several theoretical cases or families of theories to determine their constituents, similarities, and differences. After the exercise of analyzing and comparing the theories

⁶ Quotations above are only a tiny sample.

⁷ This fundamental assumption (or axiom) of action is the so-called principle of economic behavior or optimization behavior in more restrictive versions.

⁸ Practical in that different theories follow different economic policy recommendations.

⁹ This worldview refers to how perceives the economist, in theoretical terms, human beings and society. Any change in the

perception or assumptions about how and what agents know give rise to a change in the theoretical output. See Simon (1955).

¹⁰ This is not exactly a methodological paper but one that tries to provide a useful taxonomy for classifying and comparing theories. Obviously, theoretical, methodological, and historical arguments will be intertwined.

using the proposal of the template, the paper ends with both some conclusions and some building blocks proposed for defining an explanation gain criterion of the economic theories based on the potential benefits arising from the actual explanatory capacity of them.

2. A template for analyzing economic theories

Table 1 is an extended version of Figure 1. In what follows, we will refer to this table as the *template*. In Table 1 there are the basic elements necessary for a synthetic representation of an allocative process organized in quite a similar way to ABM-type modeling. ABM modeling rules are very clear in expository and analytical terms, and additionally, allow a simple elaboration of the taxonomies characterizing agents, environment, and rules. At the second stage of analysis, the template enables the identification of the emergent properties that will eventually coevolve with the economic processes.

Table 1: A basic template for comparing economic theories.

LEVEL 1	<i>Agents</i>	Typology: consumers producers entrepreneurs government (/state) homogeneity vs heterogeneity Knowledge: objective subjective tacit Rationality (Plans of action - features)
	<i>Environment</i>	Institutions (market non-market) Equivalent of value (money) Networks Communication channels
	<i>Rules</i>	Search rules, informational rules, etc. Selection rules (Economic principle) Interaction (consumers → producers; among players...) market & extra-market interactions (Selection of plans)
LEVEL 2	<i>Emergent properties*</i>	Markets market structure prices production/ output institutions knowledge innovations inventions novelty (new combinations) capabilities rules Example: money Economic cycles, economic growth, ... “Common goods,” etc., Productivity Coordination Efficiency (of plans)

(*) These include structures when not given.

To build the template we distinguish between two levels of analysis. The first level, or level 1, is composed of (a) the type of agents that deploy planned actions in interaction with others; and (b) the environment where the allocative process happens—that is, the physical and institutional setting where the individual action unfolds in interaction with other agents.¹¹ Regarding agents, it is necessary to answer questions such as who the agents are (consumers/producers/entrepreneurs/rent seekers/policy makers...); whether agents are homogeneous (representative agents) or not (agents' heterogeneity); and whether there exist different characterizations depending on some particular traits—such as, for example, gender differences. At this level, it is convenient to identify the agents' action plans—that is, what properties and content characterize the agents' action plans in terms of consumption and production, for

¹¹ The specific characterization of these two elements will be decisive for the rest of the elements considered (Encinar and Muñoz, 2005).

example—regarding different economic theories.¹² Related to these types of plans are the agents' knowledge capabilities (that are at the basis of the formation of the different types of agents' action plans), how they learn and form expectations, and so on. Regarding the other element in level 1, the environment, it is necessary to identify whether there exist markets or institutions that facilitate trade, and generic equivalents of value ("money") that allow signaling prices and opportunity costs.

At level 2, the *emergent properties* of the processes of interaction are identified—with outcomes in terms of, for example, capabilities (Cañibano et al. 2006), routines (Becker, 2004), rules (Blind and Pyka, 2014), technologies (Arthur, 2009); institutions (Crawford and Ostrom, 1995), coordination (Hayek, 1945), rationing (Benassy, 1986), cycles, the emergence of novelties (Antonelli, 2011), and complexity (Muñoz, 2022). In fact, (socio-)economic systems and economic processes are the outcome (or the emergent properties), among other factors, of various allocative processes carried out by individuals and organizations.¹³

As an illustration at this point, we briefly consider the application of the template to the neoclassical allocative process (that of neoclassical economic theory). Such a theory is a specification of the formal elements of the general or common allocative process proposed in this paper. This particular process is carried out by a specific type of agent, the neoclassical economic agent, an optant that operates out of time (or in logical time), with no truly prospective future, usually choosing a specific type of environment, with complete information and Olympic rationality. By means of a selection rule based on the logic of the principle of economic behavior (adapted as "maximize utility"), said neoclassical agent has to assign scarce resources (including endowments and actions) perfectly known in advance, to alternative well-defined uses (projected goals), fully anticipable in terms of their effects and all of them—means and goals—susceptible to expression in monetary terms. This neoclassical allocative process happens out of time in the realm of an operating environment in which everything that must happen for the best allocative results is possible and will happen. An extreme case is that of perfect competition.

It is relatively straightforward to extend this analysis to other economic theories. It is easy to show that, after the particular specifications of the formal analytical structure called the allocative process, it is possible to generate as many varieties of economic "theories" as allocative processes can be specified. Thus, in addition to the so-called neoclassical allocative process, there are Keynesian, Austrian, evolutionary, etc., theoretical allocative processes.

A specific theoretical allocative process is set once a specific characterization of agents, sets of scarce means and alternative uses (ends), the operation milieu, and the forms of interaction have been asserted. When a theorist or historian of economic thought analyzes and compares "specific" allocative processes, all these elements must be analytically "given" (Loasby, 2003). Thus, the allocative process as a *formal analytical structure* provides a template that allows the classification and comparison of any allocative process specific to any economic theory, enabling the possibility of comparing economic theories. Table 2, whilst nonexhaustive, permits both the development of a template and proves its usefulness for organizing diverse theories to compare them.

Finally, among the so-called emergent properties, there are some regularities or predictions that can be considered *economic laws*: regularities of the theoretical allocative processes investigated under a given characterization of their constituents. In this context, economic laws for each theoretical allocative process refer to the possibility (and mode) of determining emerging structures within that analytical allocative process. Although it is not the aim of this paper, it can be shown (Encinar and Muñoz, 2005) that economic theories refer to the intrinsic properties of allocative processes at a purely theoretical level; or to the extrinsic properties of actual allocative processes as characterized and recorded in statistics, historical accounts, etc.,—that is, what has been observed "empirically" (unemployment, inflation, cycles, etc.).

¹² Plans may be complementary, logical, or physically unfeasible, inconsistent, and incompatible.

¹³ Household consumption, public spending, the production generated by the different sectors of the economy, the variation in prices, etc., are nothing but a reflection of this type of process. But not only. There are too economic processes of an immaterial

type in which the type of allocation that is carried out is, for example, of the scarce resource par excellence, which is time. Likewise, processes as fundamental as the generation and introduction of new technology play also a key role in the transformation of the economic system.

Table 2: Using the template for comparing: Neoclassical Econ., Keynesian Econ., and Austrian Economics

	Neoclassical	Keynesian	Austrian
Agents	Consumers/producers Homogeneous (representative agents)	Consumers/producers Homogeneous or Heterogeneous Basic heterogeneity: consumers (neoclassical) & producers (prospective yields and expectations)	“ Human actors in general” (entrepreneurs, consumers, etc.) Heterogeneous Diversity of rules Entrepreneurship
	Consistency and compatibility of action plans Economic action as choice Objective knowledge Preferences/technologies well known Exogenous (endogenous?) change	Plans are not necessarily compatible a priori; however, all plans are compatible ex-post (rationed behavior) Subjective: expectations Objective: output, employment	Consumers' plans are always compatible, but producers' plans may contend incompatibilities or inconsistencies Subjective (tacit and private) knowledge Preferences and knowledge logic of discovery
	Olympic rationality	Animal spirits	Bounded rationality
Environment	(pseudo)markets (ideally defined); not exist true institutions There exists a general equivalent of value or money (for guaranteeing all the prices and costs relevant to the choice problems)	(pseudo)markets as neoclassic with a central authority (JMK GT pp. 164, 247), that is, the State There exists a general equivalent of value or money.	Markets and institutions as the result of evolving processes There exists a general equivalent of value, but not necessarily all means and ends may be expressed in terms of money
Rules	Optimization (maximizing behavior)	Maximization of utility and profits are given; rationing constraints	Agents select the best plans (no mathematical formalism)
Emergent Properties	Efficiency (tautological) The best (or second-best) options Pareto efficiency General equilibrium	Pseudo-efficiency of the outcome: it depends on the marginal efficiency of capital (unemployment) Discoordination processes Equilibrium and disequilibrium (rationings)	Pseudo-efficiency of the outcome: it depends on the operation of entrepreneurship Process of coordination via equilibrium of plans; but equilibrium is never completely attained

3. Applying the template to a selection of economic theories

In this section, we apply the template in Table 1 to various examples of economic theories. First, we refer to the schools of economic thought (section 3.1 and Table 2). For our exposition, schools of thought are made up of theories. According to Lakatos (1978), theories include concrete elements (or moments of each theory) that are collected, generally, in sets of hypothetical deductive systems. It is at the core of these theories that the basic and counter-distinct elements of the theory are not usually modified. The set of theories that coincide and share these basic nuclear elements can be considered to determine a “school” —or scientific research program in Lakatos’ terminology.¹⁴ The schools are characterized by the core and protective belt of auxiliary hypotheses that fix the matrix of generation of theories corresponding to each school. Thus, the specific economic theories —the theory of demand, the theory of business cycle, etc., — within different schools are “applications” or “adaptations” of these nuclear elements to explain economic phenomena that have called the attention of practitioners within each school.

In section 3.2, we apply the template to more recent theoretical developments (Table 3) that are not proper or not yet independent schools of thought. Recent developments such as game theory, evolutionary economics, computational economics, gender (feminist) economics, etc., refer to more specific modalities of allocative processes —due to the type of phenomenon studied or to the method or type of formal technique employed. Thus, Table 3 illustrates the specific contents of several allocative processes characterized by our template, which include mixed versions of the previous essential paradigms.

In any case, the application of the template should allow the comparison and eventual “measurement” of the different explanatory capacities of the theories, at the level of schools, new developments, or specific theories. Moreover, this analysis would permit us to propose a criterion for increasing the explanatory power of economic theories as a consequence of the generation, addition, or adaptation of specific characteristics relating to theoretical allocative processes.

3.1. Comparing main schools of economic thought

Table 2 classifies the basic elements of the Neoclassical, Keynesian, and Austrian schools of economic thought. Let us consider first Neoclassical economics. For most Neoclassical economists, an economy is mainly composed of consumers and producers (and perhaps a government), usually

homogeneous or representatives of their class (“representative agents”); both kinds of agents have complete knowledge and well-defined preferences and technologies. Consumers and producers interact in markets.¹⁵ The neoclassical consumer must choose within a set of scarce means —all determined and given and (usually) expressed in monetary terms. Consumers must choose the combinations or courses of action that verify the following properties: all objectives (or ends) have a monetary expression of their value, and all combinations of objectives (usually utility or profit) are fully realizable —that is, the sets of consumption and production plans are consistent. In the consumer’s case, the combinations of means-ends or actions-goals are choices because consumers cannot achieve more than one at a time —because they have budgetary and time constraints, for example.¹⁶ Under this specific characterization of the agent (level 1 of the template), consumers’ plans consist in allocating their means to achieve their most preferred combination of goods and services (those combinations that maximize their objectives in terms of utility), in the different markets —these being identifiable analytically as the operational *environment*, the theoretical *locus* for interactions and for making transactions. On the other side, producers¹⁷ are usually defined by a set of production possibilities that are determined primarily by the initial endowment of production factors and the state of technology. The neoclassical producers’ plans define how to achieve certain objectives by applying certain means, verifying the following properties: all means and objectives (or ends) of every production plan have a monetary expression (in terms of profits), and all production plans considered are (technically) feasible plans. So, the producer’s choice problem consists of carrying out the production plan that involves the operational rule for optimizing or maximizing behavior and renders the highest economic profit. Depending on the different characterization of the elements of the allocative process (included under level 1), and because of the selection rule based on the maximization of some indexes (such as utility and profit) under budgetary and technical constraints, the main deduced economic laws of the Neoclassical allocative process are the functions (correspondences) of supply and demand and the corresponding market equilibrium.¹⁸

A characteristic example of this is provided by Debreu’s (1959: 43) characterization of the producer’s courses of action: “[g]iven the price system p , the j th producer chooses his production in his production set to Y_j so as to maximize his profit. The resulting action is called an equilibrium production of the j th producer relative to p ” (italics in the

¹⁴ In this sense, it is more frequent to find the term school in the field of the history of economic thought, and paradigm (Kuhn) or research program (Lakatos, Blaug) in the context of economic methodology.

¹⁵ There are of course other forms of interaction; however, they are considered extra-market interactions such as government interventions and externalities.

¹⁶ For the Neoclassical models, the set of means, measured by their monetary value, are income or consumer income; the objectives are consumer goods, each combination of objectives is therefore a certain combination of consumer goods; the choice feature, or characteristic way the consumer prefers is the preference

structure, generally represented by the utility function. Under these conditions the principle of economic behavior is usually translated into an optimization (utility) problem subject to constraints (budget).

¹⁷ In Neoclassical economics, we cannot speak of a true entrepreneur; the Neoclassical agent is a kind of “manufacturer” determined by his or her set of a priori given possibilities of production —that are marked by the production function.

¹⁸ For most authors, these laws are based on a decentralized and free market economy; however, it is also possible to deduce them for a command economy (see, for example, Oskar Lange’s economics).

original). In this particular theory, the producer problem may be characterized as follows:

$$\max_{y_j \in Y_j} p y_j$$

where $y_j^* \in \{p y_j^* \geq p y_j, \forall y_j \in Y_j\}$ is the best action plan (of production) for the j th agent in that economy.¹⁹

Applying of the template to the Neoclassical case, it is possible to identify the emergent properties —such as Pareto efficiency and General (Walrasian) Equilibrium— of the Neoclassical allocative process. These theoretical emergent properties are examples of how and why given the proper deductive techniques and the specific content and characterization of the economic allocative processes determine the differences between economic theories.²⁰

Consider now the Keynesian allocative processes, that inherit important Neoclassical elements. It is interesting to observe its peculiar synthesis of agents' capabilities for projecting expectations about future events and the mechanical reaction to economic circumstances,²¹ both present in the consumers' and/or the entrepreneurs' behavior.²² Moreover, contrary to the General Equilibrium theory, Keynesian allocative processes consider the possibility of the incompatibility of plans and the rationing of action (consumption/production plans) as well as the subsequent emergent properties such as involuntary unemployment.²³ In addition to consumers and entrepreneurs, and regarding economic policy, a peculiar agent that Keynes calls the *state* or *central authority* is introduced (Keynes 1936, chap. 18). For the sake of comparison with the previous example, let's consider the Keynesian entrepreneur. For Keynes, the entrepreneur is not essentially a chooser, and his/her plans do not necessarily refer to means and objectives of action all with a monetary value, nor is the entrepreneur supposed to be installed in a time horizon that allows rational calculation. The Keynesian entrepreneur is a rather unique agent, imperfect, but an agent beyond the mere optant of Neoclassical economics: the entrepreneur builds subjective expectations about future economic events.²⁴ The way that Keynes characterizes this economic agent distinguishes his doctrine from the Neoclassicals.

Finally, Austrian economists propose a more complex allocative process that incorporates (to some extent) the

explanation of the formation, adoption, and deployment of plans by some types of agents —mainly entrepreneurs— that in the absence of intervention of a central authority, generates a dynamic tendency towards an ever-evolving economic equilibrium.²⁵ Thus, the Austrian allocative process is based on a different characterization of the agent and the economy. Although Austrian economics is, since its foundation by Menger (1871), different from Neoclassical economics, it shares with the latter enough elements to identify both as special types of a more general theory: modern economic theory. From the point of view of the characterization of the agents and the way they interact, the main difference is the Austrian special emphasis on the projective nature of the processes of accommodation of means that fall, according to Austrian economists, under the field of the economy (whether it is about the satisfaction of needs —Menger— or about movements in the markets —Mises and Hayek), hence the emphasis on learning, agents' expectations, disequilibrium, and coordination (Lachmann, 1977; Rizzo, 1990). Another important topics include the dynamic-changing nature of the whole economic process —including the process of creation, transformation, and disappearance of habits and preferences, techniques, markets, and even institutions—; the non-autonomous nature of the economic sphere of ethics, the conceptions which agents have of the world, cultural dynamics and the cognitive processes of agents.

Table 2 above summarizes the comparisons between these three schools of thought after applying the Table 1 template.²⁶

3.2. Comparing some recent developments in Economics

It seems interesting to extend the previous analysis to more recent economic theories that partially share characteristics of the previous three types of allocative processes discussed in section 3.1. Table 3 summarizes the results of applying the template to Game Theory, Evolutionary Economics, Computational Economics, and Feminist Economics.²⁷

¹⁹ As a theoretical result, from paragraph 3.5 it is deduced the mechanism of price variations (Debreu, 1959: 47).

²⁰ The mathematization of the theoretical economic models affect the way that statements are made about how the agents are, etc., inferential techniques used to obtain economic laws and how those laws are formulated. See Weintraub (2002), Mirowski (1989, 2002), and Hodgson (1993).

²¹ See in his *General Theory* the different treatment of consumption and investment.

²² Keynes's characterization of the entrepreneur is completely different from the producer's characterization in the Neoclassical doctrine. For Keynes, entrepreneurs are more than mere producers (see especially Keynes, 1936, chap. XII).

²³ Keynes (1936). See also Clower (1965), Leijonhufvud (1998), and Benassy (1986).

²⁴ "The considerations upon which expectations of prospective yields are based are partly existing facts which we can assume to be known more or less for certain, and partly future events which

can only be forecasted with more or less confidence." (Keynes, 1936, chap. XII, p.147)

²⁵ Austrian economists are more interested in the process of coordination of plans than in the equilibrium itself. See Hayek (1945, 1988) and Kirzner (1997).

²⁶ The main characteristics of the Keynesian and Austrian allocative processes have been compiled in Table 2 after the detailed exercise of analyzing the Neoclassical school. This is one of the main uses of Neoclassical economics for the economic theorist: that of serving as a reference or canon for the establishment of the elements and assumptions present in the allocative process's characteristic of other schools.

²⁷ As previously said, both the theoretical outcome of the application of the template and the identification of the characteristics of allocative processes are better done and much more clearly exposed in dialogue (analytical comparison) with the characteristics of allocative processes of Neoclassical economics.

Table 3: Using the template for comparing: Game Theory, Evolutionary, Computational, and Feminist Economics.

	Game Theory	Evolutionary Economics
Agents	“ Players” (consumers, firms, governments, etc.) with sets of strategic behavior. Heterogeneous in the sense of different strategies. They have <i>asymmetric/evolving information</i> (i.e., Dynamic Games, Evol. Games) or not (Static Games). Strategies (plans) are usually consistent and compatible a priori, but action may also be rationed. Objective knowledge (it refers to the set of actions and the structure of the game). Knowledge may be private. Olympian or bounded rationality	Agents (consumers, firms, etc.) with routines of behavior Routines (/rules) may incorporate expectations. Heterogeneous: they have different routines of behavior routines as such (capabilities and the resulting rules). Routines may incorporate expectations. Plans are not necessarily compatible a priori. Rationings. Knowledge: private and tacit. Subjective knowledge: preferences and technologies; Objective knowledge: output, prices, and other outcomes. Bounded rationality.
Environment	Games (games may include “ institutions” as rules of the games or structures of payments). There exists a general equivalent of value or money necessary to establish the matrix of payoffs, although these payoffs may be expressed in other terms than money.	“ Markets”, industrial sectors, institutions, routines, capabilities, rules (and new rules as an outcome of previous ones), etc.²⁸ (usually without “ central authority”). There exists a general equivalent of value or money, usually in terms of units of output. Not necessarily all means and ends may be expressed in terms of money.
Rules	Strategic behavior: maximizing payoffs.	Economic principle together with adaptive/selection mechanisms. Different mathematical formalisms (ex. Replicator); but also appreciative theorizing.
Emergent properties*	Selection of the best actions given the nature (structure) of the game. Not games themselves. Nash equilibria, etc. Not necessarily Pareto efficiency.	Adaptation to changing circumstances. Disequilibrium dynamics: evolutionary processes and increasing complexity. Processes of generation of variety, dissemination (discoordination), adaptation and retention (re-coordination); emergent orders.

²⁸ According to Nelson (2022), rather than to start from market organization as the base for organizing economic activity it is better to consider the circumstances that imply to consider other more complex modes of economic organization.

Computational Economics		Feminist Economics	
Agents	Artificial agents (all of them). Heterogeneous: they have (different) rules of behavior. Rules may incorporate expectations. Plans are not necessarily compatible a priori. Rationed behavior. Knowledge is privative for each agent. Bounded rationality.	Consumers, firms, governments, etc., (different gender) with sets of strategic behavior. Heterogeneous: Depends on gender. Men and women tend to differ in their approach to economics because they live different lives (1). Different patterns of agents' expectations depend on gender. Plans are not necessarily compatible a priori. Rationings. Different genders' responses to uncertainty. Subjective knowledge (preferences and technologies) and objective knowledge (output and other outcomes). "Imaginative rationality" is eventually linked to the feminine perspective (2) (based on one fundamental issue: gender is endogenous to the economic processes (3)).	
Environment	Artificial societies: networks, markets, etc. There exists a general equivalent of value or money, but not all means and outcomes need to be expressed in monetary terms.²⁹	Markets and institutions are shaped because of gender. There exists a general equivalent of value (money).	
Rules	Economic principle: satisfying behavior (coping with thresholds, etc.).	Strategic behavior, "imaginative rationality" and maximizing payoffs.	
Emergent properties	Agents adapt their behavior depending on the feedback between their rules and the outcomes of the interaction they observe. Complex (and evolutionary) dynamics. Complexity and emergent orders.	Selection of the best actions according to the optimum in the context of strategic behavior. Interconnection of aggregate supply and demand in the household through the multiple roles that households' members play: consumer, paid worker, unpaid worker, entrepreneur, saver, investor, taxpayer, and receiver of public services. Fluctuations in the female labor force participation. Large female-intensive unpaid economy.	

(1) McCloskey (in Ferber and Nelson, 1993). (2) Nelson (1993). (3) Stareven (2011). Feminist economics: limitation of economics because of the virtual exclusion of the feminine perspective.

²⁹ For example, in Schelling's (1969: 488) segregation model agents wellbeing depends on the proportion of agents of a different characteristic (sex, age, income, language, color, etc.), surrounding them.

Because Neoclassical economics provides a reduced version, relative to the very basic aspects of choice present in the allocative process, it has the value of showing what we might call the “complementary set,” that is, those other elements that could be added to the characterization of the levels that we have contemplated in our template for the analysis and comparison of the theories. Starting with Game Theory, if we look at the first row of Table 3, heterogeneous agents (consumers, companies, and governments) are now considered “players” endowed with sets of strategies (“plans”). Players play different strategies based on asymmetric and/or evolutionary information (if they play dynamic or evolutionary games) or simply incomplete information games when faced with non-evolutionary information (if games are static). In the case of Evolutionary economics, agents are substantially different from Neoclassical ones because they are now consumers, companies, etc., with dynamic capabilities, behavioral routines, behavioral rules, etc., that can incorporate expectations. These qualities make them truly heterogeneous. At level 1 of the Agents-Based Models (ABM), we find agents that are all artificial, in the sense that these models and their constituencies are built analytically for the study through simulations of agents’ behaviors. ABM agents are heterogeneous, with different behavior rules (thresholds, parameters...), and also capable of accommodating expectations. Finally, in Feminist economics, a differentiation between rationality and embodiment is introduced –or between man and nature that would reflect a certain separate and masculine vision of the world that is explained by standard theories. In Feminist economics, agents –including consumers, companies, governments, etc.,– have different genders, and are able to deploy purposive activity and carry out strategic behaviors according to their gender or the context. The emphasis on heterogeneity in this context is identified with different capacities and modes of response that different genders will deploy in the face of uncertainty.

There are other special research areas in economics, such as Econometrics and Economic History, but insofar as they do not necessarily rely on economic theory foundations, they do not fit the theoretical framework developed in this paper. A more complicated case is Macroeconomics: if it is understood as an investigation consistent in finding statistical relationships between aggregate indicators, then the same comment as Econometrics applies. But if it is about finding the micro foundation of macroeconomic relationships (Barro, 1993; Weintraub, 1977), then it should be adapted to the theoretical framework proposed here.

Finally, the influence of certain areas of extra-economic theory praxis, such as the use of scientific model concepts, techniques, and methods of Physics (Mirowsky, 1989), Mathematics (Weintraub, 2002), Biology (Boulding, 1981), Cybernetics (Mirowsky, 2002), etc., are not relevant to the effects of the structure of the proposed analytical template. As shown in the previous analysis, it is in the non-axiomatic elements of the models where the fundamental

part of the agents, plans, environment, areas and modes of interaction, etc., reside.

4. On the minimum conditions for a criterion of scientific progress in economic theory

The analysis in the previous sections results, on the one hand, in a taxonomy of the basic elements present in each of the (theoretical) allocative processes specified, and on the other hand, it shows explicitly the key issues for establishing the comparison between theories.

Additionally, our analysis also opens the question of the possibility of theoretical progress in economics. This idea of theoretical progress is connected to the following research strategy: the proposal of successive reformulations of the characterization of the basic elements of the theoretical allocative processes that underlie economic theories intending to produce more realistic emergent properties – that include *economic laws*. This strategy would consist of providing the basic elements of the allocative process with greater empirical content (a *surplus* of reality)³⁰ related to new phenomena or characterizing new theoretical allocative processes – “different” from the previous ones.³¹

As Popper (1972) pointed out, science is not a closed system, but a succession of explanatory phases or proposals of provisional theories as an answer to the system of questions that arise; these theories are partially or totally substitutable, in the sense of being improvable in terms of their greater explanatory capacity of the phenomena under scientific study (Loasby, 1984; Ziman, 2000). It is then reasonable to admit that the object of study in economics is provisionally and partially described by theories or schools of thought with the aforementioned characteristics.

The template proposed in this article reveals the common elements contained in the allocative processes present in the different economic theories. But it also provides a solid foundation that allows the comparison and “measurement” of the explanatory capacity of those theories. For example, it is easy to understand that in the Neoclassical allocative process, the optant agent there characterized is analytically less able to accommodate certain behaviors of real agents, beyond the mere choice between given alternatives. It is in this sense that the use of the template would also allow *the commensurability* of the theories or what is the same, the measure of the greater or lesser analytical capacity to explain actual allocative processes carried out both by agents and organizations.

The template also allows revisiting our research agenda because it opens the question of which of the explanations is analytically “superior” –and in which sense– in order to improve the explanatory capacity of the theory. (This clue is central in the search for a potential criterion of theoretical higher explanation capacity). Thus, we can address questions such as what would lead economists to opt a priori for a theory or a school of economic thought (and discard others). Since no particular theory can cover all reality and among the existing ones some have clear advantages

³⁰ See Lawson (1997).

³¹ This surplus could come from fruitful combinations of economics with new developments in psychology, neuroscience, computational sciences, etc.

(and disadvantages) over others, should it be enough with the one that best suits a particular object of study, or it would better try to broaden the explanation scope of the theory towards more general economic phenomena?³²

Any criterion of theoretical progress in explanation to evaluate existing theories and establish strategies of progress toward “better” theories should consider and balance, among other factors, more realism and increasing empirical content—that is, a *surplus* of reality³³ and enough diversity of reality included in the models and theories.³⁴ Other aspects that may be taken into consideration, are the sophistication of research methods (not a value in itself); and a certain degree of pluralism. Both aspects might open fruitfully potential venues (Harvey, 2020).

Consider for example the treatment of knowledge—an agent’s trait—both in Tables 2 and 3. According to Neo-classical economics, agents have access to a type of knowledge that is objective, allows preferences, and incorporates technologies that are complete and well-known, for which the causes of change are both exogenous and endogenous.³⁵ In the Keynesian allocative process, knowledge is subjective, based on agents’ expectations; however, variables such as output and employment are objective. Regarding the Austrians, knowledge is considered subjective (tacit and privative) and therefore both preferences and knowledge are possible because of discovery processes. In the case of Game Theory, objective knowledge refers to the set of actions, and the structure of the game is coherent with privative knowledge. In Evolutionary Economics two types of knowledge are clearly identified: subjective for preferences, and objective concerning output, prices, technologies, and other outcomes. In Computational Economics the type of knowledge is privative (but not necessarily subjective). And, finally, in Feminist Economics a type of subjective knowledge exists (specifically on preferences) whilst objective knowledge is present (for the action outcomes); the particularity of this paradigm is that the different types of knowledge must be coherent with the different genders’ responses to uncertainty.

An example of incorporating more realistic elements is Koppl (2006). Koppl identifies five leading characteristics of the emerging new orthodoxy that would result from the combination between Austrian Economics and Complexity Economics: “bounded rationality, rule-following, institutions, cognition, and evolution”. The same can be found in many ABM models, for which it is a question of incorporating specific (and “realistic”) traits of the agents and studying the analytical consequences of these additions in terms of emergent properties that can then be compared with real phenomena—as, for example, in Shelling (1977). Other examples are the attempt to integrate recent developments in neuroscience (2007), and the study of the mind (Markey-Towler, 2016) in the characterization of

economic agents and social interaction in complex environments (Miller, 2022).

5. Conclusions

This article provides a template that opens the possibility both of analyzing and comparing different economic theories. For establishing any terms of comparison among theories, we have first addressed the question of establishing an analytical structure common to all economic theories that would make them commensurable. Thus, we departed from the claim of the existence of an *empirical basis* that serves as a means for any theoretical investigation. This empirical basis is provided by the identification by economists of a common characteristic process at work for any economic phenomenon: the allocative process of scarce resources to alternative goals or ends.

The common analytical structure has been depicted in Figure 1. Analytical allocative processes are characterized by (1) the economic actors/agents (who and how are they); (2) the sets of (expected) scarce resources and actions; (3) the sets of (hierarchically ordered) alternative goals/ends or uses; and (4) the specific environment for interaction. These elements allowed us to elaborate on a template (Table 1) as an extended version of the synthetic representation of any allocative process. This template also permits the elaboration of a characterization of the taxonomy of agents, environment, and rules and, later, identifies emergent properties that coevolve with economic processes (tables 2 and 3).

The analysis has provided some building blocks as a basis with which to discuss a criterion for the progress of research in economic theory. Employing the proposed template for the analysis of the different economic theories it is shown the basic elements contained in allocative processes present in the different theories and how this allows the comparison and commensurability of the explanatory capacity of the different theories. Considering this ‘commensurability of the theories’ it is possible to improve the identification, understanding and capacities of the theories for the study of economic phenomena of higher order of complexity (or not).

³² For example, according to Lucas (1981: 224) “in cases of uncertainty, economic reasoning [and here he refers to mainstream economics] will be of no value”. However, as far as uncertainty is a pervasive feature of socio-economic systems, why shouldn’t, we therefore explore other theoretical alternatives?.

³³ Lawson (1997).

³⁴ For example, does the theory deal properly with radical uncertainty and novelties? Does it consider channels of interaction other than markets? And so on.

³⁵ However, it is not possible to consider within that theory the growth of knowledge, a prominent and pervasive phenomenon in modern economies (see Metcalfe, 2002).

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