



Modelling and complexity in social sciences: what impact on decision-making?

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النمذجة والتعقيد في العلوم الاجتماعية: ما هو تأثيرهما على صنع القرار؟

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Received: August 12, 2025

Accepted: October 14, 2025

Published: October 21, 2025

Abstract:

The issues raised by modelling (in social sciences) are by definition repetitive, and this characteristic reinforces their seriousness/interest for researchers. A model will be all the more accurate and theoretically useful if it allows us to make predictions that can be observed to see if they actually come true in practice. However, economic reality is extremely diverse and complex. In addition to theoretical and practical questions, there are also more political and ethical questions. The economy is rarely repetitive. Time disrupts the economy and hinders its tendency to reconcile "economic efficiency" and scientific rigour. Furthermore, economic logic is that of an uncertain universe, characterised by economic instability, insecurity and precariousness. In such a universe, agents favour the short term... Creativity, emotion, behaviour and subjectivity play a fundamental role. Under these conditions, could modelling be a tool for forecasting and optimisation? Economic theories are only approximate, and models cannot be confused with reality. How, then, should we position ourselves – scientifically and philosophically speaking – in relation to historical experience and experience in terms of modelling? A review of theoretical analyses/modelling is needed. We therefore propose a review of the literature (epistemological, etc.) on modelling.

The key question for us then becomes: how can we determine the relevant approach to economic policy-making from history and modelling?

Keywords: Modelling, Complexity, Social sciences, Economics sciences.

الملخص

إن المشكلة التي يطرحها النمذجة (في العلوم الاجتماعية) هي بطبيعتها متكررة، وهذه الخاصية تعزز أهميتها/أهميتها بالنسبة للباحثين. كلما كان النموذج دقيقاً ومفيداً من الناحية النظرية، كلما كان من الممكن استنتاج تنبؤات يمكن ملاحظة ما إذا كانت قد تحققت بالفعل على أرض الواقع. لكن الواقع الاقتصادي متنوع للغاية ومعقد. إلى الأسئلة النظرية والعملية تضاف أسئلة أكثر سياسية أو أخلاقية. نادراً ما تكون الاقتصاد متكررة. الوقت يزعزع الاقتصاد ويعيق ميله إلى التوفيق بين "الاقتصادية" والعلمية. علاوة على ذلك، فإن المنطق الاقتصادي هو منطق عالم غير مؤكد، يتميز بعدم الاستقرار الاقتصادي وانعدام الأمن والهشاشة. في مثل هذا العالم، يفضل الفاعلون النظرة قصيرة المدى... حيث يلعب الإبداع والعاطفة والسلوك والذاتية دوراً أساسياً. في ظل هذه الظروف، هل يمكن أن تكون النمذجة أداة للتنبؤ والتحسين؟

قد تكون النظريات الاقتصادية تقريبية فقط، ولا يمكن الخلط بين النموذج والواقع. كيف يمكننا إذن أن نحدد موقفنا - من الناحية العلمية والفلسفية - فيما يتعلق بالتجربة التاريخية والتجربة من حيث النمذجة. من الضروري إجراء مسح للتحليلات النظرية/النمذجة. لذلك نقترح مراجعة الأدبيات (الأبستمولوجيا، ...) حول النمذجة.

السؤال الأساسي بالنسبة لنا هو: من التاريخ والنمذجة، كيف يمكن تحديد النهج المناسب لاتخاذ القرارات الاقتصادية؟

الكلمات المفتاحية: النمذجة، التعقيد، العلوم الاجتماعية، العلوم الاقتصادية.

Introduction

Modelling: a universal language for the social sciences? What determines the scientific value of a model? This question has always challenged us and continues to do so. This proves that it is a difficulty that has not yet been fundamentally overcome. The question has always been: What is the legitimacy of a "speculative approach" that frees itself from the constraints of methodology (in the humanities) in terms of theoretical foundation and philosophical underpinnings? Can the model then be a means of aiding decision-making?

Many economists, considering the increasing mathematisation of their discipline, present it as a science, on a par with physics, chemistry and biology. However, learning about the natural sciences does not require studying their history. A physics student probably does not need to immerse themselves in Aristotle's writings to prepare for their exams, and it matters little to them how this author represented the mechanics of celestial bodies; Copernicus, Kepler and Galileo put an end to this conception of the universe once and for all. The history of science becomes a museum of outdated theories. Such an approach leads us to view history, philosophy, ethics, morality, etc. as a "cultural" complement that does not interfere with the learning of current knowledge. Contrary to this thesis, it seems to us that the history of economic ideas is much more than a visit to a museum. In addition to this epistemological difficulty, there are certain specific constraints. First of all, economic theories frequently contain propositions that are by their very nature untestable: descriptions of a world that is not that of experience (general equilibrium of pure and perfect competition, for example), more or less concealed tautologies (such as "trend laws" stating, for example, that the rate of profit tends to fall (except when certain factors prevent it from falling)), and normative statements often mixed with positive statements (a phenomenon that is particularly common in the field of income distribution analysis).

Even if such propositions could be eliminated from the field of economic analysis, there would still be a considerable obstacle to the implementation of the (Popperian) demarcation criterion, which relates to the practical conditions of modelling as a scientific experiment in this discipline (the experiment to which Popper refers is, of course, a scientific experiment). However, economists do not usually have laboratories in which to test their analyses; it is difficult to imagine an experiment consisting of provoking an economic crisis under precisely defined conditions for the sole purpose of testing the validity of a crisis theory. We therefore resort to another type of experiment, namely historical experience, which is necessarily less conclusive, as history never repeats itself in exactly the same way.

This contribution is an attempt to take a position on "scientific experimentation" (in this case, modelling) and historical experimentation. The environment is a complex system that evolves with its organisation and disorganisation, consisting of order and disorder. Complexity is an order whose codes we do not know. This fragility helps to explain the difficulties we encounter when it comes to deciding between contradictory analyses/approaches.

1. From scientific experience to historical experience: from legitimacy to limitations

When we formulate a general theory in our sciences, the only thing we can be certain of is that all these theories are false in absolute terms. They are only partial and provisional truths that are necessary to us. Like steps on which we rely to advance in our investigation, they represent only the current state of our knowledge and, consequently, they will have to change as science progresses, and all the more often the less advanced the sciences are in their evolution" (Bernard, 1865, P41).

Economic theories are only approximate; the model, because it simplifies, allows for a more precise understanding. However, insofar as it leaves aside the specific qualities of the elements that make up the whole to which it corresponds, it cannot be confused with reality. Based on this observation, our thinking is drawn between two paths: (1) the construction of a model between complexity and simplification; realistic but complex or simple but unrealistic.

(2) an economic apriorism which states that economic theories are based on axioms that are accepted as self-evident. Some may still argue that in the wake of complexity (a term derived from the Latin *complectere*, 'to weave together'), we can weave together disciplinary fields to form a united rope around knowledge.

The model covers different realities and uses depending on the disciplines in which it is used. In the common sense, it is what we imitate (behavioural model, etc.); in the scientific sense, it is rather what imitates or evokes. For Latouche (1978), only mathematics (modelling) can provide certainties because they are deduced from abstract axioms. For logicians (such as Popper), it is complex, if not impossible, to consider econometric models as tools of economic truth. The debate is already underway.

Economic models can only be explanatory and predictive. They can only be normative in the very limited case of highlighting Pareto-efficient actions. Economists, on the other hand, can unquestionably be normative in the instrumental sense of the term. However, this normativity results entirely from the predictive nature of their models. When economists claim to be normative, it is in the name of political criteria (majority rules) or ethical criteria (such as Rawls' criterion), which are always debatable and, in any case, not economic. We can only do economics, i.e. construct models that formalise the interaction of the behaviour of individuals or groups of individuals pursuing different objectives (wealth, etc.) if these behaviours are stable over time. If they varied constantly, nothing general could be said about the results of their interaction. Strictly speaking, it is possible to imagine stable objectives and variable behaviours. The pursuit of an objective consists, in fact, of a process of trial and error that may involve variability in behaviour. Stability of objectives and stability of economic behaviour can therefore be considered logically equivalent. As for the conditions for this stability, and therefore for the existence of an economic logic among individuals, there are two possible attitudes:

*The first, defended by Hayek, is to derive it from human nature and to posit that, because they are human beings, regardless of their human conditions in time and space, people will behave in exactly the same way with regard to material wealth (which consists of considering the principle of non-saturation and that they have an optimising rationality in the service of selfishness and hedonism. In fact, behind the multiplicity of passions that underlie the motives for individual behaviour lies an optimising rationality, serving selfishness and hedonism, which homogenises time and space (Hume, 1739-1740).

*The other attitude considers that we can only hypothesise the existence of an economic logic among individuals in societies where behaviour towards material wealth can be considered independent of other aspects of individuals' social lives. If they were not, they would have to be analysed in relation to these other aspects (political, cultural, religious, etc.), which would lead us down the path of an impossible general theory of social life.

However, the more we believe we are becoming financially efficient (and not economically efficient, since it is a question of multiplying money), the more we lose meaning. Does it make sense to be efficient in financial terms when Morocco's problem is one of poverty, precariousness and social exclusion? The vulnerability rate reached 12.9% in 2022 according to HCP data. There is a breakdown of meaning, humanly, socially and ecologically speaking. If we want to understand – we must reconcile ourselves with – the question of meaning, we must move away from financial discourse. We need to reframe the problem. To do so, we must start with Aristotle, who did not confuse economics (in the sense of *oecos nomos*) with *chrematistics* (*crema atos*: the accumulation of money).

All the classics of economic thought (Smith, Ricardo, Marx, Mill, Malthus) incorporated social thinking. They were more social philosophers than 'pure economists'. It was not until the 19th century that the neoclassicals, starting with Walras father and son, inaugurated a school of economic thought that called itself 'scientific'. By calling itself 'scientific', it dispensed with all moral and philosophical thought. It thus emptied itself of all the concerns that the classical economists up to Marx had had, which dealt with the question of justice/injustice in the distribution of wealth (money problems) and therefore with the ethical dimension of economic thought. This dimension was eliminated with neoliberal thinking. In addition to this scientific decree: "We are a science, we do as the physical sciences do, we observe that money goes from one place to another, we observe, we count, we classify, we must – for this school of thought – refrain from making judgements because the science of sciences (physics) does not make judgements.

While neoclassical economists describe the economic man hypothesis as an a priori indisputable truth, a heuristic construct, we know that the postulate of rationality refers to a principle accepted by convention without concern for conformity with reality in order to establish a demonstration. However, an explanation based on a false hypothesis would in turn be false. To get around this 'problem', they resort to the quantifier 'as if', which corresponds to the idea that the initial propositions are not really posed as true hypotheses. The only true hypothesis is that some economic facts (which are observable) can be explained as if these propositions (hypotheses) were true. This type of reasoning can be seen as economic apriorism, which states that economic theories are based on axioms that are accepted as self-evident. This apriorism and these postulates are strongly criticised by the economist Hutchison. Any theory that is not a replica of reality (1) idealises the behaviour of economic agents and (2) oversimplifies the initial conditions postulated. It would therefore be inaccurate from a descriptive point of view. It should be remembered that for Friedman, "Realistic postulates are accurate from a descriptive point of view in the sense that they take into account all the variables of the context".

Can information from the past be used to predict an uncertain future? Can the market have a memory that remembers past events? Wouldn't the market's memory be, by definition, misleading? Keynes reduces economics to a moral science in which intuition and ethics; introspection and values play as important a role as so-called scientific methodology. In an uncertain world characterised by economic instability, insecurity and precariousness, agents favour the short term of the market, community solidarity and intergenerational investments. Prioritising the immediate over the long term involves, among other things, making choices that leave as many future options open as possible, which explains the preference for real estate assets over physical investments that are less easily reversible, hence the high interest rates. Economic behaviour may reveal differences in context and rationalisation procedures rather than economic logic (Hirshman). Understanding and dispelling ambiguities in economics requires integrating concepts (for the sake of conceptualisation) into a multidisciplinary approach. Economic elements derive their complexity from their nature, their identification, their determination and the social representations on which they are based. Even individual representations differ from one situation to another and from one period to another.

Furthermore, economics is rarely repetitive. Time disrupts economics and hinders its tendency to reconcile economic efficiency and scientific rigour (Popper). The history of economic growth theories shows the contingent nature of these theories: exogenous growth models flourished in the 1950s and 1960s (at a time when the aim was to stabilise the growth that had returned after the Second World War). Then, the crisis of the 1970s and 1980s turned economists away from growth theories. These became a subject of modelling again in the late 1980s with endogenous growth models, which sharply raise the question of the role of the state in economic growth.

It is strange that wages, prices, profits, taxes and social security contributions are perceived as economic variables disconnected from their social underpinnings. Economists have always ignored the question of distribution. They have also ignored the question of power. They talk about contracts when they refer to the market, and contracts imply reciprocity.

2. Or how to bring extra-economic data into the fields of a market economy

"Science itself is far from being entirely scientific, in the sense that this word qualifies perfectly objective knowledge, leaving no room for dispute... By the very way in which the scientist poses and deals with certain problems, he often finds himself involved, albeit reluctantly or even unknowingly, in questions whose philosophical nature is obvious. There is no such thing as an entirely 'positive' science from which all philosophical controversy is absolutely and definitively excluded" (Blanché, 1972, P123).

As Hull's studies reveal, history is both more complicated and more irritating than is generally admitted by those who are limited by a single disciplinary perspective. In itself, history is quite interesting and philosophy quite valuable. But taken together, they do a lot to tell us about science and put an end to the comfortable popular illusion about how science works.

However, the model, as defined by Thiétart, is "a simplified representation of a process or system intended to explain and/or simulate the real situation under study. This truncated view is reductive, to say the least. In addition to theoretical and practical questions, there are also more political and ethical questions. We cannot proceed by extrapolation from considerations of a 'simple or simplified' situation without seeing that the assumptions he introduces for the purposes of reasoning precisely limit its scope. Human beings are not goods, things that can be appropriated; they are subjects of law. Human beings are not capital; they have capital. This classification, in economics as in management, as a "human resource" or "asset" is inappropriate because human beings are not commodities that can be accounted for in stock. Human beings do not have a value. This scattered knowledge about human beings must be brought together. The lost paradigm of diversity/complexity must be revisited.

It should be noted that it is illusory to claim to define with absolute precision the value of a company, the wealth of a country, and even less so to mathematise man and nature; due to their multidimensional nature, it is difficult, if not impossible, to apply general guidelines.

Even if, intuitively, we imagine that value (a country's wealth) depends on economic and financial activity and performance, we can see that two countries with the same activity and roughly the same performance do not have the same value. Before rushing headlong into indices and figures, it is necessary to establish a diagnosis, understand their characteristics, assess their performance in a broad sense, understand their true added value,

situate them in their environments, and understand what makes them unique and specific. This is a prerequisite for any analysis in order to maintain a "certain objectivity" in understanding their positioning and identifying the main drivers of performance.

The economic reality is extremely diverse and complex. If we want to study a phenomenon, we must identify what seems significant about it and find the explanatory variables and how they work. A priori, we know that a whole series of factors will not affect prices. On the other hand, we will need to find a measure of price increases and identify certain explanatory factors that may vary according to economic theory. Thus, we can study the influence of production costs, profits, supply and demand, currency, income inequality, social consensus, the existence of "pure or imperfect" competition, etc. Different models will not retain the same explanatory variables. Once these variables have been chosen, we must define the relationships between them and the phenomenon to be explained. For example, we can consider that an increase in supply in the face of unchanged demand will cause prices to rise, or that income inequality will lead to social unrest aimed at increasing incomes and will cause prices to rise in order to maintain a significant profit margin. We must then observe whether mechanisms similar to those in the model actually occur in reality. There are many other examples we could give.

Conclusion

A complete overhaul of the way we conceive of society, of human beings, and of economics is necessary if we want to find a form of harmony and balance. Must we reverse a certain number of sequential series? The human body is the substratum of individuals: its character is therefore sacred; which results in its inviolability: the human body is outside commercial or financial transactions. As human beings are neither goods nor things, neither the state nor companies, and even less so the financial market, can claim ownership of them. Human beings must not be classified as a resource or an "asset". We cannot therefore mathematise/model human beings and nature.

The history and philosophy of science can improve economic science. It becomes difficult to make sense of things if knowledge cannot be placed within a philosophical, economic, legal or sociological framework. We are in the humanities, and human beings are multifaceted and plural. Intellectual construction is impoverished if it is not conceptualised through a multidisciplinary approach. A whole range of literature will be ignored... epistemicide will produce KAKISTOCRACY, and this is another, even more complex debate.

References

- [1] Bernard, C. 1865. Introduction à l'étude de la médecine expérimentale. Paris : Éditions Garnier-Flammarion, 1966.
- [2] Blanché, R. 1972. L'épistémologie. PUF.
- [3] Hume, D. 1739-1740. Traité de la nature humaine : Essai pour introduire la méthode expérimentale de raisonnement dans les sujets moraux. (Traduction française par André Leroy, Aubier-Montaigne, 1946-1947. Édition GF Flammarion, 1971.
- [4] Hayek, F. Von. 1986. "Scientism et Sciences Sociales". Traduction française par Raymond Barre de "Scientism and the study of Social Sciences", Glenco, Illinois, The Free Press, 1952 Plon, 44-47.
- [5] Latouche, S. 2022. La Décroissance. PUF.
- [6] Morin, E. 2025. Y a-t-il des leçons de l'histoire ?. Denoël.
- [7] Thiéart, R-A. 2003. Méthodes de recherche en management. 2ème édition.

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