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Putting Clio Back in Cliometrics

Laurent Gauthier[1]

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This paper makes the argument for renewed cliometrics that could serve history. History and economics have grown relying on each other over the past century, but a disconnect has appeared, whereby the range between history and economics has been occupied by the latter. As a consequence, historians have tended to shun these fields of inquiry. We begin our analysis with a discussion of the complex set of separate domains that lie between history and economics, and determine certain salient features that define them, in particular the search for nomothetic explanations. We examine the reception of economic method by historians and point out that it has suffered both from this nomothetic angle and from the implicit presumption that economics are only applicable to the economy. Stressing the distinction between understanding and explaining in the philosophy of history, we show that, for historians, explaining should remain in the realm of history. We then propose that economics be considered a methodological auxiliary for understanding, as new cliometrics, not attempting to offer explanations. We discuss some examples of using microeconomics as a critical methodology in the study of ancient Greece.

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It is easy to say that historians do not understand economics. The overwhelming use of advanced mathematics in all modern economic theory prevents historians, who typically do not have a good command of formal methods, from accessing this essential part of economic knowledge. About the definition of a formally simple game describing a military conflict, an historian wrote[2]:

"The real issue with this 'statement' is not whether it is correct or not but truly the fact that it shows a choice of language that is incomprehensible for 99.99% of historians […]"

It is also easy to say that economists do no understand history. We may read in a popular economics book[3]:

"Once a manuscript is finished, it sits, dead in the water, for nearly a year until it is made ready by the publisher for its debut. This doesn't pose much of a problem if you have written, say, a history of the Third Punic War."

This statement implies that the writing of history would be entirely static, denying any reality to the historians' intense and ongoing research work. Economists do not typically have a good command of how history is produced. Nevertheless, there exists a space between economics and history, where much research has been produced, by economists, by historians, alone or together, by economic historians, and even by physicists, biologists, and mathematicians. Hence, it may appear as though the juncture between economics and history is porous enough that both fields benefit from each other.

In this paper, we will first argue that this whole space between economics and history could be termed clionomics, because it is essentially nomothetic. As such, it cannot be integrated by historical method, and remains separated from history. However, economics have much more to offer than an analysis of the economy. We show that microeconomics in particular can become a methodological auxiliary to history: the historian's territory can remain the same, only the tools change. Using microeconomics to further historical understanding constitutes a new form of

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[2] Christian Stein, "L'historien et ses modèles," *Nouvelles perspectives en sciences sociales* (2010), 5: 2, 227–279, p. 233: "Le vrai problème dans cette 'phrase' n'est pas le caractère juste ou non de la proposition, mais bien le fait qu'il y a ici le choix d'un langage qui est totalement incompréhensible pour 99,99% des historiens actuels […]".

[3] In Steven D. Levitt and Stephen J. Dubner, *Freakonomics* (New York: Harper Perennial, 2009), p. xi.

cliometrics, distinct from the existing clionomics, and would finally truly fulfill their etymologically prescribed role: helping in measuring history.

The discussion is articulated in three steps. In the first section, after carefully defining history and economics, we explore a taxonomy of the expanse between them. We then look into the reception of economic method by historians, where the economic method covers the multiple angles our taxonomy identified, under the umbrella of clionomics. Historians have often rejected these approaches, and we identify two core reasons: nomothetic explanations cannot be historical, and clionomics are mainly concerned with the economy. Then, we drill into the difference between explaining and understanding in the philosophy of history. We show that economics, and in particular microeconomics, can be seen as a methodology in understanding, without implications for explaining. In particular, we discuss an application of this new logic to ancient Greek history.

The Range Between Economics and History

What dwells in the continuum between history and economics? A naive answer to this question may be represented as shown in Figure 1. As we will see, this is not the appropriate perspective.

[FIGURE 1 ABOUT HERE]

We begin this section by carefully defining some of the terms we use. Equipped with these definitions, will then turn to surveying the terrain between economics and history. We first focus on the most obvious, historical economics, as well as its close parent cliometrics. Next we turn to the applications of the new institutional economics to history and to analytic narratives. Then we will discuss cliodynamics: although they do not emanate from economics, they are related to sociology and are applied to history. Finally, we will address quantitative history.

Before we delve into the grey area between the bounds of history and economics, it is useful to conjure up a working definition of these bounds. Beginning with history, we can inspire ourselves from the prolific French historiography. The positivists from the second half of the

nineteenth century, starting with Auguste Comte, believed that history should be grounded in the methods of the hard sciences. This way of contemplating history crystallized in the first historiography course, first taught in 1896 at the Sorbonne. The view of history by historians evolved significantly in the twentieth century, and converged towards a balanced perspective. We will follow Marrou, who in a concise and efficient fashion, proposed[4] that: "history is the knowledge of the human past." The notion of knowledge implies the construction of that knowledge from raw material, and in effect puts the human back into the science, distinguishing this definition of history from the earlier positivist approaches. According to Lucien Febvre's roughly contemporary definition of history, which is somewhat broader than Marrou's, it may be viewed not as a science, but as the scientifically elaborated narrative of the activities and creations of humankind[5]. Both definitions stress the scientific aspiration of history while at the same time effectively excluding history from the hard sciences. Raymond Aron's main work on the philosophy of history recoups with this perspective[6].

As we will discuss many aspects and sub fields of economics, it is also necessary to define them. In a somewhat restrictive manner, **economics** may be described as "the social science that studies the production, distribution, and consumption of goods and services", according to one of the best-known introduction manuals in the field[7]. Implicitly defining the **economy**, we could also state it as "the social science that studies the economy". This is the way in which most people intuitively understand the notion of economics. However, within economics also lie **microeconomics** and their derivatives, which are: "the study of how individuals make decisions and how these decisions interact[8]". Although the "micro" in microeconomics makes them appear as a narrow focus on each individual, the analyzes they afford are often scaled up, and the

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[4] Henri-Irénée Marrou, *De la connaissance historique* (Paris: Points, 2016), p. 24.

[5] See Lucien Febvre, *Combats pour l'histoire* (Paris: Armand Colin, 1992), "l'étude, scientifiquement conduite, des diverses activités et des diverses créations des hommes d'autrefois, saisis à leur date, dans le cadre des sociétés extrêmement variées et cependant comparables les unes aux autres (c'est le postulat de la sociologie)", and further "je qualifie l'histoire d'étude scientifiquement menée, et non pas de science".

[6] See Raymond Aron, *Introduction à la philosophie de l'histoire* (Paris: Gallimard, 1991), p. 13: "notre livre conduit à une *philosophie historique* qui s'oppose au rationalisme scientiste en même temps qu'au positivisme." This is also consistent with Marrou's view of historical truth: "ni objectivisme pur, ni subjectivisme radical", in Marrou, p. 221.

[7] Paul R. Krugman and Robin Wells, *Economics* (New York, NY: Worth Publishers, 2015).

[8] Ibid.

analysis of public policy, for example, is typically built up from microeconomics[9]. Economics, in the traditional meaning of the term, and microeconomics, are fairly distinct domains of knowledge and inquiry, with the latter being used as a tool to serve the former, to some extent. In that sense, microeconomics belong to economics. We will also consider that **game theory** belongs to economics[10].

The boundaries of traditional economic thought may indeed appear to have been pushed or breached, for example by popular and provocative work on **freakonomics**[11], applying micro-economic analysis to non-economic sounding circumstances, such as sumo wresting, gang members strategies and a range of other situations. The "freak" aspect of freakonomics does not however come from the subjects themselves, since they would all be reasonably standard fields of inquiry in sociology or psychology, but from the idea of associating these subjects with the traditional or intuitive notion of economics. In reality, it is not economics as we defined them above that are called in to shed a new light on these various subjects, but microeconomics. This "freak" expansion of economics towards social sciences has been analyzed and placed in its historical context in a dedicated study[12].

In economics, theories are often tested on, or inspired from, **stylized facts**: patterns summarized from reality, that encapsulate the elements that are deemed worth modeling. What economists call stylized facts may be called "general laws" in some cases, and invoke the concepts of "ideal-types" of historians. These stylized facts are not simply derived from raw data or information, they are the result of some analysis and interpretation. Economic models may also be tested on large volumes of data, and this is the realm of **econometrics**[13].

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[9] Ibid., pp. 465–540.

[10] See Don Ross, "Game Theory," in *The Stanford Encyclopedia of Philosophy*, ed. Edward N. Zalta (Metaphysics Research Lab, Stanford University, 2019): "Game theory is the study of the ways in which *interacting choices* of *economic agents* produce *outcomes* with respect to the *preferences* […] of those agents, where the outcomes in question might have been intended by none of the agents."

[11] See Levitt and Dubner.

[12] Ben Fine and Dimitris Milonakis, *From Economics Imperialism to Freakonomics* (Routledge, 2009).

[13] Over the years, econometrics have nevertheless evolved towards a pure science of data, less concerned with the testing of theoretical economic models than with the detailed search for patterns in the data using advanced statistical methods.

If we are interested in the interaction between economics and history, a good starting point may be **historical economics** or equivalently **economic history**, and the closely related field of **cliometrics** also known as the **new economic history**[14]. Historical economics are concerned with the study of past economic events. Cliometrics and historical economics are not synonymous, but they are close. According to Diebolt and Parent's introduction to cliometrics[15], cliometrics are defined as an auxiliary field of economics, that applies econometrics and economic theory to the data elaborated by historical economics. Cliometrics, according to this definition, put historical economics into the perspective of economics. We can hence consider that one critical difference between cliometrics and historical economics is that the latter has been tackled by historians as well as economists, while cliometrics have tended to remain the territory of economists, due to their greater focus on quantitative measurements.

The French *Annales* school was among the first large scholarly groups in the historiography to fully dedicate itself to economic and social history[16]. During four decades, historical economics championed by the *Annales* held the spotlight in history. Historical economics existed before that, albeit at a smaller scale, and mostly came from the German school. Max Weber's *Wirtschaftsgeschichte* was written over several years and first published posthumously in 1923. Before that, Karl Marx's *Das Kapital*, published in 1867, offered a fundamentally historical perspective on the economy. Haupert traces their roots back to the late nineteenth century, in Germany and England.

The importance of historical economics for historians was challenged towards the end of the 1960s, and it suffered a lowering of its prominent status, among other things because of the competition from anthropological history and the history of mentalities, for instance in ancient history with the innovative approaches of Jean-Pierre Vernant and Pierre Vidal-Naquet. From the standpoint of historians, pulling ideas and methods from anthropology or psychology began to yield more interesting results than pulling them from traditional economics. Historical economics

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[14] Where "new" effectively means "more formal"; see Michael Haupert, "History of Cliometrics," in *Handbook of Cliometrics*, eds. Claude Diebolt and Michael Haupert (Cham: Springer International Publishing, 2019), 3–32. Note that in the present discussion, the idea of new cliometrics does not imply they should be more formal.

[15] Claude Diebolt and Antoine Parent, *Essais cliométriques* (Bern: Lang, 2011).

[16] The founding of the journal *Annales d'histoire économique et sociale* in 1929 can serve as a date for its inception.

has nevertheless remained a very active field from the perspective of economists, which is why today cliometrics and historical economics may appear as synonymous. This does not mean either that historians' interest in historical economics has disappeared: it remains strong enough, that, relative to the other types of interaction between history and economics discussed in this section, it is still the most prolific by far. Economic history is still at the same time in a delicate situation, unsure of whether it should be classified as economics or history, which has even been described[17] as "[an] unwanted stepchild, a Cinderella in rags." In our perspective, we consider historical economics as part of history, since it is concerned with the production of historical analysis pertaining to the economy, and above all, is presumed to make use of the historical method as we have defined it.

Cliometrics, which should embrace taking every measure of history, has tended to exclusively concentrate on historical economics. It has been presented as a way of addressing important historical issues[18]: the cliometrics of human capital, financial and monetary cliometrics, and the cliometrics of growth and cycles, in particular. While these are effectively broad questions, they all rest squarely within the realm of traditional economics. Even in their applications to ancient history, cliometrics remain closely associated with the analysis of economic history[19]. Diebolt and Haupert wrote[20] that cliometrics "represent the quantitative projection of social sciences in the past." While this may be etymologically true, it is not the case in actuality, unless the social sciences were strictly reduced to traditional economics, or the only relevant quantification of the social sciences was that of the economy.

One defining aspect of cliometrics is the importance of seriality: as Parent[21] discussed, while economics in general may be nomothetic and postulate broad laws, that are presumed to be valid in an a-temporal fashion, applying them through history has tended to focus on changes taking

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[17] Immanuel Wallerstein, "A Theory of Economic History in Place of Economic Theory?" *Revue économique* (1991), 42: 2, 173–180.

[18] Diebolt and Parent, p. 3.

[19] See Claude Diebolt, "The Stakes of Cliometrics in Ancient History," *Historical Social Research / Historische Sozialforschung* (2011), 36: 3, 350–361, where the debate about applying cliometrics to ancient history revolves around whether there was a market economy or not.

[20] Diebolt and Haupert, pp. v–xiv.

[21] Antoine Parent, "L'analyse économique est-elle intemporelle ?" *Temporalités* (2004), 1, 98–106, p. 98–99.

place through time rather than on particular situations at a given point back in time. As such, cliometrics can be seen as a way of examining to what extent this a-temporal postulate is correct.

We now turn to the intersection of the new institutional economics and history, and the related field of analytic narratives. As we mentioned earlier, the analysis of institutions in economics can be built from a micro-economic level, typically using the tools of game theory. The study of institutions, **institutional economics**, used to be a qualitative endeavor in nature and has evolved towards more formal model-driven approaches, naturally called the **new institutional economics**. Pénard and Binmore provide concise overviews of new institutional economics, illustrating their use of game theory[22]. While the study of institutions is not intrinsically historical, the stylized facts from history have offered interesting applications: for instance, the survey by Pénard applies an economic model to medieval trading rules.

Even restricting the field to ancient Greece only, tens of papers have been published analyzing political setup and transitions, with empirical tests using polity-level data[23]. These works cover the entire gamut of quantification levels: from simple prisoner dilemma tables with a few numbers, to advanced probability-based models, as are common in economics. These research works have this in common that they systematically resort to economic theory to account for the stylized facts or data, and that they are mainly written by economists. These analyzes tend to consider *ex ante* social situations, and explain how each agent's optimal behavior could lead to certain aggregate patterns. They have generally been published in institutional economics, law and economics or political economy journals. We can gather in that same field some recent work at the frontier between institutional economics and history, of which Josiah Ober's is a good representative example. Ober is an historian, but he has drawn from economics concepts, as well as other social sciences, in order to examine the history of ancient Greece and explain its effervescence. He dealt with questions relating to the economy but also to social organization

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[22] See Thierry Pénard, "Game Theory and Institutions," in *New Institutional Economics: A Guidebook*, eds. Jean-Michel Glachant and Éric Brousseau (Cambridge: Cambridge University Press, 2008), 158–180 and Ken Binmore, "Game Theory and Institutions," *Journal of Comparative Economics* (2010), 38: 3, 245–252

[23] To give a few examples, see Robert K. Fleck and F. Andrew Hanssen, "The Origins of Democracy," *The Journal of Law and Economics* (2006), 49: 1, 115–146, Robert K. Fleck and F. Andrew Hanssen, "How Tyranny Paved the Way to Democracy," *The Journal of Law and Economics* (2013), 56: 2, 389–416, Bryan C. McCannon, "The Origin of Democracy in Athens," *Review of Law & Economics* (2012), 8: 2, or George Tridimas, "A Political Economy Perspective of Direct Democracy in Ancient Athens," *Constitutional Political Economy* (2011), 22: 1, 58–82.

and military choices[24]. Although these use less formally developed models, these works are quantitatively informed, and are heavily cross-referenced with the institutional economics research mentioned above[25]. One of the main data sources for the exploration of ancient Greece from the standpoint of institutional economics has been the massive inventory of all ancient Greek polities[26]. While this source is dense, it is nonetheless removed from primary historical sources, and ought to be categorized as a set of stylized facts.

The application of the new institutional economics to history, and ancient Greece in particular, may be seen as a specific case of a more general trend which has looked to apply the broad spectrum of social sciences to ancient history. The proceedings of a recent conference on applications of the social sciences[27] including economics to some aspects of ancient Greece testify to the rising importance of this approach. Considering behavioral economics, one of the contributions[28] recoups the subjects of interest to cliometrics, as he focuses on how much may be known about the ancient economy.

A closely related, but distinct, research effort is that of **analytic narratives**, which seek to explain *ex post* historical phenomena on the basis of their optimality according to game theory. The survey provided by Greif[29] considered various applications from game theory to economic history, specifically from the point of view of analytic narratives. The approach was further developed and discussed over the past two decades[30]. Application examples include those of

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[24] See Josiah Ober, *The Rise and Fall of Classical Greece* (Princeton: Princeton University Press, 2015), as well as Josiah Ober, *Democracy and Knowledge* (Princeton: Princeton University Press, 2008) and Josiah Ober, "The Original Meaning of 'Democracy'," *Constellations* (2008), 15: 1, 3–9.

[25] The fact that this analysis is not quantitative does not make it less economically grounded. See for instance Jurgen Brauer and Hubert P. Van Tuyll, *Castles, battles, & bombs* (Chicago: University of Chicago Press, 2008), where the authors are, respectively, an economist and an historian. This book studies war in medieval Europe using economics and game theory, without any mathematics.

[26] Mogens Herman Hansen and Thomas Heine Nielsen, *An Inventory of Archaic and Classical Poleis* (Oxford ; New York: Oxford University Press, 2004).

[27] Mirko Canevaro, Andrew Erskine, Benjamin D. Gray, and Josiah Ober, eds, *Ancient Greek History and Contemporary Social Science* (Edinburgh: Edinburgh University Press, 2018).

[28] David Lewis, "Behavioral Economics and Economic Behaviour in Classical Athens", in Canevaro, Erskine, Gray and Ober, 15–46.

[29] Avner Greif, "Economic History and Game Theory," *SSRN Electronic Journal* (1998).

[30] See in particular Philippe Mongin, *What Are Analytic Narratives?* (Rochester, NY: Social Science Research Network, 2016), Margaret Levi, "An Analytic Narrative Approach to Puzzles and Problems," in *Problems and Methods in the Study of Politics*, eds. Ian Shapiro, Rogers M. Smith, and Tarek E. Masoud (Cambridge: Cambridge

Mongin[31] in contemporary history (Napoleon's defeat at Waterloo), and De Magalhães[32] in ancient and medieval history. These works have generally been published in institutional economics outlets. There are indeed numerous cross-references between analytic narratives and the new institutional economics, but they need to be held separately because of two related reasons. First, analytic narratives do not tend to invoke economic theory; second, they do not actually test a theory or a concept on data but rather determine a game theory-based narrative fitting history. Since analytic narratives do not either operate closer to historical sources, they are somewhat further away from economics than the new institutional economics are, without necessarily being closer to history.

In contrast, the field of **cliodynamics** does not lie, geometrically speaking, between history and economics, but it is related to both. Cliodynamics treat history as a hard science: they take general data and stylized facts and apply mathematical models to them, often derived from the life sciences and quantitative sociology. The data that cliodynamics consider often includes economic and demographic quantities, and although their approach does not involve the application of theoretical economic models, from a methodological standpoint cliodynamics are not far from cliometrics[33]. Cliodynamics generally make use of data that is far from the primary sources and transversal through numerous periods and geographic expanses. Such data may include population estimates, conflicts, or economic output for instance, and various categorizations. It is hence best classified as a set of stylized facts for each period or polity under consideration.

Turchin[34] gave an introduction to cliodynamic methods, applying them to the rise and fall of states and empires. While this approach has been mostly ignored by historians, it received

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University Press, 2004), 201–226, Margaret Levi and Barry R. Weingast, *Analytic Narratives, Case Studies, and Development* (Rochester, NY: Social Science Research Network, 2016) and Anna Alexandrova, "When Analytic Narratives Explain," *Journal of the Philosophy of History* (2009), 3: 1, 1–24.

[31] Philippe Mongin, "A Game-Theoretic Analysis of the Waterloo Campaign and Some Comments on the Analytic Narrative Project," *Cliometrica* (2018), 12: 3, 451–480.

[32] Leandro De Magalhães, "Political Transitions in Ancient Greece and Medieval Italy," in *Advances in Political Economy: Institutions, Modelling and Empirical Analysis*, eds. Norman Schofield, Gonzalo Caballero, and Daniel Kselman (Berlin, Heidelberg: Springer, 2013), 31–45.

[33] The manner in which cliodynamics tackle history can be paralleled with that of econophysics relative to economics: physicists have applied statistical mechanics methods in an effort to simplify complex economic issues.

[34] Peter Turchin, *Historical dynamics* (Princeton, NJ: Princeton University Press, 2018).

moderately negative to positive welcome from sociologists[35], and a fairly negative appreciation from a specialist of historical demography[36]. The core criticism is that the models are fairly adhoc, and a large range of similar approaches would fit the data equally well and lead to entirely different results. As an instance of the research typical in the field, we can cite the model of expansion of societies through war proposed by a group of biologists and ecologists[37]. In the same vein, a more recent publication in the main outlet for the field[38] examined the growth and decline of the Western Roman empire with a formal dynamic model. Although the methods are extremely different, the types of questions researched by cliodynamics recoup to a large extent with the study of meta-history initiated by Arnold Toynbee in the 1930s[39].

In a way that illustrates a definite disconnect between history and cliodynamics, historians have sometimes taken exception with the way in which the cliodynamicians deal with historical data. A team of anthropologists (several of whom are specialized on the application of physics and economics methods), carried out a cross-sectional analysis through all of human history, and found that casualties at war depended on group sizes with a particular functional relationship[40]. Two ancient historians, however, showed that the aggregate data from ancient periods simply could not be trusted and the prior article's conclusions were flawed[41].

There is a somewhat loose body of research which, in the view of the discussion above, may be included in cliodynamics, although its output has tended to come out in mathematics or physics journals, rather than in cliodynamics-specific publications: the modeling of ancient texts with

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[35] See Dingxin Zhao, "Historical Dynamics," *American Journal of Sociology* (2006), 112: 1, 308–310 and Philip A. Schrodt, "Review of Historical Dynamics," *Contemporary Sociology* (2005), 34: 2, 213–215.

[36] Noël Bonneuil, "History and Dynamics," *History & Theory* (2005), 44: 2, 265–270.

[37] Peter Turchin, Thomas E. Currie, Edward A. L. Turner, and Sergey Gavrilets, "War, Space, and the Evolution of Old World Complex Societies," *Proceedings of the National Academy of Sciences* (2013), 110: 41, 16384–16389.

[38] Sabin Roman and Erika Palmer, "The Growth and Decline of the Western Roman Empire," *Cliodynamics* (2019), 10: 2.

[39] See Arnold Toynbee, *A Study of History* (New York: Oxford University Press, 1987), 2, 2 vol and Arnold J. Toynbee, *A study of history. 1* (Oxford: Oxford University Press, 1987), 1, 2 vol

[40] Rahul C. Oka, Marc Kissel, Mark Golitko, Susan Guise Sheridan, Nam C. Kim, and Agustín Fuentes, "Population is the Main Driver of War Group Size and Conflict Casualties," *Proceedings of the National Academy of Sciences* (2017), 114: 52, E11101–E11110.

[41] See Duncan Keenan-Jones and Mark Hebblewhite, "The Pitfalls of Using Ancient Population, Army and Casualty Data without Expert Curation," *Cliodynamics* (2019), 10: 1. As is generally known in classics, when Plutarch wrote of 40,000 dead, he meant "very many".

quantitative tools. Given the prevalence of philology and textual scrutiny in ancient history, work related to these texts necessarily bears on history. The methods are mostly those of network theory, but also include genetics and the full range of statistics. An overview of quantitative methods applied to mythology was recently published[42]. Specifically touching upon ancient Greece, several recent publications[43] carried out network analyzes of Homer's epic poetry. While in most cases the authors of these research works came from mathematics or physics departments, they are sometimes associated with historians. This, and the fact that the subjects addressed tend to be fairly narrow, distinguishes this stream from core cliodynamics.

In a separate domain, we finally define **quantitative history** as the application of quantitative methods, such as statistical analysis or modeling, network analysis, or big data processing, to history, by historians. Quantitative history has grown from historical economics, since statistical methods were first introduced in order to account for growing historical economic and demographic data in the middle of the twentieth century. Although quantitative history may be commingled with cliodynamics (as cliodynamicians may describe their own endeavor as quantitative history), we will consider it a fundamentally different field, precisely because it is carried out by historians. The French *Annales* recently published a whole issue dedicated to the subject[44], marking somewhat of a return towards quantitative methods, stripped of any naive belief in the superiority of these approaches simply because they are quantitative. Much attention is now paid to the historical method that gives rise to the data.

The use of network theory in history has substantially grown over the past few years. One of the first surveys, by Wetherell[45], already commented on a couple of decades of history and discussed

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[42] Ralph Kenna, Máirín MacCarron, and Pádraig MacCarron, eds, *Maths Meets Myths* (Cham: Springer International Publishing, 2017).

[43] See Dimitrios Kydros, Panagiotis Notopoulos, and Georgios Exarchos, "Homer's Iliad – A Social Network Analytic Approach," *International Journal of Humanities and Arts Computing* (2015), 9: 1, 115–132 and Pedro Jeferson Miranda, Murilo Silva Baptista, and Sandro Ely de Souza Pinto, "The Odyssey's Mythological Network," *PLOS ONE* (2018), 13: 7, e0200703.

[44] See the introduction by Karine Karila-Cohen, Claire Lemercier, Isabelle Rosé, and Claire Zalc, "Nouvelles cuisines de l'histoire quantitative," *Annales HSS* (2018), 73: 4, 773–783.

[45] Charles Wetherell, "Historical Social Network Analysis," *International Review of Social History* (1998), 43: S6, 125–144.

some examples in the context of history. Since, Lemercier[46] has given various illustrative examples, but essentially concentrated on proper methodological approaches. For historians, since the data is typically not, in and by itself, a network, then it is a delicate operation to frame it as such; in doing so one needs to be particularly careful not to project contemporary categorizations onto the past. Network theory and analysis have been part of the tool set of economists for the past two decades, and economists have contributed data, analysis and ideas in the progress of network theory[47], hence effectively establishing a new *de facto* relationship between history and economics through the vector of network theory.

In the case of ancient Greece, examples of the application of network methods abound, including for instance the study by Malkin[48], who analyzed the Greek world's extent communication and settlement patterns. More recently, the *Journal of Historical Network Research* has published an issue dedicated to ancient politics[49].

This quick survey has shown that the domains of inquiry spanning the space between economics and history do not constitute a uniform continuum, and do cover much more ground than a simple interpolation of the bounds would have implied. As Figure 2 illustrates, one finds a more complex set of relationships than the naive view presented in Figure 1. The square area surrounded by a dotted line represents all the domains that may be understood to lie in the space between economics and history.

[FIGURE 2 ABOUT HERE]

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[46] See Claire Lemercier, "Analyse de réseaux et histoire," *Revue d'histoire moderne contemporaine* (2005), 52-2: 2, 88–112 and Claire Lemercier, "Formale Methoden der Netzwerkanalyse in den Geschichtswissenschaften," *Österreichische Zeitschrift für Geschichtswissenschaften* (2012), 23: 1, 16–41.

[47] See for example the general model by Matthew O. Jackson and Brian W. Rogers, "Meeting Strangers and Friends of Friends," *American Economic Review* (2007), 97: 3, 890–915, and the review by Riitta Toivonen, Lauri Kovanen, Mikko Kivelä, Jukka-Pekka Onnela, Jari Saramäki, and Kimmo Kaski, "A comparative study of social network models," *Social Networks* (2009), 31: 4, 240–254.

[48] Irad Malkin, *A small Greek world* (New York: Oxford University Press, 2011).

[49] For instance, see Diane Harris Cline, "Athens as a Small World," *Journal of Historical Network Research* (2020), 4, 36–56.

The Reception of Economic Methods by Historians

Among the fields of inquiry that populate the space between history and economics, which ones have generally been of interest to historians? As we will discuss, historians have tended to reject much of the material that lays between economics and history, a logical consequence of the methodological framework of historiography.

Table 1 shows to what extent historians have been involved[50] in the various fields discussed earlier, in the light of their methodological components. One commonly held perspective, to which we alluded to in the introduction, is that the strong formality of the discipline may keep historians at bay from economics. The evolution of economics towards more mathematics since the middle of the twentieth century has been well established, and understanding the concepts of economic theory used in most research publications requires a mathematical background at the graduate level[51]. The table shows that while this may be the case, there are other equally valid explanations: the use of stylized facts, rather than actual raw data on one hand, and the reach for broad conclusions as opposed to narrowly restricted ones.

[TABLE 1 ABOUT HERE]

One way in which this perspective may be summarized is that for many of the areas between economics and history, the output from history is treated as input into economics. New institutional economics, analytic narratives and cliodynamics as we have defined them all use stylized facts as their input, or heavily processed historical information, itself the result of historians' work. Cliometrics work on data that may be closer to the source, but that data is still the product of historians' work and interpretation. Historical economics and quantitative history, in contrast, consist of the writing of elements of history. In the sense of Marrou, Aron or Febvre,

[50] Involvement is meant here as either directly taking part in the research, or citing it in historical research publications.

[51] See Kenneth E. Boulding, "Samuelson's Foundations," *Journal of Political Economy* (1948), 56: 3, 187–199 for a perspective at a time where economics were already quite mathematical, and E. Roy Weintraub, *How Economics Became a Mathematical Science* (Durham ; London: Duke University Press, 2002) for a more recent perspective on the history of mathematics in economics.

these historians produce knowledge of the human past, following a scientific method while at the same time aware and mindful of their humanity (and attached biases) in doing so.

Taking the output from history, cliometrics, new institutional economics, analytic narratives and cliodynamics look for general laws: either in a deductive manner, starting from economic theory overall, or in a more inductive manner, looking for the formal system that best accounts for the data (within dynamic system models, or game theory, most typically). This group could be hence called **clionomics**, because the most salient common aspect, which at the same time drives them, is the search for, or the validation of, some more or less universal *nomos*. This search for a rule transpires through two related aspects: the use of formal modeling, and the of pre-synthesized data.

As they stand, clionomics appear to be essentially disembodied from history. While they use the work of historians to make claims that are partly about history, historical research does not integrate these conclusions into its process, not even to refute them. Why is there not a productive feedback loop cycling back and forth? The intensive use of formal language in clionomics could act as a barrier. On the other hand, if the method or the conclusions were directly useful to historians, would they not have acquired some of the necessary skills to understand and use them? The issue is deeper than that, and related to the nomothetic aspect of clionomics, and to the fact that clionomics are all about the economy.

At the core, the opposition between history and clionomics stems from the opposition between a nomothetic approach to history and an idiographic approach. Any one of the fields that compose clionomics as we have defined them presumes the existence of rules and looks to history to either justify or illustrate them. In that sense, clionomics could be considered as an emanation of the hard sciences, combining the use of universal laws with mathematical formalism in most cases.

In history, however, one should establish structures, and not postulate them[52], which to a large extent rejects any "big explanation" or the use of wide concepts. A general concept may be of use to explain some facet of reality, but cannot be presumed to form a valid explanation for everything. Marrou is convinced that there is no point in elaborating historical laws, since history

[52] Marrou, p. 166.

is defined as the study of unique and singular phenomena. Analogies and parallels do not constitute such laws, they simply are illustrations and rely only on some common aspects. In social sciences, and in economics in particular, the goal is precisely to reduce a complex situation down to a manageable model. This is a core issue in being able to combine history and economics in some way. Further, as Ober pointed out about ancient Greek history[53]:

"the social scientist's goal of theory testing, aimed at some more general understanding of human behavior, may be strictly irrelevant for the historian who remains focused intensively on the Greek past."

This perspective is reinforced by Bourdieu's anthropological view of economics, and specifically about the theories of rational action[54]: it is a mistake to seek to generalize behavior models constructed off of the particular experience that we are familiar with. The search or vindication for universal laws therefore has no bearing on history, it literally takes the question away from historical inquiry. Looking at Febvre's critique of Toynbee's work is also quite illuminating: Toynbee was an historian, but his work was perceived as sociological. Febvre asks[55], from the perspective of an historian, "why bother?" Indeed, whether meta-history is approached with differential equations or with the tools of sociology, it remains a-historical for most historians. It is worth noting too that the simplest dynamic models, using ordinary differential equations, can be tuned to reflect complex cyclical or boom and bust evolution[56], hence there is not much more informational content in a one-dimensional model of that sort than in a simple literary statement about the ebb and flow of civilization, such as one from Toynbee.

As we have mentioned, the search for universality requires the use of manageable data, in the sense that it should be squared and clean. Clionomics must operate on entities that have been pre-processed. However, the concept of using stylized facts is a source of issues from the

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[53] See p. 6, "Introduction" in Canevaro, Erskine, Gray and Ober, 1–12.

[54] In Pierre Bourdieu, *Anthropologie économique* (Paris: Seuil, 2017), p. 16: "En partant du cas particulier de l'action économique dans des sociétés d'un type particulier comme les nôtres, et plus précisément de régions particulières de ces sociétés particulières, ils commettent, me semble-t-il, l'une des erreurs les plus funestes en sciences sociales : celle qui consiste à universaliser sans le savoir le cas particulier, c'est-à-dire à donner pour universelles des particularités d'un cas particulier qui s'ignore comme tel."

[55] See Febvre, p. 134: "Si on résiste à la séduction du magicien ; si on se refuse à l'attitude sentimentale du croyant assistant au culte ; si on examine les idées froidement, et les conclusions : quoi de neuf, en tout ceci ; quoi de vraiment neuf et qui puisse, historiens, nous inciter à un retour sur nous-mêmes, à une condamnation de nos méthodes, à l'adoption de méthodes neuves ?"

[56] see Turchin, *Historical Dynamics*, pp. 9–15.

perspective of history. Indeed, the simple notion of a **fact** is in and by itself questionable. It is not something buried that one just uncovers, ready for use[57]. Marrou clarifies this further: a document, in any form, is not yet history[58]. Any rigorous theory of history therefore must rely on how documents are described and then how one moves from description to explanation. Hence, by stepping away from the primary sources, clionomics gravitates away from history. Resorting to stylized information eliminates the massive amount of meta-information that comes with the establishment of any historical "fact". The disconnect from the sources therefore makes the conclusions non-historical, since they only are a reformulation of what the historians already claimed.

The notion of temporality is a cornerstone of history, and was defined in an innovative manner by Braudel[59], with three levels: long time (a geological scale), median time (a scale for economic phenomena) and event time (short time, for some social or economical events). Time is largely considered as essential to the work of historians: Marrou saw their work as mainly concentrated on evolution over time, looking for causes and consequences[60]. He recognizes too that it often is the case that what may appear as distinct phenomena, one causing the other, are in fact different symptoms of the same underlying evolution[61]. In cliometrics[62], reliance on macroeconomic models implies a predetermined approach to temporality, both in terms of scale and in framing the perception of causality by the very fact of applying a model to the data. In this case, the detailed analysis of causes and consequences required by historiography is not in the historian's territory anymore.

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[57] See Febvre, p. 115, "Les faits, pensez-vous qu'ils sont donnés à l'histoire comme des réalités substantielles, que le temps a enfoui plus ou moins profondément, et qu'il s'agit simplement de déterrer, de nettoyer, de présenter en belle lumière à vos contemporains ?" Aron is also very clear: "il n'existe pas une *réalité historique*, toute faite avant la science qu'il conviendrait simplement de reproduire avec fidélité", p. 147.

[58] See Marrou, p. 45, where he mentions a report from the French National Archives of a chamber pot thrown out of the window onto somebody's head in Saint-Germain-des-Prés, in 1610: this seemingly objective piece of information does not constitute history until an historian has put it into perspective.

[59] Fernand Braudel, "Histoire et Sciences sociales," *Annales* (1958), 13: 4, 725–753.

[60] Marrou, pp. 170–171.

[61] Marrou, pp. 174–175, about the introduction and use of modern French language in Southern France in the early modern period.

[62] See Parent, as well as Diebolt and Parent.

As we stressed earlier, most of clionomics deal with traditional economic questions. This is cliometrics' natural focus, and represents a good share of the subjects covered by new institutional economics as well as cliodynamics. This state of affairs creates a common perception that, as far as their applications to history are concerned, economics are only concerned with the economy. Since most of modern standard economics use some notion of free-market exchanges as a core concept, it is then straightforward to dismiss them as irrelevant and anachronistic for most historical analyses, especially for ancient Greece and Rome.

Hobson[63] recently wrote a critique directed against clionomics in ancient history, and in particular economic history, and reflects the points we have just mentioned. Hobson addresses the opposition between neo-primitivists, who consider the Roman empire in the guise of a "developing nation", and modernists, who consider the Roman empire to have benefited from institutions providing incentives towards economic performance. Noting that the discourse on the ancient Roman economy has been polarized by this opposition, he stresses that it detracts the attention away from the fact that presuming we could know and capture detailed measures of the Roman economy is flawed, in and by itself. In this case, economic historians bring modern economic thinking as a framework of analysis, and this goes against the grain of most historians' historiographic culture.

In fact, one of the strongest recent criticism against cliometrics, by Francesco Boldizzoni, based on many of the reasons we have discussed so far, still remained confined within a notion of economics strictly applied to the economy. Boldizzoni proposed, as we do, that the use of microeconomics does not need to lapse into narrative history, but what he offers still only pertains to the economy[64]:

"an investigation of the past from a micro-economic point of view, with an analysis of decisions taken with regard to production, consumption, and exchange at the level of producers and households, and naturally of the consequences of these decisions."

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[63] Matthew S. Hobson, "A Historiography of the Study of the Roman Economy," *Theoretical Roman Archaeology Journal* (2014), 0: 2013, 11.

[64] See Francesco Boldizzoni, *The poverty of Clio* (Princeton: Princeton University Press, 2011), p. 87; the subsequent pages address prices in a feudal economy, market demand for wheat, and other comparable measures.

Most attempts to apply economics to history, where economists claimed to give historians new tools or analytical frameworks remained very narrowly confined to the economy. A collection of essays[65], in order to "broaden and deepen the exchange of ideas between economists and historians", proposed to "show how to apply the core ideas and methods of economics to a wide range of historical issues." However, the subjects addressed from an economic perspective in this book: economic trends, institutions, labor economics, supply and demand, money, banking, inflation, and international economics, would seem utterly irrelevant to, for instance, a specialist of Greek religious epigraphy.

This focus on the economy is not representative of the range of applications of economics to other fields, even outside of social sciences. John Maynard Smith famously introduced the application of game theory to biology through evolutionary stable strategies[66], and revolutionized the study of evolution. This approach was further applied to behavioral ecology, evolutionary psychology, and in turn to the notion of cooperation in the social sciences[67]. Within social sciences, economics-grounded approaches have been developed across an immense list of domains, of which we can only provide a few examples. Issues related to religion have been explored with an economic angle, both by economists[68], and by specialists of religious studies[69]. The notion of identity has been explored from an economic perspective, first with a model accounting for the benefits of group identification through symbols[70], and with the definition of a generalized utility function accounting for identity-related preferences[71]. The related question of

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[65] Thomas G. Rawski, Susan B. Carter, Jon S. Cohen, Stephen Cullenberg, Peter H. Lindert, Donald N. McCloskey, Hugh Rockoff, and Richard Sutch, *Economics and the Historian* (University of California Press, 1996).

[66] John Maynard Smith, *On Evolution* (Edinburgh: Edinburgh University Press, 1972).

[67] This was introduced by Robert Axelrod and William D. Hamilton, "The Evolution of Cooperation," *Science* (1981), 211: 4489, 1390–1396 and Robert M. Axelrod, *The Evolution of Cooperation* (New York: Basic Books, 2006).

[68] Note the review in Laurence R. Iannaccone, "Introduction to the Economics of Religion," *Journal of Economic Literature* (1998), 36: 3, 1465–1495.

[69] Joseph Henrich, "The evolution of costly displays, cooperation and religion," *Evolution and Human Behavior* (2009), 30: 4, 244–260 and Joseph Bulbulia and Marcus Frean, "The Evolution of Charismatic Cultures," *Method & Theory in the Study of Religion* (2010), 22: 4, 254–271, for instance, developed costly signaling models to capture ritualistic behavior.

[70] Jack L. Carr and Janet T. Landa, "The Economics of Symbols, Clan Names, and Religion," *The Journal of Legal Studies* (1983), 12: 1, 135–156.

[71] George A. Akerlof and Rachel E. Kranton, "Economics and Identity," *Quarterly Journal of Economics* (2000), 115: 3, 715–753.

conformity has also been examined, accounting for conformist behavior through a pooling equilibrium[72]. Game theory has also been applied to the study of literature: Steven Brams gave an initial review[73], and some examples of applications to contemporary French literature were developed by De Ley[74]. More recently and in the same vein, Chwe[75] carried out a detailed study of Jane Austen's characters' choices. The analysis of law with the tools of economics has grown into a fully developed field[76]. Rhetorics and the study of argument structure were also tackled with the tools of microeconomics[77]. From this short list, it is apparent that these applications outside of the usual realm of economics rely essentially on microeconomics and game theory.

Could economics then be relevant for historians, not as some kind of separate extension, but as part and parcel of the historical method? In fact, the interest of historians in economics has not been from the standpoint of method, but as the raw material of the field of study itself[78]. We will now examine the potential benefits to historians of considering parts of economics as purely methodological auxiliaries rather than a subject of study.

Economics as Methodology for Understanding

We will see how economics, and in particular microeconomics, can bring to historians an angle into the past that would not be accessible otherwise; however it is crucial to delineate the nature of the questions that economics should or should not address, so that they remain broadly compatible with the historical method. We therefore begin by focusing on an important

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[72] B. Douglas Bernheim, "A Theory of Conformity," *Journal of Political Economy* (1994), 102: 5, 841–877.

[73] See Steven J. Brams, "Game Theory and Literature," *Games and Economic Behavior* (1994), 6: 1, 32–54, and the humanities in general were covered in Steven J. Brams, *Game theory and the humanities* (Cambridge, MA: MIT Press, 2011), with applications ranging from religious texts to Greek tragedy.

[74] Herbert de Ley, "The Name of the Game," *SubStance* (1988), 17: 1, 33–46.

[75] Michael Suk-Young Chwe, *Jane Austen, Game Theorist* (Princeton: Princeton University Press, 2014).

[76] It was initially introduced by Ronald H. Coase, "The Problem of Social Cost," *The Journal of Law and Economics* (1960), 3, 1–44 and further defined by Richard A. Posner, *Economic Analysis of Law* (New York: Wolters Kluwer Law & Business, 2014).

[77] See for instance Steven A. Matthews, "Veto Threats," *The Quarterly Journal of Economics* (1989), 104: 2, 347, and Barton L. Lipman and Duane J. Seppi, "Robust Inference in Communication Games with Partial Provability," *Journal of Economic Theory* (1995), 66: 2, 370–405.

[78] In the sense that a specialist of aviation history needs to have some understanding of aerodynamics and weapon systems in order to form an opinion on historical documents related to these aspects; equivalently an historian, and an economic historian in particular, will have developed an understanding of economics for the equivalent purpose.

difference in the hermeneutics of historical documents, that between comprehension and explanation. We then show the extent to which economics could be used to illuminate comprehension, while leaving explanation up to purely historical methods, and thus remain compatible with the practice of history.

There is a critical distinction between **understanding** and **explaining** in the philosophy of history, as Raymond Aron stressed[79], in spite of the convergence of both notions in general philosophy. For Aron, understanding and explaining are commingled in common language, and they require some disambiguation. He first warns against the nomothetic use of general notions in the process of understanding[80]:

"The historian does not go on a quest for general propositions to explain a unique and singular decision. He strives to understand the actor's deliberation using the knowledge that has been acquired of the context and the actor's psychology."

For Aron understanding means seizing the minimal rationality of an actor, applied to a means and relative to an end, where rationality is defined as behaving in a manner that conforms with the actor's value system[81]. He insists that rational behavior in this sense may appear irrational to those who do not thoroughly understand the value system in question. In effect, Aron conjures up rationality, which is a general concept, in order to comprehend many singular situations. This is not in opposition with the earlier statement, because "general propositions" are meant as general rules of historical consequence. Marrou asserts[82] that understanding past documents at the core just relies on our ability to naturally understand the present. In reading documents from the past, we use the same process as when reading in our daily life. Nevertheless, as Marrou

[79] In Raymond Aron, "Quelques remarques sur la compréhension et l'explication," *Revue européenne des sciences sociales* (1981), 19: 54/55, 71–82. Note that Aron used the English terms of **understanding** and **explaining** specifically, but we will consider that we can equivalently use the translation of the French *compréhension* and *explication*, comprehension and explanation, respectively.

[80] See Aron, "Quelques remarques", p. 72: "L'historien ne part pas en quête de propositions générales pour expliquer la décision unique, singulière. Il s'efforce de comprendre la délibération de l'acteur en tirant parti de la connaissance acquise du contexte et de la psychologie de l'acteur."

[81] See ibid. p. 77: "la compréhension tend toujours à saisir la rationalité de la conduite, dès lors que la rationalité se définit par la conformité de la conduite au système des valeurs et à l'adaptation des moyens aux fins de l'acteur".

[82] Marrou, pp. 81–83.

pointed out, in order to understand the Other in the past, the historian has to forget himself to some extent[83], which we may understand as the need to integrate the Other's own rationality.

In contrast to understanding, Aron defines explaining as identifying the depersonalized determinism, unknown to the actors, that have driven the unfolding of a situation. For this identification to acquire the quality of truth, the historian must show that things effectively happened as the theory states. Explaining necessarily relies on the understanding of the actors and of the flow of events (the notion of temporality gains importance here as well). Explaining may rely on the notion of Weberian *Idealtypus*: Marrou, focusing on the use of concepts[84], lists the *Idealtypus* as a scheme of general value to the historian, built from particular observations[85]. Explaining hence relies on concepts, but, recouping the avoidance of general laws, Marrou stresses that using an *Idealtypus* is legitimate only to the extent that the historian remains aware that this *Idealtypus* only exists in his or her mind. Besides, considering what may have been is also part of the historian's work on explanation according to Aron[86]: "every historian, to explain what has been, wonders what may have been." Counter-factual analysis is a part of the explaining, and not of the understanding of historical documents. As such, from the perspective of historians, they should carry out the counter-factual analyzes that are common in economics with their own method.

We can summarize the distinction between comprehension and explanation. Comprehension refers to the identification of the rationale that actors followed, as evidenced by particular historical documentation. Explanation refers to the identification of broad and interrelated laws and trends that have framed the situations in which the actors evolved. Equipped with this fundamental distinction, let us now address the role economics may play in comprehension. We will see that economics may bring a potentially useful additional perspective to the historian on two levels: first, directly as a way of shedding light on the application of rationality by the

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[83] Ibid., p. 84.

[84] Ibid., p. 153–155.

[85] Not weighing observations quantitatively, but as a function of how favorable they are to suggest the coherent transversal notion, see ibid. p. 154.

[86] Aron, p. 202.

historical actors, and second as a more efficacious way of dealing with distributional information.

As we have pointed out, an explanation (of historical material) coming from outside history is problematic to historians. The understanding (in Aron's sense) of historical material, on the other hand, can benefit from any external tool, just as one may resort to any tool in understanding the world around us today. Earlier, we have shown that economics, and more specifically microeconomics and game theory, have offered insights in a far wider range of fields than simply the economy. Hence, when considering historical material, historians can resort to these same tools in order to deepen their perception of that material. An essential aspect of this idea is that, by construction, the tools from microeconomics should be applied to historical documents as close as possible to primary sources, not to the heavily processed result of the historians' explanations. Indeed, it would otherwise result in building a broad explanation. Aron's definition of understanding relied on an extended notion of rationality; this makes it an ideal application target of microeconomics which precisely seek to account for the aggregate and individual consequences of each actor's behavior following some form of rationality.

Is establishing structures and not postulating them, as Marrou recommended the historians did, compatible with the use of an a-temporal economics-grounded perspective on historical phenomena? We argue that yes, it is indeed, to the extent that the economic perspective in question is built from the observations of historical material, rather than being postulated as an application of some overarching theoretical *nomos*. In effect, this amounts to considering microeconomics as an additional tool for the historian, rather than history as an application of microeconomics concepts. The basic assumption that the actors would possess some form of rationality is necessary for the historian to form their comprehension in any case; it is therefore not something that the economic approach would require as a necessary additional assumption. This is true even, as Aron pointed out, though it may not appear as rational to those without enough information or understanding of the context. It is worth noting too that the idea of optimality of behavior, which is what rationality would be expected to pursue, does not require that the actors would be acutely self-aware. As was shown by Foley[87], optimality is a very useful

[87] Robert Foley, "Optimality Theory in Anthropology," *Man* (1985), 20: 2, 222–242.

transversal concept to describe early humans' behavior. From an economics-based modeling perspective, Maynard Smith[88] provided a wealth of examples of optimal behavior reached through an evolutionary process, without any conscious intervention. This is also an essential part of Bourdieu's argument against *homo oeconomicus*[89]: accounting for behavior perceived as rational does not require the assumption of conscious reasoning.

As soon as a situation involving presumably rational actors would lead to the production of historical "facts", it may be possible to apply a model that accounts for the behavior of these actors and from which one can deduce relationships between these observed "facts". By doing so, the historian can reach a more detailed understanding of the actors, and also of the historical material that they base their research on. Note that the types of models that microeconomics use, in particular in the numerous applications to other social sciences, the temporal aspects are not an important factor[90]. In these models, causes and consequences do not have to be considered in a temporal dynamic perspective, as that remains the task of the historian.

Historical material may be at the same time specific and generic: an atomic element of historical information may be exploited by itself, but it may also be exploited in relation to a number of similar or comparable elements. The meta-analysis of the set of elements together contains information beyond the simple sum of the information pertaining to each element, through the characteristics of the distribution of these elements. In order to comprehend this distributional aspect, one may resort to a purely descriptive approach: using averages or counts for example, in an effort to summarize and aggregate the information. One may also use the tools of quantitative history, and consider some network statistics if it is appropriate for the data at hand. As humans, we have a limited capacity to conceptualize very large quantities of data and a form of aggregation is necessary. In this context, the tools of microeconomics can help in dealing with these voluminous amounts of information, not for simple descriptions but to ask what generative mechanisms may have engendered the distributions that are observed in the data. Typically,

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[88] John Maynard Smith, *Evolution and the Theory of Games* (Cambridge University Press, 1982).

[89] See Pierre Bourdieu, *Anthropologie économique* (Paris: Seuil, 2017), p. 15: "je défendrai une anthropologie tout à fait différente, fondée sur l'idée que, pour rendre compte des conduites perçues comme rationnelles, il n'est pas besoin de faire l'hypothèse qu'elles ont la raison, ou l'intention consciente de rationalité, pour principe."

[90] In economic theory, and in microeconomics in particular, the focus is usually not on how things may have evolved, but on how they are or were and why, in some equilibrium, as explained by Parent.

these tools are most useful when there is a certain volume of data to examine, when one can observe distributions. When there is little data, the risk is greater that these methods could in fact project information into the data, and read into it rather than out of it, because the ratio of historical data to explicit or implicit model assumptions would be low.

This logic can help devise more appropriate measures of the data, the *metrics* in cliometrics, that are not simply pulled from the shelf of statistics. Critically asking oneself what the right measure is, following a constructive view of the logic off of which the data may have been generated, the historian is not framed by the use of a metric whose only merit is that it seems intuitive or practical. Considering the process through which the information may have been created allows the historian to form a critical opinion, and argue for the right measure (or at least a better one). Recall that for Marrou, one could understand the past by using our natural ability to understand the present, while being mindful not to project anachronistic categorizations[91]. Using the inter-mediation of the tools borrowed from economics, the analogy with the present remains the same: we employ these same techniques to better understand the world around us today.

The arguments offered in this section are fairly general, but one way to summarize them could be to simply say that historians could use the tools of economics without ever writing the words "economy" nor "theory". We will now discuss some applications of this new methodological angle more precisely, focusing on ancient Greece.

The history of ancient Greece constitutes an interesting application field for microeconomics as a methodology, for several reasons. We have stressed that understanding involved integrating a form of past rationality, and that micro-economic models would rely on some rationality, as irrational as it may appear to our contemporaries. Ancient Greek philosophy defined and debated rationality, and hence this environment would seem to be the most favorable for this application. In conjunction with rationality, the idea of optimality in the sense of competitive behavior is also an element of micro-economic models[92]. In the context of ancient Greece, *agôn*, the search for excellence through debate, combat or confrontation is a fairly transversal concept that expresses a common aspiration to a search for efficiency. In spite of these two aspects of the ancient

[91] Understanding here is again in Aron's sense.

[92] The agents want something, and they try to obtain it through their behavior.

Greeks that align well with our proposed approach, there remains an immense hermeneutic distance, which should be held as a reminder to stay acutely aware of the risk of anachronistic projection, and can help ensure there may be less slippage towards applying full economic theories.

One salient feature of ancient history, and that of ancient Greece in particular, is the scarcity of data, which only represents a minute fraction of the amounts available for the modern or contemporary periods. Hence, applying micro-economic models to ancient history may be seen as a palliative model, in the sense described by Stein[93]: through the modeling and the analysis of the relationships between various observed quantities or categories, one may identify missing data or patterns, and this would convey meaning to the historian. In spite of this scarcity, there are sizable pockets of data, notably the information derived from epigraphic sources. The specific instances we will mention are data on ancient Greek votive acts and personal onomastic data, with a particular focus on the former.

About fifteen years ago, the university of Rennes started to gather divine onomastic sequences from a variety of sources, mostly epigraphic, as described in the explanatory article that introduced it[94]. This effort gave rise to the database known as the BDEG[95]. Since then, the magnitude of this endeavor increased by several orders, as it was rebooted as the MAP (Mapping Ancient Polytheisms) project[96]. The BDEG contains approximately 11,000 forms, one for each group of attested observations of invocations of the gods in Greek language, along with the onomastic sequence potentially associated with them. The Lexikon of Greek Personal Names is maintained by Oxford University[97], and has brought online an extensive database of mainly epigraphic references to personal names from ancient Greece. It contains about 350,000 single entries and 250,000 parental relationships. We addressed the notion of distributional information earlier; it is rather obvious that in order to carry out such an analysis, one needs to have access to

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[93] See Stein, p. 248–250.

[94] Pierre Brulé and Sylvain Lebreton, "La Banque de données sur les épiclèses divines (BDDE) du Crescam," *Kernos* (2007), 20, 217–228.

[95] Sylvain Lebreton, Jean-Baptiste Barreau, Karine Karila-Cohen, and Pierre Brulé, "Banque de Données des Épiclèses Grecques (BDEG)" (2014).

[96] See Corinne Bonnet and Sylvain Lebreton, "Mettre les polythéismes en formules ?" *Kernos* (2019), 32, 267–296.

[97] See Robert Parker, Jean-Baptiste Yon, and Mark Depauw, "LGPN" (Lexikon of Greek Personal Names, 1996).

the full extent of the dataset. The BDEG and the LGPN happen to have been originally designed in such a way that it is not possible to extract the full data in a straightforward fashion[98]. The way these online tools were created assumed that the only reasonable use would be atomic, and never distributional. It is worth noting that the newly designed MAP, on the contrary, possesses a flexible interface allowing for both an atomic and transversal use.

Relying on these large datasets, we can now consider some examples of cliometrical approaches. What kind of distributional measures would seem intuitive? In the case of the BDEG, it may be the distribution of votive acts across gods at the *polis* level: was Zeus always and everywhere the most common? Who came in second? For the LGPN, onomastic networks already are a field of inquiry[99], considering the links created between names through parental relationships. Observing differences in frequencies of names also raises comparable questions: which ones were popular? In this case, the new cliometrics we have been calling for can provide the framework to build formal games, for example in terms of the choices of which god(s) to pray to, and in terms of which name, more or less prestigious and more or less close to the family, to pick for a child. Using few assumptions and essentially no theoretical apparatus beyond the rationality and optimality we discussed earlier, one can obtain game equilibria[100] that provide baseline expectations for the shape of the distributions observed in the data. In essence, this is a transformation of the data, based on a particular perspective on how it may have been generated. It is akin to designing one's own statistical tests or measures in a way best adapted to the problem at hand, rather than relying on some boiler-plate solutions. This could be held as a formal econometric perspective on Marrou's exhortation to step into the Other's shoes. As such, this approach does not seek to explain or postulate the why, but to help the historian comprehend the how, so that they may have more elements to formulate the explanation.

More specifically, in the case of the epigraphic sources on votive acts, it is possible to model atomic individual choices in a simplistic manner, and then derive a self-organizing equilibrium

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[98] It actually requires a good deal of technical expertise to obtain a structured view of the entire data, in both cases.

[99] See for example Karine Karila-Cohen, "Prosopographia Attica 2.0," *Revue historique* (2016), 680: 4, 869–904 and Karine Karila-Cohen, "Le graphe, la trace et les fragments," *Annales HSS* (2018), 73: 4, 785–815, where a careful quantitative history approach is applied to the onomastic network of the Oion demes in Attic.

[100] The details of such an analysis are outside the scope of the present article.

accounting for aggregate behavior, considering it as a form of "Kolkata Restaurant Problem[101]". Only considering the number of mentions of a particular god in a city, it is difficult to ascribe it the meaning of a "fact": maybe one was more popular than another, but is the degree by which that is the case meaningful? Using the formal model, one can derive an expected distribution shape for the votive acts across gods, which expresses how, under minimal assumptions on atomic choices, the numbers of observations for each god stack relative to each other. One can hence determine ad-hoc statistical measures that can qualify the difference between the observed number of votive acts and the simple model-derived ones, and apply them to the BDEG data across the geographic space of ancient Greece. In this case, the distributional information, which would otherwise be of essentially no historical use, once considered through the lens of microeconomics, has an opportunity to become fact as historical material. The new material may now be interrogated: for example, are there periods or locations for which the distributions diverge markedly from the baseline expectation? Are the divergences systematically driven by *polis*-level characteristics? The data happens to show surprisingly regular patterns for a large range of *poleis*. Through a better comprehension of the primary source, by literally taking it from another angle, the historian may then find facts that deserve explaining, in the case at hand an apparent high degree of uniformity in religious practice.

In the end, the argument for new cliometrics rests on two simple statements: economics do not have to be about the economy, and economic methods do not have to postulate strong assumptions about the context in which they may be applied. Applying economics to history does not have to be clionomical. Then, picking the parts that may directly be useful to them, historians can benefit from the tools and the new set of questions that microeconomics, in particular, have to offer.

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[101] In particular, see Bikas K. Chakrabarti, "Kolkata Restaurant Problem as a Generalised El Farol Bar Problem," in *Econophysics of Markets and Business Networks: Proceedings of the Econophys-Kolkata III*, eds. Arnab Chatterjee and Bikas K. Chakrabarti (Milano: Springer Milan, 2007), 239–246. The "Kolkata Restaurant Problem", or the "El Farol Bar Problem", pose the question of the optimal use of a shared resource, such as a crowded bar or a restaurant serving lunch in a limited time. Very simple atomic randomized decisions are shown to be optimal, in the sense of a set of mixed strategies in a Nash equilibrium. The notion of studying the aggregate behavior of a system based on simple individual behaviors recoups with Complex Systems Analysis, mostly a branch of physics.

Figures and Tables

Figure 1: A Simple Perspective of Historical Economics

Figure 2: A More Realistic Perspective of the Relationships Between History and Economics

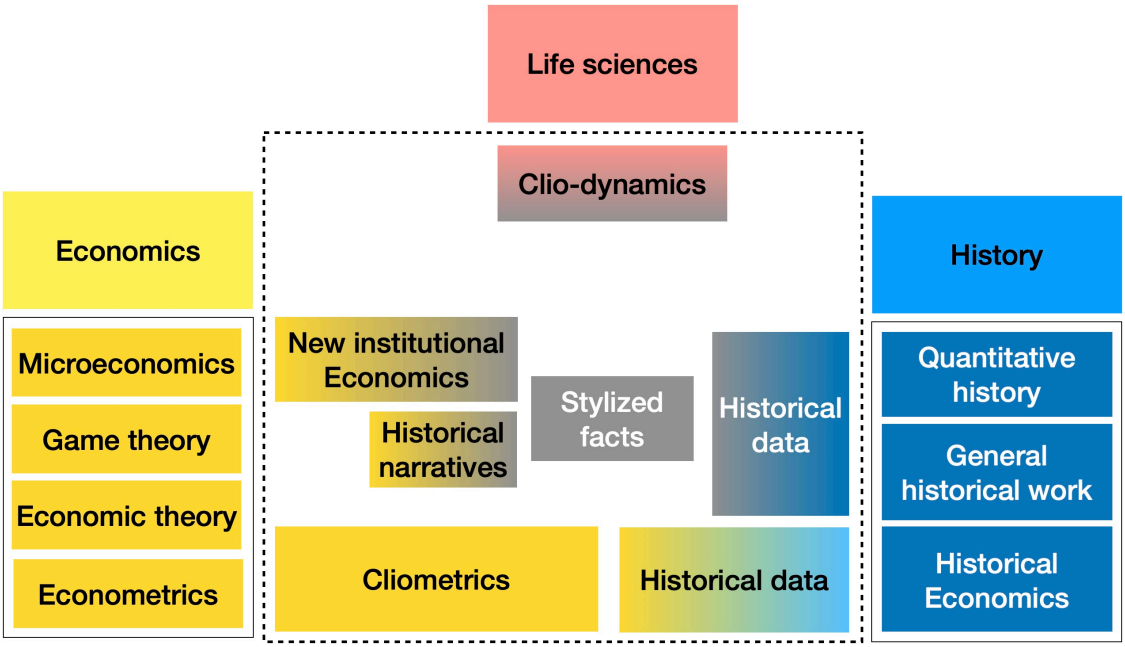

Table 1: Methodological Comparison of History/Economic Fields and Historian

Field	**Formal**	**Stylized**	**Raw Data**	**Broad Conclusions**	**Historians**
Historical Economics	-	-	XX	-	Yes
Cliometrics	XX	-	XX	X	No
NIE & History	XX	X	X	XX	No
Analytics Narratives	X	XX	-	X	No
Cliodynamics	XX	XX	-	XX	No
Quantitative History	-	-	XX	-	Yes