Economic Methodology: A Bibliometric Perspective

Alexandre Truc[a], François Claveau[b,a] and Olivier Santerre[c,a]

[a]Université du Québec à Montréal – Centre interuniversitaire de recherche sur la science et la technologie (CIRST); [b]Université de Sherbrooke; [c]Université Laval

ABSTRACT
Using tools from social network analysis, we study citation patterns since the early 1990s in the two most important journals in economic methodology (aka philosophy of economics). We mostly focus on assessing four historical claims in the existing interpretive literature. In agreement with the literature, we find that (1) it is sensible to split the field along three dimensions (corresponding to action theory, ethics and philosophy of science) and that (2) the interest for general philosophical questions (known as Big M) has steadily declined. Contra the literature, we find that (3) there is no move away from heterodox economics in the main journals: no significant interest was present to begin with. Finally, we update the literature regarding an alleged move toward the study of mainstream pluralism: (4) although this direction describes well the early 2000s, the field in the 2010s is better characterized as mainly fascinated by behavioral economics.

1. Introduction

Like other academic fields, economic methodology (also known as philosophy of economics) has its official history. In this article, we use bibliometric data together with methods from social network analysis to appraise some of its central historical tenets and to enrich the narrative.[1]

According to official history, the birth of economic methodology dates back to the late 1970s when a small number of philosophers, economists and historians of economics coalesced around shared themes. The emergence of the field is attributed to the combination of a "time of turmoil" in economics and a heightened interest for philosophy of science among historians of economics (Hausman, 2001, p. 65). In the early 1980s, it was still an "inchoate field" (Hands, 2015, p. 62), but it was following the

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CONTACTS Alexandre Truc. Email: Alexandre.Truc02@univ-paris8.fr; François Claveau. Email: Francois.Claveau@USherbrooke.ca

[1]In a companion paper (Claveau et al., 2020), we use other bibliometric methods and a larger corpus to compare the field of economic methodology with work tagged as 'Economic Methodology' by the American Economic Association (with the JEL codes).

standard process of academic institutionalization. The launch of specialized journals is a landmark of this process: *Economics and Philosophy* (E&P) in 1985 and *Methodus* in 1989, which became the *Journal of Economic Methodology* (JEM) in 1994. Another landmark is the creation of a dedicated learned society: the International Network for Economic Method (INEM) in 1989.

The early 1990s is when we take up the history of the field. With respect to appraising the existing narrative, we focus on four claims to which we give labels for ease of reference:

Three Dimensions: In the entry "Philosophy of Economics" in the *Stanford Encyclopedia of Philosophy*, Hausman (2008) distinguishes three main "subject matters [in economic methodology] which can be regarded respectively as branches of action theory, ethics (or normative social and political philosophy), and philosophy of science."

Away from Big M: McCloskey (1998, p. 160) has famously distinguished between Methodology with a big M and the work on methods with a small m, where she dismissively defines Big M as "a universalization from particular sciences to a science of science in general." Using a conception slightly less polemical of the research asking big questions about the scientific status of economics, Hands (2001) argues that, from a descriptive perspective, the importance of this type of work in the field has been decreasing in favor of questions more narrowly aimed at some parts of economics.

Away from Heterodox Economics: Another turn emphasized by Hands in more recent work is the decreasing importance of methodological research focused on heterodox approaches: "institutionalist, Marxist, Austrian, post-Keynesian and others" (Hands, 2015, p. 63).

Toward Mainstream Pluralism: The redirection of methodological attention away from Big M and heterodox economics is claimed to have benefited a variety of economic approaches: "neuroeconomics, experimental economics, behavioral economics, evolutionary economics; and the associated new tools such as computational economics, agent-based modeling, and various new empirical techniques." (Hands, 2015, p. 72)

By using clustering methods on the citation network of the two main field journals (E&P and JEM) since the 1990s, we shed light on these historical tenets. In summary, we find that (1) the distinction between the Three Dimensions is a useful interpretive grid throughout the period, (2) the move away from Big M is genuine, (3) the relative neglect of heterodox economics was already a fact in the 1990s, and (4) the methodological interest for the new mainstream started as a pluralist turn in the early 2000s, but became overwhelmingly focused on behavioral economics more recently.

2. Corpus and Method

Although economic methodology is not exhausted by what is published in *Economics and Philosophy* and the *Journal of Economic Methodology* (JEM), these two journals are widely recognized as the main specialized venues for the field. Mapping their content is thus an appropriate way to characterize what economic methodology as a field is mostly about. To do so, we recovered from Scopus all publications from these two journals since 1990 (1994 for JEM) and until 2019 inclusively: 614 articles for

Economics and Philosophy and 611 articles for the *Journal of Economic Methodology*.[2]

Like other bibliometric databases, Scopus gives us the list of references for each article. This information can be used to construct networks in a variety of manners. For this article, we generate co-citation networks. In such a network, each reference in the corpus is a node, and a link is created between two nodes when they are cited by the same article.[3] In other words, our networks are composed of books and articles that are *cited* by articles published in the two main field journals. A co-citation network is a representation of the structure of the conversation in a field: if two documents tend to be cited together in articles, we have an indication that the cited documents share some cognitive properties (and the absence of co-citations is an indication of exactly the opposite).

Co-citation analysis is particularly useful for the kind of intertemporal comparison we want to make because many nodes are shared across periods. A reference that remains central across decades will persist as a node, even if the articles citing it are different. In this way, we can follow how some publications rise and fall in popularity, how they move between clusters, and how they bridge different topics that have little else in common.

We detect clusters of nodes in our co-citation networks by applying the Leiden detection algorithm (Traag et al., 2019), which is a recent refinement of the well-known Louvain algorithm (Blondel et al., 2008). The detected clusters can be interpreted as sub-conversations in the field and the strength of connection between clusters represents how much these sub-conversations intermingle.

Once we have these automatically detected clusters, we manually attribute labels to them based on our knowledge of the field. The vast majority of the biggest clusters are easily identifiable according to us. When the identity of one cluster is unclear or subject to disagreement, we either name it 'Noise' or give it a tentative name prefixed by 'Noisy.' With this procedure, we explicitly recognize that some clusters are not easily intelligible. Most of the time, noisy clusters are simply the smallest clusters. Once the detection algorithm has regrouped the most obvious patterns, it can struggle to make sense of the remaining small groups of nodes. The smallest noisy clusters are, most of the time, citations patterns that are unique to two or three articles. In a few cases, these clusters are the result of localized bouts of interest for a particular topics. For example, the publication in 2013 of a special issue about Soros's theory of human reflexivity in the *Journal of Economic Methodology* leads the algorithm to detect one cluster about Soros. This type of cluster is detected because it breaks away from the usual citations patterns, but it does not reflect longer-term transformations in the field's interests.

The reader who wants to crosscheck our interpretations of the clusters can inspect the Technical Appendix,[4] which includes the characteristics we relied on when labeling: mainly the most frequently cited documents and the keywords (based on tf-idf) of each cluster. This appendix also includes more information about our empirical method and more results.

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[2]For more information on our corpus and for a contrast with another way to define economic methodology (not as a field, but as a type of work in the eyes of the American Economic Association), please see Claveau et al. (2020) and its Technical Appendix.

[3]In our companion paper (Claveau et al., 2020), we use bibliographic coupling instead for the network – i.e., nodes are *citing* articles and they are linked to the extent that they cite the same documents.

[4]Our Technical Appendix is available on Zenodo: https://doi.org/10.5281/zenodo.4306414

3. Three Decades of Economomic Methodology

We decided to split the network in decades. This division is arbitrary, but it introduces the temporal dimension in a highly tractable way. Indeed, we can plot the resulting three networks next to each other and detect continuities and changes with the naked eye. See Figure 1 for all the main clusters on one page, and Figure 2 for the smaller clusters of the last two decades. We note two important *continuities* that relate to the historical tenets presented in the introduction.

First, the Three Dimensions offer a useful interpretive grid over the full period. With respect to the philosophy of science dimension, Big M is the permanent cluster. Some of its most characteristic documents are Friedman (1953), Blaug (1980) and Hausman (1992), and some keywords are: science, methodology, truth, knowledge, realism. Starting in the 2000s, we also detect a philosophy of science cluster that is unmistakably more Small m, with keywords such as: econometrics, causal, macroeconomics, data mining, robustness. This cluster is never particularly large and even falls among the secondary clusters in the 2010s (see Figure 2b). The ethics dimension is represented over the whole period by Political Philosophy clusters. The most characteristic documents of this set of clusters include Rawls (1971), Nozick (1974) and Parfit (1984), and typical keywords are: equality, good, freedom, utility, justice. With respect to the action theory dimension, a cluster that we label Sociality and Interactions survives for the three decades, but only as a secondary cluster since the 2000s. Throughout the period, a focus of the cluster is game theory, with keywords such as 'games' and characteristic documents being Aumann (1976) and, later, Bacharach (2006). Yet, this cluster is broader than game theory since it touches on issues such as conventions and performativity. Since the 2000s, another secondary cluster is Decision Theory, with keywords such as 'decision' and characteristic documents being Savage (1954) and Luce and Raiffa (1957).

The Three Dimensions are not only useful as tags for many clusters. They also accurately predict the relative proximity of clusters – i.e., clusters in a given decade tend to have fewer connections when they are not part of the same dimension. Big M and Small m tend to be close in the network, and the same holds among the Political Philosophy clusters. In contrast, a glance at Figure 1 is sufficient to see that Big M is far from Political Philosophy. The same holds for Sociality and Interactions – a cluster associated to the action theory dimension – which the algorithm typically places far from Big M and Political Philosophy.

The second important continuity in economic methodology is the lack of significant interest for heterodox topics. Contrary to what we might expect based on the historical tenet Away from Heterodox Economics, such topics were not significantly more present in the 1990s than in the 2010s. At the level of aggregation we are using, they were already absent in the 1990s. In the two main journals of the field, heterodox economics has never had a significant presence. In another paper (Claveau et al., 2020), we show that another 'economic methodology' was and *still is* highly interested in heterodox economics: this set of research is tagged with the JEL Code 'Economic Methodology,' but is published in various other journals such as the *Cambridge Journal of Economics* and the *Journal of Economic Issues*. Our results thus suggest that Away from Heterodox Economics gives an inappropriate depiction of the field's history – 'Heterodox Economics: Keep Out' would be a more appropriate label.
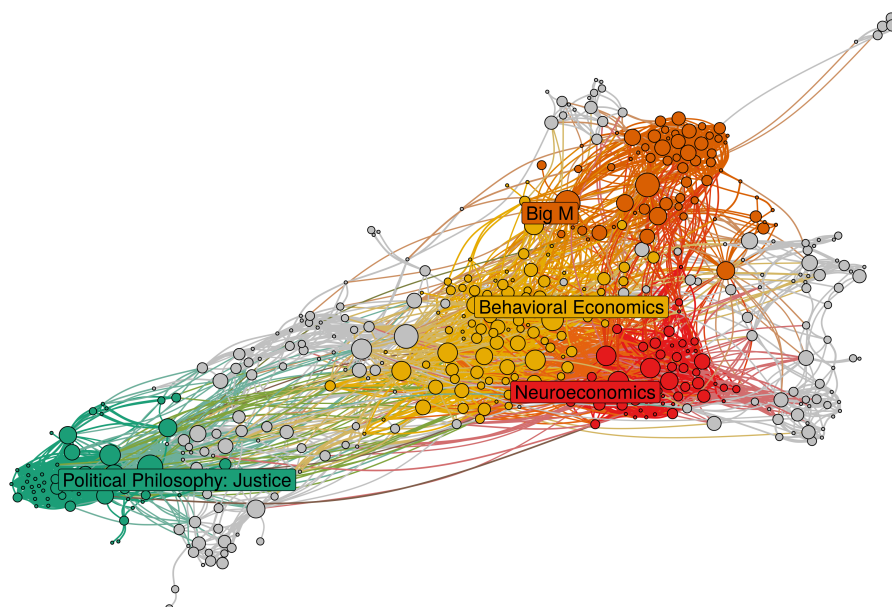
The three subsections below discuss results specific to each decade. They allow us to assess the two remaining historical tenets: Away from Big M and Toward Maintream Pluralism.
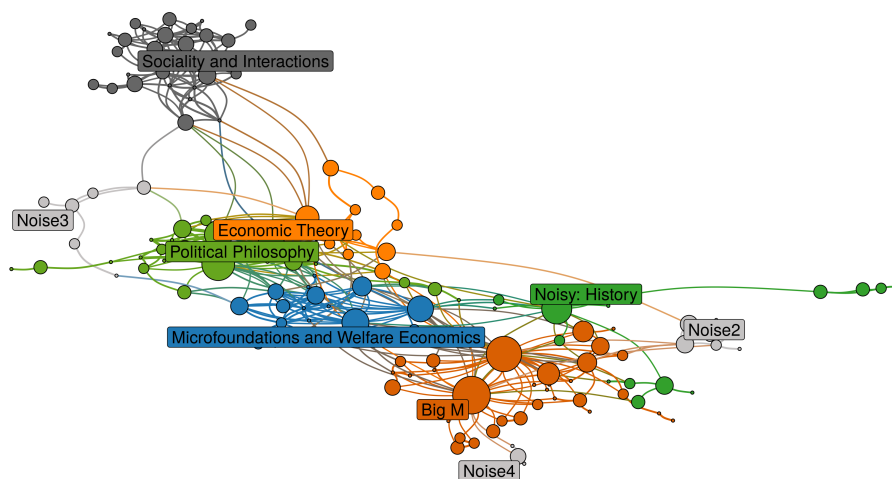
(a) 1990-1999 clusters (all clusters are shown)
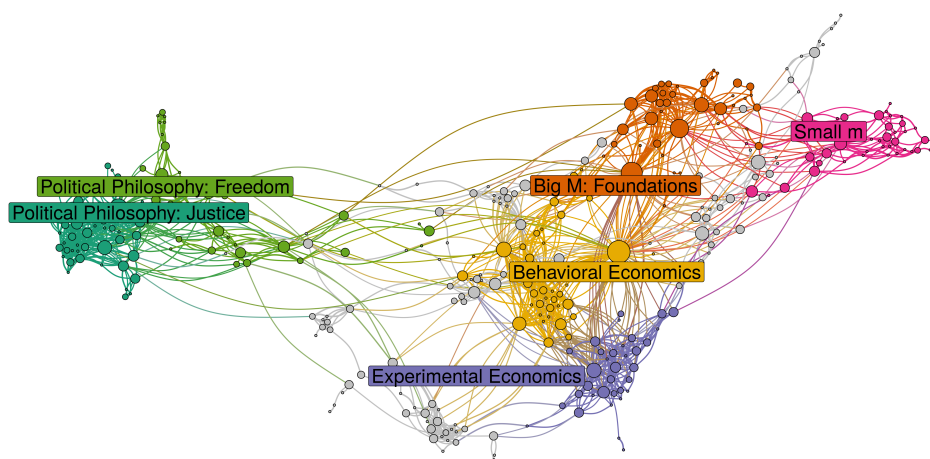
(b) 2000-2009 main clusters (see Figure 2a for the secondary clusters)

(c) 2010-2019 main clusters (see Figure 2b for the secondary clusters)

Figure 1. Co-citation networks by decades of the two main journals in economic methodology: main clusters
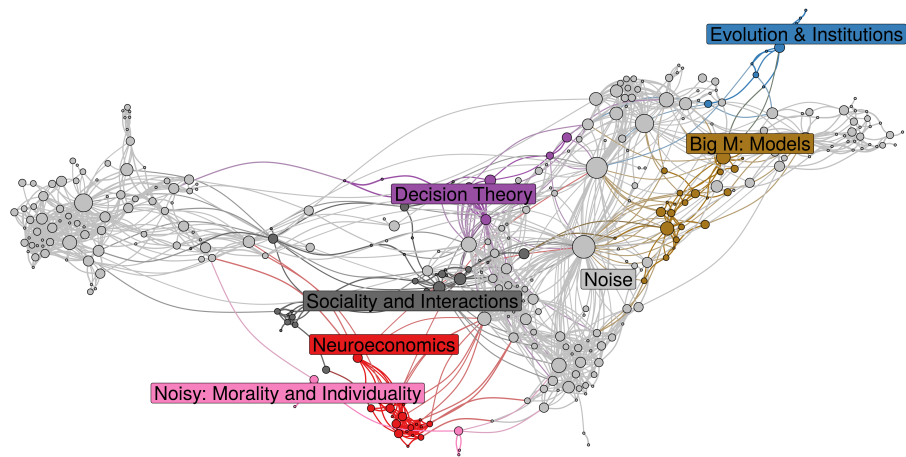
(a) 2000-2009 secondary clusters (see Figure 1b for the main clusters)
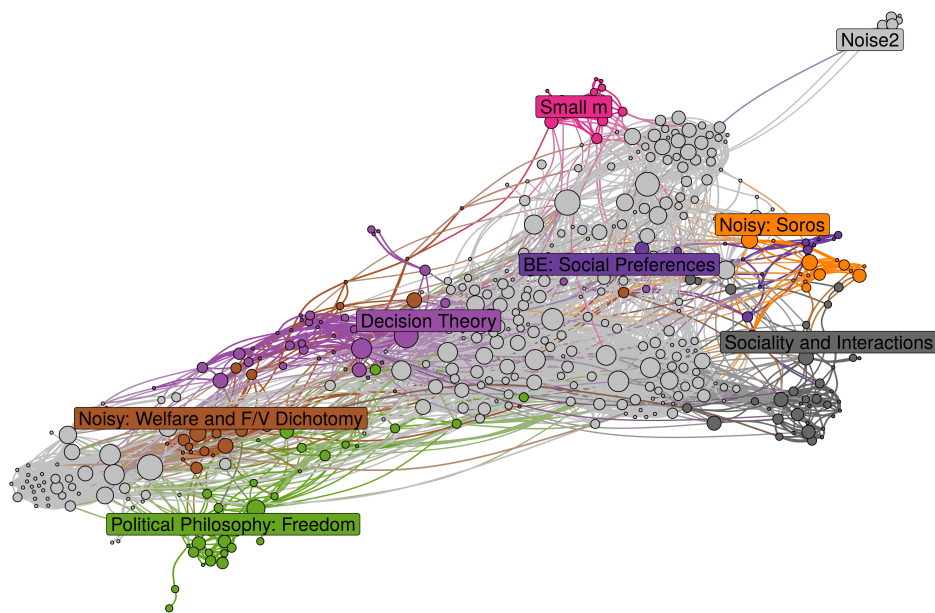

(b) 2010-2019 secondary clusters (see Figure 1c for the main clusters)

Figure 2. Co-citation networks by decades of the two main journals in economic methodology: secondary clusters

3.1. The 1990s: Three Dimensions

Five properties of the 1990-1999 network stand out. First, as can be appreciated from Figure 1, it has far fewer nodes (i.e., cited documents) than the networks for the other two decades. The main reasons for the smaller size are that fewer articles where published in the first decade (JEM starting in 1994) and the average number of references per article is trending up through time.

Second, a few documents are extraordinarily important in the first decade – i.e., they receive an important fraction of the citations. Those are represented as the largest nodes in Figure 1a. They can be neatly divided into three types of contributions:

(1) Contributions by methodologists or philosophers of economics such as Blaug (1980), McCloskey (1985) and Hausman (1992) in Big M and a neighboring noisy cluster (labeled 'Noisy: History' in Figure 1a).
(2) Contributions by moral or political philosophers such as Rawls (1971), Nozick (1974) and Parfit (1984) in Political Philosophy.
(3) Contributions by famous economists such as Robbins (1932), Samuelson (1947) and Friedman (1953) in clusters specific to this decade that we label 'Microfoundations and Welfare Economics' and 'Economic Theory.'

Among all these central references, the status of Hausman (1992) is remarkable. In this first decade, Hausman's book was the most cited reference, and the most central contribution from a methodologist both in closeness and betweenness.[5] This performance is impressive given that the book was published several years after the other most cited documents, and three years into the decade of our network. In other words, in the decade of its publication, Hausman (1992) immediately became a central and structuring reference for methodologists.

Third, regarding the identity of clusters, the first three clusters in terms of number of citations exactly correspond to the Three Dimensions: Big M (24%), Sociality and Interactions (18%) and Political Philosophy (16%), the two other noteworthy clusters are those labeled Microfoundations and Welfare Economics (14% of citations) and Economic Theory (8%). We already alluded to the content of these two clusters: seminal contributions by economists are central to them. The rest of the network is made of a few small clusters with noisy identities and situated at the periphery of the network.

Fourth, regarding the structure of the network, the Three Dimensions are evidently operative. A rough indication of this structuring role is the distance in Figure 1a between the clusters representing each dimension. More detailed evidence is supplied by the matrix in Figure 3, where cells give the percentage of links in the row cluster that are connected to the column cluster (the diagonal of the matrix gives the percentage of internal links). Sociality and Interactions (action theory), Political Philosophy (ethics) and Big M (philosophy of science) are the most inward-looking clusters and, most importantly, there are almost no direct relations between them. The strongest relation between two of these clusters involves Big M and Political Philosophy; it represents only 2.3% of the total links of Big M. Moreover, the clusters that do not fall neatly under one dimension are those that bridge the main clusters: the references included in Microfoundations and Welfare Economics and in Economic Theory are those that are shared across dimensions.

Fifth and finally, Sociality and Interactions has a unique property during the decade: it is by far the most isolated cluster, with 95,5% of its links being internal. We can infer that articles on questions related to social interactions and game theory formed an

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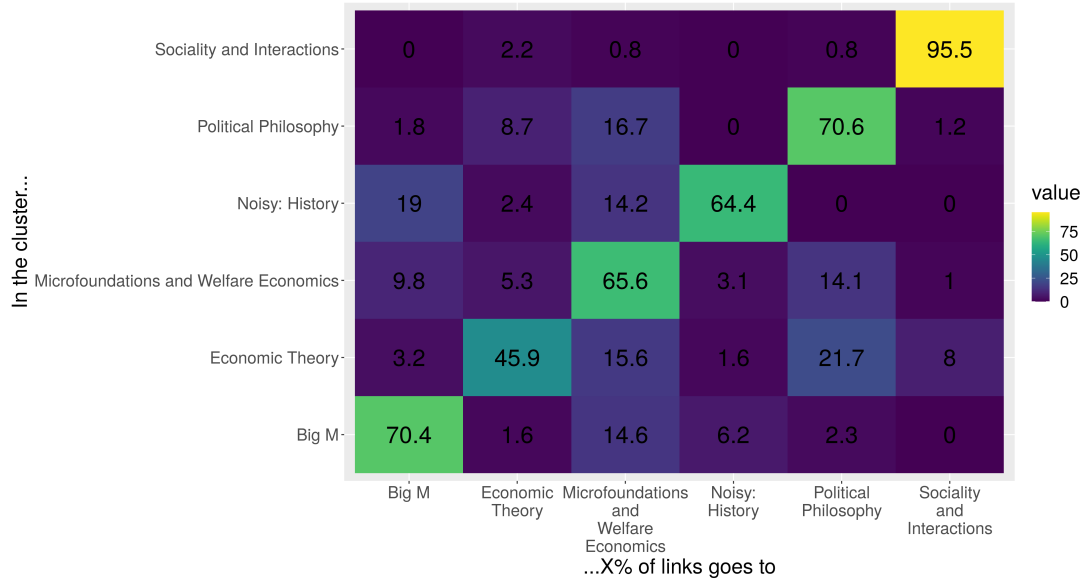[5]See the Technical Appendix for these measures.

Figure 3. Matrix of the weighted share of links between clusters

Table 1. Share of citations for the clusters surviving at least two decades

Cluster	1990s	2000s	2010s	
Big M	24%	14%	16%	←(Foundations)
		7%		←(Models)
Sociality and Interactions	16%	7%	7%	
Political Philosophy	18%	14%	12%	←(Justice)
		11%	7%	←(Freedom)
Behavioral Economics	–	13%	23%	
Decision Theory	–	4%	8%	
Neuroeconomics	–	5%	11%	
Small m	–	10%	3%	

almost autonomous subfield inside economic methodology in the 1990s. This situation will change drastically in the 2000s when action theory will migrate to the center of the network.

3.2. The 2000s: A Pluralistic Turn away from Big M?

The 1990s constitute the reference point to which we can compare the following decades in order to assess the remaining two historical tenets: Away from Big M and Toward Mainstream Pluralism. Does the 2000-2009 network move in the predicted directions?

With respect to Away from Big M, we indeed notice a decreasing interest for grand philosophy of science. The clusters structured by seminal contributions from economists about the foundations and definition of economics disappeared. For example, Samuelson (1947) is not in the top 15 most cited documents in the network, and the vast majority of clusters are now structured by relatively recent publications with narrower topics. Big M as a cluster is now split in two: one about traditional foundational issues in economics and one on the epistemic status of models. Yet, the combined size (in shares of citations and of nodes) of these two clusters is smaller than the unique Big M cluster from the 1990s (see Tables 1 and 2).
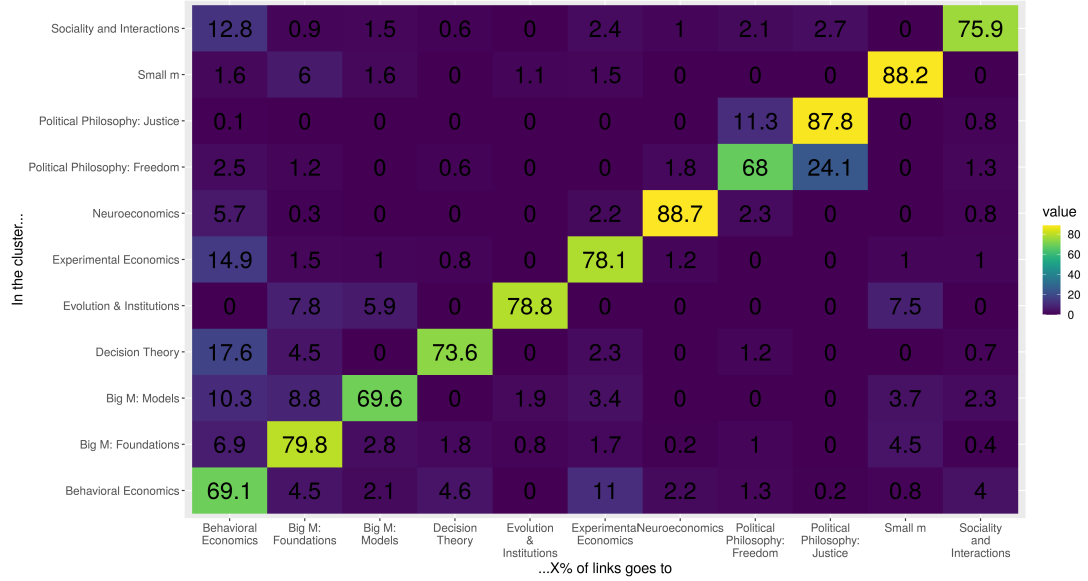
Figure 4. Matrix of the weighted share of links between clusters

We also find evidence of a move Toward Mainstream Pluralism with the emergence of various applied topics mapping onto those highlighted by Hands: three clusters relating to behavioral approaches in economics (Behavioral Economics, Experimental Economics, Neuroeconomics), one Evolution & Institutions cluster about evolutionary approaches, and one Small m cluster relating to "various new empirical techniques." (Hands, 2015, p. 72)

The most important transformation of the network is the emergence and rapid growth of Behavioral Economics and related clusters. In the 2000s, Behavioral Economics is the most central cluster as measured by closeness and betweenness, and the second most important cluster by citations (Table 1). This is partly explained by the fact that the algorithm includes Hausman (1992) in this cluster, which is the most cited and most central document in the network. With its depiction of economics as an "inexact" and "separate" science, Hausman's book contributed to framing the early methodological investigation of behavioral economics.

The rise of experiments and experimental economics understood as Vernon Smith's research program gave rise to a separate cluster about the role of experiments in economics, with the controversies involving Starmer (1999) and Binmore (1999) playing a strong structuring role. Finally, we find Neuroeconomics, a smaller cluster (and one of the least connected clusters, see Figure 4), which is also partly structured by methodological controversies, this time by Camerer et al. (2005) and Gul and Pesendorfer (2008).

The appearance of these behavioral clusters restructures the whole field. Most strikingly, while the action theory cluster was extremely isolated in the 1990s, the clusters on this dimension in the 2000s have strong relations to the new behavioral clusters and are thus placed at the center of the network. This property holds for Sociality and Interactions – which diversifies to include, in addition to game theory, team reasoning, social ontology and performativity. The property also holds for a new Decision Theory cluster. These two clusters are small, but central to the network.

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Table 2. Share of nodes for the clusters surviving at least two decades

Cluster	1990s	2000s	2010s	
Big M	22%	11% 7%	14%	←(Foundations) ←(Models)
Sociality and Interactions	19%	8%	8%	
Political Philosophy	16%	14% 11%	12% 8%	←(Justice) ←(Freedom)
Behavioral Economics	–	12%	21%	
Decision Theory	–	4%	8%	
Neuroeconomics	–	6%	11%	
Small m	–	12%	3%	

The restructuring of the field in the 2000s also affects the ethics dimension. It is still strongly represented, with two Political Philosophy clusters (Justice and Freedom) that jointly make up a quarter of the field (see Tables 1 and 2). Yet, the ethics dimension now has the least connected clusters in the network, a property evident in the network representation of Figure 1b and quantified in the matrix of Figure 4.

3.3. The 2010s: The Centrality of Behavioral Economics

The network for the 2000s supports the historical claims Away from Big M and Toward Mainstream Pluralism. What about the most recent decade?

With respect to Away from Big M, the 2010s continue the historical trajectory. In contrast with the 2000s, there is only one Big M cluster in the most recent decade, a cluster which combines the long-lived discussion about the foundations of economics with the more recent topic of the epistemic status of models. Regarding size, the combined weight of Big M is smaller (see Tables 1 and 2). Furthermore, the changing position of Big M in the network indicates a decreasing importance of the cluster for the field. Indeed, Big M is now the second least connected cluster and only Small m has a relation to it that is worth mentioning (see Figure 5).

Another indication of the historical trend Away from Big M is the position of Hausman (1992) in the field. this book quickly became a crucial reference in the 1990s, and acted as a bridge between the different specialties of the pluralistic turn in the 2000s. Various indicators of node centrality (e.g., betweenness, closeness; see the Technical Appendix) place it second in the 1990s and first in the 2000s. In the last decade, its centrality has dropped significantly (to 7th place according to betweenness and 12th place in closeness). Methodologists interested in, for instance, Behavioral Economics and Neuroeconomics now favor framing the discussion with some of the more recent and applied contributions by methodologists such as Guala (2005), Ross (2005) and Hausman (2012), rather than via the Big M appraisal of orthodox economics by Hausman (1992).

With respect to the last historical tenet, the trend Toward Mainstream Pluralism did not persist in the 2010s. What we find is rather the consolidation of Behavioral Economics and Neuroeconomics as the central topics of interest to methodologists. Jointly, they almost doubled their share of the network from the 2000s to the 2010s (see Tables 1 and 2). Many clusters that were part of the more general pluralistic turn identified by Hands (2015) did not survive the transition. Evolution and Institutions disappeared and Experimental Economics was swallowed by Behaviorlal Economics. Small m is still present, but as a very small cluster with less than 3.5% of nodes and citations (see Tables 1 and 2). Overall, the pluralistic turn of the 2000s morphed into a behavioral turn in the 2010s.
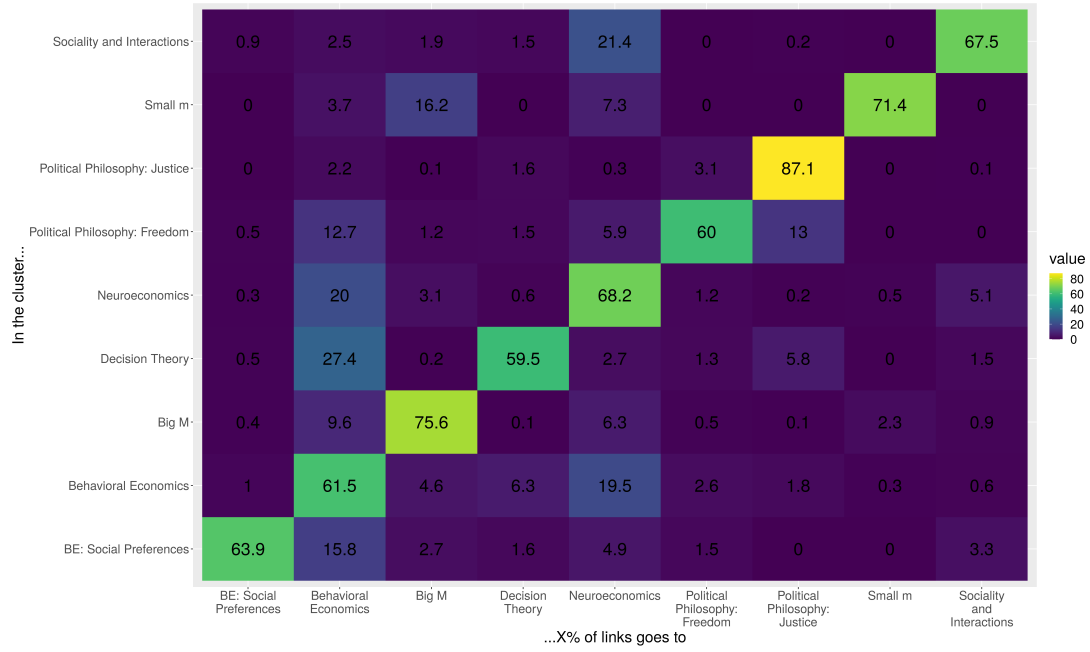
In the cluster...	BE: Social Preferences	Behavioral Economics	Big M	Decision Theory	Neuroeconomics	Political Philosophy: Freedom	Political Philosophy: Justice	Small m	Sociality and Interactions
Sociality and Interactions	0.9	2.5	1.9	1.5	21.4	0	0.2	0	67.5
Small m	0	3.7	16.2	0	7.3	0	0	71.4	0
Political Philosophy: Justice	0	2.2	0.1	1.6	0.3	3.1	87.1	0	0.1
Political Philosophy: Freedom	0.5	12.7	1.2	1.5	5.9	60	13	0	0
Neuroeconomics	0.3	20	3.1	0.6	68.2	1.2	0.2	0.5	5.1
Decision Theory	0.5	27.4	0.2	59.5	2.7	1.3	5.8	0	1.5
Big M	0.4	9.6	75.6	0.1	6.3	0.5	0.1	2.3	0.9
Behavioral Economics	1	61.5	4.6	6.3	19.5	2.6	1.8	0.3	0.6
BE: Social Preferences	63.9	15.8	2.7	1.6	4.9	1.5	0	0	3.3

...X% of links goes to

Figure 5. Matrix of the weighted share of links between clusters

The network representation in Figure 1c gives a neat depiction of the centrality of behavioral (and neuro) economics to contemporary economic methodology. It is only a slight exaggeration to say that a shared fascination for behavioral economics is what holds the field together. The Three Dimensions of action theory, ethics and philosophy of science are now bridged by the clusters Behavioral Economics and Neuroeconomics.

A noteworthy example of how the behavioral turn restructured the field is the changing position of Political Philosophy from the 2000s to the 2010s. In the previous decade, the ethics dimension was isolated. If we look closely at what bridges Political Philosophy and Behavioral Economics in the 2000s, we find very few references, and most of the links are cocitations to Hausman (1992) and to multiple articles by Amartya Sen. By the 2010s, the connection is far stronger, due to the overlapping themes of utility and nudges. Frequent cocitations involve Kahneman et al. (1997), Thaler and Sunstein (2008), Hausman (2012), and multiple articles by Robert Sugden. The connection is even stronger if we take into account that a noisy cluster about Welfare an the Fact/Value Dichotomy appeared between Behavioral Economics and Political Philosophy.

A last note must go to the status of the action theory dimension in the 2010s. Sociality and Interactions survived with subjects similar to the 2000s (team reasoning, performativity and social ontology), but its position went from the center of the network back to the margin as in the 1990s. While in the 2000s it benefited from its strong relationship with Behavioral Economics to occupy a central role in the network, it is now almost solely connected to Neuroeconomics. Decision Theory maintained its strong relationship with Behavioral Economics, while also playing a bridging role between Political Philosophy: Justice and the rest of the network.

4. Conclusion

The creation of *Economics and Philosophy* and of the *Journal of Economic Methodology* in the mid 1980s and 1990s was an important step in the consolidation of economic methodology as an academic field. In the 1990s, much of its attention focused on seminal papers in economics about methodology. Back then, it was already the case that the methodologies of heterodox economics were a minor topic – i.e., there is no significant historical trend Away from Heterodox Economics in these journals because the topic was peripheral to begin with.

Yet, two historical trends put forth in the existing interpretive literature are at least partially corroborated by our results. First, the claim that the field has steadily trended Away from Big M is fully corroborated: questions addressed by the literature today tend to be more focused on some aspect of economics or the economy rather than on the issue of the status of economics as a science. Second, there has been a temporary move Toward Mainstream Pluralism in the second decade (the 2000s), with the blossoming of a variety of new topics in relation to Behavioral Economics, Experimental Economics, Neuroeconomics, Evolutionary Economics and new empirical tools. However, the already relative importance of Behavioral Economics in the 2000s foretold the transformation of the next decade. By the 2010s, the move Toward Mainstream Pluralism had transformed into a behavioral turn: most recently, much of the attention of methodologists concentrates on Behavioral Economics and Neuroeconomics at the expense of other development in economics.

Finally, we find that the Three Dimensions proposed by Hausman (2008) are a valuable interpretive grid in all three decades: some clusters can readily be associated to "branches of action theory, ethics [...], and philosophy of science." What is striking about the recent state of the field is the centrality of clusters – Behavioral Economics and Neuroeconomics – that sit at the intersection of these three dimensions. Indeed, this behavioral turn raises questions about how to produce knowledge in economics (philosophy of science), about the status of rational choice (action theory) and about how to realize our ideal of a just society (ethics). We submit that the confluence of these three dimensions goes a long way in explaining the recent fascination of economic methodologists for the behavioral turn.

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