The Economics of JEM: Evidence for Estrangement

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Abstract

We present bibliometric evidence for increasing estrangement between the philosophy of economics and economics itself. Our analysis centers on research articles published in the *Journal of Economic Methodology* (JEM) between 1994 and 2021. We analyze the citations within these research articles, in particular with respect to the citations of economics. Our results are fourfold. (1) The share of economic citations in JEM articles has been decreasing. (2) The remaining economic citations in JEM articles are increasingly older relative to citation patterns within economics. (3) The profile of economic citations in JEM articles is increasingly dissimilar when compared to what is cited within economics. (4) There is decreasing diversity with regards to the share of attention towards different economic subfields in the articles published in JEM when compared to economics. We discuss interpretations of this evidence for estrangement between philosophy of economics and economics.

Keywords: scientometrics; bibliometrics; digital humanities; diversity; philosophy of economics; economic methodology

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Introduction

Philosophy of economics studies economics philosophically. Or so could a literally minded bystander assume. For contributors to philosophy of economics, the relation between philosophy and economics is far more complex, and subject to a great deal of discussion in the field. Does philosophy of economics represent accurately and comprehensively what happens in economics? Should it? And does philosophy of economics engage with economics in the right way; is it relevant for economics?

In this article, we provide bibliometric evidence in order to help debate these questions more fruitfully. Our analysis centers on the part of philosophy of economics that addresses questions regarding the methodology of economics – that is, we are less concerned with economic ethics, rational choice, and history of economic thought (see Hausman 2003). We focus mainly on publications in the *Journal of Economic Methodology* (JEM) between 1994 and 2021, thus aiming at uncovering "the economics of JEM".

We employ bibliometric methods in a hypothetico-deductive setup.[1] We formulate and assess the “estrangement hypothesis” – that philosophy of economics, propelled by its internal dynamics, has increasingly represented economics in ways that are at odds with the current state of economics. Specifically, we test four empirical implications of the hypothesis: (1) decreasing citation intensity, (2) citation aging, (3) citation profile dissimilarity, and (4) diverging attention shares.

We find strong support for each of the empirical implications of the estrangement hypothesis: (1) citations to economics decline, (2) they grow older, (3) they have become less similar to what economics cites of itself, and (4) large swaths of economics seem simply off radar in recent philosophy of economics. The picture that emerges is that of a growing discrepancy between economics and how philosophy of economics represents it.

Our study provides factual insight fitting for the kind of critical self-reflection that a burgeoning field of research deserves.[2] It can contribute to inform debates about how philosophy of economics should be conducted. Specifically, our study is relevant for “taxonomic” concerns about philosophy of economics, i.e. discussing what kind of topics the field studies and could study in the future. Moreover, the results we present are relevant for concerns of “representation” of economics within the philosophy of economics, i.e. discussing whether the depiction of economics within the field is accurate and comprehensive. Both the taxonomic and

[1] Our empirical strategy extends what we have done in recent papers on the bibliometrics of philosophy of economics (Claveau et al. 2021; Truc et al. 2021) and of economics in general (Claveau and Gingras 2016; Truc et al. 2023).

[2] We take it as given that few philosophers of a special science would debate the imperative to know their science and represent it accurately and comprehensively. However, philosophers of a special science, as a collective, may struggle to keep pace with the ever renewed diversity of their sciences. Our bibliometric study helps characterize to what extent philosophy of economics does so. For a study with a similar objective, but looking at philosophy of biology, see Pradeu (2017). See Malaterre et al. (2020) for results partially different from Pradeu’s.

representation concerns are, in turn, relevant for discussing matters of diversity, or lack thereof, within philosophy of economics. Indeed, while questions of diversity within philosophy of economics are rightfully centered on demographic characteristics of authors, diversity has many dimensions. One of those dimensions relates to how the diversity of topics, questions and approaches within economics is reflected in the philosophy of economics. Our study speaks to this kind of diversity.

Estrangement, as we have identified it, describes a shift in the attention of philosophy of economics away from the current state of economics, a shift which has observable implications in citation patterns. Whether or to what extent estrangement is bad news is another question. Without taking sides on this normative issue in the context of this article, we challenge everyone active in the field to develop their response.

We proceed as follows. In Section 2, we summarize the self-reflective discussions within philosophy of economics as we understand them and introduce the estrangement hypothesis and its four empirical implications that we study. In Section 3, we explain our data and methods. In Section 4, we present the study results. In Section 5 we discuss our findings.

2 Self-reflection and Estrangement

2.1 Self-reflection in the philosophy of economics

The field of philosophy of economics seems to undergo a self-reflective period in recent years. Many institutions in philosophy of economics (such as journals, associations, programmes, institutes) are in their third or fourth decade of existence. Also, there are currently an unprecedented number of strong researchers active in the field who are also recognized beyond it (Heilmann and Reiss 2021). Many of the scholars who have founded the field are still active, and several cohorts educated by them and their students are shaping the field in new ways (see Hausman 2021 and Mäki 2021 for historical overviews of the field).

We divide the self-reflection debates in the field into five kinds of concerns: (i) identity concerns, (ii) taxonomic concerns, (iii) scope concerns, (iv) representational concerns, and (v) relevance and engagement concerns.

(i) Identity concerns. Philosophy of economics is currently hosted, by and large, by the discipline of philosophy. The major journals, institutes, conferences, and teaching programmes are almost exclusively put on by philosophy departments. Most scholars working in the philosophy of economics are based in philosophy departments (with the exception of France, where most of such scholars are working in economics departments). Indeed, within the philosophy of science, philosophy of economics is now an established subfield, whereas in economics it is not (Heilmann and Reiss 2021, Hands 2023).

(ii) Taxonomic concerns. One key aspect of the self-reflection in philosophy of economics entails a sort of metaphysical concern: asking what the field actually *is* and amounts to – that is, more practically speaking, a taxonomic concern. Here, it is helpful to keep in mind the classic distinction by Daniel Hausman (2003) between: (a) history of economic thought, (b) methodology of economics, (c) rational choice, and (d) economic ethics. A number of articles have been devoted to studying the respective changes in scope of the field between these four broad aspects. For recent and detailed discussion of taxonomic concerns, see Mäki (2021), Heilmann and Reiss (2021), Claveau et al. (2021), Mireles-Flores and Nagatsu (2022), and Hands (2023).

(iii) Scope concerns. An important variant of taxonomic concerns lies in discussing the scope of questions researched: on the one hand, philosophers of economics of the first hour have often aimed at characterizing methodological questions regarding economics as a whole. Deirdre McCloskey (1998) has called this “big M” methodology and Alexandrova et al (2021) call this more neutrally “big picture” philosophy of economics. On the other hand, in recent years, philosophers of economics have focused on narrower, more specific questions and case studies within the philosophy of economics (McCloskey’s “small m” methodology and Alexandrova et al’s “fine grained” philosophy of economics).

(iv) Representational concerns. Some philosophers of economics are questioning whether economics is "represented" in the right way. Does the field do a good job of “capturing” economics? Are some topics underrepresented or are they overrepresented? Are economic subfields (or economists) misrepresented in some way? And is adequate attention paid to heterodox economics and mainstream economics (e.g. Dow 2021, Lehtinen 2021)? A prominent theme in this regard is the question of whether there is too much focus on theory, and on microeconomics (and, specifically, on microeconomic theory). For instance, Kincaid and Ross (2021) as well as Ross and Townshend (2021) argue that philosophers of economics, like philosophers of physics before them, misrepresent economics in some ways. They contend that philosophers of economics have tended to exaggerate both the importance of theory driving experiments and the extent to which practicing scientists take theory literally as opposed to using it mainly as a heuristic and pedagogical tool.[3] The representational concerns seem to be most pressing to those philosophers of economics who subscribe to the goal of studying economics as closely as possible.

(v) Relevance and engagement concerns. These kinds of concerns are the most explicitly evaluative. Here, a number of contributors are speculating about what the *important* questions of the field are (and have been, and should be). For instance, philosophers of economics are often wondering whether there is the ‘right kind’ of engagement with economics. Is the work of philosophers of economics in any way useful to economics as a science, or to individual

[3] The recent debate in JEM on interpreting the role of microeconomic theory for economics, instigated by Gilboa et al (2022), which has generated responses by Kuorikoski and Marchionni (2024) and Janssen, Knuuttila and Morgan (2024), is a recent example of a debate that is driven, in part, by the idea that it is important to capture the practice of economics adequately.

economists?[4] Is philosophy of economics 'relevant' for economics? One nagging worry is that philosophy of economics is not connected enough to what economics is about. Earlier contributions have searched for reasons on the economics side to explain the lack of engagement between economists and philosophers (e.g. Frey 2001), or have sought to create dialogues between economists and philosophers (e.g. Boettke et al. 2006). Some of the essays in the 2021 JEM special issue entitled "Economic Methodology and Philosophy of Economics: Past, present and future" strike a somewhat more pessimistic tone. For example, Vromen (2021) contends that economists have recently started to reflect more on the methodology they employ, but that economic methodologists have distanced themselves from the practice of economics. He argues that economic methodologists play less of an intermediary role between philosophy and economics, but are rather using economics as a case study for the philosophy of science. At the same time, contributors like Ross (2021), Guala (2021) and Alexandrova et al. (2021) stress the inherent demand and need for methodology of economics.

To sum up. The five kinds of concerns—(i) identity concerns, (ii) taxonomic concerns, (iii) scope concerns, (iv) representational concerns, and (v) relevance and engagement concerns—are key to the self-reflection efforts in the philosophy of economics. The aim of our study is to provide bibliometric evidence that is relevant to them. Our evidence speaks most directly to the representational concerns, but, as we shall see, it is relevant for the other concerns as well.

2.2 The need for evidence in debating "estrangement"

The self-reflection questions are often debated in seminars and at conferences, both in the sessions, but perhaps more hotly in coffee breaks and over drinks. Some of the arguments exchanged are undoubtedly based on personal interests and proclivities of the philosophers and methodologists of economics themselves. Looming "estrangement" between the field of philosophy of economics and economics itself is an important undercurrent in such debates. Indeed, the simple fact that the *identity* of philosophy of economics has become more philosophical in recent times raises the question whether there is also a kind of estrangement from economics.

Evidence is needed that allows for a more informed and fruitful debate (and, if necessary, intervention for change). This article provides such evidence–bibliometric evidence for the estrangement of philosophy of economics from economics. More specifically, we started off by formulating a hypothesis about the dynamics of philosophy of economics as a field.

> **Estrangement Hypothesis:** As philosophy of economics matures, it becomes increasingly driven by its internal dynamics, which translates into a growing discrepancy between the current state of economics and its representation of it.

[4] These concerns are not limited to philosophy of economics. For instance, Khelfaoui et al. (2021) investigate the visibility of philosophy of science in the sciences (STEM and SSH) using bibliometric methods and a rich literature has developed around the relevance and usefulness of philosophy for the sciences (e.g. Rovelli 2018, Laplane et al. 2019, De Haro 2020, Pradeu et al. 2021).

The present study is an attempt at assessing this hypothesis with bibliometric methods. To be amenable to bibliometric testing, we interpreted this hypothesis as having four implications:[5]

1. **Decreasing Citation Intensity.** As philosophy of economics matures, bibliographic references to economics take a decreasing share of what it cites.
2. **Citation Aging.** As philosophy of economics matures, its citation share to *recent* economic documents declines. More specifically, the citation pattern of philosophy of economics toward economics ages far more quickly than the citation pattern of the economics toward itself.
3. **Citation Profile Dissimilarity**. As philosophy of economics matures, its full citation profile toward economics becomes less similar to the full citation profile of economics toward itself at any point in the past of economics. In other words, early in its creation, what philosophy of economics cites from economics is similar to what, at some point in the past, economics cited about itself. Since it certainly takes time for even the most attentive philosophy of economics to identify new important trends in economics, its most similar citation profile will probably be with the state of economics a few years back. When philosophy of economics is more established however, the estrangement hypothesis implies that we cannot find a publication year in economics that cites itself in a fashion highly similar to how philosophy of economics cites economics.
4. **Diverging Attention Shares**. As philosophy of economics matures, the divergence grows between its relative attention to the various parts of economics and the relative attention of economics toward the same parts.

3 Data and methods

We describe how we test the observable implications of the estrangement hypothesis.

3.1 Data sources

We use data from two bibliographic databases: Clarivate's Web of Science and Elsevier's Scopus. The need to use both databases arises from the fact that the first years of our main journal for philosophy of economics, the *Journal of Economic Methodology* (or JEM), are only indexed in Scopus, while the license we use for the Web of Science database does allow us to work with large corpora such as our economics corpus of more than 350,000 articles (which would have been impossible with Scopus).

More specifically, we use a classification from the US National Science Foundation to identify the *economics* journals in Web of Science (National Science Board, 2006, Appendix table 5-39). Among the documents in these journals, we keep only research articles (thus removing, for instance, book reviews). Scopus provides the documents for philosophy of economics. Our first corpus of philosophy of economics is made of all research articles in JEM. The second corpus

[5] Other implications could be formulated and tested.

results from a search on Scopus for publications (either journals or books) with both "philosophy" and "economics" in their titles, from which we also keep only research articles or chapters. Two thirds of documents in this second corpus of philosophy of economics are from two journals: *Economics & Philosophy*, and *Politics, Philosophy & Economics* (for the full list of sources see the Technical Appendix).

For us, the division between JEM and the 'Other Philosophy of Economics' captures the distinction between venues focusing on the philosophy of economic *science* (JEM) and other venues that encompass more diverse aims of philosophy of economics (e.g., decision theory, ethics and economics, history of economic thought). The philosophy of science imperative to "know your science" should thus apply to a greater extent to JEM, and empirical observations that correspond to the predictions of the estrangement hypothesis are, at least *prima facie*, more troubling for JEM than the other philosophy of economics.

Since our assessment of the estrangement hypothesis centers on JEM, we start our philosophy of economics corpora in 1994, the year when JEM started publication. We make our economics corpus go back to the early 1980s to provide the historical background to the early years of philosophy of economics. We stop all our corpora in 2021 because our economics data are incomplete beyond this date. Table 1 supplies general descriptive statistics for our three corpora.

Journal type	Articles	References (total)	Share of references toward economics (as detected)
Economics Journals	362,930	12,519,803	40.7%
Journal of Economic Methodology	618	26,406	29%
Other Philosophy of Economics	1,198	46,811	18.2%

Table 1: Descriptive statistics of the bibliographic data

3.2 Data cleaning

This study uses extensively the references of documents. We developed various heuristics for data cleaning to detect when the same document is referenced by an economics document or a philosophy of economics document, even though the two citing documents are indexed in different databases.[6] We attributed unique identifiers to references that are the same. Extensive tests were performed on random samples to make sure that we very rarely attribute the same

[6] For instance, we use OpenRefine's implementation of the fingerprint algorithm in an iterative fashion to find clusters of the same document with minor spelling differences. See https://openrefine.org/docs/technical-reference/clustering-in-depth (last accessed 2023-12-19). We will gladly share our data cleaning routine with interested readers. For another article using both Scopus and Web of Science, see Echchakoui, 2020.

identifier to two references that are, in fact, different, and that we attribute the same identifier when the references are indeed the same.

Furthermore, we developed another set of heuristics to find which references are toward economics documents. The shares of references that we confidently classify as being to economics documents are in the last column of Table 1. The complement of these shares are composed of two types of documents: those that are not economics documents and those that are economics documents, but that our heuristics do not identify as such. For instance, citations to working papers are especially hard to identify computationally. Manual classification on random samples gives a sensitivity around 0.7 for our identification procedure, with an almost perfect precision. According to our tests, further major improvements of sensitivity will generate significant costs in terms of precision. The economics references that we fail to identify are typically to documents that are very rarely cited. Consequently, we are confident that their exclusion does not affect in any major way our results.

3.3 Measuring aggregate citation behaviors

Our primary units are published documents. The main dyadic property for our purposes is the citation relation: 'd_i is citing d_j.' In this relation, we refer to d_i as the 'citing document' and to d_j as the 'cited document.'

There are two main monadic properties of documents for our purposes. First, we rely on the publication year of documents (y_i). Second, we use two group types membership (g_i). Our first group type was introduced above: publishing venues. There are three possibilities for this type: journals in economics, the *Journal of Economic Methodology*, and other venues in philosophy of economics (which combine journals and a few books).

Our second group type is used in the section on attention shares: specialties inside the discipline of economics. Frontiers between specialties are certainly more in flux than the disciplines themselves, but they still exhibit a significant degree of stability through time.[7] Furthermore, specialties have typical citation behaviors that allow us to detect them with bibliometric tools. For our purposes, we built co-citation networks of economics documents published in overlapping two-decade windows: 1984-2003, 1994-2013, 2004-2021. We use the Leiden community-detection algorithm to find clusters (Traag et al., 2019).[8] These clusters are then grouped in intertemporal specialties when two clusters for adjacent windows share most of their cited documents.

We use the notation D and C for *sets* of citing and cited documents respectively. We specify some properties of the sets in parenthesis. For instance, D(JEM) is the set of documents published in JEM while D(Econ, 1984-2003) is the set of documents published in economics between 1984 and 2003, inclusively. Sets of cited documents can take up to four arguments, C(g, y → cg, cy), where g and y are grouping and year information about the source of the

[7] See Claveau and Gingras 2016 for the use of the same concept for economics.
[8] See Truc et al. 2021 for another use of the Leiden algorithm on a co-citation network.

citation (i.e., the citing documents), cg and cy are grouping and year information about the cited documents themselves, and the arrow symbol is used as a reminder of the direction of the citation relation. For instance, C(JEM, 1994 → Econ, 1990) means the set of documents cited by JEM articles in 1994 that were published in economics in 1990. We sometimes count the number of element in a set, which we denote by |S|.

We will define a few new properties and functions over these sets in the results below. Although we cannot share our data due to their proprietary nature, the code to reproduce our analysis is provided in our Technical Appendix.

4 Results

In this section, we probe our data to test the four empirically observable implications of the estrangement hypothesis: decreasing citation intensity, citation aging, decreasing similarity of citation profiles and diverging attention shares.

4.1 Citation intensity

Our first implication is conceptually the simplest.

Decreasing citation intensity: For any $y_i > y_j$,

$$|C(JEM, y_i \rightarrow ECON)| / |C(JEM, y_i)| < |C(JEM, y_j, \rightarrow ECON)| / |C(JEM, y_j)|$$

In plain English, the claim is that, as philosophy of economics matures, the proportion of its references that go to economics decreases. Among its portfolio of citations, those that are to economics documents take a diminishing share.

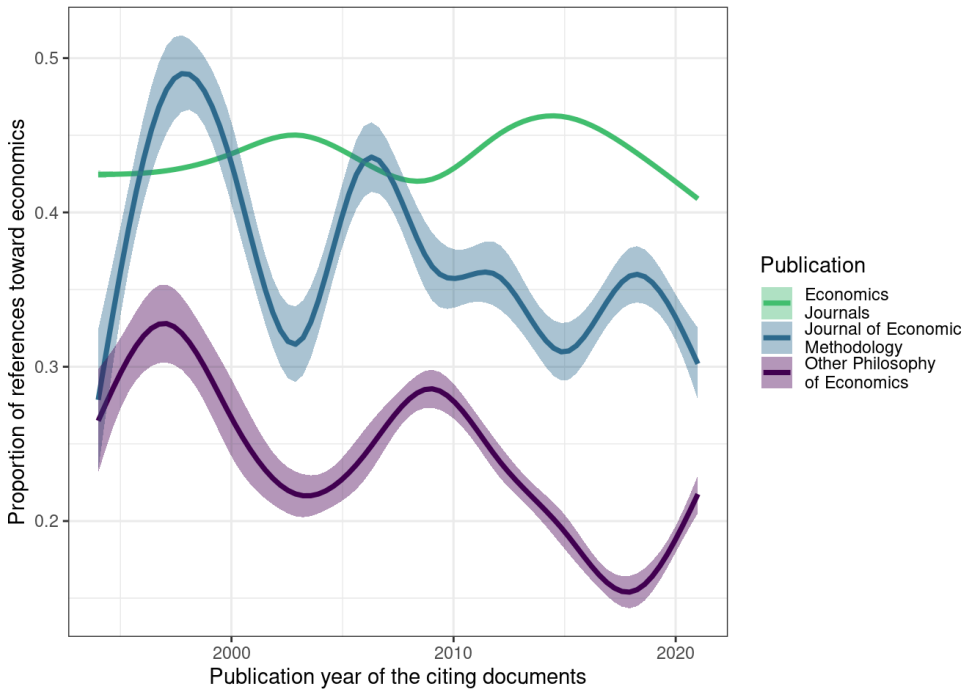

Figure 1: Proportion of citation toward economics from three types of journals (proportions are corrected for fluctuations in estimated recall; see the Technical Appendix)

Figure 1 tests this claim. The main curve is the one for the *Journal of Economic Methodology*. From 1994 to 2006, we do not observe decreasing citation intensity for this journal: the curve exhibits wide fluctuations with no clear trend. However, a trend sets in after this point, with a clear decrease in the share of citations toward economics for the rest of the period. If we take the share per decade, decreasing citation intensity is observed over the three decades, from a citation share of 40% in 1994-2003 to a share of 33% in 2014-2021, with an intermediate share of 38% for the middle decade of 2004-2013.

The other two curves are supplied as contrasts. We see that economics has a relatively stable self-citation rate over the period, while the other publications in philosophy of economics have an even stronger downward trend than JEM publications when it comes to citations toward economics.

4.2 Citation aging

For the second testable implication of the estrangement hypothesis, we need the notion of citation delay between the year of publication of the citing document and the year of publication of the cited document, i.e., dl = y - cy in the notation introduced above. For a set of cited documents C(g, y → cg) where the publication year of the cited document (cy) is not fixed, we have a distribution of citation delay. We can thus define the cumulative distribution function over this set: CDF(dl; g, y → cg). This function gives the probability for a document in the group cg and cited by a document in group g published in y to have a citation delay smaller or equal to dl. Take this example:

CDF(10; JEM, 1994-2003 → Econ) = 0.46,

which means that 46% of citations to economics documents by documents published in the decade 1994-2003 in the *Journal of Economic Methodology* have been published inside the ten years before the publication year of their citing document.

With the cumulative distribution function, we can now spell out more precisely the first version of citation aging:

Non-contrastive citation aging: For any positive delay dl and any $y_i > y_j$,

CDF(dl; JEM, y_i → Econ) < CDF(dl; JEM, y_j → Econ).

In plain English, the claim is that, as philosophy of economics matures, the proportion of cited economics documents published inside any given citation delay (say, 5 or 10 years) decreases. In graphical terms, the cumulative distribution function of JEM toward economics would shift toward the right as the field matures.

Since citation aging might be a phenomenon that occurs in most fields, including economics, a stronger claim is more interesting:

Relative citation aging: For any positive delay dl and any $y_i > y_j$,

CDF(dl; Econ, y_i → Econ) - CDF(dl; JEM, y_i → Econ) > CDF(dl; Econ, y_j → Econ) - CDF(dl; JEM, y_j → Econ)

In plain English, the claim is that, as philosophy of economics matures, the gap widens between the typical citation delay of its economics citations and the typical citation delay of economics toward itself. In graphical terms, the cumulative distribution function of JEM toward economics should shift faster to the right as the field matures than the CDF of economics toward economics.

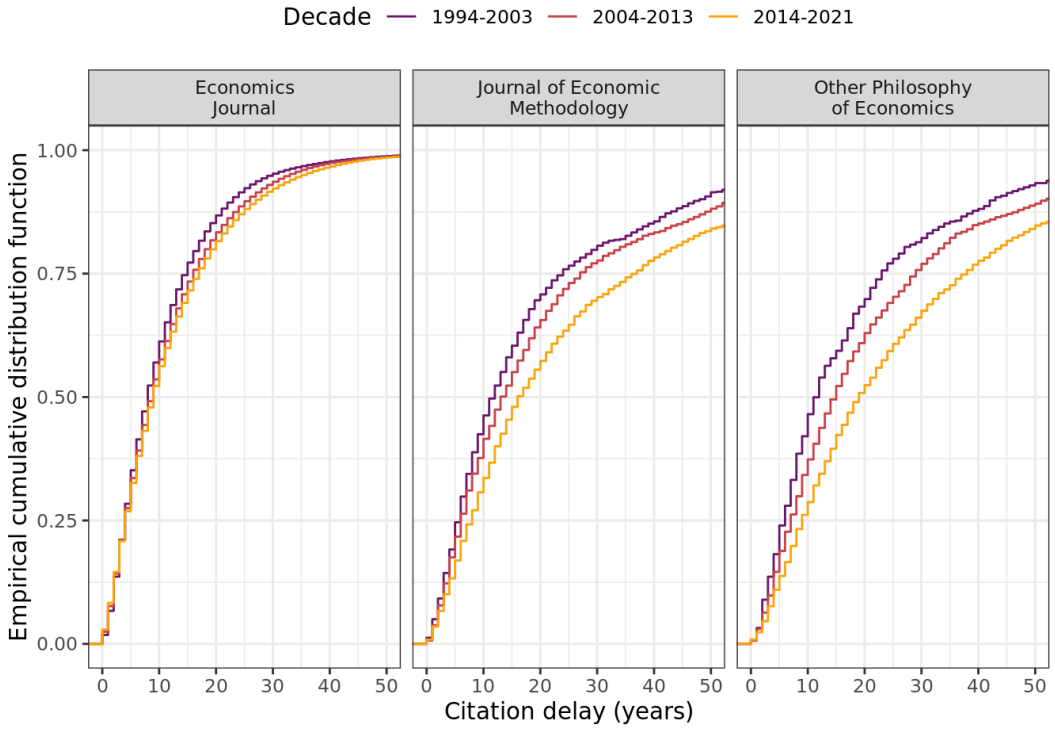

Figure 2: Delay of citation toward economics from three types of journals and over three decades

Figure 2 tests these two claims. For non-contrastive citation aging, one must focus on the middle panel, which represents the empirical cumulative distribution function of citations from the *Journal of Economic Methodology* toward economics over the three decades of the field. We see that, as expected, the distribution in the last decade (2014-2021) is shifted to the right compared to the first decade (1994-2003). This rightward shift started in the previous decade (2004-2013), but has accelerated.

Relative citation aging is assessed by comparing the evolution of the cumulative distributions in the first panel (from economics to economics) with the evolution in the second panel. We can notice a slight rightward shift in the citation delay from economics too, but it is far slower than the shift in the *Journal of Economic Methodology.* In other words, there is citation aging from economics, too, but this process runs at a far higher pace in JEM.

The last panel is offered as an additional contrast, going beyond the two main claims tested in this section. Since the philosophy of economics venues in the last panel are less focused on philosophy of economic *science*, we could expect that scholars publishing in these venues feel less compelled than those publishing in JEM to follow contemporary developments in economics. This expectation would translate in a distribution of citation delays in the third panel that is even more shifted to the right initially and shifts even faster to the right than the middle panel. What we find, however, is that citation delays for these two types of journals in philosophy of economics have distributions that look much alike in all decades. Articles in the *Journal of Economic Methodology* do not seem to keep track of what is new in economics significantly more than the other venues in the field.

4.3 Citation profiles

Philosophy of economics might exhibit citation aging because, with the growth of scientific disciplines, it becomes harder to quickly assess which developments in economics are worth attention within philosophy of economics. Attentive philosophers of economics would still strive to do justice to major developments in economics, but succeed in it only with an increasing delay. For instance, if they initially started working on new trends with a delay of only one to three years, a more mature, but still attentive philosophy of economics could come to resemble the state of economics of five to ten years back.

In contrast, an implication of the estrangement hypothesis is:

> **Decreasing citation profile similarity**: For any $y_i > y_j$,
> $\max_k(\text{sim}(C(\text{JEM}, y_i \rightarrow \text{Econ}), C(\text{Econ}, y_k \rightarrow \text{Econ}))) < \max_l(\text{sim}(C(\text{JEM}, y_j \rightarrow \text{Econ}), C(\text{Econ}, y_l \rightarrow, \text{Econ}))$

In plain English, as philosophy of economics matures, its citation profile grows more distant from the citation profile of economics *at any given point in time*. In graphical terms, if we draw for each time period a measure of similarity between the citation profiles of JEM toward economics

and of economics toward itself, the maximum value reached for this measure will be highest for the oldest time period and lowest for the most recent time period.

To operationalize this claim, we again split documents in our philosophy of economics corpora by their publication decade. The citation profile of these documents toward Economics is then compared to the citation profile of documents published in economics *each year* from 1980 onward. Citation profiles are formatted as multidimensional vectors, where each vector element is the number of citations to a specific document. The similarity of two vectors – $sim(C_i, C_k)$ – is measured using cosine similarity.

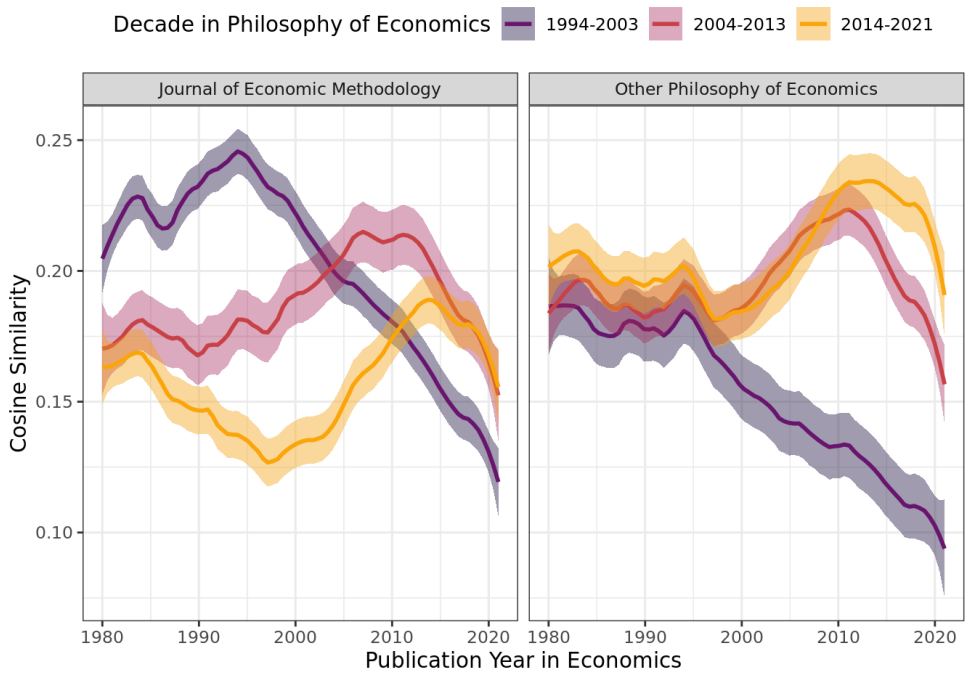

Figure 3: Similarity of citation profiles toward economics, where philosophy of economics is compared to economics

Figure 3 tests the claim of decreasing citation profile similarity. The left-hand-side panel is of immediate concern. It shows that profile similarity peaks around 1994 for the first decade of the *Journal of Economic Methodology* (1994-2003), around 2008 for the second decade (2004-2013) and around 2014 for the third decade (2014-2021). Most importantly, these peaks are lower as the field matures, which is exactly what we expected. The drop from a maximum similarity of 0.25 in the first decade to a maximum below 0.2 in the most recent decade confirms the claim of this section.

The second panel of Figure 3 is offered for contrast. It shows that, surprisingly, peak similarity in citation profiles increases with time for the other venues of philosophy of economics in our corpus. Furthermore, peak similarity in these journals started lower than in JEM in the first decade and grew to be significantly higher than JEM in the last decade of our corpus.

Decreasing similarity of citation profile thus seems to be a condition that affects the *Journal of Economic Methodology* specifically.

4.4 Attention shares

The estrangement hypothesis recognizes that estrangement is not synonymous to absolute disconnection: an estranged philosophy of economics still keeps some interest in economics. However, this interest is mostly defined by the internal dynamics of the field, which implies that citations to economics will tend to cluster in some parts of economics, irrespective of the relative interest that economists have in these parts. This dynamics is what generates the last implication of the estrangement hypothesis that we assess in this article: diverging attention shares.

Figure 4 depicts the detected specialties of economics from the mid-1980s to the early 2020s. Each vertical bar represents the distribution of Economics among these specialties over a two-decade window. The curves between the bars indicate how documents are reallocated in the next two-decade window.

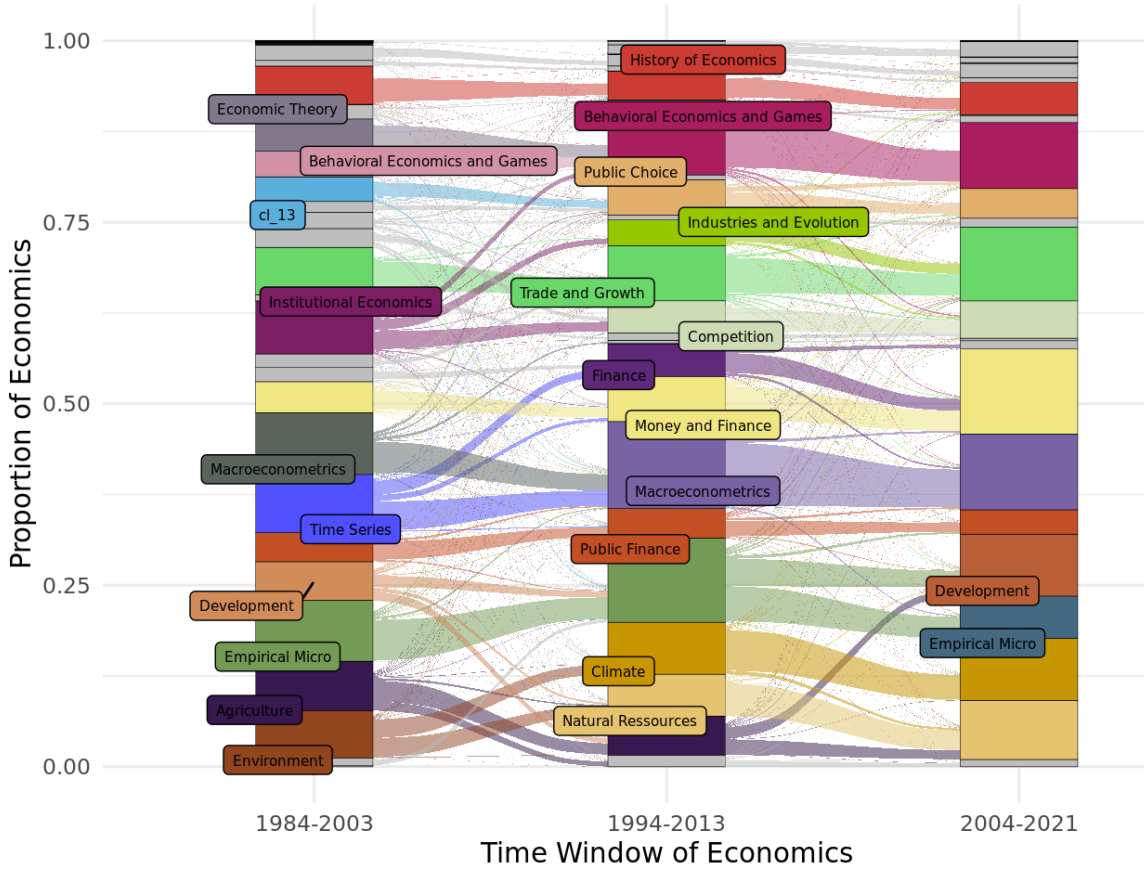

Figure 4: Specialties in economics over 40 years. The specialties are detected by applying the Leiden community detection algorithm on co-citation networks of documents published

in economics. The names of the clusters are manually attributed by the authors after inspecting various characteristics of the cluster (see the Technical Appendix for details).

Let us use 's' to refer to a specialty. We can now define A(g, y → s, cg) as the attention share of citing group D(g, y) toward specialty s in cited group cg. This attention share is equal to the proportion of citations by D(g, y) toward cg that are toward s. For two citing groups g_1 and g_2, their attention shares toward the set of specialties in cited group cg are identical at time y if and only if $A(g_1, y \rightarrow s_h, cg) = A(g_2, y \rightarrow s_h, cg)$, for all s_h that are elements of a partition of cg.

With this notion, the fourth implication of the estrangement hypothesis can be expressed as follows:

Diverging attention shares. For any $y_i > y_j$,

$sum\_\{s_h\} \mid A(g_1, y_i \rightarrow s_h, cg) - A(g_2, y_i \rightarrow s_h, cg) \mid >$

$sum\_\{s_h\} \mid A(g_1, y_j \rightarrow s_h, cg) - A(g_2, y_j \rightarrow s_h, cg) \mid$

In plain English, as philosophy of economics matures, the distance grows larger between its attention shares toward specialties in economics and the attention shares of economics toward the same specialties. In graphical terms, if the horizontal axis is the attention shares of economics toward its own specialties and the vertical axis is the attention shares of JEM toward economics specialties, the 45 degree line in this plane corresponds to equal attention shares in economics and in JEM. The implication is that the points representing specialties will fall ever further from this 45 degree line as philosophy of economics grows older.

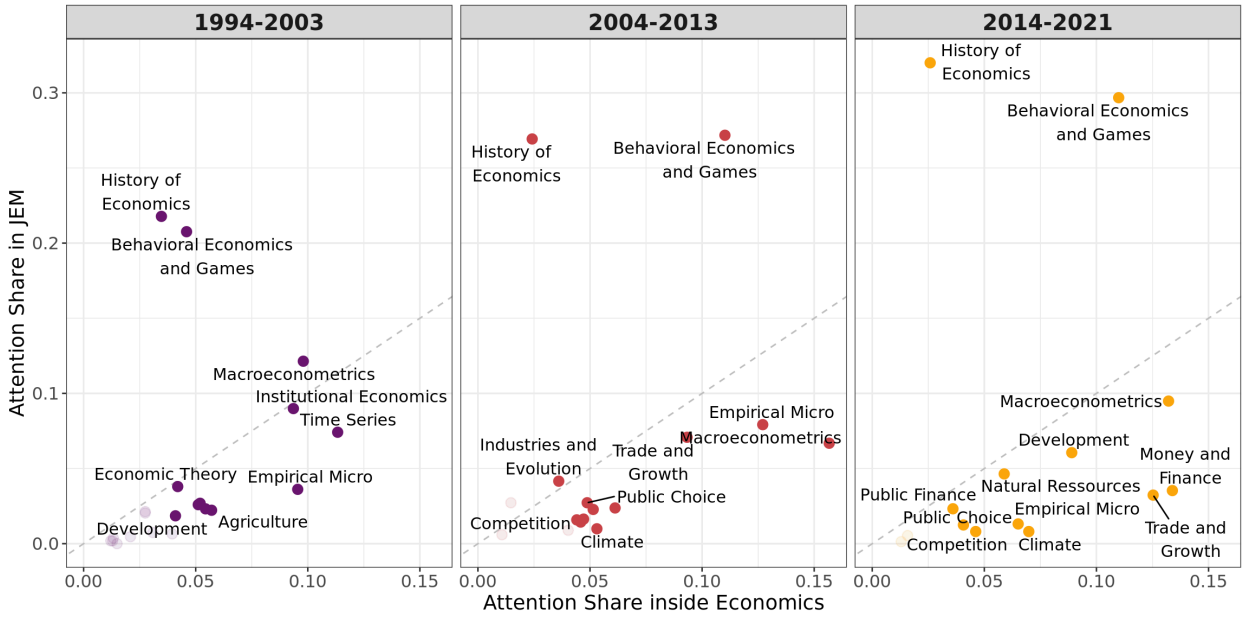

Figure 5: Attention shares toward specialties in economics. The dotted line is the 45 degree line where all specialties would fall if the attention shares from economics and from JEM were identical. The smallest specialties are either not included (below an attention share of 0.01) or included as semi-transparent and with no label.

We indeed find that the sum of the absolute differences in attention increases over the three decades, with 0.775 in 1994-2003, 0.878 in 2004-2013 and 1.013 in 2014-2021. Figure 5 illustrates this divergence in attention shares. We see in the first panel that two specialties were already, in the first decade, significantly above the 45 degree line of equal attention shares. We have manually labeled these specialties: 'History of Economics' and 'Behavioral Economics and Games'. Putting these specialties aside, we see that most of the other specialties are relatively close to the 45 degree line, including 'Macroeconometrics,' 'Institutional Economics' and 'Economic Theory.' Two connected phenomena occur when we move toward the middle and third panels. First, we see that the two specialties that already attracted a disproportionate amount of attention in JEM get even higher shares in the more recent decades. They attracted two thirds of JEM's attention in the last decade although their combined attention share in economics is not even 15%. Second, JEM's attention share toward other specialties is almost zero most recently. Some important specialties such as 'Climate Economics', 'Trade and Growth', and 'Money and Finance' barely register on JEM's radar.

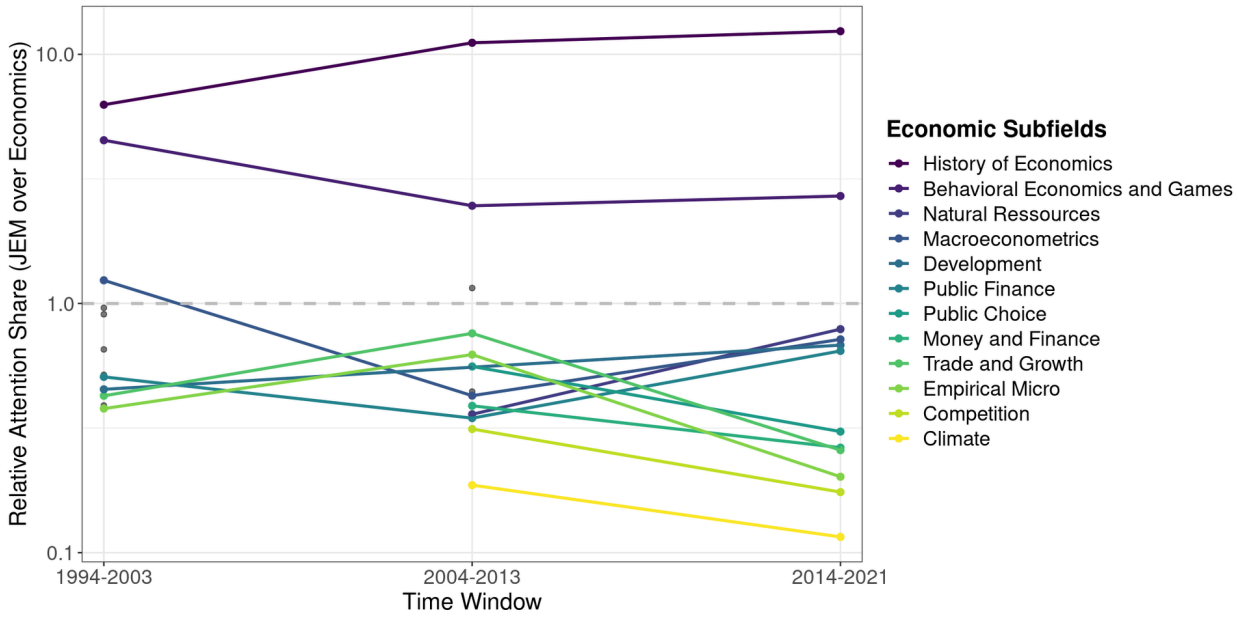

Figure 6: Relative attention share from JEM and economics to specialities in economics over three decades. The horizontal dotted line represents the point of equal attention shares. The y-axis is a logarithmic scale, so equal distances above or below the dotted line represent the same intensity of divergence in attention shares, with JEM paying more attention than economics to a speciality if the point is above the line, and the reverse if the point is below the line. Specialties are included if their combined attention share (JEM + economics) is greater than 0.05 in the time window. Isolated gray points are specialties that exist for only one window.

Figure 6 represents the same results differently. The dotted line corresponds again to equal attention shares. Hence, specialties *above* this dotted line draw more attention from JEM compared to economics. Conversely, specialties *under* the dotted line draw more attention from economics than from JEM.

With this representation, ‘History of Economics’ stands out as the specialty attracting an ever increasing excess of attention from JEM, with 12.4 times more attention compared to economics in the last decade. The trajectory of ‘Behavioral Economics and Games’ is notably different because attention shares in JEM and in Economics both increased over the first two decades. At the other extreme, ‘Climate Economics’ gets virtually no attention from JEM, reaching an all time low in the last decade of 8.7 times less attention when compared to Economics. A distinctive feature of the last decade is the multiplication of these specialties with very low relative attention from JEM: there are 6 specialties in 2014-2021 with an attention share three times smaller in JEM than in economics, while this number was zero and two in the first two decades respectively.

5 Discussion

The estrangement hypothesis states that, as it ages, philosophy of economics is increasingly driven by its internal dynamics, which leads it to represent economics in ways that are ever more at odds with the current state of economics. In the case of the *Journal of Economic Methodology*, data strongly corroborate the four empirical implications of the estrangement hypothesis formulated in this article. Citations to economics are less frequent, they grow older, they have become less similar to what economics cites of itself, and large swaths of economics seem simply off radar to recent philosophy of economics. We first discuss the implications of these findings for the self-reflective debates within the philosophy of economics. Thereafter, we discuss possible consequences one might draw for it.

5.1 Evidence for estrangement: what does it mean for the self-reflection concerns within philosophy of economics?

What can be learned from the bibliometric evidence for estrangement? Specifically, what does it entail for the five self-reflection concerns we identified in section 2?

First and foremost, we believe that the bibliometric evidence enhances our understanding of the field’s dynamics. The evidence emphasizes many of the self-reflection concerns: the five concerns mentioned are not just imagined or the result of speculation. There is bibliometric evidence for them. First, it underscores the identity concern (i): philosophy of economics has indeed become less closely congruent with economics, as discussed by Heilmann and Reiss (2021) and Hands (2023).[9] Regarding the concerns of taxonomy (ii) and scope (iii), the picture seems clear: philosophy of economics, as conducted in JEM, has increasingly focused on fewer subfields within economics. That is, over time, there is less diversity in terms of the topics and themes discussed in economics. This finding is of importance in particular with regards to the perceived trend of more “fine grained” work taking over from “big picture” philosophy of economics (Alexandrova et al 2021). This trend coincides with fewer subfields in economics

[9] However, we have no evidence allowing us to claim that philosophy of economics has become *more philosophical* (see our Technical Appendix).

being analyzed in fine-grained philosophy of economics published in JEM. Furthermore, the evidence for estrangement underpins a pessimistic take on the representation concerns (iv): the representation of economics is less diverse than economics itself, and thus less accurate and comprehensive in that respect, which is in line with the view of, for instance, Dow (2021), Lehtinen (2021), Kincaid and Ross (2021), as well as Ross and Townshend (2021). Finally, in as far as citations are a meaningful measure of "engagement" and "relevance" (v), the evidence suggests there is less of it, which is relevant for the discussions in the special issue of the Journel of Economic Methodology from 2021, especially Vromen (2021).

On this reading of the evidence, it shows that philosophy of economics has become more dissimilar to economics in important respects. There is a discrepancy in citation patterns between philosophy of economics and economics itself, which suggests that philosophers of economics have shifted their attention. Rather than mirroring what happens in economics, they are increasingly preoccupied with other things, or so the bibliometric evidence suggests.

5.2 From evidence for estrangement to evaluation and action

Philosophers of economics have become increasingly driven by interactions with their in-group members and thus spend less resources tracking what occurs with economics. This, in turn, raises the question whether that is a good or bad thing. Does it constitute a kind of "failure" of the field? For instance, does it substantiate the idea that the philosophy of economics is increasingly an echo chamber in which philosophers of economics are talking to themselves? Or does the estrangement we uncovered have benign, or even optimistic explanations, for instance related to the increasing philosophical maturity, independence, and creativity of the field?

The interaction between philosophers of economics about questions raised by philosophers of economics generates estrangement, and it thus also generates less diversity in what is being discussed about economics. At the same time, one may maintain that there are good philosophical grounds for such prioritization. That would amount to endorsing a position such as the following.

> **Philosophical Primacy:** not all scientific developments merit the same degree of philosophical attention. As philosophy of economics matures, it grows more adept at identifying the developments that merit philosophical attention, which tend to be older and concentrated in some specialties of economics.

Specifically, one might defend "philosophical primacy" in order to explain and justify the large amount of articles written on "Behavioural Economics and Games" in JEM. The proliferation of this kind of work would be simply due to philosophical problems being particularly interesting and fruitful to discuss. Take, for example, the increasing attention to discussing the concept of "preference" in philosophy of economics. The disproportionate amount of attention for this subject may well be justified by philosophers of economics having discovered a fruitful subject of research–one that merits disproportionate attention. Indeed, one might further argue that

division of labor between philosophers and economists dictates that philosophers of economics "take over" the discussion of conceptually fruitful topics. Not every topic and theme in economics will harbor those. Indeed, if one were to endorse "philosophical primacy" normatively, one would expect the following: an early philosophy of economics would probe various specialties of economics, with no strong preference for older contributions. As philosophy of economics matures, its scholars would limit their investigation of specialties with low philosophical potential and would coalesce around a reduced list of major references and topics for further analysis.

Naturally, weaker positions than "philosophical primacy" are also possible, such as granting that some aspects of economics with high philosophical potential are off radar in philosophy of economics, but maintaining that this is a necessary limitation: to avoid superficiality, philosophy of economics must have selective attention with respect to economics. One might also further explain the estrangement by "journal sorting", i.e. the process of increasing specialization and compartmentalisation. Some areas of economics may simply have come to be discussed philosophically in other journals than JEM.[10]

We do not wish to endorse "philosophical primacy" here – that would require a much more in depth discussion. We merely wish to illustrate that our evidence for estrangement can facilitate discussions about the relative merit of research directions within philosophy of economics. We challenge scholars in the field to develop their own responses to the evidence presented in this article.

We find it plausible that many will see the evidence for estrangement as indicating a worrying and unjustified lack of diversity in philosophy of economics regarding its attention toward economics. We hope that scholars (including those entering the field) use our findings to identify underappreciated areas of economics that offer worthwhile opportunities for contributing new and interesting work to the philosophy of economics.

We also think that those in positions of power within the field – such as editors and convenors of seminars and conferences – will do well to reflect on the diversity implications of the evidence we presented here. More often than not, attention to multiple dimensions of diversity is fruitful for overall diversity. Broadening the range of topics, questions, and approaches from economics may also lead to more demographic diversity of authors within philosophy of economics.

[10] For example, climate economics and the shift away from structural econometrics may well receive their fair share of philosophical attention, but in seemingly more generalist journals such as *Journal of Applied Philosophy* and *Philosophy of the Social Sciences* and in journals that cut differently across academic specializations (e.g., *Ethics, Policy & Environment*).

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