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Quantitative and Computational Approaches in the Social Studies of Economics¹

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This special issue presents a diverse set of scholarly contributions that apply quantitative and computational methods to questions that fall within the broad scope of the social studies of economics. The main aim of putting the contributions together is to showcase these methods and their potential to help generate novel insights and new accounts about economics as a scientific discipline embedded in a social context, about its evolution over time, and about its role in policymaking. The special issue contains ten contributions that apply a variety of methods, illustrate different ways in which they can be put to use, and offer an overview of the kinds of data they help analyze.

Three recent developments are motivating this special issue.

First, the set of quantitative and computational methods that has emerged in recent decades is both large and diverse. This set includes not only methods from classical statistics, but also network analysis, natural language processing and other computational methods associated with contemporary data science. These methods are readily accessible today and are already used extensively in the social sciences and the humanities (Weingart, 2015; Nelson, 2020; Do et al., 2022; Grimmer et al., 2022). They have been used for the study of a large variety of issues about economics. One example of such a method is prosopography, which allows for the statistical analysis of specific research fields, journals, institutions, and periods (see Hoover and Svorenčík, 2023, on the American Economic Association; Rossier and Benz, 2021, on Swiss economists; Lebaron and Dogan, 2020, on central bankers). Another example are bibliometric methods that are increasingly applied to map the development of disciplines and the interrelation of scholarly fields (Claveau and Gingras, 2016; Truc, 2022), or to study specific economic issue, such as inflation (Goutsmedt, 2021) and individual scientific contributions (Andrada, 2017). Network analysis has proven to be a versatile tool to study the circulation of ideas (Herfeld and Doehne, 2019), professional relationships (Goutsmedt et al., 2021), and the connection between economists and policy institutions (Helgadóttir, 2016; Flickenschild and Afonso, 2019). Finally, tools such as text mining also open up a large number of possibilities for addressing research questions in the social studies of economics, such as the evolution of specific concepts (Cherrier and Saïdi, 2018), the fragmentation of economics (Ambrosino et al.,

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2018), or the emergence of regional specificities in economic research (Goutsmedt and Truc, 2023). The application of all of these methods has been made easier by a collective effort of an international and interdisciplinary community of data and programming enthusiasts, who share dedicated packages in various computer languages, foremost R and Python.

Second, while data collection and access, including metadata, used to be difficult, different kinds of data relevant to studying science in its social context are now available in digital formats and often easily accessible. Bibliometric databases such as Web of Science and Scopus have long been used for historical research, but newcomers such as Dimensions and OpenAlex are expanding our possibilities. Many services, including JSTOR (and its Constellate platform) and Project Gutenberg, also give access to the full text of articles and books. For researchers studying the role of economics in the public sphere, services such as Media Cloud and Europresse, and tools directly supported by social media platforms facilitate the study of economists' public stances. For scholars addressing the relationship between economics and policymaking, the movement for open government data implies the availability of a large amount of policy-relevant information.

Third, post-war economics has been characterized by significant growth in inputs (number of economists, size of research funding, and diversity of requests from decision-makers) and in outputs (academic articles, expert contributions to court cases, reports for specialized committees, and media outlets). This makes it harder for social scientists to study economics by solely using qualitative and interpretive methods. Complementing such methods with more recently developed tools is a means to more fully explore the various ways in which economics has developed and can be characterized.

Against this background, the goal of this special issue is to showcase how some methodological developments can be put to fruitful use for the social studies of economics. Thereby, the scope of the special issue is not limited to the history of economic theories and ideas. It also includes the practices of economists, the organization of the discipline, or the role of economists and economics in different social spheres. Furthermore, it is also not limited to the 20th and 21st centuries. Quantitative and computational methods constitute a powerful resource to provide new perspectives on the development and transformations of earlier historical periods (Erikson and Hamilton, 2018). As such, this introduction to the special issue provides an overview of the kinds of topics and questions we take to fall under the label 'social studies of economics' (Section 1) and of all the contributions contained in the special issue (Section 2), with a focus on the different methods used, how these methods are applied to address a variety of questions, and the kind of data they analyze.

1. Social Studies of Economics

We use the term 'social studies of economics' to describe a body of research dedicated to studying how economic knowledge is produced, validated, and applied as well as how the economics profession both influences and is influenced by broader social, cultural, and political contexts. The term itself first appeared in print in Philip Mirowski's (2004) *The Effortless Economy of Science?*, in which he advocated for (and demonstrated) a rapprochement between

science studies and the fields of history, methodology and philosophy of economics (hereafter, HMPE), in order to study how science is actually practiced today. In the early 2000s, this call for drawing also on sociology of science and science studies in the HMPE resonated within the field and was indeed well underway (Hands, 2001, chapter 5). While the term ‘social studies of economics’ was sparingly reused until recently, it rose to more prominence when it was reintroduced by a group of European scholars to specifically emphasize the relevance of social factors to understand knowledge production processes within economics and in relation to society (Maesse et al., 2021; see Rossier et al., in this special issue). We believe this term to be a compelling expression that has the potential to unify the wealth of research aimed at enhancing our understanding of economics, by including social factors either as external influences on economics, as internal dynamics inside economics, or as effects of economics on broader society.

While the new label might suggest that the field is novel, contributions to the social studies of economics (SSE) began concurrently with the establishment of political economy as a specialized field. For instance, Adam Smith (1776, IV.8) argued that “merchants and manufacturers have been by far the principal architects” of mercantilism, and that this system of ideas favored their private interest at the expense of public interest. In turn, Karl Marx (1977 [1859], Preface) explained the content of “bourgeois economy” by “the contradictions of material life, from the conflict existing between the social forces of production and the relations of production.” Countless other authors made early forays into what we identify as SSE: from Thomas Carlyle’s dismissal of political economy as the “dismal science” to Alfred Marshall’s (1920, I.I.3) complaint that his science was “still almost in its infancy” due to a scarcity of great minds pursuing it, as “a science which has wealth for its subject-matter, is often repugnant at first sight to many students.”

These early insights served specific roles in intellectual struggles and were not primarily focused on solely understanding the development of political economy and economics. Indeed, dedicated exploration of the evolution of economics only emerged later, with Joseph Schumpeter’s (1954) *History of Economic Analysis* being an early example. As the specialized fields of HMPE grew in the second half of the 20th century, methodological discussions about how to study economics blossomed (see e.g., Giraud, 2019, for a history of these discussions). While some contributions exclusively analyzed the relation among ideas (Blaug, 1985), much research effort focused on social dynamics and the relation between economics and the broader social realm (Goodwin et al., 1969; Coats, 1993). Contemporary research in SSE draws on more diverse traditions including, besides HMPE, science studies, sociology of science or of professions, international political economy, and economics itself. This special issue thus celebrates the convergence of these influences in a joint project of rigorously investigating the discipline of economics.

To understand the current state of SSE as a highly diverse field, some remarks about its multiple origins are worth mentioning. First, scholars in science studies approached economics as what they took to be a peculiar *science*. They spawned the strand of research on the performativity of the discipline (Callon, 1998; MacKenzie et al., 2007). Second, some sociologists viewed economists as a professional community with a specific culture (Fourcade,

2009) and distinctive involvements in the academic, economic and political fields (Lebaron, 2000). Third, scholars in politics and international political economy have found in economics a source of *influential political ideas*, from Keynesianism (Hall, 1989) to Neoliberalism (Peck and Tickell, 2002; Harvey, 2007). On the way, some thinkers have been inspired by Michel Foucault's lectures at *Collège de France* in the late-1970s on governmentality and biopolitics (Foucault, 2004a; 2004b).

Beyond these intellectual threads, many scholars adopting an SSE perspective in the history of economic thought to economics have been trained in economics and some are practicing economists. Quite a few study social factors to explicitly challenge the mainstream from various heterodox perspectives – e.g., feminism (Ferber and Nelson, 1993) and postcolonialism (Zein-Elabdin and Charusheela, 2004), while some other economists contribute to SSE from an established position in mainstream economics (e.g., Hamermesh, 2013), sometimes to promote a research strand in economics (Angrist et al., 2020) or to criticize specific aspects of the discipline (Heckman and Moktan, 2020). As in the early days of classical political economy, referencing social factors in the development of economics is a widespread strategy in intellectual struggles among economists.

The contemporary dynamism of social studies of economics is thus partly due to the confluence of diverse theoretical and disciplinary perspectives. It is this diversity in perspectives and questions that we hope gets illustrated by putting together the following contributions in one special issue. As it is also propelled by the application of diverse research methods, we hope that the methods used in the following contributions—spanning natural language processing (e.g., topic modeling), factor analysis, network analysis, as well as more conventional statistical methods (e.g., regression analysis)—further convey this diversity.

2. Contributions to the Special Issue

Victoria Bateman and Erin Hengel propose a comprehensive array of descriptive statistics to illustrate “The gender gap in UK academic economics (1996-2018)”. They employ two intersecting databases: the biennial survey conducted by the UK's Royal Economic Society (RES) from 1996 to 2016, and the data compiled by the Higher Education Statistical Agency (HESA) for the years 2012 to 2018. The RES survey provides a detailed snapshot of gender composition in economics departments across the UK, broken down by rank. This data is enriched and supplemented by the HESA data, which encompasses a comprehensive overview of individuals employed under a contract in publicly-funded higher education institutions, in addition to students enrolled in economics courses during this period. Bateman and Hengel provide a comparative analysis of gender representation across multiple levels including professors, lecturers and students. Their approach identifies areas where the gender gap remains most pronounced (e.g., tenured professors). In an effort to provide a more intersectional viewpoint, they also consider ethnicity. This additional dimension allows for the exploration of how gender disparities can further be influenced by ethnic diversity. Hence, the study not only emphasizes the gender gap but also underscores how this gap may be shaped by ethnicity.

Nicolas Camilotto uses bibliometric data: he queried the Web of Science database to search for titles, abstracts and keywords including the word “trust”. This gave him a large corpus of 101,416 articles. With the aim of “Navigating the Oceanic Literature on Trust”, Camilotto applies network analysis to map how the apprehension of the concept of “trust” has evolved in economics since the late 1950s. Using the references cited by these articles, he builds bibliographic coupling networks, which link articles together depending on the number of references that they share in their bibliography. Rather than building a huge network for the whole period of inquiry, he rather constructs successive historical networks. He studies separately an initial period, between 1958 and 1990, and then builds networks for overlapping fifteen-year periods (1990-2004; 1991-2005; until 2006-2020). For each network, he identifies clusters of articles that share many references in common. The intertemporal analysis allows him to observe that there is no “economics of trust”, but a wide range of heterogeneous literature unified around certain methods (“experimental trust”), applications (trust used medical research) or concepts (trust related to social capital).

Like Camilotto, Alexandre Truc relies on bibliometric data to explore one particular field of research in economics. In “Neuroeconomics: Hype or Hope?,” Truc investigates the current state of neuroeconomics. In light of the philosophical and methodological debate around its importance beginning in the early 2000, Truc aims to understand the standing of neuroeconomics today vis-à-vis economics and see whether it ever stabilized as a legitimate and successful research program in economics. Truc draws on different corpora from multiple databases (Google Ngram corpus, Web of Science’s keyword and references corpora, EconLit’s JEL codes and keywords, and Microsoft Academic) mainly to cross-validate his results about the long-term development of neuroeconomics within economics compared to the development of behavioral economics. Focusing on the period between 2000 and the late 2010s, Truc first shows mainly by way of descriptive statistics and citation analysis how, compared to behavioral economics, neuroeconomics peaked in the early 2010s and stagnated or even declined thereafter. Truc also studies the interaction between economics and neuroscience, computing the share of citations between both, which shows a decrease in interest among economists in neuroscience alongside an ever-increasing interest among neuroscientists in economics. Truc discusses the reasons behind the decline of neuroeconomics. He identifies the costly nature and novelty of neuroscientific methods as opposed to methods from psychology, the rather non-enthusiastic attitude towards interdisciplinarity by economists, and the fact that research in neuroeconomics is published in non-economic publication outlets rather than in economics journals. Truc concludes that while neuroeconomics still exists as a research program, it has lost momentum.

Telmo Menezes, Antonin Pottier and Camille Roth explore the scientific literature on a specific economic concept, the Environmental Kuznets Curve (EKC) hypothesis, which posits an inverted U-shaped relationship between pollutants and economic development. To this end, they built a corpus of 2709 articles by querying Scopus in mid-2021 for documents containing the exact phrase “environmental Kuznets curve.” To explore this literature, they innovatively mix different strategies. On the one hand, they use well-worn methods—descriptive statistics on authors and journals, and network analysis applied to direct citations inside their corpus—to convincingly show that two temporally-ordered communities characterize this literature. On the

other hand, they analyze abstracts using Semantic Hypergraph, which is a novel approach in natural language processing (Menezes and Roth, 2021). This is a refreshing approach in light of the current dominance of the connectionist paradigm because it relies on a rich representation of language inspired by the symbolic paradigm. The authors extract the pollutants studied by each article and detect whether results confirm or infirm the EKC hypothesis. The authors conclude that the EKC literature is drifting away from economics and toward different interpretations of the EKC hypothesis and, consequently, of what it means to empirically test it.

Magda Fontana and Martina Iori's research objective is to determine if there has been an observable increase in the fragmentation of mainstream economics between 1986 and 2006 that could have hampered the communication between the discipline's different specialties. Their methodology combines citation analysis with topic modeling and regression analysis. With citation data from seven of the most influential journals in economics, they devise an indicator of the diversity of information used by an article. To detect subfields in economics, they use topic modeling. They find no evidence of increased fragmentation and rather detect more active communication across journals and topics. They then apply regression analysis to demonstrate that the diversity of articles (quantified by their diversity index) is positively associated with their citation counts in the ten years following publication, which suggests that articles relying on more diverse economic research attract more scholarly attention in economics. To further substantiate this finding, they confirm that top-cited articles and articles published by Nobel Prize winners (before the authors obtained the prize) tend to have higher values for the diversity index. All in all, their results run against the narrative that economics was losing its internal cohesion in the late 1990s and early 2000s.

Topic modeling is also applied in "Salvation into Nation: Topic Modeling Early Modern Economic Writings" authored by Emily Erickson, Keniel Yao, and Daniel Karell. The authors focus on a transition in the early modern era in England when economic thought began to use empirically-based and scientifically-rooted arguments and analysis to study questions around commerce and trade. To trace this transition and determine more precisely when it occurred, the article combines topic modeling, drawing specifically on the Latent Dirichlet Allocation (LDA) algorithm, with traditional historical methods to coding and close reading, bringing the authors' own knowledge of the period to validate and interpret the input and output of the algorithm. The corpus they use is built from the project "The Early English Books Online Text Creation Partnership", which aims at creating a fully searchable archive of texts from the Early English Books Online database. The resulting corpus is a subset of this database identified as being concerned with issues related to economics. Erickson, Yao, and Karell then analyze how the 66 topics identified algorithmically in economic texts changed over time in their corpus. On the basis of the correlation of two topics identified by co-occurrence, they produce a clustered network of interlinked topics to show how the dominance of topics of trade, politics, travel, religion, and husbandry changed over time and argued that their results speak for the occurrence of this transition only after 1660. In their analysis, the authors emphasize and show how one core aspect of using computational methods in historical analysis is to complement computational procedures with expert knowledge of the historical period studied and the practice of close reading of the text.

Murat Bakeev also uses topic modeling in “Academic Macroeconomics and Monetary Policy”, to examine the Federal Open Market Committee (FOMC)—i.e., the committee in charge of deciding monetary policy in the Federal Reserve System of the United States. Bakeev’s corpus consists in the transcripts of FOMC meetings from 1976 to 2016, which he complements with biographical information on FOMC members. With these data, he contributes to the literature on the participation of economic science to monetary policy, focusing on the use of econometrics, of theoretical frameworks and of considerations regarding credibility. Bakeev’s strategy is to use the presence of a few words in the most common words of a topic as an indication that this topic instantiates one of the three themes of interest. For instance, a topic is deemed to be about the credibility of monetary policy if the word ‘credibility’ is among its 20 most common words. By studying the association between speaker profiles and the three allegedly academic themes, he finds that econometric and theoretical themes are more frequently used by FOMC members with PhDs in economics, but that no association to advanced degrees in economics exists for the credibility theme. Furthermore, he investigates whether a familiar division in academic economics—the split between graduates from freshwater and saltwater universities—is correlated to the frequency of use of each theme, finding scant evidence that this distinction is relevant. Reflecting on these results in light of a close reading of some of the transcripts and general knowledge about the dynamics at the FOMC, Bakeev suggests that the conversational context of the meetings generates substantial thematic convergence among members, leading to associations between biographical profiles and theme prevalence that are less strong than should otherwise be expected.

In “The Space of Research Topics in Economics in the Twenty-First Century”, Thierry Rossier, Pierre Benz, Anton Grau Larsen and Kristoffer Kropp explore the “homology” between the subjects chosen by researchers and their resources and characteristics. They mix two types of data. First, they use research projects with economics as the main discipline that have been financially supported by the Swiss National Science Foundation (SNSF). This dataset encapsulates a wide range of information: individuals and institutions associated with the project, the nature and amount of funding, and, for most projects after 2009, the project abstracts. Their second data source, the Swiss Elite Database, provides an extensive prosopography of Swiss university professors. They intersect this resource with the research grants data, specifically for those applicants listed within the Elite database. Rossier, Benz, Larsen, and Kropp also train a topic model on their corpus of project abstracts (LDA algorithm) to decipher the interconnections amongst various topics. They then employ multiple correspondence analysis, identifying three main axes of opposition among topics. Thereby, each topic, as well as the most frequent words within each topic, are projected onto these three axes, which facilitates an examination of the structure underlying diverse research projects. For instance, they observe an opposition between financial economics and other economic topics, as well as between microeconomics and macroeconomics. In a subsequent step, the individual characteristics of the applicants to the SNSF are projected into this topical space, revealing the social attributes (like experience in public expertise or gender) that underlie the distribution of topics.

The aim of “The social field of elite trade economists: A quantitative SSE perspective” by Matthias Aisleitner and Stephan Pühringer is to characterize the social field of elite economists and to show how being positioned in that field correlates with influence and power inside and outside academia. To arrive at a dataset that gives a good representation of the current discourse about trade in economics, they combine two types of data. First, they identify economists working on “trade” issues, thanks to EconLit and Web of Science databases. Second, they compile data about these economists’ career trajectories, bibliometric indices, rankings of their universities, and connections to policy institutions or think tanks. Like Rossier, Benz, Larsen, and Kropp, they apply multiple correspondence analysis and then cluster analysis to study how what they call “intra-academic capital”, measured notably by citations, is associated with policy-relevant “extra-academic capital.” Their analysis reveals that even among the elite of trade economists, where various forms of capital concentrate, only a small number of them are actually successful in achieving substantial political and societal impact. Furthermore, they find that different forms of intra-academic capital (e.g., having a highly recognized PhD supervisor or a degree from a top economics department) corresponds with different forms of impact. What they infer from their results is that, while academically successful scholars might have opportunities for reaching some degree of political and public impact, there is no automatic connection between academic success and impact outside academia.

In “Mapping Economists’ Belief Spaces Using Survey Data”, Tod Van Gunten investigates the structure of opinions among economists. Going beyond measuring the degree of consensus on some topics, this article identifies beliefs that tend to co-occur and which of those can be considered more central to one’s belief system. Van Gunten relies on two sets of surveys: the 2000 and 2011 surveys of the American Economic Association (AEA) members and a survey of delegates of the 2000 Democratic and Republican conventions, allowing for a comparison of the partisan gap regarding different economic issues among both politicians and economists. His strategy is built on three distinct approaches. In the initial stage, Van Gunten employs a method of dimensionality reduction (Principal Component Analysis) to demonstrate that the distinction between free-market and interventionist beliefs is the dimension accounting, by far, for the highest proportion of the variance in survey responses. In a second step, network analysis of belief correlations allows Van Gunten to understand what the core beliefs of economists are. In the final phase, correlational class analysis is employed to ascertain if respondents exhibit common response patterns to the survey questions, beyond merely sharing similar answers. As a result, Van Gunten shows that economists do not present a high diversity of belief systems. Instead, the main divergence lies between economists who exhibit ideological alignment (with between 40 and 75% of economists arranging their beliefs in ideologically consistent ways) and those who exhibit no such alignment. Finally, Van Gunten uses simulated data based on marginal distributions from 1976 and 1990 surveys to suggest that ideological alignment has persisted since the 1970s, rather than waning as might have been expected.

Conclusion

In 2018, the *Journal of Economic Methodology* (JEM) published a special issue titled “A quantitative turn in the historiography of economics?”. This issue aimed to offer methodological

reflections on the “tools useful for studying the history and methodology of economics” (Edwards et al., 2018). While the JEM special issue as a whole acknowledged potential challenges associated with the application of quantitative and computational methods in HPME, it also expressed optimism regarding their capacity to constitute a useful addition to the toolbox of HPME scholars. This *Œconomia* special issue extends these reflections in a somewhat different vein. First, the issue proposes a range of applications of a wide variety of methods to different objects of study, showcasing this anticipated usefulness in a variety of cases. Second, while Edwards et al. (2018) explained that quantitative and computational methods may facilitate closer connections between historians and methodologists of economics and economists, this special issue exemplifies how these methods may also help establish connections with other fields of research aside from economics such as sociology, science studies, and political sciences. By gathering contributions by scholars from different disciplines under the label “social studies of economics”, it is hoped that this issue will foster interdisciplinary collaborations on applying quantitative and computational methods to the rigorous study of economics.

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