ARTIFICIAL INTELLIGENCE AND SHAPESHIFTING CAPITALISM

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Abstract

Artificial intelligence (AI) is anticipated to reshape the economy by revolutionizing human interaction with technology. Despite its significance, research endeavors in the field of economics remain relatively limited. In this editorial, we outline the articles featured in a Virtual Special Issue designed to expand the scope of inquiry for economists examining AI and its implications. We position these articles within the current economic literature and propose an agenda for further research aimed at fostering a more varied understanding of the impacts, implications, and challenges of AI technologies at the intersection with economic activity.

Keywords: artificial intelligence; capitalism; economic institutions.

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1. Introduction

Artificial Intelligence (AI) refers to the development of machines (particularly computer systems) capable of performing tasks that typically require human intelligence (McCarthy 2007). These tasks encompass learning, reasoning, problem-solving, perception, understanding natural language, and more. AI systems can analyze large datasets, recognize patterns, and make decisions, often surpassing human capabilities in accuracy and speed (Winston 1984).

For its capacity to revolutionize human interaction with technology, AI is expected to reshape various aspects of economic activity (Lu and Zhou 2021). AI technologies can automate tasks, streamline processes, and optimize resource allocation, leading to increased productivity across various sectors of the economy (Acemoglu and Restrepo 2018). AI fosters innovation by enabling the development of new products, services, and business models (Babina et al. 2024; Cockburn et al. 2018). AI has the potential to improve quality of life through advancements in healthcare, transportation, education, and environmental sustainability, leading to better overall welfare.

Despite its undeniable relevance to the present and future of the economy, the economics literature has so far given limited attention to the potential economic impacts, implications, and challenges of AI technologies (Bickley et al. 2022). Figure 1 presents the results of a search conducted in the Scopus database using the search string "artificial intelligence". The evolution in the number of articles referencing AI in the title, abstract, or keywords across the subject areas of "Economics, Econometrics, and Finance" and "Business, Management, and Accounting" is compared.

[Insert Figure 1 about here]

At first glance, what is striking is the positive trend characterizing both series, with AI rapidly becoming a topic capable of attracting considerable attention from researchers across the two areas. However, when attempting to conduct a bibliometric comparison regarding the magnitude of the research effort exerted by scholars in the two areas to investigate the impacts, implications, and

challenges of AI technologies, the disparity between the two series is significant. Economics literature began to show interest in AI and its implications later than business and management literature did. The threshold of 50 articles per year was only reached in 2017, whereas the same level of effort was evident ten years earlier in the business and management literature. Even when considering the grand total of articles on AI published in peer-reviewed journals within the two areas, the field of "Economics, Econometrics, and Finance" is outclassed by that of "Business, Management, and Accounting". If we consider the period from 1980 to 2023, the total number of papers referring to AI technologies published in the area of "Business, Management, and Accounting" is approximately 8700, whereas those published in the area of "Economics, Econometrics, and Finance" barely reach 2300. Despite the need for caution in interpreting these numbers, owing to the varying sizes of the two areas in terms of researchers and journal coverage (the Scopus database includes 1618 journals in the "Business, Management, and Accounting" area and 1260 in the "Economics, Econometrics, and Finance" area), as well as the differing approaches to publishing, the significant difference in the levels of the two series cannot be overlooked.

This brief article serves as the editorial for the Virtual Special Issue published in the Journal of Evolutionary Economics. Building upon the aforementioned scenario, the special issue aimed to stimulate debate on the implications of AI technologies in the field of economics, with a particular focus on the complex interactions between AI and the evolution of capitalist institutions in a broad sense (Davidson 2024; North 1990).

The Journal of Evolutionary Economics has a long tradition of attention to the role of innovation and new technologies in economic dynamics. As such, it is an ideal platform for the debate on how institutions, particularly market institutions, can evolve in response to AI, or conversely, how institutions can shape the way in which AI technologies are adopted and incorporated within economies (Paredes-Frigolett and Pyka 2022, 2023; Yun et al. 2018).

Accordingly, the aim of the Virtual Special Issue is to expand the scope of inquiry for economists considering AI and its implications. It aims to foster debate on several pertinent topics, including: i) the potential impact of AI on creativity and innovation processes, driving changes in specific sectors; ii) the role of AI in fostering sustainable growth in productivity and income, as well as its influence on the distribution of these economic benefits; iii) how the financial sector can sustain AI-based entrepreneurial initiatives during their development stages, thereby expediting the integration of AI technologies into the economy.

The remainder of the article is structured as follows. First, we present the articles included in the Virtual Special Issue. Then, we position the Virtual Special Issue in the economics literature on AI. By reconsidering our call for papers, the final section formulates possible avenues for future research on AI and its implications and challenges in the economics field.

2. The Virtual Special Issue

Three articles were selected for the Virtual Special Issue out of a total of 14 submissions following our initial call for papers.

Agrawal et al. (2023) provide a theoretical model that connects advances in AI, specifically in prediction technology, to how these advances impact economic aspects of innovation, particularly in areas where discoveries are made by combining different elements or ideas (combinatorial-type discovery problems). The key tool used in this analysis is the "ranking function", which helps to understand how improved prediction technology influences the expected benefits and costs associated with potential new innovations. The model further explores the nuanced ways in which AI-driven improvements in prediction technology impact the innovation process, by considering different characteristics of the innovation search process, such as: whether the search for innovations is conducted in parallel (multiple potential innovations are explored at the same time) or sequentially (one potential innovation is explored at a time); whether the potential innovations being considered are independent of each other or act as substitutes, meaning that the success of one could diminish

the value or relevance of the others; the degree to which there are bottlenecks or constraints that limit the speed and efficiency of the discovery process. Among the many insights highlighted, one particularly interesting result is that enhanced AI prediction capabilities may lead to riskier combinations moving through the discovery pipeline, increasing the chances of more radical innovations being discovered. Therefore, and this is our view, the often reported stylized fact (e.g. Cabral 2002) that incremental innovation is mainly the prerogative of large firms and radical innovation is instead in the hands of new firms and start-ups (in a typical 'Schumpeter Mark 1' dynamic) could be challenged by the advent of AI. Indeed, large incumbents can easily rhyme with more data to deploy and better predictive capabilities of the algorithms employed.

The contribution of Le et al. (2024) is also mainly theoretical in nature. It analyses the complex relationship between robotization brought by the AI revolution and how this may affect economic growth and the income of workers. Incorporating some new features compared to the state of the art and starting from the well-known fact that automation, through the use of industrial robots for routine tasks, displaces low-skilled labor, their theoretical framework also highlights that horizontal innovation (i.e., the creation of new products or services that do not necessarily displace existing ones) can create new job opportunities where low-skilled workers have an employment advantage, counterbalancing the above mentioned negative effect. Additionally, labor-augmenting technologies improve the productivity of low-skilled labor, helping mitigate again the negative impacts of automation. In other words, one (among others) important take-away from their research endeavor is that low-skilled labor continues to be a significant factor in modern production systems, and the job prospects it may offer are largely influenced by how various technologies interact.

Finally, Montanaro et al. (2024) focus on the financial side of the AI-revolution, and in particular examine how the venture capital (VC) industry is fueling the emergence of new entrepreneurial phenomena in the AI sector globally. Their empirical analysis clearly shows that AI-based startups tend to raise less VC capital than non-AI-based startups due to a number of challenges that the authors

believe are particularly acute in the AI space, including information gaps, regulatory uncertainties, intense competition, and ethical and privacy concerns. However, at the same time, they also find that the impact of these challenges can be lessened by factors such as the maturity of the venture and the experience of the investors. Thus, a key conclusion of their work is that the documentation of this widespread "funding gap" (e.g. Colombo and Grilli 2007) in the financing of AI-based start-ups naturally calls for some form of intervention by specific public policies and ad-hoc regulation, which should be capable, at the same time, to nurture AI ventures without creating too many entry barriers for entrepreneurs (and investors).

3. Positioning the special issue in the economics literature on AI

To understand the knowledge advancements provided by the contributions summarized in the previous section, as well as to position them in the economics literature regarding the impact, implications and challenges related to AI, we resort to an additional bibliometric analysis that focuses on the top 20 economics journals. To identify these journals, we used both the impact factor (IF) from Web of Science and the scientific journal rank (SJR) from Scopus-Scimago. These procedures yielded the set of journals shown in Table 1, which we believe unanimously reflect high quality according to economics scholars' judgment.

[Insert Table 1 about here]

In order to thoroughly explore the broadest possible set of contributions concerning the economic implications of AI, while avoiding undue exclusions, we queried the dataset comprising articles published in these journals at any given time using the keyword "artificial intelligence." Google Scholar served as our source, ensuring the broadest time span for article detection. This procedure identified 234 articles containing the specified keyword in the text. Upon review, 148 of these articles were excluded from further analysis due to their lack of relevance to the topic of AI. This lack of relevance was observed either through generic mention in the text without substantial conceptual or empirical insight, or solely through passing references in the bibliography.

The remaining 86 papers relevant to the AI topic are analyzed in their time distribution and content. As far as top economics journals are concerned, the theme takes off only from 2019 onward. In the 1978-2010 period, the number of papers per year never exceeds one, beginning timidly to grow in the years immediately following (2-3 papers per year). The peak is reached in 2023 with 14 papers. This demonstrates the incipient nature of the debate within economic science on the topic, despite the significant attention and concerns raised in the media and political circles about the impact of AI on future society.

In terms of content, papers can be classified into subject areas (see Table 2). The most populated area (comprising over one-third of the total) includes papers where AI is not the subject of analysis, but rather serves as a methodological tool. These papers utilize algorithms and simulation models derived from AI applications, or they review AI methodologies that could be useful for economic modeling. Notable examples highly cited in the literature include Athey and Imbens (2017; 2019), Gentzkow et al. (2019), and Mullainathan and Spiess (2017). However, while the sheer quantity of these papers indicates the pervasiveness of AI and suggests its still largely untapped potential as a support for economists' work, an in-depth examination of the modeling techniques used falls outside the scope of our analysis.

[Insert Table 2 about here]

Contiguous to this area is the category labeled "Rationality, problem solving & decision-making", which distinguishes itself from the previous one because here advances in AI methodologies are not solely pertinent to the economic scientist's investigation; they also pertain to the development and identification of search procedures that enable agents and systems with bounded rationality – both procedural and substantive - to navigate complex decisions amidst uncertainty and arrive at sound solutions to challenging problems. Among the three papers included in this category, it is imperative to mention the seminal paper on rationality by Herbert Simon (1978), a Nobel laureate in economics and widely recognized as one of the founding fathers of AI. Notably, in 1956, Simon, alongside

computer scientist and cognitive psychologist Allen Newell, authored the computer program "Logic Theorist", thus declaring «over Christmas, Al Newell and I invented a thinking machine» (McCorduck 2004, p. 138).

Turning now our focus to the subject areas more relevant to our analysis, it is evident from the literature that the most considerable attention has been directed to "Jobs, employment and the labor market." In particular, as indicated in Table 2, this area stands out as one characterized by extensive debate: while articles included in it account for one-fifth of the total, they capture over half of all citations pertaining to the sample under consideration. Theoretical and empirical approaches converge to study key issues of labor economics, addressing questions such as: (i) how does AI-based automation and computerization change skill demands at both the individual and team level? (ii) what impact does this have on employment/unemployment rates and labor income?

In summary, these studies converge in arguing that AI capital has a dual effect on employment, both substituting and complementing it. The first effect impacts workers engaged in cognitive and manual tasks that can be executed following explicit rules, while the second affects workers involved in non-routine problem-solving and complex communication tasks (Author et al. 2003). More pessimistic perspectives highlight how AI reduces employment and the labor share in value added, potentially reducing labor demand and wages, thus leading to technological unemployment (Acemoglu and Restrepo 2020; Mokyr et al. 2015). At the same time, there has been an observed "polarization" in the labor market, wherein wage increases disproportionately benefit individuals at the extremes of the income and skill distribution, exacerbating inequality (Author 2015).

However, AI can have a complement effect by boosting output in a way that generates greater demand for labor. Furthermore, the prevailing viewpoint suggests that the displacement effects are mitigated in the medium to long term by the emergence of new jobs that enhance workers' comparative advantage in providing problem-solving skills, adaptability, and creativity (Acemoglu and Restrepo 2018; 2019). Nevertheless, some authors exercise caution in predicting the net consequences of AI

on labor markets. Agrawal et al. (2019a) attribute this uncertainty to the interplay between prediction and decision tasks, in which AI plays a key role, making it challenging to determine whether the impact will be favorable to labor or capital.[1] Other models seem to show that in equilibrium the unemployment induced by AI gradually diminishes over time (Nakamura and Zeira 2023). The contribution of Le et al. (2024) to the Virtual Special Issue positions itself in this debate by suggesting that the combination of horizontal innovation and the enhancement of productivity among low-skilled workers may potentially mitigate the adverse effects of AI-based technologies on workers situated at the low extreme of the skill and income distributions.

Given their implications for employment, closely related to the preceding contributions are papers focusing on the relationships between AI, productivity, and growth. A discussion is ongoing on the role of AI in counteracting demographics-based secular stagnation. In this context, models based on various growth theory approaches are proposed, yielding divergent results in the short run, but sharing optimistic outlooks for the long run. While all papers call for further future research, Acemoglu and Restrepo (2017) demonstrate that models of directed AI-based technological change can generate a positive relationship between population aging and economic growth. Brynjolfsson et al. (2021) argue that productivity growth resulting from the adoption of general-purpose technologies such as AI may be underestimated due to significant complementary intangible investments. They show, for the United States, that adjusting for intangibles yields a total factor productivity level 15.9 percent higher than official measures at the end of 2017. Berg et al. (2018) find that AI-based automation contributes positively to growth, but negatively impacts equality among workers. Nordhaus (2021) tests the hypothesis that rapid AI growth beyond a certain threshold could accelerate economic growth through an increasing pace of cascading improvements in the economy. He concludes that such a moment is not imminent, but identifies these as early indicators of its potential occurrence.

[1]On AI as a substitute for human cognition in prediction, see also Agrawal et al. (2023) in this Virtual Special Issue.

The last substantial cluster of papers focuses on the impact of AI on market design and operations (e.g., Roth 2018; Varian 2010), algorithmic competition (e.g., Assad et al. 2024; Kirilenko and Lo 2013), and the influence of digital giants (e.g., Tirole 2023). A burgeoning research niche is emerging concerning the challenges posed by shifts towards over-concentration and collusion in the absence of "meeting of minds", particularly in relation to antitrust and regulation (e.g., Calvano et al. 2020; Klein 2021). Finally, completing the picture are some exemplary country studies focusing on competitiveness in the AI domain (e.g. China; see Cheng et al. 2019) as well as sector-specific studies highlighting critical areas where AI is in its nascent and experimental stages (e.g. education, see Escueta et al. 2020; and justice, see Ludwig and Mullainathan 2023).

Only two articles delve into the mechanisms of generating AI-based innovation. Pratt (2015) compares the exponential growth of applications and diversification of uses enabled by AI technological developments to the "Cambrian explosion" that occurred half a billion years ago on Earth, triggering virtuous circles leading to rapid diversification of biological life. Drawing on this analogy, the paper offers insights into how AI might affect the economy and how to address potential challenges. Beraja et al. (2023b) start from the consideration that the critical resource for AI-based innovation is data, to discuss the role of the state as a provider of data and thus a stimulator of innovation, emphasizing the shareability between government and commercial uses of data and trained algorithms. In light of this dearth of economic literature on the features and mechanisms of AI-based innovation, the contributions of Agrawal et al. (2023) and Montanaro et al. (2024) to this Virtual Special Issue are significant for advancing knowledge. They respectively discuss key aspects such as the relationships between prediction technology and economic aspects of innovation, and the role of VC in fostering new entrepreneurship in the AI industry.

Last but not least, and indeed of great interest here, are some papers that address important issues that fall under a broad category we refer to as "Agents, institutions, and social structures". Leib et al. (2024) propose an experiment on the influence of AI algorithms on the honest/dishonest behavior of

agents, thus raising questions about the responsible management of AI-based advice. Levy and Razin (2019) survey the literature on the effects of "echo chambers" – i.e., polarization in individuals' belief – on economic outcomes (e.g., mobility and inequality) and political outcomes (e.g., political gridlocks, populism), stressing the role of AI in exacerbating these phenomena. Guriev and Papaioannou (2022) summarize the economics literature on the recent surge of populism, highlighting the role of AI automation in fostering widespread discontent in lower-class communities. Tirole (2021) examines how autocratic regimes, democratic majorities, private platforms, and civil organizations can wield social control by managing the dissemination of information about individuals' behavior through AI. His modeling leads to the conclusion that "bundling" (assembling information on an individual prosocial behavior with other data on his/her political or religious attitudes) and "guilt by association" are most effective mechanisms for taming societies with weak ties and characterized as "politically docile." In a similar vein, Beraja et al. (2023a) argue, based on evidence from China, that AI technology and autocratic regimes mutually reinforce each other.

In addition to positioning the papers of the Virtual Special Issue, this brief survey allows us to identify the main gaps in the incipient literature on the economic impact of AI, with a focus on how AI and capitalism are co-evolving in a mutually influential relationship. The next section outlines the areas and topics that require the greatest research efforts.

4. Prospects for future research

This Virtual Special Issue can only make a small (but hopefully significant) contribution to advancing our knowledge of the AI economy, but in reality much remains to be done to better understand what AI will mean for the functioning of modern societies.

Understanding the interrelationships between capitalism and AI is especially crucial for economists and evolutionary theorists. The survey of the literature conducted in the previous sections indicates that much of it falls within two distinct approaches. On the one hand, scholars in marketing, logistics, and business, information scientists and engineers explore the current opportunities offered by new

technologies for radical changes in the production and distribution of goods and services, which generate value for consumers (for recent surveys, Duan et al. 2019; Dwivedi et al. 2021; Wirtz et al. 2019). On the other hand, economists tend to focus on significant yet more conventional issues such as employment, labor market, productivity, growth, and market competition. They typically employ approaches and models that do not readily count for the institutional change within capitalism. The latter aspect is mainly addressed by scholars in sociology and political science, who, adopting a futurist perspective, extrapolate various latent trends to foreshadow contrasting scenarios regarding the transformation of capitalism. Some underline the authoritarian potential of AI, coining various terms that stress the dangers to the freedom of individuals stemming from the concentration of data and knowledge in the hands of a few economic organizations and/or institutions: platform capitalism (Srnicek 2017), surveillance capitalism (Zuboff 2019), neuro capitalism (Helbing and Hausladen 2022), inhuman capitalism (Dyer-Witheford et al. 2019). Other scholars propose that AI paves the way for a society of abundance, free goods and almost zero marginal costs of reproduction, in many respect, beyond capitalism: post-capitalism (Mason 2015), digital socialism (Morozov 2019), fully automated luxury communism (Bastani 2019), are evocative terms used to represent this (r)evolution.

We believe that bridging the gap and making studies at the micro, meso and macro levels consistent with each other is a must for economists. In fact, the to-do list is quite long. AI is credited with the potential to lead to a paradigm shift in the Kuhn-Dosi sense, i.e., radical changes in the way companies set strategies and operations, governments design policies, and people live (Agrawal et al. 2018; Dwivedi et al. 2021; Makridakis 2017). However, AI consists of a cluster of innovations associated with a mixture of multiple research fields, each with its own goals, methods, and applications (Wang 2019). In accordance with Dosi (1982), this implies that a broad set of trajectories, or technological avenues, depart from the AI paradigm, which are then selected and shaped by the institutional and socio-economic environment. In this perspective, futurism is a fruitless effort if it falls into technological determinism, rather than taking into account that the future can take a multitude of

paths, dependent on the past, but open to human action. Being doomed by reality to living with uncertainty, it is urgently imperative for scholars to link technological forecasting to social and economic change, as transformative applications and social impacts of AI are expected soon and in any case long before any final scenario can actually materialize. Below we focus on some challenging issues.

First, we need studies on the mutually interdependent selection mechanisms between AI and the economic order. From this perspective, the literature on varieties of capitalism is a useful reference (Hall and Soskice 2001; Hancké et al. 2007). Differences in country-specific institutions as systems for coordinating economic agents have given rise to a spectrum of institutional forms, from liberal market economies to coordinated market economies, via intermediate configurations oscillating between laissez faire and state dirigisme. Moreover, in recent decades, we have witnessed the emergence and success of new authoritarian forms of state capitalism, in which central planning and decentralized autonomy of economic agents coexist to some degree (Musacchio, et al. 2015). Varieties in capitalism foster varieties in economic and social outcomes, as well as in the environment in which firms develop innovation capabilities (radical versus incremental innovation) and markets are variously conducive to innovation (generation versus diffusion). A number of research questions emerge:

(i) How do varieties of capitalism select the different technological trajectories of AI? In other words, what is the influence of a specific institutional matrix – i.e., the interdependent network of formal and informal norms characterizing a specific context – on the way AI impacts sectors, favors the birth, survival, and growth of firms, and shapes human-machine interaction? In particular, what institutional contexts can best accommodate AI and the spread of its applications, ensuring positive externalities for firms and workers in terms of efficient labor markets, training, education and skills upgrading, and flexible industrial relations, so as

to achieve higher levels of employment? (e.g. Akkermans et al. 2009; Soskice 2020, 2021; Herrmann and Peine 2011; Tschang and Almirall 2021).

(ii) How does AI influence the evolution of varieties of capitalism in the light of the latter's path dependence? Will the spectrum of varieties of capitalism be modified in the direction of a reduction in the varieties of capitalism? Or will the proliferation of divergent selection processes produce a greater variety and enrichment of forms of capitalism? Will the different varieties find an equilibrium between them, or will disequilibria emerge that will trigger a "battle of systems"?

(iii) Can AI trigger a virtuous circle between mass production and mass consumption of new products and services similar to that promoted by Fordism in the 20th century, allowing for sustained and sustainable growth in output, productivity, and income (Agrawal et al. 2019b)? How the institutions can favor the activation of this circle, simultaneously guaranteeing the freedom and equality of people, the right to privacy, and the preservation of ethical values (Floridi 2021)? What history on other general-purpose technologies can teach us about the evolutionary dynamics of AI in diverse forms of capitalism?

Second, this set of questions opens up a more apical issue. Foresight scenarios stimulate minds to think about the possibility that a future general infrastructure based on big data and supercomputing could make an economic order based on central planning practically feasible and more efficient than a market economy, resolving the conflict between opposing conclusive statements – Hayek's (1945) assertion of impossibility and Lange's (1967) assertion of the possibility for planners to replicate the socially optimal allocation of markets – in favor of the latter. Could this apply to a portion of existing market structures? Or is Hayek still relevant in the age of AI, and is the market superior to planning in both protecting individual freedom and privacy and contextually giving economic agents greater incentives to exploit the potential of artificial intelligence? In a Coasian view, the distribution of roles between markets and firms, as different economic orders in the organization of exchanges between

individual agents, is driven by a Darwinian-type selection. From this selective process, it is reputed to emerge a contingent equilibrium that reduces transaction costs as much as possible by combining the price system, which economizes on information and coordination costs, and hierarchy, which limits market frictions by using authority and planning. This configuration is deemed unstable and can be modified incrementally or radically by endogenous innovation generation and technological paradigm shifts. In this regard, applications of AI seem to be pushing in different directions, and it is very difficult to find a balance between the opposites.

Two examples help clarify the point. According to Agrawal et al. (2018), an important feature of AI in the economic sphere is its ability to produce low-cost predictions. Leveraging this potential, Amazon could even pursue a new business model, called "shipping-then-shopping" or "anticipatory shipping." The key idea is to use predictive analytics tools to analyze a customer's shopping history (order history, product search history, shopping basket activity, etc.) to predict what they might need. In theory, anticipatory shipping would allow Amazon to ship products (possibly via drones) to consumers "before" they order them (Tang and Veelenturf 2019). Today the predictions are not too accurate, but what would happen if they improved? AI might be able to offer an *alternative to the marketplace*: a planned economic order that allows customers, as soon as they get up in the morning, to receive the goods and services they presumably want at home. Customers could still return unwanted items and their choices would be reformulated. Realistically, for a broad category of goods, consumers would be willing to give up their autonomy and privacy and be guided by AI applications in their choice of products, so as to save on search and information costs, as well as avoid problems of information asymmetry on product quality, running the risk of buying a "lemon", in Akerlof's sense.

An opposite example, in which AI helps to *expand market functioning*, is suggested by Melkevik (2023). According to human morality, for a range of goods and services, a free market does not exist because our commitment to freedom is counterbalanced by other values. Consider the market for

services offered by a medical doctor (and similarly, by a lawyer or civil engineer). In this case, there is no pure form of contractual freedom, as the service cannot be sold by just anyone, for the reason of ensuring protection for those who, suffering from irreducible information asymmetry, are unable to assess its quality, thus risking serious damage to their health. Today, hiring a medical doctor (or a lawyer or an engineer) is limited by standards of competence such that people cannot be victims of outright fraud. Licensing and professional registries reduce complexity for patients seeking a competent doctor. The trade-off is that people competent in simple injuries are not allowed to be in the market: «the market is too broad, as it leads to more losses of lives, and the licensure system is too narrow, as it is inefficient» (Melkevik 2023, p. 119). In this case, a machine learning based on AI, which can predict the exact skill level required to deal with a specific injury, broadens the market, offering more choices and ensuring the qualification of the person to be hired at low search and information costs.

Related to these opposite trends, some questions arise:

(i) Will AI foster a capitalist world in which dynamic entrepreneurs and a liberal market system incentivize the creation and distribution of innovations (Schumpeter (1912) Mark I, or Entrepreneurial Capitalism)? Or will the economic concentration pushed by AI leave only to large hierarchically organized companies the task of enhancing the innovation process, while entrepreneurs, deprived of their animal spirit (creativity and risk seeking), will leave economic and social power to the State (Schumpeter (1942) Mark II, or State Capitalism)?

(ii) Should the type of economic planning promoted by AI be conducted by the State or by a single central entity taking all the decisions, according to a mission-oriented policy? Or, will the power of command, coordination and control reside in networks of private organizations and public institutions, the latter mainly devoted to diffusion-oriented policy? So far the centralization and control of big data has favored the formation of markets dominated by digital giants. Will AI determine a progressive process of ownership concentration in all

industries, with the emergence of privately-owned or state-owned large enterprises? Could coordinated market economies foster ownership alternatives, such as public sector platforms, digital municipalism, open source institutions, platform cooperatives and inclusive ownership (Dyer-Witheford 2020)?

(iii) As regard as free market functioning, recent literature has illustrated the potential of AI in helping firms escape or circumvent market regulation and in encouraging market manipulation through personalized dynamic pricing, price discrimination, algorithmic collusion, and so on (Calvano et al. 2020; Mariotti 2021; Rab 2019; Van de Rest et al. 2020). Could these attacks on economic welfare be countered by an AI conceived as a comprehensive regulator (rather than a market-like coordinating mechanism), i.e., a complementary actor to the state in regulating the market externalities and failures? Is the current set of antitrust norms, rules and laws capable of preventing large AI-based firms from extracting value and wealth, while instead contributing to societal goals (Kenney et al. 2021)? Can self-regulation be helpful (e.g. Cusumano et al. 2021)? Or do we need new regulatory actions?

Last, bust surely not least, let us turn our attention to issues of evolutionary theory of the firm. Will human-machine interaction foster creativity and innovation, or will the increasing delegation to learning machines and robotics drain some of the sources from which the innovative idea draws inspiration (Balasubramanian et al. 2020)? How organization routines are going to be modified by the diffusion of AI? Is AI destined to replace or, instead, complement humans in their creative functions? And, in both cases, what are the implications for exploration and exploitation of technological opportunities and their deployment in economic systems?

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Tables

Table 1 – List of sampled economics journals

Journal
American Economic Journal: Applied Economics
American Economic Journal: Macroeconomics
American Economic Review
Annual Review of Economics
Econometrica
International Economic Review
Journal of Economic Growth
Journal of Economic Literature
Journal of Economic Perspectives
Journal of Economic Theory
Journal of International Economics
Journal of Labor Economics
Journal of Monetary Economics
Journal of Political Economy
Journal of the European Economic Association
Quarterly Journal of Economics
Review of Economic Studies
Review of Economics and Statistics
The Economic Journal
The RAND Journal of Economics

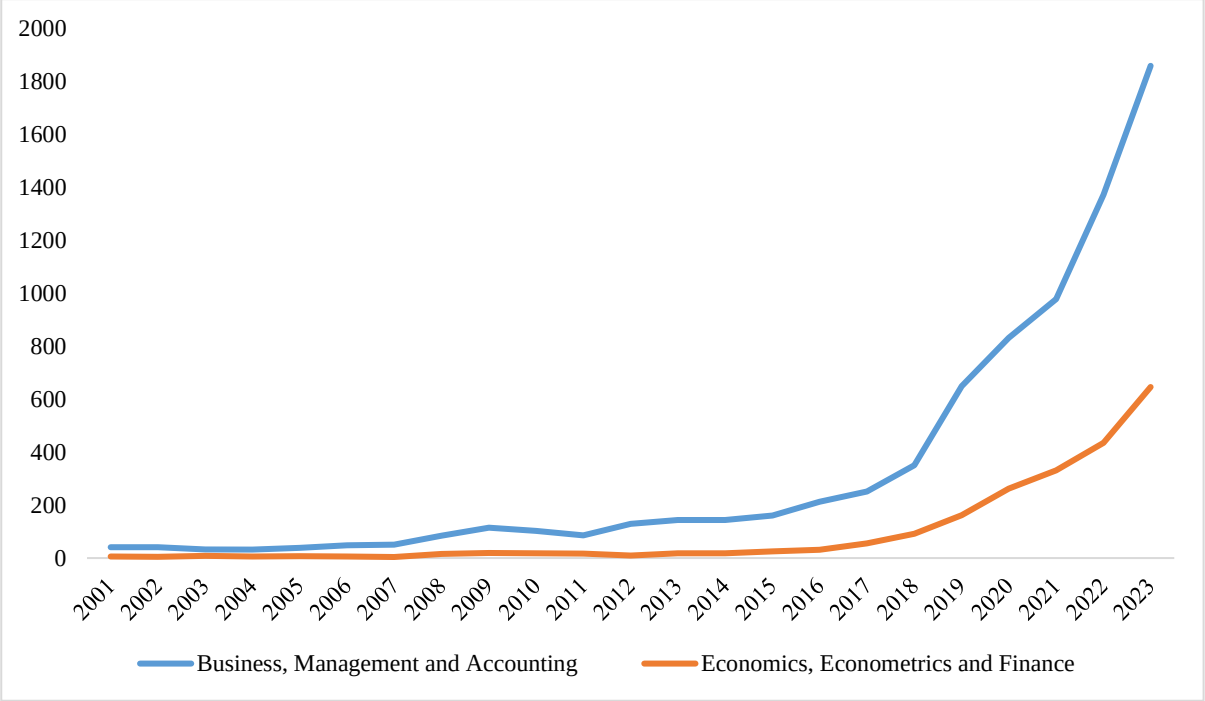
Table 2 – Papers classification into subject area

Subject area	Papers		Citations	
	N.	%	N.	%
Methods, modelling & simulation	30	34.88	8872	20.29
Jobs, employment, and labor market	17	19.77	23751	54.31
Market functioning and competition issues	11	12.79	1788	4.09
Productivity and growth	10	11.63	2075	4.74
Country and industry studies	5	5.81	666	1.52
Rationality, problem solving & decision-making	3	3.49	5545	12.68
Book reviews	3	3.49	25	0.06
Agents, institutions, and social structures (miscellaneous)	5	5.81	646	1.48
Innovation	2	2.33	368	0.84
Total	86	100.00	43736	100.00

Source: Google Scholar. Data retrieved in March 2024.

Figures

Figure 1 – Scopus articles by year



Source: Scopus – Elsevier. Data retrieved in March 2024.