

Futures Studies in Artificial Intelligence and Economics: Research Pathways, Opportunities, and Challenges

Marziyeh Nourahmadi* 

Assistant Professor of Financial engineering, Hazrat-e Masoumeh University, Qom, Iran.
m.nourahmadi@hmu.ac.ir

Mohammad Javad Nourahmadi 

Associate Prof., Department of Theoretical Economics, Faculty of Economics, Allameh Tabataba'i University, Tehran, Iran. mjnourahmadi@gmail.com

Abstract

Purpose: This study was conducted with the aim of providing a comprehensive and systematic examination of research pathways at the intersection of artificial intelligence and economics. Given the rapid growth of artificial intelligence technologies and their impacts on economic models and financial strategies, this research analyzes the opportunities and challenges in this field.

Method: In this study, the Knowledge Mapping method was employed, utilizing the Bibliometrix package in R software. Key topics and emerging trends in articles from the Scopus and Web of Science databases were identified, followed by a systematic review of the relevant scientific papers for a deeper analysis. The focus of the research was on exploring the applications of artificial intelligence in areas such as economic modeling, financial forecasting, portfolio optimization, and risk management.

Findings: Artificial intelligence holds significant potential in improving the accuracy, speed, and quality of economic analyses. However, challenges such as transparency in decision-making processes, reliance on high-quality data, and the interpretability limitations of models are among the main barriers to the development of its applications in economics.

Conclusion: This study suggests future research pathways, including the development of more transparent models, the creation of new evaluation frameworks for AI reliability, and expanding access to trustworthy data. The findings could help researchers and professionals better understand the opportunities and challenges, enabling them to pursue innovative research paths in this field.

KeyWords: Artificial Intelligence, Economics, Economic Modeling, Financial Forecasting, AI Challenges, Research Opportunities, Bibliometrix Methode, Systematic Review

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Corresponding Author/ E-mail: Marziyeh Nourahmadi / m.nourahmadi@hmu.ac.ir

Introduction

Futures research in artificial intelligence (AI) and economics is an emerging interdisciplinary field aimed at understanding and predicting the impacts of AI advancements on economic systems and social trends (Trabelsi, 2024; Dwivedi et al., 2023; Ruiz-Real et al., 2021). This field has garnered significant attention from researchers and policymakers due to AI's high potential for transforming industries, informing policy decisions, and addressing complex socio-economic challenges.

Advancements in AI technologies provide powerful analytical tools that enhance the ability to forecast and analyze various scenarios. These capabilities enable researchers and policymakers to identify and plan for future economic and social developments with greater accuracy. At the same time, the integration of AI in this domain raises critical questions regarding its economic implications, ethical considerations, and broader impacts on labor markets, governance structures, and social inequality (Ruiz-Real et al., 2021). Studies in this field employ various methodologies, such as trend analysis, scenario planning, and the Delphi technique, to identify new research avenues for leveraging AI in economic growth while mitigating risks such as job displacement and rising inequality (Dwivedi et al., 2023). Alongside economic opportunities, discussions on transparency, accountability, and the ethical management of data have become increasingly prominent, as these factors are crucial for fostering public trust and ensuring fair policy outcomes.

This paper explores research trajectories, opportunities, and challenges associated with AI in the economy, emphasizing the importance of futures-oriented approaches in understanding the transformative impact of this technology on economic structures.

Methodology

This study combines the bibliometrix method and a systematic review to identify key topics, emerging trends, and research gaps in the field of AI foresight and economics. This approach enables a comprehensive and structured examination of scientific literature, providing a clear overview of academic advancements and research connections in this domain.

Research Questions

To guide the analysis and achieve the research objectives, the following key questions are posed:

1. What are the main research trajectories in the field of AI and economics?
2. What opportunities exist for leveraging AI in economic and financial models?
3. What are the key challenges in this research domain?

Methodological Steps

Step 1: Scientific Article Search

To collect scientific data, relevant keywords related to the research topic were searched in two reputable databases: Scopus and Web of Science. This search was conducted on January 9, 2025, yielding the following initial results:

- Scopus: 1,297 articles
- Web of Science: 77 articles

These articles include research related to AI in economics, policymaking, economic analysis, and forecasting, providing a solid foundation for an in-depth bibliometric analysis (Truc et al., 2021; Chain et al., 2019). The primary focus of this study is on AI applications in areas such as economic modeling, financial forecasting, portfolio optimization, and risk management. These methods not only offer a comprehensive view of scientific advancements and research trajectories but also identify existing opportunities and challenges in this domain.

After applying filters—such as subject relevance, keyword refinement, and English language restriction—the number of articles was reduced to 915 and 75, respectively. Duplicate articles were then removed, and the datasets from both databases were merged, resulting in a final dataset of 932 articles for analysis.

Step 2: Bibliometric Analysis

Bibliometric analysis was conducted using extracted data and the R software. This method employs advanced tools to quantify and analyze scientific

publications, examining the knowledge structure and research networks. The structural analysis of the articles included identifying hot topics, emerging fields, leading researchers, and scientific collaborations (Ninkov et al., 2022; Wallin, 2005).

Step 3: Knowledge Mapping

Using the knowledge mapping method, relationships between key research concepts and structures were visually represented. This approach helps researchers accurately identify emerging trends and research gaps.

Step 4: Content Analysis of Studies

The final set of articles included research across various domains, such as AI in economic modeling, financial forecasting, portfolio optimization, and risk management. This step facilitated a deeper analysis of the identified topics, leading to comprehensive insights into existing opportunities and challenges in the field.

Tools and Resources

- Databases: Scopus, Web of Science
- Software: Bibliometrix package in R

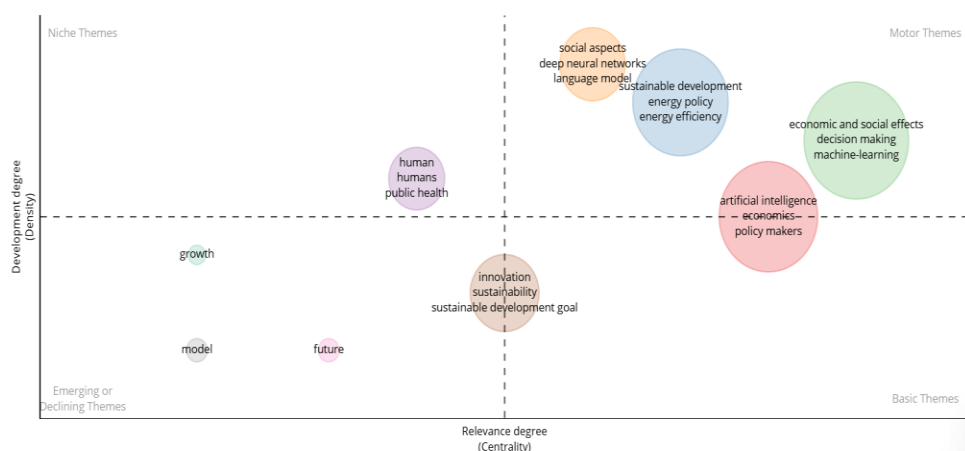
The bibliometric and knowledge mapping methods provide a powerful framework for quantifying and structurally analyzing scientific data, making them essential tools for identifying research trends and gaps. These approaches not only offer a comprehensive overview of the current research landscape but also provide a forward-looking perspective on future research directions.

Findings

The key findings of this study indicate that in recent years, interest in the application of artificial intelligence (AI) across various scientific and industrial domains has significantly increased. Analyzing publication trends and co-authorship networks of leading researchers highlights the widespread interdisciplinary integration of AI. Leading countries such as China, the United States, and Germany have played a central role in knowledge production in this field, facilitating extensive international collaboration. Furthermore, three-field analysis of research has shown that topics such as

"artificial intelligence," "sustainability," "machine learning," and "digital transformation" are among the most critical focal points of global research.

Additionally, an analysis of scientific sources and thematic distribution of research topics underscores the importance of key resources and Bradford's Law, emphasizing the concentration of literature relevant to this domain. The findings suggest that subjects such as "deep learning," "smart cities," "digital economy," and "the social and environmental impacts of technology" are emerging and highly relevant areas in AI research. The growing volume of scientific publications in this field reflects the increasing influence of AI on global macroeconomic issues, including sustainable development, resource optimization, and the enhancement of human quality of life.



Thematic Analysis of Research Topics

These findings highlight the importance of directing research towards the challenges and opportunities of the digital age. Given these trends, researchers can focus on key topics and leverage interdisciplinary collaborations to develop innovative solutions for complex problems and achieve sustainable development goals. Furthermore, the results of this study emphasize the necessity of appropriate policymaking and investment in artificial intelligence research to enable countries to advance in scientific and technological competition and harness the potential of this technology to enhance social and economic well-being.

Conclusion

This study suggests future research directions, including the development of more transparent models, the creation of new evaluation frameworks for AI reliability, and the expansion of access to trustworthy data. Additionally, to enhance international collaboration and establish more effective regulations, greater engagement between researchers and policymakers is essential. The findings of this study can assist researchers and professionals in identifying opportunities and challenges, enabling them to pursue innovative research pathways in this field.

Ultimately, it is recommended that AI models be designed with greater ethical considerations and transparency to increase their trustworthiness and facilitate their broader adoption in economic applications. This research lays the groundwork for future studies on the interdisciplinary connections between artificial intelligence and economics.

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