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COMPARATIVE ANALYSIS OF TRADITIONAL AND AI TOOLS' AND METHODS' APPROPRIATENESS FOR SCIENTIFIC RESEARCH IN ECONOMICS

Abstract. *The authors compare tools and methods used in scientific research in economics throughout the ages. The research starts with the elucidation of the evolution of the methodological apparatus in scientific economic research, laying out its main phases: (a) foundation of the methodological apparatus - when the first attempts at quantitative economic and statistical analysis were implemented (XVIII – XIX); (b) development of quantitative analysis and the introduction of econometrics (starting in 1920s); (c) the computerization phase of scientific research in economics with the use of computer modeling, processing of panel and temporal data (from the 1940s); (d) predominance of empirical approaches – so called "credibility revolution", characterized by systematic study of the cause-and-effect influences of economic variables on each other (from the 1960s to the 1990s), and (e) domination of interdisciplinary approaches and digital transformation - which became evident since 2000. Highlighting specifics of the methodological apparatus on the ongoing phase main attention is paid to possible application of AI while writing literature review, carrying out qualitative and quantitative research, data collection and data analyses, writing and editing papers.*

The paper quotes differrent and often opposing assessments of appropriateness of AI in scientific research - from their glorification as a tool that foster divergent thinking, challenge known biases, enhance the refinement of concepts etc, to the statements that large language models merely reproduce patterns from human data without the semantic grounding or consciousness; according to the opponents of AI use in research, texts composed by AI are frought with biases, hallucinations and have problems with fairness, accuracy validation, accountability, reproducibility, scientific transparency, and creativity. An experiment ran by the authors validates the widely acclaimed thesis of the deficient level of AI creativity.

Keywords: *tools and methods of economic research, AI, variety, veracity and validity of compiled data.*

ПОРІВНЯЛЬНИЙ АНАЛІЗ ТРАДИЦІЙНИХ ТА ШІ ІНСТРУМЕНТІВ І МЕТОДІВ ЩОДО ЇХ ПРИДАТНОСТІ ДЛЯ НАУКОВИХ ДОСЛІДЖЕНЬ В ЕКОНОМІЦІ

Анотація. *Автори порівнюють інструменти та методи, що використовувалися в наукових дослідженнях в економіці протягом століть. Дослідження починається з періодизації еволюції методологічного апарату в наукових економічних дослідженнях, у ході якого були визначені основні етапи: (а) становлення методологічного апарату, в рамках якого були зроблені перші спроби кількісного економіко-статистичного аналізу (XVIII – XIX); (б) розвиток кількісного аналізу та впровадження економетрії (починаючи з 1920-х років); (в) фаза комп'ютеризації наукових досліджень в економіці з використанням комп'ютерного моделювання, обробки панельних та часових даних (з 1940-х років); (d) переважне використання емпіричних підходів – так звана «революція довіри», що характеризується системним аналізом причинно-наслідкового впливу економічних змінних одна на одну (з 1960-х до 1990-х років), та (е) панування міждисциплінарних підходів та цифрової трансформації, що стали загальновживаними з 2000 року. При дослідженні специфічних рис методологічного апарату на поточному етапі основна увага приділяється можливостям застосуванню ШІ в процесах написання оглядів літератури, проведення якісних та кількісних досліджень, збору та аналізу даних, написання та редагування статей.*

У статті наводяться різні та часто протилежні оцінки доречності використання ШІ в наукових дослідженнях – від їхньої глорифікації як інструменту, що сприяє нестандартному мисленню, кидає виклик визнаним упередженням, допомагає вдосконаленню концепцій тощо, до тверджень, що великі мовні моделі лише відтворюють шаблони отриманих від людства даних без їх семантичного обґрунтування чи свідомості; на думку противників використання ШІ, тексти, скомпоновані ШІ, сповнені упереджень, галюцинацій та мають проблеми з об'єктивністю, підтвердженням достовірності, відповідністю, відтворюваністю, науковою транспарентністю та креативністю. Експеримент, проведений авторами, підтверджує широко поширену тезу про низький рівень креативності ШІ.

Ключові слова: *інструменти та методи економічних досліджень, ШІ, галюцинації, асортимент, дійсність та достовірність даних, креативність*

Formulation of the problem. With the rapid development of digital technologies, the study of the use of artificial intelligence in scientific research is gaining particular relevance. According to recent estimates, the global market size of artificial intelligence in scientific research was worth USD 5.8 billion in 2024, with a compound average annual growth rate of 34.2% [1]. This rapid expansion is explained by the exponential growth of the number of published research papers and corresponding need of faster discovery processes, analytics based on big data, and automation of laboratory and research processes. However, the booming use of AI rocks the very foundations of scientific research, creating ethical and legal problems, calling into question transparency, replication and verification of results, as well as posing the threat of poor data quality, biases, hallucinations, and fabrications.

Analysis of resent research and publications. Research on the role of AI in the scientific process has been actively developing in recent years. Among the best-known experts on the use of AI are psychologist Gary Marcus, computer scientist Judea Pearl and researcher in machine learning Michael I. Jordan. In the sphere of scientific research experts have studied possibilities of AI in literature reviews and information retrieval. In parallel, the impact of AI models on creativity and innovation is studied by Doshi & Hauser [2] and Eapen et al. [3], while an increasing attention is paid to the problems of hallucinations, biases and distorted interpretation by Sun et al., [4] and Hassija et al. [5].

But despite the growing practice of implementing AI tools into the methodological apparatus of scientific research, there are no systematic comparisons of traditional and AI tools in specific scientific fields, in particular economics. The criteria for assessing the feasibility and effectiveness of AI application in scientific research also remain insufficiently researched. Furthermore, existing researches fragmentarily examine how the integration of artificial intelligence affects the epistemological and ethical foundations of scientific research.

The purpose of the article. The aim of the paper is to determine how artificial intelligence tools are transforming the paradigm of scientific research in the field of economics, comparing them with traditional methods, assessing their effectiveness, advantages and limitations, and testing their practical applicability.

The initial hypothesis is that AI tools and methods can increase the speed and convenience of scientific research, but are inferior to traditional methods in the depth, novelty, and accuracy of formulation and creativity of research problem solving.

The main material presentation. The methodological apparatus in scientific economic research was formed as a result of a long-term evolutionary process. This process can be conventionally divided into five phases. The *foundation* of the methodological apparatus of economic research dates back to the stage of development of classical economic theory (XVIII – XIX). During this period, research was based mainly on general scientific and descriptive methods characteristic of political economy, including induction, deduction, observation, historical and logical analysis. Economic concepts were formed by representatives of classical theory – A. Smith, Mill J. S. – on the basis of rationalistic assumptions and intuitive-logical models, which allowed them to identify universal patterns in economic processes without extensive use of empirical data [6; 7]. During this period, the first attempts at quantitative economic and statistical analysis were implemented, the applied idea of which was laid down in the work of W. Petty "Political Arithmetic" (1690) [8]. At the same time, the lack of large-scale statistical data limited the possibilities of quantitative analysis, so rational argumentation remained the main tool of research.

The second stage of development of the economic research methodology began in the 1920s and was marked by *the development of quantitative analysis and the introduction of econometrics*. Through the use of statistics, mathematics, and modeling, this stage initiated the transformation of economics into a science with testable hypotheses. The development of econometrics, initiated by R. Frisch and J. Tinbergen, made it possible to substantiate economic patterns using quantitative models. In the 1930s, R. Frisch presented his rocking-horse model of cycles – a complex and mathematically sophisticated system of equations that reflects the idea of a dynamic equilibrium system that responds to exogenous shocks, generating oscillating economic cycles. During the same period, A. Kolmogorov formulated the axiomatic foundation of probability theory, laying a strictly formalized basis for stochastic inference. John von Neyman together with Egon Pearson completed the development of a rationalized strategy for testing statistical hypotheses, which became a key element of modern inferential statistics. The quantitative approach to economic research received its logical continuation in the works of Milton Friedman. In 1953, Milton Friedman emphasized that economic models should be evaluated by their ability to make accurate predictions, not by the realistic nature of their assumptions. This approach laid the foundation for instrumentalist methodology, where models are viewed as analytical tools for predicting economic phenomena [9]. Since the mid-1950s, economists have increasingly used structural models, macroeconomic modeling, along with the development of optimization methods and the application of game-theoretic frameworks to analyze complex economic systems.

From the 1940s, *the computerization phase* of scientific research in economics began with the use of computer modeling, processing of panel and temporal data. Developed in 1949 by New Zealand economist Bill Phillips, the machine known as MONIAC (Monetary National Income Analogue Computer) was the first analogue computer uses fluidic logic to model the workings of the United Kingdom economy. It had a series of clear plastic tanks and tubes attached to a steel board the size of a cupboard. Each tank represented a sector of the UK national economy, and the flow of money in the economy was illustrated by colored water [10]. Less well known are Guy Orcutt's electromechanical devices, which allowed the calculation of complex duopoly and spatial problem [11].

The first attempts to move from manual calculations to digital modeling were unsuccessful. In the 1930s, Wassily Leontief tried to solve 44 simultaneous equations on a mechanical computer created by John Wilbur at MIT, but failed. The computing capabilities of the time allowed economists to solve only 9 simultaneous equations in 3 to 4 hours. Although the first general-purpose computer, the ENIAC, began operating in 1946, statistical research during these years was conducted primarily using desktop calculators and punch-card tabulators [12].

The early 1950s saw the widespread use of the Monte Carlo method for econometric and statistical calculations.

The installation of next-generation computers at leading universities during 1950s and the development of the first programs in the early 1960s allowed for complex simulations, optimization calculations, and macro-planning. Thus, the integration of hardware, software, and econometric methods allowed for the transition from theoretical models to computational economic models.

The fourth stage, encompassing the period from the 1960s to the 1990s, is characterized by the predominance of *empirical approaches* within the economic methodological framework. Since the 1960s and especially the 1980s and 1990s, there has been a "credibility revolution", a shift in focus from simple

correlation to causal inference through natural experiments, quasi-experiments [13]. In particular, the use of natural experiments in macroeconomics, described in the article "Natural Experiments in Macroeconomics", indicates the growing role of such methods during this period [14]. The methodological apparatus of scientific research has been supplemented with such key methods as difference-in-differences (DiD) method, instrumental variables (IV), regression analysis of variance (RDD), high-frequency panel data, randomized controlled trials (RCTs) in various fields of economics and economic development. The essence of these methods was the systematic study of causal effects, that is, the cause-and-effect influences of economic variables on each other. Economic research has received a significant boost due to the emergence of new software and analytical platforms (SAS, Stata, R etc), that allow working with large data sets, building complex econometric models, and conducting experimental research.

An outstanding scientific and methodological achievement of this period was the publication of "The Methodology of Economics: Or How Economists Explain" by Mark Blaug, in which he critically analyzed the state of economic science at the time, drawing attention to the excessive abstractness and mathematization of economic models, which often failed to be empirically tested [15].

Thus, the 1980s–2000s era was one of the most important periods in the development of economic methodology. It set a new standard for scientific validity, emphasizing the identification of causal effects, replicability and high reliability of empirical findings, and methodological transparency.

The modern phase in development of the economic science methodological apparatus, which began in 2000, is characterized by a significant influence of *interdisciplinary approaches and digital transformation*. The integration of economics with sociology, ecology, cognitive sciences and computer science opens up new opportunities for identifying patterns in large data sets and forming substantiated forecasts. Due to this, methodological attention is shifting from classical regression approaches to interdisciplinary tools and forecasting methods, in particular scenario planning and foresight studies, which provide a comprehensive analysis of potential trajectories of economic systems. The development of information technologies and access to big data have radically changed the research toolkit. Big Data, machine learning, agent-oriented modeling, network analysis and simulation methods have become standard tools of economic analytics.

A special role in modern research is played by artificial intelligence. As defined by Google Cloud (one of the best experts in the field), AI is a set of technologies that empowers computers to learn, reason, and perform a variety of tasks, including understanding language, analyzing data, and even providing suggestions [16]. At present AI is actively used in various areas of the economy – from macroeconomic analysis and forecasting of market trends to assessing the effectiveness of projects and optimizing economic decisions.

AI tools for research are applications that help researchers with tasks of collecting data, automating work, and offering creative solutions, providing alternatives to traditional methods. Without going into technical specifics, (such as difference between supervised, unsupervised, and reinforcement learning or the use of the artificial neural networks and principles of connectionism), we would confine to the list of the most popular aps in scientific research, which include (as of 2025) Gemini, Perplexity, Scite.ai, Consensus, Julius, Elicit, Zotero, ResearchRabbit, Paperguide, Scopus AI, NotebookLM, Gamma, and many other (see Table 1).

Table 1

Applications of AI in scientific research

Area	AI Tools	Application
Literature review	Semantic Scholar, Elicit, Research Rabbit, Scite.ai, Consensus, Paperguide, Julius, Scopus AI	Recommendations of relevant publications, literature categorization, document screening and summarization
Qualitative research	NVivo with AI modules, NotebookLM, GPT-based coding assistants, Gemini	Text analysis, sentiment, content and discourse analysis, thematic and semantic clustering, pattern and trend detection
Quantitative research	SPSS with AI plug-ins, IBM Watson Analytics, Python (scikit-learn, TensorFlow, PyTorch), R (caret, tidymodels), MATLAB & Simulink	Forecasting, regression, simulation, predictive modeling, anomaly detection
Writing and editing	Grammarly, ChatGPT, Paperpal, Perplexity, Zotero	Grammar and style correction, coherence and readability enhancement, translation, citations and reference management, content generating and paraphrasing
Visualization	Looker, Gamma, Power BI and Tableau with AI features	Creation of infographics, building interactive dashboards, generation of AI assisted presentations

Source: compiled by the authors

As was ascertained by Dr. Josephine Woodhams [17] on the basis of the responses from 2,345 researchers from various disciplines across the world, 76% of respondents reported using some form of AI tool. Majority reported using AI for machine translation (49%), while some used it for chatbot tools (43%) and AI-powered search engines or research tools (25%).

Majority of AI tools for research offer a mix of free and premium plans, providing accessibility for researchers with varying budgets. Free versions provide limited features; premium subscriptions offer advanced functionalities. At the same time many advanced features in AI tools require subscriptions, indicating a shift towards the commercialization of academic research tools [18].

Not withstanding essential difference between AI tools, all of them are designed to assist on some phase of scientific research by way of automating complex analytical processes, identification of hidden patterns, simulation of the behavior of economic agents, scenario forecasting and substantiation of recommendations based on the integration of various sources of information.

Advocates of AI claim that AI is always objective and unbiased, reduce human error, accelerate research and development, is fast, accurate and infinitely available.

To check such statements one should start with the examination of the functions of AI tools, which in economic research include the following: automating literature reviews; literature mapping; summarising research papers; multi-document analysis; data collection; data analysis; writing and editing papers; improving academic writing style; checking authors' submission meets journal criteria, and more

AI research methods and traditional research methods differ in several key ways.

AI research methods, as a rule involve the following steps:

1. Collecting a large amount of data.
2. Training an AI model on the data.
3. Evaluating the performance of the AI model.
4. Deploying the AI model to solve a problem or make a prediction.

On the other hand, traditional methods typically involve quite different steps:

1. Formulating a research question or hypothesis.
2. Conducting a literature review to grasp the existing body of knowledge.
3. Collecting data using a variety of methods.
4. Analyzing the data to identify patterns and relationships.
5. Drawing conclusions and making recommendations.

As of today most frequently AI is used in literature review.

When comparing advantages and disadvantages of both methods one should clarify a purpose of literature review: wherther it is

- a required component of any scientific paper, needed only to comply with the requirements of the publisher or
- a demonstration of a deep knowledge of the topic, or
- a way to find original research problem, controversial issue or a gap in the knowledge and present own substantiated view.

In the first two case the superiority of AI is obvious: AI tools significantly improve the speed, precision and relevance of search results through advanced natural language processing (NLP) and semantic search techniques. Rather than merely matching keywords, AI interpret context and meaning behind queries, analyzing patterns and providing tailored responses [19].

But alongside with numerous advantages of AI research methods it is necessary to mention challenges that make their utilization unwarranted for the purpose of finding original research problem, controversial issue or a gap in the knowledge. Among the challenges the main are variety, veracity and validity of compiled data, hallucinations and 'black box' problem.

Variety – the diversity of data types and sources – can be interpreted both as advantage and disadvantage: on the one hand, the use of AI allows to go beyond traditional statistical methods to uncover complex, non-linear relationships between diverse data sources [20]. On the other hand, restrictions on the use of only academic sources are justified by the very essense of the latter, as they are peer reviewed papers, checked by other subject experts before publishing, that are written by subject specialists for an academic audience, and include evidence and citations. As a rule they are narrowly focused, reproducible, or clearly sourced, with conclusion based on in-depth analysis; they are aimed to be objective and well-reasoned, assisting in design of credible academic arguments based on reliable evidence.

Compared to mentioned characteristics, literature review composed by AI can engender serious risk for

hallucinations, presentation of plausible but incorrect information and fabricated references, biases and other errors that is disguised by scholarly tone of results [20]. Among the most often detected biases (responses that may reflect hidden bias, gaps, or outdated training data) are both technical (access, algorithmic, machine, and emergent biases*)* and cognitive *(*anhoring, automation, *c*onfirmation, groupthink, information, selection, and availability heuristic*)* [21].

All the above mentioned specifics of using AI tools jeopardize veracity (providing authenticity and originality of the data) and *validity* (necessary to ensure accuracy of data, the consistency of the information) of the literature review. Moreover, both veracity and validity of the review can be dubious due to 'Black Box Algorithms' and possible 'hallucinations'.

A *'black-box model'* in AI refers to a machine learning model that operates as an opaque system where the internal workings of the model are not easily accessible or interpretable. These models are like a "magic trick" where data goes in and answers come out, but the reasoning behind the answer remains a mystery. The reasons behind it are the following:

- the algorithm is proprietary or confidential (kept secret by a company);
- the model is too complex, where even developers can't explain how inputs become outputs.

In economic research such lack of transparency potentially leads to issues with bias, fairness, accuracy validation, accountability, reproducibility and scientific transparency [5]. As a striking example of this drawback one can ask different AI tools the same question (and even the same AI tool at different times) and receive different answers.

AI Models might also hallucinate, meaning that large language models (LLMs) produce information that sounds plausible but is factually incorrect, fabricated, or misleading — and often does so with confidence**.** In literature research, a *hallucination* refers to the generation of content that is syntactically and semantically coherent but not grounded in academic literature or the provided data**.** AI hallucinates especialy active when the user's question is vague.

Sun, Y et al. (2024) identified 8 first-level error types: "Overfitting"; "Logic errors"; "Reasoning errors"; "Mathematical errors"; "Unfounded fabrication"; "Factual errors"; "Text output errors"; and "Other errors", further subdivided into 31 second-level error types [30]. Some researchers even argue that hallucination represents an inherent trait of the GPT model and suggest that completely eradicating hallucinations without compromising its high-quality performance is nearly impossible [4].

Without downplaying severity of the consequences of 'black box' and '*hallucination', which can completely* distort literature reviews, we would like to mention one more, and to our mind the most consequential drawback of AI created literature reviews – lack of (a) common sense and (b) creativity.

As for common sense, Nikita Duggal [22] has stated, that while AI systems can process and analyze vast amounts of data, they need help understanding context, making intuitive judgments, or adapting to new and unforeseen situations… Unlike humans, AI lacks the innate ability to grasp everyday knowledge and social norms, which can result in logically correct decisions but are practically or ethically flawed.

Speaking about creativity, the same author noted that AI tools essentially recombine pre-existing data, limiting its capacity for true innovation.

The problem of the 'creativity' of AI has already captured attention of the experts in different fields. Views of the authors range from "AI has the potential to revolutionise research methodologies" [17] and glorification of AI for fostering divergent thinking, challenging existing biases, aiding in the evaluation of ideas, enhancing the refinement of concepts, and promoting collaborative innovation among employees and customers [3] to papers of Noam Chomsky [23], who argue that large language models merely reproduce patterns from human data without the semantic grounding or consciousness that underpins authentic creativity. As pointed out by F. Sağın et al [24], the academic community is nowadays "polarized, with some embracing AI for its accessibility and efficiency thus advocating it as an indispensable tool, while others cautioning against risks to academic integrity and intellectual development".

To check whether AI is capable of developing truly innovative ideas, Harvard Business School Assistant Professor Jacqueline Ng Lane with colleagues compared ChatGPT's creative potential to crowdsourced innovations produced by people [25]. The researchers found that both humans and AI have their strengths: while people contribute more novel suggestions, employing more unique "out of the box" thinking, AI creates more practical solutions.

Milan Ehrhardt [26] on the basis of his own experience with music and writing, came to a conclusion that even if AI can mimic our styles and sometimes even fool us into thinking it has a personal touch, true creativity often comes from deep feelings, cultural influences, and the wild, sometimes illogical nature of the

human mind. Any algorithm, no matter how advanced, lacks these things.

Anil Doshi and Oliver Hauser studied the causal impact of generative AI ideas on the production of short stories in an online experiment where some writers obtained story ideas from an LLM. They found that access to generative AI ideas causes stories to be evaluated as more creative, better written, and more enjoyable. However, generative AI–enabled stories are more similar to each other than stories by humans alone [2].

We also ran a test, asking Gemini and post-graduate students to suggest research questions for the fairy tale Little Red Riding Hood. Gemini created the following:

1. Compare and contrast the core narrative elements, characters, and moral conclusions, identifying significant deviations.
2. Investigate the pre-Perrault European oral folktale traditions, such as "The Story of Grandmother," to understand the tale's evolution.
3. Analyze the major symbolic elements, such as the red hood, the forest, and the wolf, and explore the tale's connections to rites of passage, especially for young women.
4. Research critical analyses, including psychoanalytic (e.g., Freudian, Jungian) and anthropological interpretations, focusing on the story's representation of human fears, desires, and developmental stages.
5. Examine the tale through a feminist lens.
6. Trace the cultural impact of "Little Red Riding Hood".
7. Synthesize research on the narrative's central ethical dilemmas regarding obedience, deception, and the portrayal of 'nature' versus 'civilization' in the forest setting.
8. Find information regarding the tale's use as a cautionary narrative, exploring how its lessons about trust and stranger danger have been interpreted and applied across different historical periods.

Suggestions of the students included the following:

- intergenerational conflict;
- problems of parenting / of adulthood / of old people loneless;
- parent's negligence;
- peculiarities of Wolf/Granny diet;
- wolf's strategy of nutrition;
- the fairy tale as a tool of of marketing services of Nova poshta (instead of sending daughter in the wood);
- the fairy tale as a tool of of advertising nursing senior center;
- wildlife protection against grandmothers and hunters;
- personal data protection.

Eric Berne in his book "Games People Play" [27] suggested that the moral of the story can be "not that innocent maidens should keep out of forests where there are wolves, but that wolves should keep away from innocent-looking maidens and their grandmothers; in short, a wolf should not walk through the forest alone". Also he raised the interesting question of what the mother did after she got rid of little Red Riding Hood or the day".

The conducted research allows us to systematize the advantages and limitations of traditional and AI-based research methods.

Table 2

Comparison of traditional and AI research methods

Parameter	Traditional methods	AI methods
Nature of analysis	Statistical, deterministic	Self-learning, complex pattern
Data type	Formalized data	All data types (structured and unstructured)
Data volume	Limited by sample size and data availability	Large, including Big Data, streaming data, social networks
Data processing	Manual or semi-automated processing, standard packages	Fully automated, algorithmic optimization, clustering, NLP
Methodology focus	Typically hypothesis-driven, where a researcher forms a testable hypothesis and designs an experiment or study to confirm or refute it.	Often data-driven and model-centric, focusing on developing and advancing algorithms and models that learn patterns from data, sometimes without a predefined hypothesis.
Hypothesis testing	Used to draw conclusions	AI models are used to make predictions or solve problems

Continuation of Table 2

Forecasting	Based on historical data, limited by model complexity, high accuracy for well-structured data and linear models, limited accuracy for complex relationships	High accuracy, integration of large and heterogeneous data, ability to detect hidden patterns
Interpretability	High, results are understandable, cause-and-effect relationships are easy to explain	Often low, "black boxes" effect, difficult to explain the internal logic of models
Transparency	High	Low
Required resources	Standard software, limited computing power	High computing power, specialized software, servers, GPU
Implementation complexity	Easy to use, standard packages	Requires knowledge in machine learning, programming, computing power
Adaptability	Limited	Advanced due to automatic learning and adaptation

Source: compiled by the authors

Conclusions. Substantiating the choice of using certain tools and research methods requires understanding and comparing their functional capabilities. Traditional approaches – econometrics, experiments, modeling – provide reliability, hypothesis testing and understanding of causality. Artificial intelligence, in turn, provides scale, speed and the ability to work with large and complex data sets that were previously unavailable. In areas with a large amount of structured data (macroeconomics, finance), the best effect is achieved by combining classical AI models and algorithms. In areas related to human behavior and R&D analysis (labor, behavioral and innovation economics), AI opens up new opportunities, in particular, recognizing behavioral patterns, identifying innovation trends and predicting technology development, but traditional methods remain the basis for reliability and scientific validity.

Considering the specific requirements of each specific field of economic research, further scientific exploration should be aimed at solving the problem of identifying and justifying the most appropriate mixes of traditional and AI methods. This involves developing criteria for their optimal combination and assessing performance in different applied contexts. A synergistic integration of traditional and AI methods in scientific research will help overcome the limitations of each category and ensures maximum research and practical effectiveness.

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