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GENERATIVE AI: A NEW GENERAL-PURPOSE TECHNOLOGY FOR GROWTH AND RESEARCH

Generativni modeli veštačke inteligencije – nova tehnološka revolucija za ekonomski rast i istraživanje

Abstract

Building on the review of the explosive achievements of Generative AI in its breakout year 2023 in our previous paper [52], this paper focuses on continued AI developments in 2024, its impact on growth, economic research, and the design and conduct of macroeconomic policy. GenAI has matured to become a true general-purpose technology of the new industrial revolution. The promise of Generative AI has moved from the 2023 hype phase of experimental applications to practical implementation and tangible results based on improved model capabilities, personalized content, energy efficiency, and autonomous agents focused on results. Improved model capabilities, driven by the further development of large LLM-based models and multimodal applications done by specialized AI companies, are now accompanied by the proliferation of small language models customized to company-specific processes and product needs. The year 2024 brought a significant development of "generative agents," which autonomously perform complex tasks and deliver desired results in legal and financial market services. As a transformative technology, AI has a significant impact on economic growth, research, and policymaking. It enhances productivity through automation, improves decision-making, and faster innovation. It can simulate economic scenarios, predict macroeconomic variables, and generate new hypotheses for research and policy design. Key areas for future research include labor markets, capital allocation and inequality. The fast progress of GenAI poses challenges (job displacement, algorithmic bias, and ethical concerns) and necessitates balanced policy interventions. Ethical dimensions, particularly bias and accountability in algorithmic decision-making, are critical for ensuring that AI benefits society. Policy recommendations include ensuring the equitable distribution of AI benefits, providing equal access to AI technologies, reducing the digital divide, investing in digital infrastructure, AI literacy and reskilling, and establishing robust ethical frameworks. Policies to promote inclusive growth, adapt to changing labor markets, and ensure transparent and accountable AI deployment would allow governments to harness GenAI potential while safeguarding societal well-being.

Keywords: *artificial intelligence (AI), AI singularity, general pre-trained transformers (GPT), ChatGPT, large language models (LLM), small language models (SLM), generative AI models (GenAI), machine learning (ML)*

Sažetak

Nadovezujući se na pregled eksplozivnih dostignuća generativne VI u prelomnoj 2023. godini dat u našem prethodnom radu [52], ovaj rad se fokusira na razvoj VI u 2024. godini, njen uticaj na rast, ekonomska istraživanja i definisanje makroekonomske politike. GenVI je tokom prošle godine postala „tehnologija opšte namene" nove industrijske revolucije, slično parnoj mašini i električnoj energiji u prve dve. Očekivanja su se pomerila iz faze hiperoptimizma, zasnovanog na eksperimentalnim aplikacijama u 2023. godini, u realnu sferu fokusiranu na praktičnu implementaciju i opipljive rezultate zasnovane na poboljšanim karakteristikama modela, personalizovanom sadržaju, energetskoj efikasnosti i „generativnim agentima" fokusiranim na rezultate. Poboljšane karakteristike velikih modela zasnovanih na LLM i multimodalnim aplikacijama koje su razvile specijalizovane AI kompanije, sada su praćene proliferacijom malih jezičkih modela prilagođenih specifičnim procesima i potrebama proizvoda pojedinih

kompanija. 2024. godina donela je značajan razvoj „generativnih agenata" koji autonomno obavljaju složene zadatke i isporučuju željene rezultate u pravnim uslugama i uslugama na finansijskim tržištima uslugama. GenVI kao transformativna tehnologija ima značajne implikacije za ekonomski rast, istraživanja i vođenje makroekonomske politike. Ona povećava produktivnost kroz automatizaciju, poboljšava donošenje odluka i ubrzava inovacije. Ona simulira ekonomske scenarije, predviđa makroekonomske varijable i generiše nove hipoteze za istraživanje i testiranje ekonomskih politika. Ključne oblasti za buduća istraživanja uključuju tržišta rada, alokaciju kapitala i nejednakost. Brz napredak GenVI donosi izazove (gubitak radnih mesta, pristrasnost programskih algoritama i etička pitanja), što zahteva prave mere ekonomskih politika. Etičke dimenzije, pristrasnost i odgovornost u donošenju odluka, ključne su za osiguranje da VI koristi društvu. Preporuke ovog rada za ekonomsku politiku uključuju osiguranje pravedne raspodele koristi VI, obezbeđenje jednakog pristupa VI tehnologijama, smanjenje digitalnog jaza, ulaganje u digitalnu infrastrukturu, VI pismenost i prekvalifikaciju, kao i uspostavljanje robusnih etičkih okvira. Politike za promociju inkluzivnog rasta, prilagođavanje promenama na tržištima rada i osiguranje transparentne i odgovorne primene AI omogućile bi vladama da iskoriste potencijal GenVI dok štite dobrobit društva.

Ključne reči: *veštačka inteligencija (VI), VI singularnost, generativni unapred obučeni transformatori (GPT), ChatGPT, veliki jezički modeli (LLM), mali jezički modeli (SLM), generativni VI modeli (GenVI), mašinsko učenje (ML)*

Introduction

The year 2024 witnessed significant advancements in artificial intelligence (AI), particularly in the domain of generative AI (GenAI), reinforcing its transformative potential across industries, research fields, and societal applications while enhancing productivity. Building on the momentum from prior years, 2024 emphasized both technological innovation and practical integration, making AI more accessible and versatile than ever before.

One notable development was the increased adoption of GenAI in enterprise settings. Leading companies launched pilot programs that integrated GenAI capabilities into their digital platforms, aiming to improve integrated business planning and decision-making processes. These initiatives demonstrated the potential of GenAI to enhance operational metrics, such as forecast accuracy and inventory management, leading to substantial productivity gains.

Another key trend in 2024 was the maturation of GenAI technologies beyond the initial hype phase based on experimental applications discussed in Vujović [52] and a move to practical implementations, where GenAI, in tandem with other AI technologies, is used to standardize processes and deliver tangible benefits (results). Industry leaders emphasized the importance of moving beyond the novelty of GenAI and focusing on its real-world applications to drive innovation and efficiency.

Furthermore, the widespread adoption of GenAI was already evident across various business functions. A McKinsey survey [44] revealed that 65% of organizations were regularly using GenAI in at least one business function (most commonly in marketing, sales, and product development) where it generated significant value. This enabled companies to streamline workflows, enhance customer experiences, and develop innovative products and services, thereby reinforcing the transformative impact of GenAI on the global economy. These developments underscored the growing importance of GenAI as a powerful tool to achieve competitive advantages and drive growth through technological innovation such as:

- *Improved Model Capabilities*: Large Language Models (LLMs), such as OpenAI's GPT-4 and Google's Gemini 2, demonstrated unprecedented capabilities in reasoning, collaboration, and multimodal understanding. As Korinek discussed in [37], [38] and [39], model functionalities were expanded to include more robust decision-making, ethical reasoning, and real-time adaptability. Multimodal systems became more integrated, allowing seamless transitions between text, image, and video generation, paving the way for enhanced user applications in industries like healthcare, media, and education.
- *Personalization and Context-Awareness:* During 2024, GenAI models achieved a new level of contextual understanding and personalization to adapt to individual user needs, leveraging advancements in reinforcement learning from human feedback (RLHF) and fine-tuned datasets specific to individual users or organizations. This progress facilitated the development of personalized education systems, healthcare diagnostics, and customer service platforms.
- *Energy Efficiency and Sustainability:* Responding to growing environmental concerns, GenAI models

saw breakthroughs in energy-efficiency during 2024 both through innovations in hardware and software optimization techniques.

- *Autonomous Agents and Collaboration:* Generative agents, which autonomously perform complex tasks while collaborating with humans and other AI systems, were deployed in sectors ranging from legal services to financial markets, offering automated high-level decision-making processes while ensuring alignment with human objectives.

This enabled enhanced integration into industries and research such as:

- *Healthcare and Biotech:* GenAI allowed drug discovery and personalized medicine, leading to a reduction in the cost and time required for clinical trials. Healthcare providers utilized AI-powered diagnostics and treatment recommendation systems to improve patient outcomes.
- *Economic Research and Policymaking*: Economists and policymakers adopted GenAI to model macroeconomic scenarios, simulate policy impacts, and analyze real-time data. This enabled more responsive and evidence-based decision-making. Enhanced forecasting tools predicted inflation, unemployment, and market trends with greater accuracy, informing central bank policies and fiscal interventions.
- *Creative Industries:* AI-generated content became a staple in entertainment, advertising, and journalism. Models capable of producing high-quality, human-like narratives and visuals disrupted traditional workflows while raising questions about intellectual property and creative authorship.

The fast development of GenAI models and agents raised some challenges and ethical considerations requiring:

- *New Regulatory Developments:* National and international regulatory frameworks for AI, such as the EU AI Act, are needed to balance innovation with ethical considerations (data privacy, algorithmic fairness, and accountability in decision-making).
- *Treatment of Bias and Inequality:* Despite advancements, challenges remain regarding unintended algorithmic bias and the potential exacerbation of socioeconomic inequalities. The digital divide widened as high-resource nations and organizations capitalized on AI innovations while low-resource settings lagged behind. Policymakers and researchers called for more inclusive AI development practices to bridge these gaps.
- *Misinformation and Content Authenticity:* The proliferation of AI-generated content heightened concerns about possible misinformation (hallucinations) and the use of deep-fake technologies. While AI-driven detection tools improved, the arms race between creators and regulators underscored the need for continued vigilance and proactive measures.

The developments in AI and GenAI during 2024 underscored their transformative potential while highlighting the need for sustainable and equitable integration into society. Future research and policy should focus on aligning these technologies with societal values, addressing ethical challenges, and ensuring broad-based benefits. As organizations continue to explore and implement GenAI technologies, the potential for further advancements and applications remains vast. GenAI output, which closely resembles human outputs, has profound implications for economic growth, research, and policymaking. As a transformative general-purpose technology, GenAI holds the potential to boost productivity by automating and augmenting cognitive tasks, drive innovation by accelerating research and development cycles, and enhance macroeconomic policymaking through data-driven insights and predictive capabilities. GenAI models, particularly large language models (LLMs) like OpenAI's GPT series or Google's BERT, are capable of performing complex tasks traditionally associated with human cognition, such as writing, translating, and even generating novel research ideas [24]. In the context of economic growth, GenAI can enhance productivity by automating cognitive tasks, facilitating faster and more efficient decision-making, and accelerating the innovation process across various sectors [29]. In economic research, GenAI tools enable economists to quickly process large volumes of data, identify new research avenues, and generate novel hypotheses, which could lead to breakthroughs in theory and practice [37]. For macroeconomic policymaking, GenAI's predictive abilities and scenario modeling can

assist in crafting evidence-based policies and improving fiscal and monetary strategies [13].

The transformative potential of GenAI can reshape traditional economic paradigms. With advancements in machine learning and natural language processing, GenAI has the ability to reduce transaction costs, enhance the speed and accuracy of economic modeling, and democratize access to economic research. As such, understanding the implications of GenAI is crucial for economists, policymakers, and researchers who aim to harness its capabilities while managing the associated risks, such as job displacement, inequality, and bias in algorithmic decision-making (see [24] and [46]).

The structure of the paper proceeds as follows: the next section provides a brief review of background and theoretical issues; Section 3 examines the multifaceted impact of GenAI on economic growth by exploring the potential for GenAI to drive productivity and innovation; Section 4 explores the implications for economic research, highlighting the role of GenAI in data processing and hypothesis generation and testing; Section 5 discusses the potential applications of GenAI in macroeconomic policymaking, particularly in forecasting and real-time policy evaluation; Section 6 considers the challenges and risks associated with GenAI, including ethical concerns and the digital divide; the last section concludes.

Background and Theoretical Considerations

Existing research on artificial intelligence (AI) and economic growth highlights its transformative potential as a general-purpose technology capable of driving productivity, innovation, sectoral and employment shifts. It is estimated that close to 80% of jobs in the U.S. economy could see at least 10% of their tasks done twice as quickly with generative AI. Andrew McAfee's report [42] delves into the transformative potential of GenAI on the economy. GenAI enables widespread productivity gains by enabling tasks to be completed more quickly and efficiently. This technology is already delivering large productivity gains, which will increase and spread over time as people and organizations come up with complementary innovations that leverage generative AI's capabilities.

McAfee's report concludes that GenAI can be considered a "general-purpose technology" powerful enough to accelerate overall economic growth and promote innovations with the potential to positively transform economies and societies. Unlike previous general-purpose technologies, such as the steam engine, electrification, and internal combustion engine which brought changes over decades, GenAI's effects are anticipated to be felt more quickly due to its ability to diffuse rapidly via existing infrastructure (the internet) and its ease of use owing to its natural language interface. This technology is already resulting in overall productivity improvements enabling the acceleration of economic growth.

Generative AI will reduce demand for some skills, increase demand for others, and create demand for entirely new job categories. Fears of large-scale technological unemployment are probably overblown. The history of general-purpose technologies shows that the growth they bring is accompanied by strong demand for labor, albeit often in new occupations: more than 85% of total U.S. employment growth since 1940 has come in entirely new occupations.

The rapid changes brought by generative AI will require prompt and effective reskilling efforts. Generative AI itself can be a valuable tool in this effort and in improving the performance of entry-level employees and in addressing wage inequality. Because generative AI accumulates knowledge and makes it available on demand, it is particularly effective at improving the performance of entry-level employees.

Multiple authors emphasize that AI catalyzes growth by enabling more efficient resource allocation and fostering innovation through enhanced decision-making and prediction capabilities. Acemoglu and Restrepo [2] explore AI's dual impact on productivity and labor markets, noting that while automation displaces certain tasks and jobs, it also generates new opportunities and jobs in complementary sectors. Additionally, Brynjolfsson, Rock, and Syverson [22] argue that AI technologies amplify human capital by automating routine tasks and allowing workers to focus on higher-value activities, contributing to overall economic growth. They also emphasize the productivity paradox associated with AI, noting that

measurable gains often lag behind initial adoption due to the need for complementary organizational changes and workforce adaptation. Most studies caution against uneven adoption and potential disparities, highlighting the importance of policy interventions to manage transitions and distributional impacts.

The role of AI in economic research and policymaking has also received significant attention. AI-driven tools have been shown to enhance economic research by automating literature reviews, generating hypotheses, and processing large datasets, as demonstrated by McKinsey Global Institute surveys and report [43]. Tools such as machine learning models and generative AI systems enable predictive analytics for macroeconomic indicators and scenario analysis, offering valuable insights for fiscal and monetary policy. For instance, the IMF has used AI to forecast inflation trends and identify financial vulnerabilities, thus improving policy responsiveness. Despite its promise, scholars underscore the need for frameworks to address risks such as algorithmic bias and lack of transparency, advocating for the development of ethical and regulatory standards to guide AI's integration into economic research and governance.

On the policy front, McKinsey Global Institute's annual "State of AI" surveys [44] illustrate how AI accelerates decision-making by improving forecasts for inflation, labor market trends, and fiscal policies. Similarly, the IMF recent studies highlight the utility of machine learning models in real-time monitoring of systemic financial risks, enabling policymakers to respond more effectively to emerging crises. Despite these advancements, many studies caution against uneven AI adoption, stressing that disparities between regions and sectors could exacerbate inequality and hinder inclusive growth. Together, these studies illuminate both the opportunities and challenges AI presents for economic research and policymaking, underscoring the need for adaptive strategies to maximize benefits while mitigating risks.

The theoretical framework for understanding how Generative Artificial Intelligence (GenAI) influences productivity and economic growth can be built around the traditional notion of technological progress and its effects on factor productivity. As with past technological revolutions, GenAI reduces the cost of performing specific tasks and allows for more efficient allocation of resources. One key mechanism through which GenAI influences productivity is by automating cognitive tasks traditionally performed by humans. This automation frees up human labor to focus on higher-value activities, potentially boosting overall economic output [24]. GenAI can reduce the time and cost associated with data analysis, decision-making, and draft content generation, allowing firms to achieve higher productivity without increasing their labor inputs [29]. In economic research, AI models can quickly process large datasets, identify trends, and generate new hypotheses, effectively accelerating the pace of knowledge creation and innovation [38].

Another significant mechanism through which GenAI influences productivity is its ability to reduce transaction costs, a concept central to economic theory (Coase theorem). Transaction costs refer to the costs associated with coordinating economic activity, including search, information, bargaining, and enforcement costs. By automating tasks related to these activities, GenAI reduces the friction involved in transactions across a variety of industries. In the financial sector, AI-powered tools such as chatbots and algorithmic trading platforms help reduce the costs of customer service and market research, while enhancing the speed and accuracy of trading strategies [19]. Similarly, in the manufacturing sector, AI can streamline supply chain management by predicting demand more accurately and optimizing production schedules, thus reducing the need for costly inventory management [24].

GenAI also plays a crucial role in enhancing innovation. By automating certain aspects of the research and development (R&D) process, it allows firms to redirect resources toward more complex and creative tasks. This is particularly evident in industries where GenAI assists in ideation and prototyping. In biotechnology, for example, GenAI is used to design novel proteins, accelerating the development of new drugs and medical treatments. In creative industries, GenAI provides tools that assist in generating novel content, allowing creators to experiment with new ideas and rapidly prototype designs. The role of GenAI in facilitating faster innovation cycles aligns with endogenous growth theory, which emphasizes the

role of knowledge and technological progress in driving long-term economic growth. By enhancing the speed and scale of innovation, GenAI contributes not only to sector-specific productivity improvements but also to broader economic growth by fostering technological diffusion and cross-industry spillovers.

Finally, GenAI improves decision-making processes by providing more accurate, data-driven insights and enhancing the ability of firms and policymakers to predict economic outcomes. Through the use of predictive modeling and scenario analysis, GenAI enables decision-makers to assess the potential impacts of various economic policies or business strategies before implementation [13]. In the context of macroeconomic policymaking, for instance, AI-driven models can simulate the effects of changes in fiscal or monetary policy on key indicators such as inflation, unemployment, and GDP growth. By integrating large datasets and real-time information, GenAI helps policymakers make more informed decisions, reducing the uncertainty inherent in economic forecasting [8]. This improvement is critical for maintaining economic stability and fostering growth in an increasingly complex and interconnected global economy.

The integration of Artificial Intelligence (AI) into economic theory and practice has garnered increasing attention in recent years, particularly with regard to its potential to drive economic growth. Early studies on AI's economic impact focused largely on automation's effect on productivity, labor markets, and industrial organization [24]. These works primarily emphasized the role of AI in automating routine tasks, which is expected to enhance productivity by allowing workers to focus on higher-value activities [1]. More recently, research has shifted towards understanding how advanced AI, particularly generative AI models, can influence innovation, knowledge creation, and decision-making processes. Chui et al. [29] explore how AI is poised to drive productivity gains across a range of sectors, from healthcare to finance, by automating cognitive tasks that were traditionally carried out by skilled professionals. This broader conception of AI's potential challenges previous productivity theories, suggesting that AI not only replaces certain types of labor but also augments human creativity and problem-solving abilities [24].

In terms of economic research, AI, and more specifically, GenAI models such as OpenAI's GPT-4 and Google's BERT, are reshaping the methodologies employed by economists. Korinek [38] notes that these advanced AI systems have significantly improved the efficiency and scope of economic analysis by automating data analysis, model testing, and hypothesis generation. AI tools allow researchers to process and analyze large datasets far more efficiently than traditional methods, thereby expanding the range of economic questions that can be tackled within the same time frame. Additionally, as observed by Brynjolfsson et al [19], GenAI's ability to generate natural language text from structured data has been particularly useful in literature reviews, allowing researchers to synthesize vast quantities of academic work and identify new research directions more effectively.

The role of AI in policymaking is another area of significant interest in the literature. Several studies have explored how AI can improve the design and evaluation of macroeconomic policies. For instance, Binns [13] discusses the potential of AI-driven models to assist in scenario analysis, enabling policymakers to simulate the effects of different policy interventions on economic variables such as inflation, unemployment, and GDP growth. These AI models can also enhance real-time policy monitoring by identifying early warning signs of economic instability or financial crises, as demonstrated in recent applications in financial market monitoring by Tufano et al. [49]. Furthermore, the ability of AI to forecast economic trends with greater accuracy than traditional econometric models suggests that its role in guiding monetary and fiscal policies could become increasingly important in the future [8]. These studies illustrate that the role of AI in economic research and policymaking is expanding rapidly, with profound implications for the way economists conduct research, design policies, and interpret economic phenomena.

Impact on Economic Growth

The impact of Generative AI (GenAI) on economic growth is multifaceted, with potential productivity improvements across a variety of sectors. In industries

such as manufacturing, healthcare, and finance, GenAI has demonstrated its capacity to reduce inefficiencies and automate labor-intensive tasks, which in turn enhances overall productivity. In manufacturing, AI-powered systems optimize production schedules, predict demand with greater accuracy, and reduce the need for costly inventory management, all of which contribute to lowering costs and improving the efficiency of the production process [24]. In healthcare, GenAI has revolutionized diagnostic processes by analyzing medical images, interpreting lab results, and even predicting patient outcomes with a level of precision that exceeds traditional methods. This not only improves healthcare delivery but also increases productivity by allowing healthcare professionals to focus on more complex tasks that require human judgment and expertise [29]. In finance, GenAI has facilitated the automation of customer service and fraud detection, thereby reducing costs and improving decision-making [13]. By enhancing productivity, these improvements contribute to overall economic growth.

Beyond productivity, the adoption of GenAI also has profound implications for labor markets, capital allocation, and R&D investments. The displacement of routine and cognitive tasks by AI has led to significant shifts in labor markets. While automation has replaced some low-skill and repetitive jobs, it has also created demand for higher-skilled positions in AI development, data science, and machine learning engineering [21]. Furthermore, GenAI's ability to enhance decision-making processes in both the private and public sectors can lead to more efficient capital allocation [29] which, in turn, also encourages higher levels of investment in R&D, as firms seek to remain competitive in an AI-driven economy. Overall, GenAI has the potential to foster a surge in technological advancements, further accelerating economic growth [38].

The Macroeconomic Impact of GenAI on Growth

The macroeconomic impact of GenAI is seen through its potential to drive productivity, economic growth, and innovation across a variety of sectors. Labor market disruption, wage polarization, and economic inequality are potential challenges. To harness the full potential of GenAI while minimizing its risks, policymakers need to adopt strategies that promote inclusive economic growth, invest in education and reskilling, and ensure equitable access to AI technologies. As GenAI continues to evolve, its role in shaping the future of economies around the world will be increasingly central to discussions on sustainable development and global prosperity. The macroeconomic impact can be observed through several key dimensions:

Productivity and Economic Growth: GenAI has the potential to significantly boost productivity across various sectors by automating complex cognitive tasks, improving efficiency, and accelerating innovation. By streamlining processes in many industries, GenAI reduces costs, increases output, and enhances the speed of decision-making. AI-driven systems help optimize production and inventory management, enable faster prototyping, modeling, research, and facilitate the development of new products and services. In healthcare, AI systems accelerate diagnostic processes and drug discovery, enhance patient outcomes, and help address complex global health challenges. These productivity gains lead to increased economic growth, with a positive spillover effect on broader economic activity. The underlying advancements in technology can drive long-term growth by creating new markets and improving the overall efficiency of existing industries.

Labor Market Disruptions and Wage Polarization: The integration of GenAI into the economy is expected to have a profound impact on labor markets. While AI automation can displace workers in routine, low-skill jobs, it also creates demand for high-skill workers, particularly in AI-related fields like data science, machine learning, and systems engineering. This shift is likely to exacerbate wage polarization, allowing high-skilled workers in AI-intensive sectors to capture a disproportionate share of economic gains, while low-skill workers face greater displacement risks and stagnant wages. The growing reliance on AI also accelerates the shift from manual labor to cognitive labor, which will require substantial investments in reskilling and workforce development in line with new technological demands. Policymakers will need to implement measures to address these inequalities through education reforms and social safety nets to support displaced workers.

Capital Allocation and Investment: GenAI can transform the way capital is allocated in the economy. By enhancing the precision of forecasting and risk assessment tools, AI enables more efficient investment decisions in both private and public sectors. AI-powered tools will allow firms and financial institutions to better assess market trends, optimize resource allocation, and manage investment portfolios, which can improve the overall efficiency of capital markets. Moreover, AI's ability to accelerate research and development (R&D) cycles by optimizing simulations, modeling, and experimentation is likely to spur further investment in innovation and R&D. This in turn, can lead to long-term technological advancements, driving sustained economic growth.

Macroeconomic Policy Design and Forecasting: GenAI has the potential to revolutionize macroeconomic policy design and forecasting. AI-driven models allow for the simulation of a wide range of economic scenarios, enabling policymakers to better understand the potential effects of fiscal and monetary policies before implementation. GenAI models can model more realistically the real-life impacts of tax cuts, stimulus packages, or interest rate adjustments, thus helping governments to anticipate outcomes more accurately and make more informed policy decisions.

AI's ability to process vast amounts of real-time data also improves forecasting capabilities, providing more timely predictions of key economic indicators such as inflation, unemployment, and GDP growth. Traditional econometric models often struggle to account for the complexities and volatility of modern economies, especially in the face of external shocks like financial crises or pandemics. GenAI's enhanced forecasting ability can help governments and central banks to more effectively respond to economic fluctuations and adapt policies in real time.

Economic Inequality and Distribution of Wealth: The macroeconomic impact of GenAI is also closely tied to its effects on economic inequality. The automation of cognitive tasks and the increased demand for high-skill labor are likely to widen the gap between high- and low-income individuals and sectors. The benefits AI-driven productivity and wealth increases may be disproportionately concentrated in AI-intensive industries, leaving other sectors and workers behind. This could exacerbate existing disparities in wealth and income if not corrected by policy measures aimed at mitigating the potential for widening inequality. These could include progressive taxation, universal basic income, and policies aimed at improving access to education and training for displaced workers or lower income groups.

Global Economic Integration and Competitiveness: GenAI has the potential to further integrate the global economy by enabling faster communication, cross-border trade, and the development of global supply chains. AI-powered tools can optimize logistics, predict demand more accurately, and reduce trade barriers, fostering greater global economic interconnectedness. However, this also raises concerns about global competition and the potential concentration of AI capabilities in a few large tech firms or advanced economies. The dominance of AI-driven companies in a few countries could lead to economic imbalances and exacerbate the digital divide between nations. To address these challenges, international cooperation and governance frameworks will be essential. Ensuring that AI development is inclusive and accessible across borders can help ensure that all nations can benefit from AI's potential and prevent the monopolization of AI technologies by a few actors.

The Microeconomic Impact of GenAI on Growth

The microeconomic level impact of GenAI has the potential to stimulate significant growth by enhancing firm-level productivity, reducing costs, fostering innovation, introducing new products, improving resource allocation, and gaining a competitive edge in the market. AI enables firms to operate more efficiently by automating routine tasks and augmenting the productivity of high-skilled workers. This transformation also requires firms to invest in workforce development to acquire the skills needed in an AI-driven environment. Ultimately, the widespread adoption of GenAI has the potential to drive growth at the firm level, with broader implications for industry dynamics and economic expansion. The microeconomic impact of GenAI can be observed through the following dimensions:

Productivity Enhancements: GenAI is a powerful tool for increasing productivity within firms by automating repetitive, labor-intensive tasks, augmenting labor productivity in non-repetitive tasks and improving decision-making processes. In manufacturing, GenAI can optimize production schedules, predict equipment failures, and streamline supply chains, enable faster production times and cost savings. In services, AI-driven automation improves efficiency by handling routine inquiries and data processing tasks, allowing human employees to focus on more complex, value-added activities.

The cumulative effect of these firm-level productivity gains will contribute to overall economic growth as more output will be produced with fewer inputs, raising the potential for higher profits, wages, and economic output in the long term.

Cost Reduction and Efficiency: GenAI's ability to identify inefficiencies in operations, reduce waste, and achieve substantial cost reductions. In retail, for example, AI systems can forecast demand more accurately and allow optimized inventory management. Lower costs and increased operational efficiency will generate savings that can be invested in expanding production, increasing marketing efforts, or developing new products and services, thereby fostering microeconomic growth.

Innovation and Product Development: GenAI accelerates innovation by enhancing firms' ability to develop new products, services, and business models. AI-driven tools allow businesses to rapidly prototype and test new concepts, simulations, and designs. AI is already being used to speed up drug discovery, software development and access to new technology. The increased pace of innovation enables firms to compete, attract new customers, and expand their market share, contributing to microeconomic growth within individual sectors.

Labor Market Dynamics and Skill Development: GenAI can create some labor displacement in certain low-skill or routine jobs, as well as new opportunities for high-skill workers. GenAI will increase demand for hi-skill expertise in AI-related fields, such as machine learning, data analysis, and systems integration. Firms will invest in training and upskilling their workforce, promoting the development of new human capital, including retraining of workers displaced by AI-driven automation and allocating them to more strategic, creative, and decision-making roles. In the longer run, this may foster higher levels of human capital development, which can drive long-term growth and productivity improvements.

Competitive Advantage and Market Structure: The integration of GenAI can reshape the competitive landscape within industries. Firms that adopt AI technologies early gain a competitive edge by improving their operations and product offerings faster than competitors. They can enhance customer experience, optimize marketing, and streamline operations to secure a dominant position in the market. Furthermore, GenAI can lead to new business models and market structures. AI may enable the creation of personalized products or services at scale, or entirely new ways to connect with customers.

Market Efficiency and Consumer Welfare: Efficiencies brought about by GenAI will have positive implications for consumer welfare through lower prices and improved affordability for consumers. In retail and entertainment, GenAI will provide the ability to analyze consumer behavior and preferences and enhance the overall customer experience. This increased customization can drive higher levels of consumer engagement and spending, contributing to firm-level growth.

Resource Allocation and Capital Investment: GenAI improves resource allocation within firms by enabling more precise forecasting, optimizing supply chains, and streamlining production processes. Moreover, the application of AI in financial decision-making improves capital allocation decisions, as AI-driven tools can analyze large datasets to predict market trends, assess investment opportunities, and optimize portfolio management. By improving decision-making, firms can direct their capital more effectively toward high-return investments, further driving growth.

Empirical Studies

Empirical studies examining the impact of Generative AI (GenAI) on economic growth are still emerging. Two studies offer valuable insights into how AI, particularly generative models, affects productivity, innovation, labor

markets, and the measurement of GDP and broader economic performance.

The first, by Brynjolfsson and Collis [20], addresses the failure of GDP to capture the true value of often free digital goods and services provided by AI and delivered via the internet. They estimate that the median digital service client in the US is willing to pay annually more than USD 32 thousand for digital services (including USD 17.5 thousand for search engine services, USD 8.4 thousand for email, USD 3.6 thousand for maps/GPS, USD 1.2 thousand for video news clips and movies, and about USD 1.5 thousand for combined e-commerce-social media-music, and messaging).

Given that these services account for a substantial increase in well-being and underestimate the contribution of AI and GenAI services, they propose a revised measure of GDP: GDP-B, capturing the welfare gains (consumer benefits) of new and free goods and services.

The second is an ILO empirical study [33] study of GenAI potential effects on job quantity and quality based on task and occupational exposure to generative AI (particularly GPT-4). They find that clerical work is the most exposed, with 24% of tasks highly exposed and 58% moderately exposed. Other occupations have significantly lower exposure rates, with highly exposed tasks ranging between 1% and 4%, and medium exposure not exceeding 25%. The primary impact is expected to be the augmentation of workers' abilities by automating specific simpler tasks within jobs (such as data entry and info search), freeing up clerical workers time to engage in more complex problem-solving tasks. Certain tasks within jobs may be automated albeit full automation of occupations and jobs appears less likely at this stage. This could lead to changes in job roles and responsibilities, but not necessarily a reduction in overall employment given the expected expansionary impact of GenAI on economic growth.

Based on [33], the effects of Generative AI may vary significantly across countries and gender. In high-income countries, 5.5% of total employment is potentially exposed to automation, compared to just 0.4% in low-income countries. This disparity is due to differences in occupational structures and the availability of IT infrastructure to support AI integration. The study finds that AI-induced automation and augmentation are more likely to affect clerical jobs, given their significant representation in jobs exposed to AI.

The potential effects on job quality (increased work intensity or reduced autonomy) need to be managed properly to support quality employment and transition to AI-based systems and tools. Social dialogue is needed to ensure that the integration of AI into the workplace benefits all workers, companies, and society as a whole.

According to [33], tasks and occupations most exposed to GenAI automation are:

- Clerical and Administrative jobs, involving tasks such as data entry, scheduling, and basic customer service, which are repetitive and routine,
- Basic analytical jobs, including routine data analysis and reporting,
- Simple content creation jobs, such as drafting standard documents, generating routine reports and marketing materials.

On the other end of the labor market spectrum, GenAI will generate new demand for high skills in:

- AI and machine learning expertise (in neural networks, large datasets and natural language processing),
- Programming and software development (with proficiency in Python and prompt engineering skills),
- Advanced data analysis skills and big data management critical for training AI models,
- Understanding and implementing ethical guidelines for AI development and deployment,
- AI integration and deployment of AI into existing systems and workflows,
- General AI strategic management skills.

As ILO study [33] concludes, policies that support orderly and fair labor market transition should reflect:

- Displacement of jobs (involving routine and repetitive tasks),
- Augmentation of existing jobs by automating routine tasks,
- Creation of new job opportunities, particularly in tech-related fields and creative jobs,
- Potential skill adaptation to work effectively alongside AI (including digital literacy, data analysis, and the ability to interpret AI-generated insights),

- Uneven sector-specific impacts in high-tech and science (STEM) fields, creative and service industries.

Transformation of Economic Research

Generative AI (GenAI) has significantly accelerated data analysis, modeling, and hypothesis generation in economic research, transforming how economists process information and generate insights. By leveraging advanced machine learning models such as large language models (LLMs), GenAI enables researchers to analyze vast datasets with unprecedented speed and accuracy. For example, tools like OpenAI's GPT-4 can summarize complex economic literature, extract relevant data, and identify trends across studies, streamlining the traditionally labor-intensive process of literature reviews. Similarly, natural language processing (NLP) systems are used to analyze text-based datasets, such as policy documents or consumer sentiment surveys, uncovering patterns and relationships that inform economic modeling and policy decisions. These capabilities not only enhance the efficiency of existing research workflows but also open avenues for exploring previously intractable questions.

In modeling, GenAI has proven invaluable for improving the precision and scalability of economic simulations. Machine learning frameworks can integrate vast and heterogeneous datasets – such as trade flows, labor market dynamics, and financial transactions – into predictive models that generate robust forecasts and counterfactual scenarios [50]. For instance, during the COVID-19 pandemic, AI models were used to simulate the economic impact of policy measures, such as stimulus packages and lockdowns, providing real-time guidance to policymakers [28]. Additionally, GenAI tools have been employed to optimize macroeconomic forecasting, with models like OpenAI's Codex assisting in the development and testing of econometric code, reducing time spent on technical implementation.

GenAI also facilitates hypothesis generation by identifying novel patterns in data and proposing testable economic theories. By analyzing correlations and causal relationships across large datasets, AI systems can pinpoint underexplored areas in existing literature or suggest new variables to consider in economic models. For example, NLP tools have been used to analyze the historical relationship between public sentiment and market fluctuations, revealing nuanced dynamics that traditional econometric methods might overlook, as stressed by Brynjolfsson and McElheran [23]. This capability not only enhances the rigor of economic research but also democratizes access to advanced analytical tools, allowing researchers in resource-constrained environments to contribute to the global body of knowledge.

The adoption of specific GenAI tools in economic research underscores their growing relevance. GPT models assist with text-based tasks such as drafting reports, analyzing survey responses, and summarizing academic papers. NLP systems like Google's BERT are employed for sentiment analysis and policy evaluation, while machine learning platforms (such as TensorFlow and PyTorch) facilitate large-scale data analysis and predictive modeling. As these tools become more integrated into economic research workflows, they promise to not only enhance productivity but also expand the frontier of economic inquiry, though their adoption must be accompanied by critical evaluation to address issues of bias, transparency, and accessibility.

Korinek [38] provides a comprehensive examination of the evolving role of large language models (LLMs) in economic research, with a particular focus on their collaborative and reasoning capabilities. He highlights the significant recent advancements in LLMs' ability to reason and work collaboratively with human researchers, enhancing the efficiency and scope of economic analysis. The ongoing maturation of AI tools, which have transitioned from mere search engines and computational assistants to active contributors to the research process, enabling more robust analysis, hypothesis generation, and scenario testing.

LLMs can now assist in addressing complex economic questions by improving data processing, synthesizing large volumes of literature, and generating novel insights through advanced reasoning capabilities. Korinek [38] identifies the growing ability of LLMs to collaborate with human researchers in iterative problem-solving, facilitating a more dynamic and interactive research process. These developments have profound implications for the speed

and breadth of economic inquiry, enabling researchers to tackle previously intractable problems more efficiently. He discusses the potential for LLMs to enhance the reproducibility of economic research by standardizing the processes of data analysis and model development, but cautions about the limitations of LLMs, particularly in their ability to address complex causal relationships and their susceptibility to biases embedded in training data, which necessitates careful scrutiny by researchers.

Implications for Macroeconomic Policy

The advent of GenAI holds significant implications for the design, forecasting, and evaluation of macroeconomic policies. One of the key ways in which GenAI can contribute to policy design is through its enhanced big data handling and modeling capabilities. By leveraging machine learning algorithms, AI can simulate a wide range of economic scenarios and model complex systems that were previously difficult to capture using traditional econometric techniques. AI-driven models can simulate the effects of fiscal interventions such as stimulus packages, tax cuts, or government spending, providing policymakers with a clearer understanding of potential outcomes under varying conditions. This ability to model counterfactual scenarios allows for more informed policy decisions, as AI tools can predict the potential economic consequences of different policy measures before they are implemented [23]. Additionally, AI models can be used to optimize policy interventions in real-time, adapting to changing economic conditions and ensuring that fiscal and monetary policies remain effective under evolving circumstances [38].

GenAI's ability to improve forecasting in macroeconomics represents another transformative change in the field. AI models, particularly those using large-scale data analysis, can improve predictions of key macroeconomic variables such as inflation, unemployment, and GDP growth. Traditional econometric models often struggle with capturing the complexities of modern economies, especially in the face of shocks such as financial crises or pandemics. However, machine learning techniques, including neural networks and time series forecasting, can process vast amounts of real-time data, identifying patterns and trends that might otherwise be missed. For instance, AI-powered tools can integrate a wide variety of economic indicators, such as employment rates, consumer sentiment, and international trade flows, to generate more accurate and timely forecasts [50]. During the COVID-19 pandemic, AI models were used to predict the economic impact of lockdowns and government policies, offering policymakers a critical tool for navigating uncertainty [28]. The ability to predict economic outcomes with greater precision enables governments and central banks to make more informed decisions about interest rates, fiscal stimulus, and other macroeconomic policies.

Furthermore, GenAI plays a crucial role in the real-time evaluation of policy outcomes. Traditional economic evaluation methods often rely on slow, retrospective analysis, which can delay the assessment of policy impacts. In contrast, AI tools can provide continuous feedback by processing and analyzing data as it becomes available. This capability enables real-time monitoring of macroeconomic indicators and the effectiveness of policy interventions. For example, AI can assess the impact of a new tax policy on consumer spending, track shifts in unemployment following a stimulus program, or analyze the effects of monetary tightening on investment levels. By providing immediate insights, AI tools allow policymakers to make timely adjustments to policies, thereby enhancing their ability to respond to changing economic conditions. In this sense, AI does not only serve as a forecasting tool but also as a dynamic feedback mechanism that ensures policies remain adaptive and relevant in an increasingly complex global economy.

In sum, GenAI is revolutionizing macroeconomic policy by improving the design, forecasting, and evaluation of economic interventions. Its ability to model complex economic systems, predict key variables with greater accuracy, and provide real-time feedback positions AI as a transformative tool for policymakers. As AI continues to evolve, it is likely that these tools will become central to economic decision-making, enhancing the responsiveness and effectiveness of macroeconomic policies in addressing the challenges of a rapidly changing world.

Korinek's work [39] addresses the profound implications of generative AI (GenAI) and large language models (LLMs) on economic theory, research, and policymaking. He argues that the rapid development of AI technologies, particularly in the context of LLMs, represents a paradigm shift for the economy and poses significant challenges for economic policy. There are several critical areas where AI will directly influence structural issues including inequality, labor markets, and the allocation of resources. AI's potential to enhance productivity and innovation also raises concerns regarding its effects on income distribution, as automation may displace workers in low-skill sectors while simultaneously increasing demand for highly skilled workers in technology-driven industries.

AI also presents policy challenges in areas such as education, social stability, macroeconomic management, antitrust regulation, intellectual property, and environmental sustainability. Proactive policy measures are needed to ensure equitable distribution of benefits of AI-driven growth, while mitigating risks associated with economic disruption and technological monopolies. Global cooperation on AI governance is needed, given the cross-border nature of AI's impact and the necessity of establishing international frameworks for effective regulation and ethical use, while also ameliorating the growing digital divide.

Korinek [39] underscores that AI's rapid development is not just a technological shift but a paradigm change that will reshape key facets of economic theory and practice. He asserts that while AI has the potential to significantly boost productivity, enhance innovation, and drive economic growth, it also brings a host of challenges that require careful policy consideration. A case in point is the potential GenAI impact on economic inequality. By automating cognitive tasks traditionally performed by humans and augmenting labor productivity in high-skilled jobs, GenAI is likely to exacerbate wage polarization, as low-skilled workers in routine jobs may face displacement, while demand for high-skilled workers in AI-related fields increases. Potentially, we may observe a growing divide between sectors that are AI-intensive and those that are not, and the implications for income distribution across different skills and socioeconomic groups. This trend will necessitate targeted policy interventions in education and workforce development to ensure that individuals can adapt to the new demands of the labor market.

Macroeconomic implications of AI adoption may also be significant. The microeconomic displacement of labor through automation may lead to changes in aggregate demand, consumption patterns, and overall economic stability. This, in turn, raises concerns about the long-term effects of AI on traditional macroeconomic (fiscal and monetary) policy tools. Policymakers will need to adapt and recalibrate existing frameworks to address the economic shocks AI may produce. Moreover, Korinek [39] highlights the need for new regulatory approaches to manage AI's role in market structures, including antitrust measures to prevent monopolistic practices by large AI firms, and intellectual property regulations to address the challenges posed by AI-driven innovation.

Social and political ramifications of widespread GenAI adoption are also significant. The risks of social opposition to growing use of AI and political instability (and even unrests) arising from job displacement and widening inequality must not be underestimated. Timely policies that promote social safety nets, fair distribution of AI's economic benefits, and investments in skills training to prepare the workforce for the new technological landscape are, thus, of utmost importance. The same principles apply to the environmental implications of AI, particularly regarding the high energy consumption required for large-scale machine learning models and sustainable AI development practices.

Given the cross-border nature of AI's development and deployment, a global governance framework for AI would be most appropriate, based on international cooperation, to ensure that AI technologies are developed and regulated in line with shared global prosperity, global standards on AI ethics, transparency, and accountability, to prevent AI from exacerbating global inequalities and to ensure that its benefits are widely shared.

Challenges and Risks

While GenAI offers significant opportunities for enhancing economic growth and efficiency, it also raises several challenges and risks that must be addressed to ensure that

its benefits are widely shared. These include algorithmic bias, job displacements, data privacy concerns, and increased inequality through the digital divide. Policymakers and economists must work collaboratively to develop solutions that mitigate these risks, ensuring that the deployment of GenAI leads to inclusive and sustainable economic outcomes.

Algorithmic bias, which arises from the data used to train AI systems, may inadvertently perpetuate or even exacerbate existing biases, leading to discriminatory outcomes in hiring, credit scoring, and law enforcement [46]. Thus, AI algorithms can reproduce racial and gender biases present in training datasets, which can result in unfair treatment and outcomes for marginalized groups [7]. Policymakers must address these biases through improved data governance and transparent AI models that can be audited for fairness [11].

Job displacements can be a significant challenge in sectors where routine cognitive tasks are common. AI's ability to automate tasks such as customer service interactions, document review, and data analysis raises concerns about the future of work, especially for workers in industries most susceptible to automation. Although AI will create new job opportunities, job displacements may disproportionately affect low- and middle-skilled workers, exacerbating income inequality and social stability [1] unless accompanied with reskilling and retraining programs and universal basic income initiatives to mitigate the negative effects on affected workers [12].

Data privacy is another critical issue. AI systems that rely on large-scale data collection, can inadvertently expose sensitive information or be vulnerable to data breaches, creating risks for individuals and organizations [54]. Robust data protection frameworks are needed to ensure that individuals' privacy rights are respected. Existing EU General Data Protection Regulation is an important step toward protecting data privacy which will need to be updated to address emerging threats.

Digital divide which refers to disparities in access to AI tools, poses another challenge that could exacerbate inequality between regions and countries. As GenAI systems become more integral to economic and social processes, the divide between those who have access to cutting-edge technologies and those who do not could widen, disproportionately impacting lower-income individuals and developing countries. Access to advanced AI tools requires not only physical infrastructure (reliable internet connectivity) but also the skills and resources to effectively utilize these technologies. Countries and communities that are unable to keep pace with technological advancements risk falling further behind economically, widening global inequality. As noted by Brynjolfsson and McAfee [24], the digital divide has the potential to concentrate economic power in technologically advanced regions while leaving others at a disadvantage. To mitigate these risks, it is essential that policy frameworks prioritize equitable access to education, infrastructure, and technology, ensuring that the benefits of AI are shared more broadly and reducing the risk of exacerbating existing inequalities [27].

As GenAI becomes an increasingly integral part of the global economy, policymakers must take proactive steps to promote equitable access to AI technologies. Programs that support the provision of affordable internet access, as well as AI technologies, are crucial for fostering inclusivity. Cooperation within countries (between developed urban and less developed rural areas) and internationally is vital to building the necessary technological and institutional frameworks to leverage AI for economic growth [27]. Ensuring that AI technologies are accessible to all segments of society can help to democratize the economic benefits of AI and prevent a concentration of power in technologically advanced regions. Investing in digital infrastructure, AI literacy, and reskilling effort are critical areas for policy action.

Finally, policymakers must establish robust ethical frameworks for the use of GenAI in decision-making and policymaking. As AI tools increasingly inform policy decisions, it is crucial to ensure that these systems operate in a transparent, accountable, and ethical manner. Ethical guidelines should focus on ensuring fairness in AI outcomes, preventing discrimination, and safeguarding privacy rights (confirmed with regular AI audits for fairness, transparency, and compliance with ethical standards) [11].

Conclusion

Generative artificial intelligence (GenAI) has emerged as a general-purpose technology, a transformative force with

profound implications for economic growth, research, and policymaking. As evidenced throughout this paper, the integration of GenAI into various sectors offers the potential to enhance productivity through automation, improve decision-making, and accelerate innovation. By automating cognitive tasks across industries, such as legal document processing, healthcare diagnostics, and financial analysis, GenAI promises to reduce transaction costs and streamline processes [24]. Moreover, the ability of GenAI models to simulate economic scenarios, predict macroeconomic variables, and generate new hypotheses opens up new avenues for economic research and policy design [29]. However, as this technology rapidly evolves, it also brings significant challenges, including risks related to job displacement, algorithmic bias, and ethical concerns [46]. These potential disruptions necessitate thoughtful policy interventions to ensure equitable access, mitigate negative social impacts, and promote responsible use of AI in decision-making.

The transformative potential of GenAI is undeniable if accompanied by rigorous research to address the complex challenges it poses. Future research should focus on the long-term effects of GenAI on labor markets, the evolution of capital allocation in AI-driven economies, and the implications of AI for global inequality [24]. Additionally, further investigation into the ethical dimensions of AI, particularly concerning bias and accountability in algorithmic decision-making, is critical for ensuring that AI technologies are deployed in ways that benefit society as a whole [11]. As the capabilities of GenAI continue to expand, interdisciplinary research of its economic, social, and regulatory impacts will be crucial for shaping sustainable growth while safeguarding individual rights and societal well-being. Lastly, future research should explore the intersection of GenAI and global governance to manage the potential geopolitical risks associated with the uneven distribution of AI technologies [27]. By addressing these research gaps, policymakers and scholars alike can better navigate the opportunities and risks presented by GenAI in the years to come.

Tentative general policy recommendations for Serbia coming out of this paper include suggestions to:

- *Ensure equitable distribution of AI benefits:* As generative artificial intelligence (GenAI) becomes an increasingly integral part of the global economy, policymakers must take proactive steps to ensure that its benefits are equitably distributed, and its risks are mitigated.
- *Provide equal access:* Programs that support the provision of affordable internet access, as well as AI technologies, are crucial for fostering inclusivity. International cooperation is also vital, as developing nations may need support in building the necessary technological and institutional frameworks to leverage AI for economic growth [27]. Ensuring that AI technologies are accessible to all segments of society can help to democratize the economic benefits of AI and prevent a concentration of power in technologically advanced regions.
- *Reduce digital divide:* The rapid development and deployment of AI systems have the potential to exacerbate existing inequalities, particularly between developed and developing countries, as well as within societies where access to technology is uneven [24]. Policymakers should focus on reducing the digital divide by ensuring that marginalized communities have the necessary infrastructure, skills, and resources to participate in and benefit from AI advancements.
- *Invest in digital infrastructure, AI literacy, and reskilling:* As AI systems continue to disrupt labor markets, particularly through automation, there is an urgent need for reskilling programs that can help workers adapt to the changing demands of the workforce. Reskilling initiatives should target workers in industries most susceptible to automation, such as manufacturing, retail, and customer service, with an emphasis on AI-related competencies. Public-private partnerships can be instrumental in these efforts through joint training programs and career transition support.
- *Establish robust GenAI ethical frameworks:* Since GenAI tools increasingly inform policy decisions, it is crucial to ensure that these systems operate in a transparent, accountable, and ethical manner. Algorithmic bias and lack of fairness are significant concerns that could undermine the legitimacy of AI-driven policies. Ethical guidelines should focus

on ensuring fairness in AI outcomes, preventing discrimination, and safeguarding privacy rights. AI audits and regular reviews of AI systems could help assess their fairness, transparency, and compliance with ethical standards. Moreover, policymakers should ensure that AI-driven decisions are interpretable and could be challenged if necessary.

This would help foster public trust in AI tools and ensure that they are used responsibly. Additionally, regulatory frameworks, such as the European Union's General Data Protection Regulation (GDPR), provide useful models for setting data protection and privacy standards that can be applied to AI technologies in various sectors. Establishing comprehensive ethical guidelines will be essential to managing the social and economic risks associated with GenAI, and to ensuring that its deployment serves the public good. In short, as GenAI continues to shape the national and global economy, policymakers must take action to promote equitable access to AI technologies, invest in education and reskilling, and establish ethical frameworks for AI use. These policy recommendations are crucial for ensuring that the benefits of AI are widely shared, that individuals and communities are equipped to adapt to the changing labor market, and that the deployment of AI is transparent and accountable. By addressing these challenges, governments can harness the full potential of GenAI while safeguarding societal well-being.

It should be stressed that GenAI is revolutionizing macroeconomic policy by improving the design, forecasting, and evaluation of economic interventions. Its ability to model complex systems, predict key variables with greater accuracy, and provide real-time feedback positions GenAI models as a transformative tool for policymakers. In the near future AI will likely become central to economic decision-making, enhancing the responsiveness and effectiveness of macroeconomic policies. To follow this trend, macroeconomic policy in Serbia should actively pursue:

- *Changes in Policy Design* due to enhanced ability to model big data and allow the simulation of complex economic scenarios. This helps policymakers understand potential outcomes of fiscal and monetary interventions, leading to more informed decisions.
- *Improved Macroeconomic Forecasting* of key macroeconomic variables (such as inflation, unemployment, and GDP growth) by processing vast amounts of real-time data to identify patterns and trends often missed by traditional models.
- *Real-Time Evaluation and Feedback* on policy outcomes by analyzing data as it becomes available. This enables real-time monitoring of macroeconomic indicators and the effectiveness of policy interventions in economic and social dimensions, allowing for timely adjustments.

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