Economic and Legal Aspects of Using Generative Artificial Intelligence: A Systematic Analysis

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Abstract: The rapid integration of generative artificial intelligence (GenAI) into global economic systems presents a dualistic phenomenon characterized by unprecedented productivity potential and significant legal uncertainty. This study aims to analyze the macroeconomic impact of GenAI alongside the emerging legal frameworks regulating its use. The research employs a comparative analysis of economic forecasts from 2023-2024 and judicial precedents regarding intellectual property rights. The results indicate that while GenAI could contribute up to $4.4 trillion annually to the global economy, the lack of clear copyright regulations and liability standards creates substantial investment risks. The article concludes that sustainable economic growth driven by AI requires a harmonized legal approach that balances innovation incentives with the protection of proprietary data.

Keywords: Generative AI, labor productivity, intellectual property, economic efficiency, legal regulation, EU AI act.

Introduction: The advent and rapid proliferation of generative artificial intelligence (GenAI) in late 2022 signaled the commencement of a new epoch in the evolution of the global digital economy. Unlike preceding waves of automation, which were predominantly directed towards the substitution of routine manual labor and algorithmic operations, contemporary large language models (LLMs) and generative neural networks possess the distinct capability to execute non-routine cognitive tasks. This fundamental distinction transforms generative AI from a mere technological instrument into a potent

macroeconomic factor capable of reshaping the labor market structure, altering value chains, and redefining the very concept of intellectual property.

The urgency of this research is dictated by the unprecedented velocity of technological adoption. According to the AI Index 2024 Annual Report prepared by Stanford University, while the costs associated with training state-of-the-art models are rising exponentially, the cost of inference for the end-user is decreasing, thereby rendering the technology accessible to millions of small and medium-sized enterprises [1]. This economic accessibility creates a paradoxical situation wherein business entities strive for efficiency maximization through AI integration, yet the legal infrastructures of most jurisdictions remain unprepared to regulate the ensuing relationships. A critical economic problem lies in the uncertainty regarding the valuation of the "net" efficiency of implementation. Although forecasts predict trillion-dollar additions to the GDP, they frequently neglect the transaction costs associated with legal risks. Legal uncertainty manifests in two primary dimensions: the protection of rights to machine-generated content and the liability for utilizing copyright-protected data during model training. The absence of clear legal norms establishes an environment of "investment fog" compelling companies to allocate substantial reserves for potential litigation expenses, which consequently diminishes the return on innovation.

In scientific literature, a divergence is observable between optimistic economic forecasts and conservative legal doctrine. Economists view GenAI as a General Purpose Technology (GPT), comparable in impact to the invention of electricity or the internet, capable of overcoming years of productivity stagnation in developed nations. Conversely, legal scholars focus on systemic risks, pointing to the inapplicability of traditional authorship concepts to algorithmic processes and the potential threat of a copyright system collapse.

The objective of this study is to conduct a comprehensive analysis of the macroeconomic potential of generative AI in correlation with emerging legal regimes. The research aims not merely to enumerate economic benefits and legal barriers but to identify their intersection points, determining specifically how regulatory constraints - such as those within the EU AI Act or United States case law - quantitatively impact the realization of the technology's economic potential. Understanding this interrelationship is essential for formulating a balanced public policy that neither stifles innovation through excessive regulation nor permits chaos within the sphere of intellectual property.

Methods

The methodological framework of this research is constructed upon a multidisciplinary approach that integrates quantitative economic forecasting with qualitative legal analysis to ensure a holistic evaluation of generative artificial intelligence. To achieve the stated objectives, the study first employs a comprehensive secondary data analysis focusing on macroeconomic indicators provided by systemic financial institutions between 2023 and 2024. The primary sources for economic data include the Goldman Sachs Global Economics Research papers and the McKinsey Global Institute reports regarding the productivity frontier of generative models. These sources were selected due to their rigorous econometric modeling which accounts for labor displacement and the multiplier effect of artificial intelligence on total factor productivity across diverse industrial sectors.

The quantitative component of the methodology involves a comparative assessment of projected GDP growth rates and sector specific value-added estimations. By synthesizing data from these institutional reports, the study identifies trends in the marginal cost reduction of cognitive labor and correlates these findings with the acceleration of the automation of work activities. Special attention is paid to the variance in productivity gains between developed and emerging economies, allowing for a more nuanced understanding of the global economic impact. The economic modeling also incorporates an analysis of the "cost of inference" trends reported in the Stanford AI Index 2024, which serves as a proxy for the accessibility and diffusion rate of the technology within the private sector.

Simultaneously, the research utilizes a qualitative legal research method, specifically focusing on the "black letter law" and recent judicial precedents that establish the boundaries of intellectual property and liability. The legal analysis is centered on two primary jurisdictions: the United States and the European Union. The study examines the European Union's Artificial Intelligence Act (EU AI Act) as a seminal regulatory instrument to determine the compliance burden imposed on developers of high-risk AI systems. This involves a detailed review of the legislative text to extract specific requirements for transparency, data governance, and human-centric oversight, which are then evaluated for their potential to create market entry barriers for small enterprises.

Furthermore, the study employs a case-study method to analyze significant litigation that currently shapes the legal landscape. The analysis of Thaler v. Perlmutter

(2023) is used to investigate the evolving definition of "authorship" and the exclusion of machine-generated works from copyright protection. Additionally, the ongoing litigation in The New York Times Co. v. OpenAI Inc. is analyzed to explore the limits of the fair use doctrine in the context of large-scale dataset training. By cross-referencing these legal findings with the economic data, the research identifies the specific points of friction where legal uncertainty directly mitigates the theoretical economic gains predicted by the aforementioned financial models.

The synthesis of these diverse data streams allows for the development of a unified analytical framework. This framework evaluates the "net" economic impact of generative AI by subtracting the estimated transaction costs associated with legal compliance and intellectual property risks from the gross productivity gains. This integrated approach ensures that the conclusions of the study are grounded in both technological potential and regulatory reality, providing a robust basis for the subsequent results and discussion sections.

Results

Macroeconomic Analysis and Labor Market Transformation. The analysis of data from leading financial institutions corroborates the hypothesis that generative artificial intelligence acts as a substantial supply-side shock to the global economy. According to detailed calculations by Goldman Sachs, the widespread adoption of GenAI could drive a 7% increase in global GDP over a ten-year period, which in absolute terms is equivalent to the creation of a new economy the size of China's [2]. This growth is driven by two factors: the direct automation of existing work processes and the liberation of resources for the creation of new products and services.

Particularly illustrative are the data from McKinsey & Company, which estimate the annual economic impact of GenAI adoption to range between $2.6 trillion and $4.4 trillion [3]. For perspective, the upper bound of this estimate exceeds the entire nominal GDP of the United Kingdom for 2023. The study indicates that the primary value added is formed not in the IT sector, as typically assumed, but in traditional industries such as banking, retail, pharmaceuticals, and law. This is achieved through the automation of cognitive operations including text analysis, code generation, marketing strategy formulation, and primary data processing.

A critically important result is the re-evaluation of automation potential. Prior to the emergence of generative models, experts believed that approximately 50% of employee work time was subject to automation. New data indicate that contemporary technologies are capable of assuming 60 to 70% of work tasks [3]. However, this does not imply total unemployment. The analysis reveals that approximately 300 million full-time jobs globally will undergo not elimination, but structural transformation [2]. A shift is occurring from task execution to process management, where the human role changes from "creator" to "editor" and "verifier" of AI outputs.

Legal Barriers and the Intellectual Property Crisis. Economic optimism encounters rigid legal realities which, as the analysis demonstrates, act as a significant constraining factor. The primary obstacle is the status of generation results. An analysis of the judicial decision in Thaler v. Perlmutter (2023) demonstrates the firm stance of the United States judicial system: works created without direct creative human participation are not eligible for copyright protection [4]. This creates an economic vacuum wherein companies invest millions of dollars in generating content-software code, design, text-that is legally in the public domain and can be freely utilized by competitors. This substantially reduces the incentives for corporate investment in the full automation of creative processes.

A second systemic risk is associated with the legitimacy of training data. The lawsuit The New York Times v. OpenAI exposed a fundamental issue of modern AI: the majority of models are trained on copyright-protected data without obtaining licenses [5]. If courts rule in favor of rights holders and deny the application of the fair use doctrine, the economic model of GenAI could collapse. The necessity for retrospective rights clearing or the payment of statutory damages would render the cost of model development prohibitively high, effectively monopolizing the market in the hands of a few technology giants.

Additional burdens are created by regulatory pressure. The EU AI Act introduces a strict classification of AI systems by risk level. Systems used in critical infrastructure, education, or employment (high-risk categories) are required to undergo complex certification procedures, ensure data transparency, and maintain human oversight [6]. The analysis indicates that for small businesses, the compliance costs associated with these requirements can constitute up to 15–20% of the total project budget, significantly slowing the diffusion of technologies within the economy. Thus, the legal environment at the current stage acts not as a driver, but as a filter, eliminating risky yet potentially high-yield usage scenarios.

Discussion

The juxtaposition of the projected macroeconomic gains and the current legal constraints reveals a fundamental

structural tension that can be characterized as a digital productivity paradox. While the technological infrastructure for a multi-trillion dollar expansion of the global economy is largely in place, the legal framework is currently operating as a regressive force that may prevent the full realization of these benefits. The primary conflict arises from the fact that economic efficiency in the generative AI era is predicated on the mass production of low-cost cognitive outputs, whereas the legal system is built on the protection of high-cost human creative labor. This divergence creates a scenario where the more a company relies on autonomous AI systems to gain a competitive edge, the more it dilutes its own intellectual property portfolio.

A critical point of discussion is the implication of the "human-in-the-loop" requirement, which has moved from a technical recommendation to a legal necessity. As evidenced by the judicial refusal to grant copyright to machine-generated works, businesses are now forced to maintain human oversight not merely for quality assurance, but specifically to satisfy the legal criteria for "human authorship". This requirement introduces an artificial floor for marginal costs, preventing the total cost optimization that purely algorithmic systems could theoretically achieve. From an economic perspective, this represents a significant deadweight loss, as human capital is diverted to verification tasks that add little to the final product's utility but are essential for its legal protection.

Furthermore, the discussion must address the systemic risk of market monopolization driven by regulatory compliance. The stringent requirements for data transparency and governance outlined in the European Union's Artificial Intelligence Act, while noble in their intent to ensure ethical AI, create disproportionate financial burdens. Larger technology conglomerates possess the capital and legal resources to navigate these complex certification processes, whereas small and medium-sized enterprises (SMEs) may find the cost of compliance higher than the potential productivity gains. This leads to a market structure where innovation is centralized within a few dominant firms, potentially stifling the broad-based economic competition that usually follows the introduction of a general-purpose technology.

The issue of "fair use" versus "commercial exploitation" also remains the most volatile element of the AI economic model. If judicial systems worldwide begin to mandate retroactive licensing for all data used in model training, the economic feasibility of current LLMs could be compromised. This would transform AI development from a software-driven industry into a traditional licensing-heavy industry, drastically increasing the barriers to entry and reducing the speed of technological iteration. The uncertainty surrounding these legal outcomes prevents institutional investors from committing the full scale of capital necessary for the second stage of the AI revolution, which involves deep integration into critical infrastructure and public administration.

Ultimately, the successful integration of generative AI into the global economic fabric requires a transition from a reactive to a proactive legal doctrine. The current approach of trying to fit AI into existing nineteenth-century copyright frameworks is proving inadequate for the twenty-first-century digital reality. A new economic-legal synthesis is required, where the protection of human creativity is balanced with the need to incentivize the development of autonomous systems. Without such a synthesis, the "AI-driven GDP explosion" predicted by financial institutions will likely remain a theoretical possibility rather than a practical reality, limited by the persistent friction of outdated regulatory structures.

Conclusion and Proposals

This study confirms that generative artificial intelligence represents a transformative economic force with the potential to add trillions of dollars to the global economy through productivity enhancements. However, this potential is currently constrained by a lagging legal framework regarding copyright ownership and liability. The analysis shows that without legal certainty, the transaction costs associated with using GenAI will remain prohibitively high for many risk-averse industries.

Based on the findings, the following proposals are advanced to harmonize the economic and legal landscapes:

1.   Creation of a Hybrid Copyright Category: Legislatures should consider establishing a sui generis right for AI-generated works that offers a shorter term of protection than traditional copyright. This would incentivize investment in AI content generation without monopolizing the public domain indefinitely.

2.   Standardized Data Licensing Markets: To mitigate litigation risks like the New York Times case, a standardized clearinghouse mechanism for training data should be established. This would allow content creators to be compensated and AI developers to calculate clear economic costs for model training.

3.   Mandatory Transparency Protocols: Economic agents must disclose when they interact with AI. Implementing digital watermarking standards, as suggested in the EU AI Act, builds consumer trust and allows for the correct attribution of liability in cases of

AI errors or hallucinations.

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