

The Role of Data Factors in Economic Growth in the New Quality Productive Forces Stage: Post-print

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Abstract

Currently, the data elements market is still in its infancy, market participants remain to be cultivated, and unified pricing models for on-exchange and off-exchange transactions have yet to emerge. We should actively monitor market practices, promptly summarize patterns, timely improve policies, and strengthen the market price formation mechanism for data assets.

Full Text

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3 Practical Paths for Improving the Market Price Formation Mechanism for Data Assets

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3.1 Supporting Market Practices

Encouraging the balance sheet recognition of data resources represents an exploratory step toward the capitalization of data assets, which can further enhance enterprises' intrinsic motivation to unleash the value of data elements. We should track practical application scenarios and innovative methods of data

asset evaluation, and encourage data exchanges and third-party service institutions to explore the application of cutting-edge technologies such as blockchain and artificial intelligence in data pricing. These technologies are not only important carriers of new quality productive forces but can also promote the formation of more accurate and dynamic pricing models by enhancing the transparency and automation of data transactions. For example, automated pricing mechanisms based on smart contracts can reduce human intervention, lower transaction costs, and provide technical support for the efficient circulation of data elements, thereby empowering the continuous upgrading of new quality productive forces. We should also pay attention to the latest practices of domestic and international exchanges in data asset pricing, encourage trading institutions to formulate frameworks and guidelines for data element value assessment, and support mature regions to pioneer pilot programs. This will enable the market to explore diversified pricing models and price formation mechanisms, generating replicable and scalable experiences and practices.

3.2 Strengthening Policy Guidance

We should promptly release the “Opinions on Accelerating the Development and Utilization of Public Data Resources” and accelerate the establishment of a price formation mechanism that aligns with the characteristics of public data elements. We should explore conducting enterprise data price surveys and information disclosure, and strengthen the regulation of abnormal market price fluctuations. Policy formulation should emphasize the cultivation of new quality productive forces, support the open sharing and innovative application of public data resources, encourage cooperation between enterprises and research institutions in developing data-driven solutions, and promote the deep integration of data elements with the real economy. Simultaneously, we should increase investment in data element market infrastructure, such as building secure and trusted data trading platforms and computing power networks, to provide foundational support for the efficient circulation and value release of data assets, thereby consolidating the technological foundation for new quality productive force development. We should advance the construction of the data elements market system in a coordinated manner, develop the data elements service industry, and vigorously cultivate data service providers to create a favorable ecosystem for improving the market price formation mechanism for data assets.

Finally, the government should fully play its role in orderly guidance and regulated development, firmly safeguard the security bottom line, and clearly define regulatory red lines.

The Role of Data Elements in Economic Growth in the Stage of New Quality Productive Forces

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In the stage of new quality productive forces, economic growth models require a transformation from traditional resource-driven approaches to innovation-driven approaches, emphasizing the deep integration of knowledge, technology, and data. As a core component of new quality productive forces, data elements have become the fifth factor of production after land, labor, capital, and technology. With the rapid development of artificial intelligence, big data, and IoT technologies, the characteristics of data elements and their role in economic transformation have become increasingly prominent. Driven by new quality productive forces, data elements are reshaping traditional production models and providing new sources of momentum for economic growth.

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1 Economic Characteristics of Data Elements

Data elements possess economic characteristics fundamentally different from traditional factors of production, enabling them to play an irreplaceable role in economic growth. Within the framework of new quality productive forces, these characteristics further highlight their role in promoting high-quality economic growth. The first characteristic is that marginal costs approach zero, meaning data can be used infinitely with almost no additional cost. New quality productive forces emphasize efficiency improvements through technological innovation and data application, and this near-zero marginal cost characteristic of data elements constitutes an important foundation for realizing new quality productive forces. The second characteristic is non-rivalry and non-excludability—data can be simultaneously used by multiple entities without diminishing its value, forming a stark contrast to the exclusivity of traditional resources. The core of new quality productive forces lies in collaborative innovation and knowledge sharing, and the non-rivalrous and non-excludable nature of data elements provides crucial support for achieving this goal. The third characteristic is network effects and increasing returns to scale: the more frequently data is used, the greater its economic value becomes. New quality productive forces rely on network effects and increasing returns to scale, and this characteristic makes data elements an important driving force for new quality productive forces. These three characteristics make the use value of data elements far exceed their ownership value, meaning that benefit distribution is based more on use value than ownership. This transformation not only reshapes traditional production functions but also drives a continuous increase in the proportion of knowledge production and consumption, providing new momentum for economic growth.

2 Mechanisms Through Which Data Elements Empower Economic Growth

Data elements empower economic growth through multiple mechanisms. First, data elements significantly enhance production efficiency. In manufacturing, industrial internet platforms enable intelligent management of production processes through real-time data collection and analysis, reducing resource waste and cost expenditures. In agriculture, the application of big data technology makes precision agriculture possible, improving land use efficiency and agricultural product quality. Second, data elements accelerate innovation-driven development. Artificial intelligence and machine learning technologies can discover patterns difficult to detect through traditional methods by analyzing massive datasets, thereby driving technological and business model innovation. In finance, the application of big data risk control models has significantly improved financial institutions' risk management capabilities. In healthcare, data-driven precision medical technology is transforming traditional diagnosis and treatment models. Furthermore, the deep application of data elements promotes the transformation of industrial structures toward knowledge-intensive and high value-added directions. Emerging industries centered on the digital economy, such as cloud computing, artificial intelligence, and blockchain, are becoming new engines of economic growth. Meanwhile, traditional industries achieve efficiency improvements and value chain upgrades through digital transformation. For example, retail optimizes supply chain management through big data analysis, improving market response speed and customer satisfaction. Finally, the flow and sharing of data elements help narrow regional economic disparities. By building a nationally integrated data elements market, the technology and management experience of developed eastern regions can be rapidly transmitted to central and western regions, promoting coordinated regional economic development. Guizhou Province has vigorously developed its big data industry, successfully achieving a transformation from a traditional resource-based economy to a digital economy. Zhejiang Province has focused on building the "City Brain," using big data and artificial intelligence technology to optimize urban management and services, significantly improving urban operational efficiency. Shenzhen has completed its transformation from traditional manufacturing to high-tech industries by developing the digital economy. These successful practices provide valuable experience for other regions in China to discover new growth points through data elements.

3 Main Challenges Facing the Development of Data Elements

Despite the important role of data elements in economic growth, their application still faces numerous challenges. First, the problem of data silos is severe. Due to departmental barriers and interest segmentation, large amounts of data are isolated in storage, making cross-departmental and cross-regional sharing and collaboration difficult. Second, data privacy and security issues are promi-

ment. The widespread use of data brings risks of privacy leakage and data misuse, and how to balance data utilization with privacy protection has become an urgent problem to solve. Third, the marketization of data elements is insufficient. Currently, the market allocation mechanism for data elements has not been fully established, and data trading platforms and pricing mechanisms remain imperfect. Fourth, the problem of talent shortage and skill mismatch is significant. The deep application of data elements requires a large number of high-quality talents, while the current education and training system cannot fully meet this demand.

4 Policy Recommendations

To fully leverage the role of data elements in economic growth, China needs to adopt a series of measures at the policy, technology, and institutional levels. First, we should improve the market allocation mechanism for data elements. Establish a unified national data elements market to break down data silos and promote the free flow of data across departments, regions, and enterprises. Simultaneously, improve data trading and pricing mechanisms, formulate scientific and reasonable data pricing standards, and promote the standardized development of data trading markets.

Second, strengthen data privacy and security protection. Improve laws and regulations, formulate specialized data protection laws, and clarify the boundaries of data use and sharing. Promote privacy computing technologies, such as federated learning and homomorphic encryption, to realize data value mining while protecting data privacy.

Third, promote digital infrastructure construction. Accelerate the construction of new infrastructure such as 5G and IoT to provide technical support for the efficient flow and application of data elements. Build a national-level big data platform to integrate scattered data resources and enhance overall data utilization efficiency.

Furthermore, strengthen talent cultivation and skill upgrading. Optimize the education system by adding majors such as data science and artificial intelligence in universities and vocational colleges to cultivate interdisciplinary talents. Conduct vocational training to provide data skills training for enterprise employees and enhance the digital literacy of the workforce.

Finally, promote coordinated regional development. Facilitate the flow of data elements to central and western regions, and promote the development of the digital economy in these regions through policy guidance and technical support. Build digital economy demonstration zones, conduct digital economy pilots in key areas, and explore replicable and scalable experiences.

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Note: Figure translations are in progress. See original paper for figures.

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