

Theoretical Mechanisms, Practice Foundations, and Policy Options for Big Data Driven High-quality Economic Growth in China

Li Hui*

Northwest University

Abstract: In the transition of China's economy from high-speed growth to high-quality growth in the new era, economic practices are oriented to fostering new growth drivers, developing new industries, and forming new models. Based on the data flow, big data effectively integrates technology, material, fund, and human resource flows and reveals new paths for the development of new growth drivers, new industries and new models. Adopting an analytical framework with “macro—meso—micro” levels, this paper elaborates on the theoretical mechanisms by which big data drives high-quality growth through efficiency improvements, upgrades of industrial structures, and business model innovations. It also explores the practical foundations for big data driven high-quality growth including technological advancements of big data, the development of big data industries, and the formulation of big data strategies. Finally, this paper proposes policy options for big data promoting high-quality growth in terms of developing digital economy, consolidating the infrastructure construction of big data, expediting convergence of big data and the real economy, advocating for a big data culture, and expanding financing options for big data.

Keywords: big data, high-quality growth, innovation-driven

* Li Hui, associate professor, School of Economics and Management, Northwest University.

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Correspondence concerning this article should be addressed to Li Hui, School of Economics and Management, Northwest University, Xi'an. E-mail:lh0424@126.com

Introduction

After 40 years of arduous exploration since reform and opening up, China's economy has transformed from high-speed growth to high-quality growth. This is a conspicuous feature of China's economic development in the new era as well as the fundamental principle of its growth in the future. How to realize high-quality growth by improving economic growth, promoting upgrades of industrial structures, and innovating business models will be the focus of researches and the prominent issue to be addressed now and in the future. High-quality growth is now happening in the era of big data and big data has become an important indicator of a country's comprehensive strength as it integrates cloud computing, the Internet of Things and other new technologies and promotes the in-depth integration of information technology and economic and social development. Big data has become a new resource, "the new oil that fuels the future society." With enormous potential values, it can tremendously affect and change economic development, social governance, and the production and living of the people. It provides new tools for addressing new challenges and new problems in the high-quality economic growth of China.

The dynamic development of big data involves five stages: software development—scientific research—commercial application—national strategy—social life. The proposition of Moore's law and the technological development of transistors in 1966 laid the physical foundation for big data. With the emergence of "data mining" in 1989, big data began to generate "big values". Then the spread of social media, starting in 2004, turned every user into a potential data generator and big data began to take form (Tu, 2014). In September 2008, an essay published in *Nature* put forward the concept of big data for the first time from the perspective of scientific research. Later, an increasing number of foreign scholars were engaged in the study and application of big data. Howe D et al. (2008) theoretically discussed the application of big data in specific industries. McAfee A et al. (2012) reviewed the origin and history of big data. Sejnowski T J et al. (2014) studied the application of big data in the neurosciences. Krumholz H M (2014) conducted in-depth research on the application of big data in medical care. Zikopoulos P and Eaton C (2011) focused on the exploration of big data technologies. Domestic scholars, including Yang Yi (2012), Han Fangfang (2013), and Wang Xincan (2013), also gave general reviews and summaries of the development of big data. In recent years, Chinese scholars discussed the influence of big data on the research paradigm of economics. He Da'an (2018) proposed a theoretical analysis framework for the innovative fundamentals of microeconomics in the upcoming "the data dialogue". Zhu Haijiu (2018), however, proposed the viewpoint that data are unable to tell people what to do in the future. Some scholars discussed the influence of big data on social governance (Sun, 2018) and macro regulation (He & Yang, 2018). While China is one of the first countries to study the influence of big data on the theories of economics, there are few studies on the influence of big data on high-quality economic growth. How does big data permeating into every field of social production and life affect high-quality economic growth? What are the theoretical mechanisms and practice foundations? How can we design supporting policies

that will encourage leap-forward developments in big data industry that will become the new engines for high-quality economic growth? In these questions lie the logical starting point and significance of this study.

Following the research approach of “theoretical mechanisms—practice foundations—policy options”, this paper elaborates on the internal mechanism of big data promoting high-quality economic growth through efficiency improvements, upgrades of industrial structures, and business model innovations. Then it reviews the practice foundation of big data promoting high-quality economic growth in terms of technological advancements of big data, the development of big data industries, and the formulation of big data strategies. Last, this paper proposes policy suggestions of utilizing big data to promote high-quality economic growth in the context of the new era from the developing digital economy, consolidating the infrastructure construction of big data, accelerating the integration of big data and the real economy, advocating for a big data culture, and improving big data financing.

Theoretical Mechanisms for Big Data Promoting High-quality Growth

At the stage of high-quality economic growth, practices are oriented to fostering new growth drivers, developing new industries, and forming new models from the macro, meso, and micro levels respectively. Based on the analytical framework with “macro—meso—micro” levels, this paper proposes theoretical mechanisms of big data promoting high-quality growth (Figure 1). At the macro level, this paper reveals the important role of big data in efficiency improvements from the aspects of promoting the combined efficiency of production elements, stimulating innovation efficiency and improving macro regulation efficiency. At the meso level, this paper explains the effect mechanism of big data on upgrades of the industrial structures from changing industrial correlations, facilitating industrial convergence and generating big data industries. At the micro level, this paper analyzes how big data can urge innovation in business models from upending the thinking models, changing the

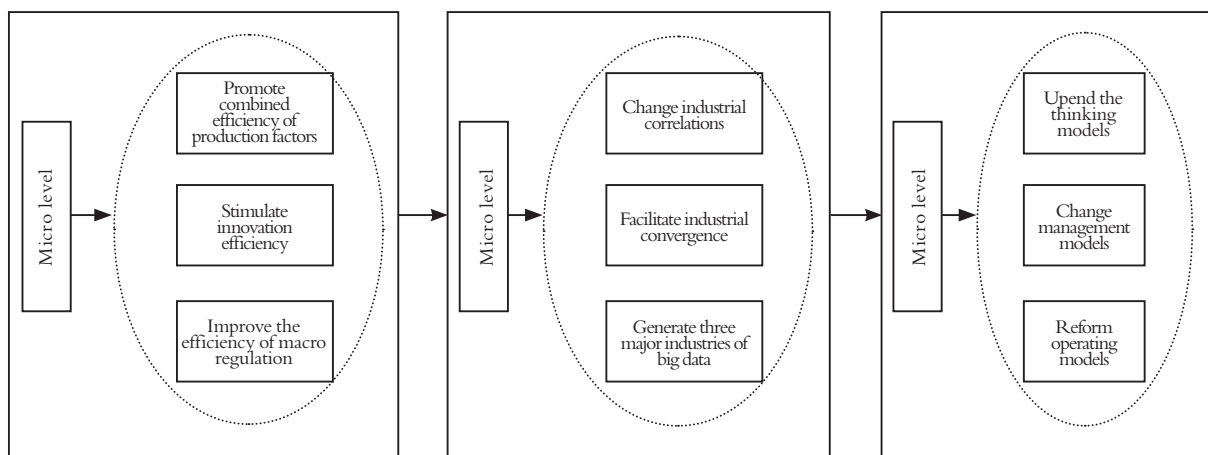


Figure 1 Theoretical Mechanisms for Big Data Promoting High-quality Economic Growth

management models, and reforming the operating models.

Big Data Drives High-quality Economic Growth by Increasing Efficiency at the Macro Level.

Big data improves the combined efficiency of production elements. Competition drives a company to move forward, while efficiency is where the life of the company lies. Efficiency is the ratio of input to output. The pursuit of high efficiency requires that a company be able to respond rapidly to the market and give timely feedback and take immediate action in all procedures regarding the value chain, including research and development(R&D), procurement, production, sales, logistics, and services. In this process, big data thinking is indispensable. There are significant changes in the combinations and positions of production factors in the era of big data. Traditional patterns of production factors are restructured. In the meantime, big data, relying on the internet, transforms the inputs, combinations and utilization methods of traditional resources and liberates man from burdensome labor to realize the maximum outputs with the minimum inputs of labor, capital, land, and resources. In this way, big data notably increases the combined efficiency of production elements and brings important new driving forces to high-quality growth.

Big data stimulates innovation efficiency. At the stage of high-quality growth, it is difficult to sustain the former pattern of promoting economic growth through massive investments. Innovation becomes the first driver for high-quality growth. Driven by innovation, China is beginning to develop a “Three new economy”^① to constantly bring new impetus to economic growth (Ren, 2018). As a result, innovation becomes an internal demand for high-quality development. Innovation efficiency depends on the efficiency of cooperation among the sub-systems as well as the internal efficiency of each sub-system. Their organic integration decides whether innovation is successful or not. Big data provides brand new impetus to innovation efficiency. Based on the data flow, it exerts a profound impact on the division of labor and cooperation patterns of the society by effectively integrating technology, materials, funds, and human resources flows and deeply merging the Internet, cloud computing and other industries. Thus, big data becomes an important tool for process innovations, management innovations, and system innovations. For the logistics and computer industries that are included in the big data platform, their employed populations and production efficiencies are far higher than those of traditional manufacturing. So is their innovation efficiency.

Big data improves the efficiency of macro regulation. Mismatches between demand and supply, excess production capacity, and low-end locking of the economic structures seriously hinder high-quality development. Due to mismatches of resources, excess resources will be allocated to industries where supply exceeds demand, resulting in excess production capacity. Industries, where supply falls short of demand, will be in inadequate supply due to a lack of resources. Low-end locking of

① “Three new economy” refers to the economy featuring new industries, new business forms , and new business models.

economic structures brings about an imbalanced supply of low and medium-end products and high-end products. That means, low and medium-end products would be in excess, but high-end products would be in shortage. In the face of mismatches between supply and demand, excess production capacity and other market failures, the government will take macro regulatory action. Whether the macro regulation decisions are scientific is decided by the “quantity” and “value” of data in the hands of the government. The collection and processing of big data could effectively solve the “quantity” and “value” problems of data so that the government could conduct macro regulation in a more proactive, scientific, and systematic manner. With the great support of data, the government can balance and coordinate the scientific ratios of the economic sectors and formulate effective economic development strategies from a universal and sustainable standpoint. Based on mass data analysis, the local markets can utilize the law of value to spontaneously allocate resources in an effective manner in the short run. The government, however, could use big data for the overall macro regulation to increase the efficiency of macro decision-making.

Big Data Propels High-quality Growth by Promoting Upgrades of Industrial Structures at the Meso Level.

Big data changes industrial correlations. Industrial correlations, the inner linkage of industries underpinning and reinforcing each other, are mainly manifested by the supply-demand correlations of products and technologies. In the supply-demand correlations of products, the products of one industry are the production factor of other industries; in the supply-demand correlations of technologies, one industry has to base its production on the technical support from other industries. Industrial correlations change dynamically with technological advancements. The era of big data, featuring extensive applications of cloud computing and the Internet of Things transforms traditional industrial correlations. Enterprises may utilize big data decision-making means to accurately analyze the demand and supply of products in the market and avoid the blind and random production as much as possible. Intelligent manufacturing has become a prevailing trend.

Big data facilitates industrial convergence. Industrial convergence represents the need for industrial improvements in efficiency and the natural result driven by external factors, including technological innovations and economic globalization. There are many factors that will affect industrial convergence, and technological innovations are undoubtedly one of the most important drivers. Big data, as a brand-new economic resource, is an important technological innovation. Through the in-depth convergence with traditional manufacturing, it may urge traditional manufacturing to allocate resources more effectively and organize procurements, production, marketing, logistics, and other business activities more accurately, thus realizing high-quality growth. At the same time, in-depth convergence of big data and traditional manufacturing may give birth to new producer services, thus pushing forward optimization of the industrial structures.

Big data generates three major industries. Based on big data, new industries that adapt to high-quality growth emerge in large quantities, mainly classified into industries directly involving big data,

industries in relation to big data, and industries where big data exerts influences. With the help of big data, these industries have succeeded in improving both management and production efficiency, providing better customer experiences and bringing about higher economic and social benefits at the same time. Industries directly involving big data are those developed from the core technologies of big data. They are mainly engaged in big data collection, processing, storage, analysis, and cloud platform operations, which are the value-added core services of big data, and fall in the category of digital economy. Such industries directly drive the economic growth of China and are an important direction of China's modern services in the future. Industries in relation to big data are the upstream and downstream industries that serve the industries directly involving big data, mainly engaged in integrated circuits, electronic devices, software development, and smart terminals. Industries, where big data exerts influence, are new business forms of traditional industries that are upgraded and transformed based on the core technologies of big data, including intelligent energy, intelligent manufacturing, intelligent agriculture, intelligent tourism, telemedicine, and the digital cultural and creative industries.

Big Data Pushes Forward High-quality Growth by Innovating Business Models at the Micro Level.

Big data upends traditional thinking models. How big data changes the existing thinking models is reflected in the following aspects: First, big data refers to the entire dataset rather than the random samples; second, big data represents hybridity rather than accuracy; third, big data is about correlations rather than causal relationships. Under the new economic conditions in the new era, the traditional business models encounter bottlenecks in their development because they fail to meet the needs of technological advancements or meet the diversified needs of the markets. Big data brings opportunities for business model innovations. As the amount of data continues to grow, data are no longer irrelevant but correlate with each other in a sophisticated manner. Cross-boundary convergence will be the theme of business development in the future.

Big data transforms traditional management models. The era of big data brings challenges to the traditional management models of enterprises, putting them in a disadvantageous position in the competition of high-quality growth. The "elite decision-making" model featuring decision-making by the senior management will be turned into an innovative model featuring decision-making by the public. Decision-making based on experience and intuitions will transform into that based on the collection and analysis of data. In the era of big data, the key to enhancing the market competitiveness of a company lies in how to fully mine useful information from mass customer information and consumption records to construct an effective data management platform.

Big data reforms the traditional operating models. In the era of big data, companies may mine value from large-scale diversified data and change their original models of profit and operation, to create enormous economic value. Utilizing big data technologies, enterprises may accurately target their customers and analyze their potential demands. On this basis, enterprises will redefine their

supply chains, optimize production and marketing processes, improve operating efficiency, expand income channels and gain more profits. Nowadays, big data has penetrated manufacturing, finance, retail, and education, which creates enormous economic and social benefits. In this era, enterprises that achieve success through business model innovations have sprung up in China, such as Alibaba and JD.com.

Practice Foundations for Big Data Promoting High-quality Growth

The McKinsey Global Institute(MGI) recognized big data as the “fourth industrial revolution” in its report in 2011, making this invention comparable to that of the steam engine, electricity, and the Internet. The report detailed the application of big data in business and defined big data as a new type of productivity. In 2012, the World Economic Forum(WEF) in Davos, Switzerland focused on the subject of “big data” and put forward the concept of “data assets”. In the same year, the US government input \$200 million to support big data development, upgraded big data as a national strategy and placed it at the heart of national interests together with digital sovereignty, territorial sovereignty, air supremacy, and command of the sea. China also began to attach importance to big data at the same time. In 2013, the Ministry of Science and Technology of China included big data in its “973” national basic research program; in 2015, the State Council published the *Action Outline for Promoting the Big Data Development*; in 2017, the 19th National Congress of Communist Party of China (NCCPC) further pointed out that, with the convergence and fusion of information technology and human life and production, data have exploded and clustered throughout the globe, which produces a significant effect on economic development, social governance, and people’s lives. In general, China is moving at the same pace as other major developed countries regarding big data as a national policy.

Big Data Technology Provides Innovation Support for High-quality Growth.

The support from backstage technologies is indispensable for the popularization of big data. Big data technology is a type of technology used to select useful and valuable information from varied types of data. Big data technology runs through every procedure of big data applications from the collection, sorting, and storage to processing and display. The core technology of big data mainly consists of data collection, storage, cleaning, mining, and visualization. In recent years, the development and popularization of new technologies, including the Internet of Things, cloud computing, data integration, linked data, and information release, provide innovation support for promoting high-quality growth by big data.

Around the world, Google, Microsoft, and Oracle companies have taken the lead in innovating big data products and services and applying big data to transportation, public security, social security, food safety, and other fields of livelihood, which achieves remarkable results and significantly increases social governance efficiency. As for the specific situations in China, big data technology

has driven the emergence of a large number of “smart+” digitalized integrated livelihood service platforms. Big data has penetrated into medical services, ecological maintenance, education services, household services, and community services and plays an important role in drug safety, environmental protection, education standards, quality of life, and city governance. Internet enterprises represented by Baidu, Alibaba, and Tencent have been deeply engaged in the practice of high-quality economic growth. They make full use of big data platforms and play their part by different means.

Big Data Brings Important Opportunities for High-quality Industrial Growth.

The continuous improvement of big data technology drives the “commercialization” and “industrialization” of big data. Most big data-related industries fall into the modern service sector, which is an important industrial foundation for high-quality economic growth in China. As Per the “four 70%”^① criteria for the service sector of a mature economy, there is still space and the requirement for further development of China’s service sector, and big data provides an important opportunity for the leap-forward development of a high-quality service sector. In recent years, China’s big data industry has made significant progress. It is estimated that China will contribute 20%^② of the world’s total data by 2020. By that time, China will become one of the countries with the most abundant data resource reserves in the world. The implementation of a series of supporting policies optimizes the environment for the development of China’s big data industry. Most provinces have set detailed and highly operable goals for all stages of big data development.

Big data exchange platforms serve as an important foundation and means to push forward the development of big data industries. China has built over 20 big data exchange institutions in recent years and the big data transaction markets are becoming growingly optimistic. Guizhou Province is at the forefront of the development of big data industries in China and has formed a characteristic development model for this industry. A big data exchange has been built in Guiyang. Its scope of business covers multiple fields, including big data credit investigations, financial big data, and governance big data. Its business models are diversified, including online transactions, transactions of the right to use, and equity transactions. Some provinces have made plans and set specific goals for their big data industries to achieve by 2020. Among them, Jiangsu Province targets one trillion yuan, Guangdong Province 600 billion yuan, Beijing and Shanghai 100 billion yuan, respectively, and Guizhou Province 450 billion yuan^③.

The Formation of Big Data Strategies Lays a Policy Foundation for High-quality Growth.

① An important indicator for the formation of the modern industrial structure is that the service industry takes a dominant position in economic development. In developed countries and regions, the position of the service industry can be summarized into “four 70%”, namely, the value added of the service industry accounts for about 70% of the GDP, the number of employees in the service industry is around 70% of the total social employment population, the service industry contributes 70% of the total economic growth, and producer services account for 70% of the service industry.

② *Big Data Boosts High-quality Development*, published on version 05 of Guangming Daily on May 27, 2018.

③ *2017 Q1 Trade Risk Monitoring Report of Guangdong Province*.

China completed the top-level design of big data policies in 2015 and refined and implemented these policies in 2016. Today, China's big data development has stepped from theoretical research to practical applications and expanded gradually to major industries and fields. All provinces and municipalities are important players in high-quality development. As big data becomes a national strategy, the provinces and municipalities, combining their own advantages in economic resources, scientific and technological resources, and human resources, formulate their strategies on big data development with local characteristics in terms of key technologies, advanced product manufacturing, and construction of industrial ecosystems. In March 2017, the *Analysis Report on Planning of Local Government for Big Data Development* was released. The report reveals that most provinces and municipalities in China have put forward big data development strategies that suit their local conditions and implemented these strategies in line with the requirements of the Action Outline for Promoting the Development of Big Data.

All regions have their explicit goals for big data development. Twenty provinces and municipalities have set specific objectives for local big data development. Among them, most cities aim to be the “application and demonstration center” and “industrial center/leading area” with big data as a powerful driver for local economic and social development. For example, Jiangsu Province aims to “strive for a leading and distinctive national big data comprehensive pilot zone”. Some regions represented by Suzhou and Nanning, based on their local conditions and foundations and in the context of big data progress at home and abroad, set out detailed plans for the development models, business models, and important projects for local big data industries in terms of the industrial ecology constructions and big data applications.

Policy Options for Big Data Promoting High-quality Growth

Major developed countries deem big data as an important move in driving economic development and optimizing state governance. The US was the first country to utilize the Internet and big data to enhance its state governance ability. It attaches great importance to the value of big data and makes it a tool for all industries to use to solve problems. Meanwhile, it also reforms the systems and mechanisms that hinder the development of big data. The Japanese government and non-governmental organizations regard new industries based on big data and cloud computing as a new economic growth pole and constantly enlarge their inputs in science and technology. China should learn from and sum up the precious experience of big data development from other countries and carry out its own big data practices. China should also consider local conditions, study and properly utilize big data based on the realistic needs of its economic and social development, so that big data will become a new momentum driving high-quality growth in China.

Utilizing Big Data to Drive Innovation and Vigorously Develop Digital Economy.

Innovation has become a major driver for China's high-quality development in the new era.

In this context, economic development will be driven by innovation instead of production factors and investments. Innovation has become important strategic guidance of China, an important breakthrough for digitalization and intellectualization of all industries and an important safeguard of high-quality development. The era of big data provides a historic opportunity for China to become an innovative country. Now, China is a significant force in the development of digital economy in the world and ranks near the top in artificial intelligence, big data, and smart cities. Statistics show that, in 2017, China's digital economy grew to 27 trillion yuan , accounting for around 33% of the GDP, ranking second in the world^①.

Digitalization provides strong security for driving innovative upgrades and development and serves as the source of the innovation tide. China should utilize big data to promote innovative development and vigorously develop digital economy. Companies should constantly upgrade their independent innovation capability by making use of the rapid development of big data, cloud computing, the Internet of Things(IoT), and other digital technologies and seize the opportunities of the Belt and Road Initiative. At the same time, China should export the achievements in digital technologies, share these achievements with other countries in the world, and enhance the cooperation with countries worldwide in e-commerce, smart cities, and mobile payments. It should also export the advanced concepts and technologies related to digital economy and innovation models, thus offering more Chinese visions and Chinese approaches to digital innovations.

Consolidating the Construction of Big Data Infrastructure and Increasing the Supply of Public Network Facilities and Services.

The construction of big data infrastructure is the key to realizing a digital power and smart China and the focus of developing the economy of big data. China has achieved leap-forward development in Internet technologies and industries in the past five years. The gap between China and developed countries has narrowed in terms of market values and rankings of Internet companies, the profit model innovation of the Internet, and the development of Internet mobile software. However, as China has a vast territory and its regional development is highly unbalanced, Internet infrastructure construction which is indispensable for big data is still unbalanced and underdeveloped. The Internet infrastructure construction in Central and West China is inadequate to satisfy the demands for developing big data.

To solve this problem, China should first strengthen the transformation of existing big data centers and server resources. China should fully utilize the platform facilities and data resources of companies and governments in stock and build up low-carbon, environment-friendly and highly effective regional and industrial big data clustering platforms. Second, China should focus on improving the construction of big data infrastructure in western regions. China should build new application infrastructure, digital network systems, and backbone networks with

① China Internet Development Report 2018.

consideration to the advantages and characteristics of West China, to push forward the upgrading of existing broadband networks. China should actively foster new models, new industries, and new business forms, including an industrial chain of information technology and information service bases. Seizing the historic opportunity of the Belt and Road Initiative, China should build a northwest sub-center of the Belt and Road Big Data Center. Third, instead of direct investments from governments and state-owned enterprises, China should gradually allow private funds to invest in the construction of big data infrastructure to feature the diversification of management and operating models and optimize investment efficiency. Last but not least, China should also continue pushing forward the construction of administrative data convergence and sharing platforms. The focus should be put on the layout of national big data platforms, big data centers, and other infrastructure and on the overall planning for social data resources and administrative data resources. With the opening and sharing of administrative data as a breakthrough, a number of key projects of big data can be implemented.

Perfecting Institutional Designs and Accelerating the Convergence of Big Data and the Real Economy.

Centering on improving development quality and the quality of the supply system, China should push for the reform of quality, efficiency, and the driving forces of economic development. Seizing the opportunity of integration of digital, network and intelligent development, China should foster and vigorously develop a batch of strategic emerging industrial clusters, to move China's industries toward the middle and high end of global value chains. China should pay attention to the following to accelerate the convergence of big data and the real economy.

China should enhance theoretical studies on the coordinated development of manufacturing and big data industries. China should further explore how manufacturing enterprises utilize big data technologies to achieve integrated innovation development. In concept, China should transfer the former enterprise management systems based on economies of scale and build industrial systems and organization structures oriented to consumers' needs.

China will accelerate the convergence of the 5G information communication technology and the real economy, give full play to the policy guiding role of the government, and encourage enterprises to evolve into network-based, smart, and digitalized enterprises and to change their traditional thinking of business. In the meantime, enterprises should combine their own management and resource advantages and fully utilize the big data technologies for the network-based and intelligent transformation of their designs, manufacturing, management and services.

China should utilize the block chain technology to constantly reduce transaction costs. China should intensify the study and application of block chain technologies and realize the reform of transaction mechanisms in the real economy through technological innovation. A real-name verified transaction system which is based on block chain technologies under the real-time supervision should be set up throughout society to mitigate information asymmetry among transaction parties, which

improves the efficiency of market transactions, and remarkably reduce the cost of market transactions.

China should pay attention to the top-level design and build a mechanism that facilitates the convergence of big data and the real economy. From the development experience of other countries, a powerful management department should first be in place to coordinate, guide, and regulate the convergence process and the organization structure should be improved to push forward the convergence step by step in a planned manner. In key fields, China should give full play to the fiscal and tax policies and increase subsidies to complex and sophisticated technologies.

Developing a “Respect for Data” Culture and Exploiting Big Data to Improve the Governance Capability.

The lack of data cultures was one of the major reasons for underdevelopment in China. The era of big data will be an opportunity for China to realize modernization in all aspects. Today, the world, regions, industries, and human behaviors compose a complex network, in which all components have innumerable links with each other. The topological property of the network reveals that the data link in a multi-dimensional manner, bringing about enormous changes to economic and social activities. In this context, governments, enterprises, and individuals need to master sufficient information in their daily decision-making. They should learn about the information as much as possible to fully understand the problems and their interconnections, make correct and scientific decisions, and guide people's behaviors. Thus, they should develop a cultural habit featuring respect for data, data-based decision-making, and data-based analysis of problems in society.

The high-quality governance capability of a government is an important foundation for high-quality development. For the government, the possession of mass high-quality data is an important precondition of improving its governance capability. China should develop a healthy and rational data culture that keeps pace with the times; it should transform big data from a technological symbol to a cultural one; it should develop a data culture with Chinese characteristics, namely respect for facts, emphasis on precision, admiration for rationality and logic, data-based forecasts, data-based decision making, and data-based innovations. China should treat big data as an important means to improve the China's capacity for governance and open and share the data among central, provincial, municipal, and county/district governments. Big data technologies will be adopted for handling and solving problems concerning public affairs. Based on big data, cloud computing, and artificial intelligence, a government will constantly optimize its ability to handle public affairs for the management of natural disasters, social emergencies, and health and medical incidents. Data-driven industries will be fostered in fields where the market mechanisms are unable to guarantee the effective supply. The government should provide policy support for related enterprises to constantly develop a market environment in favor of big data innovations. The government should set up a data-based decision-making mechanism to enhance its decision-making ability. It should make full use of big data so that the decisions will be more scientific, proactive, and well-targeted. Based on big data, the government should be able to effectively allocate public resources and push forward

the establishment of a fair and just social order. The government will utilize big data to enhance its work efficiency and public service ability, constantly strengthen the role of big data in improving the working competence and efficiency of its departments and upgrade its comprehensive service ability.

Developing a Diversified Fund-raising Pattern and Optimizing the Financing Environment of Big Data.

The development of big data will be impossible without the support of finance. A diversified financing pattern plays an important role in perfecting the financing environment of big data. First, more players should participate in the financing of big data projects. China should actively attract financial market institutions, various international financial organizations, and development financial institutions to participate in financing for big data projects. China should vigorously attract investments in the industrial clusters of big data and industrial chains of big data and actively accept the transferred industrial chains and associated industries of big data. Using investment attraction as an important breakthrough, the government will help boost the development of the big data industry. Second, the government should develop a diversified financing model for big data. Funds will be raised through traditional bank loans and development financial instruments; highly transparent capital markets, such as the equity and debt markets, will be utilized for fund-raising. The government should further explore the financing models of profit and risk sharing to promote institutional innovations and product innovations in big data financing. Third, the government should innovate the financing channels and give play to the platform role of funds. The government should expedite the establishment and operation of big data investment funds, strengthen continuous investments in big data, cloud computing, and Internet industries, and guide social capital to jointly establish an investment foundation for the big data industry. Fourth, China should set up typical examples, timely clarify misrepresentations and misunderstandings, and conduct promotion activities for investment in and financing for big data to create a favorable public opinion environment for big data construction.

In the meantime, China should continue to improve the supporting measures for financing for big data and attract more investments in big data construction. China should also enhance the institutional guarantees for the financing policies of big data, carefully study the policies and measures that support investments in and financing for big data. Financial institutions that are highly engaged in big data construction should be entitled to preferential policies regarding re-lending and required reserves. Effective measures should be taken to prevent, control, and mitigate debt risks. China should also accelerate the construction of a risk control system that caters to the business characteristics of big data and strengthen the supervision, early warning, and risk assessment of financial institutions and markets to strictly prevent liquidity risks.

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