

Digital Economy, Carbon Emissions and High-Quality Economic Development

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Abstract: Under the urgent needs of economic development, the digital economy has gradually become a key force to help Chinese economy achieve “corner overtaking”. In theory, this paper analyzed the role of digital economy in promoting high-quality economic development and the mediating role of carbon emission intensity. Empirically, this paper measured the comprehensive level of digital economy and high-quality development in 30 provinces in China (excluding Tibet) from 2011 to 2020, and built a model for testing on this basis. The study found that the digital economy significantly promoted high-quality economic development and passed the robustness test. The intermediary effect showed that the digital economy could play a boosting role in high-quality economic development by curbing carbon emission. Further, the regional heterogeneity test analysis found that the boost effect of digital economy gradually weakened in the eastern, central and western regions, and the boost effect was not obvious in the western region. Finally, according to the influence mechanism and the conclusion of regional heterogeneity, this paper put forward some specific suggestions to promote high-quality economic development.

Keywords: Digital economy; High-quality economic development; Carbon reduction effect; Mediating effect.

1. Introduction

Chinese economic growth model has shifted from rapid development model to high-quality development model, and more emphasis has been placed on supply-side structural reform. However, the disappearance of demographic dividend and difficulty in technological innovation [1] have brought relatively serious obstacles to economic development. At the same time, the novel coronavirus epidemic has also caused a great impact on the economy. In the urgent need of economic development, the rapid development of digital economy and deepening integration with other fields [2], has played an important role in stimulating consumption, increasing employment, creating demand, technology diffusion, etc. [3], and has gradually become a key force to help China's economy achieve “overtaking the curve”. Existing studies have shown that digital economy can achieve green economic development by promoting green technological innovation [4, 5]. Meanwhile, Chinese extensive economic growth features obvious, and the economic development of industrialization is often accompanied by a large amount of energy consumption [3], resulting in a sharp rise in carbon emissions and the eventual global warming will pose a serious threat to all countries. Different from the traditional economic growth, the development of the digital economy is accompanied by lower energy consumption, and the traditional economy and the digital economy develop together, carbon dioxide emissions show different trends. Therefore, the digital economy may promote high-quality economic development by curbing carbon emissions.

2. Literature Review

2.1. Digital economy and high-quality economic development

The impact of digital economy on high-quality economic development is multi-dimensional and complex, and its mechanism is more complex. From the micro individual level,

on the one hand, the digital economy has the ability of information transmission across time and space, which can weaken the degree of information asymmetry, increase the availability of financing, and alleviate the problem of credit resource mismatch [6]. Funds can further flow to the technological innovation sector, improve the innovation ability, so as to achieve accurate matching between new products and actual demand, and promote consumption upgrading. On the other hand, digital economy can promote non-agricultural employment, significantly increase residents' income, and realize efficient social division of labor based on labor skills [7], which helps promote economic structural transformation. At the same time, the emergence of digital technologies and platforms has greatly changed the spirit of innovation and entrepreneurship [8], improved the success rate of entrepreneurship, and formed a “demonstration effect” of entrepreneurial success [2]. Thus, it has a positive impact on entrepreneurial behavior in neighboring areas.

From the perspective of medium industrial level, the digital economy promotes the upgrading of industrial structure and enables high-quality economic development through industrial integration, correlation, structural adjustment and innovation [1]. First, the versatility and high permeability of digital technology encourage traditional industries to continuously absorb digital technology and accelerate and deepen the integration process [6]. Second, with the wide application of digital industry, the cost of obtaining information has been greatly reduced, the information asymmetry barrier between industries has been broken, and the intensive industrial clusters brought about by industrial correlation have formed economies of scale [9]. Third, the digital economy promotes the optimization and adjustment of industrial structure through the improvement of digital technology and the technological penetration of other industries [10], and the digital economy platform promotes the upgrading of the industrial value chain to a certain extent [11]. Fourth, the digital industry has high productivity and

active innovation [1], and there is a significant “spillover effect” in the process of industrial application, which intensifies market competition, forcing the digital industry to constantly upgrade and innovate, and further promote high-quality economic development through innovation [12].

From a macroeconomic perspective, digital economy promotes economic growth by increasing input factors, improving resource allocation efficiency and total factor productivity [3]. First, the digital factor is a new input factor, which is added to the macro production function to optimize the factor input ratio and bring the marginal utility increasing effect, thus causing the geometric growth of economic output [1]. Second, the application of digital technology breaks geographical restrictions and enables capital to flow freely across time and space. Moreover, enterprises use digital technology to accurately portray consumers [13] and integrate demand information into all links of the industrial chain [11], thus improving the accuracy of supply and demand matching and improving the efficiency of resource allocation. Third, digital economy reduces supply cost by improving output efficiency, stimulates demand by promoting product upgrading, and improves effective supply [14], thus improving total factor productivity.

2.2. Digital economy, carbon emissions and high-quality economic development

According to existing research findings, most scholars believe that the development of digital economy can restrain carbon emission intensity, and promote the upgrading of industrial structure, enhance green technology innovation, improve energy structure, and enhance energy efficiency are powerful means to reduce carbon emission. Moreover, Zhang et al. [15] believe that the intermediary effect of industrial structure upgrading is the most obvious. First of all, the digital economy promotes the coordinated development and deep integration of industries, through scale effect and competitive effect promotes resource sharing [16], and promotes the industrial agglomeration from high energy consumption to green and low consumption, thus optimizing the industrial structure. Secondly, digital technology increases the availability of financing for enterprises, strengthens the competition of existing enterprises [17], promotes the flow of resources to high-tech sectors, and increases R&D investment [18], thus enhancing the ability of green technology innovation and promoting the development and utilization of renewable energy [19]. Finally, the digital economy promotes the transformation of production and consumption to the direction of “virtualization” and “dematerialization” [20], stimulates the public's demand for green development [11], and thus optimizes the energy consumption structure. In addition, digital technology intelligently transforms the energy production process [21], reduces redundant waste, and thus improves energy efficiency.

Based on the research on carbon emission and high-quality economic development, mainly from the aspects of dual-carbon target and various pilot policies, the empirical results show that carbon emission reduction can promote high-quality economic development. On the one hand, carbon emission reduction can achieve the decoupling of economic growth and energy consumption as soon as possible [22], and the dual-carbon target can promote the high-quality transformation of industrial structure [23], so that carbon emission reduction can promote high-quality economic development through the upgrading of industrial structure

[24]. On the other hand, carbon emission reduction can promote high-quality economic development through green technology innovation, mainly by improving innovation input and innovation efficiency. Zhang Yuesheng et al found that green technology innovation has a partial intermediary effect [25].

2.3. Literature review

There is a large amount of literature examining the impact of digital economy on high-quality economic development and carbon emissions, and there is also literature examining the impact of carbon emissions on high-quality economic development. However, there is little literature that integrates the digital economy, carbon emissions, and high-quality economic development into a unified analytical framework, without in-depth exploration of the internal links. Therefore, this paper tries to find out the internal relationship between the three, and investigate whether carbon emission has an intermediary effect in the digital economy to promote high-quality economic development.

3. Theoretical Analysis and Research Hypothesis

3.1. The impact mechanism of the digital economy on high-quality economic development

At present, most scholars agree that high-quality development is multi-dimensional. Starting from the five dimensions of the new development concept, this paper theoretically explores this influence mechanism. First, innovation activities are characterized by high investment and high risk [26], while digital technology can reduce the cost of information search, improve the financing efficiency of enterprises, and consolidate the capital base of R & D innovation. In addition, digital technology can improve the matching accuracy of innovation activities with actual needs [6] and reduce risks. Second, the development of the digital economy has led to the rise of the gig economy, which has increased a large number of job opportunities and enabled low-skilled labor to earn higher incomes [13]. At the same time, the digital economy has reduced financing conditions and provided financial support for the long-tail population, thus achieving coordinated development. Third, the digital economy itself has its own green attributes, and most of the digital industries are environment-friendly enterprises [26]. Moreover, the digital economy can introduce green resources to other high-energy enterprises through industrial structure upgrading, and change the public lifestyle through dematerialization and virtualization, so as to achieve green development. Fourth, the Internet and other platforms have broken the geographical restrictions and become more and more open, and the digital economy can stimulate enterprises to increase investment in R&D and innovation, thus laying a solid foundation for integrating into the middle and high-end of the global value chain, occupying more external market shares [26], and ultimately achieving open development. Fifth, the inclusive nature of the digital economy brings a large number of small, micro, vulnerable and remote economic entities into the scope of service, thus promoting inclusive regional growth [27] and ultimately achieving shared development. Based on the above analysis, hypothesis 1 of this paper is proposed.

H1: Digital economy plays a driving role in promoting

high-quality economic development.

3.2. The intermediary effect of carbon emission reduction

Chinese economic growth is mostly promoted at the expense of the environment [11], and most of it comes from industrial energy consumption [28]. On the one hand, the high penetration of the digital economy can promote the coordinated development and deep integration among industries, promote resource sharing through scale effect and competition effect, realize the free flow of resources, and promote the transformation of industries from high energy consumption to green and low consumption, so as to achieve the carbon emission reduction target. The carbon emission reduction target can further promote the high-quality transformation of energy structure, industrial structure and market structure [23], accelerate the decoupling process of economic growth and energy consumption [22], and promote high-quality economic development. On the other hand, the wide application of digital technology eases the financing constraints of enterprises, and the attraction of super profits makes enterprises inclined to independent innovation, thus promoting the flow of resources to high-tech sectors, improving the innovation ability of enterprises in green technology, accelerating the development of new energy, curbing carbon emissions, and realizing the carbon emission reduction target. The carbon emission reduction target further increases investment in green and low-carbon technology innovation, improves carbon total factor productivity, and promotes high-quality economic development. Based on the above analysis, hypothesis 2 of this paper is proposed.

H2: Digital economy plays a role in promoting high-quality economic development by curbing carbon emissions.

4. Research Design

4.1. Model construction

First of all, in order to study the impact of digital economy on the high-quality development of provincial economy, this paper constructs the following benchmark regression model:

$$Hqed_{i,t} = \alpha_0 + \alpha_1 Difi_{i,t} + \sum \alpha_c Control_{i,t} + \mu_i + \delta_t + \varepsilon_{i,t}$$

Where, i represents the province, t represents the period, $Hqed$ represents the level of high-quality economic development, $Difi$ represents the level of digital economy development, $Control$ represents a series of control variables, μ_i represents the province fixed, δ_t represents the time fixed, $\varepsilon_{i,t}$ represents the random disturbance term.

Secondly, in order to study whether carbon emission intensity can be used as a mediating variable, the following mediating effect model is constructed:

$$CI_{i,t} = \beta_0 + \beta_1 Difi_{i,t} + \sum \beta_c Control_{i,t} + \mu_i + \delta_t + \varepsilon_{i,t}$$

$$Hqed_{i,t} = \alpha_0 + \gamma_1 Difi_{i,t} + \gamma_2 CI_{i,t} + \sum \gamma_c Control_{i,t} + \mu_i + \delta_t + \varepsilon_{i,t}$$

Among them, $CI_{i,t}$ are the intermediary variables, representing the carbon emission intensity of province i in the period t . The prerequisite for the existence of intermediate effects is that the coefficient α_1 of the benchmark regression model passes the significance test, and α_1 represents the total

effect, γ_1 represents the direct effect, and $\beta_1 \times \gamma_2$ represents the indirect effect.

4.2. Measurement and description of variables

4.2.1. Measure the level of high-quality economic development

As for the measurement of the level of high-quality economic development, the existing research has not formed a unified measurement system. Because high-quality economic development is multi-dimensional, it is difficult to accurately measure it with a single variable, so many scholars construct a multi-dimensional evaluation system. Therefore, this paper draws on the ideas of Zeng Sheng and Yang Yaowu et al. [28][29] and combines the available data at the provincial level to build a corresponding comprehensive evaluation system on the five dimensions of the new development concept, including 5 first-level indicators and 25 second-level indicators, and calculates it through the entropy method to obtain a comprehensive index of high-quality economic development, which is recorded as $Hqed$.

4.2.2. Measurement of the development level of digital economy

Based on the ideas of Zhao Tao et al., this paper constructs an evaluation system that takes the inclusive development of digital finance, the penetration rate of mobile phones, Internet-related output and the penetration rate of Internet broadband as secondary indicators. The data passed KMO and Bartley sphericity tests, so principal component analysis was used. The comprehensive index of digital economy is obtained by dimensionality reduction of multiple variables, which is denoted as $Difi$.

4.2.3. Measurement of carbon emission intensity

Coefficient method or material balance method is generally adopted for the calculation of carbon emission intensity. In this paper, based on the ideas of Yu Jiahong et al. [30], nine fossil raw materials such as coal, coke and crude oil are selected based on the material accounting method and converted through the conversion coefficient of standard coal. There is a certain relationship between carbon emission intensity and regional GDP and population size. In order to more accurately measure the possible intermediary effect of carbon emission intensity, this paper chooses to measure the carbon emission of per capita GDP as the "carbon emission intensity" required by this paper.

4.2.4. Control variables

In order to more comprehensively analyze the impact of digital economy on high-quality economic development, in addition to the above core variables, we refer to the ideas of Zhao Tao et al., Li Zongxian et al., Yu Jiahong et al. The model also introduces government fiscal expenditure (fiscal), marketization index (marketind), financial development level (finance), financial science and technology expenditure (tech), Energy consumption structure (enestr), urbanization level (urban) and infrastructure construction (inf) are seven control variables.

4.3. Data sources and descriptive statistics

This paper takes 30 provinces in China (excluding Tibet, Hong Kong, Macao and Taiwan) from 2011 to 2020 as research samples, and the original data comes from statistical yearbook, Statistical Bulletin and Beijing University Digital Financial Inclusion Index.

Table 1 shows the descriptive statistics. The results show

that the minimum level of high-quality economic development is 0.1180, the maximum is 0.6139, the average is 0.2876, and the standard deviation is 0.1045, indicating that there are certain differences in the quality of economic development among different provinces, and a few provinces

have a high level of economic development. The standard deviation of digital economy is 1.5444, indicating that the development level of different provinces is significantly different.

Table 1. Descriptive statistics of variables

	Variable name	Symbol	Mean	Sta.	Min	Max
Explained variable	High-quality economic development	Hqed	0.2876	0.1045	0.1180	0.6139
Explaining variable	Digital economy	Difi	3.0000	1.5444	0.2513	7.4272
Intervening variable	Carbon intensity	CI	1.2245	0.8437	0.0413	3.6837
Controlled variable	Government expenditure	fiscal	26.4262	11.4531	11.8800	75.8300
	Marketization index	marketind	69.5921	11.7992	43.0200	92.5200
	Financial development level	finance	3.3536	1.0834	1.6776	7.5520
	Financial technology expenditure	tech	2.0457	5.5202	0.0039	93.0270
	Energy consumption structure	enestr	74.4946	34.6540	1.4300	189.50
	Urbanization level	urban	3.4267	0.1766	2.8831	3.7650
	Infrastructure construction	inf	15.8960	4.7985	4.0400	26.78

5. Empirical Test

5.1. Baseline regression results

The fixed effect model is selected according to the results of Hausman test, and the time and province are double fixed. The regression results, as shown in column (1) of Table 2, show that the coefficient of digital economy (Difi) is 0.0311, which is significantly positive, indicating that digital economy has a boosting effect on high-quality economic development, and this result supports hypothesis 1. In fact, the characteristics of scale economy, scope economy and long tail effect of digital economy promote the rapid development of enterprises [3], the high penetration of digital technology accelerates the deepening integration of digital economy and traditional industries, promotes the continuous optimization and transformation and upgrading of industrial structure, and the wide coverage of digital economy such as the Internet reduces the degree of information asymmetry in the market. At the same time, the addition of digital production factors further accelerates the flow of production factors, thereby improving the efficiency of resource allocation. Therefore, the digital economy has played a boosting role in the high-quality development of the economy from the micro enterprises, the middle industry and the macroeconomic level.

From the perspective of control variables, the estimated coefficient of marketization index is significantly negative, which is inconsistent with the expectation, mainly because the marketization index may not fully reflect the degree of marketization; With the increase of government fiscal expenditure, the level of economic development has not been effectively improved [14]. The increase of fiscal expenditure on science and technology will significantly reduce the level of high-quality economic development, mainly because most of the scientific and technological talents and resources are concentrated in private enterprises. Government expenditure on science and technology cannot greatly improve the efficiency of social innovation, but will reduce other expenditures due to the crowding of more funds, thus lowering the level of economic development. The estimated coefficient of financial development level is not significant, or even negative. The possible reason is that the explosive growth of the real estate industry has attracted a large amount

of loan funds, squeezed the development space of emerging industries, and hindered economic development [9]. The urbanization level failed to pass the significance test, possibly due to the short survey period of the data used and the small change of urban population density in each province, which could not significantly affect the high-quality economic development.

Table 2. Results of baseline regression and intermediate effect regression

Variate	Hqed	CI	Hqed
	(1)	(2)	(3)
Difi	0.0311* (0.0160)	-0.1806* (0.0990)	0.0239 (0.0163)
CI			-0.0395** (0.0167)
enestr	-0.0004 (0.0004)	0.0119*** (0.0032)	0.0001 (0.0004)
marketind	-0.0011** (0.0005)	0.0108*** (0.0035)	-0.0006 (0.0005)
fiscal	0.0019 (0.0018)	-0.0115 (0.0126)	0.0015 (0.0017)
tech	-0.0005** (0.0002)	-0.0001 (0.0015)	-0.0005** (0.0002)
finance	-0.0048 (0.0144)	0.0020 (0.0911)	-0.0047 (0.0128)
inf	0.0050** (0.0024)	-0.0082 (0.0114)	0.0046* (0.0024)
urban	0.0003 (0.0368)	0.3795 (0.3626)	0.0152 (0.0337)
Constant term	0.1826 (0.1190)	-0.7430 (1.4066)	0.1533 (0.0916)
Provincial fixation	YES	YES	YES
Year fixation	YES	YES	YES
Period quantity	10	10	10
R²	0.9555	0.9698	0.9586

Note: The brackets in the table indicate robust standard error, ***, ** and * indicate that the regression results pass the significance test at 1%, 5% and 10% confidence levels respectively, as shown in the following table.

5.2. Test results of mediation effect mechanism

Previously, the intermediary effect of carbon emission intensity was theoretically analyzed, and now empirical test is conducted. The regression results are shown in columns (2) and (3) of Table 2. It can be seen that the estimated coefficient of digital economy *Difi* in column (2) is -0.1806, which is significantly negative, indicating that the development of digital economy effectively inhibits carbon emissions, and the low-carbon emission reduction effect of digital economy is established. The estimated coefficient of *CI* of carbon emission intensity is significant in column (3), which is -0.0395, and the estimated coefficient of *Difi* is reduced from the original 0.0311 to 0.0239, indicating the existence of an intermediary effect mechanism of carbon emission intensity, that is, the development of digital economy can promote high-quality economic development by inhibiting carbon emission intensity. This result supports hypothesis 2. In fact, the high penetration and wide application of digital technology promote the coordinated development and deep integration of industries and the free flow of resources, promote the industry to green low-energy industry, so as to optimize the industrial structure, curb carbon emission intensity, further realize the rapid transformation of energy structure and industrial structure, and promote high-quality economic development; At the same time, digital technology expands the scope of capital sources of enterprises, increases independent innovation efforts, and improves green technology innovation capabilities, thus curbing carbon emission intensity. In order to achieve carbon emission reduction targets, enterprises will further increase investment in green technology innovation, forming a virtuous circle and promoting high-quality economic development.

5.3. Further research: regional heterogeneity

There are great differences in the resource endowment of regions, which will lead to different levels of regional economic development. The promotion effect of the development of digital economy on the level of high-quality economic development may show significant heterogeneity in regional distribution. Therefore, this paper divides the whole population into three sample regions: east, middle and west, and conducts benchmark regression for different sample regions respectively. The results are shown in the following table.

As can be seen from the regression results in Table 3, digital economy can promote high-quality economic development in the eastern and central regions, but has no significant impact on the western region. From the estimation coefficient, the eastern region is 0.0471, the central region is 0.0273, and the western region is 0.0057. It can be seen that the boosting effect of the digital economy is most obvious in the eastern region, while the central region is general and the western region is not obvious. The main reason is that the eastern region has obvious “first-mover advantage” [2], so that the dividend effect of the digital economy can be released more fully. Moreover, provinces in the eastern region can further promote economic development through positive spatial spillover effect, and such spatial spillover effect is more “icing on the cake” rather than “delivering carbon in the snow”. However, the development of digital economy in the western region started late, coupled with geographical location, human capital and other restrictions, digital economy is at a low level, and in the process of rapid growth, more siphon effect will occur rather than spillover effect,

which makes the development of digital economy in the western region difficult to effectively promote high-quality economic development, and the dividends of the digital economy in the region have not been fully realized [12].

Table 3. Results of regional heterogeneity test

Variate	Hqed	Hqed	Hqed
	(1) East	(2) Midland	(3) West
Difi	0.0471* (0.0240)	0.0273* (0.0129)	0.0057 (0.0094)

6. Robustness Test

6.1. Replace the explained variable

Here, the weighting method combining subjective and objective is adopted. First, the primary index is weighted equally, and then the secondary index is weighted objectively [26] to obtain a new composite index and re-estimate it as a substitute variable. The results are shown in column (1) in Table 4. It can be seen that the estimated coefficient of the digital economy is 0.0236, which indicates that the conclusion is robust through the significance test.

Table 4. Robustness test results

Variate	Hqed	Hqed
	(1) Replacing the explained variable	(2) Excluding municipalities sample
Difi	0.0236* (0.0127)	0.0453** (0.0094)

6.2. Exclude samples of municipalities directly under the Central Government

The four municipalities are at the forefront of digital economy development, which may lead to great differences in the boosting effect of digital economy. Therefore, samples of municipalities directly under the central government are excluded from the sample data to avoid the impact of such differences. Column (2) in Table 4 is the result after the exclusion. It can be seen that the estimated coefficient of digital economy increased to 0.0453, which increased significantly, and passed the significance test, indicating that the conclusion is robust.

6.3. Instrumental variable method

Considering the endogeneity problem, the historical data of post offices in each province in 1984 are used as instrumental variables. However, this tool variable is cross-section data and cannot be directly used for panel data analysis [2]. Referring to the solution proposed by Zhao Tao et al., a time series data [2] is introduced. In this paper, the national information technology service income is selected, and then the interaction term is constructed with the number of post offices per million people in each province in 1984 to obtain the required instrumental variables. The estimated results are shown in Table 5.

The results show that the instrumental variable *iv* has a significant impact on the digital economy from the first stage estimation results. In the weak instrumental variable test, the partial R^2 is 0.3358, indicating that the instrumental variable *iv* has a strong explanatory power to *Difi*, the F statistic is 16.5692, greater than 10, and the K-Prk Wald F statistic is 29.4970, greater than the 10% bias critical value of 16.38,

indicating that the null hypothesis of weak recognition is rejected. Able to overcome endogenous problems. After considering the endogeneity problem, the estimated coefficient of digital economy is significantly positive, indicating that the research conclusion is still valid.

Table 5. Test results of instrumental variables

The first stage	Coefficient	Clustering standard error	P value
iv	6.97e-07	1.72e-07	0.0000
The second stage	Coefficient	Clustering standard error	P value
Difi	0.0117	0.0043	0.0060
The weak instrumental variable test	The partial R ²	The F statistic	The minimum eigenvalue statistic
	0.3358	16.5692	132.4530

7. Conclusions and countermeasures

In the context of the new normal of triple shocks, the digital economy has gradually become a key force to help Chinese economy achieve "overtaking the curve", and it is of great significance to study the internal relationship between it and high-quality economic development. From the perspective of carbon emission intensity, based on the panel data of 30 provinces in China (excluding Tibet and Hong Kong, Macao and Taiwan) from 2011 to 2020, this paper constructs a comprehensive index of core variables, studies the boosting role of digital economy and the mediating role of carbon emission through benchmark regression model and intermediary effect model, and conducts regional heterogeneity analysis. The main conclusions are as follows: First, digital economy has significantly promoted high-quality economic development and passed the robustness test; Second, the digital economy can promote high-quality economic development by curbing carbon emissions. Third, the boosting effect of digital economy is more significant in the eastern region, followed by the central region, and not significant in the western region. Based on the above conclusions, the following countermeasures and suggestions are put forward:

First, actively promote digital technology innovation and improve digital infrastructure. On the one hand, the government should increase investment in digital infrastructure, accelerate the research and development and innovation of digital technology, promote the integration and innovation of digital technology with the real economy and high energy consumption fields, achieve industrial transformation and upgrading and efficiency improvement, and further consolidate and release the dividend advantages brought by the development of digital economy. On the other hand, enterprises should increase the intensity of investment in research and development and innovation of key digital technologies, add digital elements, so as to improve production efficiency and achieve geometric economic growth.

Second, we need to promote green and low-carbon technologies and upgrade the industrial structure. Enterprises should encourage the research and development of green and low-carbon technologies, inject new momentum into high-energy consumption industries, achieve green transformation,

and catalyze the effect of technological innovation on emission reduction. At the same time, strengthen the control of funds, guide the flow of funds to green industries, optimize the industrial structure, improve energy efficiency, and reduce the proportion of high energy consumption. Third, based on differences in resource endowments, measures should be taken according to local conditions. First of all, each province should combine its own level of economic development and factor endowment, develop the level of digital economy in a differentiated way, and continue to promote the economic development of the eastern region, promote green technology spillover to the central and western regions. Second, the government should increase investment in new infrastructure in the central and western regions, break geographical restrictions, form a unified national trading market, promote the flow of resources to the central and western regions, and accelerate the release of the dividend advantages brought by the development of the digital economy. Finally, focus on promoting the application of green and low-carbon technologies in the western region, developing new energy, encouraging the use of clean energy, and curbing carbon emissions, so as to enhance high-quality economic development.

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