Research on Influence Mechanism of Marketization Process Based on Big Data Analysis under the Background of the Cybereconomy

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Abstract. The cybereconomy provides new momentum for the traditional economy, adds new formats and models, and is the main momentum for China's economic progression. Therefore, the cybereconomy level of 30 provinces in China from 2011 to 2019 is measured by constructing a comprehensive index system and an econometric model to explore the impact of the cybereconomy on the marketization process and its internal mechanism. The results show that the cybereconomy has significantly promoted the development of the marketization process, and government intervention has inhibited the promotion of the cybereconomy to the marketization process. The research result has crucial academic and realistic significance to accelerate marketization, enhance the overall innovation ability, and build a modern socialist country.

1 Introduction

The cybereconomy has become China's most active economic development force. The arrival of the digital age has profoundly affected human production and lifestyle and played a key role in creating employment. It stimulates consumption and investment. In recent years, the scale of China's cybereconomy has continued to grow, exceeding CNY 45 trillion in 2021, accounting for 39.8 % of GDP. The cybereconomy provides power for the national economy and is a stabilizer and accelerator for the national economy. Thus, it is necessary to understand the relationship between the cybereconomy and the marketization process and find the influencing factors between them. The research related to the cybereconomy is diverse as it has focused on the impact of the cybereconomy on production and lifestyle as well as on the socio-economic structure. The impact of the cybereconomy includes the upgrading of industrial structure, technological innovation, high-quality progression, income distribution, and consumption gap [1]. No previous studies have conducted empirical tests and profound theoretical analyses on the impact of the cybereconomy on the marketing process. This motivates the progression of this study.

The contribution of this study lies in two aspects. The first is summarizing the existing literature combined with China's provincial panel data and testing the relationship between the cybereconomy and the marketing process. Bin gave empirical evidence based on the external dynamic environment, enriching the existing research on the cybereconomy. The second is revealing the regulatory role of government intervention in the cybereconomy and understanding China's marketization process from the macro level.

2 Literature Review and Hypothesis

2.1 cybereconomy Affecting Marketization Process

In recent years, digital technology, represented by big data and artificial intelligence, has been increasingly integrated into various fields of China's economic and social progression. The evolution of the cybereconomy has profoundly affected the allocation of resources, economic structure transformation, and the marketization process. Tapscott proposed the concept of a "cybereconomy" and described social relations in the context of the Internet. As pioneers of the cybereconomy, the United States and Japan tend to equate the cybereconomy with e-commerce in a broad sense in practice. It is believed that the cybereconomy is an infrastructure, information, and communication technology or production activity directly related to digital technology [2]. With the innovation and expansion of emerging information technology, its applications and methods are becoming extensive and complex. The connotation of the cybereconomy has been extended to all economic activities that use e-commerce or the Internet for transactions [3]. China's "G20 cybereconomy Development and Cooperation Initiative" in 2016 pointed out that the cybereconomy is related to economic activities that use digital knowledge and information as necessary production factors. With the network as a carrier and effective use of ITC to improve efficiency and optimize the economic structure, the

cybereconomy has provided new momentum for the traditional economy, adding new formats and models.

As China's economic progression model changes from "fast" to "quality", the market plays a decisive role in the allocation of resources, and market competition has become the main driving force to promote economic and social development [4]. Marketization is based on the characteristics of market openness and demand-oriented according to market rules. The goal of maximizing the efficiency of the operating mechanism is achieved through marketization [5]. The promotion of marketization is mainly measured by the degree of progression of the market, the relationship between the government and the market, the progression of the non-state-owned economy, and the construction of the rule of law environment [6]. The regional resource allocation with a high degree of marketization is more desirable as the transaction cost becomes lower, the competition system becomes sanity, and the legal system becomes strengthened [7]. The evolution of the cybereconomy improves the marketization process. Most of the existing literature affirms the energetic role of the cybereconomy in marketization. We summarize the main viewpoints of scholars on the effect of the cybereconomy on marketization in recent years from four aspects. First, the cybereconomy can improve the level of product marketization. The progression of the cybereconomy helps enterprises expand the business chain, bring a convenient and quick consumption experience to consumers, stimulate consumers ' diversified demand for products, and promote the growth of product output and variety [8]. Second, the cybereconomy can optimize the market-oriented allocation of factors. The progression of the cybereconomy and digital platform effectively promotes the development of artificial intelligence with the assistance of information technology and reduces the demand for labor and the cost of information dissemination, which is conducive to the faster and more convenient flow of production factors and efficiency [9]. Third, the cybereconomy can stimulate the vitality and creativity of non-state-owned economies. Entrepreneurs can communicate online and offline anytime and anywhere through various digital platforms, which allows entrepreneurs to accurately grasp business opportunities and enhance innovation capabilities. The integrated development of the cybereconomy and finance also alleviates the financial pressure on entrepreneurs, stimulates the vitality of innovation and entrepreneurship, and improves entrepreneurial activity [10]. Fourth, the evolution of the cybereconomy can accelerate the integration of the market and government. On the one hand, big data technology helps government departments plan. On the other hand, based on the public goods attributes of data elements and the scale of investment in data technology equipment, government departments are the builders of the cybereconomy [11]. Because of the above analysis, this paper proposes Hypothesis H1:

H1: The development of the cybereconomy helps to improve the marketization process.

2.2 Regulatory mechanism

Government intervention is for the management of the national economy, which is an economic function. It is the government that controls to promote market development and regulates market operation in economic operation and regulation. As government decision-making has a time lag and is short-sighted, and government decision-maker's knowledge and information capacity are weak, it is difficult for them to grasp the trend of scientific development and make effective decisions in a short time [12]. Therefore, government intervention may hinder the achievement of goals. Recent research shows that government intervention inhibits the advancement of the marketization process. There are three aspects of understanding. First, government intervention highlights the functions of the government but hinders the fateful role of the market in the distribution of resources. This restricts the effective allocation of social resources. Under the current system, its actual action reveals its original intention, which is not conducive to the progression of the marketization process. Second, in the institutional arrangements represented by the target responsibility system, there is a phenomenon of "promotion tournament" within the government, and local governments may intervene blindly due to " performance orientation" [13] resulting in " ultra vires", "loss of power", and "chaos of power". This brings a negative impact on the advancement of the marketization process. Third, due to the path dependence of the market mechanism, it is difficult to adjust the degree of government intervention adaptively [14]. According to this, we propose hypothesis H2.

H2: Government intervention weakens the role of the cybereconomy in promoting the marketization process.

3 Research Design

3.1 Sample selection and Data

We use the panel data of 30 provinces in China from 2011 to 2019 excluding China's Hong Kong, Macao, and Taiwan regions and the Tibet Autonomous Region, where there are much missing data. The data are collected from the ' China Provincial Marketization Index Report (2021) , China Statistical Yearbook, 'and ' China Labor Statistics Yearbook, 'and 270 research samples were finally obtained. Stata15.0 software is used for data analysis and processing.

3.2 Variable Declaration

3.2.1 Explained variable: marketization process(Dm)

China's marketization index is collected from the ' China Provincial Marketization Index Report (2021) ' compiled by Fan et al. to measure the marketization process. The index has the characteristics of objectivity, systematicness, and strong authority. It has also been widely recognized and used by domestic researchers.

3.2.2 Explanatory variables: cybereconomy (Dei)

According to Liu et al. (2020) [15], we construct the evaluation index system of the cybereconomy from three dimensions: digital transaction, Internet progression, and information progression.

3.2.3 Regulated variable: government interference (Ui)

The measurement method of Zhigang (2014) [16] is used for the proportion of government general budget expenditure in GDP. The higher the proportion of fiscal budget expenditure in regional GDP, the higher the degree of government intervention in the market.

3.2.4 Control variable

In order to analyze the impact of the cybereconomy on the marketization process comprehensively, the variables that may affect the marketization process are controlled. The following control variables are selected: urban and rural structure (Urs); investment level (Il); demand structure (Ds); urban and rural consumption gap (Igp); Dependence on foreign trade (Dft). The specific variable measurement method is shown in Table I.

TABLE I. RELATED VARIABLES DESCRIPTION

Variable type	variable name	variable symbol	computed mode
dependent variable	marketization process	Dm	Regional marketization index
independent variable	cybereconomy	Dei	Comprehensive Development Index of Regional cybereconomy
regulated variable	government interference	Gi	Government general budget expenditure / GDP
control variable	urban and rural structure	Urs	Urban population by province / total population by province
	investment level	Il	Regional Investment Index
	demand structure	Ds	Total retail sales of social consumer goods / GDP
	urban and rural consumption gap	Igp	Urban per capita consumption expenditure / rural per capita consumption expenditure
	Dependence on foreign trade	Dft	Total import and export / GDP

3.3 Model Setup

Based on 270 research samples from 30 provinces in China from 2011 to 2019, the impact of the cybereconomy on the marketization process is examined to construct a benchmark regression model as follows.

$$Dm_{i,t} = \alpha_0 + \alpha_1 Dei_{i,t} + \alpha_2 Control_{i,t} + \varepsilon_{i,t} \quad (1)$$

where $Dm_{i,t}$ represents the marketization index of $i$province in t year to measure the marketization process of each province, Dei_i represents the cybereconomy level of province i in year $t, \alpha_0$is a constant term, and the coefficient α_1 measures the impact of the cybereconomy on the marketization process. The coefficient α_1 is the core parameter of this study. If α_1 is significantly positive after controlling a series of characteristic variables $Control_{i,t}$, the cybereconomy promotes the evolution of the marketization process. If α_1 is significantly negative, the cybereconomy inhibits the marketization process. $\varepsilon_{i,t}$ denotes a random perturbation term.

4 Authentic Proof Analysis

4.1 Baseline regression results

Columns (1) and (2) of Table III show the regression results before and after the introduction of control variables, respectively. Whether or not control variables are introduced, the coefficients of the cybereconomy are significantly positive at the 1% level, indicating that the cybereconomy has promoted the development of the marketization process. The coefficient of the control variables shows that the urban-rural structure, investment level, and urban-rural consumption gap are significantly positive at the 5% level. This indicates that the urban-rural structure, investment level, and urban-rural consumption gap have a crucial role in elevating the development of the marketization process. The demand structure and foreign trade dependence are not significant, as the demand structure and foreign trade dependence have no impact on the development of the marketization process.

4.2 Moderating effect analysis

After testing the transmission mechanism of the effect of the cybereconomy on the marketization process, we explore the impact mechanism behind it. In practice, the government may abuse its power, which is not conducive to the development of the marketization process. As a result, we add the interaction term of the cybereconomy and government intervention to the benchmark regression model to examine the mechanism of government

intervention in the process of cybereconomy and marketization.

$$Dm_{i,t} = \beta_0 + \beta_1 Dei_{i,t} + \beta_2 Dei * Gi + \beta_3 Control_{i,t} + \varepsilon_{i,t} \quad (2)$$

In Eq. (2), Gi is the moderating variable of government intervention. It is judged whether government intervention has a moderating effect on the relationship between the cybereconomy and the marketization process, which is judged by the significance of β_2. The proportion of the government's budget expenditure to GDP indicates the degree of government intervention. The larger the index value, the higher the degree of government intervention. The regression results of the interaction between the cybereconomy and government intervention are shown in column (3) of Table III. The coefficient of the interaction term is -1.1623 at the 1 % of significant level. The higher the degree of government intervention, the more it inhibits the positive impact of the cybereconomy on the marketization process.

TABLE II. BENCHMARK REGRESSION AND ADJUSTMENT EFFECT ANALYSIS

Variable	(1)	(2)	(3)
Dei	0.6632*** (9.8810)	0.3834*** (8.2987)	0.6540*** (7.1728)
Dei * Gi			-1.1623*** (-3.6164)
Gi			-0.6055 (-0.6320)
Urs		2.8210** (2.4214)	4.9771*** (4.3448)
Il		0.0009** (2.7012)	0.0005* (1.8047)
Ds		0.0651 (0.0760)	-0.3426 (-0.4368)
Igp		1.4307*** (4.5384)	1.4099*** (5.1631)
Dft		-0.0005 (-1.1131)	-0.0006* (-1.8294)
constant	6.2212*** (123.6539)	1.9103* (1.7255)	1.1588 (1.1339)
sample size	270	270	270
R^2	0.6276	0.7170	0.7592

Note:*, * *, * * * are significant at the level of 10 %, 5 %, and 1 %, respectively; the t value is adjusted by the robust standard error in brackets.

5 Conclusions and Implications

Though an important factor affecting the level of marketization, the cybereconomy has not attracted enough attention. According to the panel data of 30 provinces in China from 2011 to 2019, we construct data on the cybereconomy, marketization process, and government intervention, and test the impact and mechanism of the cybereconomy on the marketization process. First, the progression of the cybereconomy significantly promotes the marketization process. Secondly, after testing the moderating effect of government intervention, it is found that government intervention inhibits the promotion of the cybereconomy in the marketization progress. That is, the lower the degree of government intervention, the more significant the character of the cybereconomy in elevating the marketization process.

Through the above research conclusions, two policy implications are proposed. First, in the context of the information age, the cybereconomy promotes the marketization process by improving the level of marketization, stimulates the creativity of the non-state-owned economy, and accelerates the integration of government and the market. Therefore, accelerating cybereconomy and building digital China are demanded in the marketization process. Secondly, as a strategy in the new era, the cybereconomy needs to integrate the relationship between the government and the market to promote the marketization process. While following the government's planning and guidance to carry out the necessary infrastructure construction of digital technology, we also need to follow the open nature of the market economy, and appropriately reduce government intervention. Following the government's planning and guidance only may hinder the marketization process.

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