A Review of Theoretical and Practical Studies on Taxation of Data Elements

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Abstract. Along with the continuous development of the digital economy, data elements have become an important factor of production, which plays a key role in promoting economic growth, enhancing enterprise competitiveness and optimising resource allocation. The growth of economic value and commercial application of data elements has become more and more significant, which makes the issue of taxing data elements become the core focus of global fiscal policy research; however, due to the characteristics of intangible, mobile and cross-border, the traditional tax system is facing challenges. However, because of the intangible, mobile and cross-border characteristics of data, the traditional tax system is facing challenges and impacts, and how to define the property rights of data, estimate the value of data, and formulate a fair and reasonable tax policy has become a problem that needs to be solved urgently. This paper analyses the theoretical basis of data element taxation and summarizes the practical experience of major international countries through literature analysis and case study, By comparing domestic and international cases on data element taxation in recent years systematically explores the current development status of data element taxation in China and the institutional, technical and legal dilemmas faced by China, and gives countermeasures that can improve the tax system, advance the pace of system construction, promote the scientific perfection of China's data element taxation system, and promote the formation of a healthy situation of the digital economy.

Keywords: Digitalised production factors; digital tax; tax policy; Tax framework.

1. Introduction

The deep embedding and extensive intertwining of data elements in the economy and society have become a core production factor of strategic significance in the era of the digital economy. According to the Global Digital Economy White Paper disclosed by the China Academy of Information and Communications Technology, the scale of the global digital economy will be presented at US$41.4 trillion in 2022, accounting for 46.1% of the overall global GDP, with an increase of 7.4% compared with the same period of the previous year. Economic development has been driven by the wide application of data elements, but it has also triggered conditions such as market monopoly and uneven distribution of value, which have posed serious challenges to the traditional tax system. Based on the gradual increase in the value of data and the fact that large-scale platform enterprises have made excessive profits by taking advantage of data, it is extremely urgent and indispensable to create a scientific and reasonable data tax system.

Currently, the international community has been exploring data taxation, such as the digital tax implemented by the EU, and the Organization for Economic Co-operation and Development has formulated a 'two-pillar' program to realise the re-adjustment of the tax distribution of multinational digital enterprises. At present, the international community has been exploring the scope of data taxation, and our country has started to push forward the market-oriented change of data elements. However, the tax policy still needs to be further improved. The structure of this paper is arranged as follows: Section 2 elaborates on the theoretical foundations of data element taxation, systematically examining the concept, economic attributes, and the necessity and feasibility of taxation. Section 3, through literature analysis and case studies, summarises the practical experiences of major

international economies in the taxation of data elements and, in light of China's current stage of development, explores the institutional, technical, and legal challenges it faces. Section 4 builds upon the preceding analysis to propose targeted and practical policy recommendations, aiming to provide a strategic framework for the development of a sound and rational data taxation system in China. Section 5 reviews and evaluates existing domestic and international research, identifies current limitations, and outlines potential future research directions, thereby laying a theoretical foundation for the coordinated advancement of China's digital economy governance and tax system reform.

2. The Theoretical Basis of Data Element Taxation

2.1. Data Element Economic Characteristics

Data elements are the production factors that bring certain benefits when index data is used by individuals, enterprises and other organizations. It has economic characteristics such as scarcity and non-competition, which are easy to form a data monopoly and intensify market competition. Therefore, data element taxation is inevitable.

Data element taxation is to tax the income of economic value generated by it [1]. How much the economic value of the data element is derived based on the impact of its economic characteristics. This paper will analyze the impact of scarcity and non-competition of data elements.

The economic value brought by the scarcity of data elements makes some enterprises monopolize the industry through data elements. Tax can optimize resource allocation, adjust the distribution structure of data elements and other ways to adjust the economic value generated by it so that enterprises can pay their data tax to reasonably improve the data element market.

Although this feature can play a beneficial impact on the digital economy, such as reducing costs and promoting industrial integration, when non-competitive is not widely used, and there may be great losses [2]. Therefore, the positive effects of non-competition of data elements can be enhanced through reasonable taxation.

2.2. Data Element Market Status

In recent years, data elements have developed rapidly in related fields. At the same time, enterprises increase their profits through digitalization, and even monopolistic competition appears [3]. Therefore, how to rationalize data element taxation and other issues need to be solved. China's data element market is at an important stage, and the state attaches great importance to the construction of the data element market. In 2025, the Implementation Plan on improving the security governance of data circulation to better promote the marketization of data elements shows that planning the foundation construction of data-related systems will be the development direction in the next few years. Internationally, countries have introduced relevant laws in order to improve their competitive advantages. In 2023, the European Union promulgated the Data Act, which regulates the rights and obligations of enterprises regarding user data [4].

2.3. The Need for Taxation of Data Elements

As a core production factor of data, its unique attributes make data tax management an urgent and complicated task. Data presents characteristics of being non-competitive, non-scarce [5] and having a low marginal cost. While it promotes the flow and utilization of data, it may, possibly because of the excessive aggregation of resources, lead to an unfair situation in the competitive landscape. Taxation of data can prevent large enterprises from monopolising the market and ensure that data creators receive the benefits they are entitled to. Adopting a tax on data can ensure that resources are allocated in a rational manner, leading to an increase in fiscal revenues and driving society and the economy onto a track of sustainable development.

2.4. Feasibility of Taxing Data Elements

The regulation of data on emerging factors of production has not been effectively achieved by the traditional tax system, and there is an urgent need to solve the problem of how to carry out reasonable taxation on data, which can be analysed from the three dimensions of economy, law and technology to analyse the feasibility of taxing data. Firstly, taxation can reduce the uneven distribution of resources and avoid unfair competition in the market. As a means of production, data has the basis for taxation, and reasonable taxation can promote the fair distribution of data [6]. Secondly, in terms of legal feasibility, although the current legal system has not yet perfected the tax system for data, many countries have begun to formulate relevant policies. Finally, in terms of technological feasibility, technological advances have led to more accurate data management, which provides a reliable tool for taxation and ensures fair and transparent taxation [7]. Economic taxability is the starting point and basis for determining the object of taxation. Therefore, the economic taxability of taxable objects is a prerequisite for further enactment of laws to tax them [8]. In conclusion, data taxation is feasible at the economic, legal and technical levels, which can promote the rational use of resources and guide the digital economy into a healthy development track.

3. Domestic and international data element practices and recommendations for the future

3.1. International Practice in Data Element Taxation

Internationally, as developed countries and regions such as the United States and Europe started earlier in this field, they have established a data element market governance model with their own characteristics and strive for global dominance in this field [9].

The EU has opted for a data governance model based on human rights guarantees [9]. On 25 May 2018, the EU officially implemented the General Data Protection Regulation (GDPR). The regulation aims to strengthen data protection in the EU in response to new privacy challenges brought about by the development of digital technologies [10]. The implementation of the GDPR strengthens the protection of the rights of data subjects and standardizes the aspects of data elements in the EU. It provides the direction and framework for China in terms of personal data protection and how to standardize data elements. However, the regulation also has certain limitations. For example, due to the large number of member States, there are still differences in personal data such as criminal convictions and crimes, making it difficult to implement the GDPR uniformly. However, it is undeniable that the implementation of GDPR has provided an example for Chinese and even global data protection legislation, allowing other countries to reduce exploration costs and avoid potential errors.

The United States has chosen a data governance model based on data freedom [9]. As a result, unlike the EU's GDPR, the US does not have a comprehensive data privacy regulation governing the collection and use of data [11]. In 2020, the California Consumer Privacy Act (CCPA) officially took effect in California, which strengthens the protection of consumers' personal information and improves the efficiency and fairness of tax collection and administration. It has promoted China's standardization in international trade cooperation and provided references for China's data legislation, such as the Cybersecurity Law and the Personal Information Protection Law. But because the CCPA applies primarily to California and not the United States, its global reach is relatively limited compared to the GDPR.

3.2. The Development of Data Element Taxation in China

In recent years, alongside the accelerating digitalisation of national governance, China has progressively explored the taxation of data elements, moving from policy advocacy to practical implementation and establishing a relatively structured developmental trajectory.

At the policy level, the government has actively fostered the development of the data element market through tax incentives aimed at promoting scientific and technological innovation. Policies such as the additional deduction for R&D expenditures have significantly stimulated enterprise investment in data collection, processing, and monetisation. According to official statistics, tax reductions and exemptions serving the purpose of supporting technological advancement amounted to RMB 893.7 billion in the first three quarters of 2024, demonstrating the critical role of fiscal policy in underpinning the infrastructure of the digital economy.

Meanwhile, the digital modernisation of China's tax administration has been steadily progressing. During the 2024 National Tax Work Conference, authorities outlined a key initiative known as the "Digital Transformation and Capacity Enhancement Programme for Tax and Fee Administration." This program is designed to improve governance efficiency by incorporating cutting-edge technologies, including big data processing and cloud-based solutions. Such tools are intended to facilitate a more adaptive, accurate, and responsive tax collection framework.

A notable advancement occurred in February 2024 when Suzhou successfully recorded roadside vehicular network sensor data as an asset on financial statements — a first-of-its-kind development in China. This was made possible through collaboration between the Suzhou Data Element Value Co-Creation Platform and the Suzhou Big Data Exchange, enabling an integrated approach to data ownership confirmation, valuation, and accounting. This case offers a practical reference model for handling the financial and tax-related dimensions of digital assets.

Simultaneously, the State Administration of Taxation has made significant progress in implementing a nationwide electronic invoicing system. This initiative has enhanced the integration of enterprise accounting systems with regulatory frameworks, supporting more transparent and traceable tax supervision. The ongoing digital enhancement of invoicing mechanisms stands as a key institutional support for effective tax administration in the era of data-centric economic activity.

4. Challenges and Suggestions of Data Element Taxation in China

4.1. The Challenges

With the rapid development of information technology, the taxation of data elements still faces a lot of difficulties. From the dimension of tax system design, due to the diversification and decentralisation of taxpayers in the development of digital economy, the frequent flow of data makes it more difficult to define the scope of taxation; the boundaries of tax objects are vague and difficult to be distinguished, there are obstacles to value assessment, and the complexity of valuation is raised by the special attributes of data; it is also difficult to determine the tax items and the tax rate, and the integration of data and traditional businesses, and there are obvious scenarios for the integration of data and traditional businesses. It is also difficult to determine tax items and tax rates, and the integration of data business and traditional business has obvious differences in scenarios, making it difficult to adopt a uniform standard.

4.2. Recommendations for Future Data Element Taxation Development Policies

In the era of digital economic globalization, in order to increase the competitive advantage between countries, countries are strengthening the research on data elements and reasonable taxation. However, data taxation in our country is in the transition stage from theory to practice. How to make the best use of the advantages of the traditional data element market is an urgent problem to be solved. Based on the research of data element taxation, the following suggestions are summarized.

First, pay close attention to the relevant policies and data governance models in the United States and Europe in this field, and learn from influential legislation such as GDPR and CCPA. On the one hand, in-depth study of the competitive advantages and shortcomings of the data governance model in the United States and Europe, and constantly explore, reveal and abide by the development law of the digital economy; On the other hand, we should combine China's own characteristics and advantages, and reasonably learn from the experience of the United States and Europe, so as to put

forward an“open and actively defensive data governance model" based on data security in the future, constantly improve the tax system of data element taxation and formulate relevant laws, and help the formation of a new global digital economy pattern with the development of China’s digital economy [9].

Second, China’s tax collection and management system and other departments of the data platform docking are not perfect; “data barriers” and other problems still exist. Therefore, our country can establish a perfect data security protection system, unify data standards, strengthen the protection of taxpayers personal information, ensure the security and confidentiality of information sharing platforms, and prevent data from being maliciously tampered or forged, help the tax authorities to obtain real and reliable data, improve the precision of tax collection and administration, and avoid the loss of tax.

5. Conclusion

This investigation predominantly examines the taxation of data elements, highlighting the theoretical root, economic viability, and practical issues of introducing a data tax system. By merging literature analysis and case-study approaches, the paper gives a comprehensive scrutiny of the current situation of data element taxation in China and across the globe. The research approach used was to carry out a thorough comparison of domestic and international policies regarding data taxation, appraising the approaches of countries such as the EU and the United States. The study recognized key lessons from their experiences, notably in data governance, tax collection mechanisms, and digital asset valuation. The theoretical framework builds upon the economic characteristics of data elements, specifically their scarcity, non-competitiveness, and replicability. These characteristics manifest the necessity for a specialized tax system to ensure fair resource dispersion and prevent monopolistic doings. The paper further examines the legal and technological viability of data taxation, contending that progress in both aspects lays the groundwork for setting up an effective data tax system.

Notwithstanding the contributions of the study, there are limitations. At first, a shortfall in research remains about the exact calculation of data value and the establishment of an explicit tax base.s. Besides, though the paper focuses on international practices, it could further examine the cross-border challenges of taxing data elements, especially when considering global data flows and differing national tax policies. In essence, this exploration offers a valuable starting point for understanding the complexities of data element taxation. Nevertheless, more work must be done to fine-tune the theoretical models and deal with the practical problems associated with implementation, particularly in the creation of a unified global tax framework for data.

Authors Contribution

All the authors contributed equally and their names were listed in alphabetical order.

References

[1] Fang Zhu, HE Qian, ZHAO Shen. Taxation theory progress and realization path of data elements [J]. Journal of yunnan university of finance and economics, 2025, 9 (02) : 49-62. DOI: 10.16537 / j.carol carroll nki jynufe. 001006.

[2] Jones C I, Tonetti C. Noncompetition and Data Economics [J]. American Economic Review, 2020, 110 (9) : 2819-2858.

[3] Gelepithis M, Hearson M. The politics of taxing multinational firms in a digital age[J]. Journal of European Public Policy, 2022, 29(5): 708-727.

[4] Chen Yifan, FENG Zhigang, ZHANG Zhiqiang. Development trend of power data of science and technology policy and its enlightenment to our country [J]. Journal of think-tank, theory and practice, 2024, 9 (6) : 39-49. DOI: 10.19318 / j.carol carroll nki. Issn 2096-1634.2024.06.05.

[5] China Academy of Information and Communications [Z]2024-9-26

[6] Research on the value of Data and the construction of Data element market system 2024

[7] Chu Ruigang. Normative Realization of data Taxability from the perspective of structural Functionalism. Law Science,2024,(03):174-192.

[8] Wu S. A Feasibility Study on Taxation of Data[J].

[9] Li Xiaolei, Lu Anwen & Ouyang Rihui.(2024). Comparison of data element market governance models in the United States and Europe and China's Response: From the perspective of global digital economy strategy Game. Journal of Chongqing University of Posts and Telecommunications (Social Science Edition), 36(02), 77-87.

[10] Li, H., Yu, L., & He, W. (2019). The impact of GDPR on global technology development. Journal of Global Information Technology Management, 22(1), 1-6.

[11] Mulgund, P., Mulgund, B. P., Sharman, R., & Singh, R. (2021). The implications of the California Consumer Privacy Act (CCPA) on healthcare organizations: Lessons learned from early compliance experiences. Health Policy and Technology, 10(3), 100543.