



The Impact of Artificial Intelligence Development on Regional Taxation Gaps

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Abstract: As the core engine driving new-quality productive forces, artificial intelligence (AI) is profoundly reshaping the economic geography pattern. Investigating its impact on inter-regional tax gaps is of critical significance for advancing common prosperity. Grounded in the current state of AI development and the existing regional tax divide in China, this paper explores the mechanisms through which AI's siphon effect, industrial agglomeration effect, and spillover effect influence the regional tax gap. Thus, it is aimed to offer suggestions for optimizing the national artificial intelligence development strategy layout and deepening the tax system reform, as well as exploring a modernized tax path.

Keywords: artificial intelligence; tax gap; impact effect

1. Introduction

As the core driving force of the new round of technological revolution and industrial transformation, artificial intelligence is profoundly reshaping the economic growth model, industrial structure layout and regional development pattern. While enhancing total factor productivity and promoting the deep integration of the digital economy and the real economy, it has also triggered profound changes in the distribution of tax bases, tax jurisdiction and regional financial structure. Although existing studies have focused on the impact of the digital economy on tax distribution, most of them have concentrated on specific business forms such as e-commerce and platform economy, and few have systematically explored the deep mechanism of its impact on regional tax gap from the perspective of the technical attributes of artificial intelligence. This paper, based on the three core effects of artificial intelligence - the suction effect, industrial agglomeration effect and spillover effect, attempts to construct an analytical framework to reveal how artificial intelligence reshapes the regional tax pattern through factor flow, industrial restructuring and technology diffusion. The research aims to provide theoretical support and policy reference for optimizing the regional tax distribution mechanism and building a fiscal and taxation system that adapts to the era of artificial intelligence, to better promote the empowerment of economic high-quality development by artificial intelligence, with a view to achieving a balance between economic growth and common prosperity.

2. Background and definition of the concept

2.1 Background

With the accelerated evolution of a new round of scientific and Technological Revolution, artificial intelligence (AI) is profoundly reconstructing the traditional production function and value creation path. Scholars such as Kromann (2020) [1], Ballestar (2020) [2], have verified the promoting effect of artificial intelligence on the improvement of total factor productivity. Scholars such as Giacomo (2021) [3] and Chor Davin (2021) [4] have expounded on the paths through which artificial intelligence influences the distribution of the value chain. Confronted with this wave of technological transformation, China has constructed a comprehensive policy matrix covering the entire chain from technology research and development, industrial application, to security governance. Initial deployments have been made in core urban agglomerations such as the Beijing-Tianjin-Hebei region and the Yangtze River Delta, striving to explore a new development paradigm for the deep integration of the digital and real economies through policy guidance and technological breakthroughs. However, the release of technological dividends is often accompanied by the adjustment of the distribution pattern. While driving economic growth, artificial intelligence also has an impact on the existing tax base form, tax source distribution and value distribution rules. Whitney (2019) [5] believes that regions with developed digital economies have a stronger boosting effect on tax growth. The natural spatial bias of digital technology can easily lead to the deviation between tax source and tax revenue, and then aggravate the financial imbalance between regions. If this phenomenon can not be effectively controlled, it will lead to the solidification of "Matthew effect" of inter-regional financial resources, which goes against the original intention of common

prosperity. Therefore, in the process of advancing the AI strategy, identifying its precise pathways of impact on regional tax disparities and institutionally designing compatible fiscal and taxation adjustment mechanisms have become critical issues demanding in-depth exploration. Clarifying the intrinsic mechanisms through which AI development influences the regional tax gap holds significant theoretical value and practical policy implications for coordinating technological change with regional coordinated development, and for constructing a modern fiscal and taxation system oriented towards common prosperity.

2.2 Definition of tax gap

The tax gap originates from the distortion of tax distribution under the system of fiscal decentralization. The definition of tax gap in the current literature usually refers to the systematic gap in tax revenue, tax source distribution and tax capacity between different regions. David (2020) [6] studied the differences in tax revenue between regions in the digital economy. From the perspective of concept evolution, the research on tax gap mainly includes two aspects: one is the external effect brought by regional tax competition, and the other is the unfair distribution caused by the deviation between tax and tax source.

In the context of the rapid development of artificial intelligence, this paper defines the tax gap as the difference in the degree of empowerment, application depth and governance efficiency of artificial intelligence technology between different regions, tax revenue capacity, tax source cultivation quality and tax governance level. This definition not only focuses on the difference of tax revenue results in the traditional sense, but also pays more attention to the reshaping effect of artificial intelligence as a key driving technology on the tax ecosystem. It is worth emphasizing that this definition pays special attention to the interaction between the technical attributes of artificial intelligence and the attributes of the tax system. On the one hand, as a general purpose technology, the permeability and substitution of artificial intelligence technology may lead to the coexistence of traditional tax base shrinkage and the rise of new digital tax sources, the existing tax system is not adaptable to the new economic formats triggered by artificial intelligence, which may aggravate the contradiction of tax distribution among regions. This interaction has jointly shaped the new characteristics of the regional tax gap in the era of artificial intelligence.

3. An analysis of the impact of artificial intelligence on regional tax gap

3.1 The development status of artificial intelligence in China

In recent years, China's national top-level strategic design has strengthened the importance and support for the development of artificial intelligence industry, and built a multi-level policy system, covering key links such as technology research and development, industrial application, ecological construction and security governance. Among them, the construction of artificial intelligence innovation and application pilot area is an important strategic measure for the country to promote the development of artificial intelligence industry, explore the new path and new model of the deep integration of artificial intelligence and the real economy, form replicable and replicable experience, and provide a leading demonstration for the innovative development of artificial intelligence nationwide.

By 2022, China's Ministry of Industry and information technology has supported the construction of 11 ai innovation and application pilot zones in three batches, and basically formed a network of AI Innovation and Development Pilot Zones covering major regions of the country. From the perspective of layout, the construction of pilot areas has obvious stage characteristics and regional characteristics. In 2019, the first batch of pilot zones will be established, focusing on institutional innovation and application scenario exploration; in 2021, the second batch of pilot zones will be established, focusing on industrial ecological construction and regional coordinated development; in 2022, the third batch of pilot zones will be established, emphasizing breakthroughs in the field of characteristics and cross-regional cooperation. This batch and multi-level layout strategy reflects the systematic thinking and step-by-step working idea of the state to promote the development of artificial intelligence industry.

3.2 Current situation of tax gap in China

The current situation of local tax gap in our country presents the complex characteristics of multi-level and multi-dimension in terms of tax revenue scale and actual tax burden level.

At the level of tax revenue scale, tax revenue is accelerating to a small number of central cities. The eastern region has a sound infrastructure, rich human resources and a diversified economic structure, dominated by high-end manufacturing, financial services, information technology and modern service industries, forming science and technology industrial clusters, however, the Midwestern sectional figure skating championships are still dominated by traditional manufacturing and energy

industries, and the cultivation of emerging industries is insufficient, which lacks the potential and driving force for sustained economic growth. In the aspect of commodity tax, the principle of "Place of production" of value-added tax leads to the flow of tax to the place of registration of enterprises rather than the actual place of consumption, which leads to the deviation of tax and tax source. In terms of income tax, the "Headquarters economy" effect of corporate income tax makes the cities where corporate headquarters gather attract a large number of tax inflows, while the tax interests of the industrial undertaking places or branch locations are relatively damaged. At the same time, industrial clusters attract a large number of scientific and technological talents, enrich the tax base of personal income tax, and form the agglomeration of personal income tax.

At the level of actual tax burden, there are significant differences in actual tax burden among different regions, both policy differences caused by national strategies and tax depressions caused by local government competition. The Midwestern Sectional Figure Skating Championships and the Midwestern sectional figure skating championships were held in Beijing. At the same time, some local governments in the eastern region through tax rebates, financial incentives and other ways to attract investment, the formation of policy depression. Therefore, the current regional actual tax burden differences show a complex picture of the coexistence of national regulatory dividends and local bottom-chasing depressions. This difference pattern not only reflects the tension between national macro-control and local autonomous behavior, but also constitutes the core issue that must be faced and regulated in the process of building a unified national market.

4. The effect of artificial intelligence development on regional tax gap

The development of artificial intelligence has a multidimensional impact on the regional tax gap by reshaping the allocation of production factors, industrial organization forms and regional division of labor. Its mechanism is mainly realized through three effects: siphon effect and industrial agglomeration effect to expand the tax gap, and spillover effect has the potential to narrow the gap.

4.1 Siphon effect

The siphon effect refers to the one-way flow of high-end production factors such as talents, capital and technology from backward areas to advanced areas caused by the development of artificial intelligence, which aggravates the imbalance of interregional tax base.

The artificial intelligence industry is highly dependent on high-end talents. Developed regions have formed a talent magnetic field effect with the agglomeration of scientific research institutions, high salary levels and perfect infrastructure. The backward areas are faced with brain drain, which leads to the degradation of local human resource structure. It not only directly reduces personal income tax revenue, but also weakens the incubation ability of innovative enterprises and indirectly compresses the corporate income tax base.

The artificial intelligence industry has the characteristics of high R & D investment and high risk, and relies on venture capital and capital market support. The financial agglomeration effect in developed areas attracts global capital inflow, while the lack of capital support in backward areas results in the loss of corporate income tax. The influx of capital has promoted the rapid growth and high profits of artificial intelligence enterprises in developed areas, so as to obtain a richer corporate income tax base. However, due to the lack of capital in backward areas, local enterprises are difficult to develop and grow, and even the original enterprises may shrink or move out due to financing difficulties, which directly leads to the erosion of corporate income tax base.

The application of artificial intelligence technology such as remote collaboration and cloud services has significantly reduced the dependence of enterprise operation on geographical location, but enterprise headquarters and R & D centers still tend to concentrate in areas with perfect innovation ecology. Through transfer pricing and intellectual property ownership, enterprises retain profits in areas with low tax rates or preferential policies, resulting in cross-regional transfer of tax sources and value creation in developed regions, the tax distribution pattern of cost bearing in backward areas leads to the widening of the tax gap between regions.

4.2 Industrial agglomeration effect

Industrial agglomeration effect refers to that artificial intelligence technology accelerates the restructuring of industrial space by strengthening economies of scale and network effects, thus affecting regional tax capacity and tax quality.

The artificial intelligence industry has strong economies of scale, which promotes artificial intelligence enterprises to cluster in a few core cities, and the industrial cluster brings about tax intensification effect, to further promote the concentration of tax revenue to the artificial intelligence industry cluster area. Artificial intelligence industry agglomeration forms a pyramid structure, and there are significant differences in tax creation ability at all levels. Top-level basic algorithms and core R & D are concentrated in a very small number of cities, generating high corporate income tax, personal income

tax and value-added tax revenues through technology licensing and patent revenues. This level has the highest tax density, but also the strongest geographic concentration. Mid-level application development and solutions are distributed in regional central cities, generating considerable corporate income tax and value-added tax, but some profits flow to the top through intellectual property costs. The underlying data annotation and content processing industry can be dispersed to low-cost areas, mainly creating limited value-added tax and personal income tax, and the tax contribution is much lower than that of the upper level.

Artificial intelligence drives the transformation of industrial structure to high-tech service industry, and the response ability of tax base in different regions to emerging industries is different, forming the differentiation of tax base structure. The developed areas of artificial intelligence are dominated by digital economy and R & D services, with large value-added space and high tax base elasticity. However, backward areas rely on traditional manufacturing, with low marginal profits and small tax base elasticity. The application of artificial intelligence technology may also reduce employment and consumption taxes in labor-intensive industries in backward areas by replacing traditional labor with automation, and further widen the tax base quality gap.

4.3 Spillover effects

The spillover effect refers to the diffusion of technological knowledge and innovation results related to artificial intelligence from advanced areas to backward areas, leading to the improvement of production efficiency and industrial upgrading of the latter, thus narrowing the tax gap.

The first dimension of spillover effect is horizontal spillover. Traditional industries improve production efficiency, reduce costs and increase output by introducing artificial intelligence technology, thereby increasing the value-added tax and corporate income tax base. Platformization reduces the threshold of technology acquisition, open source frameworks and models reduce development costs, and help enterprises in backward areas skip the stage of technology accumulation and directly enter the value creation link. At the same time, productivity improvement drives wage growth and increases personal income tax revenue. If the diffusion rate is fast enough, it can partially offset the negative impact of the siphon effect.

The second dimension is vertical spillover. Artificial intelligence drives the reconstruction of the global value chain. Backward areas can be embedded in the regional division network by undertaking data processing, model training, hardware manufacturing and other links, through industrial chain linkages, it drives the technological upgrading of upstream and downstream enterprises. For example, the government should guide the development of AI + special industries, such as smart tourism and Smart Energy, and foster new tax sources, so as to promote cross-regional sharing of tax revenue and narrow the tax gap.

The third dimension is skill spillovers, the diffusion of skills through mobility and training. The technical personnel trained from other places will promote the technical ability of local enterprises, and then improve the profitability and tax contribution of enterprises. This kind of spillover effect presents obvious stage characteristics. In the early stage, it is mainly based on the use of technology, and brings about tax improvement by improving production efficiency. In the medium term, adaptive innovation will be carried out to form localized solutions and create characteristic tax sources. In the mature stage, it will participate in global innovation, and even achieve technology transcendence, forming a new tax growth pole.

5. Conclusions

This article starts from the realistic background of the development of artificial intelligence and systematically analyzes its impact mechanism on regional tax gaps. The research finds that artificial intelligence is not a neutral technology. Its spatial distribution is significantly unbalanced. Through the suction effect and industrial agglomeration effect, it has intensified the concentration of taxes in developed regions, widening the tax gap between regions. At the same time, the spillover effect provides the possibility for backward regions to narrow the gap, but the key lies in whether they can effectively receive and transform the technological dividends. Therefore, future policy design should encourage technological innovation while strengthening the tax coordination mechanism between regions, promoting the transformation of the tax system structure towards a digital-friendly type, and enhancing the tax base resilience and self-generating capacity of backward regions.

References

- [1] Kromann Lene, Malchow-Møller Nikolaj, Skaksen Jan Rose, Sørensen Anders. (2020).Automation and productivity—a cross-country, cross-industry comparison[J]. *Industrial and Corporate Change*. Volume 29, Issue 2. 2020. PP 265-287.
- [2] Ballestar María Teresa, Camiña Ester, Díaz Chao Ángel, Torrent Sellens Joan.(2020).Productivity and employment

- effects of digital complementarities[J]. *Journal of Innovation & Knowledge*. Volume 6, Issue 3. 2020.
- [3] Giacomo Damioli, Vincent Van Roy, Daniel Vertesy.(2021).The impact of artificial intelligence on labor productivity[J]. *Eurasian Business Review*. Volume 11, Issue 1. 2021. PP 1-25.
- [4] Chor Davin, Manova Kalina, Yu Zhihong.(2021).Growing like China: Firm performance and global production line position[J]. *Journal of International Economics*. Volume, Issue preublish. 2021. PP 103445.
- [5] Whitney B. Afonso.(2019).The Impact of the Amazon Tax on Local Sales Tax Revenue in Urban and Rural Jurisdictions[J]. *Public Budgeting & Finance*. Volume 39, Issue 2. 2019. PP 68-90.
- [6] David R. Agrawal, David E. Wildasin.(2020).Technology and tax systems[J]. *Journal of Public Economics*. Volume 185, Issue. 2020. PP 104082.