

Research on the Evolution Trends of Industrial Structure and Spatial Agglomeration under Exogenous Trade Shocks

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Abstract: The global trade pattern is disturbed by policy adjustments, public health events, and geopolitical situations, and external trade shocks have become normalized, profoundly affecting the upgrading of China's industrial structure and the evolution of regional agglomeration patterns. To clarify the intrinsic relationship between exogenous trade shocks and domestic industrial development, this paper draws on official statistics from the National Bureau of Statistics and the General Administration of Customs. Taking into account the real scenarios of rising trade barriers and cross-border supply chain fluctuations, it analyzes the evolution of the three industrial structures and the differentiation characteristics of the manufacturing industry under external shocks, and explores the restructuring direction of the industrial agglomeration pattern in coastal and inland areas. Research has found that changes in the external economic and trade environment are forcing export-oriented industries to accelerate their transformation. Labor-intensive industries feature concurrent domestic gradient relocation and overseas transfer. High-tech industries continue to converge towards core urban clusters, and industrial spatial layout is gradually departing from the coastal unipolar layout and evolving towards multi-regional coordination. Based on the practical shortcomings of industrial development, proposing targeted optimization paths can provide theoretical basis and practical reference for regional industrial planning and safeguarding the security of industrial and supply chains.

Keywords: Exogenous Trade Shocks, Industrial Structure, Spatial Agglomeration, Industrial Upgrading, Regional Industrial Layout.

1. Introduction

Economic globalization is in a phase of profound restructuring, and international trade is not only determined by market supply and demand. Various sudden external factors have been disrupting the global trade order, and exogenous trade shocks have become normalized. Exogenous trade shocks differ from endogenous cyclical adjustments in the domestic economy, and their impact sources all come from outside the economy, covering types such as trade policy adjustments, economic and trade frictions among major economies, public health events, geopolitical conflicts, etc. They can reshape tariff regimes, cross-border logistics costs, overseas market demand, and global supply chain division of labor patterns.

In recent years, global trade protectionism has continued to rise, with many countries setting import restrictions and imposing tariff barriers. The public health incident has impacted the international maritime and air logistics system, directly extending the supply chain turnover cycle. The frequent fluctuations in the geopolitical situation have also caused significant fluctuations in energy and commodity trade prices. The above-mentioned multiple external factors overlap and exert a deep impact on domestic and export-oriented industries.

Existing studies take a single perspective, discussing the relationship between trade shocks and industrial upgrading separately, or focusing on the regional characteristics of industrial spatial agglomeration. Existing research rarely incorporates exogenous trade shocks, industrial restructuring, and spatial agglomeration patterns into a unified analytical framework, and lacks empirical trend analysis with official public data [1]. China's manufacturing industry has long been

deeply integrated into the global economic and trade system, and is highly integrated with global trade. Its industrial layout is also linked to the international market. Even small external changes quickly pass to industrial structure and regional industrial layout.

This article uses the yearbook of the National Bureau of Statistics, foreign trade data from the General Administration of Customs, and official policy documents on industrial transfer, all of which are official and authoritative. The basic characteristics of industrial structure evolution and spatial pattern changes under the external trade environment are sorted out, and the internal relationship between the two is clarified. The shortcomings of real development are identified and optimization ideas are proposed, fitting the research on industrial chain restructuring and regional coordinated development.

2. The Connotation, Types, And Practical Background of Exogenous Trade Shocks

The global economic landscape is constantly restructuring, and exogenous trade shocks have become a typical external influencing factor. It is different from domestic endogenous factors such as consumption upgrading, technological innovation, and macroeconomic regulation. External shocks will directly change cross-border trade rules, market transaction costs, and reshape the spatial layout of international markets. The exogenous trade shocks faced in the operation of China's market economy can be classified into three categories. Some economies have broken the traditional industrial division of labor in free trade by imposing unilateral tariffs, setting import quotas, and

regulating the export of high-end technologies. A global public health event can lead to the suspension of international air routes, slower port clearance, increased cross-border logistics costs, and disrupt the normal rhythm of the global supply chain [2]. Regional geopolitical conflicts can cut off cross-border flows of energy and industrial raw materials, push up commodity prices, and increase the pressure on manufacturing operations from both production and export ends. The pace of global trade liberalization has slowed down, trade protectionism and unilateralism continue to spread, the binding force of multilateral trade rules has been weakened, and regional economic and trade agreements have gradually become the mainstream of international cooperation. The overall changes in the international economic and trade environment have raised the international market access standards for traditional export industries in China, and the export-oriented development model constructed by low-cost and large-scale production has become unsustainable. The risk-resistance weaknesses of the cross-border logistics system have also been exposed, with fluctuations in sea freight rates, container supply, and customs clearance efficiency, compressing the profit margins of the foreign trade industry. The impact of exogenous trade shocks covers the entire foreign trade chain, transmitted sequentially through the upstream and downstream of the industrial chain, running through the export and production manufacturing links, and ultimately affecting the allocation of production factors and the overall layout of regional industries. Labor-, capital-, and technology-intensive industries differ significantly in exposure to shocks, and coastal and inland cities differ in industrial carrying capacity, which in turn drives deep adjustments in industrial structure and spatial layout [3]. Nowadays, various external shocks have become normalized and accumulate gradually, which is also the external environment that China's industries must adapt to for long-term development.

3. The Current Situation of Domestic Industrial Structure Adjustment Under Exogenous Trade Shocks

The external trade environment has been in constant flux, and the three domestic industries and manufacturing sub sectors are all undergoing structural adjustments accordingly. The industry as a whole is showing a trend of contraction of traditional sectors, high-end industry expansion, and deep integration of manufacturing and productive service industries, all of which can be seen in the annual industry bulletin of the National Bureau of Statistics.

From the perspective of the macro industrial pattern, fluctuations in overseas demand directly affect the development of the secondary industry's export-oriented sector, and domestic economic growth is gradually shifting towards a domestic demand-led model. In 2024, the proportion of the tertiary industry economy will rise to 56.7%, and the productive service industry will expand synchronously with the upgrading of the manufacturing industry. The development pattern of high-end and service-oriented industrial structure will become increasingly stable [4].

At the internal level of the manufacturing industry, the increase in trade barriers coupled with the contraction of overseas demand continues to compress the overseas market space of labor-intensive industries such as textiles, light

industry, and low-end assembly. The expansion pace of such industries has significantly slowed down, and the speed of clearing outdated production capacity continues to accelerate. Many companies have been relying on low-priced orders from overseas for extensive production. With the increase of tariffs and restrictions on exports, this path is unsustainable, and most can only reduce production and transform or relocate their layout.

On the other hand, technology-intensive industries such as high-end equipment manufacturing, new energy, electronic information, and biomedicine can rely on domestic policy support and foreign trade environment to increase research and development investment even when facing external technological control pressures. The speed of domestic substitution in the industry is getting faster and faster. The share of value-added in high-tech manufacturing has increased from 13.9% in 2018 to 16.3% in 2024, and the proportion of output value in manufacturing industry has been increasing year by year.

The trend of industrial integration is also constantly deepening in the changing trade environment. Many foreign trade enterprises have expanded beyond single-process production and extended to high value-added fields such as research and development design, brand operation, and cross-border logistics, effectively driving the growth of productive service industries such as research and development, commerce, and logistics. Service-oriented manufacturing has gradually become the mainstream of industrial upgrading.

Overall, external trade fluctuations have not disrupted the development order of domestic industries, but have instead formed a positive driving force, clearing out low-value-added, export-reliant outdated capacity faster, guiding industries to transform toward high-tech, high value-added and the dual-circulation paradigm, and stabilizing the overall development resilience of the industry [5].

4. Changes in Exogenous Trade Drive the Evolution of Industrial Spatial Agglomeration Patterns

From the evolution of domestic industrial spatial layout, coastal areas have long been the core areas of industrial agglomeration. The Yangtze River Delta, Pearl River Delta, and Beijing-Tianjin-Hebei region, with their port locations, open policies, and complete industrial chain supporting facilities, have gathered most of the domestic export-oriented manufacturing industries. The industrial agglomeration foundation in inland areas is relatively weak, and most of them are still scattered in traditional industries.

The global trade pattern continues to adjust, gradually breaking this fixed industrial spatial pattern. The domestic industrial agglomeration is no longer concentrated in a single coastal area, but is gradually moving towards the direction of coordinated development and division of labor between coastal and inland city clusters. This spatial evolution is also supported by tangible reality [6].

The cost of factors such as land and labor, combined with the impact of trade barriers, has led coastal core cities to relocate low-end labor-intensive industries. Regional development no longer blindly expands traditional processing capacity, but focuses more on high-end manufacturing, scientific and technological innovation research and development, and headquarters economy. Industrial development has also shifted from scale agglomeration to

quality agglomeration. Coastal urban clusters have formed a refined internal division of labor, with the central city focusing on research and development and brand building, while the surrounding cities are responsible for supporting production, gradually forming a clustered development model.

The central and western regions have become the major recipients of industrial restructuring. With sufficient land and labor resources, as well as policy support such as the rise of the central region and the development of the western region, Henan, Hubei, Anhui, Sichuan and other places continue to absorb the light industry, electronic supporting and equipment manufacturing industries transferred from the coastal areas. The advantages of local industrial park agglomeration are gradually becoming prominent, and the industrial scale of urban agglomerations such as the middle reaches of the Yangtze River, Chengdu-Chongqing, and Central Plains is steadily growing. This kind of industrial relocation is not just about simply relocating production capacity, but also driving upstream and downstream supporting enterprises to land together, improving the local industrial chain, and consolidating the foundation of inland industrial agglomeration [7].

The situation of over-concentration of industries in the eastern coastal areas in the past has eased, and the gap in regional layout imbalance is gradually narrowing. Different industries have their own layout characteristics. Technology-intensive industries are rooted in core urban clusters with abundant innovation resources, labor-intensive industries are diverted to low-cost inland or overseas markets, and productive service industries are also developed synchronously with the layout of manufacturing industries. The changes in the trade environment have effectively optimized the spatial layout of domestic industries, rationalized the regional division of labor, and enhanced the overall resilience of industries to withstand external trade risks.

5. The Intrinsic Correlation Logic Between Industrial Structure Adjustment and Spatial Agglomeration

From the perspective of actual economic and trade operations, any fluctuation in exogenous trade will bring about changes in industrial structure optimization and spatial agglomeration. The two are not independent processes, they will influence and support each other. The various impacts brought about by external trade are also continuously driving the synchronous evolution of the two, gradually forming a closed loop: external shock → structural adjustment → spatial restructuring → reverse feedback.

The overall change in industrial structure will directly affect the adjustment of regional industrial layout. The operating pressure brought by the foreign trade market has forced domestic industries to transform toward high-end and intensive development. The development threshold for high-tech and innovative industries is relatively high, and there is a strong demand for professional talents, scientific research conditions, and complete industrial chain supporting facilities. Most of these high-quality resources are gathered within the core urban clusters in China, and high-end industries are also concentrated in advantageous areas. Low-end traditional industries that cannot keep up with the pace of upgrading are gradually shifting towards lower cost inland or overseas due

to factor costs and market rules, and the hierarchical distribution of domestic industrial space is also reshaped [8]. The development gap between different industries directly affects the location selection of industry landing and has become an important factor in changing the spatial pattern.

It is not difficult to observe the actual development of industries in various regions, and it can be found that the concentrated layout of industries in local areas can also drive industrial structural upgrading. The gathering and development of a large number of similar and supporting enterprises can improve the local industrial chain system, gather professional talent resources, and promote the flow and dissemination of advanced technologies between industries [9]. Collaboration between upstream and downstream enterprises can not only reduce logistics and collaboration costs, but also create convenient conditions for technology exchange and joint research and development.

Coastal industrial clusters rely on their own basic advantages, continue to deepen technological research and product innovation, and consolidate the achievements of industrial upgrading. Cities that undertake industries in inland areas can leverage enterprise clustering to strengthen industrial supporting systems, break away from the single development model of low-end processing, gradually move towards the middle reaches of the industrial chain, and achieve overall improvement in local industrial levels. The instability of the market environment has made enterprises increasingly dependent on domestic industrial chains and regional supporting resources. Industrial upgrading and spatial layout have also formed a stable synergistic relationship in the changing trade environment, adapting to the overall trend of global industrial chain adjustment.

6. The Current Challenges and Optimization Paths Faced by Industrial Development

The global foreign trade pattern is in a stage of deep adjustment, and the transformation of domestic industrial structure and the reshaping of spatial layout have achieved phased achievements. However, in practice, the development of domestic industries still faces multiple practical difficulties. The pressure brought by external trade has not eased, and the structural problems and layout shortcomings of the industry itself are also obvious. Feasible optimization methods need to be found based on reality.

Many export-oriented traditional industries still heavily rely on overseas markets. Faced with tariff barriers and fluctuations in overseas demand, their own risk buffering space is very limited, and the pace of industrial transformation has always lagged behind changes in the external market [10]. When some inland cities undertake the transfer of coastal industries, there is a common problem of homogeneous layout and severe redundant construction. There is neither a clear regional positioning nor a development pattern of differentiated division of labor. There are still obvious technological shortcomings in the high-end industry sector, coupled with external technological blockades and trade controls, which have greatly slowed the upgrading process of high-tech industries. A mature collaborative development system has not yet been established between coastal and inland areas, and industrial transfer is mostly simple capacity relocation. The cross-regional flow of technology, talent, and innovative resources is not smooth, making it difficult to form

a joint force for regional linkage development [11].

Looking at the long-term evolution trend of foreign trade pattern, industrial development should take the path of differentiation and upgrading. Coastal areas should focus on high-end manufacturing and cutting-edge scientific and technological innovation fields, and reasonably control the disorderly expansion of low-end production capacity. Relying on its own resources and location conditions, the inland area accurately undertakes adapted industries, breaks free from the shackles of homogeneous development, and cultivates industrial clusters with regional characteristics.

Continuously improving the domestic industrial chain supporting system, tackling independent research and development of key core technologies, reducing external technological dependence of high-end industries, and relying on the endogenous strength of the industry to hedge the impact of foreign trade fluctuations. Continuously improving the national industrial spatial layout, breaking down barriers to cooperation between coastal and inland industries, promoting a coastal R&D and inland production division of labor, allowing various production factors to flow freely between regions. Establish a normalized foreign trade risk assessment mechanism, track changes in international trade policies and tariff rules, guide enterprises to adjust production and layout plans in a timely manner, and promote the steady and coordinated promotion of industrial structure upgrading and spatial layout allocation.

7. Conclusion

This article takes the normalization of exogenous trade shocks as the research background, based on official industry and economic and trade statistics data, with industrial structure adjustment and spatial agglomeration pattern evolution as the core dimensions, to sort out the characteristics and impact paths of foreign trade changes, analyze the inherent relationship between industrial structure and regional layout, and summarize the practical problems and optimization ideas of industrial development. The entire study used real macro data and closely focused on the research topic.

The fluctuations in foreign trade caused by trade policy adjustments, public events, and changes in geopolitical patterns have evolved from transient abrupt shocks to long-term normal environments. It deeply affects the development of domestic industries through three channels: trade costs, market demand, and supply chain division of labor. The external environment is forcing industry transformation, accelerating the relocation of labor-intensive production capacity, expanding the scale of technology-intensive industries, promoting the integration of manufacturing and productive service industries, and guiding industries to develop towards high-end and intensive directions.

The previous single cluster industrial pattern along the coast is gradually dissolving, and coastal cities are shifting towards high-end industrial development to improve quality. Inland city clusters are taking over industrial transfer with policy and cost advantages, forming a new layout of multi-center and networked industries, and the level of regional industrial balanced development continues to improve. There is a two-way interaction between industrial structure and spatial layout. Industrial differentiation determines the logic of location selection, while spatial agglomeration relies on

supporting resources, talent reserves, and technology spillovers to support industrial upgrading. Under the catalysis of the foreign trade environment, a collaborative evolution trend is formed.

At present, industrial development still faces problems such as high dependence on foreign trade, homogeneous regional layout, constraints in core technologies, and lagging cross-regional cooperation. In response to the trend of foreign trade, it is necessary to promote industrial differentiation and upgrading, optimize spatial agglomeration layout, tackle independent innovation in core technologies, and improve regional cooperation and foreign trade risk prevention and control system. This study only focuses on traditional trade factors and has not yet included new forms of trade such as digital trade and green trade. Subsequent research can explore new trade types like digital and green trade to provide more comprehensive references for long-term industrial planning.

References

- [1] Helm, I. (2020). National industry trade shocks, local labour markets, and agglomeration spillovers. *The Review of Economic Studies*, 87(3), 1399–1431. <https://doi.org/10.1093/restud/rdz055>
- [2] Bonadio, B., Huo, Z., Levchenko, A. A., & Pandalai-Nayar, N. (2021). Global supply chains in the pandemic. *Journal of International Economics*, 133, 103534. <https://doi.org/10.1016/j.jinteco.2021.103534>
- [3] Caliendo, L., Dvorkin, M., & Parro, F. (2019). Trade and labor market dynamics: General equilibrium analysis of the china trade shock. *Econometrica*, 87(3), 741–835. <https://doi.org/10.3982/ECTA13748>
- [4] Rodrik, D. (2016). Premature deindustrialization. *Journal of Economic Growth*, 21(1), 1–33. <https://doi.org/10.1007/s10887-015-9122-3>
- [5] Handley, K., & Limão, N. (2015). Trade and investment under policy uncertainty: theory and firm evidence. *American Economic Journal: Economic Policy*, 7(4), 189–222. <https://doi.org/10.1257/pol.20140068>
- [6] Kovak, B. K. (2013). Regional effects of trade reform: What is the correct measure of liberalization? *American Economic Review*, 103(5), 1960–1976. <https://doi.org/10.1257/aer.103.5.1960>
- [7] Ellison, G., Glaeser, E. L., & Kerr, W. R. (2010). What causes industry agglomeration? Evidence from coagglomeration patterns. *American Economic Review*, 100(3), 1195–1213. <https://doi.org/10.1257/aer.100.3.1195>
- [8] Duranton, G., & Puga, D. (2005). From sectoral to functional urban specialisation. *Journal of Urban Economics*, 57(2), 343–370. <https://doi.org/10.1016/j.jue.2004.12.002>
- [9] Bloom, N., Schankerman, M., & Van Reenen, J. (2013). Identifying technology spillovers and product market rivalry. *Econometrica*, 81(4), 1347–1393. <https://doi.org/10.3982/ECTA9466>
- [10] Crowley, M., Meng, N., & Song, H. (2018). Tariff scares: Trade policy uncertainty and foreign market entry by Chinese firms. *Journal of International Economics*, 114, 96–115. <https://doi.org/10.1016/j.jinteco.2018.05.005>
- [11] Alder, S., Shao, L., & Zilibotti, F. (2016). Economic reforms and industrial policy in a panel of Chinese cities. *Journal of Economic Growth*, 21(4), 305–349. <https://doi.org/10.1007/s10887-016-9130-z>