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Competition in the Banking Industry, Corporate Strategy, and Reshaping of Global Value Chain Position: An Empirical Study Using Chinese Industrial Enterprises as Samples

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Abstract:
This research investigates how competitive dynamics in China's financial sector influence firms' global value chain (GVC) positioning, utilizing branch distribution data from prefecture-level cities to construct two key competition metrics: the Herfindahl-Hirschman Index (HHI) and the four-firm concentration ratio (CR4). Empirical results demonstrate a non-linear association between financial market competition and corporate GVC status, where early-stage suppressive effects transition into positive impacts as competition intensifies. These empirical outcomes maintain statistical significance after incorporating control variables including regional financial development indicators, fiscal health measures, and temporal markers of financial crises. Building upon the benchmark regression results, the study identifies cities where the impact of banking competition on enterprise GVC positioning exceeds the critical threshold. Mechanism analysis demonstrates that the banking industry supports enterprises' GVC advancement through two key channels: facilitating technological innovation and promoting service-orientated manufacturing transformation, and correcting financial resource misallocation while fostering the development of medium- and high-tech enterprises. Furthermore, moderation effect analysis reveals a complementary relationship between fintech and banking competition, whereas financial scale exhibits a substitution effect with banking competition. This research provides significant insights for optimising China's banking market structure, enhancing the international competitiveness of export enterprises, and fostering synergistic development between the financial sector and the real economy.

Keywords: competition in the banking industry; Global value chain; Service-oriented manufacturing industry; financial technology; Financial scale

INTRODUCTION

In recent years, anti-globalization sentiments have intensified, with trade protectionism rising and global value chains (GVCs) becoming increasingly fragile due to the combined effects of the COVID-19 pandemic, the Russia-Ukraine conflict, and other uncertainties. Western countries have justified "disconnection" and "decoupling" under the pretext of "national security" and imposed trade restrictions under the guise of "risk reduction." These developments have heightened the risk of Chinese enterprises being marginalized in GVCs, necessitating a shift toward competitive advantages rooted in quality and technological innovation [1]. Historically, Chinese enterprises have leveraged their resource endowments and labor advantages to excel in product processing and assembly. However, their exports remain concentrated in low-tech, labor-intensive industries, which has hindered technological progress and exacerbated structural inefficiencies. As GVC participants, export-oriented enterprises face higher sunk costs and earn minimal profits as long-term suppliers[2]. To avoid being trapped in low-value-added segments, these enterprises must enhance their R&D capabilities, innovation levels, and funding to boost domestic value addition and specialization.

The financial system, which is predominantly bank-centric, compels most enterprises to rely heavily on bank loans for external funding. As a result, changes in bank behavior driven by competition within the banking industry significantly influence corporate financing processes. Financing constraints limit firms' ability to secure funds, leading to a mismatch between improvements in production capacity and the expansion of export activities. Structural imbalances in the financial system, coupled with government-controlled funding allocation mechanisms, hinder firms' efforts to move up the "smile curve" in global value chains (GVCs).

China's capital market, still in the process of development, relies heavily on indirect financing from the formal financial sector, overshadowing direct financing methods such as equity and bonds[3]. As the cornerstone of China's financial infrastructure, commercial banks serve as vital catalysts for economic expansion and international trade development. The landscape of China's financial sector has undergone significant transformation since the implementation of branch network liberalization policies in 2006 and 2009, which enabled qualified institutions to establish cross-regional operations. This regulatory shift has substantially reduced market concentration, evidenced by the dramatic expansion of banking outlets from 84,034 in 2002 to 226,700 by 2020, paralleled by the diminishing market share of traditional state-owned banking giants. These structural changes prompt essential

inquiries regarding the relationship between financial market dynamics and industrial upgrading: What is the nature of the connection between banking sector competition and corporate GVC advancement? Through what pathways does this influence manifest? What roles do emerging financial technologies and market scale play in this process? These questions hold particular significance as China enters a new developmental era, where strategic integration of external financing mechanisms becomes imperative for achieving high-quality global market engagement and fostering productive financial-real economy synergies.

While financial development is linked to advancements in GVCs[4], the connection between banking competition and GVC positioning remains underexplored. As global supply chains undergo significant adjustments, understanding how banking competition empowers Chinese manufacturers in international markets is essential. This study, using data from Chinese industrial enterprises, investigates the impact and mechanisms of banking competition on firms' GVC positions. Its contributions are threefold: First, it integrates banking market reforms to explore how competition influences GVC positioning, enriching research in the fields of finance and global division of labor. Second, it addresses endogeneity by using per capita GDP-weighted banking competition levels in neighboring cities as an instrumental variable, offering methodological innovation. Third, it examines the role of technological innovation and manufacturing servitization in linking banking competition to GVC positioning, thereby deepening our understanding of the underlying mechanisms.

THEORETICAL ANALYSIS AND RESEARCH HYPOTHESES

Overall, competition in the banking industry primarily enhances enterprises' global value chain (GVC) positions by improving credit accessibility, reducing information asymmetry, and driving technological innovation. Intensified competition encourages banks to relax credit qualifications, enhance operational efficiency, and facilitate access to R&D funding for diverse enterprises, particularly small and micro businesses. In highly monopolized banking environments, such enterprises often struggle to secure formal financing, leading to the proliferation of illegal financial institutions. However, reduced banking monopolies alleviate financing constraints for small and micro enterprises, curb illegal financial activities, and lower regulatory and transaction costs[5]. Banking competition also reduces corporate interest expenses, increases long-term loan availability, and promotes physical investment, helping firms transition from virtual to real economic activities[6]..From an information asymmetry perspective, banking competition can have adverse effects. In competitive credit markets, banks assess enterprises before extending credit. Due to the high uncertainty and limited equity financing options for emerging and small-to-medium enterprises (SMEs), banks often charge higher interest rates, diminishing the value of loan relationships[7]. Nevertheless, banking competition drives technological innovation and transformation. Zhang Liangyu and Liu Jian[8]argue that financial development has dual effects on GVC positioning. Improved financial structures provide sufficient credit, enabling production scale expansion, increased R&D investment, economies of scale, and technological upgrades in export products, thereby enhancing GVC positions.

External financing is crucial for alleviating corporate financing pressures and promoting sustainable development[9]. While banks are vital for innovative enterprises, disparities in transparency, collateral, and loan costs between SMEs and large enterprises create credit biases in China's banking sector[10]. In highly concentrated banking markets, SMEs face greater credit challenges than large state-owned enterprises, leading to credit mismatches and hindering innovation. Early-stage banking competition often involves lower loan rates to attract customers, but increased bank numbers disperse enterprise information, allowing low-quality firms to secure credit. Banks, wary of high innovation risks, tend to favor conservative firms, exacerbating low innovation challenges[11]. Financial constraints further hinder high-innovation enterprises from reinvesting in R&D, impeding their GVC advancement[12].As financial markets mature, banking competition becomes more rational. Banks adopt digital transformation, improved user experiences, and enhanced risk management to gain competitive edges, boosting information processing capabilities. To maintain profitability, banks may increase riskier asset portfolios and reduce capital levels[13]. Under competition, banks invest in identifying high-return R&D enterprises to secure high-quality clients. Firms gain negotiation power by accessing credit from diverse banks, reducing the likelihood of higher interest rates[14]. The rise of local small banks facilitates the collection of SMEs' "soft information" and fosters stable bank-enterprise relationships[15]. Relaxed financial regulations increase credit availability for SMEs reliant on external financing, enabling investments in product, process, and technological innovation, thereby enhancing their GVC positions. Based on this analysis, the first research hypothesis is proposed:

Hypothesis 1: The competition in the banking industry has a "U-shaped" relationship that first inhibits and then promotes the global value chain position of enterprises.

This article identifies two key mechanisms through which banking competition promotes the upgrading of enterprises' global value chain (GVC) positions: technological innovation and manufacturing servitization. Technological capability, as a critical

factor shaping industrial production structures, drives productivity and market competitiveness through innovation, thereby influencing firms' participation and positioning in GVCs[16]. However, technological innovation projects face inherent challenges, including long investment cycles and uncertain outcomes, making continuous and stable external financial support essential. Increased R&D investment enhances product technology content and innovation capabilities, significantly boosting value chain upgrading[17]. Conversely, deficiencies in the financial system can constrain R&D investment in financially strained firms [18]. A robust financial market environment stimulates innovation, enabling firms to climb higher in the value chain. As China's banking sector diversifies, the growing presence of commercial banks outside the state-owned sector offers greater flexibility in organizational structure, information collection, and market responsiveness, making them more willing to provide credit to local SMEs[19]. This environment facilitates access to financial resources for innovative firms, fostering a "risk-taking spirit," accelerating R&D investment, and promoting GVC advancement.

The increasing importance of intangible factors such as knowledge, technology, and management in value creation has made servitization a key strategy for modern manufacturing firms to enhance competitiveness. Investments in service-oriented activities, such as R&D, design, and after-sales services, drive product value appreciation and align with global trends toward high-value-added manufacturing[20]. Servitization improves product quality and technological complexity, facilitating deeper integration into GVCs[21]. Reduced market entry barriers and intensified banking competition invigorate financial markets, improve credit allocation, and encourage banks to innovate financial products and streamline credit processes. These developments provide high-quality financial services to the manufacturing sector, creating favorable conditions for servitization and enabling firms to occupy high-end value chain segments. Based on this analysis, the second research hypothesis is proposed.

Hypothesis 2: Technological innovation and manufacturing servitization are important channels through which banking competition affects the global value chain position of enterprises.

Banking competition not only enhances firms' resource allocation efficiency and reduces capital misallocation but also introduces negative effects such as increased non-performing loans and moral hazards. Financial technology (Fintech) mitigates information asymmetry between banks and firms, fostering an optimal market structure in the banking sector and improving credit supply for small and medium-sized enterprises (SMEs). Fintech drives innovation in business models and financial products through technologies like the Internet, cloud computing, and blockchain, accelerating resource and information sharing, lowering borrowing costs, and promoting efficient financial resource allocation. Additionally, Fintech and big data technologies enable banks to obtain comprehensive firm characteristics[22], utilize artificial intelligence for data management and real-time monitoring[23], and enhance risk management capabilities, thereby improving financial system efficiency and security.Fintech leverages the competitive advantages of different banks, fostering moderate innovation and promoting an optimal banking structure. It also spurs competition from emerging Fintech firms, intensifying traditional banking competition[24]. This pressure drives banks to use multidimensional data to accurately assess customers, lowering credit thresholds[25]. To maintain competitiveness, banks increasingly fund high-tech innovative enterprises, avoiding funding gaps as firms move up the global value chain. Traditional finance, focused on collateral, often constrains SMEs with innovative potential but limited assets. Fintech expands banks' access to "soft information," reducing moral hazards and increasing credit willingness toward SMEs. By transforming soft information into hard data, Fintech lowers risk assessment costs and supports long-tail credit for SMEs [26]. Its positive impact on financing constraints and credit allocation efficiency enhances total factor productivity, particularly in underdeveloped regions[27]. Commercial banks, due to their organizational and managerial strengths, better absorb Fintech's "technology spillover effects," fostering sustainable inclusive finance[28].

Financial scale expansion is a prerequisite for China's financial development, influencing capital allocation efficiency across industries. High-tech industries benefit more from financial scale and credit development than traditional labor- and capital-intensive sectors[29]. A larger financial scale enhances competitiveness, offering firms diverse funding options[30]. Beyond traditional bank credit, securities, insurance, and venture capital provide alternative financing channels, reducing reliance on banks[31]. A competitive financial system allocates resources to the most innovative firms[32],supporting their global value chain positioning. In regions with underdeveloped financial scales, banks remain the primary funding source. Intensified competition drives banks to innovate services, such as lower interest rates, long-term credit, and relaxed collateral requirements, compensating for limited financial resources and reducing financing costs. These measures enhance manufacturing firms' domestic value-added through R&D innovation and service factor investment, making banking competition's positive impact on global value chain positioning more pronounced in cities with smaller financial scales. Based on this analysis, Hypothesis 3 is proposed.

Hypothesis 3a: There is complementarity between banking competition and financial technology, and financial technology helps enhance the role of banking competition in promoting the global value chain position of enterprises.

Hypothesis 3b: There is substitutability between banking competition and financial scale, and the promoting effect of banking competition on the global value chain position of enterprises is more pronounced in cities with smaller financial scales.

RESEARCH DESIGN

Sample Selection and Data Sources

The export competitiveness of enterprises is quantified using data from Chinese customs, Chinese industrial enterprises, and the World Input-Output Database (WIOD). To assess banking industry competition across prefecture-level cities, data from the CSMAR database are utilized. Following the methodology of Chong T et al.[33], this study employs the Herfindahl Index (HHI) and the concentration ratio of the top four banks (CR4), measured by the number of branch offices, to evaluate banking competition in Chinese prefecture-level cities from 2000 to 2021. For analytical convenience, the inverse values of HHI and CR4 are used in the empirical analysis. Regarding the calculation of domestic value-added (DVAR) in enterprise exports, this study adopts the approach of Kee and Tang.[34] To determine the domestic value-added rate of exports. Recognizing the differences in intermediate inputs between processing trade and general trade imports, conventional methods may underestimate the proportion of foreign production factors in processing trade exports. To address this issue, the study adopts the methodology proposed by Koopman et al.[35], which assumes that foreign factors account for 5% of domestic materials. This adjustment significantly improves the accuracy of calculating the domestic value-added rate for enterprise exports.

Model Construction

This article aims to study the impact of banking competition on the global value chain of enterprises. Koopman[35] pointed out that exporting domestic value-added can provide us with a clearer understanding of the position of enterprises in the division of labor in the global value chain. Therefore, this article constructs an econometric model as follows:

$$DVAR_{it} = \alpha_0 + \alpha_1 BCHHI_{ct} + \alpha_2 lnpro_{it} + \alpha_3 lnscale_{it} + \alpha_4 lnexport_{it} + \alpha_5 subsidy_{it} + \alpha_6 age_{it} + \theta_i + \delta_t + \vartheta_{nt} + \varepsilon_{ict} \quad (1)$$

In the model specification, subscripts i, c, n, and t denote individual firms, prefecture-level municipalities, industrial sectors, and time periods, respectively. The dependent variable, $DVAR_{it}$, captures the domestic value-added ratio in export activities, serving as a proxy for firms' export competitiveness. The primary independent variable, BCHHI, quantifies banking sector competition intensity at the city level, measured through two alternative indicators: the inverse Herfindahl index and the reciprocal of the four-firm concentration ratio based on branch distribution patterns. The model incorporates multiple fixed effects: θ_i accounts for firm-specific heterogeneity, δ_t controls for temporal variations, and ϑ_{nt} addresses industry-year interactive effects, with ε_{ict} representing the stochastic error term. Control variables include: lnpro (logarithm of labor productivity), lnscale (logarithmic transformation of firm size), lnexport (log of export volume), subsidy (government financial support), and age (firm maturity).

Indicator Measurement

Domestic value added (dvar) of enterprise exports:

This article uses Kee and Tang's [34] method to calculate the domestic value-added rate of enterprise exports. The calculation formula is as follows:

General trading enterprises:

$$DVAR_{it}^{O} = \frac{DVA_{it}^{O}}{EXP_{it}} = 1 - \frac{IMP_{it}^{O} + \delta_{it}^{F}}{Y_{it}} \quad (2)$$

Processing and trading enterprises:

$$DVAR_{it}^{P} = \frac{DVA_{it}^{P}}{EXP_{it}} = 1 - \frac{IMP_{it}^{P} - \delta_{it}^{K} + \delta_{it}^{F}}{Y_{it}} \quad (3)$$

Mixed trade enterprises:

$$DVAR_{it}^{M} = \sigma_0 \left(1 - \frac{IMP_{it}^{O} + \delta_{it}^{F}}{Y_{it}}\right) + \sigma_1 \left(1 - \frac{IMP_{it}^{P} - \delta_{it}^{K} + \delta_{it}^{F}}{Y_{it}}\right) \quad (4)$$

COMPETITION LEVEL OF BANKING INDUSTRY IN VARIOUS PREFECTURE LEVEL CITIES

Drawing upon the methodological framework established by Chong et al. [33], this study employs two complementary metrics to assess banking sector competition across Chinese prefecture-level cities during the 2000-2021 period. The analysis utilizes the Herfindahl-Hirschman Index (HHI) alongside the four-firm concentration ratio (CR4), calculated based on branch network distribution patterns. The computational methodology is expressed through the following formulae:

Herfindahl Index (HHI) for the banking industry:

$$\mathrm{HHI}_{ct} = \sum_{v=1}^{N_c} \left(\frac{\mathrm{Branch}_{vc}}{\sum_{v=1}^{N_c} \mathrm{Branch}_{vc}} \right)^2 \tag{5}$$

Concentration level of the top four bank branches:

$$\mathrm{CR4}_{ct} = \frac{\sum_{n=1}^{4} (\mathrm{Branch}'_{nc})}{\sum_{v=1}^{N_c} \mathrm{Branch}_{vc}} \tag{6}$$

In the computational framework, Branch_{vc} denotes the branch count of bank v in city c, while N_c represents the total number of banking institutions within the same municipality. The metrics HHI_{ct} and $\mathrm{CR4}_{ct}$ quantify banking sector concentration levels for city c in year t, measuring the Herfindahl index and four-firm concentration ratio respectively. These indices range between 0 and 1, with values approaching 0 indicating lower market concentration and greater competition, while higher values suggest increased monopolistic tendencies. To facilitate empirical analysis, the study employs transformed measures: the reciprocal of both the Herfindahl index and the four-firm concentration ratio, effectively converting them into competition indicators. The computational expressions are as follows:

$$\mathrm{BCHHI}_{ct} = 1/\mathrm{HHI}_{ct} \tag{7}$$

$$\mathrm{BCCR4}_{ct} = 1/\mathrm{CR4}_{ct} \tag{8}$$

MEDIATING VARIABLES

Manufacturing servitization (MS): The degree of urban manufacturing servitization includes both direct and indirect consumption. We first measure the manufacturing servitization of each province, as shown in formula (9).

$$\mathrm{MS}_{sm}^{p} = a_{sm}^{p} + \sum_{k=1}^{n} a_{sk}^{p} a_{km}^{p} + \sum_{k=1}^{n} \sum_{i=1}^{n} a_{si}^{p} a_{ik}^{p} a_{km}^{p} + \cdots, (s, m = 1,2, \cdots, n) \tag{9}$$

The model specification incorporates multiple layers of economic interactions: MS_{sm}^{p} quantifies service-oriented investment intensity in manufacturing sector m within province p, where a_{sm}^{p} captures direct service consumption by manufacturing from service sector s. The first-order indirect consumption is expressed through $\sum_{k=1}^{n} a_{sk}^{p} a_{km}^{p}$, while second-order interactions are represented by $\sum_{k=1}^{n} \sum_{i=1}^{n} a_{si}^{p} a_{ik}^{p} a_{km}^{p}$. This pattern extends to nth-order indirect consumption relationships, forming a comprehensive input-output framework. To derive city-level manufacturing service metrics, the provincial indicator MS_{sm}^{p} is weighted by two key factors: the manufacturing output value (output_{m}^{c}) and the regional GDP ratio (GDP^{c}) for each city. The computational process is formalized as follows:

$$\mathrm{MS}_{sm}^{c} = \frac{(\mathrm{servitization}_{sm}^{p} \times \mathrm{output}_{m}^{c})}{\mathrm{GDP}^{c}} \tag{10}$$

This research employs the LP methodology, as proposed by Wang Jie and Liu Bin [36], to assess enterprise technological innovation through total factor productivity (TFP) measurement. The computation procedure consists of two distinct phases. Initially, a high-order polynomial approximation between capital and intermediate inputs is established, with labor coefficients determined through ordinary least squares (OLS) regression. Subsequently, capital and intermediate input coefficients are derived from the prior estimation outcomes, ultimately yielding a robust TFP estimation for the enterprise.

EMPIRICAL RESULTS AND ANALYSIS

Benchmark Result Analysis

The baseline regression analysis, as illustrated in Table 1, examines the linkage between financial market competition and corporate GVC positioning. Initial findings in specification (1) indicate a statistically significant negative association between the inverse Herfindahl index (BCHHI) and firms' GVC status, implying that intensified banking competition might initially constrain enterprises' global value chain advancement. To capture potential non-linear effects, the model incorporates a quadratic

term of the inverse Herfindahl index (BCHHI2) in specification (2). The results reveal a significant negative linear coefficient paired with a positive quadratic term, suggesting a U-shaped relationship where corporate GVC positioning initially declines before subsequently improving with increasing banking competition intensity. Specifications (3) through (6) progressively introduce additional controls, including firm fixed effects and industry-year interaction terms, to account for unobservable heterogeneity. These robustness checks confirm the stability of the primary findings. Thus, hypothesis 1 has been preliminarily validated. The above results may be due to the fact that in the early stages of competition in the banking industry, banks attract customers through lower interest rate loans to expand market share. As a result, some low-quality enterprises receive more credit funds, and the asset risk of banks also increases. At the same time, considering the uncertainty of profits for innovative enterprises and the information asymmetry of innovation activities, banks will prioritize providing credit to low-risk enterprises, reducing their enthusiasm for innovation investment, leading to long-term low innovation levels and hindering their ability to enhance their global value chain position. With the further intensification of competition and the gradual maturity of the market, banks have continuously enhanced their ability to discern information from enterprises. Banks may adopt differentiated strategies to increase credit availability in high-risk industries in order to obtain high returns, thereby promoting more enterprises to increase innovation investment and resource allocation efficiency, and driving the global value chain position of enterprises to improve.

Table 1. Benchmark regression results

	(1)	(2)	(3)	(4)	(5)	(6)
BCHHI	-0.003**	-0.007***	-0.001***	-0.011***	-0.001***	-0.009***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
BCHHI2		1.1E-05***		3.6E-05***		3.8E-05***
		(0.000)		(0.000)		(0.000)
lnpro	0.031***	0.031***	0.009***	0.009***	0.008***	0.008***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
lnscale	-0.036***	-0.036***	-0.022***	-0.022***	-0.019***	-0.019***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
lnexport	-0.107***	-0.107***	-0.009 ***	-0.009 ***	-0.008 ***	-0.008 ***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
subsidy	0.047***	0.048***	0.002***	0.002***	0.002***	0.002***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
age	-0.004***	-0.004***	-0.001***	-0.001***	-0.003***	-0.003***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)
Constant term	1.137***	1.141***	1.059***	1.074***	1.030***	1.046***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
particular year	Yes	Yes	Yes	Yes	Yes	Yes
enterprise	No	No	Yes	Yes	Yes	Yes
Year x Industry	No	No	No	No	Yes	Yes
R2	0.269	0.269	0.702	0.702	0.715	0.715
Observation value	526680	526680	526680	526680	526680	526680

Note: *, * *, * * * respectively indicate significance at the 10%, 5%, and 1% levels; The values in parentheses are robust standard errors, as shown in the table below.

Among the control variables, the coefficient for enterprise labor productivity (lnpro) is significantly positive, suggesting that enhanced labor productivity effectively boosts a firm's position in the global value chain. This could be attributed to high-productivity firms leveraging their technological and human capital advantages to improve product quality and innovation, thereby ascending to higher segments of the global value chain. Additionally, these firms often exhibit superior cost control capabilities, which enhance their overall economic performance. Conversely, the significantly negative coefficient for enterprise scale (lnscale) implies that larger enterprises face greater challenges in advancing their global value chain position. This may be due to complex internal hierarchies that impede transformation, making scale a constraining factor. The coefficient for export scale (lnexport) is also significantly negative, indicating that a higher export-to-output ratio correlates with a lower global value chain position. This phenomenon may arise because firms heavily reliant on exports tend to concentrate on labor-intensive processes like assembly and processing to maintain international market share, thereby reducing their incentive to increase the added value of their export products. Moreover, such firms often lack innovation and advanced technological advantages, relying instead on labor and resource inputs. Government subsidies show a positive and significant coefficient, suggesting that firms receiving such subsidies occupy higher positions in the global value chain. This is likely because subsidies incentivize innovation by alleviating the cost pressures associated with research and development (R&D), reducing innovation risks, and enhancing the

benefits of innovation, thereby encouraging firms to engage in R&D activities. Finally, the negative coefficient for enterprise age indicates that older firms face greater obstacles in improving their global value chain position. This may be due to entrenched traditional thinking and organizational structures within established firms, making it difficult for them to adapt swiftly to market changes and emerging technologies. Such rigidity can stifle internal innovation, hindering their ability to climb the global value chain.

After the hypothesis of the U-shaped relationship between banking competition and global value chains is once again validated, it is worth further examining whether there is a turning point in China where cities surpass banking competition. Therefore, based on the benchmark regression results, this article calculates the turning point of the level of competition in the banking industry from inhibiting to promoting the global value chain of enterprises, and identifies prefecture level cities that exceed this turning point. As shown in Table 2, in 2000, only three cities in China exceeded the turning point, namely Huanggang, Shaoguan, and Xiangtan. However, with the passage of time, the number of cities that exceeded the turning point showed an increasing trend year by year. The number of cities that exceeded the turning point in 2013 has significantly increased, but there are still many cities where banking competition has not played a promoting role in the global value chain of enterprises.

Table 2. Cities beyond the turning point

2000		2005		2009		2013	
Huanggang City	43.8378	Xiangtan City	45.4214	Xianning	59.6026	Xianning	60.0474
Shaoguan City	40.2916	Huanggang City	45.3376	Huanggang City	49.3147	Haibei Tibetan Autonomous Prefecture	57.9726
Xiangtan City	39.0037	Shaoguan City	40.0920	Xiangtan City	44.1357	Xiangtan City	54.3970
		Wuxi City	38.4048	Yibin City	43.5892	Yibin City	53.4732
				Qujing	41.6650	Lincang City	50.6489
				Huangshi City	41.0260	Huanggang City	49.7944
				Ezhou City	40.1864	Shiyan City	48.4477
				Huainan City	39.8875	Huangshi City	48.0277
				Shantou City	38.5088	Xiangyang	45.3535
				Xiangyang	38.4048	Qujing	44.8853
				Wuxi City	37.8310	Wuxi City	43.9976
						Guyuan City	43.1491
						……	

Explanation: The data results were calculated and organized by the author

Estimation and Analysis of Instrumental Variables

The benchmark regression reveals a significant U-shaped relationship between banking competition and firms' global value chain positioning, characterised by initial inhibition followed by subsequent promotion. However, this relationship may reflect bidirectional causality, as enhanced global value chain positioning can drive firms to expand their investments in research and innovation, thereby increasing their demand for substantial capital financing. Enterprises will seek financial assistance from banks, thereby intensifying competition in the banking sector. Therefore, this article uses two-stage least squares estimation for regression estimation again. Regarding the selection of instrumental variables, firstly, considering that banks, as the main body of indirect financing, have regional similarities in financial management systems, various commercial banks often prioritize cities with similar economic development levels within provincial administrative regions when selecting branch locations. Moreover, the similarity of financial markets is conducive to various banks entering the market quickly. Therefore, the competition in the banking industry among cities within provincial administrative regions has a certain correlation. Secondly, banks need to consider multiple factors when selecting loan targets. Firstly, they examine whether the enterprise has certain collateral assets and guarantees. Secondly, in order to minimize supervision and management costs and risks, banks rarely issue loans from other regions. Banks have clear regional boundaries in providing financial support to enterprises, which means that the global value chain position of enterprises is less affected by competition from other cities' banking industries. This article refers to the approach of Chong et al. [33] and improves it by using the per capita GDP of the city as a weight, and constructing an instrumental variable by weighted averaging the banking competition level of other cities in the province where the enterprise is located. The weighted average of the banking industry competition index does not directly affect the global value chain position of enterprises, but is directly related to the explanatory variables.

Finally, this article constructs two instrumental variables based on the adjusted Herfindahl index BCHHI and the adjusted concentration BCCR4, respectively, according to the following two equations.

$$SI_{cmt} = \frac{2\times pgdp_{ct}\times pgdp_{mt}}{(pgdp_{ct}+pgdp_{mt})^2} / \sum_{m\in I_{other}} \frac{2\times pgdp_{ct}\times pgdp_{mt}}{(pgdp_{ct}+pgdp_{mt})^2} \quad (11)$$

$$BC_{ct}^{iv} = \sum_{m\in I_{other}} BC_{mt} \times SI_{cmt} \quad (12)$$

The study employs a model where c denotes the firm's city location, m represents intra-provincial neighboring cities, t indicates the year, and pgdp stands for per capita GDP. Table 3 presents the regression analysis outcomes. Initial findings in columns (1) and (2) demonstrate that the inverse Herfindahl index of the banking sector and its quadratic term maintain statistical significance after endogeneity correction, consistent with benchmark regression patterns. To enhance robustness, columns (5) and (6) utilize the inverse concentration level of the top four bank branches as an alternative measure, which consistently validates the U-shaped correlation between banking competition and firms' global value chain positioning. Instrumental variable validation was rigorously conducted, with redundancy tests eliminating weak instrument concerns and the Cragg-Donald Wald F statistic substantially surpassing the 10% critical value threshold, thereby confirming the instruments' validity and their compliance with identification requirements.

Table 3. Endogeneity test: instrumental variable estimation

	(1)	(2)	(3)	(4)	(5)	(6)
BCHHI	-0.013***	-0.015***	-0.013***	-0.015***		
	(0.001)	(0.001)	(0.001)	(0.001)		
BCHHI2		1.6E-04***		1.6E-04***		
		(0.000)		(0.000)		
BCCR4					-0.108***	-0.210***
					(0.004)	(0.014)
BCCR42						0.028***
						(0.004)
lnpro	0.008***	0.009***	0.007***	0.008***	0.008***	0.008***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
lnscale	-0.022***	-0.022***	-0.019***	-0.018***	-0.018***	-0.018***
	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)
lnexport	-0.008***	-0.009***	-0.007***	-0.008***	-0.008***	-0.008***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
subsidy	0.002***	0.003***	0.001***	0.002***	0.002***	0.002***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
age	-0.001***	-0.001***	-0.003***	-0.003***	-0.003***	-0.003***
	(0.000)	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)
Redundancy check P-value	0.000	0.000	0.000	0.000	0.000	0.000
Cragg-Donald Wald F	6451.405	1480.601	6096.592	1568.627	13000	3055.758
	{19.93}	{7.03}	{19.93}	{7.03}	{19.93}	{7.03}
particular year	Yes	Yes	Yes	Yes	Yes	Yes
enterprise	Yes	Yes	Yes	Yes	Yes	Yes
Year x Industry	No	No	Yes	Yes	Yes	Yes
Observation value	526680	526680	526680	526680	526680	526680

Note: The values in parentheses are the critical values at the 10% level for weak instrumental variable testing.

Robustness Test

A well-functioning financial market plays a crucial role in value chain upgrading by mobilizing idle social funds and channeling them into research and development investments, thereby providing essential financial support for enterprises and enhancing the resilience of the value chain during restructuring [37]. In regions with advanced financial development, information service platforms help mitigate information asymmetry between local financial institutions and firms, fostering long-term collaboration. These regions also benefit from diversified financing channels, a wider range of financial products, and lower financing costs. The observed improvement in firms' global value chain positioning may be partially attributed to local financial development. To disentangle the effects of financial structure optimization and banking competition, this study incorporates the financial development level (FD), measured as the ratio of year-end loan balances of financial institutions to GDP, into the model. As shown in column (1) of Table 4, while financial development positively influences firms' global value chain positioning, the

coefficient for banking competition remains statistically significant. This suggests that the impact of banking competition on value chain positioning persists even after controlling for financial development.

For an extended period, more than half of China's financial resources have been predominantly concentrated in 31 financial hub cities, leading to significant disparities in financial supply across different regions. Consequently, this study examines whether the effects of banking competition on enterprises' global value chain positions differ between financial hub cities and non-financial hub cities. The findings, presented in columns (2) and (3) of Table 4, reveal that banking competition exerts an initial suppressive and subsequent promotive effect on enterprises' global value chain positions, regardless of whether they are located in financial hub cities or peripheral cities. Furthermore, the 2008 financial crisis had a notable adverse impact on China's banking sector and export trade. To explore this further, we analyze how banking competition levels before and after the crisis influenced enterprises' global value chain positions. The results, reported in the last two columns of Table 4, demonstrate that the financial crisis did not alter the fundamental relationship between banking competition and enterprises' global value chain positions.

Table 4. Robustness test: considering financial development level, financial location, and financial crisis

	Consider financial development	financial center	Non-financial center	Before the financial crisis	After the financial crisis
	(1)	(2)	(3)	(4)	(5)
BCHHI	-0.012***	-0.012***	-0.019***	-0.019***	-0.039***
	(0.001)	(0.001)	(0.002)	(0.002)	(0.010)
BCHHI2	7.4E-05***	0.000***	0.000***	0.000***	0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
FD	0.027***				
	(0.004)				
control variable	Yes	Yes	Yes	Yes	Yes
particular year	Yes	Yes	Yes	Yes	Yes
enterprise	Yes	Yes	Yes	Yes	Yes
Year x Enterprise	Yes	Yes	Yes	Yes	Yes
R2	0.715	0.702	0.702	0.694	0.694
N	465756	132710	393877	249451	249924

Mechanism Analysis

Verification of functional channels

Having established the U-shaped relationship between banking competition and firms' global value chain positioning, we next investigate the specific mechanisms underlying this relationship. Drawing on the theoretical framework outlined earlier, this study examines two potential channels: manufacturing servitization and technological innovation. To test these pathways, a mediation effect model is employed, with the following specification:

$$DVAR_{it} = \alpha_0 + \alpha_1 BCHHI_{ct} + \alpha_2 BCHHI_{ct}^2 + \alpha_3 W_{it} + \theta_i + \delta_t + \vartheta_{pt} + \varepsilon_{ict} \quad (13)$$

$$MS_{sm}^c = \beta_0 + \beta_1 BCHHI_{ct} + \beta_2 BCHHI_{ct}^2 + \beta_3 W_{it} + \theta_i + \delta_t + \vartheta_{pt} + \varepsilon_{ict} \quad (14)$$

$$DVAR_{it} = \gamma_0 + \gamma_1 BCHHI_{ct} + \gamma_2 BCHHI_{ct}^2 + \gamma_3 MS_{sm}^c + \alpha_3 W_{it} + \theta_i + \delta_t + \vartheta_{pt} + \varepsilon_{ict} \quad (15)$$

$$TFP_{it} = \rho_0 + \rho_1 BCHHI_{ct} + \rho_2 BCHHI_{ct}^2 + \rho_3 W_{it} + \theta_i + \delta_t + \vartheta_{pt} + \varepsilon_{ict} \quad (16)$$

$$DVAR_{it} = \sigma_0 + \sigma_1 BCHHI_{ct} + \sigma_2 BCHHI_{ct}^2 + \sigma_3 TFP_{it} + \alpha_3 W_{it} + \theta_i + \delta_t + \vartheta_{pt} + \varepsilon_{ict} \quad (17)$$

In the formula: $DVAR_{it}$ represents the global value chain position of enterprise i in year t, $BCHHI_{ct}$ is the inverse of the Herfindahl index of the banking industry in city c in year t, $BCHHI_{ct}^2$ is the square term of the inverse of the Herfindahl index of the banking industry in city c in year t, W_{it} is the control variable, MS_{sm}^c and TFP_{it} are the degree of service-oriented manufacturing investment and technological innovation of enterprise i in each city c (measured by enterprise total factor productivity), θ_i, δ_t and ϑ_{pt} represent fixed effects of enterprises, fixed effects of years, and interaction fixed effects between years and industries, ε_{ict} is random perturbation terms. Equation (13) shows the impact of banking competition on the global value chain position of enterprises without considering intermediary variables. Subsequently, as shown in equations (14) and (16), we test whether banking competition has a significant effect on the two intermediary variables of manufacturing input serviceization and technological innovation, respectively. Finally, intermediate variables are added to equation (13), as shown

in equations (15) and (17), to compare whether the impact of banking competition on the global value chain position of enterprises changes after adding manufacturing input servitization and technological innovation, and to test whether manufacturing input servitization and technological innovation are the pathways of action.

Building on the earlier analysis of impact mechanisms, this study investigates whether technological innovation acts as a channel through which banking competition influences the global value of enterprises. The results, presented in Table 5, provide insights into this relationship. Column (1) shows that regardless of whether the Herfindahl index or the share of the top four bank branches is used to measure banking competition (inverse), the first-order coefficient is significantly negative at the 1% level, while the squared term is significantly positive. This suggests that enterprises' technological progress follows a U-shaped pattern—initially declining and then rising—as banking competition intensifies. This finding aligns with the benchmark regression results, which reveal that banking competition first suppresses and later enhances enterprises' global value chain position. Thus, the U-shaped relationship between banking competition and enterprises' global value chain position is, to some extent, explained by this mechanism. These results provide preliminary support for Hypothesis 2, confirming that technological innovation is a key pathway through which banking competition affects enterprises' global value chain position.Furthermore, columns (2) and (3) demonstrate that the U-shaped relationship between banking competition and enterprises' global value chain position remains robust, with the coefficient of technological innovation being significantly positive. In line with the mediation effect model, the significance of the independent variable coefficients suggests that technological innovation serves as an incomplete mediator in this relationship.

The understanding of this result in this article is that with the gradual opening of the financial market, the banking industry has evolved from a single state-owned bank system that monopolized most of its business to a modern banking system with complete industry and clear hierarchy. The high monopoly of state-owned banks has been broken, and the diversification of funding channels for enterprises has increased the possibility of obtaining credit, providing abundant financial support for technological innovation. But with the diversification of bank types, the number of small and medium-sized technology innovation enterprises that cannot provide asset proof but want to obtain bank loans has also increased, which undoubtedly increases the difficulty of bank review and credit risk. Due to the high uncertainty of the external environment, enterprises face significant obstacles in technological innovation, which makes it difficult for projects to easily achieve the expected investment results. Banks are more cautious in selecting technological innovation enterprises, resulting in companies that are willing to engage in technological innovation interrupting their pace due to tight funding chains. In the process of continuously optimizing the market structure and intensifying competition in China's banking industry, the development of technologies such as financial networks and financial technology has accelerated the sharing and development of credit information among enterprises. The "data barrier" has been broken down, alleviating the degree of information asymmetry between banks and enterprises, providing specialized financial services and financial support for technological innovation enterprises, and thus driving the improvement of the global value chain position of enterprises.

Table 5 investigates whether manufacturing servitization serves as a channel through which banking competition influences firms' global value chain positioning. Column (1) reveals a significant U-shaped relationship, where banking competition initially suppresses and subsequently enhances the servitization of manufacturing inputs. To further explore this, manufacturing servitization (MS) is incorporated into the benchmark regression to examine changes in the coefficients of banking competition (inverse) and its quadratic term. Columns (2) and (3) demonstrate that the inverse Herfindahl index of banking competition yields an estimated coefficient of -0.017, with a quadratic term of 1.8E-04. Similarly, the competition index based on the share of the top four branches shows an estimated coefficient of -0.283 and a squared term of 0.045, both significant at the 1% level. While the banking competition coefficients remain consistent with the benchmark results, the manufacturing servitization coefficients are significantly positive. This suggests that, alongside the partial mediating effect of the proposed variable, banking competition may also exert a direct influence or operate through alternative channels on firms' global value chain positioning.

Table 6 investigates whether manufacturing servitisation acts as a channel through which banking competition influences firms' global value chain participation. Column (1) demonstrates a significant U-shaped relationship, indicating that banking competition initially inhibits and later enhances manufacturing servitisation. To explore this further, manufacturing servitisation (MS) is introduced into the baseline regression to examine changes in the coefficients of banking competition (inverse) and its quadratic term. As presented in columns (2) and (3), the inverse measure of banking competition based on the Herfindahl index exhibits an estimated coefficient of -0.017, accompanied by a quadratic term coefficient of 1.8E-04. Likewise, the banking competition index, calculated using the share of the top four branches, demonstrates an estimated coefficient of -0.283 and a squared term coefficient of 0.045, with both coefficients reaching statistical significance at the 1% level. The coefficients for banking competition align with the baseline regression results, while those for manufacturing servitisation are significantly

positive. Beyond the partial mediating role of the examined variable, the results indicate that banking competition could have a direct impact on firms' global value chain integration or function through additional mechanisms.

Table 5. Test of the Action Path Based on Technological Innovation

	TFP		
	(1)	(2)	(3)
BCHHI	-0.016***	-0.016***	
	(0.003)	(0.001)	
BCHHI2	4.9E-04***	2.7E-04***	
	(0.000)	(0.000)	
BCCR4	-0.360***		-0.253***
	(0.090)		(0.021)
BCCR42	0.080***		0.043***
	(0.028)		(0.006)
TFP		0.003***	0.003***
		(0.001)	(0.001)
control variable	Yes	Yes	Yes
particular year	Yes	Yes	Yes
enterprise	Yes	Yes	Yes
Year x Industry	Yes	Yes	Yes
R2	R2	0.843	0.807
N	N	243789	243789

The reason may be that, on the one hand, as the concentration of the banking industry continues to decline, banks are seeking innovation and differentiation in order to gain more market share, launching new financial businesses and products to gain more competitive advantages. This competitive model will drive the emergence of more personalized financial products and better service models, providing sufficient funds for service-oriented enterprises. On the other hand, as the largest industry in China's national economy, the service industry generally has a relatively low level of service-oriented input and service-oriented output in manufacturing. However, in the stage of transformation and upgrading of China's manufacturing industry, the trends of digitization, servitization, and intelligence are becoming increasingly prominent. In the process of transforming manufacturing towards servitization, the intensity of service elements continues to increase in products, and enterprises can expand their product categories and achieve differentiated competition. In the increasingly competitive environment of the banking industry, the banking industry provides investment service related business consulting and training to help enterprises improve profitability, achieve economies of scope, and promote enterprises to gradually leap from low-end links to high-end links in the global value chain. Thus, Hypothesis 2 has been verified.

Table 6: Path test based on the servitization of manufacturing industry

	MS		
	(1)	(2)	(3)
BCHHI	-0.303***	-0.017***	
	(0.090)	(0.002)	
BCHHI2	0.011***	0.000***	
	(0.003)	(0.000)	
BCCR4	-0.427***		-0.283***
	(0.035)		(0.023)
BCCR42	0.072***		0.045***
	(0.009)		(0.006)
MS		0.047***	0.047***
		(0.016)	(0.016)
control variable	Yes	Yes	Yes
particular year	Yes	Yes	Yes
enterprise	Yes	Yes	Yes
Year x Industry	Yes	Yes	Yes
R2	0.903	0.726	0.726
N	362636	362636	362636

Heterogeneity test

The impact of banking competition on a company's global value chain (GVC) position varies significantly across industries with different technological levels. This study examines the effects of banking competition on high-, medium-, and low-tech industries, with results reported in columns (1) to (3) of Table 7. Unlike high-tech industries, banking competition does not significantly enhance the GVC position of low-tech industries. This discrepancy arises because, in less concentrated banking markets, banks prioritise risk control and returns, focusing on the innovation capabilities and growth prospects of enterprises. Medium- and high-tech industries, with their higher added value and investment returns, are more likely to receive financing for technological upgrades and production expansion, enabling them to climb the value chain. In contrast, low-tech enterprises, which rely on traditional labour and natural resource advantages, face diminishing returns as natural resources deplete and the "demographic dividend" fades. Their credit funds are often used to improve production efficiency rather than drive industrial transformation or optimisation. Additionally, as banking competition intensifies, credit accessibility improves, but this has limited impact on low-tech industries. Columns (4) and (5) of Table 7 show that banking competition does not significantly enhance the GVC position of enterprises with low financing costs. These enterprises, typically positioned higher in the GVC, already enjoy strong credit ratings and stable financial conditions, making them preferred clients for banks. Thus, increased banking competition does not substantially expand their credit access.

State-owned enterprises (SOEs) benefit from local government support and abundant collateral, often crowding out non-state-owned enterprises (non-SOEs) in credit allocation. However, non-SOEs tend to excel in innovation and production efficiency (Dai Jing and Zhang Jianhua, 2013), leading to financial mismatches. This study divides the sample into SOEs (assigned "0") and non-SOEs (assigned "1"), with regression results shown in columns (6) and (7) of Table 7. Banking competition has a more pronounced impact on the GVC position of non-SOEs. SOEs, with their dominant market shares and stable supply chains, are often viewed as low-risk by banks, making their credit access less sensitive to banking competition. In contrast, non-SOEs, primarily small and medium-sized enterprises (SMEs), face higher uncertainty in R&D activities, initially deterring banks. However, as banking competition intensifies and financial markets improve, banks increasingly prioritise the growth potential and market competitiveness of non-SOEs, offering them tailored financial services to meet their needs. This shift reflects the stronger innovation and adaptability of non-SOEs, driving banks to provide more high-quality financial support.

Table 7. Heterogeneity test of enterprises

	high technology	Medium tech	Low tech	High financing costs	Low financing cost	state-owned	Non-state-owned
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
BCHHI	-0.022***	-0.012***	-0.010***	-0.015***	-0.009***	zero point zero zero six	-0.018***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.005)	(0.001)
BCHHI2	4.0E-04***	7.7E-05***	3.1E-05	1.6E-04***	4.6E-05	-1.5E-04	2.0E-04***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
control variable	Yes	Yes	Yes	Yes	Yes	Yes	Yes
particular year	Yes	Yes	Yes	Yes	Yes	Yes	Yes
enterprise	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year x Industry	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R2	0.688	0.690	0.737	0.730	0.672	0.588	0.718
N	152908	187909	179751	239682	253379	17996	443820

EXPANSION ANALYSIS: TESTING THE MODERATION EFFECT OF FINANCIAL TECHNOLOGY AND FINANCIAL SCALE

Based on the previous analysis, this article will explore the moderating effects of fintech and financial scale on the impact of banking competition on the global value chain position of enterprises. The interaction terms between fintech, financial scale, and banking competition will be added to the benchmark regression model, and the econometric model is as follows.

$$DVAR_{it} = \beta_0 + \beta_1 BCHHI_{ct} + \beta_2 fintech_{ct} + \beta_3 BCHHI \times fintech + \beta_4 BCHHI^2 \times fintech + \beta_5 W_{it} + \varepsilon_{ict} \quad (18)$$

$$DVAR_{it} = \beta_0 + \beta_1 BCHHI_{ct} + \beta_2 LS_{ct} + \beta_3 BCHHI \times LS + \beta_4 BCHHI^2 \times LS + \beta_4 W_{it} + \varepsilon_{ict} \quad (19)$$

Testing the Regulatory Effect of Financial Technology

From Table 8 (1), it can be seen that the coefficient of fintech is significantly positive, and the interaction coefficient between banking competition and fintech is also significantly positive, indicating that the application of fintech can improve the inhibitory effect of banking competition on the global value chain of enterprises in the early stage. In column (2), we can observe that the coefficients of the interaction terms BCHHI × fintech and BCHHI2 × fintech are significantly positive, indicating that with the continuous application of financial technology, the positive effects of banking competition on the global value chain position of enterprises can be better utilized. Thus, hypothesis 3a has been validated. Subsequently, this article also examines whether distinguishing financial center cities, the occurrence of financial crises, and financial development status will have different effects on the regulatory effects of financial technology. The results, presented in columns (3) to (7) of Table 8, indicate that financial technology exhibits a significantly positive effect across various samples, confirming the robustness of its positive regulatory role. This can be attributed to the enhanced risk management capabilities brought by financial technology, which reduces non-performing loans. Even in competitive environments, banks can more accurately assess the creditworthiness of firms, facilitating the allocation of credit to high-quality enterprises and thereby strengthening their competitiveness in the global value chain. On the other hand, financial technology has improved the channels for banks to acquire customers, and the combination of financial markets and information technology can enhance the information collection capabilities and credit disbursement levels of commercial banks. Improve and perfect financial services based on customer information and tags, and design more reasonable financing contracts for them. In addition, startups in the fintech field have brought more competitors, who are usually more flexible and innovative. This has driven traditional banks to actively seek innovation, improve service quality, and expand global market share. The digital payment, blockchain technology, smart contracts and other technologies possessed by fintech companies can more efficiently support enterprises in various links of the global value chain.

Table 8. Regulatory Effects of Financial Technology

	Full sample	Full sample	financial center	Non-financial center	Before the financial crisis	After the financial crisis	Consider financial development
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
BCHHI	-0.009***	-0.015***	-0.016***	-0.012***	-0.027***	-0.045***	-0.015***
	(0.001)	(0.001)	(0.006)	(0.001)	(0.003)	(0.008)	(0.001)
BCHHI2	2.3E-04***	3.3E-04***	0.001***	2.6E-04***	4.8E-04***	0.001***	3.1E-04***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
BCHHI×fintech	0.001***	0.007***	0.005***	0.005***	0.024***	0.007***	0.006***
	(0.000)	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)
BCHHI2×fintech		1.5E-04***	1.5E-04***	1.1E-04***	4.7E-04***	1.8E-04***	1.4E-04***
		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
fintech	0.015***	0.082***	0.025***	0.065***	0.271***	0.061***	0.083***
	(0.004)	(0.007)	(0.007)	(0.008)	(0.021)	(0.011)	(0.007)
control variable	Yes	Yes	Yes	Yes	Yes	Yes	Yes
particular year	Yes	Yes	Yes	Yes	Yes	Yes	Yes
city	Yes	Yes	Yes	Yes	Yes	Yes	Yes
City x Industry	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R2	0.429	0.429	0.345	0.457	0.331	0.489	0.430
N	475068	475068	106452	360189	192440	249119	475068

Testing the Regulatory Effect of Financial Scale

This study performs regression analysis on Equation (19), with the results presented in Table 9. Column (1) reveals that the interaction coefficient between banking competition and financial scale is significantly negative. However, this does not imply that financial scale suppresses the impact of banking competition on enterprises' global value chain position. Column (2) shows that the interaction term between the squared term of banking competition and financial scale is significantly positive, indicating that financial scale plays a notable moderating role in the relationship between banking competition and enterprises' global value chain position. This moderating effect remains robust even after controlling for financial location, time nodes, and financial development status. Since the inverse of financial scale is used in the moderation effect regression, the results suggest that a larger financial scale weakens the positive effect of banking competition on enterprises' global value chain position, while a smaller financial scale strengthens this effect. This points to a substitution effect between financial scale and banking competition. The underlying reason may be that cities with larger financial scales offer diverse financing channels, particularly equity financing in direct financing, which effectively mitigates inefficiencies caused by agency issues. These cities can more precisely allocate funds to high-return, high-value-added industries[38]. In regions with diversified financial markets, high-quality customers in the banking industry are more dispersed, thereby diminishing the positive impact of increased financing availability on enterprises' global value chain position. Conversely, in regions with smaller financial scales, the banking industry serves as the primary source of indirect financing. Intensified banking competition encourages banks to expand their credit targets, enabling more small and medium-sized enterprises to access bank credit. This reduces funding constraints for research and innovation activities, allowing enterprises to engage more rapidly in international market competition.

Table 9. Adjustment effect of financial scale

	Full sample	Full sample	financial center	Non-financial center	Before the financial crisis	After the financial crisis	Consider financial development
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
BCHHI	-0.006***	-0.005***	-0.004***	-0.006***	-0.005***	-0.004***	-0.006***
	(0.000)	(0.000)	(0.001)	(0.000)	(0.001)	(0.001)	(0.000)
BCHHI2	0.000***	0.000***	0.000**	0.000***	0.000***	0.000***	0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
BCHHI×LS	-0.059*	-0.412***	-1.392***	-0.102**	-0.504***	-2.474***	-0.264***
	(0.032)	(0.046)	(0.147)	(0.046)	(0.095)	(0.376)	(0.043)
BCHHI2×LS		0.037***	0.056***	0.014***	0.010*	0.086***	0.027***
		(0.003)	(0.007)	(0.003)	(0.006)	(0.009)	(0.003)
LS	15.483***	14.961***	10.461***	16.264***	6.170***	13.785***	15.804***
	(0.296)	(0.284)	(0.971)	(0.310)	(0.674)	(0.616)	(0.298)
control variable	Yes	Yes	Yes	Yes	Yes	Yes	Yes
particular year	Yes	Yes	Yes	Yes	Yes	Yes	Yes
city	Yes	Yes	Yes	Yes	Yes	Yes	Yes
City x Industry	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R2	0.414	0.414	0.325	0.445	0.340	0.493	0.412
N	475068	475068	106452	360189	192440	249119	475068

CONCLUSION AND POLICY RECOMMENDATIONS

The evolving competitive landscape in China's banking sector provides critical insights for advancing the high-quality development of the financial system and optimising the financial dimensions of enterprise global value chain (GVC) positioning. This study examines the relationship between banking competition and enterprise GVC positioning, offering significant implications for China's high-quality participation in international economic circulation and the manufacturing sector's transition toward higher value-added GVC segments. Through theoretical and empirical analysis, the study reveals three key findings: First, a U-shaped relationship exists between banking competition and enterprise GVC positioning, with initial inhibition followed by promotion. This finding remains robust after addressing endogeneity and controlling for financial geography, temporal nodes, and regional financial development. Second, enterprise technological innovation and manufacturing servitisation mediate the impact of banking competition on GVC positioning. The U-shaped relationship is less pronounced in state-owned enterprises, low-tech firms, and firms with low financing constraints. Banking competition primarily enhances GVC positioning

by reducing resource misallocation and improving the competitive standing of medium- and high-tech enterprises. Third, fintech development complements banking competition, accelerating its positive impact on GVC positioning, while financial scale expansion exhibits a substitution effect, potentially diminishing this impact.

In light of anti-globalisation trends and uncertainties in international trade, the study proposes three policy recommendations to enhance the international competitiveness of Chinese export enterprises: First, China should deepen market-orientated banking reforms by developing a diversified, multi-tiered banking system that integrates large state-owned banks with small and medium-sized commercial banks, joint-stock banks, and foreign banks. Strengthening financial services critical to GVCs, such as international payments and securities investments, will better support enterprises in ascending global value chains. Second, the banking sector should reform evaluation and incentive mechanisms to encourage credit support for R&D innovation in medium- and high-tech enterprises, financially constrained firms, and private enterprises. By offering diverse financing products and services, banking competition can alleviate financing constraints, reduce costs, and enhance GVC positioning for non-state-owned enterprises. Third, maintaining optimal financial scale and competition levels is essential for financial stability, particularly in fostering fintech innovation. While banking competition benefits medium- and high-innovation enterprises in the long term, short-term risks such as lowered lending standards and increased non-performing loans must be mitigated through appropriate regulation and government intervention. Supportive policy frameworks and regulatory standards should guide the integration of fintech with banking services, ensuring the healthy development of financial markets.

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