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A Study on the Impact and Transmission Channels of New-Quality Productive Forces in Driving a Leap in the Competitiveness of China's Manufacturing Exports Impact and Transmission Channels

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Abstract: Against the backdrop of deepening globalisation and digital integration, new-quality productive forces are reshaping the global industrial division of labour, creating key opportunities for China's manufacturing export competitiveness to leap forward. Based on 2010–2023 panel data of 31 Chinese provinces, this paper examines the impact effects and transmission paths of new-quality productive forces on manufacturing export competitiveness. The results confirm that new-quality productive forces exert a significant positive effect on manufacturing export competitiveness, with industrialisation level playing a mediating role. The effect is significantly positive in eastern and central regions but insignificant in the western region. A threshold effect of urbanisation is identified: below the threshold, the positive impact is significant; above the threshold, it turns significantly negative, presenting a non-linear feature of diminishing marginal effect. Targeted recommendations are put forward accordingly.

Keywords: New-Quality Productive Forces, Manufacturing, Export Competitiveness, Impact Effects, Threshold Effect.

1. Introduction

Currently, the global scientific and technological revolution and industrial transformation are accelerating. As an advanced form of productive forces characterised by innovation-led development, a break from traditional path dependencies, and features of high technology, high efficiency and high quality, 'new-quality productive forces' are becoming a key force in reshaping the international economic landscape and driving a paradigm shift in industrial competition. General Secretary Xi Jinping first proposed the concept of 'new-quality productive forces' in 2023, emphasising that its core lies in the qualitative transformation of labourers, means of production, objects of labour and their optimised combination. The 2024 Government Work Report designated this as a strategic task, calling for the use of scientific and technological innovation to drive industrial innovation and build new competitive advantages in international trade. China's manufacturing sector is currently at a critical juncture in its transition from scale expansion to a leap in quality, facing challenges such as 'chokepoints' in key technologies. There is an urgent need to break free from low-end lock-in through new-quality productive forces and achieve a systemic leap in export competitiveness. At present, the benefits of smart manufacturing, green innovation and digital technology empowerment are beginning to emerge; however, data from 2023 shows that China's reliance on foreign core technologies remains as high as 35 per cent, highlighting the urgency of developing new-quality productive forces. Against this backdrop, an in-depth exploration of the impact and transmission pathways of new-quality productive forces on export competitiveness holds significant theoretical and practical value.

2. Literature Review

As the core engine driving the high-quality development of the manufacturing sector, research into the mechanisms linking 'new-quality productive forces' to export competitiveness is becoming a focal point in academic circles. This paper traces the research trajectory from three dimensions: the definition and measurement of 'new-quality productive forces', the evaluation of manufacturing export competitiveness, and the mechanisms linking the two.

Regarding research on the definition and measurement of new-quality productive forces, the theoretical framework proposed by General Secretary Xi Jinping emphasises the trinity of workers, means of production and objects of labour as its core essence. Building upon this foundation, scholars have deepened their research. Huang Qunhui (2024) points out that new-quality productive forces are characterised by the leap in the trinity of workers, means of production and objects of labour and their combinations, marked by an increase in total factor productivity, and serve as the key driving force for advancing the strategy of new-type industrialization [1]. From the perspective of Marxist economics, Liu Wei (2024) proposes that the core of new-quality productive forces lies in enhancing total factor productivity, with a modern industrial system serving as its vehicle [2]. Regarding measurement systems, Ding Shichao et al. (2024) constructed a conceptual model from the perspective of factor synergy, finding that it exhibits an upward trend—higher in the east and lower in the west—with regional disparities and β-convergence characteristics [3]. Ren Yuxin et al. further refined the three-tier indicator system, applying weighting via the entropy method to lay a methodological foundation for quantitative research [4]. However, existing measurement systems are insufficiently adapted to regional heterogeneity.

With regard to research on the export competitiveness of the manufacturing sector, the Export Competitiveness Index (ECI) proposed by Yan Bing (2006) has been widely adopted and is effective in capturing the international market share of the manufacturing sector [5]. Yang Ximing et al. (2019) combined the RCA index with Porter's Diamond model, incorporating indicators related to new-quality productive forces such as innovation factors [6]. Regarding influencing factors, Wang Lan et al. (2015) demonstrated that weak value-added capacity is a key factor constraining the transformation and upgrading of China's manufacturing sector [7]. However, their analysis overlooked the moderating effect of the labour factor and paid insufficient attention to new drivers such as the self-reliance in core technologies that underpin new-quality productive forces.

Regarding the relationship between new-quality productive forces and the competitiveness of manufacturing exports, current research is still in its infancy. Yuan Hankun and Han Minchun (2024) explain that new-quality productive forces empower the high-quality development of foreign trade through three major mechanisms: disruptive innovation providing new impetus, the injection of new factors generating fresh momentum, and strategic emerging industries providing fundamental support [8]. Zheng Siping and Mao Liang (2024) introduced digital inclusive finance as a mediating variable, demonstrating that new-quality productive forces indirectly promote the technological complexity of exports by increasing the penetration rate of digital finance [9]. Huang Zhengsong et al. (2024) supplemented this with a dual mediating pathway involving industrial structure optimisation and trade competitiveness [10].

However, existing research suffers from limitations such as a narrow focus on single mechanisms, overlooking the systemic driving mechanism of 'improved worker quality – industrial ecosystem restructuring – synergistic optimisation of factors'; a lack of consideration of heterogeneity, with the interactive effects of multidimensional heterogeneity not being fully explored; and the absence of dynamic and long-term effects.

Consequently, this study constructs an evaluation system for new-quality productive forces tailored to the manufacturing sector, analysing their differentiated impacts on the export competitiveness of enterprises of varying sizes and across different industries; systematically maps out the transmission pathways; using data from 2010 to 2023, it empirically tests the mediating effects of industrialisation levels and industrial structure upgrading, as well as the threshold effect of urbanisation; and, through grouped regression analysis, examines regional disparities across the eastern, central and western regions, thereby providing theoretical and practical support for the leap in manufacturing export competitiveness driven by new-quality productive forces.

3. Theoretical Analysis and Research Hypotheses

3.1. New-quality Productive Forces Have a Significant Positive Impact on The Export Competitiveness of China's Manufacturing Sector

New-quality productive forces are an advanced form catalysed by revolutionary technological breakthroughs, innovative production factor allocation and in-depth industrial upgrading. Centred on scientific and technological innovation, they reshape manufacturing development patterns through total factor productivity improvement [11], with core features of digitalisation, intelligentisation and greening [12].

In digitalisation, data is taken as a key production factor. Digital technologies comprehensively upgrade production activities, improve information flow efficiency and resource allocation, foster new business formats and models, and expand the market scale of emerging industries [13], thus significantly lifting production efficiency, product performance, and both price and quality competitiveness. In intelligentisation, new-generation information technologies represented by artificial intelligence are deeply integrated into R&D, manufacturing and operation management, enabling autonomous machine learning and decision-making, and greatly reducing labour reliance and operating costs. In greening, low-carbon concepts run through the whole production process to promote clean energy use and resource recycling, help enterprises meet international environmental standards, mitigate green barrier risks, and shape sustainable export competitiveness.

Accordingly, Hypothesis H1 is proposed for verification:

Hypothesis H1: New-quality productive forces have a significant positive impact on China's manufacturing export competitiveness.

3.2. Mechanisms Through Which New-Quality Productive Forces Drive a Leap in China's Manufacturing Export Competitiveness

New-quality productive forces advance industrialisation by improving technological standards and management efficiency. A high industrialisation level implies sound industrial support and innovation ecosystems, which reduces the integration cost of new-quality productive forces into production and strengthens core technology absorption capacity. Meanwhile, it improves export product quality and cost efficiency through frontier technology adoption, supply chain coordination and strict quality management [14]. The industrialisation leap, driven by technical equipment upgrading and supply chain optimisation, is decisive for building export advantages and propelling manufacturing upward in the global value chain.

Accordingly, Hypothesis H2 is proposed for verification:

Hypothesis H2: Industrialisation level acts as a mediating factor in the process of new-quality productive forces driving the leap of China's manufacturing export competitiveness.

3.3. The Level of Urbanisation Exerts a Threshold Effect on The Export Competitiveness of China's Manufacturing Sector Driven by New-Quality Productive Forces

Urbanisation level reflects regional population agglomeration, economic concentration and modernisation, and presents a non-linear threshold relationship with the export-driven effect of new-quality productive forces. Below the critical threshold, inadequate infrastructure, public services and innovation platforms, weak talent agglomeration, limited market size and high marginal cost of financial services [15] severely restrict the flow and allocation of talent, technology and capital, hinder innovation commercialisation,

and weaken the driving effect. When urbanisation crosses the threshold, improved infrastructure effectively cuts production and transport costs [16], whilst improved and more convenient logistics can also significantly increase trade flows [17]. Agglomeration economies, scale effects and demand pull are fully released, amplifying the positive impact of new-quality productive forces on export competitiveness. Thus, urbanisation is a key precondition for new-quality productive forces to effectively drive export competitiveness.

Accordingly, Hypothesis H3 is proposed for verification:

Hypothesis H3: Urbanisation level exerts a threshold effect on the role of new-quality productive forces in driving China's manufacturing export competitiveness.

In summary, new-quality productive forces positively promote manufacturing export competitiveness, with industrialisation level playing a mediating role. The driving effect features both regional heterogeneity and a threshold effect of urbanisation level.

4. Research Design

4.1. Model Construction

4.1.1. Baseline Regression Model

To test Research Hypothesis 1 of this paper, the following baseline regression model was constructed, namely the impact equation of new-quality productive forces on the export competitiveness of China's manufacturing sector:

$$ECI_{it}=\alpha_0+\alpha_1 NEW_{it}+\alpha_2 control_{it}+\mu_i+\varepsilon_t+\delta_{it} \quad (1)$$

In this context, i denotes the province, t denotes the year; ECI_{it} is the dependent variable, representing the level of manufacturing export competitiveness in i during the period t; NEW_{it} is the core explanatory variable, representing the level of development of new-quality productive forces ini during the period t; α_0 denotes the model intercept, α_1 denotes the estimated coefficient of the independent variable, $control_{it}$ denotes the control variables, μ_i denotes the provincial fixed effects, ε_t denotes the time fixed effects, and δ_{it} denotes the random disturbance term.

4.1.2. Mediation Effect Model

To test Research Hypothesis 2 of this paper and examine whether a mediating mechanism exists between the development of new-quality productive forces and export competitiveness, this study draws on the research methodology of Wen Zhonglin et al. It investigates whether such a channel exists from the perspectives of industrialisation levels and industrial structure upgrading. Combining this with Equation (1), the following mediating effects model is constructed:

$$IND_{it}=\beta_0+\beta_1 NEW_{it}+\beta_2 control_{it}+\mu_i+\varepsilon_t+\delta_{it} \quad (2)$$

$$ECI_{it}=\gamma_0+\gamma_1 NEW_{it}+\gamma_2 IND_{it}+\gamma_3 control_{it}+\mu_i+\varepsilon_t+\delta_{it} \quad (3)$$

Where, in Equation (2), IND_{it} denotes the mediating effect of the level of industrialisation in i during the periodt; β_1 denotes the estimated coefficient of new-quality productive forces; and in Equation (3), γ_1 denotes the estimated coefficient of new-quality productive forces, whilst γ_2 denotes the estimated coefficient of the mediating variable.

4.1.3. Threshold Effect Model

To test Research Hypothesis 5 of this paper and investigate whether new-quality productive forces have a non-linear impact on the export competitiveness of China's manufacturing sector, this paper constructs a threshold regression model based on Equation (1):

$$ECI_{it}=\eta_0+\eta_1 NEW_{it}\times I(\bullet)(px_{it}\le\omega)+\eta_2 NEW_{it}\times I(\bullet)(px_{it}>\omega)+\eta_3 control_{it}+\mu_i+\varepsilon_t+\delta_{it} \quad (4)$$

In Equation (4), the indicator represents a single-threshold effect. 'px_{it}' denotes the threshold variable 'I(•)' denotes the indicator function, and 'ω' denotes the threshold value to be estimated.

4.2. Variable Definition and Data Sources

4.2.1. Dependent Variable: Manufacturing Export Competitiveness Index (ECI)

For the dependent variable, the Manufacturing Export Competitiveness Index (ECI), this paper draws on the estimation methods proposed by Yan Bing [5] and. Using data from the State Council Research Information Network and the statistical yearbooks of each province, we have calculated the export competitiveness indices for the 31 provinces (municipalities directly under the central government and autonomous regions) for the period 2010–2023. The calculation formula is as follows:

$$ECI_{it}=\frac{export_{it}/\sum_{i=1}^{n} export_{it}}{gdp_{it}/\sum_{i=1}^{n} gdp_{it}} \quad (5)$$

Where $export_{it}$ represents the value of manufacturing exports for the province i during the period t, and gdp_{it} represents the gross domestic product (GDP) for the province i during the period t.

4.2.2. Core Explanatory Variable: Level of Development of New-Quality Productive Forces (NEW)

Drawing on the research methodology of Ren Yuxin et al., an indicator system for new-quality productive forces was constructed from three perspectives: new labourers, new objects of labour and new means of labour. The entropy method was then applied to determine the weights of indicators at each level, thereby calculating the level of development of new-quality productive forces in China's 31 provinces (municipalities directly under the central government and autonomous regions) for the period 2010–2023.

Table 1. Evaluation Indicator System for the Development of New-Quality Productive Forces

Criteria Level	First-level indicators	Second-level indicators	Tertiary Indicators	Measurement Method
New workers	Labour productivity	Economic output	Per capita GDP	GDP/Total Population
		Economic income	Average wage	Average wage of employees in post
		Employment structure	Proportion of employment in the tertiary sector	Number of people employed in the tertiary sector / Total number of people in employment
	Workforce Qualifications	Educational attainment	Proportion of the population with higher education	Average years of education per capita
		Training expenditure	Intensity of education expenditure	Education expenditure as a proportion of total fiscal expenditure
		Potential for knowledge accumulation	Composition of the student population	Number of students enrolled / Total population
	Workforce Ethos	Innovative spirit	Investment in Innovation Human Resources	R&D full-time equivalents
		Entrepreneurial spirit	Entrepreneurial activity	Number of new enterprises per million people
New workforce	Level of industrial development	Level of informatisation	Level of enterprise informatisation	Number of enterprises engaged in e-commerce transactions / Total number of enterprises
		Proportion of strategic industries	Share of emerging strategic industries	Value added by emerging strategic industries / GDP
		Future industries	Robot installation density	Number of industrial robots installed in the region × (number of industrial employees in the region / total number of employees nationwide)
	Ecological Environment	Green Ecology	Green Resources	Forest cover
			Environmental Protection Efforts	Environmental Protection Expenditure / Government Public Expenditure
		Green production	Quality of pollution control	Chemical Oxygen Demand (COD) emissions / GDP
				Sulphur dioxide emissions / GDP
			Green inventions	Number of green patent applications / Total number of patent applications
New means of production	Material means of production	Infrastructure	Traditional infrastructure	Road mileage
				Railway mileage
			Digital infrastructure	Fibre-optic length
				Number of internet access ports per capita
		Energy utilisation level	Energy intensity	Energy consumption per unit of GDP
			Green energy consumption level	Low-carbon energy consumption structure index
		Energy utilisation potential	Potential for pollution control	Treatment capacity of exhaust gas control facilities
	Intangible means of production	Level of scientific and technological innovation	Number of patents per capita	Number of Patents Granted per Capita
			Economic investment in new products	Expenditure on new product development as a percentage of GDP
		Level of digitalisation	Digital economy	Digital Economy Index
			Corporate Digitalisation	Level of enterprise digitalisation

4.2.3. Mediating Variables

This study employs the level of industrialisation and industrial structure upgrading as mediating variables to investigate the mechanism through which new-quality productive forces drive a leap in the export competitiveness of China's manufacturing sector. The level of industrialisation is calculated using the method proposed by Zhang Juying (2019), defined as the ratio of regional industrial value added to regional gross domestic product.

4.2.4. Control Variables

To mitigate endogeneity issues arising from omitted variables, the following five control variables were identified with reference to existing literature: foreign trade dependence (FTD), per capita gross domestic product (GDP), degree of government intervention (GOV), level of transport infrastructure (INF) and level of innovation (INN). The definitions of each control variable are shown in Table 2.

Table 2. Measurement Table for Control Variables

Variable Name	Symbol	Measurement Method
Foreign trade dependency	FTD	(Total value of goods imports and exports × US dollar to Renminbi exchange rate) / Regional Gross Domestic Product
Per capita GDP	GDP	Regional Gross Domestic Product / Total Regional Population
Level of government intervention	GOV	Fiscal expenditure / Regional Gross Domestic Product
Level of transport infrastructure	INF	Logarithm of road mileage / logarithm of total freight volume
Level of innovation	INN	Logarithm of the number of domestic patent applications accepted

4.2.5. Data Sources

This study examines 31 provinces (municipalities directly under the central government and autonomous regions), covering the period from 2010 to 2023, to measure and analyse the relationship between new-quality productive forces and the export competitiveness of the manufacturing sector. Data were primarily sourced from the National Bureau of Statistics, the CSMAR database, provincial statistical yearbooks, and the *Statistical Report on the Development of the Internet in China*, with analysis conducted using STATA 18. A small number of missing data points were imputed using linear interpolation.

5. Empirical Analysis

5.1. Descriptive Statistical Analysis

Table 3 presents the descriptive statistics for each variable.

Table 3. Descriptive Statistics

Variable	Obs	Mean	Std.dev.	Min	Max
ECI	434	0.634	0.657	0.038	2.763
NEW	434	0.277	0.132	0.090	0.694
FTD	434	0.268	0.282	0.013	1.354
GDP	434	26,682.250	23,616.690	920.830	122,875.600
GOV	434	0.274	0.189	0.110	1.194
INF	434	11.504	1.058	7.557	12.908
INN	434	9.461	1.588	4.615	12.283

It can be observed that the minimum value of China's manufacturing export competitiveness index is 0.038 and the maximum is 2.763, indicating significant variations in manufacturing export competitiveness across China's provinces; the minimum value of the core explanatory variable—the level of development of new-quality productive forces—is 0.090 and the maximum is 0.694, suggesting that there are also certain differences in the level of new-quality productive forces across China's provinces. Furthermore, variance inflation factor (VIF) tests were conducted on each variable; all VIF values were less than 10, indicating that there is no severe multicollinearity.

5.2. Benchmark Regression Analysis

This paper estimates Equation (1) using provincial panel data to examine the impact of new-quality productive forces on the international competitiveness of China's manufacturing sector. The regression results are presented in Table 4. It can be seen that Column (1) of in presents the regression results for new-quality productive forces on the export competitiveness of the manufacturing sector in China's various provinces, with no other control variables held constant; the coefficient for new-quality productive forces on the export competitiveness of the manufacturing sector in China's various provinces exhibits a significant positive effect at the 1 per cent level. During the stepwise regression analysis, multiple control variables were introduced. The results indicate that the estimated coefficients for 'new-quality productivity' are all significantly positive at the 1 per cent level. This suggests that 'new-quality productivity' exerts a significant positive influence on the competitiveness of China's manufacturing exports. This confirms Hypothesis 1.

Table 4. Baseline Regression Test

	(1)	(2)	(3)	(4)	(5)	(6)
NEW	4.017***	2.146***	0.939***	1.093***	0.949***	1.339***
	(26.92)	(12.45)	(3.19)	(3.68)	(3.41)	(4.96)
FTD		1.215***	1.391***	1.379***	1.677***	1.876***
		(15.12)	(16.23)	(16.20)	(19.02)	(21.20)
GDP			0.00000666***	0.00000713***	0.00000377***	0.00000558***
			(5.00)	(5.35)	(2.86)	(4.37)
GOV				0.264***	1.179***	0.768***
				(2.76)	(8.01)	(5.06)
INF					0.228***	0.273***
					(7.83)	(9.63)
INN						-0.156***
						(-6.88)
_cons	-0.477***	-0.285***	-0.176***	-0.301***	-3.123***	-2.264***
	(-10.46)	(-7.35)	(-4.04)	(-4.81)	(-8.55)	(-6.15)
N	434	434	434	434	434	434
R^2	0.634	0.763	0.777	0.781	0.809	0.828
adj.R^2	0.621	0.755	0.768	0.772	0.801	0.821
F	724.7	673.7	483.2	370.1	351.2	333.3

Note: *, ** and *** indicate significance at the 10%, 5% and 1% significance levels respectively; the values in brackets are t-values. The same applies throughout.

5.3. Robustness Tests

To verify the accuracy of the core findings, this paper conducts robustness tests on the model primarily by re-estimating it with different explanatory variables, different time periods, and the inclusion of time fixed effects. The test results are presented in Table 5. Analysis of the regression results reveals that new-quality productivity is consistently significantly positive at the 1 per cent level, further validating the reliability of the core findings.

Table 5. Robustness Tests

	(1) Replacement of explanatory variables	(2) Changing the time period	(3) Add a fixed time period
NEW		0.855***	1.339***
		(3.74)	(4.96)
NEW2	8.771***		
	(6.14)		
FTD	1.718***	2.180***	1.876***
	(21.45)	(22.44)	(21.20)
GDP	0.00000344***	0.00000514***	0.00000558***
	(2.61)	(4.57)	(4.37)
GOV	0.884***	0.833***	0.768***
	(6.16)	(5.33)	(5.06)
INF	0.261***	0.271***	0.273***
	(9.31)	(9.62)	(9.63)
INN	-0.0805***	-0.123***	-0.156***
	(-4.43)	(-5.41)	(-6.88)
_cons	-2.556***	-2.442***	-2.445***
	(-7.20)	(-6.31)	(-6.80)
N	434	310	434
R^2	0.823	0.857	0.829
adj.R^2	0.821	0.855	0.821
F	331.3	303.5	105.4

5.4. Mechanism Testing

To verify the mechanism through which new-quality productive forces influence the competitiveness of China's manufacturing exports, this paper analyses the impact pathways, columns (1)–(3) present the regression results for the mediating effect of the level of industrialisation. Specifically, Model (1) presents the baseline regression results for new-quality productive forces on the export competitiveness of China's manufacturing sector; the results of Model (2) show that the regression coefficient for new-quality productive forces is 7.33 and passes the 1 per cent significance level test, indicating that new-quality productive forces have a significant promoting effect on the level of industrialisation; In Model (3), the regression coefficient for new-quality productive forces is 1.68 and passes the 10 per cent significance test; however, the estimated coefficient is lower than the 3.81 corresponding to Model (1), indicating that the direct effect of new-quality productive forces on the export competitiveness of China's manufacturing sector is lower than the overall effect. This confirms that the level of industrialisation mediates the relationship between new-quality productive forces and the export competitiveness of China's manufacturing sector; The level of industrialisation facilitates the role of new-quality productive forces in driving a leap in the competitiveness of China's manufacturing exports. This thereby validates Hypothesis 2.

Table 6. Mechanism Test

	(1) ECI	(2) IND	(3) ECI
IND			1.346***
			(6.19)
INS			
NEW	0.868***	0.356***	0.389*
	(3.81)	(7.33)	(1.68)
FTD	1.792***	-0.0455**	1.853***
	(20.76)	(-2.47)	(22.23)
GDP	0.00000666***	-0.00000109***	0.00000812***
	(5.75)	(-4.40)	(7.15)
GOV	1.028***	-0.0343	1.074***
	(7.00)	(-1.10)	(7.61)
INF	0.257***	0.0690***	0.164***
	(8.92)	(11.24)	(5.22)
INN	-0.0814***	-0.0202***	-0.0542***
	(-4.36)	(-5.08)	(-2.94)
_cons	-2.728***	-0.335***	-2.277***
	(-7.49)	(-4.31)	(-6.38)
N	434	434	434
R^2	0.814	0.554	0.829
adj.R^2	0.811	0.547	0.826
F	311.2	88.25	295.5

5.5. Heterogeneity Test

Table 7. Heterogeneity Test

	(1) East	(2) Centre	(3) West
NEW	0.809*	0.880***	0.299
	(1.97)	(3.00)	(1.30)
FTD	1.671***	1.922***	2.852***
	(10.03)	(9.02)	(21.93)
GDP	0.00000317	0.00000594***	0.00000214
	(1.33)	(5.35)	(1.59)
GOV	0.981	1.551***	0.0449
	(1.16)	(5.22)	(0.39)
INF	0.415***	0.150***	-0.0469*
	(7.00)	(8.01)	(-1.72)
INN	-0.0662	-0.0534***	0.0228*
	(-1.38)	(-3.29)	(1.77)
_cons	-4.460***	-1.912***	0.203
	(-4.96)	(-8.73)	(0.62)
N	154	112	168
R^2	0.714	0.709	0.816
adj.R^2	0.702	0.693	0.809
F	61.18	42.70	118.7

The 31 provinces (municipalities directly under the central government and autonomous regions) were categorised into eastern, central and western regions based on their geographical location. A grouped analysis was conducted to examine the impact of the level of new-quality productive forces on the competitiveness of manufacturing exports across China's provinces. The results indicate that the level of new-quality productive forces has a significant positive effect

in the eastern region at the 10 per cent significance level, with a coefficient of 1.97; in the central region, it has a significant positive effect at the 1 per cent significance level, with a coefficient of 3.00; in the western region, the effect was not significant.

5.6. Threshold Effect Test

To further verify whether there is a non-linear relationship between new-quality productive forces and the competitiveness of China's manufacturing exports, this paper conducts a panel threshold effect analysis using the level of urbanisation as the threshold variable. The regression results are shown in Table 8. Column (1) shows that when the level of urbanisation, as a threshold variable, is below the single threshold value of 0.8488, the regression coefficient of new-quality productive forces on China's manufacturing export competitiveness is 1.135; when the urbanisation rate crosses the single threshold value of 0.8488, the regression coefficient falls to –1.192, indicating diminishing marginal returns. It can be seen that, at different levels of urbanisation, the regression coefficient of new-quality productive forces on China's manufacturing export competitiveness varies significantly, indicating that the effect of new-quality productive forces in driving a leap in China's manufacturing export competitiveness exhibits diminishing marginal returns as the level of urbanisation continues to rise. This thereby validates Hypothesis 3.

Table 8. Threshold Effect Test

	(1) The threshold variable is UR
(UR≤0.8488)	1.135***
	(5.21)
(UR≥0.8488)	-1.192***
	(-3.75)
FTD	2.462***
	(19.07)
GDP	0.00000169*
	(1.83)
GOV	0.769***
	(7.22)
INF	0.193***
	(11.23)
INN	-0.0723***
	(-5.41)
_cons	-2.067***
	(-9.50)
N	434
R^2	0.883

6. Research Conclusions and Recommendations

This paper adopts mediation and threshold regression models based on 2010–2023 provincial panel data to analyse how new-quality productive forces affect manufacturing export competitiveness. Four core findings are obtained: First, new-quality productive forces significantly lift manufacturing export competitiveness. Second, industrialisation acts as a mediator, with its direct effect weaker than the total effect. Third, the impact shows regional heterogeneity: significantly positive in eastern and central regions yet insignificant in western China. Fourth, urbanisation has a threshold effect—the promotion effect turns negative once urbanisation exceeds the threshold, with diminishing marginal returns.

Corresponding policy suggestions are proposed as follows:

(1) Adopt differentiated regional strategies for manufacturing new-quality productive forces. Eastern areas should advance cutting-edge tech integration to build high-end manufacturing brands and lead industrial upgrading. Central regions shall undertake industrial transfer and develop featured manufacturing clusters matched with local advantages. Western regions need to fix infrastructure gaps and use fiscal incentives to attract innovation factors.

(2) Match urbanisation quality with manufacturing transformation. High-urbanisation areas shall optimise innovation carriers such as industrial incubators, while low-urbanisation regions improve public services to gather industrial talent. A dynamic monitoring mechanism is required to coordinate urbanisation and industrial development.

(3) Consolidate manufacturing innovation via industrialisation and talent-technology integration. Cultivate high-end skilled personnel, tackle core bottleneck technologies and develop high-value-added independent products. Build integrated innovation platforms to lower SMEs' participation costs and boost overall industrial innovation efficiency.

(4) Advance high-standard opening-up to upgrade global value chain status. Improve export product quality and brand value, expand diversified markets under the Belt and Road Initiative, promote Chinese manufacturing standards globally, and build a secure, autonomous industrial supply chain.

(5) Upgrade integrated infrastructure for manufacturing transformation. Reduce logistics costs by renovating traditional transport networks, and deploy 5G, industrial internet and computing hubs to foster smart manufacturing and cross-border digital trade.

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References

[1] Huang, Q. H. (2024). New-quality productive forces and new industrialisation. Chinese Social Sciences, (06), 19–26. (In Chinese)

[2] Liu, W. (2024). A scientific understanding and practical development of new-quality productive forces. Economic Research Journal, 59(03), 4–11. (In Chinese)

[3] Ding, S. C., Wei, Y. D., & Zhang, F. Y. (2024). China's new-quality productive forces: Development level and characteristics of dynamic evolution. Statistics and Decision-Making, 40(10), 5–11. (In Chinese)

[4] Ren, Y. X., Wu, Y., & Wu, Z. (2024). Financial agglomeration, industry-university-research collaboration and new-quality productive forces. Theory and Practice of Finance and Economics, 45(03), 27–34. (In Chinese)

[5] Yan, B. (2006). FDI and China's export competitiveness: An analysis from the perspective of regional differences. Finance and Trade Economics, (08), 51–55. (In Chinese)

[6] Yang, X. M., & Gao, Z. G. (2019). A study on production capacity cooperation between China and Pakistan: An analysis based on industrial competitive advantages. Price Monthly, (09), 71–79. (In Chinese)

[7] Wang, L., & Li, H. Y. (2015). A study on the pathways for China's manufacturing sector to integrate into global value chains: A perspective on embedded position and value-added capacity. Chinese Industrial Economics, (02), 76–88. (In Chinese)

[8] Yuan, H. K., & Han, M. C. (2024). New-quality productive forces empowering the high-quality development of foreign trade: Theoretical logic and implementation pathways. International Trade, (03), 15–21. (In Chinese)

[9] Zheng, S. P., & Mao, L. (2024). New-quality productive forces, digital inclusive finance and the technological complexity of manufacturing exports. Contemporary Financial Research, 7(08), 1–19. (In Chinese)

[10] Huang, Z. S., Shan, L. T., & Xu, Z. (2024). The impact of the development of new-quality productive forces on the technological complexity of manufacturing exports. Price Monthly, (09), 70–80. (In Chinese)

[11] Yang, X. M., Kang, Z. Q., & Gao, Z. G. (2025). The impact and mechanisms of new-quality productive forces on export trade competitiveness. Price Monthly, (04), 27–37. (In Chinese)

[12] Liu, Q. L., Guo, T. Z., & Zhang, P. J. (2025). A study on the impact of new-quality productive forces on the international competitiveness of China's manufacturing sector: An empirical test of a mediation model moderated by the advancement of human capital. Dongyue Collection, 46(02), 72–81, 191–192. (In Chinese)

[13] Wang, J. (2024). Mechanisms and pathways for new-quality productive forces to empower the high-quality development of export trade. Contemporary Finance and Economics, (10), 113–122. (In Chinese)

[14] Jing, S. W., Zhou, Z. J., Hu, C. H., et al. (2025). The relationship between imports of digital services and the quality of export products. Technology and Economy. (In Chinese)

[15] Du, J. T., He, Y., & Gu, Q. N. (2022). The non-linear impact of digital inclusive finance on the upgrading of rural residents' consumption structure. Statistics and Information Forum, 37(09), 63–74. (In Chinese)

[16] Chen, H., & Liu, J. Y. (2020). The non-linear impact of infrastructure development in countries along the "Belt and Road" on China's foreign trade: A study based on a panel threshold model. International Business (Journal of the University of International Business and Economics), (04), 48–63. (In Chinese)

[17] Chen, J. Y., & Liu, Y. S. (2018). The impact of trade facilitation in "Belt and Road" countries on China's trade potential. World Economic Research, (09), 41–54, 135–136. (In Chinese)