Research on the Impact of New Quality Productivity on Resident Income Distribution from the Perspective of Macroeconomic Operation

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Abstract

The purpose of this paper is to explore the impact of new quality productivity on the distribution of residents' income. By constructing an econometric model, this study empirically examines the impact of new quality productivity on the distribution of residents' income and its mechanism of action using panel data from 31 provinces in China from 2010 to 2022. The results show that new quality productivity can significantly increase the level of income distribution among residents, and this conclusion still holds after considering the endogeneity problem and conducting a series of robustness tests. The mediation effect analysis further reveals that the new quality productivity contributes to the improvement of the income distribution of residents through increasing innovation incentives. Heterogeneity analysis shows that new quality productivity has a stronger effect on the income distribution of residents in the eastern, central and northeastern regions, and a weaker effect on the western region.

1. Introduction

With the advancement of globalization and scientific and technological progress, the wealth of the global society has continued to grow, but the problems of the gap between the rich and the poor and income inequality have also increased (Jin Fenglin, 2024). In developed countries, the share of labor income has declined, the personal income gap has widened, and the inequality of income distribution has risen (Karabarbounis et al., 2014). China also faces income distribution problems, and although the Gini coefficient declined for a time after 2010, it has risen again since 2016 and remains above the international warning line of 0.4 in 2021, reflecting that inequality has not been fundamentally resolved (Zhang Fan et al., 2022). In the aftermath of the epidemic, the incomes of Chinese households earning more than 300,000 yuan per year have continued to increase, while the incomes of households earning less than 50,000 yuan per year have shown negative growth, further highlighting the social gap between the rich and the poor. Against this

background, the report of the 20th Party Congress emphasized that the core of Chinese-style modernization is to achieve common prosperity for all people, which is the essential requirement of socialism with Chinese characteristics. In order to build Chinese-style modernization and achieve common prosperity, it is necessary to raise the level of productive forces and promote the leap of productive forces through the innovation of production technology, so as to increase the income of the whole society and achieve the goal of "making the cake bigger". After achieving this initial goal, China needs to further optimize the structure of income distribution and reasonably "share the cake".

With the deepening development of economic globalization, the new quality of productive forces, while promoting economic growth, has also had a far-reaching impact on the labor market, capital flows and income distribution (Wang Yumei et al., 2024). Especially in the context of the current global economic restructuring and industrial upgrading, the impact of new quality productivity on the distribution of residents' income is particularly prominent. Therefore, an in-depth study of the impact of new quality productivity on the distribution of residents' income is of great significance for the formulation of rational macroeconomic policies and the promotion of social equity and sustainable economic development.

Therefore, this study aims to explore how new-quality productivity affects macroeconomic operations and further analyze its specific role on residents' income distribution. Through the study, this paper expects to provide policymakers with a theoretical basis to help them better understand the impact of new-quality productivity on the economy and society, so that they can formulate more effective policy measures to promote balanced economic development and social equity and justice.

2. Literature Review

In contrast to traditional productivity, new quality productivity aligns with the demands of the contemporary era, incorporating fresh knowledge, mastering novel processes, developing innovative products, harnessing new momentum, expanding emerging markets, and fulfilling the evolving needs of the populace, embodying a qualitative leap and rich connotations in productivity advancement (Luo Jianwen, 2024). Grasping the new quality of productive forces necessitates an understanding rooted in the emerging phenomena, challenges, and reforms within China's economic development, efficiently managing the dynamic equilibrium between supply and demand, productivity and production relations (Gao Fan, 2023), capital and labor income, as well as the real economy and finance. At the macro level, researchers have developed a comprehensive evaluation framework to assess new quality productivity indicators, encompassing four core dimensions: industrial innovation systems, economic support structures, talent provisioning systems, and future industrial development paradigms (Wu Wensheng et al., 2024). At the micro level, scholars have formulated a micro-enterprise level indicator system based on the two-factor theory of productivity, comprising four sub-factors: active labor, embodied labor, hard technology, and soft technology. The entropy method is employed to quantify new quality productivity (Song Jia et al., 2024). Additionally, scholars have constructed integrated indicator systems for green productivity, technological productivity, and digital productivity, utilizing an enhanced entropy weight TOPSIS method to determine the weighting of new quality productivity (Lu Jiang et al., 2024).

Research on income inequality primarily focuses on disparities in income, with a steadily growing body of related literature. Extensive empirical evidence from international studies indicates that income inequality has been rising in both developed and industrializing countries since the late 20th century (Steven N. Kaplan et al., 2010). Recent investigations have attributed

the intensification of income inequality largely to technological advancements and globalization, particularly digital globalization and competition from low-wage economies (Katrin Huber et al., 2019). Acemoglu and Restrepo's research revealed that 50%-70% of changes in the US wage structure over the past four decades were driven by the relative decline in wages for workers in industries undergoing rapid automation. Given that technology and human capital are complementary in production, a competitive labor market fosters a positive distribution effect between technology and labor, where complex tasks are matched with workers possessing higher levels of human capital. Consequently, technological changes directly impact the labor market, influencing employment and wage income (David H. Autor et al., 2013).Domestic scholars emphasize that reforming the distribution system is a pressing issue in social development, and that China's income distribution reform should be guided by Marxist theory (Zhang Xinchang et al., 2024). From a productivity perspective, scholars generally concur that the development of new quality productivity is a pivotal force driving high-quality economic development. It also serves as a crucial means to promote the equitable distribution of social wealth and achieve the harmonious unity of fairness and efficiency (Hou Guanyu et al., 2024; Li Jianhua, 2024).

Based on the research on the impact of new quality productivity on the distribution of residents' income, scholars have discussed the direct impact (Yang Wenbo et al., 2024) and indirect impact (Ma Wenwu et al., 2024). New-quality productivity realizes fair employment opportunities and improves the national income distribution system through improving the efficiency of resource allocation, expanding the scale of employment (Liang Xiaocheng et al., 2024), strengthening institutional innovation (Huang Maoxing et al., 2024), and promoting the reform of education (Zhang Xiusheng et al., 2024), and thus promotes the common wealth. At the same time, in order to promote the reasonable distribution of social wealth, Hou Guanyu (2024) and other scholars have proposed that we need to start from the macro and micro aspects, and steadily promote the common wealth by adjusting the trade pattern, optimizing the industrial structure, cultivating strategic talents, and strengthening the synergistic cooperation with the enterprises and the society.

Certainly, despite the existing research that has explored the relationship between productivity and income distribution, there remains a notable dearth of studies examining the influence of new quality productivity on residents' income distribution through macroeconomic frameworks. Much of the current scholarly output primarily underscores the impetus provided by productivity advancements for economic growth, while lacking a thorough examination of the impact of new quality productivity on income distribution.Additionally, significant variations exist in the development levels, economic compositions, and policy landscapes related to new quality productivity across diverse regions. These regional disparities can potentially alter the dynamics between new quality productivity and income distribution, posing a question that warrants further in-depth exploration.Therefore, this article endeavors to dissect the ramifications of fostering new quality productive forces on residents' income distribution from a macroeconomic standpoint, leveraging the existing body of literature. By elucidating the macroeconomic mechanisms through which new quality productivity affects income distribution, this study intends to furnish empirical support for sustainable social development and propose pertinent countermeasures and recommendations.

3. Theoretical analysis and research hypotheses

3.1. The contribution of new quality productivity to the distribution of income among the population

As a new type of productivity that improves production efficiency and product quality

through technological innovation, management innovation and organizational innovation, new quality productivity has a significant role in promoting the growth of residents' disposable income (Zhuang Hongquan, 2024). Firstly, it makes it possible to produce more products or provide more services per unit of time by improving production efficiency, thus enhancing the profitability of enterprises, which in turn may increase the income of residents by means of wage growth and bonus distribution (Li Zhanfeng et al., 2024). Secondly, the application of new technologies reduces production costs, which not only helps to reduce the prices of goods and services and increase the purchasing power of consumers, but also indirectly increases the disposable income of residents (Yang Wenbo et al., 2024). In addition, new quality productivity encourages innovation and the development of new products and services to meet consumer demand, and these high value-added products and services can bring consumers a better quality of life, thus increasing the income level of residents (Chen Hong et al., 2024).

At the same time, the development of new quality productivity is also accompanied by the emergence of new industries and new business forms, which provide more opportunities for employment and entrepreneurship and increase the employment income and entrepreneurial income of residents (Sheng Yi et al., 2024). With the optimization of the economic structure, the competitiveness of the overall economy has been improved, and the economic growth has also indirectly promoted the growth of residents' disposable income (Shen Kunrong et al., 2024). As a form of productivity characterized by high technology, high quality and high efficiency, the new quality productivity profoundly affects the pattern of residents' income distribution from different dimensions (Xian Chengyi et al., 2024). Based on the above analysis, this paper proposes research hypothesis H1:

H1: New-quality productivity helps to improve the distribution of residents' income

3.2 New quality productivity, incentives for innovation and income distribution among the population

As the core driving force of modern economic and social development, the essence of the new quality productivity lies in the deep integration of technological innovation and industrial upgrading, which not only significantly improves the total factor productivity, but also provides a strong support for the high-quality development of the economy (Yuan Zeming et al., 2024). In this process, innovation incentives play a crucial role (Gu Xin et al., 2024). Through the dual role of market mechanism and policy guidance, innovation incentives provide enterprises with strong R&D motivation and technological innovation support, thus accelerating the commercialization of scientific and technological achievements and promoting the optimization and upgrading of industrial structure (Wang Wang et al., 2023).

The development of new quality productivity not only enhances production efficiency and optimizes the allocation of production factors, but more importantly, it spawns technological progress and industrial upgrading, providing more high-quality employment opportunities for residents (Li Jiansen et al., 2024). This often has a strong demand for high-skilled personnel, prompting a shift in the labor force structure to high-skilled, high value-added direction, which in turn raises the income level of residents (Zhang Xuanming et al., 2024). At the same time, under the effect of market competition, the employment structure of some traditional industries is also undergoing profound changes, although the demand for low-skilled labor is decreasing, the demand for high-skilled labor is increasing, which alleviates the employment pressure to a certain extent, and also provides more sources of income for residents (Fang Ying et al., 2024). In addition, the development of new quality productivity also promotes the optimization of income distribution structure (Zhou Shaodong, 2024). On the one hand, technological innovation and industrial upgrading make the contribution of production factors more reasonably rewarded,

which helps to reduce the inequality of income distribution (Namaia et al., 2024); on the other hand, the government further regulates income distribution through redistributive means such as taxation and social security, which ensures that the general public can share the fruits of development (Zhou Qiang et al., 2024). Based on the above analysis, this paper proposes the research hypothesis H2:

H2: New-quality productivity contributes to the improvement of residents' income distribution through innovation incentives.

4. Research Design

4.1. Model setup

Based on the above analysis, the following basic econometric model is constructed in order to test the effect of the new quality productivity level on residents' disposable income:

$$disincome_{i,t} = \alpha_0 + \alpha_1 Npro_{i,t} + \sum_{k=1}^{n} \eta_k Control_{i,t} + \mu_i + \gamma_t + \varepsilon_{i,t} \qquad (1)$$

where i denotes province and t denotes year; denotes the disposable income of residents of province i in year t; denotes the level of development of new quality productivity in province i in year t; denotes a series of control variables; denotes province fixed effects; is a time fixed effect; and is a random perturbation term.

4.2. Description of variables

4.2.1. explanatory variable

The explanatory variable in this paper is the distribution of residents' income (disincome). It is measured by the ratio of urban to rural disposable income per capita.

4.2.2. Core explanatory variables

The core explanatory variable in this article is new quality productivity (Npro). This study adopts the methodology of scholars such as Lu Jiang and Guo Ziang (2024) to establish an evaluation framework for new quality productivity, grounded in three key indicators: green productivity, technological productivity, and digital productivity. Technological productivity is measured from two dimensions: technological advancement and innovative capacity. Green productivity is characterized by its environmental friendliness and resource efficiency. Digital productivity is assessed from the perspectives of industrial digitalization and the digital industry. Ultimately, a comprehensive indicator system for new quality productivity is constructed, and this article employs an enhanced entropy weight TOPSIS method to assign weights to the indicators, thereby obtaining a national-level assessment of new quality productivity development.

Table 1 Index System of New Quality Productivity

Grade 1	Grade 2	Serial number	Grade 3	Explanation	Unit	Attribute
Technological productivity	Innovative productivity	A1	Innovative R&D	Number of domestic patents granted	Piece	+
		A2	Innovative industries	Business income from high-tech industries	Ten thousand dollars	+
		A3	Innovative products	Industrial Innovation Funding for Regulated Industrial Enterprises	Ten thousand dollars	+
	Technological productivity	A4	Technical efficiency	Labor productivity of industrial enterprises	%	+

				on a regular basis	
	A5	Technical Research and Development	Full-time equivalents of R&D personnel in industrial enterprises on a regular basis	Hourly	+
	A6	Technical production	Robot mounted raw density	%	+
Resource-efficient productivity	B1	Energy intensity	Energy consumption/GDP	%	-
	B2	Energy structure	Fossil energy consumption/GDP	%	-
	B3	Water intensity	Fossil energy consumption/GDP	%	-
Green Productivity	B4	Utilization of waste materials	Comprehensive utilization/generation of industrial solid waste	%	+
Environmentally friendly productivity	B5	Wastewater discharge	Industrial wastewater discharges/GDP	%	-
	B6	Exhaust emission	Industrial SO2 emissions/GDP	%	-
Digital industry productivity	C1	Electronic Information Manufacturing	IC production	Ten thousand dollars	+
	C2	Telecommunications business communications	Total telecommunication services	Ten thousand dollars	+
Digital productivity	C3	Internet penetration	Number of Internet broadband access ports	piece	+
	C4	Software service	Revenue from software operations	Per person	+
Industry Digital Productivity	C5	Digital information	Length of fiber optic cable lines/area	Per meter	+
	C6	E-commerce	E-commerce sales	Ten thousand dollars	+

4.2.3. Control variables

This article utilizes the research conducted by Zhang Chunhua and colleagues (2023) and selects the subsequent control variables: industrial composition (IC), indicated by the ratio of secondary industry value-added to tertiary industry value-added; human capital accumulation (HCA), quantified by the enrollment figures in formal higher education institutions; healthcare provision, gauged by the number of regional health institution beds; the extent of urban infrastructural development (roads) is assessed through the per capita urban road area; economic development status (lnGDPpc), determined by the logarithm of per capita regional GDP; the scale

of infrastructural development (lninfra) is reflected by the logarithm of per capita urban road area; and the level of external openness (lnforex) is calculated as the proportion of total import and export volume of foreign-invested enterprises to regional GDP.

4.2.4. Mediating variable

The mediating variable selected in this paper is innovation incentives (INNOV), which is measured by the number of invention patent applications of industrial enterprises above scale with reference to the studies of LIN Chun (2024) and Du Chuanzhong (2020).

4.3. Data sources and descriptive statistics

The data presented in this article are derived from various sources, including the "China Statistical Yearbook," "China Energy Statistical Yearbook," and provincial statistical yearbooks. The analysis covers the period from 2010 to 2022. Utilizing balanced panel data from 31 provinces in China (excluding Hong Kong, Macao, and Taiwan), the descriptive statistics of the data are displayed in Table 1. The table reveals that the mean value of residents' income distribution stands at 2.5847, proximity to both its maximum and minimum values suggests, to a certain extent, a relatively equitable and comprehensive distribution of residents' income.

Table 2 conducted a correlation analysis on the indicators and found a strong correlation between the level of new quality productivity and residents' income distribution. Therefore, this study is consistent with statistical experience.

Table 2: Basic statistical characteristics of major variables

Variables	N	Mean	SD	Min	Median	Max
disincome	403	2.5847	0.3956	1.8266	2.5236	3.7349
Npro	403	0.1937	0.1766	0.0267	0.1432	0.8768
ist	403	0.8721	0.2867	0.1893	0.8409	1.8973
hcl	403	90.1826	57.8673	3.1100	76.5700	288.5500
medical	403	23.9139	16.1698	0.8400	20.2200	76.9800
road	403	16.2665	5.0173	4.0400	15.9200	26.8400
lngdp	403	10.8093	0.4893	9.4636	10.7929	12.1564
lninfe	403	10.5185	1.1442	7.8505	10.5097	14.3353
lnexinsum	403	6.0576	2.2816	-2.5455	6.6112	9.5894

Table 3: Correlation Analysis

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
(1) disincome	1.000								
(2) Npro	-0.300***	1.000							
(3) ist	0.117**	-0.058	1.000						
(4) hcl	-0.381***	0.587***	0.214***	1.000					
(5) medical	-0.304***	0.497***	0.127**	0.948***	1.000				
(6) road	-0.199***	-0.024	0.096*	0.264***	0.286***	1.000			
(7) lngdp	-0.612***	0.561***	-0.432***	0.285***	0.237***	0.115**	1.000		
(8) lninfe	-0.203***	0.377***	0.241***	0.625***	0.610***	0.082*	0.076	1.000	
(9) lnexinsum	-0.581***	0.537***	0.060	0.451***	0.306***	-0.142***	0.455***	0.350***	1.000

5. Empirical analysis

5.1. Benchmark regression results

Table 4presents the benchmark regression outcomes concerning the influence of new quality productivity on residents' income distribution. Column (1) demonstrates that the coefficient for new quality productivity, without incorporating any control variables, is 0.281, which is statistically significant at the 1% level. Upon sequentially introducing control variables, it is evident that the coefficient for new quality productivity remains significantly positive at the 1% level, suggesting that advancements in new quality productivity contribute positively to enhancing residents' income distribution. Thus, Hypothesis H1 is confirmed.

Table 4: Benchmark Regression Results

Variables	(1) disincome	(2) disincome	(3) disincome	(4) disincome	(5) disincome	(6) disincome	(7) disincome	(8) disincome
Npro	0.281***	0.374***	0.494***	0.415***	0.328***	0.300***	0.289***	0.300***
	(0.086)	(0.084)	(0.085)	(0.090)	(0.086)	(0.083)	(0.084)	(0.085)
ist		-0.183***	-0.245***	-0.219***	-0.215***	-0.117***	-0.121***	-0.118***
		(0.030)	(0.032)	(0.033)	(0.032)	(0.036)	(0.036)	(0.036)
hcl			-0.001***	-0.002***	-0.002***	-0.002***	-0.002***	-0.002***
			(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
medical				0.004***	0.004**	0.006***	0.006***	0.006***
				(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
road					-0.011***	-0.008***	-0.008***	-0.008***
					(0.002)	(0.002)	(0.002)	(0.002)
lngdp						-0.300***	-0.300***	-0.307***
						(0.058)	(0.058)	(0.058)
lninfe							0.087	0.088
							(0.094)	(0.094)
lnexinsum								0.004
								(0.006)
Province fixed	YES	YES	YES	YES	YES	YES	YES	YES
Year fixed	YES	YES	YES	YES	YES	YES	YES	YES
N	403	403	403	403	403	403	403	403
R²	0.975	0.977	0.979	0.979	0.981	0.983	0.983	0.983

Note: *, * *, * * * respectively indicate significance at the 1%, 5%, and 10% levels, with standard errors in parentheses. The table below is the same

5.2. Robustness test

This article employs the following two approaches for robustness verification: (1) tail truncation processing. Given the potential non-randomness and the risk of outliers in the data influencing the results, a 1% tail truncation is applied to all variables in this study. (2) Exclusion of municipalities directly under the central government. Considering the distinctive development characteristics and policy focus of municipalities directly under the central government, this article excludes Shanghai, Beijing, Tianjin, and Chongqing from the analysis and conducts regression analysis on the remaining samples. The outcomes indicate that after undertaking a series of robustness checks, the estimated coefficient of new quality productivity on residents' income distribution remains largely unchanged, thereby fully validating the robustness of the conclusions presented in this paper.

Table 5: Robustness test

Variables	(1) shrinkage treatment	(2) Municipalities
Npro	0.300***	0.174*
	(0.085)	(0.090)
ist	-0.118***	-0.120***
	(0.036)	(0.036)
hcl	-0.002***	-0.002***
	(0.000)	(0.000)
medical	0.006***	0.008***
	(0.002)	(0.002)
road	-0.008***	-0.004**
	(0.002)	(0.002)
lngdp	-0.307***	-0.279***
	(0.058)	(0.059)
lninfe	0.088	0.187*
	(0.094)	(0.103)
lnexinsum	0.004	0.001
	(0.006)	(0.006)
Year fixed	YES	YES
Province fixed	YES	YES
N	403	351
R^2	0.983	0.984

5.3. Endogeneity problem
5.3.1. GMM test

The development of new quality productivity and the improvement of residents' income distribution exhibit a mutual influence, where advancements in new quality productivity enhance income distribution, and in turn, better income distribution fosters higher expectations for new quality productivity. This interplay may introduce a reverse causal relationship and omitted variable issues, leading to endogeneity problems. To mitigate these concerns, this article adopts the methodology outlined by Han Wenlong et al. (2024) and applies differential GMM and systematic GMM to assess the causal link between the two. The results are summarized in Table 6. Notably, the Hansen test for the GMM model fails to reject the null hypothesis at the 10% significance level, indicating no over-identification of instrumental variables. Furthermore, after accounting for endogeneity, it is evident that the level of new quality productivity continues to significantly contribute to the improvement of residents' income distribution.

Table 6: GMM test

Variables	(1) Differential GMM	(2) System GMM
L.disincome	1.081***	0.876***
	(0.112)	(0.144)
Control variables	YES	YES
Province fixed	YES	YES
Year fixed	YES	YES
N	403	403

	0.762	0.953
AR(2) P	0.762	0.953
Hansen test P	0.503	0.157
Wald chi2	——	595145.34 (0.000)

5.3.2. instrumental variable approach

Although the benchmark model controls for variables that may have confounding effects on the pits of residents' income distribution, there may be measurement errors in the indicators of new quality productivity, which in turn biases the estimation of the effect between new quality production and residents' income distribution; in addition, the high and low levels of residents' incomes may inversely affect the development of new quality productivity, and thus the results of the benchmark regression model may be inaccurate. Based on this, this paper draws on the study of Chen Haibo (2024) and others to regress the new quality productivity with a two-period lag as an instrumental variable, and the results are shown in Table 7. The weak IV results show that the Cragg-Donald Wald F-values are all greater than the Stock-Yogo critical value at the 10% level, which passes the weak instrumental variable test; the identifiable K-Paark LM statistic is significant at the 1% level, which means that the original hypothesis is rejected and the identifiability of the instrumental variable is satisfied. These results indicate that the regression coefficients of new quality productivity on the distribution of residents' income are all significant after considering the endogeneity issue, suggesting that the results of the benchmark regression are somewhat robust.

Table 7: Instrumental variable tests

Variables	first Npro	second disincome
L2.Npro	0.571*** (0.0353)	
Npro		0.302** (0.126)
ist	0.0427** (0.0195)	-0.151*** (0.0407)
hcl	-0.000432* (0.000232)	-0.00170*** (0.000479)
medical	0.00256*** (0.000879)	0.00377** (0.00189)
road	0.000232 (0.000813)	-0.00971*** (0.00165)
lngdp	0.0612* (0.0327)	-0.167** (0.0667)
lninfe	-0.0157 (0.0442)	0.0769 (0.0894)
lnexinsum	-0.00680** (0.00312)	-0.0116* (0.00650)
Anderson canon. corr. LM statistic	161.17***	161.173***
Cragg-Donald Wald F statistic	261.71（16.38）	261.709(16.38)
Province fixed	YES	YES

	Year fixed	YES	YES
	N	341	341

5.4. Mechanism analysis

Based on the above analysis, this paper believes that the development of new quality productive forces will improve the income distribution of residents through innovation incentives. To test the above mechanism, this paper builds a stepwise mediation model based on Model (1):

$$M_{i,t} = \alpha_0 + \alpha_1 Npro_{i,t} + \sum_{k=1}^{n} \eta_k Control_{i,t} + \mu_i + \gamma_t + \varepsilon_{i,t} \qquad (2)$$

$$lnopt_{i,t} = \alpha_0 + \alpha_1 Npro_{i,t} + \alpha_2 M_{i,t} + \sum_{k=1}^{n} \eta_k Control_{i,t} + \mu_i + \gamma_t + \varepsilon_{i,t} \qquad (3)$$

where M is the mediating variable and the other variables are the same as before.

New quality productivity is often accompanied by the application of new technologies, which can inspire enterprises to develop new products and services to meet market and consumer needs. Through innovation incentives, new-quality productivity can stimulate the motivation and creativity of laborers, improve production efficiency, and thus increase the source of income and income level of residents. Table 8 column (2) is the mediation effect regression results of innovation incentives, from which it can be seen that the estimated coefficient of new quality productivity on innovation incentives (INNOV) is 6.856, which is significant at 1% level, indicating that innovation incentives are the mechanism of positive effect of the new quality productivity affecting the distribution of income of the residents, i.e., the new quality productivity can increase innovation incentives through the increase of the distribution of income of the residents, the hypothesis H2 has been proved.

Table 8: Mechanism analysis

	(1)	(2)
Variables	disincome	innov
Npro	0.300***	6.586***
	(0.085)	(0.975)
ist	-0.118***	0.458
	(0.036)	(0.416)
hcl	-0.002***	0.006
	(0.000)	(0.005)
medical	0.006***	0.071***
	(0.002)	(0.018)
road	-0.008***	-0.054***
	(0.002)	(0.021)
lngdp	-0.307***	-2.428***
	(0.058)	(0.668)
lninfe	0.088	2.899***
	(0.094)	(1.075)

lnexinsum	0.004	-0.089
	(0.006)	(0.069)
Province fixed	YES	YES
Year fixed	YES	YES
N	403	403
R2	0.983	0.895

5.5. Heterogeneity analysis

Based on the classification criteria set by the National Bureau of Statistics, this article categorizes provinces into four regions: eastern, central, western, and northeastern, for heterogeneity testing. The outcomes are presented in Table 9. Generally, the influence of new quality productivity on residents' income distribution is more pronounced in the eastern, central, and northeastern regions compared to the western region. The plausible explanation for this observation lies in the fact that the eastern region, benefiting from its earlier reform and opening-up policy, boasts a higher level of economic development, a relatively comprehensive industrial structure, and a well-established market system. These attributes create a favorable backdrop and prerequisites for fostering new quality productivity. Conversely, in the western region, the later initiation of economic development and its relatively lower level have resulted in a weaker foundation for the advancement of new quality productivity. Consequently, this to some extent constrains the ability of new quality productivity to enhance residents' income distribution in the western region.

Table 9: Analysis of Heterogeneity

	(1)	(2)	(3)	(4)
Variables	East	Central section	West	Northeast
Npro	0.277^{**}	0.237^{**}	-0.169	1.580^{***}
	(0.105)	(0.098)	(0.301)	(0.515)
ist	0.164^{**}	-0.123^{**}	-0.267^{***}	0.152^{**}
	(0.079)	(0.057)	(0.070)	(0.055)
hcl	-0.002^{***}	-0.002^{***}	-0.003^{***}	-0.005^{**}
	(0.000)	(0.001)	(0.001)	(0.002)
medical	0.003^{**}	0.003	0.005	0.013
	(0.002)	(0.002)	(0.003)	(0.009)
road	-0.005^{*}	-0.003	0.004	-0.024^{***}
	(0.003)	(0.003)	(0.003)	(0.006)
lngdp	-0.295^{***}	-0.148	-0.234^{**}	0.442
	(0.108)	(0.134)	(0.113)	(0.264)
lninfe	-0.249^{**}	-0.052	0.269	0.319
	(0.116)	(0.323)	(0.199)	(0.204)
lnexinsum	0.049^{*}	-0.052^{***}	0.017^{**}	-0.003
	(0.027)	(0.012)	(0.007)	(0.031)
Province fixed	YES	YES	YES	YES
Year fixed	YES	YES	YES	YES
N	130	78	156	39
R^2	0.983	0.990	0.983	0.997

6. Conclusion and Policy Suggestions

This article employs panel data from 31 provinces in China spanning the years 2010 to 2022 to empirically examine the impact and underlying mechanisms of new quality productivity on residents' income distribution. The research findings indicate that the development of new quality productivity can markedly elevate the level of residents' income distribution. Importantly, this conclusion remains valid even after addressing endogeneity concerns and conducting a range of robustness tests. Further heterogeneity analysis reveals that the effect of new quality productivity in enhancing residents' income distribution is more potent in the eastern, central, and northeastern regions, whereas it exhibits a weaker influence in the western region. These findings highlight the regional disparities in the ability of new quality productivity to improve income distribution among residents.

Based on the above conclusions, this article proposes the following suggestions:

Firstly, we must accurately comprehend the novel attributes and status of productivity, and enhance the advancement of productivity characterized by new qualities. The research findings reveal that the evolution of productivity with new qualities exerts a notable stimulatory influence on residents' income allocation. Consequently, both governmental bodies and enterprises ought to deepen their understanding of productivity with new qualities and establish its pivotal role in economic development. More specifically, initiatives such as augmenting investment in research and development, fostering innovation, and nurturing the growth of high-tech industries can be implemented to facilitate the cultivation and expansion of productivity with new qualities. Simultaneously, emphasis should be placed on upgrading the competencies and qualifications of the workforce to align with the shifts resulting from the progression of productivity with new qualities. Furthermore, while the progression of productivity with new qualities contributes positively to augmenting residents' income, it may also potentially intensify income disparities. Hence, it is imperative to establish and refine the income distribution system to uphold equity in income allocation. This encompasses measures such as elevating the minimum wage standards, reinforcing labor rights protections, and regulating income distribution via taxation and other methodologies to mitigate the wealth disparity.

Second, it stimulates market innovation and improves market competitiveness. The intermediation effect suggests that new-quality productivity can enhance the distribution of residents' income through innovation incentives. Therefore, the government should build a perfect innovation incentive mechanism, such as setting up a special innovation fund to support the R&D and innovation activities of enterprises, universities and scientific research institutions in the field of new qualitative productivity, and at the same time provide tax incentives and subsidy policies to reduce the cost of innovation and stimulate the motivation of the main body of innovation. In addition, a reward system for innovation achievements should be established to recognize and reward enterprises, teams and individuals that have made significant breakthroughs in the field of new quality productivity, so as to create an atmosphere of innovation in the whole society. Secondly, it is necessary to optimize the innovation environment, strengthen the protection of intellectual property rights, improve the relevant laws and regulations, and protect the legitimate rights and interests of the main body of innovation. At the same time, it is necessary to build an innovation platform for new quality productivity, promote the in-depth integration of industry, academia, research and utilization, and promote the transformation and application of innovative achievements. In addition, publicity and education on innovation culture should be strengthened to cultivate innovation awareness and innovation spirit in the whole society. In promoting the transformation and application of innovation achievements, the construction of mechanisms for the transformation of innovation achievements should be strengthened, the transformation of innovation achievements into real-life productive forces should be promoted, the economic and

social benefits of innovation achievements should be improved, and enterprises should be encouraged to adopt new technologies, processes and equipment, so as to enhance the value-added of their products and their competitiveness in the market, and to push forward the leapfrog development of new quality productive forces. In addition, it is necessary to further improve the social security system, provide stable social security and welfare support for the main bodies of innovation, narrow the income distribution gap, and realize high-quality economic development and social harmony and stability.

Third, the implementation of differentiated new quality productivity development strategies. Heterogeneity analysis shows that new quality productivity has a stronger effect on raising the income distribution of residents in the eastern, central and northeastern regions, and a weaker effect on the western region. Therefore, differentiated new quality productivity development strategies need to be formulated for the economic foundation and resource conditions of different regions. Targeted policy measures should be tailored according to the economic foundation, resource endowment, technological advantages and market demand of different regions. Specifically, the eastern region, with its strong economic strength, rich talent reserves and powerful scientific research capabilities, should continue to strengthen the development of high-tech industries, encourage enterprises to increase investment in R&D, accelerate the transformation of scientific and technological achievements, and promote the industry to a higher level. The central region, on the other hand, needs to seize the opportunity of industrial upgrading to enhance the competitiveness and value-added of traditional industries through technological transformation and model innovation, and at the same time, strengthen vocational education and skills training to provide a solid human resources guarantee for the nurturing and development of new quality productivity. For the northeast region, it should make full use of its rich natural resources, profound industrial foundation and unique geographical location to develop characteristic and emerging industries and promote the transformation and sustainable development of resource-oriented cities. The government should introduce relevant policies to support technological innovation and industrial upgrading of enterprises, and at the same time strengthen regional cooperation to realize resource sharing and complementary advantages. In the western region, due to the relatively weak infrastructure, the government needs to further increase investment, optimize resource allocation, comprehensively improve the level of transportation, communication, energy and other infrastructure, so as to lay a solid foundation for the development of new productivity, such as through the policy guidance and market mechanism, to attract capital, technology and talent to the western region, and promote the rapid development of the regional economy.

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