

# Vocational Education, Labor Income Share and Common Prosperity

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**Abstract:** Based on the index system of vocational education level and common prosperity in China, this paper calculates the index of vocational education level and common prosperity in China from 2011 to 2021 by entropy weight method, and tests the relationship between vocational and technical education, labor income share and common prosperity. The results show that the improvement of vocational education level will not directly promote common prosperity, vocational education level helps to improve the income share of workers, and has a significant positive effect on common prosperity under the interaction of vocational education and labor income share, and labor income share is an important mechanism, thus inhibiting the negative impact of vocational and technical education on common prosperity. In addition, the influence of vocational education on common prosperity shows significant regional differences, and the level of economic growth, urbanization and entrepreneurial activity are also important factors affecting regional common prosperity.

**Keywords:** Vocational education; Labor income share; Common prosperity; Mediating effect; Interaction terms

## 1. Introduction

Since the reform and opening-up policy, China's economic development has made great achievements. In 2022, the total GDP is more than 300 times of that at the beginning of reform and opening-up. Under the dual production organization and industrial development mode, the direct urban-rural consumption gap and urban-rural savings gap derived from the urban-rural income gap are the direct epitome of the urban-rural gap, and then derive the indirect urban-rural education gap, medical and health service gap and social insurance gap. Some scholars believe that under the effect of market mechanism, the government has not effectively corrected the inherent weakness of agricultural production organization and industrial development level while putting forward the dual development strategy of urban and rural areas. The gathering of production factors to cities leads to the widening gap between urban and rural areas, which has become an important social problem.

Narrowing the income gap between urban and rural areas and promoting common prosperity have become another historical mission at the current stage of development. Common prosperity is based on economic prosperity and takes narrowing the income gap as the only way<sup>[1]</sup>. Narrowing the income gap between urban and rural areas is the source of narrowing all other social gaps between urban and rural areas. There is no doubt that a person's education level determines his income level and consumption level in a certain sense<sup>[2]</sup>, and the effective way to solve the income gap between urban and rural areas, improve the income level of rural labor force, and then realize common prosperity is to carry out vocational education. The education model of vocational education with technology and skills as the main body is deeply consistent with common prosperity. According to the relevant research of Mycos Research Institute, 51% of Chinese vocational college graduates come from farmers and migrant workers' families, 12.7% come from poor areas and 22.2% come from western regions. Vocational education can improve the income level of rural labor force by improving its technical skill level. First, through the inheritance of vocational technical skills, it can transform labor force into human resource advantage, increase the income share of workers, and then effectively block the intergenerational transmission of poverty. The second is to broaden the channels for getting rich, empower the new ecology of rural industry with technology, serve the revitalization of rural areas and narrow the gap between urban and rural areas<sup>[3]</sup>. Combined with China's development practice, what is the impact of current vocational

education on common prosperity? Furthermore, when the development level of vocational education is improved, to what extent can vocational education promote common prosperity by increasing the income of workers? Answering the above questions will help to deeply understand the strategic role of vocational education development and enrich the theoretical research and practical exploration of common prosperity, but the relevant research is relatively scarce.

According to the existing research, some scholars have studied the synergistic interaction between vocational education and common prosperity in China<sup>[4]</sup>. Most scholars believe that vocational education is helpful to realize rural revitalization, narrow the gap between urban and rural areas and promote economic growth. In terms of rural revitalization, Lin Yifu believes that the key to narrowing the urban-rural gap lies in narrowing the urban-rural income gap. Vocational education improves the income of rural population by improving the skill level of workers, which is very important to narrow the urban-rural income gap<sup>[3]</sup>. Obviously, on the premise of educational equity, the improvement of the scale and quality of vocational education will significantly reduce the gap between urban and rural areas<sup>[5]</sup>, while the rural birth group is obviously at a disadvantage in terms of access to educational opportunities, especially in the post-compulsory vocational education stage, which has been verified by relevant scholars<sup>[6-7]</sup>. It can be seen that in order to realize common prosperity, the gap between urban and rural areas must be narrowed. However, the key to realize common prosperity still lies in how to improve the income of laborers. Unfortunately, there is still no path and effect test for vocational education to promote common prosperity by increasing the income of laborers. In view of this, this paper will explore the impact of vocational education on labor income share, test the intermediary effect of vocational education on common prosperity through labor income share, and further investigate the regional heterogeneity, in order to test vocational education can influence the degree of common prosperity by affecting the share of labor income, and provide strong support for the realization of common prosperity.

Specifically speaking, this paper constructs a theoretical analysis framework from the perspective of common prosperity based on the characteristics of vocational education. On this basis, this paper measures the vocational education index and the development level of common prosperity in 31 provinces, municipalities, and autonomous regions in China from 2011 to 2021, and uses various measurement methods to verify the influence of vocational education on common prosperity and its mechanism with the income share of workers as the intermediary variable. This paper has three possible marginal contributions: Firstly, based on the existing literature, this paper discusses the fundamental problem of how vocational education affects common prosperity, and discusses the relationship between vocational education and common prosperity from a more detailed perspective; Secondly, the paper comprehensively evaluates the effect of vocational education on labor income share and labor income share on common prosperity, and deepens the existing literature. Thirdly, in the process of research, the interaction between vocational education and labor income share is used to compare the different characteristics of the impact of vocational education on common prosperity in different regions. Compared with previous studies, the regional heterogeneity of the impact of vocational education on common prosperity can be measured more accurately.

## **2. Theoretical analysis and research hypothesis**

Common prosperity is the basic goal of Marxism. Eliminating poverty, improving people's livelihood and gradually realizing common prosperity for all people are the essential requirements of socialism. The research on vocational education and common prosperity is still in its infancy, and the focus is mainly on the following aspects.

### **2.1 Index measurement of common prosperity**

At present, the research results on the establishment and measurement of common prosperity index system are relatively rich. Scholars mostly measure the synergy degree of current common prosperity from the perspective of prosperity and sharing. Chen Lijun<sup>[8]</sup> et al.(2021) constructed the common prosperity index model from three perspectives of development, sharing and sustainability, which provides support for accurately identifying the process of common prosperity. In addition, Liu Peilin<sup>[9]</sup> et al.(2021) described the degree of affluence from four aspects: per capita national income level, per capita wealth holding level, social welfare security level and total labor productivity level, and described the sharing degree from per capita gap, regional gap and urban-rural gap. This indicator system created conditions for scientifically measuring the development level of common prosperity in each region. Sun Hao and Cao Xiaoye<sup>[10]</sup>(2022) followed the same research idea, but the research perspective was more

detailed, depicting the common prosperity degree of Chinese provinces and evaluating it from the perspective of international comparison. There are also a few scholars who use county statistical data to analyze the spatio-temporal evolution process, laws and characteristic results of poverty alleviation and common prosperity in the original contiguous poverty-stricken areas, and measure the common prosperity degree of ethnic areas and provinces<sup>[11]</sup>. This is the basis for studying the logical relationship between vocational education and common prosperity, but it is worth noting that the income level of the poor is more worthy of attention than the measurement of common prosperity.

## **2.2 Vocational Education and Urban-Rural Income Gap**

Under the background of common prosperity, the income gap between urban and rural areas needs to be solved urgently. After the elimination of absolute poverty, the problem of relative poverty has become prominent. According to the calculation standard of relative poverty population, the relative poverty population in rural China is close to 200 million. Relative poverty and the excessive income gap between urban and rural workers are the direct reflection of the imbalance between urban and rural development in China. Scholars have tested the impact of education on urban-rural income gap from multiple perspectives. Different levels of education have different impacts on urban-rural income gap. Scholars generally believe that the labor force with vocational education can narrow the urban-rural income gap<sup>[3,12]</sup>, and the expansion of vocational education scale and improvement of quality will significantly reduce the urban-rural income gap<sup>[5]</sup>. Lin Yifu (2007) believes that the contribution of vocational education to narrowing the income gap between urban and rural areas lies in: firstly, rapidly increasing farmers' income by improving the productivity of agricultural labor force; secondly, improving the technical skills of rural non-agricultural industry transfer labor force to adapt to the changing employment structure and technical structure of cities<sup>[3]</sup>. However, some scholars based on different research data have concluded that higher education shows a trend of widening the income gap between urban and rural areas in both the short and long term<sup>[13]</sup>. There is a significant positive correlation between vocational education and the increase of labor income<sup>[14]</sup>. Vocational education promotes the creation of wealth for low-income groups by carrying out vocational skills training and training and conveying talents with new technologies and new knowledge and skills, which is one of the most direct and effective ways to alleviate relative poverty.

## **2.3 Labor Income Share and Common Prosperity**

The income of laborers is usually composed of labor income and property income. Increasing the income of rural labor force is an important way to narrow the income gap between urban and rural areas<sup>[14]</sup>. Farmers are the majority of low-income groups and lack property, human capital, technology and income-generating capacity. According to the China Household Income Survey (CHIP) in 2013, the property share of the 10% households with the most wealth in China was 160 times that of the 10% households with the least wealth, and the property income was more concentrated in the hands of high-income people. Under the premise that the property gap between residents will continue to widen and no corresponding policy measures to adjust the property gap will be issued in the short term, how to improve the labor income share of workers is particularly important. Based on the micro-survey data of China Household Financial Survey Database ("CHFS2019"), the degree and mechanism of vocational education affecting the growth of residents' wage, (Feng Huimin et al., 2022)<sup>[15]</sup>. The conclusion shows that vocational education can improve the wage of workers, but the impact on the wage level of different workers is heterogeneous and presents a "U" relationship.

Vocational education has great potential in the process of wealth creation towards common prosperity. However, the existing research on vocational education and common prosperity is still in a state of separation, the relevant research on the logical relationship between vocational education, labor income share and common prosperity is relatively scarce, and the research on the joint point of vocational education and common prosperity is relatively weak. How to establish the training mechanism of vocational talents to realize common prosperity deserves further study by scholars.

## **3. Study Design**

### **3.1 Model Construction**

In order to test the above research hypothesis, the following basic model is constructed for the transmission mechanism of the influence of vocational education level on common prosperity:

$$Cmw_{i,t} = \alpha_0 + \alpha_1 Pedu_{i,t} + \alpha_c Z_{i,t} + \varepsilon_{i,t} \quad (1)$$

In formula (1),  $Cmw_{i,t}$  is the common wealth level of the province in the period,  $Pedu_{i,t}$  is the vocational education development level of the province in the period,  $Z_{i,t}$  is a series of control variables, and  $\varepsilon_{i,t}$  is a random disturbance term.

Formula (1) discusses the direct effect of vocational education on common prosperity. In order to discuss the possible mechanism of vocational education affecting common prosperity, according to theoretical analysis, whether labor income share is the intermediary variable between vocational education and common prosperity need to be tested. The specific inspection steps are as follows, based on the linear regression model (1), if the coefficient  $\alpha_1$  passing the significant test, construct the linear regression equation between the vocational education level ( $Pedu$ ) and the intermediate variable labor income share ( $Share$ ), and constructed the linear regression equation between common wealth index ( $Cmw$ ) and vocational education level ( $Pedu$ ), labor income share ( $Share$ ) and its cross-term ( $Pedu \times Share$ ),  $\beta_1, \gamma_1, \gamma_2, \gamma_3$  represent related coefficients and the established regression model is shown in Equations (2) and (3):

$$Pedu_{i,t} = \beta_0 + \beta_1 Share + \beta_2 Z_{i,t} + \varepsilon_{i,t} \quad (2)$$

$$Cmw_{i,t} = \gamma_0 + \gamma_1 Pedu_{i,t} + \gamma_2 Share_{i,t} + \gamma_3 Pedu_{i,t} \times Share_{i,t} + \gamma_c Z_{i,t} + \varepsilon_{i,t} \quad (3)$$

### 3.2 Variable measurement and description

#### 3.2.1 Common Wealth Index ( $Cmw$ )

Common prosperity is a long-term basic national policy of our country, and the time sequence of common prosperity should be lengthened. On the regional series, if the time series is lengthened, the statistical caliber of statistical yearbook may be inconsistent and the data of some regions may be missing, among which Tibet is the most obvious. Because of the lack of data of many indicators, most researchers will exclude it from the evaluation object. However, Tibet, as a place where ethnic minorities live in compact communities, is a place where China can overcome difficulties in realizing the strategy of common prosperity. It is obviously not in line with the purpose of the study to exclude it from the evaluation object of common prosperity. In addition, from the connotation of common prosperity, common prosperity is an all-round shared prosperity including material foundation, regional coordination, income distribution regulation, environmental protection, spiritual culture, education, health, etc. Therefore, based on the existing research on vocational education and common prosperity<sup>[4, 8, 16]</sup>, we try to construct a common prosperity index system with wealth, commonality, and sustainability as the core, as shown in Table 1. Based on establishing the index system of common prosperity, the common prosperity index of 31 provinces, municipalities and autonomous regions is calculated by entropy weight method, and the average value of each region is obtained according to the division method of eastern, central, and western regions. Meanwhile, considering the particularity of ethnic areas on the road of realizing common prosperity in China, the average value of common prosperity index of ethnic areas is also listed.

*Table 1 Index system of common prosperity index*

First-level index	Second-level index	Measurement Index	Attribute
Richness Degree	Resident income.	Per capita disposable income of residents (yuan).	+
	Resident consumption.	Per capita consumption Expenditure of residents (Yuan).	+
	Engel coefficient.	Proportion of food expenditure to total consumption expenditure (%).	-
	Urbanization.	Urbanization rate (%).	+
	Density of durable goods.	Average number of household cars per 100 households at the end of the year (cars).	+
	Education level.	Average number of students in colleges and universities per 100,000 population (person).	+
	Basic public service.	Average number of beds per 10,000 people in medical	+

		institutions (Zhang).	
	Social security.	Social Endowment Insurance Fund Expenditure for Urban and Rural residents per 100,000 population (Yuan).	+
<b>Common Degree</b>	Income gap between urban and rural areas.	Per capita disposable income of urban residents / average disposable income of rural residents (%).	-
	Regional income gap.	Per capita disposable income of regional residents / per capita disposable income of national residents (%).	-
	Consumption gap between urban and rural areas.	Per capita consumption expenditure of urban residents / per capita consumption expenditure of rural residents (%).	-
	Regional public service gap.	Urban per capita beds in medical institutions / rural per capita beds in medical institutions (%).	-
	Degree of educational inequality.	Per capita education expenditure for urban primary and secondary school students / rural primary and secondary school students (%).	-
	Elasticity of residents' income growth.	Per capita disposable income growth rate / regional GDP growth rate (%).	+
	Elasticity of increase in labourers' remuneration.	Growth rate of labourers' compensation / regional GDP growth rate (%).	+
	Proportion of financial expenditure on people's livelihood.	Proportion of local financial expenditure on education, health care, social security and employment to local budget expenditure (%).	+
<b>Sustainability</b>	Scientific and technological innovation.	RD input intensity (%).	+
		Number of patents granted per 10,000 people (pieces).	+
	Ecological environment.	Forest coverage (%).	+
		Carbon emission intensity (yuan / person).	-
	Development quality	Per capita GDP (CNY / person).	+
		Labor productivity (yuan / person)	+

Note: Vocational education includes higher vocational education and secondary vocational education. "+" stands for positive index, "-" stands for negative index. The data in this paper are standardized.

According to the evaluation results of common prosperity index in Table 2, the common prosperity index of 31 provinces, municipalities and autonomous regions in China shows a stable growth trend. The average value of China's common prosperity index in 2011 is 0.183, and the average value of China's common prosperity index in 2021 is 0.347, indicating that China's common prosperity level is also increasing with the economic growth, with a growth rate of 89.72%. At the same time, the average value of China's common prosperity index from 2011 to 2021 of 31 provinces, municipalities and autonomous regions in China is sorted. The top five provinces and municipalities are Beijing, Zhejiang, Shanghai, Guangdong and Jiangsu, with common prosperity index of 0.44, 0.37, 0.35, 0.34 and 0.33 respectively. Considering the special circumstances of Beijing and Shanghai as municipalities directly under the Central Government, Beijing and Shanghai are excluded. Zhejiang Province is with the highest common prosperity index. This is the same as the research conclusion of other scholars <sup>[17]</sup>. Hainan, Guizhou, Gansu, Qinghai and Tibet have lower common prosperity index, which are 0.20, 0.20, 0.19, 0.17 and 0.11 respectively. It can be seen that the level of common prosperity in a region is often affected by the level of regional economic development, and the more economically developed regions, the higher the degree of common prosperity. In addition, in the comprehensive score of common prosperity, there is a certain gap among the eastern, central and western regions, 0.31 in the eastern region, 0.24 in the central region, 0.22 in the western region and 0.22 in the ethnic minority areas.

*Table 2 Ranking of Common Prosperity Index of 31 Provinces in China from 2011 to 2021 by Province*

<b>District</b>	<b>2011</b>	<b>2013</b>	<b>2015</b>	<b>2017</b>	<b>2019</b>	<b>2021</b>	<b>Average</b>	<b>Rank</b>
Beijing	0.33	0.36	0.41	0.44	0.51	0.58	0.44	1
Zhejiang	0.26	0.32	0.36	0.38	0.42	0.51	0.37	2
Shanghai	0.27	0.28	0.32	0.36	0.41	0.49	0.35	3
Guangdong	0.24	0.27	0.31	0.35	0.41	0.51	0.34	4
Jiangsu	0.23	0.28	0.31	0.33	0.38	0.50	0.33	5
Xinjiang	0.28	0.32	0.32	0.35	0.36	0.26	0.32	6
Tianjin	0.23	0.26	0.30	0.32	0.38	0.44	0.32	7
Fujian	0.20	0.23	0.27	0.29	0.32	0.39	0.28	8
Shandong	0.19	0.23	0.26	0.28	0.31	0.39	0.27	9
Liaoning	0.20	0.23	0.24	0.27	0.30	0.34	0.26	10
Shaanxi	0.19	0.23	0.26	0.27	0.30	0.33	0.26	11
Hubei	0.17	0.20	0.23	0.25	0.29	0.35	0.25	12
Inner Mongolia	0.18	0.20	0.23	0.26	0.29	0.33	0.24	13
Shanxi	0.18	0.21	0.24	0.24	0.26	0.31	0.24	14
Chongqing	0.16	0.20	0.23	0.25	0.28	0.33	0.24	15
Sichuan	0.16	0.20	0.23	0.25	0.27	0.33	0.24	16
Ningxia	0.17	0.19	0.22	0.25	0.28	0.32	0.24	17
Guangxi	0.17	0.19	0.23	0.25	0.27	0.29	0.23	18
Yunnan	0.18	0.20	0.22	0.23	0.26	0.29	0.23	19
Hebei	0.16	0.19	0.22	0.24	0.27	0.33	0.23	20
Hunan	0.16	0.19	0.21	0.23	0.26	0.33	0.23	21
Jiangxi	0.16	0.18	0.21	0.23	0.27	0.34	0.23	22
Anhui	0.15	0.19	0.21	0.22	0.26	0.33	0.23	23
Heilongjiang	0.18	0.20	0.21	0.22	0.25	0.29	0.22	24
Jilin	0.18	0.19	0.21	0.22	0.26	0.29	0.22	25
Henan	0.14	0.18	0.20	0.22	0.25	0.32	0.21	26
Hainan	0.15	0.17	0.19	0.20	0.23	0.29	0.20	27
Guizhou	0.13	0.16	0.18	0.20	0.23	0.28	0.20	28
Gansu	0.13	0.15	0.18	0.19	0.21	0.24	0.19	29
Qinghai	0.11	0.14	0.16	0.18	0.21	0.25	0.17	30
Tibet	0.05	0.07	0.10	0.12	0.15	0.18	0.11	31
Whole Country	0.183	0.21	0.24	0.26	0.29	0.347	0.26	/
<b>Eastern Region</b>	0.22	0.26	0.29	0.31	0.36	0.43	0.31	
<b>Middle Region</b>	0.17	0.20	0.22	0.24	0.27	0.33	0.24	
<b>West Region</b>	0.16	0.19	0.21	0.23	0.26	0.28	0.22	
<b>Ethic Minority</b>	0.16	0.18	0.21	0.23	0.26	0.28	0.22	

Data source: Calculated by STATA software.

### 3.2.2 Vocational education level index ( $Pedu$ )

The high-quality development of vocational education is mainly reflected in the development scale of vocational education and the training quality of skilled talents [16]. The scale of vocational education is measured by the regional density of vocational skilled people and the talent structure of vocational education at all levels and types. The training quality of vocational education is reflected in the investment of education funds and education expenses of vocational education on the one hand, and the quality of running vocational education and the professional quality of students on the other hand. Measured by the ratio of students to teachers and the proportion of vocational qualification certificates. The index system for measuring China's vocational education level index ( $Pedu$ ) is shown in Table 3.

*Table 3 Index system of vocational education level*

First-level index	Secondary index	Measurement index	Attribute
Vocational education level	Educational scale	Number of students in various vocational schools per 100,000 population (person).	+
		Proportion of students in higher vocational education and secondary vocational education (%).	+
		The proportion of higher vocational education in general higher education (%).	+
	Investment in education	Expenditure on education per student (10,000 yuan per person).	+
		Per student general public budget expenditure on education (ten thousand yuan per person).	+
		Per student education expenditure index (per student education expenditure / per capita GDP).	+
	Quality of education	Student-teacher ratio in higher vocational schools (%).	-
		Student-teacher ratio in secondary vocational schools (%).	-
		Proportion of secondary vocational school graduates with vocational qualification certificates (%)	-

The index of vocational education level is calculated by entropy weight method, and the development index of vocational education in 31 provinces, municipalities and autonomous regions of China from 2011 to 2021 is calculated, which is shown in Table 4. According to the general situation of vocational education development in Table 4, the development level of vocational education in China has maintained a steady upward trend in recent years, and the average value of vocational education development index has increased from 0.199 in 2011 to 0.309 in 2021, an increase of 55%; At the same time, there are obvious regional differences in the development level of vocational education, and the vocational education level in regions with higher economic development level is also higher. In 2011, Beijing, Shanghai, Jiangsu, Tianjin and Zhejiang were the regions with better development level of vocational education in China, and Beijing, Shanghai, Guangdong, Tianjin and Zhejiang were the regions with better development level of vocational education in 2021. Studies have shown that capital and skills are complementary<sup>[18]</sup>. The hypothesis of "capital-skill complementarity" holds that skilled workers have stronger adaptability to advanced technology, and industrial development in economically developed regions usually has higher capital investment, which makes economically developed regions need more skilled workers in the process of technological upgrading, thus affecting regional human capital structure and income share of workers.

*Table 4 Statistical description of the development level of vocational education in China*

Year	Observations	Average	Standard Deviation	Minimum	Maximum
2011	31	0.199	0.039	0.147	0.338
2012	31	0.217	0.041	0.144	0.347
2013	31	0.229	0.049	0.150	0.382
2014	31	0.240	0.072	0.150	0.500
2015	31	0.263	0.083	0.171	0.549
2016	31	0.271	0.063	0.186	0.503
2017	31	0.287	0.088	0.199	0.588
2018	31	0.297	0.087	0.202	0.622
2019	31	0.301	0.085	0.221	0.698
2020	31	0.294	0.077	0.191	0.620
2021	31	0.309	0.071	0.228	0.575
Total	341	0.264	0.078	0.144	0.698

### 3.2.3 Labor income share (*Share*)

From the existing literature research, labor income distribution is usually measured by labor income share as the basic data. Regional differences in education investment and quality affect the skill structure of the labor force, which in turn affects the labor force's share of income<sup>[18]</sup>. Vocational education further

improves the bargaining power and wage level of high-skilled labor<sup>[19]</sup>, which in turn changes the income share of skilled workers. The measurement of labor income share is measured at the micro level by the ratio of the cash paid by the enterprise for the employees in the current period divided by the total operating income<sup>[20]</sup>, and at the macro level, it is usually measured by the proportion of labor income in the national income<sup>[21]</sup> and the income distribution index taking into account efficiency and fairness<sup>[22]</sup>. Based on the availability of data, the indicator is measured using the "GDP" method of labor income share.

### 3.2.4 Control variables

In order to more comprehensively measure the effect of vocational education on common prosperity, it is also necessary to set control variables that may have an impact on common prosperity, as follows: Industrial structure (*Stru*), measured by the proportion of tertiary industry in GDP; The level of regional economic growth (*Gdpi*) is measured by the logarithm of regional industrial added value; The level of entrepreneurial activity (*Entrep*), drawing on the research ideas of Zhao Tao et al.<sup>[23]</sup>, uses the number of private and self-employed enterprises and their employment effects to measure the entrepreneurial activity at the provincial level. The level of urbanization (*Density*) is measured by the logarithm of population density, that is, the ratio of population to regional area.

### 3.3 Data sources and descriptive statistics

Based on the availability of data and the reliability of the study, the time range of panel data research in this paper is defined in 2011-2021, and the research objects involve 31 provinces and cities (including Tibet, Xinjiang, Chongqing and other provinces and cities). Relevant data of common prosperity index system and vocational education index system in Table 1 and Table 3 come from China Statistical Yearbook, China Social Statistical Yearbook, China Education Statistical Yearbook, China Education Expenditure Statistical Yearbook, China Energy Statistical Yearbook, Annual Report on Higher Education Quality, provincial statistical yearbooks and bulletins. Other control variables come from EPS database, and some missing data are supplemented by interpolation method.

Table 5 Descriptive statistical results of variables

	Variables	Observations	Average	Stranded Deviation	Minimum	Maximum
Explained variable	<i>Cmw</i>	341	0.255	0.0821	0.050	0.580
Explanatory variables	<i>Pedu</i>	341	0.255	0.0547	0.140	0.560
Mediation variables	<i>Share</i>	341	0.528	0.0897	0.270	0.730
Control Variables	<i>Stru</i>	341	0.497	0.0887	0.327	0.839
	<i>Lngdp</i>	341	0.413	0.174	-0.228	0.803
	<i>Entrep</i>	341	0.036	0.018	0.010	0.112
	<i>Density</i>	341	5.320	1.488	0.900	8.280

Table 6 Variable correlation test

Variables	<i>Cmw</i>	<i>Pedu</i>	<i>Share</i>	<i>Stru</i>	<i>Entrep</i>	<i>Lngdp</i>	<i>Density</i>
<i>Cmw</i>	1						
<i>Pedu</i>	-0.189***	1					
<i>Share</i>	-0.083*	0.397***	1				
<i>Stru</i>	-0.160***	0.715***	0.152***	1			
<i>Entrep</i>	-0.233***	0.390***	0.146***	0.476***	1		
<i>Lngdp</i>	0.068*	0.235***	0.393***	0.003	0.040	1	
<i>Density</i>	0.053*	-0.060	-0.202***	0.256***	0.253***	-0.123**	1

Table 5 describes the statistical results of variables. Table 6 reports the correlation coefficient of each variable in the model. It can be preliminarily seen that there is a significant correlation between vocational and technical education (*Pedu*) and the income level of workers (*Share*) and the common



prosperity index ( $Cmw$ ). From the direction of the coefficient in the table, the development of vocational education can improve the income proportion of labor force, but vocational and technical education cannot directly promote the realization of common prosperity. In addition, other control variables and common wealth also have significant correlation, indicating that the selected control variables are effective.

#### 4. An empirical study on the impact of vocational education on common prosperity

##### 4.1 Basic model regression results

In order to further explore the relationship between vocational and technical education, labor income share and common prosperity, it is necessary to test and measure with the help of relevant data, and the measurement results of gradually adding interaction terms and control variables are shown in Table 7.

*Table 7 Benchmark regression results of the impact of vocational and technical education on common prosperity*

Explanatory and control variables	Explained variable					
	(1)	(2)	(3)	(4)	(5)	(6)
<i>Pedu</i>	-0.627*** (0.123)	-0.350*** (0.126)	-1.044*** (0.331)	-0.974*** (0.37)	-1.145*** (0.381)	-1.017*** (0.318)
<i>Share</i>		-0.484*** (0.132)	-0.347** (0.158)	-0.350** (0.168)	-0.409** (0.170)	-0.395*** (0.148)
<i>Pedu × Share</i>			1.322** (0.586)	1.171* (0.658)	1.461** (0.681)	1.457** (0.577)
<i>lngdp</i>				0.060** (0.025)	0.061*** (0.024)	0.056*** (0.021)
<i>Density</i>					0.005** (0.002)	0.008*** (0.002)
<i>Entrep</i>						-0.986*** (0.155)
<i>C</i>	0.415*** (0.032)	0.564*** (0.062)	0.524*** (0.087)	0.504*** (0.0953)	0.515*** (0.100)	0.494*** (0.086)
<i>N</i>	341	341	341	341	341	341
<i>Numbers of ID</i>	31	31	31	31	31	31
<i>Adjusted R<sup>2</sup></i>		0.101				
<i>F</i>						

Note: \*\*\*, \*\*, and \* indicate significant at the 1%, 5%, and 10% levels, respectively, with numbers in () being standard errors and values in [] being P.

In column (1), the estimation coefficient of the core explanatory variable vocational education development index for common prosperity is significantly negative, which indicates that the higher the level of vocational education development, the farther away from the goal of achieving common prosperity, which is obviously not in line with the psychological expectations of ordinary people. After adding the labor income share in column (2), the regression results show that there is also a significant negative correlation between the labor income share and common prosperity, Zhang Jun et al. [24] (2022) believe that "affected by trade protectionism and the financial crisis, domestic independent innovation requires high-quality labor to match, and labor-biased technological progress is an important reason for the increase in labor income share". However, capital deepening has led to a faster increase in the marginal output of skilled labor than unskilled labor, and with the development of corporate governance and financial markets, skilled workers can have productive capital while participating in labor, and property income has become an important part of residents' income, which is the main source of income disparity [25]. In addition, skilled workers also tend to increase their vocational skills learning, and the income gap is further widened. Therefore, this is the reason for China's high Gini coefficient, which to a certain extent explains the important reason why the improvement of vocational and technical education level and the increase of labor income share will not effectively promote common prosperity. It can be seen that vocational and technical education can effectively improve the income level of skilled workers, and in order to further consider the partial effect of vocational and technical education and workers' income share on common prosperity, the interactive term of vocational education and income share is

introduced in columns (3)-(6) as one of the variables affecting common prosperity. Model (3) shows that when vocational and technical education has a negative impact on common prosperity, the partial effect of interaction terms on common prosperity is positive, and the improvement of vocational and technical education level will affect the income share of workers to a certain extent, thereby suppressing the negative impact of vocational and technical education on common prosperity.

For the control variables, the coefficient of regional economic growth level is significantly positive, and the main ways for the first rich regions to drive common prosperity in other regions: first, the spillover of economic growth between regions, and second, through transfer payments and counterpart support<sup>[26]</sup>, both of which require resumes on the accumulation of material data; The coefficient of urbanization is significantly positive, urbanization as the engine of China's economic growth, Wan Guanghua et al. <sup>[27]</sup> believe that the common prosperity effect of urbanization can promote the income and consumption level of rural residents and, urbanization is accompanied by the concentration of production factors such as talents and capital, and the demand for diversified factors in cities can improve the matching degree of skills and specialties and jobs, and accumulate experience through "learning by doing", thereby increasing employment opportunities and narrowing the income gap between urban and rural areas. In addition, in the process of urbanization, rural residents are transformed into urban residents, and under the demonstration effect of urban residents, the consumption level of urban and rural areas converges; Some scholars <sup>[23, 28]</sup> believe that innovation and entrepreneurship can inject new momentum into regional economic development to drive employment, thereby effectively promoting common prosperity. However, with the overall increase in the level of urban and rural entrepreneurship, the activity of urban entrepreneurship is much higher than that in rural areas.

#### 4.2 Robustness test

##### 4.2.1 Endogenous problems

For the possible endogenous problems, this paper uses the method of using the first period of vocational education lag as an explanatory variable for regression, and the regression results in column (1) in Table 8 are significantly negative at the level of 1% and are consistent with the previous benchmark regression results.

##### 4.2.2 Other robustness tests

*Table 8 Robustness test of the impact of vocational education on common prosperity*

Variables	Lag by one period (1)	Tail shrinking treatment (2)	Exclude municipalities(3)
<i>Pedu</i>		-0.179* (0.100)	-0.913* (0.492)
<i>L.Pedu</i>	-0.255*** (0.0907)		
<i>Share</i>		-0.032 (0.038)	-0.358* (0.210)
<i>Pedu × Share</i>			1.298 (0.874)
<i>lngdp</i>	0.110*** (0.0326)	0.061*** (0.022)	0.056*** (0.021)
<i>Density</i>	-0.0689 (0.0965)	0.006* (0.003)	0.006** (0.003)
<i>Entrep</i>	-1.042*** (0.270)	-0.983*** (0.172)	-0.907*** (0.204)
<i>Constant</i>	0.673 (0.501)	0.296*** (0.025)	0.476*** (0.117)
<i>Observations</i>	310		297
<i>Numbers of ID</i>	31	31	27
<i>R<sup>2</sup></i>	0.091		

Note: \*\*\*, \*\*, and \* indicate significant at the 1%, 5%, and 10% levels, respectively, the number in ( ) is standard error, and the value in [ ] is the P value.

In order to eliminate the adverse effects of outliers and non-randomness on the model, the robustness of the model was tested by tail shrinking treatment and excluding municipalities. After a 1% tail reduction of the main explanatory variables, the results are shown in column (2) of table 8. In addition, considering the special status and political bias of municipalities directly under the central government, the results of re-estimating the model after excluding Beijing, Shanghai, Tianjin and Chongqing are shown in column (3) of table 8.

#### 4.2.3 Intermediary effect testing

The results of the mediating effect of labor income share between vocational education and common prosperity are shown in Table 9. Base on the basis of column (1) in Table 9 ,we can confirm that vocational education has a significant negative impact on common prosperity, the impact of vocational education on the share of labor income in column (2) is significantly positive, indicating that vocational education can significantly increase the income share of workers, after adding the intermediary variable in column (3), the impact of vocational education on common prosperity is still significantly negative, but the impact of labor income share on common prosperity is not significant, after the introduction of the interaction of vocational education and common prosperity in column (4), The impact of vocational education and labor income share on common prosperity is significantly negative. Among them, assuming that other variables remain unchanged, an increase in the vocational education index by 1 unit directly leads to a decrease of 1.02 units in the common prosperity index, and at the same time, increases the share of labor income by 0.31 units, thereby indirectly increasing common prosperity by 0.45 ( $1.46 \times 0.31 \approx 0.45$ ) units, indicating that vocational education affects common prosperity by increasing the income share of workers.

*Table 9 Results of the mechanism of vocational education affecting common prosperity*

Variables	<i>Cmw</i> (1)	<i>Share</i> (2)	<i>Cmw</i> (3)	<i>Cmw</i> (4)
<i>Pedu</i>	-0.188** (0.088)	0.306*** (0.060)	-0.173* (0.093)	-1.017*** (0.318)
<i>Share</i>			-0.031 (0.056)	-0.395*** (0.148)
<i>Pedu</i> × <i>Share</i>				1.457** (0.577)
<i>lngdp</i>	0.0567** (0.025)	-0.113*** (0.022)	0.0615** (0.027)	0.056*** (0.021)
<i>Density</i>	0.00637** (0.003)	-0.232*** (0.060)	0.006** (0.003)	0.008*** (0.002)
<i>Entrep</i>	-0.996*** (0.271)	0.821*** (0.168)	-0.986*** (0.271)	-0.986*** (0.155)
<i>C</i>	0.282*** (0.028)	1.701*** (0.311)	0.294*** (0.035)	0.494*** (0.086)
<i>N</i>	341	341	341	341
<i>Numbers of ID</i>	31	31	31	31

Note: \*\*\*, \*\*, and \* indicate significant at the 1%, 5%, and 10% levels, respectively, the number in ( ) is standard error, and the value in [ ] is the P value.

#### 4.2.4 Further analysis: regional heterogeneity

There is regional heterogeneity in the development level of vocational education and its impact on common prosperity in the eastern, central and western regions, and the impact of regional vocational education development differences on common prosperity is detailed in Table 10 (1)-(3).

The results show that the impact coefficient of vocational and technical education on common prosperity in the eastern region is significantly negative at the level of 1%, and the impact of vocational education on common prosperity in the central and western regions is not significant, in general, the improvement of vocational education level in different regions will inhibit the development process of common prosperity to a certain extent, and the increase of labor income share in different regions has no significant impact on common prosperity, but basically the regression coefficient is negative, and the increase of labor income share inhibits common prosperity in reverse, which is consistent with the basic conclusion of overall regression. The impact coefficient of the interaction between vocational education and labor income share on common prosperity in the eastern region was significantly positive at the level

of 10%, while the return result in the central and western regions was not significant. The reason for this difference may be that vocational education tends to have a higher level of development in economically developed areas, higher employment opportunities and lower opportunity costs of mobility, which makes workers who have received vocational education have more opportunities to obtain higher labor remuneration, and the "learning by doing" and "following" effects will also enable low-skilled workers to actively receive more vocational education, thereby accelerating the process of common prosperity.

*Table 10 Regional heterogeneity analysis of the impact of vocational and technical education level on common prosperity*

Variables	Eastern (1)	Middle (2)	Western (3)
<i>Pedu</i>	-0.905*** (0.332)	-0.630 (1.226)	-0.816 (0.810)
<i>Share</i>	-0.178 (0.177)	-0.059 (0.607)	-0.421 (0.310)
<i>Pedu</i> × <i>Share</i>	0.942* (0.553)	0.334 (2.590)	1.442 (1.198)
<i>lngdp</i>	0.147*** (0.031)	0.088*** (0.030)	0.007 (0.039)
<i>Density</i>	0.030*** (0.004)	-0.008 (0.006)	0.0098** (0.004)
<i>Entrep</i>	-1.387*** (0.329)	-0.541 (0.799)	-1.141*** (0.417)
<i>Stru</i>	-0.077* (0.044)	-0.126 (0.250)	0.033 (0.203)
<i>C</i>	0.319*** (0.094)	0.474 (0.358)	0.465*** (0.176)
<i>N</i>	121	99	121
<i>Numbers of ID</i>	11	9	11

Note: \*\*\*, \*\*, and \* indicate significant at the 1%, 5%, and 10% levels, respectively, the number in ( ) is standard error, and the value in [ ] is the P value.

In addition, from the perspective of various instrumental variables, the regression coefficient of economic growth level to common prosperity in the eastern and central regions is significantly positive at the level of 1%, indicating that the improvement of regional economic development level is the basis for achieving common prosperity. In addition, the impact of urbanization level on common prosperity in the eastern and western regions is significantly positive, while the return results in the central region are not significant, which may be due to the more obvious spatial spillover effect in areas with higher urbanization levels. The impact of entrepreneurial activity on common prosperity in the eastern, central and western regions is significantly negative, and the upgrading of industrial structure cannot effectively achieve common prosperity.

## 5. Conclusions and policy recommendations

### 5.1 Research conclusions

On the basis of measuring the common prosperity index and the vocational education level index, the relationship between vocational and technical education, labor income share and common prosperity was measured, the findings are as follows:

First, from the basic regression results, the estimation coefficient of vocational education on common prosperity is significantly negative, and the correlation coefficient between labor income share and common prosperity is also significantly negative. This is because the development of education in a region is still subject to the inconsistency of regional economic growth, there is still a great imbalance in the degree of education improvement in economically backward and economically developed areas, and for the vast economically underdeveloped areas of China, the proportion of people receiving higher education to the total population of the region is still low. Vocational education can obviously increase the income level of workers, but in the current situation in China, that urban and rural education are still independent, the higher the education level of the population has more labor income, capital income will increase correspondingly, so vocational education will not converge the level of common prosperity

between regions.

Second, from the perspective of the intermediary test effect, the impact of vocational education on the share of labor income is significantly positive, indicating that vocational education can increase the income share of workers. Furthermore, when the share of labor income was used as the mediating variable, the impact of vocational education on common prosperity was still significantly negative, but the impact of labor income share on common prosperity was not significant. However, from the theoretical analysis, it can be seen that vocational education affects common prosperity by affecting the share of labor income, and in order to further verify, the interactive terms of vocational education and labor income share are introduced to significantly negatively affect the share of labor income on common prosperity, indicating that the improvement of vocational and technical education level will affect the income share of workers to a certain extent, thereby inhibiting the negative impact of vocational and technical education on common prosperity.

Third, from the perspective of the control variables affecting common prosperity, the level of regional economic growth, urbanization level, and entrepreneurial activity level will affect common prosperity. The coefficient of economic growth level affecting common prosperity is positive, economically developed areas drive the development of surrounding underdeveloped areas through economic spillover, urbanization level affects common prosperity coefficient is positive, urbanization increases employment opportunities through the concentration of production factors, and improves the skill level of labor force through "learning by doing", thereby increasing employment and reducing urban and rural income levels. In addition, the impact of innovation and entrepreneurship on common prosperity is negative, because innovation mostly occurs in cities with more concentrated production factors, and the difference in entrepreneurial activity between urban and rural areas is not conducive to the realization of common prosperity.

## **5.2 Policy recommendations**

In view of the conclusions, it can be seen that vocational education can significantly increase the income level of workers, and the increase of workers' income level will not significantly promote common prosperity or even have a negative impact, but the interaction between vocational education and labor income has a significantly positive impact on common prosperity, which can inhibit the negative impact of the increase in the income share of workers on common prosperity. To this end, in order to enhance the contribution of vocational education to common prosperity, we should focus on the following aspects.

### **5.2.1 Clarify the impact of different types of vocational education on common prosperity**

Secondary vocational education and higher vocational education are two different types of vocational education, usually the labor force in first-tier cities has relatively rich basic education and higher education resources, the proportion of labor force receiving higher vocational education is relatively high, and the industrial economy is more backward areas, the labor market for skilled talents acceptance ability is weak, secondary vocational education is a "passive" choice for labor to obtain human capital accumulation. Different types of vocational education are affected by factors such as regional education resources, and the process of common prosperity is also different. Therefore, when formulating policies related to vocational education, it is necessary to clarify the differences in the types of vocational education.

### **5.2.2 Promote the regional development of vocational education on the share of labor income and reduce regional disparities**

Differentiated measures are taken according to the differences in labor income shares in different regions, and corresponding policy support is given to provinces with relatively low labor income shares, so as to promote the flow of labor factors between different regions and narrow regional differences. Promote the efficient allocation of production factors, improve the regional coordinated development mechanism, reshape the economic geographical pattern, and narrow the regional differences in labor income share.

### **5.2.3 Deepen the reform of the income distribution system and improve the factor income distribution system**

Ensure the coordination of the income distribution ratio of labor and other factors, and rationalize the allocation among various factors. On the one hand, it is necessary to persistently improve China's income distribution system with distribution according to work as the main body and promote the formation of

a fairer and more reasonable income distribution system. On the other hand, it is necessary to deepen the reform of the labor market system and ease the distortion of factor market prices. Through deepening the reform of the income distribution system, improve the factor income distribution system, and coordinate the regional development of labor income share.

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