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Transportation Infrastructure and Common Prosperity from the Perspective of Chinese-Style Modernization: Enabling Effects and Advancement Paths

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Abstract: "Common prosperity depends on development, and development comes first in transportation." Achieving common prosperity is the essential requirement for Chinese-style modernization under the construction of a sustainable transportation power country. Based on China's 30 provincial panel data from 2001 to 2021, this paper calculates the common prosperity index under modernization construction and uses the fixed-effect model and bootstrap mediation effect analysis method to examine the impact and promotion path of transportation infrastructure empowering common prosperity (mediating effect). The study found that transportation infrastructure has a significant enabling effect on common prosperity, and the higher the level of common prosperity, the stronger this effect. After a variety of robustness tests, the conclusion is still reliable. The specific path is that transportation infrastructure further strengthens its role in empowering common prosperity through the four intermediaries of economic growth, factor flow, industrial upgrading, and market expansion. Except for the complete intermediary effect of factor flow, the other intensity ratios are all at 65% or above. In addition, there is heterogeneity in the impact of transportation infrastructure on common prosperity, which is reflected in the significant effect in areas with large urban populations, eastern regions, and first-tier or former new first-tier cities. To this end, a quadrilateral orientation focusing on "economy, factors, industries, and markets" is proposed, with dense transportation networks and regional differentiation as the focus of sustainable transportation development, providing empirical support for promoting common prosperity.

Keywords: Chinese-style modernization; transportation infrastructure; common prosperity; intermediary effect; sustainable development

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1. Introduction

"Common prosperity" and "transportation power" are distinct themes and strong needs for development in the new era, and they have always been important strategies affecting livelihood and development of China's people. Firmly grasping the new development concept of Chinese-style modernization is a strategic requirement for building a sustainable transportation power, and it is also the need of a better era to accelerate the realization of common prosperity for all people. Common prosperity is the essential requirement of socialism and an important feature of Chinese modernization; The construction of a powerful transportation country is an industrial pillar that plays a fundamental, leading and strategic role in the national economy. Chinese-style modern transportation puts forward higher requirements for construction, operation, and services. It is an important guarantee for promoting social sustainability and economic high quality and is also a "booster" and "accelerator" for realizing common prosperity. The report of the 20th National Congress of the Communist Party of China clearly stated that we should comprehensively promote Chinese-style modernization with the focus on building a strong country and achieving common prosperity for all people. In the modernization drive, the

pioneers of Chinese-style modernization with transportation as the link have made remarkable achievements. "If you want to get rich, build roads first", "Transportation + Poverty Alleviation", "Transportation serves agriculture, rural areas and farmers" and "Transportation + Technology" are all manifestations of transportation infrastructure construction to common prosperity. China is in a critical period of socialist construction. Transportation is an important support and pioneer in promoting social development. Common prosperity is the starting point and focus of modernization. Sustainable development urgently requires the "strong alliance" of the two. At present, we must deeply implement the history of building a transportation powerhouse and solidly promote common prosperity. At this stage, how to clarify the key role and path of transportation infrastructure in promoting common prosperity will be of more practical significance.

Transportation has always been the backbone in supporting poverty alleviation, increasing income, improving people's livelihood, and enhancing balanced development, and transportation infrastructure with transportation as the core is the fundamental guarantee for promoting common prosperity for the people. A more interesting question is whether transportation infrastructure directly affects common prosperity, or in what way transportation infrastructure mainly promotes common prosperity, and which path is more obvious. There are few direct demonstrations of transportation infrastructure and common prosperity in previous studies, and, furthermore, a clear explanation cannot be provided; this would be a subject worthy of further research.

Based on the above, this paper establishes the research theme of the mechanism of transportation infrastructure promoting common prosperity and attempts to answer the following questions: First, how should the level of common prosperity from the perspective of Chinese modernization be measured? Second, how does transportation infrastructure promote common prosperity, and which channels are more obvious? Third, does transportation infrastructure show a significant mediating effect in promoting common prosperity? Fourth, is there regional heterogeneity in the impact of transportation infrastructure on common prosperity? Thinking about the above issues will help us deepen our understanding of the relationship between the two.

2. Literature Review

In fact, discussions about transportation infrastructure promoting common prosperity have gradually begun. Judging from the existing literature, some studies have focused on directly establishing transportation infrastructure to promote common prosperity by constructing structural equations, Hausman tests, or GMM models. However, there are still relatively few direct studies of this type, and more are indirectly discussed from the aspects of regional economic growth, income gap, factor flow, production demand, etc. through intermediary effect, threshold effect, and cross-effect models. Therefore, based on direct and indirect perspectives, this paper will summarize the relevant literature research results from these two aspects.

First, it is believed that transportation infrastructure is an important factor affecting common prosperity. As the basic transportation guarantee for regional exchanges, transportation has gradually deepened its impact on regional common prosperity, which is mainly reflected in the income gap [1]. The gap between rich and poor is the most direct factor affecting common prosperity, and poverty is the biggest shortcoming. The relevant literature at home and abroad all believe that increasing transportation infrastructure, especially urban transportation infrastructure, can significantly reduce the poverty rate [2,3]. In addition to that, the construction of rural transportation infrastructure can also drive rural economic growth in the long term, drive social progress, and promote national economic development [4]. Improving the level of transportation infrastructure has a microscopic effect on increasing the income of rural residents more than that of urban residents [5], which is conducive to narrowing the income gap between urban and rural areas and promoting the development of common prosperity. More specifically, transportation infrastructure can also reduce poverty by increasing per capita income. For example, road construction

is more beneficial to the income of poor farmers; reducing transfer costs and increasing employment of rural migrant labor are also key links for transportation infrastructure to play a role in poverty reduction [6]. However, when considering the specific impact of transportation infrastructure on common prosperity, it is believed that spatiality [7], heterogeneity [8], and spillover [9] are the most important ways of impact. In addition, in recent years, some studies have also begun to focus on the multi-perspective field of transportation infrastructure's impact on common prosperity. For example, transportation infrastructure can reduce inequality and income distribution [10], or high-speed rail may reduce inequality in future socioeconomic status and capital and achieve equitable economic opportunities for cities along the route [11].

Secondly, it is believed that transportation infrastructure through the middle path is also the key to promoting common prosperity. The flow of factors is an inevitable choice for regional common prosperity, and new economic geography has theoretically affirmed the important role of transportation infrastructure in promoting the flow of factors [12]. Reducing transportation costs and promoting the flow of labor and capital are directly reflected. As the economy is the prerequisite for common prosperity, some studies focus on the relationship between transportation infrastructure construction and economic growth. Contributions in this area have been verified by a large number of theories and empirical studies. It is generally believed that transportation infrastructure is a key factor in promoting economic growth [13,14]. It benefits surrounding areas through spillover effects and promotes regional economic coordination. Of course, regional economic development can also deepen the relationship between the two from another angle. The faster the regional economy develops and the greater the need for large-scale production, the more industrial agglomeration will be intensified, and the more complete the transportation infrastructure will be. Transportation infrastructure construction and regional economic development both show significant agglomeration characteristics, further stimulating the industrial agglomeration effect of the production industry. On this basis, the scale of production and services will also stimulate the demand for production factors, and transportation infrastructure is the carrier of factor flow. Its continuous improvement stimulates the flow of enterprise factors, reduces the mismatch of production factors, and improves productivity [15]. If transportation costs are considered, transportation infrastructure has significantly reduced the time and economic costs of labor and material flows [16], effectively opening up the flow of regional factors. The flow of human capital with technology diffusion and knowledge innovation as the core is a reflection of the gradual improvement of transportation infrastructure. These high-skilled human flows expand the audience scope of technology and knowledge and accelerate regional synergy [17]. In addition, transportation infrastructure can also promote the expansion of market potential, thereby expanding the scope of regional development. For example, transportation infrastructure can expand the market scale by reducing production costs [18] and promoting consumption rates in areas along the route [19].

The above-mentioned research reveals the intrinsic connection between common prosperity and transportation infrastructure and posits that transportation infrastructure not only directly affects common prosperity but may also affect the process of common prosperity through factors such as economy, industry, factors, technology, knowledge, and markets. Unfortunately, when constructing the relationship between transportation infrastructure and common prosperity, the existing literature either only focuses on the direct analysis of promotion mechanisms and paths at the theoretical level or only focuses on the empirical perspective of transportation infrastructure and economic growth and gaps from indirect verification; that is, only economic variables are used to reflect common prosperity. Moreover, common prosperity is not just a single coordination on the material level. Common prosperity under Chinese-style modernization has more directions. Transportation infrastructure provides basic guarantees for sustainable social and economic development, and sustainable transportation lays a solid foundation for common prosperity [20]. To examine the impact of transportation infrastructure on common

prosperity, the lack of multi-dimensional measurement results that rely solely on economic factors are not convincing. Based on this, this paper uses existing research as a starting point and summarizes the theoretical mechanism, impact effects, and heterogeneity of transportation infrastructure in promoting common prosperity by sorting out the paths through which transportation infrastructure affects common prosperity. The possible marginal contributions of this paper are as follows: First, based on the existing literature, a profound analysis of the correlation mechanism between transportation infrastructure and common prosperity will help to more accurately grasp the impact of transportation infrastructure on common prosperity from a theoretical level. Second, with modernization and sustainable development as the background and based on 30 provincial-level panel data, the construction and measurement of the common prosperity index system have been deepened, and the results have prepared the way for exploring the causal relationship between the two. Third, based on the theoretical basis, for the first time, the mechanism of the intermediary model of transportation infrastructure promoting common prosperity is established, which helps to comprehensively understand the key role of transportation infrastructure in common prosperity and the synergy of various intermediary factors, and provides theory support for relevant policy formulation. Fourth, attention is paid to the impact of regional differences on transportation infrastructure and common prosperity, and a path reference for regional special policy formulation is provided by comparing the current status and characteristics of common prosperity in different classified areas.

3. Theoretical Analysis and Research Hypotheses

3.1. The Direct Effect of Transportation Infrastructure on Common Prosperity

Transportation infrastructure is an irreplaceable factor in achieving common prosperity. It is a carrier of economic development and the efficient flow of various resources between regions. It can break through time and space constraints to a certain extent, affect the division of labor and cooperation, and directly affect the material level and spiritual level of a region [9]. The "14th Five-Year Plan for the Development of Modern Comprehensive Transportation System" proposes that "to build a strong country, transportation comes first", laying a foundation for directly promoting common prosperity, which has been elaborated in the previous review of the relevant literature. Generally speaking, on the one hand, transportation infrastructure carries the efficient flow of social resources, provides a lasting impetus for regional economic development, and also provides guarantees for the realization of "prosperity" in common prosperity; on the other hand, transportation infrastructure can alleviate the imbalance of urban–rural and regional development and narrow the income gap, promote "common" inclusive benefits in common prosperity, and maintain regional equity. By building transportation infrastructure interconnection, highlighting the advantages of dense transportation network interconnection is also an idea to alleviate the problem of unbalanced and inadequate regional development. It is conducive to strengthening the direct effect of transportation infrastructure in promoting common prosperity and is conducive to realizing common prosperity in the true sense. In summary, the research hypotheses of this paper are put forward:

H1: *Transportation infrastructure development can promote the improvement of common prosperity.*

3.2. The Indirect Effect of Transportation Infrastructure Empowering Common Prosperity

Common prosperity is prosperity in all aspects and is closely related to a region's economy, resources, innovation, and market. Transportation infrastructure mainly affects economic development, factor flow, industrial diffusion, and market expansion through changes in transportation costs. Therefore, transportation infrastructure construction must have an indirect mechanism impact on common prosperity. To this end, with reference to the existing literature, the main paths through which transportation infrastructure empowers common prosperity are analyzed from the above four perspectives.

(1) Economic growth effect. The continuously improving transportation infrastructure is an important influencing factor in China's "economic miracle" and will also be the long-term guarantee for the economy to maintain stable and rapid development. Among them, highway and railway transportation infrastructure are the main transportation systems for China's economic growth and can promote substantial economic growth [21]. Transportation infrastructure is an important channel for the spatial flow of economic factors and a necessary condition for the formation of regional economic integration. It plays an important role in promoting economic development in backward areas and achieving income equity. At the same time, economic development, as the material guarantee of prosperity, is an important foundation for expanding people's livelihood and well-being and narrowing regional gaps. It is also the first goal to achieve common prosperity for all. Existing studies have shown that economic development is a prerequisite for the realization of common prosperity, and transportation infrastructure has an increasingly strong impact, penetration, and support on the economic and social development of a country or region. For example, the improvement of railway transportation infrastructure can shorten the time distance for regional personnel exchanges while promoting the flow of regional knowledge and information [22] and strengthening exchanges between underdeveloped regions and developed regions, thereby improving the economic benefits of underdeveloped regions and reducing regional economic development disparity and promoting common prosperity. In summary, transportation infrastructure can drive regional economic growth and ultimately affect the level of common prosperity. Therefore, this paper proposes the following:

H2a: *Transportation infrastructure can influence common prosperity by promoting economic growth.*

(2) Factor flow effect. The three elements of labor, capital, and technology have a positive effect on economic growth and coordinated development. First of all, transportation infrastructure is the guarantee for economic activities, such as material and human mobility across geographical space. It is the basis for improving channel capacity, strengthening allocation efficiency, and realizing co-construction and sharing. Transportation infrastructure will first change regional accessibility. The reduction in trade costs will further promote capital to break through spatial boundaries, attracting goods and materials to meet regional market demand, promote the advantages of developed regions, and drive the flow of production factors. At the same time, it may have negative spillover effects on lagging regions. With the accumulation of capital factors, developed regions need more labor factors to strengthen production. To this end, transportation infrastructure construction can effectively promote the flow of agricultural labor to non-agricultural sectors and meet the factor needs of industry agglomeration. It will also affect the urban–rural income gap and promote the rationalization of the urban–rural income gap. However, the transfer of labor and capital is limited by a single supply, while technical factors can cover multiple places at the same time [23]. Supply-side reform has transformed China's economy from high-speed growth to medium–high-speed and high-quality growth. The technological level with innovation as the core has an increasingly critical impact on comprehensive regional development, and transportation infrastructure also plays an important role in technology diffusion. For example, the opening of high-speed rail can expand the market size and enhance the region's attraction to highly skilled labor, thereby stimulating talent-driven innovation activities [17]. The inter-regional flow of these highly skilled labor forces with knowledge communication and technological innovation capabilities further promotes technology diffusion and knowledge flow, enhances regional innovation levels, and provides a development foundation for the realization of common prosperity. In summary, this paper proposes the following:

H2b: *Transportation infrastructure can affect common prosperity by promoting factor mobility.*

(3) Industrial diffusion effect. Achieving sustainable common prosperity of both material and spiritual prosperity requires sustained efforts at the industrial level. On the one hand, the improvement of transportation infrastructure will enhance social protection for industrial extensions. In turn, it will develop surrounding industrial resources through transportation and break through the upgrade from craft industry to product industry. Since then, industrial development has triggered the agglomeration of factors through the expansion of product demand, transforming the industrial structure into a more advanced direction. For example, the spillover effect of economic development has brought economic diffusion dividends to surrounding areas, and the decline in transportation costs has accelerated this diffusion, allowing the secondary and tertiary industries to obtain more factor supplies, promoting the upgrading of the industrial structure [24] and ultimately promoting regional interconnection and coordination. On the other hand, transportation infrastructure can break the segmentation of different spatial and geographical locations, reduce factor transfer and transportation costs, effectively improve the efficiency of industrial resource allocation under the guarantee of total factor productivity, promote the development of local industries, and form an agglomeration effect. First of all, by compressing the time and space distance between the production place and the consumption place, resources can flow to the places with the highest productivity and output under the action of the market. Furthermore, by reducing transportation costs, market segmentation occurs, the competitive environment is optimized, production efficiency is improved, and resource misallocation is corrected [25]. At the same time, economies of scale can be formed through economic agglomeration, and the accumulation of industrial resources and wealth can be accelerated. In summary, this paper proposes the following:

H2c: *Transportation infrastructure can influence common prosperity by promoting industrial diffusion.*

(4) Market expansion effect. The path by which transportation infrastructure promotes common prosperity by stimulating market expansion falls on two sides, producers and consumers. For producers, the input quantity, price, and net income of production factors are the three channels through which transportation infrastructure affects the production efficiency of enterprises and ultimately affects the scale of enterprises. In other words, the improvement of transportation infrastructure can affect the adjustment of factors between industries and enterprises by affecting the acquisition of enterprise factors and the quantity, price, and income of production inputs [26], thereby affecting the economies of scale of producers and market expansion, and the market. The intensity of expansion is an important yardstick for measuring regional economic and coordinated development. For example, the opening of the Beijing-Shanghai high-speed railway accelerates the center–periphery effect, which promotes the expansion of enterprises by promoting the aggregation of human factors and, to a certain extent, drives the economic growth of areas along the line [27]. Therefore, the overall role of transportation infrastructure construction is to enhance market competition, promote the expansion of enterprise scale, and ultimately promote the efficiency and fairness of the regional economy. For consumers, rising income levels, increased spending power, and improved quality of life are the main manifestations of market diffusion driven by improved transportation infrastructure. The construction of transportation infrastructure can promote market scale and have a positive impact on residents' income. At the same time, the reduction in transaction costs allows transportation infrastructure to better perform its connecting function; promote market expansion; enhance the self-efficiency of enterprises and the sustainable income of workers; narrow regional, urban–rural, and individual gaps; and make an important contribution to promoting common prosperity. In summary, this paper proposes the following:

H2d: *Transportation infrastructure can influence common prosperity through market expansion.*

4. Research Design

4.1. Model Design

In order to explore the impact of inter-provincial transportation infrastructure (roads, railways) on the level of common prosperity, a fixed-effects model is used, and regional and time fixed effects are added to establish the following econometric model:

$$CP_{it} = \beta_0 + \beta_1 Infra_{it} + \beta_2 X_{it} + \mu_i + \theta_t + \varepsilon_{it} \quad (1)$$

In the formula, i, t represent the province and year, respectively, CP_{it} represents the level of common prosperity, $Infra_{it}$ is transportation infrastructure construction, X_{it} is the control variable, β_2 is the degree of influence of the control variable, μ_i, θ_t are the region and time fixed effects, and ε_{it} is the error term.

The above is the baseline regression of explanatory variables on the explained variables. However, when considering the relationship between variables, according to Baron [28], it is believed that explanatory variables can directly affect the explained variables, but most of them also need to consider the indirect effects; that is, they indirectly affect the explained variable through the mediating variable M. Based on the previous theoretical mechanism analysis, the study believes that transportation infrastructure not only directly affects the level of common prosperity but may also affect common prosperity through four paths: economic growth, factor flow, industrial diffusion, and market expansion. In order to test the effects of the four paths, referring to the research of Wen Zhonglin [29], the stepwise regression coefficient method was used to construct a mediating effect model, and the following equation system was established:

$$CP_{it} = \beta_0 + \beta_1 Infra_{it} + \beta_2 X_{it} + \mu_i + \theta_t + \varepsilon 1_{it} \quad (2)$$

$$M_{it} = \alpha_0 + \alpha_1 Infra_{it} + \alpha_2 X_{it} + \mu_i + \theta_t + \varepsilon 2_{it} \quad (3)$$

$$CP_{it} = \gamma_0 + \gamma_1 Infra_{it} + \gamma_2 M_{it} + \gamma_3 X_{it} + \mu_i + \theta_t + \varepsilon 3_{it} \quad (4)$$

In the formula, M_{it} are the possible intermediary variables that affect common prosperity, β_1, γ_1, respectively, represent the total effect and direct effect of transportation infrastructure on common prosperity, α_1 is the degree of influence of transportation infrastructure on intervening variables, $\alpha_1 \times \gamma_2$ represents the mediating effect transmitted through the mediating variable and satisfies $\beta_1 = \gamma_1 + \alpha_1 \times \gamma_2$. $\varepsilon 1_{it}$, $\varepsilon 2_{it}$, $\varepsilon 3_{it}$ are the random interference terms of each model, and the definitions of other variables are consistent with Equation (1).

In the above three models, in order to obtain a more accurate confidence interval of the coefficient product, the bootstrap method with higher testing power is used to directly test the significance of the coefficient product. The specific process has four steps: in the first step, test Equation (2), and if β_1 is significant, it indicates that transportation infrastructure has an impact on common prosperity and the argument is based on the mediating effect; thus, subsequent tests are conducted; in the second step, the tests of α_1 in Equation (3) and γ_2 in Equation (4) are performed sequentially. If both are significant, it means that transportation infrastructure has a mediating effect on common prosperity; in the third step, test γ_1 in Equation (4). If γ_1 is not significant, it means that the impact of transportation infrastructure on common prosperity is realized through intermediary variables; if γ_1 is significant, it indicates that both direct and mediating effects exist. The fourth step is to use the bootstrap method to test the above results. If it is significant, it passes the mediation effect test; otherwise, the mediation effect is not significant.

4.2. Variable Selection and Description

1. Explanated variable (*CP*): common prosperity level

To grasp the process of common prosperity and quantify the level of common prosperity, a scientific and reasonable index evaluation system needs to be built. Common prosperity with Chinese-style modernization characteristics is a system that includes material and spiritual (affluence) and takes into account both process (sustainability) and results (sharing). For this purpose, it is specifically understood as follows:

(1) Affluence indicators are used to reflect material affluence and spiritual affluence, and they measure the material and spiritual gaps between groups and generations;
(2) Sharing indicators are used to reflect the universality and difference of benefits for all people, to measure development coordination from the urban–rural and regional development gap, and to measure the level of basic public services from education, medical care, housing, and transportation.
(3) Sustainability indicators are used to reflect the follow-up ability of common prosperity and the carrying capacity of resources and the environment. They measure the long-term development potential of economic development and the ecological environment.

Based on this, an evaluation system of common prosperity was constructed that includes the three dimensions of affluence, sharing, and sustainability, 6 secondary indicators, and 22 tertiary indicators. In order to objectively and deeply reflect the distinguishing ability and importance of the indicators, the entropy weight method is used to calculate indicator weights (Table 1). For specific methods, please refer to Tan Yanzhi [30].

Table 1. Common prosperity evaluation index system and weights.

Primary Indicator	Secondary Indicator	Tertiary Indicator	Indicator Meaning	Nature	Weights
Affluence	Materials	GDP per capita (yuan/person)	scale of economic development	+	0.1101
		Per capita disposable income (yuan)	efficiency of economic development	+	0.0825
		Engel coefficient	consumption structure	-	0.0682
	Spirits	Proportion of added value of cultural industry (%)	development level of cultural industry	+	0.0348
		Proportion of cultural and tourism fiscal expenditure (%)	cultural tourism investment level	+	0.0399
		Public library collections per capita (volumes)	reading penetration level	+	0.0510
		Sports venue area per capita (m^2/person)	sports popularity level	+	0.0364
Sharing	Development coordination	Urbanization rate of permanent population (%)	difference in urban and rural population	+	0.0617
		The income gap between urban and rural residents	Urban–rural income gap	-	0.0463
		The income gap between regional residents	regional income gap	-	0.0397
	Public service	Education expenditure intensity	public education	+	0.0445
		Per capita housing construction area (m^2/person)	public housing	+	0.0395
		Medical resources per 1000 people (person)	public health	+	0.0391
		Transportation resources per 10,000 people (vehicles)	public transit	+	0.0414

Table 1. *Cont.*

Primary Indicator	Secondary Indicator	Tertiary Indicator	Indicator Meaning	Nature	Weights
Sustainability	High-quality development	GDP growth rate (%)	economic development speed	+	0.1012
		Number of invention patents per 10,000 people (piece)	economic development quality	+	0.0167
		Contribution rate of household consumption (%)	consumption scale	+	0.0384
		Proportion of digital economy added value (%)	digital scale	+	0.0281
	Ecosystem	Energy consumption per unit of GDP (tons/10,000 yuan)	ecological economy	-	0.0214
		Carbon emissions per unit of GDP (kg/10,000 yuan)	ecological security	-	0.0145
		Air quality index	ecological life	+	0.0207
		Green space coverage rate in built-up areas (%)	ecological space	+	0.0239

2. Explanatory variable (*Infra*): transportation infrastructure

China's transportation infrastructure mainly includes railways, highways, civil aviation, shipping, and pipeline transportation. As for road and railway transportation, both freight and passenger transportation account for far more than half of the total, sharing the main transportation volume [25]. Therefore, following the approach of Luo Nengsheng [31], the densities of inter-provincial highways and railways were selected as the measurement indicators of transportation infrastructure, specifically measured by dividing the sum of highway mileage and railway mileage by the administrative area of each province.

3. Mediating variables

According to the previous assumptions, the economic growth effect, factor flow effect, industrial diffusion effect, and market expansion effect are the intermediary variable mechanisms of this paper. The specific settings are as follows: ① economic growth effect (*econ*): use regional GDP growth rate to measure the level of regional economic development to reflect the economic growth effect; ② factor flow effect (*tolf*): referring to the research of Wang Weiwei [32], the production factor flow index is calculated from the weighting of the three factors of labor, capital, and technology, and then the overall factor flow level in a certain region is measured; ③ industrial diffusion effect (*indu*): the rationalization and advancement of the industrial structure can drive the efficient flow of factors and optimize the allocation of resources. The level of common prosperity can be reflected through the level of the industrial structure. The higher the industrial level, the more it can stimulate flow, increase income, and drive regional development. Therefore, the ratio of the output value of the tertiary industry to the total regional output value is used to measure the industrial diffusion effect; ④ market expansion effect (*mark*): commodity circulation forms "economy of scale effect" and "market competition effect", stimulating enterprises to expand their scale and create more job opportunities, and market vitality drives market expansion. Therefore, the ratio of total private employment to total employment is chosen to measure the market expansion effect.

4. Control variables

Control variables are factors that affect the level of common prosperity in addition to transportation infrastructure. Based on the existing research, this paper mainly selects four control variables, specifically: ① degree of government intervention (*gove*): common prosperity cannot rely solely on regional development. Government policy intervention and financial support can also affect common prosperity to a certain extent, so the ratio of regional general public budget expenditures to regional GDP is used as the measurement

standard; ② level of opening up to the outside world (*open*): opening up to the outside world requires a region to have a certain industrial foundation, and the competitive effect it brings will affect the regional economy and planning. The ratio of the total regional import and export trade to the gross production value is used as an alternative indicator of opening up to the outside world; ③ informatization level (*info*): the promotion of regional common prosperity requires timely grasping of information and the use of existing regional advantages to convert information sharing into information flow. According to the research of Yan Yilong [33], it is believed that the empowerment of information flow in the internet era is helpful. In order to make up for information poverty and promote endogenous poverty alleviation, the ratio of the number of Internet access users to the total population is used to measure the level of informatization; ④ financial level (*fina*): financial level is an external stabilizing factor that promotes common prosperity. It affects common prosperity from many aspects, such as technology, housing, and investment. The financial level is measured by the ratio of commercial bank deposits to regional GDP.

4.3. Data Explanation and Descriptive Statistics

Considering the requirements of the research content of this paper and the availability of data, the study uses 30 provinces and municipalities in China's mainland (excluding Tibet, Hong Kong, Macao, and Taiwan) as the investigation sample, and the research interval is 2001–2021. Data on various indicators mainly come from the National Bureau of Statistics data, provincial statistical yearbooks, and Wind and EPS databases. The economic data mainly come from the "China Fiscal Yearbook" and "China Macroeconomic Database", and those involving monetary units are based on 2001. The GDP deflator in the base period is used for processing; the comprehensive energy consumption and carbon emissions in terms of ecological environment are from the "China Energy Statistical Yearbook". In addition, some evaluation indicators have missing values, which are manually collected from the official website of the Provincial Bureau of Statistics or the "Government Work Report". Some data that cannot be queried are supplemented by linear interpolation. Table 2 shows the descriptive statistical results of various variables.

Table 2. Descriptive statistics of variables.

Variable		N	Mean	St.d	Min	Max
Explained variable	*CP*	630	0.401	0.023	0.094	0.763
Explanatory variable	*Infra*	630	5.364	1.182	0.207	10.461
Mediating variables	*econ*	630	5.367	5.588	2.803	14.232
	tolf	630	9.37	3.165	3.112	18.981
	indu	630	0.412	0.073	0.31	0.842
	mark	630	6.227	6.845	2.476	28.104
Control variables	*gove*	630	21.252	8.994	7.326	46.328
	open	630	3.264	0.747	1.864	7.005
	info	630	14.322	6.849	7.268	29.336
	fina	630	1.023	0.357	0.464	3.392

It should be noted that, as can be seen from Table 2, the fluctuations in our country's provincial common prosperity index are relatively small, while the fluctuations in transportation infrastructure are relatively large. Among them, the mean of *CP* is 0.401, and the span range is (0.094, 0.763); the mean of *infra* is 5.364, and the span range is (0.207, 10.461), indicating that the overall change in common prosperity is small, reflecting that common prosperity includes multiple indicators. Comprehensive measurement shows that growth changes and gaps are not obvious, but there are large regional gaps in transportation infrastructure construction, and uneven development exists. In addition, the st.d of the *mark* is significantly greater than the mean, indicating that there is a large imbalance in the level of marketization in country's provinces.

5. Empirical Results and Analysis

5.1. Baseline Regression Results

Considering that this paper uses the fixed-effects model of panel data, we first tested it and found that the Hausman test results of each model rejected the null hypothesis at the 1% significance level, indicating that the use of the fixed-effects model is reasonable. Table 3 reflects the parameter estimation results of Equation (1). Column (a) eliminates the control variables, and column (b) adds the control variables. The results show that regardless of whether variables are controlled, transportation infrastructure has a positive impact on common prosperity, and all have passed the 1% significance level, indicating that transportation infrastructure construction can effectively promote common prosperity. The value in column (a) is 0.347, and the value in column (b) is 0.302. After adding control variables, the coefficient is reduced, and the performance is more robust. These results show that transportation infrastructure construction promotes common prosperity significantly and stably and is an indispensable factor in achieving common prosperity. Hypothesis 1 is verified.

Table 3. Benchmark and quantile regression results.

Variable	Model (a)	Model (b)	Q25 (c)	Q50 (d)	Q75 (e)
	CP	*CP*	*CP*	*CP*	*CP*
Infra	0.347 ***	0.302 ***	0.246 ***	0.340 ***	0.373 ***
	(0.022)	(0.018)	(0.227)	(1.048)	(0.069)
gove		0.134	0.101 *	0.231	0.294
		(0.005)	(0.013)	(1.904)	(0.274)
open		−0.152 **	−0.248 ***	−0.266 ***	−0.261 ***
		(−2.743)	(0.139)	(0.059)	(1.623)
info		0.266 **	0.233 ***	0.194 ***	0.205 ***
		(0.012)	(0.117)	(0.421)	(0.524)
fina		−0.167 **	−0.197 ***	−0.207 ***	−0.218 ***
		(−0.039)	(0.064)	(0.236)	(0.057)
_cons	3.154 ***	2.255 ***	0.116 ***	0.253 ***	0.294 ***
	(4.426)	(2.769)	(7.042)	(4.064)	(5.128)
control variables	N	Y	Y	Y	Y
region	Y	Y	Y	Y	Y
time	Y	Y	Y	Y	Y
N	630	630	630	630	630
R^2	0.635	0.568	0.642	0.609	0.617

Note: ***, **, and * represent the significance levels of 1%, 5%, and 10%, respectively, and the standard errors are in parentheses. The same below. Y is the abbreviation of Yes, N is the abbreviation of No.

In addition, from the perspective of control variables, *info* passed the 5% significance level. Information circulation and dissemination are increasingly becoming the key to regional development. The coefficients of *open* and *fina* are negative. Opening to the outside world expands the advantages of regions with location advantages or accumulated strength in attracting foreign investment, further widens the gap with less developed regions, and weakens the level of regional common prosperity. The expansion of the scale of the financial industry will produce a crowding-out effect, which is not conducive to the entrepreneurship of small and medium-sized enterprises, suppressing the income of ordinary workers and increasing the income distribution gap among residents, and it is not conducive to common prosperity. *Gove* failed the test, indicating that there is no close direct connection between government intervention and common prosperity. It may be that underdeveloped areas obtain more transfer payments due to redistribution policies, which make up for local fiscal shortcomings. After neutralization, it is not significant. For this reason, local government fiscal expenditure has not significantly affected common prosperity.

In order to continue to deeply explore the impact of transportation infrastructure on different levels of common prosperity development, this paper attempts to estimate using quantile regression. First, we select the 25%, 50%, and 75% quantiles from the

different development levels of common prosperity to examine the high, medium, and low differences in the impact of transportation infrastructure on the level of common prosperity. The results are shown in Table 3. It can be seen that no matter which quantile it is, the impact coefficient of transportation infrastructure on common prosperity is positive and passes the significance test, which is consistent with the benchmark regression results. Upon comparing each quantile, it is found that the coefficient shows a decreasing and rising trend, indicating that the higher the level of common prosperity, the more obvious the promotion effect of transportation infrastructure on common prosperity. The possible economic explanation is that the initial transportation infrastructure carries the underlying ideas and logic of industries with a basic social development system to promote common prosperity [34]. As common prosperity continues to advance, the level of transportation infrastructure also increases. As a carrier for the efficient flow of economic development resources between regions, it maximizes the release of "quality improvement dividends", but any further increase will lead to a decrease in the marginal utility of an increased starting point.

5.2. Robustness Check

1. Endogeneity problem

Considering the possible reverse causality between transportation infrastructure and the level of common prosperity, as well as the self-selection problem caused by model errors, in order to avoid biased parameter estimates caused by the endogeneity of explanatory variables and reduce potential endogenous errors, the instrumental variable method was chosen, and lagged variables are tested. First, it draws on the construction of Liu Shenglong [35] and selects the policy preference index (IV1) as the replacement instrumental variable for transportation infrastructure, as shown in column (a) of Table 4. Moreover, at the same time, the one lagged period of the explained variable (IV2) is selected as the lagged instrumental variable, see column (b) of Table 4. In addition, in order to verify whether the instrumental variables are reliable, the two-stage least squares method is used for estimation, and the Hansen test is selected to automatically correct the heteroskedasticity problem. The results show that the LM statistic value indicates the existence of correlation and passes the non-identifiable test; the *p*-value of the Hansen test is greater than the threshold, accepting the null hypothesis that the instrumental variable is valid; that is, there is no over-identification problem. The Wald statistical values are 159.93 and 137.54, respectively, passing the weak instrumental variable test with a significance level of 1%, which once again shows that the selection of instrumental variables is reasonable. At the same time, the impact coefficients of the first two columns of transportation infrastructure on common prosperity are 0.252 and 0.192, and passed the 1% significance level, which is consistent with the benchmark regression results, and the conclusion is robust and effective.

Table 4. Robustness check (1).

Variable	(a) IV1	(b) IV2	(c) *L2.Infra*	(d) *L1.X*
	CP	CP_{t-1}	***CP***	***CP***
Infra	0.252 *** (0.066)	0.192 *** (0.127)		
L2.Infra			0.236 *** (0.081)	
L1.gove				0.107 (0.003)
L1.open				−0.137 ** (−3.490)
L1.info				0.248 ** (0.166)

Table 4. *Cont.*

Variable	(a) IV1	(b) IV2	(c) *L2.Infra*	(d) *L1.X*
	CP	CP_{t-1}	***CP***	***CP***
L1.fina				−0.132 ** (−0.045)
_cons	6.104 *** (0.291)	8.649 *** (5.677)	14.660 *** (4.285)	21.265 *** (5.264)
control variables	Y	Y	Y	N
region	Y	Y	Y	N
time	Y	Y	Y	N
N	630	630	630	630
R^2	0.625	0.664	0.551	0.582
LM	84.26 (0.000)	133.27 (0.000)		
Hansen	20.14 (1.000)	21.86 (1.000)		
Wald	159.93 ***	137.54 ***		

Note: LM and Hansen correspond to *p* values in parentheses. *** and ** represent the significance levels of 1% and 5%, respectively.

In addition, in order to exclude the influence of reverse causation, this paper chooses to lag the explanatory variables by two periods and all the control variables by one period and to re-estimate the equation. The results are shown in columns (c) and (d) of Table 4. The results show that the coefficient of the explanatory variable is still positive and has passed the robustness test at the 1% significance level; in addition to the estimated coefficient of the control variable being slightly smaller due to the weakening of the degree of control after a lag of one period, the coefficient sign and significance are consistent with the baseline regression results and also pass the robustness test.

2. Replace the core explanatory variables (RCEV)

Drawing on the research of Zhu Lin [36], it is believed that transportation infrastructure construction not only includes the increase in density, but also covers the improvement of efficiency, both of which can be used as its proxy variables. Therefore, the sum of passenger transport efficiency and freight efficiency is selected for robustness analysis, which is represented by the sum of passenger and freight turnover in each province, recorded as *transP-G*. The regression results are shown in column (e) of Table 5. It can be seen that the coefficients of transportation infrastructure are all positive, indicating that transportation infrastructure can indeed promote common prosperity and the results are robust.

Table 5. Robustness check (2).

Variable	(e) RCEV	(f) SOT	(g) EIV
	CP	***CP***	***CP***
Infra		0.327 *** (0.046)	0.484 *** (0.296)
transP-G	0.185 *** (0.012)		
_cons	13.846 *** (6.842)	26.872 *** (4.254)	20.516 *** (4.119)
control variables	Y	Y	Y
region	Y	Y	Y
time	Y	Y	Y
N	630	630	630
R^2	0.599	0.632	0.584

Note: *** represents the significance levels of 1%.

3. Shorten observation time (SOT)

Shortening the observation time can eliminate the influence of different policy guidance. Since the 18th National Congress of the Communist Party of China, the top-level design plan of "eliminating poverty and unswervingly implementing common prosperity" has been proposed; a common prosperity demonstration area will be established in 2021. In order to eliminate the above policy interference, this paper adjusts the original full sample data from 2001 to 2021 and selects the data from 2013 to 2020 for re-regression estimation. The results are shown in column (f) of Table 5. The transportation infrastructure coefficient value does not change much and has the same sign, basically consistent with the baseline regression.

4. Eliminate insignificant variables (EIV)

It can be seen from the previous benchmark regression results that the control variable government intervention degree is not significant and is planned to be eliminated and re-estimated as column (g) of Table 5. The results show that the transportation infrastructure coefficient value becomes larger and has the same sign, which is consistent with the benchmark regression results. It indicates that transportation infrastructure significantly increases the level of common prosperity, and the results are robust.

5.3. Mediating Effect Analysis

Economic growth, factor flow, industrial diffusion, and market expansion are the intermediary variables in this paper. Equations (2)–(4) are used to test. The results are as follows.

Column (1) of Table 6 shows the total effect of transportation infrastructure on common prosperity, which is consistent with the previous baseline regression results. Columns (2) and (3) present the regression results of the economic growth effect of transportation infrastructure construction promoting the level of common prosperity. The regression coefficient of transportation infrastructure in column (2) is 0.494 and passes the 1% significance level, indicating that the construction of transportation infrastructure can effectively promote regional economic growth, which is consistent with the research conclusion of Huang Shulei [37]. After adding the economic growth variable in column (3), the regression coefficient is still positive and significant but is significantly smaller than the baseline regression coefficient, and the intermediary effect accounts for a larger proportion, accounting for 80.16% of the total effect, indicating that economic growth is a common influence of transportation infrastructure. Economic growth has a significant mediating effect, which can promote the level of common prosperity by accelerating economic growth. Hypothesis 2a has been verified. In general, economic development is the material basis for achieving common prosperity, and transportation infrastructure creates favorable conditions for economic development, promotes regional integrated economy, and ultimately achieves regional coordination.

Columns (4) and (5) in Table 6 show the regression results of the factor flow effect of transportation infrastructure construction promoting the level of common prosperity. The regression coefficient of transportation infrastructure in column (4) is 0.386 and is significant at the 1% significance level, indicating that transportation infrastructure construction can promote the flow of factors, which is consistent with the research conclusion of Yang Qian [38]. After adding the factor flow variable in column (5), the regression coefficient is still positive but does not pass the significance level, indicating that there is no direct effect in the total effect, that is, a complete mediation effect, indicating that transportation infrastructure promotes common prosperity through the factor flow effect. The effect is significant, and, thus, Hypothesis 2b is strongly verified. On the one hand, transportation infrastructure is the carrier for the flow of the three elements of human resources, capital, and technology and can effectively promote the optimal allocation of resources under the guarantee of total factor productivity. On the other hand, human resources and capital are the core of factor flow, and the inter-regional flow of some highly

skilled labor with knowledge communication and technological innovation capabilities further promotes technology diffusion and knowledge flow, enhances regional innovation levels, and contributes to provide lasting power for realizing common prosperity.

Table 6. Test of the mediating effect of transportation infrastructure in promoting common prosperity (1).

Variable	(1) CP	Economic Growth Effect		Factor Flow Effect	
		(2) M	(3) CP	(4) M	(5) CP
Infra	0.302 ***	0.494 ***	0.145 ***	0.386 ***	0.194
	(0.016)	(0.267)	(0.045)	(0.109)	(0.179)
gove	0.134	0.178 ***	0.123	0.047 ***	0.384
	(0.009)	(0.0193)	(0.014)	(0.046)	(0.273)
open	−0.152 ***	0.340 ***	−0.126 **	0.017 ***	−0.146 **
	(−2.456)	(1.952)	(2.358)	(2.561)	(8.449)
info	0.266 ***	0.104 ***	0.178 ***	0.387 ***	0.207 ***
	(0.031)	(0.127)	(0.465)	(3.755)	(4.776)
fina	−0.167 ***	0.210 ***	−0.109 ***	0.149 ***	−0.039 **
	(−0.126)	(0.284)	(0.476)	(10.366)	(1.772)
M			1.186 ***		4.482
			(7.554)		(4.090)
_cons	7.654 ***	9.469 ***	11.558 ***	29.327 ***	4.267 ***
	(32.162)	(8.324)	(6.871)	(4.358)	(4.263)
control variables	Y	Y	Y	Y	Y
region	Y	Y	Y	Y	Y
time	Y	Y	Y	Y	Y
N	630	630	630	630	630
R2	0.596	0.624	0.538	0.514	0.573
mediating effect			Significant, accounting for 80.16% of the total effect		Significant and completely mediated effect

Note: *** and ** represent the significance levels of 1% and 5%, respectively.

Columns (6) and (7) in Table 7 give the regression results of the industrial upgrading effect of transportation infrastructure construction on promoting common prosperity. Among them, the result of column (6) shows that the regression coefficient of transportation infrastructure construction is 0.136 and passes the 1% significance level, indicating that transportation infrastructure construction can stimulate the upgrading of regional industrial structure. After adding the industrial upgrading indicator to the baseline regression, that is, the regression result in column (7), its coefficient is still positive at the 1% significance level, the coefficient of transportation infrastructure dropped significantly, and the intermediary effect accounted for 67.36%. This shows that transportation infrastructure construction can promote common prosperity through the industrial upgrading effect, verifying Hypothesis 2c. Generally speaking, the improvement in transportation infrastructure can provide transportation convenience for the development of regional secondary and tertiary industries, especially the increase in the proportion of tertiary industries, creating conditions for regional industrial interconnection. The high connectivity between regions further accelerates knowledge spillover and technology diffusion, causing resources and services to flow into backward areas, updating the level of specialization in backward areas, promoting coordinated and balanced regional development, and being conducive to promoting the construction of common prosperity.

Table 7. Test of the mediating effect of transportation infrastructure in promoting common prosperity (2).

Variable	Industrial Diffusion Effect		Market Expansion Effect		All M-Variables
	(6) M	(7) CP	(8) M	(9) CP	(10) CP
Infra	0.136 *** (1.044)	0.208 *** (0.276)	0.089 *** (0.109)	0.210 *** (4.457)	0.164 *** (1.269)
gove	0.085 ** (2.569)	0.106 (1.236)	0.012 *** (3.256)	0.281 (0.659)	0.149 (2.343)
open	0.114 *** (0.451)	−0.048 * (−0.177)	0.145 *** (0.164)	−0.125 *** (−7.556)	−0.122 ** (−4.615)
info	0.074 ** (0.066)	0.094 *** (2.684)	0.041 *** (6.542)	0.114 ** (5.849)	0.056 ** (0.147)
fina	0.183 *** (1.228)	−0.12 1** (−0.048)	0.463 *** (6.394)	−0.049 ** (−0.189)	−0.032 ** (−0.095)
M		3.156 *** (8.447)		6.299 *** (2.472)	
_cons	4.569 *** (11.063)	21.365 *** (9.851)	3.884 *** (11.864)	14.659 *** (4.656)	16.267 *** (5.488)
control variables	Y	Y	Y	Y	Y
region	Y	Y	Y	Y	Y
time	Y	Y	Y	Y	Y
N	630	630	630	630	630
R^2	0.613	0.594	0.577	0.592	0.627
mediating effect		Significant, accounting for 67.36% of the total effect		Significant, accounting for 72.75% of the total effect	

Note: ***, **, and * represent the significance levels of 1%, 5%, and 10%, respectively.

Columns (8) and (9) in Table 7 give the regression results of the market expansion effect of transportation infrastructure construction on the level of common prosperity. Among them, the regression coefficient of transportation infrastructure construction in column (8) is 0.089 and is significant at the 1% level, indicating that transportation infrastructure construction can drive production and consumption, promote market expansion, and deepen trade ties with transportation infrastructure, alleviating the gap between supply and demand and promoting a virtuous cycle in the market. Judging from the regression results in column (9), after the market expansion indicator is introduced into the benchmark model, its coefficient is 0.210 and passes the 1% significance level, which is smaller than the benchmark regression coefficient (0.302). At this time, the mediation effect accounts for 72.75%, indicating that transportation infrastructure can promote common prosperity through market expansion and has a significant intermediary effect, verifying Hypothesis 2d. By connecting the production end and the consumption end, transportation infrastructure creates conditions for active production and consumption, thereby promoting the internal circulation of the national economy and a high-level dynamic balance of supply and demand, making resource allocation more efficient and achieving integrated regional development.

In addition, in order to comprehensively observe the influence of mediating variables, this paper finally conducted a parallel test of four mediating effects. The results are shown in Table 7 (10). It can be seen that the coefficient of transportation infrastructure is 0.164, which is consistent with the baseline regression sign, but the value has dropped significantly. This once again shows that the impact of transportation infrastructure on common prosperity has both a direct effect and an intermediary effect, mainly relying on the mediating effect to promote it.

6. Heterogeneity Analysis

Furthermore, considering that there may be regional heterogeneity in the impact of transportation infrastructure construction on common prosperity, this paper is based on the data released by the State Council's 2022 urban resident population statistics, the Bureau of Statistics regional planning, and the China Business News New First-Tier Cities Research Institute, and combined with using the digit grouping method, the above samples are divided into two groups according to population size, geographical distribution, and whether they are in the first line or have been in the new first line (2013–2022), and then model (1) is used to regress one by one. The results are as shown in Table 8.

Table 8. Heterogeneous results of transportation infrastructure promoting common prosperity.

Variable	Population Size		Geographical Location		First-Tier or Former New First-Tier Cities	
	(1) Large *CP*	(2) Small *CP*	(3) East *CP*	(4) Mid-West *CP*	(5) Yes *CP*	(6) No *CP*
Infra	0.244 ***	0.102 ***	0.417 ***	0.294 ***	0.423 ***	0.168 ***
	(0.023)	(0.019)	(2.256)	(2.910)	(5.738)	(1.659)
gove	0.216 ***	0.174 ***	0.301 ***	0.114 *	0.597 **	0.176 ***
	(0.127)	(0.039)	(1.662)	(1.801)	(3.562)	(0.943)
open	0.051 ***	0.046 ***	0.017 ***	−0.035 *	0.134 ***	−0.024 ***
	(0.017)	(0.107)	(0.049)	(0.119)	(6.009)	(0.169)
info	0.063 ***	0.024 ***	0.496 ***	0.158 ***	0.436 ***	0.171 ***
	(0.029)	(0.065)	(1.291)	(2.594)	(1.342)	(2.011)
fina	0.184 **	0.095 **	0.152 **	0.226 **	0.194 **	−0.125 **
	(0.135)	(0.146)	(4.862)	(2.026)	(0.991)	(1.594)
_cons	0.455 ***	0.417 ***	9.269 ***	5.093 ***	9.087 ***	8.359 ***
	(2.496)	(0.083)	(0.193)	(4.345)	(3.652)	(3.428)
control variables	Y	Y	Y	Y	Y	Y
region	Y	Y	Y	Y	Y	Y
time	Y	Y	Y	Y	Y	Y
N	315	315	252	378	336	294
R^2	0.587	0.552	0.684	0.711	0.639	0.643

Note: ***, **, and * represent the significance levels of 1%, 5%, and 10%, respectively.

Columns (1) and (2) of Table 8 show the results of sample groups of large and small cities divided according to urban population size. Column (1) shows that the urban population is large, and the transportation infrastructure coefficient is 0.244, which is significant at the 1% level. Column (2) shows that the urban population is small, and the transportation infrastructure coefficient is 0.102, which passes the 1% level. The test shows that transportation infrastructure has a stronger impact on common prosperity when the urban population is large. The larger the population, the more transportation construction can be increased to enhance the promotion effect on common prosperity.

There are still large differences in natural resource endowments, infrastructure levels, and economic development foundations in different regions, which may affect a city's superstructure demand. Therefore, columns (3) and (4) show the results of the data divided according to geographical location. Column (3) shows that the eastern region (12 provinces) passed the 1% test, with a coefficient of 0.417, which is greater than 0.294 in the western region (18 provinces), indicating that the role of transportation infrastructure in China's regional common prosperity is more pronounced in the eastern region. The reason may be that there are many advantageous development cities in the east, transportation tends to be improved, and development dividends are highly released, which is conducive to exerting regional "spillover effects" to promote common prosperity.

First-tier or new first-tier cities are ranked based on happiness, business charm, etc., reflecting the overall level of the city. Therefore, columns (5) and (6) show the classification regression results for the sample group according to whether it is a first-tier city or was a

new first-tier city, of which there are four first-tier cities and 12 provincial capital cities that were once a new first-tier city. Column (5) shows that the coefficient of first-tier or former new first-tier cities is 0.423 and is significant at the 1% level, which is significantly larger than the coefficients of non-first-tier and non-new first-tier cities, indicating that first-tier or former new first-tier cities will significantly improve the development level of transportation infrastructure, which will then enhance the promotion effect of transportation infrastructure on common prosperity.

7. Conclusions and Enlightenment

Achieving common prosperity is a plan for building a sustainable transportation power that is "clear and stable" for Chinese-style modernization. Giving full play to the empowerment of transportation and promoting the construction of sustainable transportation provide a possible path to solidly promote common prosperity. This paper summarizes the theoretical mechanism of transportation infrastructure enabling common prosperity from four aspects—economic growth, factor flow, industrial diffusion, and market expansion—and provides an answer to the path for transportation infrastructure to promote common prosperity. Based on the panel data of 30 provinces and cities from 2001 to 2021, the specific effects and paths were robustly verified through the mediation effect model. The results show that, first, transportation infrastructure can significantly promote the level of common prosperity (H1 established), and the quantile results further show that transportation infrastructure has a stronger effect in areas with high common prosperity. After multiple robustness tests, the conclusion is still reliable. Second, transportation infrastructure can promote common prosperity through intermediary paths, such as economic growth, factor flow, industrial diffusion, and market expansion (H2a, H2b, and H2c are established). Surprisingly, from the perspective of the intensity of the intermediary effect, all four paths show a relatively high proportion of intermediaries. Factor flow is a complete intermediary effect, and the other three are all above 65%, further indicating that the intermediary effect is the main path. Third, transportation infrastructure has a heterogeneous effect on common prosperity, which is reflected in the significant effect in areas with large urban populations, eastern regions, and first-tier or former first-tier cities.

Based on the above conclusions, the following enlightenments can be drawn: First, accelerate the construction of transportation infrastructure and release the enabling role of transportation in promoting common prosperity. Vested transportation infrastructure is a key idea for promoting common prosperity, and it should be guided by regional coordination and balanced development, promoting the overall planning of transportation infrastructure according to local conditions, effectively connecting regional transportation interconnections, and promoting common prosperity with high-quality transportation and sustainable development. Second, focus on the quadrilateral orientation of "economy, factors, industry, and market". Transportation infrastructure has the role of promoting common prosperity mainly by strengthening the economy, factors, industries, and markets. Therefore, economic growth is fundamental. Promote regional exchanges through the basic functions of transportation, leverage the external economic benefits of transportation infrastructure, and promote regional economic development. The flow of factors is a constant. Give full play to transportation convenience, strengthen the free flow of factors between regions, and form a transportation mode with smooth movement of manpower, fast material resources, and extensive technology. Industrial upgrading is the key. Focus on improving transportation infrastructure, give full play to regional industrial characteristics according to local conditions, promote industrial agglomeration and in-depth industry docking, and enhance the endogenous power of industrial upgrading. Market expansion is the focus. The supply and demand focus of transportation infrastructure should be expanded to stimulate production and consumption, enhance market vitality within an internal cycle, expand product market scope, promote market expansion, and narrow regional gaps. Third, specific policies should be formulated based on differences in regional transportation infrastructure. The eastern improves quality and creates synergy, the central focuses on

forming a hub, and the western provides more support to improve accessibility. Further consolidate the construction policies of "Rise of Central China", "Develop the West", and "Regional Integrated Development Circle"; provide a template for all aspects of sustainable development of common prosperity; and also provide practice for solidly promoting the common prosperity of all people under the perspective of Chinese-style modernization.

In addition, although this paper verified the specific path through which transportation infrastructure promotes common prosperity, it did not include spatial factors in the scope of the study. Spatial spillover is also one of the important features of transportation and common prosperity. To this end, the next step is to build a spatial econometric model to analyze the spatial spillover effects of sustainable transportation development on common prosperity.

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