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Measurement and Structure of Common Prosperity of Urban Residents the Case of Hangzhou, China

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ABSTRACT: Common prosperity is an important feature of the social state that the people of the world aspire to, and an important feature of the Chinese path to modernization. Taking common prosperity as the result of income and assets does not facilitate a full understanding of people's common prosperity, because common prosperity also includes people's pursuit of subjective happiness such as happiness and satisfaction. From the perspective of the need for a better life in China, this study constructs a subjective evaluation system of the common prosperity of urban residents, including 5 dimensions and 25 specific indicators. It uses survey data from 460 participants and applies the graded response models to estimate parameters and predict latent variables. We find that 21 indicators are in line with the reasonable range of basic assumptions and parameters. They have a strong ability to distinguish the common prosperity of residents in different regions, but have different functional characteristics. The confirmatory factor analysis shows that the common prosperity index of residents includes four potential factors: income, education, medical care, and old-age care, and ecology, which has a good structural effect. In terms of weight, education, medical care and old-age care are the most important factors influencing common prosperity. Among them, the classification policy of high school entrance examination, the quality and fairness of primary and secondary education, the degree of medical insurance security, and the waste sorting and community security are important aspects of evaluating the Common prosperity of residents.

Keywords: Subjective cognition of the need for a better life; Common prosperity; Graded Response Models; Measurement; Influence Factors

1. Introduction

In order to fully implement the strategic decision of the Chinese government to promote the construction of demonstration zones for common prosperity through high-quality development, the Zhejiang Provincial government issued the Implementation Plan of Zhejiang High-quality Development and Construction Demonstration Zone for Common Prosperity (2021–2025) [1]. The Hangzhou Municipal Committee of the Communist Party of China and the Hangzhou Municipal Government issued the Action Plan for Hangzhou to become a Model city of the Zhejiang High-quality Development and Construction Demonstration Area of Common Prosperity [2]. In recent years, Hangzhou has made remarkable achievements in economic and social development. The income level of urban residents ranks among the top in China, the income gap between urban and rural areas is relatively low, and a high level of equality of basic public services has been realized in Hangzhou. At the same time, there are still many problems, such as a large income gap among urban residents, uneven distribution of compulsory education resources, insufficient supply of elderly care services, serious traffic congestion in the morning and evening peak hours, and difficult access to the "last kilometer" of public transport [3]. Therefore, it is of great practical significance to study common prosperity from the perspective of residents' needs for a better life.

The literature review shows that relevant studies mainly focus on the connotation and index construction of common prosperity at the macro level. Only a few studies examine the status of the common prosperity of residents, and they take rural residents as the research object. There is a lack of research on urban residents. In addition, objective

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income and asset indicators are mainly used to measure common prosperity, while subjective indicators such as happiness and satisfaction are lacking. At the same time, these studies refer to the measurement framework of multidimensional poverty and adopt the counting method or equal-weight scoring method to measure the level of the household commonwealth, which may lead to inaccurate measurement results. Therefore, this study aims to solve the following problems. First, how to construct the common prosperity index suitable for urban residents. Based on the theory of subjective needs for a better life and the needs of urban residents, this study plans to design 30 specific subjective evaluation indicators from a multi-dimensional perspective. Second, how to scientifically measure and select the indicators and levels of common prosperity of residents. We believe that the existing research selects the index of common prosperity according to the value judgment, but lacks the measurement basis, which may lead to some unsatisfactory indicators being included in the evaluation system. In addition, using the counting method or equal weight scoring method to measure residents' common affluence fails to distinguish the weight difference among different indicators, which exists in itself and has an important impact on the measurement results of common affluence. Therefore, we use the item response theory model to reflect the differences of different measurement indicators through item differentiation coefficient and item threshold coefficient, to provide a sample for scientific selection of common prosperity indicators. In conclusion, this study provides relevant evidence for promoting regional common prosperity and people's well-being in terms of index construction and method application. In particular, under the development trend of urban-rural integration in China, urban and rural residents have integrated development, and their life needs are increasingly converging. The analysis framework of urban residents' common prosperity proposed in this study, including income, education, medical care, pension and ecology, can also provide a valuable reference for the assessment of rural residents' common prosperity.

The remainder of the article is organized as follows: Section 2 covers the literature Review; Section 3 reviews the data and methods used; Section 4 introduces the findings of the study; Section 5 presents the discussion; and lastly, Section 6 presents conclusions.

2. Literature Review

2.1. People's Need for a Better Life

As a strategic goal of social development, the realization of common prosperity for all people is based on the premise of meeting the reasonable needs of people. Common prosperity is regarded as the common but differentiated and differentiated sufficiency of wealth at different levels of people's needs and as a whole [4]. From the perspective of the world, European and American countries have a long history of theoretical research on needs, profound ideological and theoretical origins, interdisciplinary, cross-industry, cross-field, comprehensive and institutionalized color. Representative theoretical views include Maslow's personal needs theoretical paradigm of individual psychology, Bradshaw's social needs classification theory, and Doyal and Gough's human needs theory [5]. Chinese scholars have expanded the needs theory of the international academic community based on adhering to Marx's people-oriented needs theory in combination with China's national conditions. Peng (2010) [6] proposed that in the process of social transformation in China, social welfare objectives should be formulated based on social needs. Yao (2019) [7] believes that in the application of the need theory in local welfare governance, how to effectively consider the needs of the target group of individuals and their families at the same time becomes an important aspect of introducing cultural elements into the theory and realizing local expansion. Liu (2022) [5] proposed a theoretical system of social needs composed of individual needs, social welfare service needs, common needs, basic needs and social welfare needs.

From the perspective of composition, people's growing needs for a better life are manifested in material needs, social needs and psychological needs [8]. In the application research, Hu (2020) [9] used the subjective scoring method when quantifying the index of people's need for a better life, and constructed the index of Zhejiang's need for a better life from the dimensions of economic confidence, political goodwill, cultural richness, social harmony and ecological civilization. Other studies apply the theory of the need for a better life to the analysis of social governance. For example, Hu (2023) [10] portrayed the relative deprivation of Chinese farmers from the three dimensions of material needs, social needs and social participation needs. Shen et al. (2022) [11] incorporated the concept of a good life into the construction of common prosperity indicators for Chinese rural residents, and Ma (2022) [12] expanded the need for a good life to happiness and satisfaction at the political and psychological level, and then examined the impact on subjective common prosperity. Bian (2020) [13] applied the idea of the need for a better life to develop the high-quality life index of urban residents.

2.2. Common Prosperity at the Macro Level

Before the 19th National Congress of the Communist Party of China, building a moderately prosperous society in an all-round way is a phased goal for China to achieve common prosperity. Relevant studies have analyzed the indicators of a well-off society. He (2003) [14] first proposed the framework of the evaluation indicator system of an all-round well-off society. Yang and Zhu (2004) [15] analyzed the subsystem of an all-round well-off society in rural areas using the analytic hierarchy process. Zhu (2017) [16] proposed the establishment of new indicators such as innovation indicators, new economic indicators, efficiency indicators of rule of law construction, environmental protection indicators and coordinated development indicators. Since the 19th National Congress of the Communist Party of China formally put forward the goal of basically achieving common prosperity for all people, relevant research has focused on the following three directions. The first pays attention to the connotation of common prosperity. The study believes that the center of common prosperity should be placed in the state of people's need to meet their good life. Li (2021) [17] believes that common prosperity is a multi-dimensional and developed new form of civilization in politics, economy, society, ecology, culture and other aspects. It is a common phenomenon that all people have the means of production and living needed for a better life and to maintain a reasonable gap. Liu and Wang (2021) [18] proposed that common prosperity means sharing material wealth, spiritual self-confidence and self-improvement, social harmony, and a happy and beautiful life with a livable environment. The second focuses on how to measure common prosperity. The research focuses on designing the indicator system of common prosperity. They put forward a variety of indicator systems for measuring common prosperity. Liu et al. (2021) [19] pointed out that the indicator system of common prosperity includes two dimensions: overall prosperity and sharing of development achievements. Chen and Yu (2021) [20] designed the common prosperity index of three dimensions of development, sharing and sustainability indicators, and Jiang and Dou (2022) [21] designed the common prosperity index system of four dimensions of people, sharing, development and security. The third is to analyze the possible problems in China's process of promoting common prosperity. Jiang and Dou (2021) [22] believed that the difficulties in promoting common prosperity lie in the unbalanced and insufficient development, the unbalanced distribution pattern of social interests, and the unbalanced degree of realization. Li et al. (2021) [23] pointed out that the implementation of rural revitalization has become an inevitable requirement for achieving common prosperity.

2.3. Research on Common Prosperity at the Micro Resident Level

In contrast to macro research, only a few studies have examined the common prosperity of micro-groups. Some studies use objective indicators such as income to analyze the common prosperity of residents. Shen et al. (2022) [11] used provincial data to analyze the space-time evolution of the common prosperity of farmers, and Zhang et al. (2022) [24] used an analytic hierarchy process to measure the common prosperity index of households when analyzing the impact of digital inclusive finance on common prosperity. Liu et al. (2022) [25] used the counting method to measure the common prosperity of farmers when analyzing the impact of social security insurance on the common prosperity of farmers. Tan and Wu (2022) [26] used the equal weight scoring method to measure the common prosperity of farmers when analyzing the flow of rural labor.

On the other hand, some studies use subjective evaluation indicators to analyze the common prosperity of residents. Ma (2022) [12] believes that subjective well-being can directly reflect the degree and quality of the realization of common prosperity, focusing on the impact of political and psychological factors on subjective common prosperity. Liu and Zhang (2023) [27] believed that the subjective welfare gap could be used to examine the subjective common prosperity of residents, and then estimate the impact of social quality on the common prosperity of residents. Xu and Zhang (2019) [28] proposed to use the sense of gain, happiness and security to evaluate the quality of life of residents in Shanghai, and Zhang (2020) [29] built the subjective evaluation index of high-quality life of residents in Chongqing around "good life" and "harmonious environment".

Arguably, the above research will provide valuable guidance for the study of common prosperity. However, most of the objects concerned in relevant studies are concentrated at the national and provincial levels, and there is lack of attention to the micro-family. The object of common prosperity for all is the people. Although there are a few literatures concerned about the common prosperity of families, they focus on rural residents and do not pay attention to urban residents. In addition, from the perspective of research content, relevant research mainly uses objective indicators such as income and assets to measure common prosperity, but lacks subjective dimensions such as residents' satisfaction and happiness to measure common prosperity. Common prosperity includes not only material prosperity, but also spiritual prosperity. Therefore, through the "bottom-up" evaluation method, to examine the subjective evaluation of the respondents on the need for a better life, and to design the indicator system of urban residents' common prosperity has

become an important issue in the study of common prosperity in the new era. In addition, from the perspective of research methods, it may not be possible to distinguish the weights of different indicators by using the counting method or equal weight scoring method to measure the common prosperity of residents, and the research methods also need to be updated. Given this, how to define the evaluation indicators of urban residents' common prosperity and scientifically select appropriate indicators constitute the focus of this paper. Therefore, our research objectives include two aspects. First, from the perspective of residents' subjective cognition, we should build a subjective evaluation index system of residents' common prosperity around the multi-dimensional connotation of urban residents' need for a better life. The second is to use the hierarchical response model to examine the effectiveness and reliability of the indicators of common prosperity, providing theoretical support and empirical evidence for the measurement of common prosperity at the level of Chinese residents.

3. Materials and Methods

3.1. Study Area and Data Source

The central government of China identified Zhejiang Province as the first high-quality development and construction of the common prosperity demonstration zone in 2021. Hangzhou, the provincial capital city, has determined the strategic positioning of building a high-level "digital smart Hangzhou · livable paradise". The city is striving to be the model of high-quality development and construction of the common prosperity demonstration zone in Zhejiang. The Action Plan for Hangzhou to Become a Model City for Zhejiang's High-quality Development and Construction of a Common Prosperity Demonstration Zone points out that the new development pattern of "Greater Hangzhou, High-quality, and Common Prosperity" should be accelerated. By 2025, the city aims to achieve the goal of rich and prosperous life, spiritual self-confidence and self-improvement, livable and suitable environment, social harmony, universal and inclusive public services, including regional, urban and rural prosperity, collective prosperity, material and spiritual prosperity. From the perspective of residents' wealth, in 2022, the per capita disposable income of all residents in Hangzhou was 70,281 yuan [30], 16.55% higher than that of all residents in Zhejiang Province, and the per capita disposable income of urban residents in Hangzhou was 77,043 yuan, 8.15% higher than that of urban residents in Zhejiang Province, ranking fourth in the income list of major cities in China, only lower than Beijing, Shanghai and Suzhou [31]. From the perspective of the income gap of residents in Hangzhou, the urban-rural income gap in Hangzhou is relatively small. In 2022, the urban-rural income ratio was only 1.70, 11.76% lower than the provincial urban-rural income ratio (1.9). Therefore, government policy support and practical conditions provide guidance and a basis for the study of common prosperity of residents in Hangzhou.

The data of this study are from the questionnaire survey conducted in Hangzhou from July to August 2022. Before filling in the questionnaire, the investigator will introduce the purpose of this survey to the respondents and emphasize that the data are only used for academic research. In the survey, we selected urban residents living in Shangcheng District, Gongshu District, West Lake District, Qiantang District, Binjiang District, Xiaoshan District and Tonglu County as the survey objects, and adopted an on-site simple sampling method to obtain 460 valid questionnaires. Among them, there were 191 male respondents, accounting for 41.52%, and 269 female respondents, accounting for 58.48%. In terms of age structure, respondents aged 18 to 30 account for about 35.65%, respondents aged 31 to 40 account for about 33.04%, respondents aged 41 to 50 account for about 22.39%, and respondents aged over 50 account for about 8.91%. About 36.30% of respondents have a high school degree, 53.26% have a university degree, and 10.44% have a graduate degree. Among them, 20% of respondents' family income is less than 100,000 Yuan, 33.26% of respondents' family income is between 100,000 Yuan and 200,000 Yuan, 35.22% of respondents' family income is between 200,000 Yuan and 500,000 Yuan, and 11.52% of respondents' family income is more than 500,000 Yuan.

3.2. Indicators and Dimensions

Human needs are the key to understanding the social welfare system and the value basis for the distribution of social resources and the operation of the welfare system [32]. The State establishes a social welfare system in order to meet the social needs of the members of the society. The specific goals that society needs to meet include adequate nutrition and water, economic income security, basic education security, adequate medical security, safe environment for children to grow up, housing welfare security, safe working environment security, and social participation of social members, among others [6]. Since the Fifth Plenary Session of the 19th CPC Central Committee, "Satisfying the needs of a better life" and building a modern social welfare system with Chinese characteristics have become the highest goals of national development [5]. Therefore, meeting the people's growing needs for a better life has become the key to China's current welfare system. General Secretary Xi Jinping pointed out that people expect better education, more

stable jobs, more satisfactory income, more reliable social security, better medical and health services, more comfortable living conditions, a more beautiful environment, and a richer spiritual and cultural life. The "Eight Better" points show the scope of connotation for the study of China's needs for a better life. In terms of hierarchy, the needs of a good life can be divided into material needs, social new needs and psychological needs. As for how to classify needs, Yao (2019) [7] believed that the needs of service objects should be refined and classified through "bottom-up" empirical assessment. In the empirical study, Huo and Zhang (2023) [10] divided the needs for a good life into material needs, social needs and social participation needs. This study focuses on the connotation of urban residents' needs for a better life, and conducts research through the subjective evaluation of respondents' needs for a better life, such as income, education, medical care, pension, environment and confidence, among others. Specific indicators are shown in Table 1.

Table 1. Descriptive statistics for the common prosperity indices.

Dimensions (Latent Variable)	Measurement Index	Value Range	Mean (Standard Deviation)
Income dimension	Employment Opportunities (Item1)	1~5	3.230 (0.940)
	job satisfaction (Item 2)	1~5	3.315 (0.877)
	salary satisfaction (Item 3)	1~5	3.133 (0.899)
	stable job positions (Item 4)	1~5	3.293 (0.935)
Educational dimension	Pre-school and primary school for children (Item 5)	1~5	3.414 (0.928)
	The middle school the children attend (Item 6)	1~5	3.443 (0.798)
	Senior high school entrance examination policy (Item 7)	1~5	3.162 (0.953)
	Quality of the school the child attends (Item 8)	1~5	3.426 (0.854)
	Education-related policy (Item 9)	1~5	3.425 (0.837)
	Fairness of children's education (Item 10)	1~5	3.402 (0.951)
Medical dimension	Participate in social health insurance (Item 11)	1~5	4.313 (1.510)
	Sign up for commercial health insurance (Item 12)	1~5	3.122 (1.998)
	Satisfaction of seeing a doctor (Item 13)	1~5	3.437 (0.867)
	Medical insurance reimbursement ratio (Item 14)	1~5	3.465 (0.843)
	Medical insurance reimbursement coverage (Item 15)	1~5	3.450 (0.866)
Old-age care dimension	Participate in the social endowment insurance (Item 16)	1~5	3.974 (1.749)
	The community has home care services (Item 17)	1~5	3.370 (1.965)
	Community service for home care of elderly (Item 18)	1~5	3.588 (0.818)
	Social endowment institution (Item 19)	1~5	3.412 (0.849)
Ecological dimension	Community garbage classification (Item 20)	1~5	3.380 (0.864)
	Community security situation (Item 21)	1~5	3.533 (0.868)
	Community ecological environment (Item 22)	1~5	3.489 (0.859)
	Community culture, fitness facilities (Item 23))	1~5	3.370 (0.942)
	Transportation convenience (Item 24)	1~5	3.511 (0.879)
	Traffic congestion (Item 25)	1~5	2.885 (0.982)

The income dimension is the basic material condition that residents need to meet for a better life, and the income level and subjective income evaluation are important dimensions to examine the material abundance and quality of life of residents [3,13,33]. Based on this, this study adopts four subjective indicators of urban residents' satisfaction with employment opportunities, job satisfaction, salary satisfaction and stable job positions, and reflects the degree of common prosperity of urban residents through respondents' subjective evaluation of satisfactory income needs.

The educational dimension is the representation of a better life from the perspective of social harmony among residents, especially whether urban children can enjoy fair and high-quality educational resources is an important content of common prosperity of residents [28,34]. This study focuses on the satisfaction index of six subjective indicators of urban residents' education, which are preschool and primary school for children, the middle school of children, senior high school entrance examination diversion policy, quality of the school the children attend, education-related policies and the fairness of children's education. Through the subjective evaluation of the respondents to meet the needs of education, it reflects the sharing of residents' common prosperity.

The medical dimension is a representation of the good life of residents from the perspective of social harmony. Especially, high-quality medical and health services are more important for evaluating the common prosperity of residents [28], such as the accessibility and equalization of medical resources [20], satisfaction with medical services [3], and convenience of medical services [28]. In this study, five subjective evaluation indicators, such as respondents' satisfaction with medical treatment, medical insurance reimbursement ratio and scope, are used to reflect the sharing of residents' common prosperity.

The old-age care dimension is a representation of a better life from the perspective of social harmony of residents. The level of old-age care security, supply and quality of old-age care services is often used to investigate the sharing of common prosperity [21]. In this study, the satisfaction of respondents to four subjective indicators, including participation in pension insurance, community home care service, and social care institution service is used to investigate the satisfaction of residents with social security needs such as social care and home care service.

The ecological dimension is a representation of residents' needs for a better life with a livable ecological environment. The livable living environment is a developmental indicator for measuring common prosperity [35], such as garbage disposal, sewage treatment [11], environmental quality [21], cultural leisure and transportation convenience [28]. Based on the cited studies, this study adopts five subjective evaluation indexes of respondents on community garbage classification, community security, community ecological environment, community cultural facilities, urban traffic congestion and convenience, to reflect the satisfaction of respondents on the ecological needs of health, safety, greening and urban transportation convenience of residential communities.

For all the items, the data given in our study are ordered categories, and the values of them are 1, 2, 3, 4, and 5. In order to provide more detailed data, Table 1 provides descriptive statistics of mean and standard deviation.

3.3. Statistical Method

The Item Response Theory (IRT) is a mathematical model to establish the relationship between latent variables or latent traits and the correct answer rate of test items. IRT can evaluate and select test items, predict latent traits through hypothesis testing, parameter estimation, information calculation and other procedures. The graded response model (GRM) is used to deal with ordered categories on a rating scale, such as Likert scales [36]. The GRM is widely used in psychology, pedagogy, clinical outcomes, social science and other fields. For instance, the subjective well-being scale [37,38], English listening ability rating scale [39,40], psychological scale [41], health-related quality of life [42,43], Poverty measurement [10,44].

Common prosperity was viewed as a latent construct in the GRM, measured by a series of test items. Suppose that for i th household (i = 1,2…n) and j th test items (j = 1,2…m), all items take on the ordered categories (k = 0, 1,…,K), α_j is the discrimination (or item slope) parameter of j th test item, b_{jk} is the kth threshold parameter for item j, or it be considered the difficulty of responding with category k or higher for item j, Y_{ij} is the answer of i th household to j th test item , θ_i is the latent trait ability parameter of the i th household, which conforms to normal distribution and represents the common prosperity degree of the household. Among them, the discrimination parameter and threshold parameter are the decisive factors for each item. The item discrimination parameter reflects the magnitude of the relationship between an item and the latent construct. The threshold parameter refers to the item's difficulty or the latent trait level in which the probability of answering at or above the particular category equals 50 % [45].

First, given the level of latent trait θ, we compute the probability that the response will be observed in category k or higher. The function is cumulative probabilities, and is expressed as follows:

$$P(Y_{ij} \geq k|\theta_i) = \frac{\exp\{\alpha_j(\theta_i - b_{jk})\}}{1 + \exp\{\alpha_j(\theta_i - b_{jk})\}} \quad (1)$$

The GRM is considered a generalization of the two-parameter logistic model [45]. The GRM considers items as a series of K–1 dichotomous item. The 5-point scale is adopted in the subjective evaluation of common prosperity, K equals 4 in the study. Therefore, we can calculate the probability of selecting k when the ith respondent answers the jth item, the formula is as follows:

$$P(Y_{ij} = k|\theta_i) = P(Y_{ij} \geq k|\theta_i) - P(Y_{ij} \geq k+1|\theta_i) \quad (2)$$

For Equation 2, the probability of respondents choosing the lowest category, or any of the higher score categories is 1. Together, the probability of answering above the highest category is zero [46].

4. Results

4.1. Selection of Common Prosperity Indicators Using Grade Response Models

4.1.1. Hypothesis Test

Unidimensionality and monotonicity of response hypothesis tests are required by IRT, before the parameter estimation. This study carries out unidimensionality test by factor analysis. We first investigate the reliability and validity of the items. The result of Cronbach's Alpha Index showed that Cronbach's α of all items was 0.874. Kaiser-Meyer-Olkin and

Bartlett's spherical tests were used for validity testing, and the results showed that Cronbach's α was greater than 0.7, the internal consistency of the item was credible. At the same time, the overall Kaiser-Meyer-Olkin was 0.882, and the KMO value of each item ranged from 0.719 to 0.940. In addition, the significance of statistical value of Bartlett's sphericity test is 0.000 (χ^2 = 3803.900). Therefore, factor analysis was suitable for our research. The result showed that the characteristic value of the first factor is 7.670, the characteristic value of the second factor is 1.459, and their ratio is 5.257. From the above results, the single dimension of the trait space is established. In addition, Mokken Scale Procedure (MSP) is used to verify monotonicity. Specifically, MSP is based on Loevinger's H value [47], and higher positive Loevinger's H values reflect better appropriateness of the scale. Mokken (1971) suggested that the borderline value of the Loevinger's H is 0.30 [48]. Results show that the Loevinger's H values of five items are all less than 0.3, in other words, item 11, item 12, item 16, item 17 do not conform to the monotonicity assumption. As a result, twenty-one items are consistent with the monotonicity assumption.

4.1.2. Analysis of Parameter Estimation Results

In the GRM, the discrimination parameter and threshold parameter have reasonable value ranges. The discrimination parameter represents the discrimination capability of test items for latent construct. Higher discrimination values indicate more sensitive discriminations between respondents [48]. In previous studies, the value of the discrimination parameter was considered to be between [0.3, 4] [49–51]. When the discrimination parameter value is greater than 1.34, the discrimination capability of the item is high [51,52]. On the other hand, the threshold parameter indicates the level of the latent trait. Higher threshold parameter indicates that it is more difficult to fall in the next from one category. Some research believe that the difficulty of the item is in the range of [−4, 4] [49,53].

Table 2 lists the results of parameter estimation. The results show that the estimated parameters of 25 items meet the expected values. Among them, the discrimination coefficient of the items 18, 24 and 25 are less than 1.35, which reflects that these items have a general discrimination of latent structures. The discrimination coefficient of other items is between [1.40, 2.4], indicating that they have a high discrimination of potential features. Especially the items 1, 5, 8, 9, 10, 14, 15, and 23 have the highest discrimination. At the same time, the threshold coefficient shows an increasing trend from negative value to positive value, and there is no inverse threshold. This means that they span a broad range of the latent trait below and above the mean. In addition, we found that items 1, 2, 3, 4, 5, 7, 8, 9, 10, 13, 19, 20, 23, and 25 are more suitable for expressing groups above the average level of common prosperity. This is because their average threshold coefficient is higher than the mean of all items. On the contrary, other items are more suitable to reflect the groups below the average level of common prosperity.

4.1.3. Analysis of Test Information

Figure 1 shows the test information curve, providing the total information amount and measurement error. According to the calculation relationship between reliability and information [54], when the amount of information is equal to 10, the reliability is equal to 0.9. We found that the test has maximum information When θ is about between [−3.6, 2.8]. Hence, the reliability within this interval is approximately 0.90. In addition, the test provides a wide range of information, which indicates that it is used for respondents with different score levels.

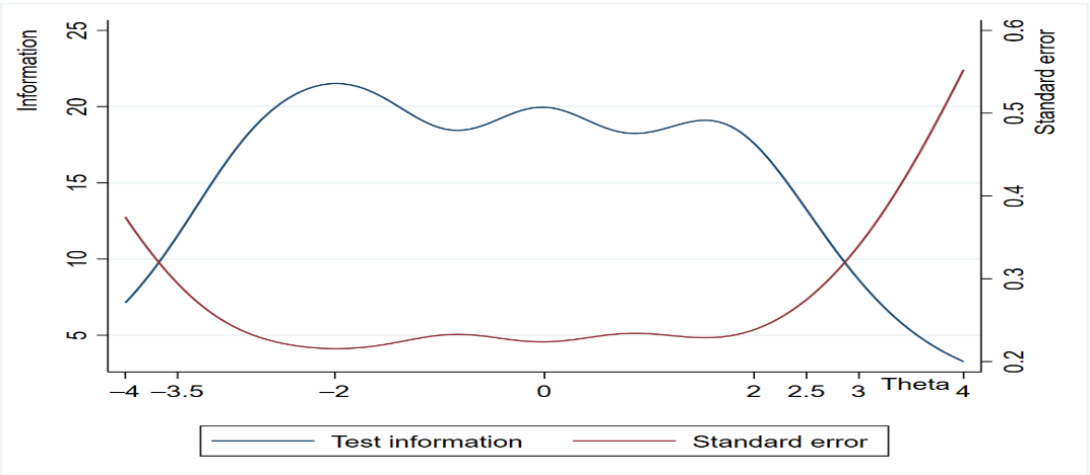

Figure 1. Test information function.

Table 2. Parameter estimation results of the two-parameter Logistic model.

Items	Discrimination Coefficient	Cut Point	Difficulty Coefficient	Items	Discrimination Coefficient	Cut Point	Difficulty Coefficient
Item 1	1.802*** (0.167)	≥2	−2.079*** (0.188)	Item 14	1.796*** (0.171)	≥2	−2.539*** (0.248)
		≥3	−1.419*** (0.130)			≥3	−1.793*** (0.164)
		≥4	0.484*** (0.085)			≥4	0.006*** (0.076)
		≥5	1.782*** (0.166)			≥5	1.831*** (0.172)
Item 2	1.681*** (0.157)	≥2	−2.476*** (0.231)	Item 15	1.907*** (0. 178)	≥2	−2.468*** (0.233)
		≥3	−1.615*** (0.149)			≥3	−1.656*** (0.147)
		≥4	0.331*** (0.083)			≥4	0.046*** (0.075)
		≥5	2.001*** (0.188)			≥5	1.683*** (0.156)
Item 3	1.552*** (0.143)	≥2	−2.479*** (0.234)	Item 18	1.082*** (0.127)	≥2	−4.256*** (0.547)
		≥3	−1.204*** (0.125)			≥3	−2.784*** (0.342)
		≥4	0.648 *** (0.097)			≥4	−0.107*** (0.108)
		≥5	2.379*** (0.225)			≥5	2.227*** (0.260)
Item 4	1.602*** (0.151)	≥2	−2.238*** (0.209)	Item 19	1.443*** (0.145)	≥2	−3.034** (0.322)
		≥3	−1.561*** (0.148)			≥3	−1.903*** (0.198)
		≥4	−0.318*** (0.085)			≥4	0.266*** (0.090)
		≥5	2.036*** (0.195)			≥5	2.077*** (0.209)
Item 5	1.889*** (0.182)	≥2	−2.138*** (0.199)	Item 20	1.549*** (0.146)	≥2	−2.437** (0.233)
		≥3	−1.517*** (0.141)			≥3	−1.777*** (0.167)
		≥4	−0.005*** (0.084)			≥4	−0.014*** (0.083)
		≥5	1.803*** (0.174)			≥5	2.577*** (0.244)
Item 6	1.610*** (0.164)	≥2	−2.811*** (0.299)	Item 21	1.584*** (0.141)	≥2	−2.807*** (0.278)
		≥3	−2.176*** (0.220)			≥3	−1.837*** (0.171)
		≥4	0.169*** (0.088)			≥4	−0.248*** (0.083)
		≥5	2.119*** (0.214)			≥5	1.915*** (0.184)
Item 7	1.462*** (0.140)	≥2	−2.442*** (0.238)	Item 22	1.678*** (0.156)	≥2	−2.658** (0.256)
		≥3	−1.303*** (0.135)			≥3	−1.778*** (0.161)
		≥4	0.560*** (0.100)			≥4	−0.162*** (0.080)
		≥5	2.228*** (0.219)			≥5	1.980*** (0.1805)
Item 8	2.194*** (0.210)	≥2	−2.219*** (0.201)	Item 23	1.824*** (0. 167)	≥2	−2.298** (0.206)
		≥3	−1.626*** (0.141)			≥3	−1.314*** (0.122)
		≥4	0.071*** (0.074)			≥4	−0.009*** (0.076)
		≥5	1.758*** (0.164)			≥5	1.853*** (0.173)
Item 9	2.243*** (0.215)	≥2	−2.260*** (0.209)	Item 24	1.167*** (0.123)	≥2	−3.612** (0.405)
		≥3	−1.672*** (0.143)			≥3	−2.181*** (0.238)
		≥4	0.092*** (0.074)			≥4	−0.131*** (0.099)
		≥5	1.706*** (0.158)			≥5	2.154*** (0.237
Item 10	2.407*** (0.231)	≥2	−1.835*** (0.156)	Item 25	0.972*** (0.113)	≥2	−2.841** (0.342)
		≥3	−1.357*** (0.117)			≥3	−0.884*** (0.143)
		≥4	0.054*** (0.071)			≥4	1.383*** (0.189)
		≥5	1.482*** (0.137)			≥5	3.184*** (0.369)
Item 13	1.511*** (0.147)	≥2	−2.624*** (0.260)				
		≥3	−1.863*** (0.179)				
		≥4	−0.048*** (0.084)				
		≥5	2.247*** (0.219)				

Note: ** and *** are significant at 5% and 1% levels respectively. Standard error is in brackets. Bold indicates that the mean of the threshold coefficient of these items are higher than overall mean.

4.2. Evaluation of the Structure and Weight of Common Prosperity

4.2.1. Confirmatory Factor Analysis

According to the results of the graded response model, four indicators of medical and elderly care were deleted. We merged the medical and elderly care indicators into one dimension. In order to further investigate the rationality of the internal structure of common prosperity, residents' common prosperity is divided into four dimensions: income, education, medical care and old-age care, and ecology. Second-order confirmatory factor analysis is used to test the factor structure. The results of Table 3 show that the factor loads of the first-grade factors are between 0.792 and 0.985,

and the factor loads of the second-grade factors are between 0.622 and 0.880, both of which have good significant levels. In addition, the model fitting indicators showed good results, with RMSEA, CFI, TLI, and CD values of 0.05, 0.943, 0.924, and 0.981, respectively. The indicators all reached ideal statistical levels. Therefore, the Common prosperity index of residents includes four dimensions of income, education, medical care and old-age care, and ecology, which has a good structural effect.

Table 3. Results of confirmatory factor analysis.

Structural Model					
Latent Variable	**Factor**	**Parameter Estimation**		**Standard Error**	
Common Prosperity	Income	0.792***		0.030	
	Educational	0.985***		0.029	
	Medical & Retirement	0.954***		0.043	
	Ecological	0.936***		0.036	
Measurement Model					
Latent Factor	**Observed Variable**	**Parameter Estimation**	**Latent Factor**	**Observed Variable**	**Latent Factor**
Income Factor	Item 1	0.668*** (0.033)	Medical & Retirement Factors	Item 13	0.622*** (0.037)
	Item 2	0.684*** (0.032)		Item 14	0.742*** (0.026)
	Item 3	0.626*** (0.036)		Item 15	0.804*** (0.021)
	Item 4	0.700*** (0.032)		Item 18	0.880*** (0.015)
Educational Factors	Item 5	0.659*** (0.034)		Item 19	0.855*** (0.017)
	Item 6	0.656*** (0.034)	Ecological Factors	Item 20	0.857*** (0.017)
	Item 7	0.715*** (0.030)		Item 21	0.815*** (0.022)
	Item 8	0.742*** (0.029)		Item 22	0.828*** (0.019)
	Item 9	0.664*** (0.035)		Item 23	0.738*** (0.028)
	Item 10	0.735*** (0.028)		Item 24	0.736*** (0.027)
				Item 25	0.789*** (0.024)
Model Fitting	RMSEA	CFI	TLI	SRMR	CD
Result	0.05	0.943	0.924	——	0.981
	Good	Good	Good	——	Good

4.2.2. Weighting of Common Prosperity Evaluation Index

On the basis of confirmatory factor analysis results, normalize the standardized path loads within the same plane, and then calculate the weights of each indicator. The formula is as follows:

$$W_{ij} = \frac{\lambda_{ij}}{\sum_{j}^{n} \lambda_{ij}} \quad (3)$$

Table 4 lists the weight results of residents' common prosperity indicators. For urban residents, education, medical care and old-age care are the most important factors influencing Common prosperity. Especially, the importance of Items 8 and 9 in educational factors is more prominent, while the importance of Items 14 and 15 in medical and elderly care factors is more prominent. This is because Hangzhou, as a developed city in China, has a relatively higher income level among residents. They attach great importance to their children's education and are very concerned about the quality and policies of their education in schools, in order to maintain their children's advantage in future competition. In addition, serious illness medical expenditure is an important life pressure faced by residents. They believe that the coverage and proportion of reimbursement that social medical insurance can afford are very important for the construction of common prosperity. Ecological factors rank the third in residents' common prosperity, of which Item 21 and Item 22 are more important. This shows that they believe that the garbage disposal and public security of the community are more important for the evaluation of common prosperity. The income factor ranks last in the index of common prosperity. Unlike the lower income level of Chinese residents, Hangzhou residents have a higher income level and have been among the top for many consecutive years. For them, income factors are not as important as education and elderly care factors. Among the income factors, they are more concerned with the happiness and satisfaction of salary brought by work.

Table 4. Weighting results of common prosperity.

Primary Indicators	Weight$_i$	Secondary Indicators	Weight$_{ij}$	Primary Indicators	Weight$_i$	Secondary Indicators	Weight$_{ij}$
Income Dimension	0.216	Item 1	0.241	Medical & Retirement Dimensions	0.260	Item 13	0.194
		Item 2	0.262			Item 14	0.221
		Item 3	0.256			Item 15	0.225
		Item 4	0.240			Item 18	0.156
Educational dimension	0.269	Item 5	0.202			Item 19	0.204
		Item 6	0.200	Ecological Dimension	0.255	Item 20	0.209
		Item 7	0.172			Item 21	0.210
		Item 8	0.213			Item 22	0.234
		Item 9	0.214			Item 23	0.178
		Item 10	0.202			Item 24	0.169
						Item 25	0.209

4.2.3. Analysis on the Characteristics of Households' Common Prosperity

Using the weights of indicators, we can calculate the common prosperity index of residents, and then examine the differences in the common prosperity index of different ages, education levels, and family structures. The calculation is divided into two steps. The first step is to calculate the primary index based on the secondary indicators, where x_{ij} is the score of the secondary indicators and w_{ij} is the corresponding weight.

$$X_i = x_{ij} \times w_{ij} \quad (4)$$

The second step is to calculate the total index based on the sum of the first level index, where X_i is the score of the first level index and C_i is the corresponding weight of the first level index.

$$\text{prosperity} = \sum C_i \times X_i \quad (5)$$

Table 5 lists the characteristics of residents' common prosperity with different characteristics. In terms of age groups, respondents aged from 22 to 30 have the lowest level of common prosperity, which is due to their lower common prosperity factors in income, education and ecological dimensions. The respondents aged from 31 to 40 have relatively lower common prosperity factors in the two dimensions of health care, old-age care and ecology. From the perspective of education level, respondents with undergraduate and master education have a relatively lower level of common prosperity, which is because they have low educational factors and ecological factors, which also reflects that residents with higher education levels have higher living needs for children's education and ecological needs than others. From the perspective of family structure, the single respondents have the lowest level of common prosperity, and their evaluation on income, education and ecology is relatively lower. However, families with multiple children have relatively lower wealth factors in the income dimension. From the perspective of income level, low-income respondents with an annual family income of less than 100,000 yuan have the lowest level of common prosperity. They are highly satisfied with the ecological environment, but they are more concerned about income, education, medical care and old-age care, and their wealth level in these areas is relatively lower.

Table 5. The characteristics of households' common prosperity.

Variables	Income Indicators	Education Indicators	Medical & Retirement Indicators	Ecological Indicators	Total Indicators
22~30 years old	9.13	7.32	9.42	9.07	8.71
31~40 years old	9.83	9.95	9.23	9.08	9.52
41~50 years old	9.93	10.43	9.54	9.29	9.80
Over 50 years old	9.63	10.59	9.42	9.72	9.85
High school education	9.56	10.14	9.23	9.17	9.53
College degree	9.60	8.79	9.47	9.26	9.26
Postgraduate	9.63	7.80	9.51	8.87	8.91
single	8.68	5.03	9.34	8.70	7.88
couple	9.44	5.96	9.55	9.01	8.43
One child, couple	9.85	10.06	9.27	9.29	9.62
Two children, couple	9.52	9.77	9.48	9.15	9.48
Three children, couple	9.11	9.19	8.61	9.23	9.03
Income ≥ 100,000 Yuan	9.03	8.17	9.25	9.19	8.90
Income ≤ 500,000Yuan	9.61	9.32	8.78	9.05	9.17
Income > 500,000Yuan	9.75	9.35	9.51	9.24	9.45
Total	9.59	9.18	9.38	9.18	9.32

5. Discussion

Unlike the existing research, which focuses on the objective measurement of macro common prosperity and common prosperity of rural residents, our research aims at urban residents with high living standards in China and examines the respondents' subjective evaluation of common prosperity. In addition, our research adopts the item response theory and exploratory factor analysis. Through measuring the difficulty and threshold coefficient of different indicators or items, we reveal the functional differences of different indicators in measuring the common prosperity of residents. By measuring the path load, we explore the factor structure of common prosperity and the weight of each index. This can, to a certain extent, optimize the shortcomings of the previous research in measuring the common prosperity using the equal weight or counting method. Based on the residents' good needs for income, education, medical care, old-age care and ecological environment, this study designed 25 subjective evaluation indicators. The results of the grade project reflection model showed that four indicators did not meet the assumption of partial independence and were removed from the measurement indicator system.

In terms of income demand dimension, items 1 to 4 have high discrimination, and their average threshold coefficient is higher than the average level. Therefore, the subjective evaluation index of the income dimension is suitable for distinguishing groups with relatively high level of common prosperity. This study's conclusion is consistent with conclusion drawn from a previous study [3].

In terms of the dimension of educational needs, the ability to distinguish items 8 to 10 is higher than items 5 to 7. In terms of the average value of the threshold coefficient of the project, the average value of the threshold coefficient of item 6 "Satisfaction evaluation of children attending secondary school" is lower than the average level, indicating that this indicator is more suitable for distinguishing groups with relatively low level of common prosperity. In short, the quality and fairness of primary and secondary education are the key difficulties that should be solved in the process of people's common prosperity. The research conclusions are similar to another study [9].

As far as the dimension of medical needs is concerned, the ability to distinguish between question 13 and question 15 is strong, but only the mean value of the threshold coefficient of question 13 is higher than the average level. However, due to the limited high-quality medical resources in large cities, the problem of medical difficulty is the pain point that should be solved on the road to common prosperity. As for the dimension of pension needs, the discrimination coefficient of item 18 is low, and its average threshold coefficient is lower than the average level. This is because residents' need for community home-based elderly care is not universal enough. In contrast, the average value of the threshold coefficient of item 19 is higher than the average level, which is more suitable for evaluating groups with relatively high level of common prosperity. This is because social pension service is the main way for residents to provide for the aged, but the quality of its service supply still has great room for improvement. In general, the research findings of education, medical care and old-age care we found are similar to other research findings [55].

In terms of ecological environment, item 23 and item 24 are weak in distinguishing ability. The mean value of the threshold coefficients of item 20, item 23 and item 25 is higher than the average level, which indicates that community garbage classification, cultural and entertainment facilities and traffic congestion are more suitable for distinguishing groups with relatively high level of common prosperity. How to improve these needs of the public is a difficult problem to be solved in order to achieve common prosperity. In particular, respondents rated item 25 "Traffic congestion problem" as the lowest satisfaction, which is similar to what is in literature [3].

The results of the second-order factor model show that the common prosperity index of urban residents is composed of four potential factors: income, education, medical care and old-age care, and ecology. From the weight results, factors such as education, medical care and old-age care are more important for residents' common prosperity, followed by ecological factors, and income factors are the least important. In particular, the quality and fairness of education, the proportion and scope of medical insurance reimbursement, community health and public security are relatively important for the evaluation of common prosperity of residents. This is basically similar to the result of the project difficulty coefficient.

From the perspective of individual and family characteristics of common prosperity, we find that compared with other respondents, single respondents, young respondents, highly educated respondents and low-income respondents have a relatively lower level of Common prosperity, which is different from relevant research [24].

Our research has three limitations. The first is that the research on the common prosperity of residents is still in its infancy, and there is still much room for discussion on the measurement indicators of the common prosperity of residents. Whether it is using objective indicators such as income and assets, or subjective indicators such as well-being and satisfaction, it may only analyze the problem from a certain perspective. Therefore, the two types of indicators need to be comprehensively evaluated in the future. The second is that the research results of this paper can only reflect the

common prosperity of coastal urban residents with relatively developed economy in China, which is not necessarily applicable to urban residents in central and western China, nor to rural residents. In future, the scope of research objects will be expanded. Of course, in the process of promoting the construction of the common prosperity demonstration zone, the case of Hangzhou urban residents will play a demonstration and promotion role for other regions in China.

6. Conclusions

This article designs a subjective evaluation scale of the common prosperity of urban residents, and tests it with the hierarchical item response model and confirmatory factor analysis. They have strong distinguishing ability, but their functions are different. The results of confirmatory factor analysis show that the common prosperity index of residents includes four dimensions of income, education, medical care and old-age care, and ecology, and has a good structural effect. In addition, education, medical care, old-age care and ecological issues are the most important influencing factors of common prosperity. Specifically, residents are more concerned about the classification policy of the high school entrance examination, the quality and fairness of primary and secondary education, the degree of medical insurance protection, and the reflection of Waste sorting and community security.

Based on the above conclusions, the following countermeasures and suggestions are put forward to promote the common prosperity of urban residents. First, reform the policy of secondary school entrance examination and run vocational education well in order to alleviate educational anxiety.

First, reform the policy of diverting senior high school entrance exams and expand the number of high school students enrolled. At the same time, we will run vocational education well and improve the quality of vocational high schools. Specifically, the return of vocational education in the labor market can be improved through integration of general high school education and vocational education, integration of industry and education, and integration of science and education, so as to fundamentally change residents' prejudice against vocational high schools and reduce education anxiety.

Second, strengthen policy publicity and improve the degree of medical security. Hangzhou residents are not satisfied with the amount and breadth of medical insurance reimbursement, which has a great impact on the realization of common prosperity. Further understanding, Hangzhou Municipal Medical Insurance Bureau guidance and support of people's livelihood security project "West Lake benefit guarantee", is a basic medical insurance supplement of commercial medical insurance, low cost, no threshold for insurance (no age, medical history, etc.), large coverage. But some residents do not understand, it is recommended to strengthen publicity.

Third, expand the scope of home care and explore new models for the elderly. Hangzhou has entered a moderately aging society, and it is urgent to actively deal with the aging population. Hangzhou residents are in urgent need of home-based care for the elderly. According to different needs of elderly care, provide precise services to meet the needs of different elderly groups, such as the care of disabled elderly and mentally retarded elderly; Introduce the combination of private capital and government funding to better meet the needs of elderly care.

Author Contributions

Conceptualization, M.Z. and Z.H; Methodology, M.Z.; Software, Z.H.; Validation, S.X.; Formal Analysis, S.X.; Investigation, M.Z.; Resources, M.Z.; Data Curation, M.Z.; Writing—Original Draft Preparation, M.Z. and Z.H.; Writing—Review & Editing, M.Z. and Z.H; Visualization, M.Z.; Supervision, M.Z; Project Administration, M.Z; Funding Acquisition, M.Z. and Z.H.

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Not applicable.

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Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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