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Comparative Study on the Agglomeration Degree and Influencing Factors of the Urban Creative Class in the Central Area of the Yangtze River Delta

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Abstract: The creative class has become an important force in promoting sustainable urban development. Existing research has explored many factors for the agglomeration of the creative class, but there is still a lack of comparative studies from a heterogeneity perspective and on the design of cross-cultural adaptability factors, especially comparative studies across different regions in Chinese cities. This paper focuses on 27 central district cities in the Yangtze River Delta region of China, based on panel data from 2012 to 2019, and uses the location entropy method to measure the agglomeration degree of the creative class in different cities. Considering the cultural background of China, a model of influencing factors including five dimensions: economic foundation, living environment, cultural and educational environment, innovation environment, and ecological environment is constructed. The study finds: (1) The agglomeration degree of the creative class in the central urban cluster of the Yangtze River Delta is significantly higher than the peripheral level, forming an agglomeration distribution pattern led by Shanghai, with Nanjing, Hefei, Hangzhou, Suzhou, Ningbo, and other important node cities. The agglomeration degree of the creative class generally shows an upward trend. (2) The economic foundation, living environment, cultural and educational environment, innovation environment, and ecological environment all have a significant positive impact on the agglomeration of the creative class, among which the impact of the living environment, cultural and educational environment, and innovation environment is larger, while the economic foundation and ecological environment are relatively smaller. (3) There are differences in the influencing factors of the creative class agglomeration at the provincial levels of Jiangsu, Zhejiang, and Anhui in the Yangtze River Delta. Compared with the more core provinces of Jiangsu and Zhejiang, the cultural and educational environment and ecological environment have a more significant impact, while the relatively peripheral Anhui province is more dependent on the city's openness and innovation environment factors. This study reveals the spatial distribution rules and influencing factors of the creative class in the central cities of the Yangtze River Delta, providing insights for coordinated and sustainable regional development.

Keywords: cities in the central area of the Yangtze River Delta; creative class; agglomeration

1. Introduction

In the era of the creative economy, the creative class has become an important force in driving urban development and renewal. Since Richard Florida proposed the concept of “creative class” [1] in the context of the new economy, it has sparked the research interest of scholars in academia and also initiated active discussions among urban managers, planners, and real estate professionals. In recent years, the concept of the creative class has gradually become a new paradigm for understanding urban renewal, the creative industry, and

sustainable regional economic growth. Scholars have explored the impact of factors such as the creative class, human capital, and inclusiveness on regional economic development [2], as well as the relationship between creative cities, cultural industries, and the creative class [3], revealing the significant role and value of the creative class in promoting urban sustainable development.

The Yangtze River Delta region, encompassing Shanghai, Jiangsu Province, Zhejiang Province, and parts of Anhui Province, is one of the most economically developed, open, and innovative regions in China. This area, covering only 4% of the nation's land, is home to approximately 17% of China's population and generates nearly a quarter of the national GDP [4]. The Yangtze River Delta is not only China's economic engine but also a crucial global economic hub. Within China's new development paradigm, the region plays a pivotal role in driving the domestic circulation and serves as a core strategic hub for the dual circulation of domestic and international economies [5]. This region boasts a strategic geographical advantage, characterized by its access to the sea and major rivers, bridging the eastern and western parts of China, and connecting the north and south. It has excellent port resources, strong international connections, and a high level of coordinated openness [6]. These features make the Yangtze River Delta indispensable in enhancing China's participation in global cooperation and competition. As regional integration deepens, the Yangtze River Delta is becoming a global innovation hotspot, attracting investment and talent from around the world. This not only facilitates sustainable regional development but also drives economic growth in China and globally.

Existing research indicates that the creative class can significantly contribute to the development of cities or regions. To verify the logical connection between the creative class and economic growth proposed by Florida, Andersen studied Nordic regions and found that areas with higher densities of the creative class indeed exhibited faster economic development [7]. Sands and Reese, through their study of 40 mid-sized Canadian cities, pointed out that the creative class has a significant positive impact on regional sustainable growth [8]. Alfken examined the spatial distribution changes of artists in Germany over a certain period, revealing the geographical agglomeration of the creative class [9]. Mateos-Garcia and Bakhshi reported a 28% increase in creative employment across 47 creative clusters in the UK [10]. In Australia, research on the creative class covers several aspects, including the contribution of creative industries to economic growth [11], cultural policies related to the creative class [12], the role of Lesbian, Gay, Bisexual, Transgender, Queer/Questioning, Intersex, and other sexual orientations, gender identities, and gender expressions (LGBTQI+) producers in the creative industries [13], and immigrant creative workers [14]. Recent studies also focus on the creative class in rural areas, asserting that they play a significant role in promoting rural economic and cultural development [15].

The discussion on the factors influencing the agglomeration of the creative class is multifaceted, encompassing regional economic growth levels [4], urban per capita GDP growth, government scale, and indicators of science, education, culture, and health services [16]. However, these factors are not definitive, and cities need to implement comprehensive policies to fully harness the potential of the creative class. Thus, policy is also a crucial factor affecting the agglomeration of the creative class. Some scholars argue that the economic and ecological environment does not have a significant impact on the creative class [17]. Research from the perspective of labor heterogeneity reveals that the distribution of skill-based and entrepreneurial, self-employed, and salaried members of the creative class depends on different attracting factors [18,19]. Informal third spaces facilitate social interaction and creativity, thereby attracting the creative class [20]. Pavelea's study on Romanian urban creative class suggests that talent, technology, and territorial assets significantly influence the geographic concentration of the creative class, but different types of tolerance have varying impacts on its concentration [16]. Hard location factors may be more critical than tolerance, openness, or convenience [21]. The "super creative class" tends to concentrate in central urban areas [22]. High income, high education levels, and a

conducive environment for innovation and entrepreneurship are also significant factors attracting the creative class [23].

Although existing research has explored the factors influencing the agglomeration of the creative class from various perspectives, there is still a lack of comparative studies on agglomeration across different regions, particularly among inter-provincial cities. There remains significant potential for exploring the heterogeneity of creative class agglomeration across different regions. Additionally, most of the current research focuses on Europe and North America, with relatively fewer comparative studies on cities in East Asian countries, particularly in China. Given the cultural differences, it is essential to consider “cross-cultural” issues when designing measurement indicators for the factors influencing the creative class. These indicators should be adjusted and tailored to specific regional cultural contexts. Current research needs to incorporate more diverse and in-depth exploration in this regard.

Given the gaps in existing research, this study focuses on 27 central cities in the Yangtze River Delta region of China and addresses the following two research questions:

- (1) What is the spatial distribution of the creative class in different cities and regions (Jiangsu Province, Zhejiang Province, Anhui Province) within the Yangtze River Delta? Specifically, how can the agglomeration of the creative class in various cities and regions be measured?
- (2) What are the main factors influencing the distribution of the creative class in the central cities of the Yangtze River Delta? Are there differences in these influencing factors across different regions?

By delving into these questions, this study aims to clearly depict the spatial distribution of the creative class in the central cities of the Yangtze River Delta and to identify the factors that contribute to this distribution. Understanding these factors will help in formulating relevant policies to attract and retain the creative class, thereby providing significant insights for the sustainable development of the Yangtze River Delta region and potentially other regions globally.

2. Literature Review

The agglomeration of the creative class and its influencing factors have been a focal point of academic attention. Since Florida introduced the concept of the “creative class” [1], numerous studies have explored the factors influencing the agglomeration of the creative class from different perspectives. These studies primarily focus on economic, social, cultural, technological innovation environments, and inclusiveness. A few studies also address industrial structure and sectoral heterogeneity factors [24,25].

2.1. Economic Environment

The level of regional economic development is a critical factor influencing the agglomeration of the creative class. Studies have found that the creative class tends to concentrate in economically developed cities with abundant employment opportunities [26]. Clifton also demonstrated that in the UK, the creative class is more prevalent in regions with strong economic performance and high levels of human capital [27]. Additionally, Gabe noted that the negative impact of economic crises on the agglomeration of the creative class is less severe compared to other groups [28]. In the Yangtze River Delta region of China, the economic environment is not the primary factor influencing the agglomeration of the creative class, mainly due to non-commercial drivers. However, there is a positive correlation between economic conditions and wage levels for professional and technical creative classes [17]. The economic environment, which includes a certain level of economic development, infrastructure, and industrial structure, is crucial for attracting and retaining the creative class [29,30]. Boschma and Fritsch found that the agglomeration of the creative class promotes economic growth but also exacerbates regional inequality in European regions [26].

2.2. Technological and Innovation Environment

The technological and innovation environment plays a crucial role in the agglomeration of the creative class. Regions with strong technological innovation capabilities are more likely to attract the creative class [31,32]. For instance, Shanghai has effectively attracted and retained creative talent through optimizing policy formulation and enhancing intellectual property protection [33]. As a knowledge-based industry, the creative industry requires significant R&D investment and benefits from agglomeration to reduce costs [34]. Collaborative innovation and spatial linkages are essential, and research indicates that government funding for science and technology, as well as connections between enterprises and universities or research institutions, have a significant positive impact on regional innovation performance [35,36]. Wang Meng found that the agglomeration of the creative class and knowledge externalities have significant effects on urban innovation based on a study of 20 major cities [37]. Additionally, research on the drivers and economic consequences of technological innovation talent agglomeration shows that such agglomeration is primarily influenced by the innovation environment and is positively correlated with regional economic growth [38]. Policy support and participation can significantly promote technological innovation and innovation performance in enterprises, although the effectiveness of these policies depends on factors such as the rationality of policy design and market competition conditions [39–41]. Despite receiving significant attention from the government, the cultural and creative industries still face issues such as an incomplete policy system [42,43].

2.3. Socio-Cultural Factors

Socio-cultural factors play a crucial role in the agglomeration of the creative class. These factors, along with urban wage levels, jointly influence the spatial concentration of the creative class [44]. Bereitschaft and Cammack found that communities with higher levels of social diversity in Chicago tend to have more creative class talent [45]. This finding supports Florida's assertion that a diverse and inclusive environment is conducive to attracting creative talent [1]. From a cultural background perspective, cultural differences in different countries significantly impact the agglomeration of the creative class. For instance, individuals in high power distance cultures may exhibit lower originality when working under supervision, while in low power distance cultures like the United States, the presence of peers may inhibit creativity [46]. Research in the Netherlands shows that Bohemians and the creative core with specific spatial patterns tend to congregate in municipal areas where cultural, natural, and racial diversity are relatively concentrated and close to workplaces [47]. Cities can attract and retain the creative class by providing creative workspaces, promoting cultural diversity, and optimizing urban infrastructure [48–50].

2.4. Urban Openness and Inclusiveness

The openness and inclusiveness of a city are crucial for attracting the creative class. Evans highlighted that cities need to provide physical spaces for the agglomeration of creative industries by redeveloping old industrial areas and constructing creative spaces [51]. Additionally, cities must foster a diverse and inclusive socio-cultural environment to enhance their soft power [49,52]. Specific measures include providing creative workspaces, promoting cultural diversity, optimizing urban infrastructure, and implementing inclusive policies [49–52]. Furthermore, urban policies should adhere to principles of fairness and justice to ensure that all groups share in the benefits of development [53]. Ma Renfeng explored the theoretical origins, logical relationships, and development paths of the mutual shaping of creative class agglomeration and urban space, emphasizing the importance of urban openness and inclusiveness [54]. However, Peck criticized the approach of treating the creative class as a “panacea” for urban development, arguing that it could exacerbate social inequality [55].

2.5. Ecological Environment

Richard Florida has emphasized the importance of environmental comfort in attracting the creative class, suggesting that they prefer to reside in areas with beautiful environments and high quality of life [56]. Amenities such as pleasant climate and natural surroundings play a significant role in attracting creative talent [2]. Portland, for instance, has successfully attracted a large number of young creative professionals through its livable urban environment, developed public transportation and bicycle systems, and high-quality green parks [57]. Smaller cities can attract creative talent by protecting the ecological environment and improving infrastructure to create high-quality living conditions [58]. Rao and Dai found that environmental comfort has a significant positive impact on the agglomeration of the creative class in the context of China [59]. In 2023, the European Union published a report discussing how the cultural and creative sectors can drive the green transition, emphasizing their potential to embed sustainability principles into other industries and serve as models for progress toward a greener society [60]. This indicates that the creative class may be more environmentally conscious. These studies illustrate a close connection between the creative class and the ecological environment. As environmental awareness among Chinese residents increases, the quality of the environment is likely to become an important factor in talent mobility [18].

2.6. Research Gap

Despite extensive research discussing the factors influencing the agglomeration of the creative class, the conclusions are often inconsistent and sometimes contradictory. For instance, Alfken found that while amenities, openness, and inclusiveness are considered important for the geographic mobility and regional agglomeration of the creative class, they do not significantly impact the growth rate of artists in Germany [9]. Conversely, You's research based in China indicates that amenities, social tolerance and openness, and economic incentives significantly influence the agglomeration of creative professionals (CP) and the super creative core (SCC). However, the relative importance of these factors varies over time and across creative subgroups [61].

These studies suggest that the factors influencing the agglomeration of the creative class may exhibit regional heterogeneity. Therefore, existing research still presents several areas worth exploring:

- (1) **Comparative Studies from a Heterogeneity Perspective:** Most existing studies focus on analyzing the overall agglomeration factors in single or specific regions. However, there is a lack of comparative studies across different regions, particularly inter-provincial cities in China. Cross-regional comparative research on Chinese cities is especially scarce.
- (2) **Lack of Cross-Cultural Adaptation Factors:** The construction of models for factors influencing the agglomeration of the creative class in different regions should consider cross-cultural adaptability.

This study, considering the emphasis that Chinese people place on cultural education, living environment, and ecological environment, proposes that cultural education and living environment are more suitable indicators for the Chinese cultural context. Thus, socio-cultural factors, urban openness, and inclusiveness indicators are divided into two aspects: cultural education environment and living environment. The cultural education environment focuses on factors such as the supply and investment of cultural and educational resources, while the living environment includes factors such as consumption, healthcare, and inclusiveness. Based on this, this study constructs a model of factors influencing the agglomeration of the creative class in the Yangtze River Delta from five aspects: economic environment, living environment, cultural education environment, innovation environment, and ecological environment. In designing specific measurement indicators, this study aims to adapt them better to Chinese practices.

3. Model Design

3.1. Model Setting

Based on Florida's theory of the creative class and related studies by Wang Qun [17], Alfken [9], and Cooke and Lazzeretti [62], and considering the Chinese cultural context, this study constructs a model to analyze the agglomeration level and influencing factors of the creative class in the Yangtze River Delta from five dimensions: the economic environment, living environment, cultural education environment, innovation environment, and ecological environment.

$$E_{it} = a + \beta_1 \ln(Eb_{it}) + \beta_2 \ln(Le_{it}) + \beta_3 \ln(Ce_{it}) + \beta_4 \ln(Ie_{it}) + \beta_5 \ln(Ne_{it}) + \mu$$

Among them, i and t represent the city and year, respectively; E represents the agglomeration degree or level of the creative class; Eb represents the economic foundation, which is explained by GDP per capita and residents' disposable income; Le represents the living environment, which is explained by consumption expenditure per capita, the number of hospital beds, and library collection and accessibility; Ce represents the cultural and educational environment, which is mainly expressed in terms of government expenditure on education and the number of students enrolled in tertiary institutions; Ie represents the innovation environment, mainly in terms of the level of government expenditure on science and technology and the number of patents granted. Ne represents the ecological environment, described in terms of both green area and air quality. μ is the error value and obeys the distribution with an expected value of 0.

3.2. Main Variables

The dependent variable is the agglomeration degree of the creative class. Based on previous research, the creative class location entropy is used to express the creative human capital agglomeration level (agglomeration degree) of a region. The calculation formula is $LC_{ij} = (c_{ij}/c_j) / (c_i/c)$, where LC_{ij} is the location entropy of the creative class. The greater the location entropy, the greater the creative class agglomeration and the higher the level of creative human capital. In the formula, LC_{ij} represents the agglomeration level of the creative class in the region j , i representing the creative class, j representing regions or cities, c_{ij} represents the number of creative classes in the region j , c_j represents the total number of employed people at the end of the year in the region j , c_i represents the number of creative classes nationwide, and c represents the total number of employed people nationwide. An LC_{ij} value greater than 1 indicates that the agglomeration of the creative class in the place is higher than the national average, while a value less than 1 indicates the opposite. According to the research of Florida scholars and Chinese scholars [38], this paper selects the sum of employees in the information transmission, computer services and software industry, the financial industry, the scientific research and comprehensive technical services industry, the culture, sports and entertainment industry, the education industry, the health, social security and social welfare industry, and the public administration and social organizations for measurement.

Based on existing research and the Chinese cultural context, this study uses 12 sub-indicators across five dimensions—economic, living, cultural education, innovation, and ecological environments—as independent variables.

(1) Economic Environment

This study measures the economic environment using per capita GDP and per capita disposable income referring to existing studies [38]. These two indicators reflect the economic development level, residents' economic status, and consumption capacity of a region from different perspectives. A higher per capita GDP usually indicates a higher level of economic development and better economic infrastructure, which is crucial for attracting and retaining creative talent. It also indirectly reflects employment opportunities and income levels in the area. Residents with creative talent tend to prefer living in economically prosperous regions with abundant job opportunities and high income levels.

Higher per capita disposable income means that residents have more funds to meet living needs and enjoy life, indicating stronger consumption capacity and market demand. This positively affects residents' quality of life and helps attract creative talent. Although there are varying conclusions on whether economic development level significantly influences the attraction of the creative class [17,26], most existing studies support the view that sound economic development is beneficial for attracting the creative class.

(2) Living Environment

The impact of the urban socio-cultural environment or social inclusiveness on the creative class can be summarized as living environment factors. This concept is more suitable in the context of Chinese culture. Therefore, we have chosen "living environment" [17] as a significant factor, measured by three indicators: per capita consumption expenditure [63], the number of hospital beds per 10,000 people [17], and the proportion of the non-local population (openness) [18]. These indicators reflect the quality of the living environment and its attractiveness to creative talents from different perspectives. Per capita consumption expenditure is an important indicator of residents' living standards and consumption capacity. It reflects the economic status and consumption habits of residents, as well as the economic vitality and market demand of the region. Higher consumption levels usually indicate better quality of life and more consumption choices, which are crucial for attracting and retaining creative talents. Per capita consumption expenditure also reflects the consumption structure and lifestyle of residents. Creative residents tend to prefer living in cities with diverse consumption structures, modern lifestyles, and inclusiveness because these cities offer more cultural and entertainment options and higher quality of life. The number of hospital beds per 10,000 people reflects the abundance of medical resources and the level of medical services in a region. The adequacy of medical resources directly affects the quality of life and health status of residents, which is an important consideration for creative talents. Inclusiveness does not have a clear measurement standard. Early on, Florida used attitudes towards same-sex marriage as a measurement indicator [1], but most other countries do not have matching data. Therefore, many non-North American studies use the proportion of foreign residents in the total population as a substitute. For research in China, using the proportion of the non-local population in the total population is more appropriate [18]. This indicator reflects the inclusiveness and diversity of a society, as well as its development vitality. An open and diverse social environment is conducive to the agglomeration and exchange of creative talents.

(3) Cultural Education Environment

A robust cultural environment can facilitate continuous exchange among the creative class in both work and life, fostering knowledge renewal and self-expression. Considering the high emphasis Chinese parents place on their children's education, a strong cultural education environment can provide educational assurance for the children of creative professionals, thereby attracting creative talent. Therefore, we select the cultural education environment as an important influencing factor, using the following indicators: government education expenditure per 10,000 people [17], number of library books per 10,000 people [38], and number of college students per 10,000 people [18]. These indicators reflect the abundance, distribution, and cultural atmosphere of educational resources in the Yangtze River Delta from different perspectives, significantly impacting the agglomeration and development of the creative class. The indicator of government education expenditure per 10,000 people reflects the level of government emphasis and investment in education. Higher government education expenditure generally means better educational facilities, higher-quality teaching staff, and more educational opportunities. It also reflects the support for talent cultivation and scientific research, which is crucial for nurturing high-quality talent and providing an innovative research environment, indicating the overall educational level and long-term development potential of a region. The number of library books per 10,000 people highlights the richness and accessibility of cultural and educational resources in a region. This indicator reflects the opportunities and conditions for residents

to receive knowledge and cultural influence, forming a cultural atmosphere that stimulates creativity. It indirectly indicates the region's cultural education level, regional innovation, and competitiveness. The number of college students per 10,000 people focuses on the status of higher education, talent reserves, intellectual support capacity, and abilities in knowledge renewal and technological innovation in a region. These factors are highly attractive to the creative class.

(4) Innovation Environment

The innovation environment is particularly emphasized in China. According to existing research [32], regions with a strong atmosphere of innovation are more likely to attract and generate a creative class. This study selects the ratio of R&D expenditure to GDP [38] and the number of granted patents per 10,000 people as indicators to represent the innovation environment. These two indicators comprehensively reflect the development level and characteristics of the innovation environment in the Yangtze River Delta from the perspectives of input and output. The ratio of R&D expenditure to GDP reflects the intensity of R&D investment, indicating the degree of government emphasis and investment in technological innovation. This directly relates to the region's innovation capacity and development potential. Regions with high R&D investment often provide better research facilities and conditions, attracting and nurturing high-quality scientific talent, thus promoting the formation and development of the creative class. The number of granted patents per 10,000 people reflects the situation of innovation achievements, intellectual property, and the ability to apply and transform technology. A higher number of granted patents per 10,000 people means the region has strong technology transformation capabilities, where creativity and technology can more easily be turned into actual products and services. Such regions often have stronger market competitiveness and economic development potential, providing more opportunities and platforms for creative talent.

(5) Ecological Environment

Although existing research indicates that the ecological environment has a weak impact on the agglomeration of the creative class [17], it is an indispensable factor in considering talent mobility, especially in the context of increasing emphasis on ecological environment protection in China. Referring to existing research [38,57] and data availability, this study selects the area of green space per 10,000 people [18] and the percentage of days with good air quality as indicators of the ecological environment. Green space per 10,000 people reflects the ecological livability and quality of life in a city or region, as well as environmental pressure and sustainable development. The percentage of days with good air quality is an important indicator of air pollution levels and environmental health [64]. It also reflects the city's image, making it a significant factor in talent mobility.

3.3. Data Source

Based on the research questions and variable data availability, 27 cities in the central area of the Yangtze River Delta were selected as the research objects, including Shanghai, and the cities of Nanjing, Wuxi, Changzhou, Suzhou, Nantong, Yangzhou, Zhenjiang, Yancheng, Taizhou in Jiangsu Province; Hangzhou, Ningbo, Wenzhou, Huzhou, Jiaxing, Shaoxing, Jinhua, Zhoushan, Taizhou in Zhejiang Province; Hefei, Wuhu, Ma'anshan, Tongling, Anqing, Chuzhou, Chizhou and Xuancheng in Anhui Province. The data for the relevant indicators are obtained from the 2012–2019 Statistical Yearbook and the Eco-Environmental Development Report of each city, the China City Statistical Yearbook, and the National Statistical Yearbook [65–73].

4. Results Comparative Analysis of the Agglomeration Degree of Urban Creative Classes in the Central Area of the Yangtze River Delta

Based on the constructed model of factors influencing the agglomeration of the creative class in the central cities of the Yangtze River Delta, this chapter will utilize panel data from 2012 to 2019 to analyze the number and agglomeration degree of the creative class

in 27 central cities of the Yangtze River Delta. Firstly, by calculating the number and proportion of the creative class in each city, the spatial distribution pattern of the creative class in the central cities of the Yangtze River Delta will be analyzed. Secondly, the location quotient model will be used to measure the spatial agglomeration degree of the creative class in each city, analyzing the differential characteristics of creative human capital spatial agglomeration. Through the analysis of the number, proportion, and location quotient of the creative class, a comprehensive reflection of the spatial distribution characteristics and dynamic changes of the creative class in the central cities of the Yangtze River Delta can be achieved. This will lay the foundation for the subsequent analysis of the factors influencing the agglomeration of the creative class.

A comparative analysis of the agglomeration of the creative class in 27 cities in the central area of the YRD, illustrated by the following three indicators: the number of people in the creative class, the proportion of the creative class, and the degree of agglomeration (locational entropy). Judging from the absolute number of creative class gatherings, cities in the central area of the YRD vary greatly due to different city levels. According to statistical data, among the 27 cities in the central area of the YRD, the average number of creative classes is 417,400 people. In first place is Shanghai, the leading city in the YRD, with the average number of creative classes reaching more than 2.4 million people in 2012–2019, far exceeding that of the other 26 cities, and 2.5–4 times the number of the creative class in the following cities of Nanjing, Hangzhou, Suzhou, Hefei, and Ningbo. Starting from Wenzhou below, the number of people in the creative class in all other cities is less than 500,000, and the city with the least amount of people in the creative class is Chizhou, with an average value of only 77,200 people (Table 1).

Table 1. Distribution of urban creative class in the central area of the Yangtze River Delta.

Ranking	City	Average Value	Minimum Value	Maximum Value	Standard Deviation	N
1	Shanghai	240.95	167.50	308.34	39.05	8
2	Nanjing	104.83	60.51	141.72	27.28	8
3	Hangzhou	86.86	67.89	106.13	12.34	8
4	Suzhou	80.82	44.73	114.92	23.87	8
5	Hefei	79.81	64.90	126.10	19.48	8
6	Ningbo	56.81	45.65	69.83	7.62	8
7	Wenzhou	49.70	42.89	56.32	4.28	8
8	Wuxi	38.69	36.77	39.94	1.34	8
9	Nantong	35.26	27.26	44.43	5.91	8
10	Shaoxing	33.56	30.06	38.98	3.34	8
11	Changzhou	32.74	24.52	43.34	7.33	8
12	Jinhua	29.37	27.50	32.67	2.00	8
13	Yancheng	28.56	22.89	35.72	4.58	8
14	Jiaxing	25.04	19.79	31.23	3.89	8
15	Taizhou	24.45	16.67	29.87	5.18	8
16	Wuhu	22.57	11.42	25.72	4.64	8
17	Yangzhou	21.90	16.32	29.77	3.98	8
18	Zhenjiang	20.65	16.69	26.42	3.49	8
19	Ma'anshan	19.72	14.04	30.90	5.23	8
20	Taizhou	19.10	17.78	24.93	2.39	8
21	Huzhou	16.50	15.11	17.81	0.99	8
22	Anqing	14.34	13.39	15.13	0.65	8
23	Chuzhou	10.60	9.79	11.57	0.52	8
24	Zhoushan	9.08	7.76	10.13	0.90	8
25	Xuancheng	8.95	7.50	13.56	1.98	8
26	Tongling	8.38	3.77	14.11	3.84	8
27	Chizhou	7.72	6.74	9.22	0.88	8
Overall situation		41.74	3.77	308.34	48.15	216

Unit: 10 thousand people. "N" represents the time span of the panel data used in this study.

In terms of the indicators of “proportion of creative class” and “degree of agglomeration”, the degree of agglomeration of cities in the central area of the YRD is significantly higher than the national average, but there is a significant difference between cities, with nearly one-third of them still having a degree of agglomeration of the creative class that is lower than the national average. The overall average proportion of the creative class in the urban agglomeration of the YRD central area is 9.71%, which is significantly higher than the national average of 7.67% during the same period. Secondly, the overall mean value of the agglomeration degree of the creative class is 1.26, which means that the overall agglomeration level is 26% higher than the national average. As can be seen from Tables 2 and 3, in the two indicators of the proportion of the creative class and the degree of agglomeration, the city rankings are basically the same. However, the order of cities changes considerably when compared to the number of people in the creative class. Although Shanghai still leads the YRD, its advantages are no longer obvious. Provincial capitals such as Nanjing, Hefei, and Hangzhou, and even small prefecture-level cities such as Ma’anshan and Zhoushan, have relatively high agglomeration or proportion. Among the 27 cities in the central region of the YRD, the proportion of the creative class is above average in 13 cities, below average in 14 cities, above the national average in 20 cities ($\geq 7.67\%$), and below the national average in 7 cities. Correspondingly, on the aggregation index, there are 20 cities with an agglomeration degree of creative class exceeding the national average level (≥ 1) and 7 cities with an aggregation degree lower than the national average level. From the perspective of creative class agglomeration, apart from Shanghai as the leading municipality, the first tier includes three cities in Jiangsu and Zhejiang, namely Nanjing, Suzhou, Changzhou, Hangzhou, Zhoushan, and Ningbo, while Anhui Province includes two cities, Hefei and Maanshan, with a relatively balanced distribution. Among the cities in the third tier, which are below the YRD and national averages, there are Jiaxing and Taizhou in Zhejiang, Yangzhou, Nantong and Yancheng in Jiangsu, and Chizhou, Xuancheng, Anqing, and Chuzhou in Hefei. The data show that there are significant differences and imbalances in the agglomeration level of the creative class within the urban agglomeration in the central area of the YRD, reflecting the development gap between cities. Promoting the integration of the YRD in the context of common prosperity requires further attention to the balance of inter-regional development (Tables 2 and 3).

Table 2. Comparison of the proportion of creative classes in cities in the central area of the Yangtze River Delta.

Ranking	City	Average Value	Minimum Value	Maximum Value	Standard Deviation	N
1	Shanghai	0.179	0.150	0.224	0.021	8
2	Nanjing	0.179	0.127	0.210	0.025	8
3	Hefei	0.152	0.129	0.231	0.033	8
4	Ma’anshan	0.142	0.107	0.213	0.033	8
5	Hangzhou	0.129	0.105	0.147	0.014	8
6	Zhoushan	0.122	0.106	0.134	0.011	8
7	Suzhou	0.117	0.064	0.166	0.035	8
8	Changzhou	0.116	0.087	0.153	0.026	8
9	Ningbo	0.107	0.091	0.125	0.010	8
10	Zhenjiang	0.107	0.087	0.136	0.017	8
11	Wuhu	0.105	0.048	0.117	0.023	8
12	Wuxi	0.100	0.095	0.103	0.004	8
13	Shaoxing	0.097	0.087	0.113	0.010	8
14	Tongling	0.091	0.082	0.119	0.012	8
15	Huzhou	0.088	0.084	0.093	0.003	8
16	Taizhou	0.087	0.059	0.109	0.020	8
17	Wenzhou	0.086	0.074	0.098	0.007	8
18	Jinhua	0.084	0.080	0.092	0.005	8
19	Yangzhou	0.082	0.061	0.111	0.015	8
20	Nantong	0.077	0.058	0.098	0.014	8

Table 2. Cont.

Ranking	City	Average Value	Minimum Value	Maximum Value	Standard Deviation	N
21	Jiaxing	0.076	0.061	0.093	0.011	8
22	Chizhou	0.067	0.055	0.081	0.008	8
23	Yancheng	0.065	0.051	0.083	0.011	8
24	Taizhou	0.047	0.045	0.061	0.006	8
25	Xuancheng	0.044	0.037	0.067	0.010	8
26	Anqing	0.039	0.034	0.044	0.004	8
27	Chuzhou	0.036	0.034	0.038	0.001	8
Overall situation		0.097	0.034	0.231	0.040	216

Table 3. Comparison of urban agglomeration levels in the central area of the Yangtze River Delta.

Ranking	City	Average Value	Minimum Value	Maximum Value	Standard Deviation	N
1	Shanghai	2.33	2.23	2.50	0.08	8
2	Nanjing	2.33	1.88	2.69	0.24	8
3	Hefei	1.97	1.78	2.57	0.29	8
4	Ma'anshan	1.84	1.40	2.37	0.31	8
5	Hangzhou	1.67	1.56	1.78	0.06	8
6	Zhoushan	1.59	1.49	1.68	0.06	8
7	Changzhou	1.50	1.27	1.84	0.21	8
8	Suzhou	1.50	0.96	1.89	0.33	8
9	Ningbo	1.40	1.18	1.54	0.11	8
10	Zhenjiang	1.38	1.22	1.53	0.12	8
11	Wuhu	1.37	0.71	1.64	0.29	8
12	Wuxi	1.30	1.15	1.40	0.07	8
13	Shaoxing	1.28	1.00	1.65	0.23	8
14	Tongling	1.20	0.92	1.58	0.19	8
15	Huzhou	1.16	0.99	1.24	0.08	8
16	Taizhou	1.13	0.85	1.33	0.18	8
17	Wenzhou	1.13	1.09	1.18	0.03	8
18	Jinhua	1.10	1.03	1.19	0.04	8
19	Yangzhou	1.07	0.91	1.24	0.09	8
20	Nantong	1.00	0.82	1.20	0.14	8
21	Jiaxing	0.98	0.89	1.07	0.06	8
22	Chizhou	0.87	0.82	0.91	0.04	8
23	Yancheng	0.84	0.76	0.94	0.08	8
24	Taizhou	0.62	0.57	0.68	0.04	8
25	Xuancheng	0.58	0.50	0.94	0.16	8
26	Anqing	0.50	0.47	0.54	0.02	8
27	Chuzhou	0.48	0.41	0.55	0.05	8
Overall situation		1.26	0.41	2.69	0.51	216

It is worth noting that Hefei, Ma'anshan, Wuhu, and other cities in Anhui Province have outstanding performance in terms of the number and agglomeration of the creative class, showing strong development vitality and potential. In particular, Hefei has surpassed even Hangzhou, Ningbo, and other sub-provincial cities in Zhejiang in the absolute number and agglomeration of creative classes. On the other hand, in addition to the major cities of Shanghai, Nanjing, Hefei, Hangzhou, and Suzhou, several smaller cities such as Zhoushan, Ma'anshan, and Changzhou also have a relatively high proportion and agglomeration of the creative class, which indicates that the number of creative classes in the employed population of these cities has a relatively high proportion. To a certain extent, this reflects the industrial structure and development environment of the city, which is also related to the small base of local employment (Figure 1).

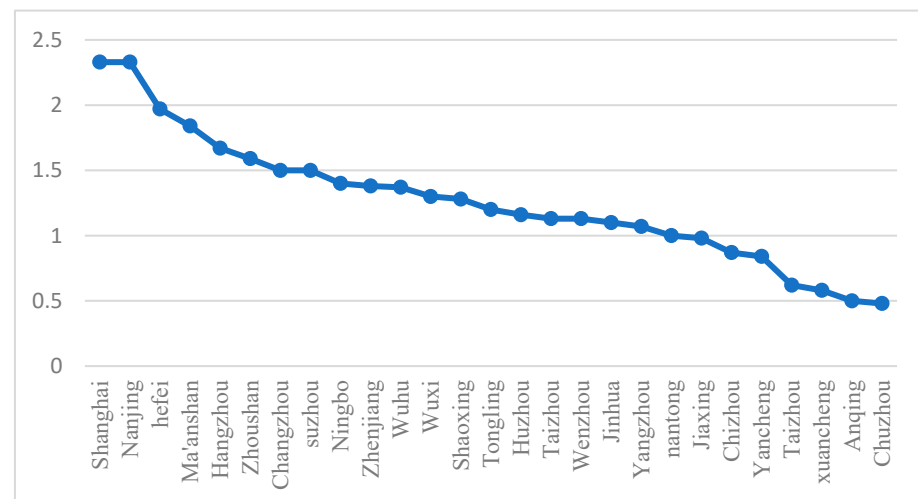


Figure 1. The agglomeration level of urban creative classes in the central area of the Yangtze River Delta.

From the perspective of vertical development trends, in the eight years from 2012 to 2019, the agglomeration of the creative class in the central area of the YRD's city clusters has continued to increase, and the number of creative talents in each city has increased significantly (Table 4, Figure 2).

Table 4. The agglomeration and number of creative classes in the central area of the Yangtze River Delta's cities from 2012 to 2019.

Years	2012	2013	2014	2015	2016	2017	2018	2019	Total Average
Agglomeration of creative class	1.21	1.24	1.25	1.28	1.26	1.29	1.30	1.29	1.26
Number of people in the creative class	32.06	36.71	38.34	40.24	42.35	44.88	47.02	52.31	41.74

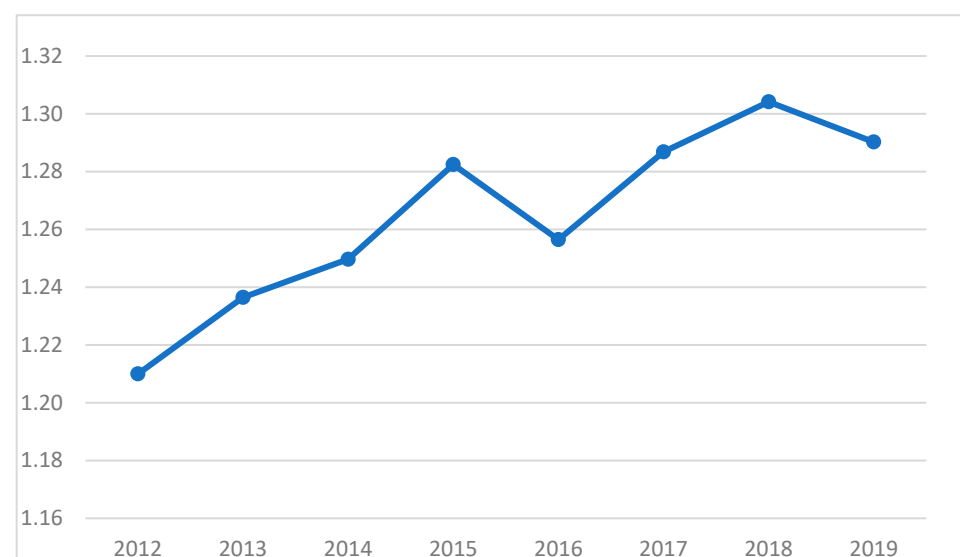


Figure 2. Trends in agglomeration of the creative class in the Yangtze River Delta from 2012 to 2019.

5. Regression Analysis of Factors Influencing the Agglomeration of the Creative Class in the Yangtze River Delta

The previous section analyzed the spatial distribution of the creative class in the central cities of the Yangtze River Delta. To further explore the key factors influencing the agglomeration of the creative class, this chapter will build an econometric model based on

existing research and considering the Chinese cultural context. The model will focus on five dimensions: economic environment, living environment, cultural education environment, innovation environment, and ecological environment. Using panel data from 2012 to 2019, this chapter will conduct an empirical analysis of the factors influencing the agglomeration of the creative class in the central cities of the Yangtze River Delta. First, the analysis will explore the impact of various factors on the agglomeration of the creative class from the perspective of the Yangtze River Delta as a whole. Second, based on the heterogeneous characteristics of the central cities in Jiangsu, Zhejiang, and Anhui provinces, the study will further analyze whether the key factors influencing the agglomeration of the creative class differ across these regions. Through empirical analysis, this chapter aims to reveal the key factors influencing the spatial agglomeration of the creative class in the central cities of the Yangtze River Delta and to examine the similarities and differences in the impact mechanisms across different regions. The goal is to provide references for developing more targeted policies to attract creative talent in different areas.

5.1. Factors Influencing the Agglomeration of Urban Creative Classes in the Central Area of the Yangtze River Delta

The panel model is constructed from five aspects as follows: economic environment, living environment, cultural education environment, innovation environment, and ecological environment. The explanatory variables include per capita GDP, per capita disposable income, per capita consumption expenditure, number of hospital beds per 10,000 people, number of library books per 10,000 people, openness (proportion of non-local population), government education expenditure per 10,000 people, number of college students per 10,000 people, R&D expenditure as a proportion of GDP, number of patents per 10,000 people, green space per 10,000 people, and percentage of days with good air quality. The dependent variable is the location quotient. Robust standard errors are used for modeling. After performing the Hausman test, a random effects model with both individual and time-fixed effects is selected. Statistical software SPSS 20.0 is used to verify the theoretical model and research hypotheses (Tables 5 and 6).

Table 5. Descriptive statistics of main model indicators.

Level 1 Indicators	Level 2 Indicators	Mean	Minimum Value	Maximum Value	Standard Deviation	N
Level of creative class agglomeration	Location entropy	1.10	0.41	2.57	0.49	216
Economic foundation	GDP per capita	86,545.53	24,190.00	180,044.00	35,106.54	216
	Disposable income per capita	41,042.34	20,426.00	73,615.00	11,586.58	216
Living environment	Consumption expenditure per capita	25,668.72	13,048.00	48,272.00	7033.71	216
	Number of hospital beds per 10,000 people	48.47	27.8	81.71	10.03	216
	openness	0.08	−0.17	0.41	0.15	216
Cultural and educational environment	Government education expenditure per 10,000 people	1986.48	842.51	4571.01	730.59	216
	Number of college students per 10,000 people	0.025743	0.006	0.1126	0.0234841	216
	Public library collection per 10,000 people	1.05	0.16	3.32	0.71	216
Innovation environment	Science and technology expenditure per GDP	1.421	0.003	3.996	1.10	216
	Number of patent rights authorizations per 10,000 people	31.74	2.00	102.00	20.77	216
Ecosystem environment	Green space area per 10,000 people	34.77	5.50	150.50	31.16	216
	Excellent air quality rate	76.96	52.10	100.00	10.84	216

Table 6. Regression analysis of factors agglomerating the creative class in the Yangtze River Delta.

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
Number of college students per 10,000 people	0.749 ** (14.10)	0.594 ** (13.97)	0.569 ** (13.12)	630 ** (11.83)	0.583 ** (10.99)	0.662 ** (9.97)	0.620 ** (9.459)	0.560 ** (8.80)	0.475 ** (7.89)
Openness		0.324 ** (6.93)	0.204 ** (3.42)	0.319 ** (5.08)	0.262 ** (4.36)	0.494 ** (2.83)	0.300 ** (5.42)	0.285 ** (5.12)	0.258 ** (4.18)
GDP per capita			0.184 ** (3.14)	0.262 ** (4.46)	0.277 ** (4.71)	0.287 ** (5.14)	0.337 ** (5.53)	0.324 ** (5.35)	0.298 ** (4.58)
Public library collection per 10,000 people				0.289 ** (2.98)	0.343 ** (3.99)	0.311 ** (3.56)	0.281 ** (3.23)	0.194 ** (2.12)	0.198 ** (2.48)
Science and technology expenditure per GDP					0.130 ** (2.063)	0.508 ** (5.17)	0.349 ** (3.76)	0.339 ** (2.67)	0.286 ** (2.13)
Consumption expenditure per capita						0.289 ** (3.98)	0.343 ** (3.41)	0.319 ** (3.30)	0.295 ** (2.87)
Number of hospital beds per 10,000 people							−0.588 ** (−5.16)	−0.729 ** (−5.21)	−0.846 ** (−7.15)
Green space area per 10,000 people								0.106 ** (2.34)	0.138 ** (2.99)
Government education expenditure per 10,000 people									0.176 * (3.04)
Individual fixed effects	yes	yes	yes	yes	yes	yes	yes	yes	yes
Time-fixed effects	yes	yes	yes	yes	yes	yes	yes	yes	yes
R ²	0.559	0.638	0.653	0.681	0.686	0.716	0.720	0.718	0.733
N	216	216	216	216	216	216	216	216	216

Notes: * represents $p < 0.05$, ** represents $p < 0.01$.

From the perspective of the economic environment, the level of economic development plays a significant role in promoting the agglomeration of the creative class in the Yangtze River Delta. The variable “per capita GDP” is included in the model and shows a positive correlation with the creative class agglomeration, with a relatively stable coefficient. This indicates that the level of economic development is an important factor influencing the agglomeration of the creative class. An increase in per capita GDP can attract more creative professionals. This finding aligns with the experience of the Yangtze River Delta as one of the most economically developed and active regions in China, attracting a large influx of people. Previous studies have also shown that the Yangtze River Delta is the most dynamic region in terms of population mobility and has the highest total population inflow in China [74]. As an economically developed area, the Yangtze River Delta offers more development opportunities and can provide more diverse and leisurely facilities and spaces for creative professionals. Another indicator, “disposable income”, did not pass the significance test to be included in the model. After eliminating multicollinearity, a possible explanation is that per capita GDP, as a more comprehensive economic indicator, better explains the changes in the agglomeration of the creative class. In contrast, although disposable income directly reflects the economic status of residents, it may not sufficiently explain the changes in the agglomeration of the creative class independently. This is also confirmed in the studies of Chinese scholars such as Wang Qun [17].

The living environment is an important factor affecting the agglomeration of the creative class in the Yangtze River Delta. The three indicators of openness, per capita consumer expenditure, and the number of hospital beds per ten thousand people are all included in the model and show significant influence on the agglomeration of the creative class. In particular, openness, as the main indicator reflecting the city’s inclusiveness, is one of the early indicators to enter the model and has a positive correlation with the influence

on the agglomeration of the creative class. In Florida's "3T" theory, tolerance is one of the three important factors that determine urban development, and it is also an important factor in attracting the gathering of the creative class. Therefore, increased tolerance will significantly promote the agglomeration of the creative class. It can be seen from Model 6 that for every increase by 1 unit in the openness index, the agglomeration level of the creative class can increase by 0.3 units. In addition, per capita consumer expenditure can reflect the consumption level and cost of living of the city, indirectly reflecting the richness of entertainment and leisure in urban life. Creative professionals tend to prefer places where the cost of living is relatively appropriate, with convenient public facilities and ample cultural and leisure spaces, such as bars, coffee shops, and leisure bookstores. In the Yangtze River Delta, smaller cities like Zhoushan, Ma'anshan, and Wuhu may not be as economically developed as larger cities like Hangzhou and Nanjing, but they exhibit a higher level of creative class agglomeration. This is due to certain soft factors in these cities that attract creative professionals to work or live there. Although the indicator of hospital beds per ten thousand people is included in the model, it shows a negative correlation, meaning that as the number of hospital beds increases, the agglomeration level of the creative class actually decreases. One possible reason for this is that the creative class may place more emphasis on the quality of life and cultural atmosphere rather than the abundance of medical resources; alternatively, it could be the inverse effect of the distribution of medical resources, where the creative class may prefer to live and work in areas outside of large cities with abundant medical resources, where the number of hospital beds is relatively low. This suggests that the medical conditions of a city are not a key factor in determining whether creative professionals stay or leave. The agglomeration of the creative class depends not only on traditional development indicators such as the economy and medical resources but also on soft factors like cultural atmosphere, innovation environment, and quality of life. Therefore, policymakers should focus on enhancing the cultural and living environment of the city when attracting the creative class, rather than simply pursuing the accumulation of economic and medical resources.

From the perspective of the cultural and educational environment, cultural and educational factors have a significant impact on the agglomeration of the creative class in the Yangtze River Delta. The "number of college students per ten thousand people" is the first indicator to enter the model, indicating the high sensitivity of the dependent variable to this factor. The "number of books per ten thousand people" and "government expenditure on education" are also included in the model and have a significant impact. From the regression results, it is evident that both variables have a high explanatory power regarding the agglomeration degree. Therefore, the cultural and educational environment is a key factor in attracting creative people to work in the YRD, and enhancing the factors related to the cultural and educational environment can significantly promote the agglomeration of the creative class in the YRD. Regardless of the number of college students or the level of educational expenditures, they reflect the environment that creative people like and need, including innovative vitality, multiculturalism, inclusiveness, knowledge networks, etc. Cities with a large number of college students and high education levels tend to be more innovative, have a more active and diverse atmosphere, are more tolerant of personalization and novelty, and tend to have more spaces for leisure, entertainment and creative innovation platforms. The carrier is more conducive to informal communication, the establishment of a tacit knowledge dissemination network and the realization of creativity (self-value), thus forming a benign creative ecology. Furthermore, in the era of knowledge economy or creative economy, the level of investment in universities and education itself means the production and innovation of knowledge, and most creative personnel come from universities and need to integrate into a certain innovation environment.

From the perspective of the innovation environment, investment in scientific and technological R&D innovation has a significant positive impact on the agglomeration of the creative class. According to the regression model, science and technology expenditure relative to GDP also passed the significance test at an early stage. It enters the regression

model, and shows high explanatory power ($b = 0.286$). However, the “number of patent rights authorizations” did not pass the significance test, but the regression coefficient is negative, showing that the marginal benefit of increasing the number of patent rights in promoting the agglomeration of the creative class is decreasing. Studies such as Yu Wentao and Zhang Suqiu support the positive relationship between science and technology funding and the agglomeration of the creative class [18,32]. However, Wang Qun’s study shows that the level of technology expenditure and the technological environment represented by the number of patents does not have a significant effect on the creative class [17]. The results of previous studies basically correspond to the results of this study. A possible explanation for this is that the composition of the creative class itself is heterogeneous, including cultural and creative personnel as well as technology R&D personnel and scientific researchers. Although the creative class as a whole shows certain commonalities, the heterogeneity of the industry or the heterogeneity of labor relations may result in different sensitivities to different factors. Moreover, the number of authorized patents cannot be a good indicator of a city’s technological innovation environment, but funding investment can better reflect this. Innovation has now become a national and local development strategy, and the YRD has a perfect environment for science and technology innovation, with a head advantage in supporting facilities and service systems such as intellectual property rights, which can safeguard the intellectual property rights of science and technology or R&D creatives and the transformation of their applications. This has a more attractive and significant impact on technological creative talents. Therefore, the innovation environment represented by technological innovation will have a significant impact on the aggregation of the creative class.

The ecological environment has a certain impact on the agglomeration of the creative class in the Yangtze River Delta. According to Florida’s perspective, the creative class has a clear preference for the environmental quality of the cities in which they reside. With the growing awareness of environmental protection, the ecological environment of a city often becomes an important factor in attracting creative professionals. The regression model indicates that the “Air Quality Index” did not pass the significance test to enter the model, but the “green space area per ten thousand people” entered the regression model and showed a positive correlation, implying that an increase in green space area can enhance the attractiveness to creative professionals. There are differing conclusions in existing studies regarding whether the ecological environment has a significant impact on the agglomeration of the creative class. Wang Qun [17] and others believe there is no significant impact, but Yu Wentao and others believe there is a significant attraction effect [18]. This study partially supports the latter view. Of course, this conclusion may vary in different regional scopes and in the heterogeneity of the creative class. Within the Yangtze River Delta region, there may not be an ecological environment selection issue, but from a national perspective, the ecological environment factor is likely to become a significant variable affecting the agglomeration of the creative class. Yu Wentao studied the agglomeration distribution of different types of creative workers across the country and found that the level of air pollution has a negative and significant impact on the regional distribution of the skilled creative class, while the degree of local government environmental governance shows a positive impact [18]. However, for the entrepreneurial creative class, the results are exactly the opposite. Consequently, whether the ecological environment has a significant impact on the agglomeration of the creative class is related to its regional differences and the heterogeneity of the types within the creative class. Compared to the green space area, the air quality index did not show significance in this study. A possible explanation is that the impact of this factor on the agglomeration of the creative class may be smaller than the influence of other variables in the model, leading to the air quality index not being included in the model. Alternatively, it could be that creative professionals have a more direct perception of urban green spaces.

5.2. Comparative Analysis of Factors Influencing the Agglomeration of the Creative Class in Different Regions of Zhejiang, Jiangsu and Anhui in the Yangtze River Delta

Considering the development disparities among the provinces and cities in the Yangtze River Delta, to further examine whether there are differences in the factors attracting the creative class agglomeration in different regions, a regional heterogeneity test is conducted on the samples according to the “provincial” scope. At the same time, considering that Shanghai, as a municipality directly under the central government, has a significant advantage and is not representative, it is excluded from the analysis. The random effects panel data model is still used, and from the perspective of regional heterogeneity, a further regression analysis of the influencing factors of the creative class agglomeration in the three provinces of Zhejiang, Jiangsu, and Anhui in the Yangtze River Delta is conducted. The results can be seen (Table 7), compared with taking the entire central urban cluster of the Yangtze River Delta as the research object, there are fewer variables that pass the significance test and enter the model in the regression models of the three provinces. The three regions have both commonalities and individualities in influencing the agglomeration of the creative class.

Table 7. Regression analysis results of factors influencing the agglomeration of the creative class in Zhejiang, Jiangsu and Anhui.

Variable	Zhejiang Province (Model 10)		Jiangsu Province (Model 11)		Anhui Province (Model 12)	
GDP per capita	/	/	0.283	5.104		
Disposable income per capita	/	/	/	/	/	/
Consumption expenditure per capita	/	/	/	/	/	/
Number of hospital beds per 10,000 people	−0.278 **	−3.21	/	/	/	/
Library collection per 10,000 people	/	/	0.142	2.093	/	/
Openness	/	/			0.497 **	4.493
Government education expenditure per 10,000 people	/	/			/	/
Number of colleges students per 10,000 people	0.727 **	8.41	1.03 **	9.329	/	/
Science and Technology expenditure/GDP	/	/	/	/	−0.166	−2.201
Number of patent rights authorizations per 10,000 people	0.254	3.60	/	/	0.312	2.749
Green space area per 10,000 people	0.544	7.94	−0.333	−2.783	/	/
Excellent air quality rate	/	/	/	/	/	/
R ²	0.717		0.885		0.708	
N	72		72		64	

Notes: ** represents $p < 0.01$.

Among the three provinces, the relatively concentrated influencing factors are the number of college students per ten thousand people, the number of patents per ten thousand people, and the green space area per ten thousand people; these three indicators have varying degrees of impact in each province. In terms of the cultural and educational environment, “the number of college students per ten thousand people” and “the green space area per ten thousand people” have a significant impact on the agglomeration of the creative class in Zhejiang and Jiangsu provinces. For Jiangsu province, “the number of books per ten thousand people” also has a significant impact. Therefore, in terms of attracting creative personnel, “cultural and educational environment” and “ecological environment” play a significant role in the two provinces of Jiangsu and Zhejiang. However, these indicators do not have a significant impact on the agglomeration of the creative class in Anhui province. For Anhui province, openness, the number of patents per ten thousand people, and expenditure on science and technology per ten thousand people are important

factors affecting the mobility or agglomeration of the creative class. Among them, openness and innovative activities (number of patents) have a significant positive effect, while the proportion of expenditure on science and technology has an unexpected negative impact. This may reflect that high investment in science and technology funds does not directly translate into attractiveness to the creative class, possibly because the way these funds are spent or their distribution structure does not directly benefit the creative class, or these investments are more concentrated in specific fields rather than a broad range of creative industries. This serves as a reminder to urban policymakers that if they want to further attract more creative talents, they may need to consider optimizing the structure of the use of science and technology funds to better serve the creative class.

Additionally, in the model for Zhejiang Province, the number of hospital beds per ten thousand people has a significant impact but shows a negative correlation. As previously explained, for Zhejiang, medical conditions are not the main factor attracting the creative class; more importantly, it may be the overall environmental advantages of Zhejiang in terms of economy, culture, and lifestyle. Similarly, economic development factors are also a significant factor affecting the attraction of creative personnel in Jiangsu, but unexpectedly, the green space area per ten thousand people shows a negative correlation. This may reflect the creative class's high demand for resources in urban core areas, and an increase in green space area may conflict with these demands. To better attract and retain the creative class, policymakers need to find a balance between green space construction and urban resource allocation in urban planning, ensuring that green spaces are not just an increase in quantity but also meet the needs of the creative class in terms of function and utilization efficiency. The creative class needs not only green spaces but also these spaces to support innovative activities, art exhibitions, social gatherings, and other functions. The data may also reflect the creative class's attention to the actual value of the ecological environment.

6. Conclusions and Suggestions

6.1. Research Conclusions

- (1) The agglomeration degree of the creative class in the central urban cluster of the Yangtze River Delta is significantly higher than the national average. A distribution pattern of creative class agglomeration led by Shanghai, with Nanjing, Hefei, Hangzhou, Suzhou, Ningbo, and other important nodes of the Yangtze River Delta, has been formed.
- (2) There is a significant difference in the agglomeration of the creative class in the central cities of the Yangtze River Delta, reflecting the imbalance of regional development. Among the 27 central cities of the Yangtze River Delta, 20 cities have a creative class agglomeration degree that exceeds the national average, while 7 cities are below the national average, indicating a significant disparity in the development of central cities in the Yangtze River Delta.
- (3) The agglomeration degree of the creative class in the central cities of the Yangtze River Delta shows a significant upward trend overall. This corroborates the fact that with the development of China's creative economy and the adjustment of industrial structure, the number of creative class individuals is continuously increasing, playing an increasingly important role in urban development.
- (4) Factors that have a significant impact on the agglomeration of the creative class in the Yangtze River Delta are mainly in five aspects: economic environment, living environment, cultural and educational environment, innovation environment, and ecological environment. However, the more pronounced influences are in the living environment, cultural and educational environment, and ecological environment. The city's openness, the number of college students, green space area, library book collection, and expenditure on cultural and educational activities may all affect the agglomeration of the creative class. From the perspective of the innovation environment, investment in science and technology has a significant impact on the agglomeration of the creative class. The impact of ecological factors on the agglomeration of the creative

class is uncertain or conditional; the green space area per ten thousand people has a significant impact, but the air quality index does not have a significant effect.

- (5) Looking at the three different provincial-level regions of Zhejiang, Jiangsu, and Anhui in the Yangtze River Delta, there is a clear heterogeneity in the factors influencing the agglomeration of the creative class. Among them, the cultural and educational environment and the ecological environment have a more significant impact on Zhejiang Province. In addition to the cultural and educational environment, the growth of per capita GDP is more important for Jiangsu. Anhui Province, with relatively weaker economic development, mainly needs to emphasize the creation of an open environment and a science and technology innovation environment, and optimize the structure of the subjects supported by science and technology funds.

6.2. Theoretical Contribution

- (1) This study conducts a comparative analysis of the agglomeration degree of the creative class and its influencing factors in 27 central cities of the Yangtze River Delta through panel data, taking into account the cultural background of China. The model construction and variable factor design have selected indicators that are more in line with China's national conditions, such as education, healthcare, ecological environment, and using the "proportion of non-local population" to represent openness, which helps deepen the understanding of the patterns and influencing factors of the creative class agglomeration in China. This research perspective and method provide a beneficial supplement to cross-regional comparative studies, especially in Chinese cities within the East Asian region.
- (2) This study selects 27 central cities in the Yangtze River Delta region of China as the research subjects for cross-regional research, and conducts a heterogeneity analysis of the agglomeration degree and influencing factors of the creative class in different cities and regions (Jiangsu, Zhejiang, and Anhui) of the Yangtze River Delta. The choice of research subjects and analytical perspectives enriches the global theoretical research on the creative class, especially providing supplements and deepening the study of the spatial distribution of the creative class in China.
- (3) The results of this study not only provide insights for the sustainable development of the Yangtze River Delta region but also offer references for other regions, especially in the East Asian area, to formulate policies to attract and retain creative talents. At the same time, the study provides theoretical support and practical guidance for promoting regional innovation development and economic transformation and upgrading, which helps to achieve the goals of regional sustainable development. These findings also have certain value for the theoretical development and practical application in related fields.

6.3. Countermeasures and Suggestions

- (1) Optimize the configuration of the agglomeration factors of the creative class and the creative ecology. To better attract the creative class, it is necessary to further optimize the investment and allocation of relevant urban capital, technology, population, space, education, and other related factors in the central area of the YRD, improve the level of public service guarantees, and create a more suitable creative ecological environment for the creative class. In terms of cultural and educational environment, investment in education can be further strengthened and higher education vigorously developed. A city with strong development vitality and competitiveness must be supported by high-quality university resources. Secondly, continuously improve the humanistic environment and establish spatial carriers and platforms that are more in line with the tastes of the creative class in terms of recreation and entertainment. Thirdly, maintain good consumption vitality and enhances the city's cultural tolerance. Incentivizing cultural consumption through a variety of means, and attracting creative talents to settle in cities through talent policies such as relaxing restrictions on settlement, pro-

viding resettlement subsidies, and increasing business start-up incentives. Continue to maintain strong investment in scientific and technological research and development, and continuously improve related support and encouragement policies for scientific and technological innovation, cultural creativity, and industrial integration. Based on maintaining good economic development and environmental ecology, continually strengthen environmental factors such as culture, education, life, and technological innovation to create an ecological environment for the gathering of the creative class and increase its attraction and adhesion to the creative class.

- (2) Promote the balanced development of creative class gatherings in different regions of the YRD. Accelerate the development of central cities with a low agglomeration of creative classes in the YRD, organically combine the cultivation of creative classes with urban talent introduction and urban renewal development, and promote balanced regional development in the YRD. Through typing and differentiated classification, making up for the shortcomings and strengthening the advantages of different regions in a targeted manner, fully understanding the important role of creative talents in urban innovation and development, and using the YRD integration strategy to accelerate the flow of talents, innovation, and other elements, tap local resource advantages and industrial advantages, establish relevant working mechanisms and measures to promote the agglomeration of the creative class, formulate relevant action plans, integrate and optimize relevant talent policies, etc. Increase support for the development of the cultural and creative industries, and create a better carrier for the gathering of creative talents.
- (3) Pay attention to the negative spillover effects of the agglomeration of the creative class, and continuously optimize policies to promote the agglomeration of creative talents. The agglomeration of the creative class will not only bring good things to the development and renewal of a city, but it may also bring some “negative” effects. That is, the phenomenon of “gentrification” that occurs in the course of high levels of urbanization, which leads to an increase in house prices, consumption, etc., and which may result in the exclusion of the local population and of the creatives themselves. Therefore, when cities in the central area of the YRD are promoting the agglomeration of the creative class, we need to pay attention to the various changes brought by the creative class to urban development and the characteristics of different types of creative talents, constantly optimize relevant policies, maintain a balance between efficiency and fairness, and build “Focus on “communicable” cities and youth-friendly cities to better leverage the positive effects of the gathering of creative talents.

6.4. Limitations

This study still has some limitations, e.g., the time range of the panel data extraction: The panel data used in this study span from 2012 to 2019, covering a relatively long period, but do not reflect the impact of the pandemic after 2020, which may have a significant effect on the mobility and agglomeration of the creative class. Secondly, the regional segmentation is not deep enough; this study mainly analyzes the overall situation of the central cities in the Yangtze River Delta, mentioning the heterogeneity of different regions such as Jiangsu, Zhejiang, and Anhui, but there is less detailed analysis of specific cities. Future research could consider including the latest data after the pandemic for analysis, and more deeply analyze the specific situations of each city in light of the characteristics of urban development and the creative class in China, in order to more accurately understand the uniqueness of the creative class agglomeration in each city. Especially under the background of China’s promotion of urban-rural integration, the issue of the creative class moving between urban and rural areas can enrich the current international research on the creative class.

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