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Cultural diversity, entrepreneurship and urban trade competitiveness—— Empirical evidence of urban panel data in China

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Abstract: Based on the reality of large-scale population mobility brought about by China's urbanization, using the panel data of 268 cities in China in 2012 and 2018, this paper constructs urban cultural diversity indicators from the perspective of labor source, and studies the impact of cultural diversity on urban trade competitiveness and its mechanism. Research findings: Cultural diversity and urban trade competitiveness show an inverted "U" relationship. The impact of cultural diversity on the trade competitiveness of different cities is different. The administrative level of the city and whether the city is coastal will affect the effect of cultural diversity on the city's trade competitiveness. Entrepreneurship is an intermediary variable between cultural diversity and urban trade competitiveness. Specifically, it affects urban trade competitiveness through two channels: entrepreneurial innovation and entrepreneurial entrepreneurship. The above results have brought important enlightenment to the interpretation of the relationship between cultural diversity and urban trade competitiveness.

Keywords: cultural diversity; entrepreneurship; urban trade competitiveness

1. Problems and literature

Since the reform and opening up, China's trade scale has expanded rapidly and stimulated rapid economic growth, which is called "China miracle" by academia and politics. However, behind the vigorous development of overall trade, there is a growing gap in urban trade development. In 2019, the total import and export volume of goods trade in the eastern region accounted for 80.5% of the country 4%, the trade development level of cities in the eastern region is generally stronger than that of cities in the central and western regions. However, even if it is also located in the eastern region, the trade development gap between cities is still wide. For example, in 2019, the total import and export volume of Shenzhen accounted for 41.5% of the whole province 7%. So, what causes the disparity of urban trade development? How to effectively stimulate the competitiveness of urban trade, so as to narrow the gap of urban trade development? As an important part of the region and the carrier of thousands of enterprises, an in-depth discussion on these issues will help us understand the micro mechanism of China's urban trade development and bring enlightenment to the study of trade competitiveness at the regional or enterprise level.

In the past 40 years, China has experienced the largest accelerated process of urbanization in human history, accompanied by large-scale population mobility. Based on this, the early literature believed that the root of the improvement of urban trade competitiveness lies in the demographic dividend: Large scale population inflow into cities brings cheap labor to cities, promotes urban economic growth [1], and makes

labor-intensive products exported by cities have more price advantages [2]. However, if we think that the improvement of China's urban trade competitiveness is only due to the demographic dividend, it is obviously inconsistent with the fact that China's population aging problem has intensified, the scale of urban effective labor force has decreased and the demographic dividend has been weakened in recent years [3]. In addition, China's export market is mainly developed economies such as Europe and the United States, which means that the advantages of China's export products are not only reflected in price. In fact, the above views only consider the impact of population flowing into cities and eventually expanding the scale of urban labor force, but ignore the impact of population flowing into cities and integrating into urban work and life on urban economic development. In this process, the most prominent problem is the collision of different cultures. There is such a fact that Chinese traditional administrative divisions and cultural regions are highly overlapped, so that people in the divisions often have their own unique "regional cultural brand", which is embodied in different living habits, personality, values, abilities and skills [4]. Therefore, when cities continue to accept foreign population, cities also continue to accept various cultures and become "containers of human culture". The process of people's communication and cooperation is also a process of mutual collision of various cultures. At the same time, it makes the city form a unique multicultural atmosphere and has a more or less impact on the economic development of the whole city. As an exchange and cooperation between people and an important way of urban economic development, trade will naturally be affected by urban cultural diversity.

Most of the existing literature on cultural diversity and economic effects take dialect or ethnic diversity as the measurement index, and the general conclusion is that cultural diversity will inhibit economic growth. However, the reality is not completely consistent with this since the reform and opening up, a large number of inland people have poured into the eastern coastal cities, which will undoubtedly lead to more diversified dialects or ethnic groups in the eastern coastal cities. According to the above view, the economic development of eastern coastal cities will be restrained, but the reality is that these cities have the fastest economic development. The author believes that this may be because when dialect or ethnic diversity is used as the measurement index in the previous literature, the dialect or ethnic type owned by the city itself is often directly used as the data source for index calculation, which means that the factors of population mobility are ignored, foreign cultures are excluded, and the estimation of cultural diversity is not accurate. In view of this, the author tries to use the diversity of labor sources to measure the diversity of city culture. On the one hand, different sources of labor represent different cultures to some extent. On the other hand, because of the strict registered residence system in China, the population mobility factor has been taken into consideration when we are matching the labor force. The possible marginal contributions of this paper are: First, from the perspective of research, based on the reality of population mobility brought by China's urbanization, there are few literatures on urban trade competitiveness from the perspective of cultural diversity. The author tries to make up for the deficiency of such research China's registered residence registration system is China's strict household registration system. Two, it can better distinguish the basic premise of foreign personnel, measure the cultural diversity by the diversity of labor sources, study its impact on China's city

trade competitiveness, and enrich the research on cultural diversity and China's trade development.

2. Theoretical analysis and research hypothesis

Many international studies measure cultural diversity by the diversity of labor source (nationality or nationality) and study the changes of American cities under the wave of immigration. Ottaviano and Peri research found that American cities are multicultural under the impact of the wave of immigration. Due to different cultural backgrounds, immigrants and local residents will complement each other in the process of communication, so as to promote innovation and accelerate economic growth [5]. Moreover, people from different cultural backgrounds often have different cognitive abilities and ways of thinking, so that people often have different ideas in the same work interaction, which is conducive to the formation of new ideas for comprehensive innovation [6], which is considered to be an important reason for the leading global economic development level of the United States. Although China is not a country of immigration, it has a vast territory and profound culture. Each region has its own unique culture, and these cultures will be significantly reflected in the local people. China's urbanization process brings large-scale population mobility, which is similar to the immigration fever in American cities, and will also have a multicultural impact on the inflow zone. Therefore, the method of measuring cultural diversity by the diversity of labor sources is also applicable to Chinese cities.

In fact, cultural diversity belongs to the category of diversity research. The existing relevant literature generally believes that diversity has both advantages and disadvantages. On the one hand, diversity will damage people's trust, increase communication costs, hinder team cooperation, and then have a negative impact on the economy [7,8]. On the other hand, it will stimulate technological diversity and complement each other. This double-sided nature is also reflected in cultural diversity. Some people believe that cultural diversity will inhibit economic growth by slowing down the process of urbanization, hindering the accumulation of human capital and inhibiting the deepening of market division of labor. However, there are also views that cultural diversity will promote local people's technological complementarity, innovation and entrepreneurship, and provide a deep-seated decisive force for regional economic growth. Some scholars also stressed that we should comprehensively consider the two-sided nature of cultural diversity. Cultural diversity can promote regional development, but when it reaches a certain degree, cultural differences exist everywhere, resulting in prominent conflicts, leading to a crisis of social trust, an increase in the crime rate, which is not conducive to the overall development of the region. Therefore, hypothesis 1 is proposed: Cultural diversity and urban trade competitiveness show an inverted "U" relationship.

Population mobility brings about the improvement of cultural diversity, and then affects the trade competitiveness of cities. However, the characteristics of cities will affect the choice of population mobility, such as administrative level, geographical location, etc. Different cities attract people differently, which means that the cultural diversity measured by the diversity of labor sources is heterogeneous, and its impact on urban trade competitiveness will also be different. Therefore, hypothesis 2 is

proposed: There are differences in the impact of cultural diversity on urban trade competitiveness.

As a “container of human culture”, cities not only contain multi cultures, but also integrate them and gradually form a unique cultural atmosphere. Entrepreneurship is deeply influenced by the urban cultural atmosphere This is because with more and more people pouring into the city to work and live, the vast majority of enterprises and other organizations are concentrated in the city. The environment around entrepreneurs is the city, and the entrepreneurial spirit is always influenced by the urban multiculturalism. Therefore, Qian believes that diverse culture is the social driver of entrepreneurship. In cities where cultures meet, entrepreneurship is becoming more and more active [9]. At the same time, entrepreneurship is closely related to trade. According to Schumpeter’s “creative destruction” theory, entrepreneurship will promote entrepreneurs to break through the domestic market and open up the international market, so as to make outstanding contributions to the export trade of a country or region. Therefore, many scholars have investigated the impact of entrepreneurship on trade from the perspectives of export growth, export intensity, export tendency and export performance. The results show that the more active entrepreneurship is, the more beneficial it is to trade [10–13]. Therefore, the author speculates that cultural diversity will affect urban trade competitiveness through entrepreneurship, and then puts forward hypothesis 3: Entrepreneurship is an intermediary variable between cultural diversity and urban trade competitiveness.

3. Models and variables

3.1. Model construction

In order to specifically investigate the impact of cultural diversity on urban trade competitiveness, combined with the previous analysis, the following nonlinear benchmark model is constructed:

$$QUA_{it} = \alpha_0 + \alpha_1 DIV_{it} + \alpha_2 DIV_{it}^2 + \sum_z \alpha_z X + \delta_1 + \delta_2 + u_{it} \quad (1)$$

where i represents the city and t represents the time. QUA_{it} represents the trade competitiveness of city i in year t , DIV_{it} represents the cultural diversity index of city i in year t , DIV_{it}^2 is the quadratic term of cultural diversity, and X represents the control variable δ_1 represents the fixed effect of provinces and cities, δ_2 represents time fixed effect and u_{it} is random error term.

3.2. Variable description and data source

3.2.1. Explained variables

There are many traditional indicators to measure trade competitiveness, including international market share, dominant comparative advantage, trade competition index, etc., but these indicators are gradually abandoned because they focus on reflecting the trade scale and do not reflect the international division of labor status and trade benefit acquisition ability of a country or region Since the reform and opening up, China’s

trade scale has expanded rapidly. However, with the increasingly complex economic situation at home and abroad, the “volume” advantage of trade is difficult to “resist” the weakening advantage of domestic labor force, the strengthening of environmental and energy binding force, the increasing pressure of RMB appreciation, the intensification of trade protectionism and other problems [14]. Therefore, the traditional indicators to measure trade competitiveness are difficult to effectively reflect trade competitiveness and do not fit the theme of this paper. In fact, at this stage, China’s trade development model is gradually changing to “win by quality”. Only by producing high-quality products can we gain trade advantages in the world and realize the fundamental transformation from “big trading country” to “powerful trading country”. Based on this, the quality of urban export products is selected as the index to measure urban trade competitiveness. Referring to the methods of Khandelwal and others, firstly calculate the quality index (qua_{kmt}) of export products of urban enterprises, and then obtain the quality of export products (QUA_{it}) at the urban level through weighted average [15]. The estimation equation of export product quality is as follows:

$$\ln q_{kmt} = -\sigma \ln p_{kmt} + \ln E_{mt} - \ln P_{mt} + \varepsilon_{kmt} \quad (2)$$

where, k represents the enterprise, m represents the exporting country, t represents the time, q_{kmt} and p_{kmt} respectively represent the export quantity and price of a product (HS8 bit code) exported by k enterprise to m country in t year; $\ln E_{mt} - \ln P_{mt}$ is a variable that changes over time and the importing country; ε_{kmt} is the residual term. The quality of export products is defined as:

$$\widehat{qua}_{kmt} = \widehat{\varepsilon}_{kmt} / \sigma - 1 \quad (3)$$

After obtaining the quality of an export product of an enterprise, the weighted average is carried out according to the product level and the export country level in turn, and the index is standardized. Then, the quality of export products at the city level is obtained through the weighted average:

$$S - qua_{kt} = (qua_{kt} - \min qua_{kt}) / (\max qua_{kt} - \min qua_{kt}) \quad (4)$$

$$QUA_{it} = S - qua_{kt} \times (q_{kt} / \sum_{kt \in i} q_{kt}) \quad (5)$$

QUA_{it} is the export product quality of i City in t years; q_{kt} refers to the trade scale of k enterprise in t year. The data used in the index comes from China customs database. The original data are cleaned by using the methods of Shi bingzhan and shaowenbo for reference, and the export product quality index of 271 cities in 2012 and 2018 is finally obtained [14].

3.2.2. Explanatory variables

Using the method of Ottaviano and Peri for reference, the origin of labor force is used as the indicator of cultural diversity [5]:

$$DIV_{it} = 1 - \sum_{j=1}^J (e_{jt}^i)^2 \quad (6)$$

where e_{jt}^i represents the total labor force in j Province, where t represents the total labor force in J province.

The value range of DIV_{it} is between 0 and 1. If all labor forces in city i come from the same province, the value is 0; If no labor force in the city i comes from the same province, the value is 1. The larger the value of this index, the stronger the cultural diversity of the city i is. The index data comes from the dynamic survey of China's labor force only retain the population above half a year away from the registered residence to exclude the "unstable" labor force who has not yet integrated into the city. Identify the place of outflow and inflow, judge whether it is local labor force, and take the average value of the adjacent two years in odd years. After matching with the quality data of urban export products, the data of 268 cities are finally obtained.

3.2.3. Control variables

In order to accurately investigate the multidimensional impact of cultural diversity on urban trade competitiveness, other variables that may affect urban trade competitiveness are added to the benchmark model, including: the level of opening to the outside world (open), the level of human capital (human), the size of urban labor force (lnlabor), government support (gov), and urban characteristics (lncity). Among them, the level of opening to the outside world directly affects the development of urban trade. The higher the level of opening to the outside world, the stronger the competitiveness of trade development, which is expressed by the degree of dependence on foreign capital; Human capital is the key factor that affects the comparative advantage of urban trade.

The key factor of competitive advantage is expressed by the average number of years of education in the city. The scale of labor force is mainly to control the impact of demographic dividend factors on urban trade competitiveness, expressed as the logarithm of urban non-agricultural population. Government support is expressed by the proportion of science and technology expenditure in government financial expenditure, which reflects the government's attention to the development of urban scientific and technological innovation, which is mainly to control the innovation incentive effect brought by government policies. The urban characteristics are expressed by the logarithm of the average wage of urban employees. This index can reflect the urban economic level, price level and resource endowment, and measure the comprehensive level of the city.

The calculation data comes from China Urban Statistical Yearbook, China Science and technology statistical yearbook and local urban statistical yearbooks. The descriptive statistics of main variables are shown in **Table 1**.

Table 1. Descriptive statistics of main variables.

Variable name	Mean value	Standard deviation	Minimum value	Maximum	Number of samples
QUA_{it}	1642	0.187	1180	2665	1876
DIV_{it}	0.300	0.251	0.012	0.976	1876
open	0.031	0.027	0.013	0.428	1876
human	2676	1239	0.722	7896	1876
lnlabor	4275	2844	2212	7482	1876

gov	0.020	0.323	0.062	0.011	1876
lncity	10.772	0.456	10.211	11 545	1876

Note: The data is calculated by the author.

4. Empirical results and analysis

4.1. Benchmark estimation

Using the panel data of 268 cities in China from 2012 to 2018, this paper preliminarily tests the impact of cultural diversity and its secondary term on urban trade competitiveness. The specific results are shown in **Table 2** Columns (1) and (2) separately examine the impact of cultural diversity and secondary items on urban trade competitiveness; add all control variables to columns (3) and (4) for regression analysis. The difference is that columns (1) and (3) do not add fixed effect, and columns (2) and (4) add time fixed effect and province fixed effect Since the existence of nonlinear relationship cannot be directly judged only by the significance of the quadratic term coefficient, the author also uses utest to test the significance of the quadratic term and reports the test results in the regression estimation results.

The **Tables (1)–(4)** of the benchmark regression show that there is a nonlinear relationship between cultural diversity measured by the diversity of labor sources and urban trade competitiveness, regardless of whether control variables or fixed effects are added. Specifically, the primary term coefficient of cultural diversity is significantly positive and the secondary term coefficient is significantly negative, that is, there is an inverted “U” relationship between cultural diversity and urban trade competitiveness. Hypothesis 1 is true. This means that with the improvement of cultural diversity, the city’s trade competitiveness will increase first and then decrease When the cultural diversity is low and has not reached the “inflection point”, the cultural exchange and collision brought by cultural diversity will help to produce a variety of skills, knowledge and ideas, form a social atmosphere conducive to innovation and entrepreneurship, promote the accumulation of entrepreneurship, and then improve the competitiveness of urban trade However, once the intensity of cultural diversity exceeds the “inflection point”, cultural diversity will inhibit the city’s trade competitiveness. This may be because the excessive intensity of cultural diversity will produce psychological distance effect, resulting in the aggravation of cultural conflict, the increase of social instability and the rise of crime rate, which will obviously frustrate the city’s trade competitiveness. In addition, according to the observation of international experience, our interpretation is: Under a certain structural framework, when the cultural diversity reaches a certain degree, similar enterprises in the city have been highly concentrated, the head effect of the industry is significant, the difficulty of innovation and entrepreneurship increases sharply, the entrepreneurial spirit is frustrated, the bankruptcy of traditional processing trade enterprises increases, and the continuation of urban trade competitiveness requires industrial transformation and upgrading. Relying only on cultural diversity may be counterproductive.

Table 2. Explanatory variables of benchmark estimation results.

Explanatory variable	(1)	(2)	(3)	(4)
DIV_{it}	1.662*** (3.176)	1.347** (2.145)	1.175** (2.258)	1.151*** (3.245)
DIV_{it}^2	-1.431*** (-3.682)	-1.218*** (-3.887)	-1.073* (-1.846)	-1.062** (-2.184)
open			0.028* (1.769)	0.024* (1.756)
human			0.005 (0.948)	0.003 (0.937)
lnlabor			0.081** (2.467)	0.076** (2.586)
gov			0.221** (2.467)	0.283** (2.586)
lncity			1.321* (1.894)	1.347** (2.267)
_ cons	0.857** (2.374)	0.856* (1.810)	0.742*** (3.881)	0.792*** (3.948)
Provincial fixed effect		Control		Control
Time fixed effect		Control		Control
Number of samples	1876	1876	1876	1876
R^2	0.022	0.027	0.036	0.054
Utest	2.173	2.452	3.069	4.081
Inflection point	0.580	0.553	0.548	0.542

Note: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$; the values in brackets are t statistics.

In addition, there is a threshold effect between cultural diversity and urban trade competitiveness, and the inflection point is between 0.54 and 0.58.

After comparing with the average value of cultural diversity of sample cities, it is found that the intensity of cultural diversity in most cities in China has not reached the “inflection point”, that is, the impact of cultural diversity in most cities on urban trade competitiveness is still in the promotion stage. The estimation results of control variables show that the opening-up level, human capital, labor force scale, government support and urban economic level are positively correlated with urban trade competitiveness, indicating that the more open a city is, the larger the labor force scale is, the more the government pays attention to scientific and technological innovation, and the higher the urban economic level is, the stronger its trade competitiveness is. Among them, there is a positive correlation between human capital and urban trade competitiveness, but it is not significant. This may be because a city’s trade development has a considerable demand for labor with different educational backgrounds, so it is inappropriate to measure the level of human capital by the length of education.

4.2. Relationship robustness

The causal relationship between trade and competitiveness of cities may show that there is a causal relationship between cultural diversity and Urban Competitiveness: The city's trade behavior will also promote economic development, attract population into the city and bring about the improvement of cultural diversity. Therefore, in order to overcome the endogenous relationship between cultural diversity and urban trade competitiveness, the instrumental variable method is used for testing.

An appropriate instrumental variable needs to be highly related to the endogenous variable and independent of the random error term. Therefore, the author tries to use the logarithm of the number of restaurants with non-local flavor in the city as the instrumental variable, mainly considering that people's dietary preference will be affected by the place of origin, and they will also prefer to choose foods close to their hometown flavor after entering the city. Therefore, the more restaurants with non-local flavor in the city, the more it can reflect the diversity of the place of origin of labor in the city. However, urban trade competitiveness will not directly affect the number of urban catering stores. Here, the big data information of "dianping.com" is used to calculate the number of non-local flavor catering stores in each city. If the taste of catering stores is different from that of the city, it is regarded as non-local taste. Further, in order to verify whether the instrumental variable is a weak instrumental variable, the econometric test is carried out. If the f statistic is significantly greater than 10, the original hypothesis of "existence of weak instrumental variable" can be rejected. The final estimation results are shown in **Table 3**.

Table 3. Explanatory variables of endogenous test estimation results (1) (2).

Explanatory variable	(1)	(2)
DIV_{it}	0.957** (2.176)	0.764** (2.245)
DIV_{it}^2	-0.834* (-1.762)	-0.693** (-2.197)
F statistic	36.224***	36.671***
Control variable		Control
Provincial fixed effect	Control	Control
Time fixed effect	Control	Control
Number of samples	1463	1463
R^2	0.047	0.059
Utest	3.651	3.982
Inflection point	0.574	0.551

Note: *p < 0.10, **p < 0.05, ***p < 0.01; the values in brackets are t statistics.

It can be seen that the regression equation has passed the test, indicating that the selection of tool variables is appropriate and the estimation result is reliable. Then, the regression was carried out, and it was found that the regression result of cultural diversity was still that the primary term was significantly positive and the secondary term was significantly negative, indicating that there was an inverted "U" relationship

between cultural diversity and urban trade competitiveness, which verified hypothesis 1 again. However, compared with **Table 2**, when the number of restaurants with non local flavor is taken as the measurement standard, the estimation coefficient will be smaller and the inflection point will be larger. This is not difficult to understand, because non local flavor restaurants have business risks in the city. If the taste cannot be accepted by a certain number of people in the city, the store will withdraw from the market in consideration of profit, which underestimates the level of cultural diversity in the city to a certain extent.

In addition, the author also tests the robustness by changing the measurement indicators of the explained variable and the explanatory variable. Firstly, replace the index of the explained variable and use the logarithm of the city’s total trade volume in the current year to represent the city’s trade competitiveness. Columns (1)–(2) of **Table 4** show the estimation results of changing the explained variable, and the difference is whether to add the control variable. The results show that the primary term coefficient of cultural diversity is significantly positive and the secondary term coefficient is significantly negative, which is consistent with the previous conclusions. Cultural diversity can still have an impact on the urban trade competitiveness with the total trade volume as the index, and shows an inverted “U” relationship. At this time, the inflection point is about 0.52.

Then change the explanatory variables. We choose the diversity of the number of surnames in the city to measure cultural diversity. Surnames have experienced historical precipitation and have unique cultural connotation. The diversity of surnames in cities can reflect the cultural diversity to a certain extent; however, since the statistical data of surnames of most urban population are not public, the author uses the “name of the person in charge of the enterprise” in the data of Chinese industrial enterprises to match with the city where he is located to obtain the number of surnames of the person in charge of the enterprise in each city. In addition, since the time range of China’s industrial enterprise database is 2007 and 2013, all export product quality and control variables are replaced with the data in this time period for panel regression. Specifically, $name_{it}$ is used to indicate the diversity of surnames, and the processing

method is the same as the above: among $name_{it} = 1 - \sum_{n=\text{surname}}^N (m_{nt}^i)^2$ them, the person

m_{nt}^i in charge of the enterprise representing the surname n accounted for the proportion of the person in charge of the total enterprise of city i in T , and n is the collection of all surnames in the city, and the specific value range is between 0 and 1. If all business leaders in city i have the same surname, the value is 0; if they have different surnames, the value is 1. Columns (3)–(4) of **Table 4** report the estimated results of replacing explanatory variables. The results show that the cultural diversity measured by the diversity of the surnames of the heads of urban enterprises still shows an inverted “U” relationship with the urban trade competitiveness, which is basically consistent with the regression results above, but the inflection point is larger than the previous index. This may be due to the particularity of the index. The person in charge of the enterprise is the group that can best reflect the vitality of innovation and entrepreneurship in the city, which means that the index enlarges the promotion of cultural diversity to a

certain extent, so the city will be more tolerant of the index.

Table 4. Estimation results of replacement variables.

Explanatory variable	(1)	(2)	(3)	(4)
	$Ln EX_{it}$	$Ln EX_{it}$	QUA_{it}	QUA_{it}
DIV_{it}	4.104*** (3.224)	3.681* (1.829)		
DIV_{it}^2	-3.878*** (-3.398)	-3.512** (-2.389)		
$Name_{it}$			6.324** (2.342)	4.002* (1.953)
$name_{it}^2$			-3.919* (1.789)	-2.597** (2.352)
Con_s	2.977* (1.873)	4.532*** (3.781)	1.144 (1.421)	1.245* (1.716)
Control variable		Control		Control
Provincial fixed effect	Control	Control	Control	Control
Time fixed effect	Control	Control	Control	Control
Number of samples	2016	2016	1876	1876
R^2	0.088	0.092	0.083	0.089
Utest	4.087	4.031	5.324	5.667
Inflection point	0.529	0.524	0.807	0.771

Note: * p < 0.10, **p < 0.05, ***p < 0.01; the values in brackets are t statistics.

4.3. heterogeneity of impacts

According to China's national conditions, the government may affect urban development through economic policies, intervening in the land market, affecting the labor market and other measures. Therefore, the government preference will affect the comprehensive development level of cities, which is often the primary consideration when people choose cities. In fact, the administrative level of a city is positively related to the preference of the government. Therefore, the administrative level can represent the comprehensive development level of the city to a certain extent [16]. For example, sub provincial cities will get more financial support, human capital and other resources conducive to economic development than ordinary prefecture level cities, and people will also prefer to work and live in sub provincial cities. Accordingly, the samples are divided into municipalities directly under the central government, sub provincial cities and prefecture level cities according to the administrative level of the city for regression analysis. Columns (1) and (3) of **Table 5** report the estimation results of three types of cities respectively. By observing the three columns of data, it is found that cultural diversity and the trade competitiveness of municipalities directly under the central government, sub provincial cities and prefecture level cities show an inverted "U" relationship, but there are differences in the size and significance of the coefficients of primary and secondary terms. The cultural diversity of municipalities directly under the central government and sub provincial cities will play a stronger

role in urban trade competitiveness, which proves that hypothesis 2 is true. Combined with the inflection point, the cultural inclusiveness of cities is also related to the administrative level. The cultural inclusiveness of municipalities directly under the central government and sub provincial cities is higher than that of prefecture level cities. This may be because the economic level, institutional environment, educational coverage and infrastructure of these two cities are better than prefecture level cities, so that there is a better mechanism to solve the possible cultural conflicts caused by multiculturalism and weaken its negative impact. In addition, comparing the average value of cultural diversity of sample cities, it is found that the impact of cultural diversity on urban trade competitiveness is still in the promotion stage, whether it is a municipality directly under the central government, a sub provincial city or a prefecture level city.

Table 5. Heterogeneity analysis.

Explanatory variable	(1) Municipality directly under the Central Government	(2) Sub provincial city	(3) Prefecture level city	(4) Coastal city	(5) Inland city
DIV_{it}	2.169*** (3.482)	1.941*** (3.111)	1.630* (1.871)	2.563*** (2.381)	1.341* (1.711)
DIV_{it}^2	-1.436** (2.287)	-1.350** (-2.345)	-1.662* (-1.892)	-1.997* (-1.792)	-1.325** (-2.345)
Con_s	2.565* (1.899)	1.314** (2.448)	2.325*** (3.863)	-0.004*** (-3.098)	1.314** (2.448)
Control variable	Control	Control	Control	Control	Control
Provincial fixed effect	Control	Control	Control	Control	Control
Time fixed effect	Control	Control	Control	Control	Control
Number of samples	28	105	1743	770	1106
R^2	0.028	0.049	0.071	0.065	0.049
Utest	3.008	3.067	3.891	4.130	4.349
Inflection point	0.755	0.719	0.490	0.642	0.506

Note: *p < 0.10, **p < 0.05, ***p < 0.01; the values in brackets are t statistics.

Government preference is also reflected in the geographical location of cities. Some studies show that the Chinese government has coastal preference in regional development strategy [17]. For example, since the reform and opening up, the state has adopted a series of institutional innovation and location oriented economic policies in coastal cities, and set up national economic and technological development zones and national high-tech industrial parks, so as to gradually open the gap between the economic development level of coastal cities and inland cities. Therefore, cities can be divided into coastal cities and inland cities based on whether they are located in coastal provinces. Columns (4)–(5) of table 5 report the estimation results of the two types of cities respectively. Obviously, the impact of cultural diversity in coastal cities is more prominent, which proves hypothesis 2 holds again. At the same time, the cultural inclusiveness of coastal cities is higher, which may be because, on the one hand, a large number of pilot reform policies of the government are implemented in

these cities, which makes coastal cities more receptive to new things and changes. On the other hand, the geographical advantages of coastal areas contribute to the development of urban trade and make cities vulnerable to overseas culture, with higher openness and inclusiveness.

5. The path of cultural diversity to enhance urban trade competitiveness

5.1. Intermediary effect model

In order to test hypothesis 3, the “three-step regression method” is used to test the intermediary effect of entrepreneurship. However, entrepreneurship is rich in connotation and there is no unified measurement method at present. Here, drawing on the practice of h é Bert and link, entrepreneurship is divided into innovative spirit and entrepreneurial spirit, and the following model is constructed [18]:

$$QUA_{it} = \alpha_0 + \alpha_1 DIV_{it} + \alpha_2 DIV_{it}^2 + \sum_z \alpha_z X + \delta_1 + \delta_2 + u_{it} \quad (7)$$

$$\ln Innovate_{it} = \beta_0 + \beta_1 DIV_{it} + \beta_2 DIV_{it}^2 + \sum_z \beta_z X + \delta_1 + \delta_2 + u_{it} \quad (8)$$

$$Pioneer_{it} = \gamma_0 + \gamma_1 DIV_{it} + \gamma_2 DIV_{it}^2 + \sum_z \gamma_z X + \delta_1 + \delta_2 + u_{it} \quad (9)$$

$$QUA_{it} = \lambda_0 + \lambda_1 DIV_{it} + \lambda_2 DIV_{it}^2 + \lambda_3 \ln Innovate_{it} + \lambda_4 Pioneer_{it} + \sum_z \lambda_z X + \delta_1 + \delta_2 + u_{it} \quad (10)$$

where i and t refer to the city and year, $\ln Innovate_{it}$ and $Pioneer_{it}$ are entrepreneurial spirit and entrepreneurial spirit respectively.

The former is expressed by the number of patent applications authorized per 10,000 people in the city, while the latter is expressed by the proportion of employees of private enterprises and individual enterprises in the total labor force in the city. Model (7) is the total effect model, models (8) and (9) are the intermediary mechanism model, and model (10) is the direct effect model. The control variables and fixed effects are consistent with the above.

Table 6. Intermediary effect test.

Explanatory variable-	(1)	(2)	(3)	(4)	(5)	(6)
	QUA_{it}	$\ln Innovate_{it}$	$Pioneer_{it}$	QUA_{it}	QUA_{it}	QUA_{it}
DIV_{it}	1.151*** (3.245)	3.239** (2.463)	0.089* (1.873)	0.692** (2.213)	0.112* (1.726)	0.034* (1.730)
DIV_{it}^2	-1.062** (-2.184)	0.017* (-1.894)	-1.075** (-2.201)	-0.941** (2.259)	-0.109* (1.708)	-0.138* (-1.815)
$\ln Innovate_{it}$				2.650** (2.448)		1.241** (2.109)
$Pioneer_{it}$					6.311** (2.496)	5.398** (2.497)

Con_s	0.792*** (3.948)	1.772 (1.256)	0.015* (1.723)	1.332 (1.658)	0.245* (1.864)	1.242 (1.512)
Control variable	Control	Control	Control	Control	Control	Control
Provincial fixed effect	Control	Control	Control	Control	Control	Control
Time fixed effect	Control	Control	Control	Control	Control	Control
Number of samples	1876	1792	1736	1792	1736	1736
R ²	0.054	0.206	0.196	0.214	0.263	0.325
Utest	4.081	3.294	3.001	3.421	3.187	4.298
Inflection point	0.542	0.537	0.593	0.368	0.513	0.123

Note: * p < 0.10, **p < 0.05, ***p < 0.01; the values in brackets are t statistics.

5.2. Impact mechanism test

Table 6 reports the test results of the impact mechanism of cultural diversity on urban trade competitiveness. Column (1) is the estimation result of model (7), which is consistent with the estimation result of column (4) in Table 2. Columns (2) and (3) respectively report the estimation results of models (8) and (9), (4) and (5) list the impact of cultural diversity on urban trade competitiveness after adding entrepreneurial innovation and entrepreneurial spirit respectively. (6) column is the estimation result of model (10), which indicates the impact of cultural diversity on urban trade competitiveness after all two variables are added to the model.

The regression results of each column show that hypothesis 3 is established, which enriches the theoretical mechanism of cultural diversity and improving urban trade competitiveness by affecting entrepreneurship. According to the estimation results of columns (2)–(3), cultural diversity can affect two variables: entrepreneurial innovation and entrepreneurial entrepreneurship. At the same time, it is also found that there is a nonlinear relationship between cultural diversity and entrepreneurial spirit, that is, there is also an inverted “U” relationship, indicating that cultural diversity will inhibit entrepreneurial spirit after reaching a certain degree. This may be because cultural diversity promotes the accumulation of entrepreneurial spirit, but when the accumulation reaches a certain degree, a large number of excellent enterprises have gathered in the city, and the industry head effect is significant. If the urban economy and industrial structure have not been adaptively changed, too many cultures will also inhibit the accumulation of entrepreneurial experience and reduce the probability of entrepreneurs’ success in innovation and entrepreneurship. To a certain extent, it has hit the improvement of the entrepreneurial spirit of the city’s overall entrepreneurs. It can be estimated that entrepreneurship and cultural diversity can more or less weaken entrepreneurship and its influence by adding the two variables (Entrepreneurship and cultural diversity) separately. The estimation results in (6) show that when both variables are added, the impact of cultural diversity and its secondary term will be further reduced, which means that entrepreneurial innovation and entrepreneurial spirit are the intermediary variables of cultural diversity affecting urban trade competitiveness, but only part of them have intermediary effect.

6. Conclusion and enlightenment

In combination with the reality of population mobility brought about by China’s

urbanization, we use the diversity index of labor source to measure cultural diversity, and empirically test the relationship and mechanism between it and urban trade competitiveness. It is found that cultural diversity and urban trade competitiveness show an inverted “U” relationship, that is, with the rise of cultural diversity, urban trade competitiveness will increase first and then decrease. This conclusion is still valid after the robustness test. In addition, according to the results of heterogeneity analysis, this impact will be different due to the administrative level of the city and whether it is coastal or not. Specifically, the cultural diversity of municipalities directly under the central government and sub provincial cities will have a stronger impact on urban trade competitiveness, and the inflection point is also greater, which means that the cultural inclusiveness of these two cities is higher. This may be because the comprehensive development level of these two cities is better, which can bring better solutions to cultural differences and weaken the negative impact caused by too many cultures. Compared with inland cities, coastal cities are more culturally inclusive. Possible reasons include: The implementation of a large number of innovative policies and unique geographical advantages make coastal cities more receptive to new things and changes, more vulnerable to overseas culture, and more open and inclusive. In the channel test, entrepreneurship is the influence channel of cultural diversity and urban trade competitiveness, which is specifically through two channels: entrepreneurial innovation and entrepreneurial spirit. At the same time, it is also found that there is an inverted “U” relationship between cultural diversity and entrepreneurship. We believe that in the process of increasing cultural diversity, the entrepreneurial spirit of entrepreneurs brought by multi-cultural exchanges and collisions has been accumulated. However, if the urban economy and industrial structure do not change adaptively, under the original single sample framework, too many cultures may make it difficult for entrepreneurs to sustain their entrepreneurial spirit.

To sum up, the following enlightenment is obtained: First, population mobility can enhance cultural diversity. Considering the fact that the intensity of cultural diversity in most cities in China is far from reaching the “inflection point”, the current government should emphasize that the advantages of urban cultural diversity can be effectively brought into play by promoting the diversification of population sources. We should not blindly pursue cultural unity because population migration may bring conflict. Seeking common and different talents is the key to the long-term development and unique advantages of various cultures. Second, cities should pay attention to enhancing the inclusiveness of multiculturalism and cultivate and continuously improve entrepreneurship. Advanced management systems, policies and laws can foster an open and inclusive urban atmosphere, attract talents from all over the world and form a benign cultural interaction environment. However, it is worth noting that attracting talents does not mean retaining talents, reducing xenophobia and promoting internal multi-cultural exchanges and integration, so as to achieve the sustainable development of entrepreneurship and effectively stimulate the positive role of cultural diversity. In addition, cultural diversity also has a non-linear relationship with entrepreneurship, which means that the urban government needs to support entrepreneurial activities, stimulate the diversified needs of the market and provide entrepreneurs with more entrepreneurial opportunities. Third, we should pay attention to the adaptive change between cultural diversity and the change of urban industrial

structure. To enhance the competitiveness of urban trade, we should not only pay attention to the competitiveness of trade products, but also strengthen the optimization of industrial structure, so as to realize the benign interaction between multicultural integration, industrial structure adaptation and optimization and urban economic development.

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