



Does dialect diversity improve enterprise employment? Evidence from Chinese listed companies

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ABSTRACT

The employment effect of dialect diversity is not only a fundamental issue in research related to Chinese dialects; it is also of great significance for improving regional employment levels, enhancing people's livelihoods, and driving economic development in China. This paper uses data on regional dialects and listed companies in China from 2011 to 2021 to thoroughly examine the impact of dialect diversity on enterprise employment and finds that there is a significant positive correlation between them. In terms of internal mechanisms, dialect diversity can enhance enterprise employment levels by expanding the scale of their production and innovation. Further examination reveals that in terms of factor intensity, labor and production exhibit a more pronounced employment effect of dialect diversity in enterprises than capital and R&D innovation. In terms of ownership types, the employment effect of dialect diversity is strongly reflected in samples of private and foreign-funded enterprises, while its significance is not as apparent in state-owned or collective enterprises. In terms of region types, dialect diversity significantly improves the employment of enterprises in the eastern region, but suppresses the employment of enterprises in other regions. This study provides conclusions on the employment effect of dialects within Chinese enterprises. It also lays a crucial foundation for implementing scale enhancement mechanisms in production and innovation, improving regional support policies and enterprise management systems, and leveraging the employment promotion effect of dialect diversity.

1. Introduction

China's diversity of dialects is one of the most unique characteristics of its culture. Over thousands of years of development and changes in China, a diverse dialect system has emerged, with each regional dialect representing the rich culture, history, values, and customs of the area. The complexity and uniqueness of Chinese dialects serve as important symbols of people's identity and sense of regional belonging. Dialects have also been a significant theme in regional economic research.

In recent years, China has been focused on boosting employment levels. Enhancing the capacity for regional employment and promoting coordinated development across regions are key requirements for improving employment in the country. Thus, this study's research on employment levels has immense practical value for the current Chinese economy by providing an in-depth analysis of regional employment improvement while considering important regional characteristics such as dialect diversity.

This study also has considerable theoretical research value. The employment effect serves as the central focus of the role of dialect

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diversity at the macro (economic) and micro (enterprise) levels and is closely related to various research topics, including economic performance, enterprise production, and R&D innovation. A dialect is a cultural, human-centered characteristic; therefore, the economic impact of dialect diversity must be measured through human-centered behavioral indicators, such as employment. For example, the core influencing mechanism of cultural diversity's economic performance promotion effect is the enrichment of group information, quality, and ability (Hambrick et al., 1996; Hong & Page, 2001), while the core influencing mechanisms of cultural diversity's economic performance inhibition effect are reduced trust and increased communication costs (Alesina et al., 2012; Alesina & Ferrara, 2002, 2005; Milliken & Martins, 1996). However, whether positive or negative, the impact of dialect diversity on human behavior and characteristics has consistently been the most direct and central channel of action. Therefore, the employment level, which is closely related to human behavior, has naturally become a research topic with important theoretical value. Currently, there is relatively little direct research on this topic. This study aims to fill this research gap by effectively supplementing the extant literature while also providing necessary support for research topics such as economic performance and technological innovation.

Notably, this study also has substantial exploratory research value. Dialect diversity has both positive and negative impacts, and the ultimate influence of dialect diversity on various research topics, such as economic performance, technological innovation, and production and operation is unclear. Similarly, despite extensive research on employment, the precise influence of dialect diversity is still not fully understood. Existing research and empirical findings have yet to yield a definite conclusion; therefore, further research and testing is necessary.

China is currently pursuing a dual development goal: promoting Mandarin while simultaneously protecting cultural heritage, such as dialects. At the same time, many important developmental imperatives are regionally based, such as the stabilization of employment and the protection of people's livelihoods. Accurately grasping the employment effects of dialect diversity is critical for gaining a thorough understanding of the relationship between regional culture and economic development and guiding the effective formulation and implementation of relevant policies.

This study also makes a further academic contribution by going beyond the baseline analysis of the employment effects of dialect diversity. It explores the logic and internal mechanisms of the baseline results, examining the interaction between critical variables to thoroughly investigate and analyze their essential properties. This approach bolsters the conclusions of this research, providing stronger support, credibility, and applicability. It aligns with both the general requirements of academic research and practical research goals, ensuring that the research conclusions hold equal importance and provide higher value than the baseline results from the initial analysis.

In summary, this study is potentially innovative in several aspects. First, it examines the promoting effect of dialect diversity on enterprise employment levels, providing necessary support for China's dedicated efforts to protect dialect inheritance and achieve stable employment. Using data on dialects and sample data from listed companies enables this study to explore the impact of dialect diversity in the Chinese context. Second, while numerous studies recognize the impact of dialect diversity on employment as a fundamental mechanism, there is a lack of targeted research to test this impact, resulting in a relative lack of support for and integration with related research. This paper fills this research gap by comprehensively integrating existing theoretical research to explore important factors such as production scale expansion and innovation scale expansion. Third, this paper further examines and interprets characteristics that reflect the context of the Chinese economy, such as factor density, ownership and region. These characteristics are highly relevant to the employment effect of dialect diversity. The conclusions of this research have both theoretical and practical research value, as they fully integrate China's economic reality and existing theoretical research, further enriching the research framework of this paper.

The remainder of this paper is organized into four sections. Section 2 provides a review of relevant literature and theoretical assumptions and explains the research hypothesis. Section 3 explains the research design, including the econometric model and the related variables used for empirical testing in this study. This section also describes the source, processing, and descriptive statistics of the sample data in this paper. Section 4 reports the results of the empirical tests, including the baseline analysis, mechanism tests of production and innovation, further tests of element intensity, ownership and region, and robustness tests. Lastly, Section 5 summarizes the test results of this study and proposes targeted and effective policy recommendations.

2. Literature review and research hypotheses

Several studies in the extant literature provide effective support for the employment promotion effect of dialect diversity. Lee et al. (2010) assert that a higher level of regional diversity can enhance openness and creativity by attracting talented people, promoting regional human capital concentration, and achieving a higher level of regional innovation. This is in line with Jacobs' (1961) discovery that cities play the role of "open systems," attracting talent from different backgrounds and stimulating their creativity. As manifestations of an open system, dialect diversity and inclusiveness influence employment. Florida (2002) believes that a tolerant, open, and diverse social culture results in low barriers to entry and helps attract talent from a region or city. Moreover, diversity can enhance overall productivity by leveraging skill complementarity (Lazear, 1999), thus enhancing the relative skill advantage and employability of the labor force (Liu et al., 2020).

Existing studies demonstrating the positive effects of diversity include several that utilize data from the United Kingdom and the United States. Lee (2011) argue that ethnic diversity may attract human capital, tourists, or companies and increase productivity through various problem-solving methods or minority entrepreneurship. After a series of model estimates of employment growth in 53 British cities between 1981 and 2001, Lee (2011) find that cities with a high number of immigrants had higher employment growth in the 1990s. Qian (2013) analyzes data from U.S. metropolitan areas to test the correlation between cultural diversity and human capital and finds that there is a significant positive correlation between them. Qian argues that this correlation is a driving force behind

innovation and entrepreneurship. Using industry-level U.S. census data from 1980 to 2000, Sparber (2009) finds that racial heterogeneity leads to increased productivity in many industries. Specifically, industries that employ a large number of employees responsible for creative decision-making and customer service benefit from diversity, while industries characterized by high levels of team effort experience drawbacks. Ottaviano and Peri (2005) examine census data from 1970 to 1990 and find that the overall effect of diversity on the wage and employment of U.S.-native workers is positive and significant. The range of abilities inherent in language diversity, and the resulting benefits in productivity, are significant contributors to this positive impact. Glaeser et al. (1992) analyze data on the growth of large-scale industries in 170 U.S. cities from 1956 to 1987 and determine that local competition and urban diversity encourage employment growth in industries, primarily due to cross-industry knowledge spillover. Although local competition and urban diversity differ from dialect diversity, which is a cultural characteristic, the results of Glaeser et al.'s (1992) study provide a reference for the possible knowledge spillover effect and employment promotion effect of dialect diversity.

Some studies also reveal the positive effects of diversity in the Chinese context. Pan et al. (2017) claim that cultural diversity is highly correlated with openness, tolerance, and regional population mobility. Their analysis of data on inter-provincial population flow from China's sixth population census indicates that population inflow strengthens the influence of cultural diversity on enterprise innovation. Utilizing sample data on the Chinese labor force, Liu et al. (2015) find that within the same dialect region, the probability of cross-city labor flow increases by more than 30% when the distance between dialects increases by one level. The primary reasons for this phenomenon are the dialect-based identification effect and the complementary effect of the labor force.

In contrast to research documenting the positive effects of diversity, some studies find that dialect diversity has an employment-inhibiting effect. Xiong et al. (2023) examine Chinese city-level data from 2007 to 2018 and determine that dialect diversity has a significant inhibitory effect on employment and labor mobility measured by the total number of workers. The decrease in employment levels can be largely attributed to the low levels of inclusion and trust caused by dialect diversity. This corroborates the inhibiting effect of personal and ethnic heterogeneity on trust levels identified by Alesina and Ferrara (2002). Moreover, the cultural gap caused by dialect diversity increases the psychic cost of social integration within the labor force, making integration into society and the economy more challenging (Bleakley & Chin, 2004; Sjaastad, 1962). Milliken and Martins (1996) examine the affective consequences of diversity and conclude that racial diversity complicates inter-group interaction and increases costs in several areas, including personnel flow, communication, and cooperation. Falck et al. (2012) find that the cross-regional migration flow in Germany is influenced by historical dialect similarity, causing linguistic differences to limit the inflow and integration of the regional labor force and making workers unwilling to move to culturally unfamiliar environments. Chen et al. (2014) review interview data from Shanghai, China, and find that dialects are the embodiment of identity. Thus, a common dialect can reduce the barriers to information exchange, facilitating integration into the local society. Having a common dialect can also reduce transaction costs in the labor market when interacting with local people. From the employee perspective, Gong et al. (2011) discover that in China, proficiency in dialects and spoken language abilities improve employees' adaptability, relevance, and dedication to the organization and community, thus improving the degree of job embeddedness and reducing turnover rates. Similarly, workers who exhibit greater disparities in dialects and accents receive lower employment ratings, and regions with greater dialect differences experience less labor mobility (Carlson & Mchenry, 2006; Liu et al., 2015). Using the Industrial Enterprise Database (IED) and city-level dialect data, Si et al. (2023) determine that dialect diversity has a significant inhibitory effect on regional human capital accumulation and workers' bargaining power, which further reduces the labor income share.

In summary, previous studies have provided support for both the positive and negative correlations between cultural diversity and employment level. Each study presents a unique viewpoint and internal logic, resulting in a lack of consistency across their conclusions. By integrating with existing studies to analyze the internal influence mechanism, it becomes apparent that the main mechanisms leading to the negative correlation involve communication, trust, and other labor integration costs. In contrast, the mechanisms of positive correlation primarily involve innovation and creativity enhancement (Jacobs, 1961; Qian, 2013; Pan et al., 2017) and productivity gains (Lee, 2011; Sparber, 2009; Ottaviano & Peri, 2005). These factors are crucial for enhancing labor employment levels and human capital accumulation within enterprises. Building on this foundation, this paper proposes basic correlation hypotheses.

H1. Dialect diversity can enhance regional openness and inclusiveness, improve productivity and innovation, and increase enterprise employment. However, dialect diversity may reduce the tolerance, communication ability, and trust of groups and may inhibit the inflow of regional labor force and enterprise employment.

H2. Production and innovation are crucial factors for enterprises, serving as important channels for the employment promotion effect of dialect diversity. These factors are suitable for testing as intermediate influencing variables.

3. Research design

3.1. Model settings and variable definitions

The econometric model for the empirical part of this paper is constructed as follows:

$$\ln \text{Employ}_{i,j,t} = \alpha_0 + \alpha_1 \text{Dialectdiversity}_{ij} + \alpha_n \text{Controls}_{i,j,t} + \varphi_{\text{year}} + \varphi_{\text{province}} + \varphi_{\text{industry}} + \varepsilon_{i,t} \quad (1)$$

In Equation (1), i , j , and t represent the enterprise, the city, and the year, respectively, and the dependent variable, $\ln \text{Employ}_{i,t}$, is the employment level of an enterprise. This paper draws on the research method of Mao and Wang (2023), measuring the variable by the number of employees of listed company i in year t , which has been logarithmically standardized. Drawing on the method of Xu et al.

(2015), this paper uses two explanatory variables to represent the diversity of dialects. The first is the number of dialect types, *Dialectdiversity1_j*, defined as the sum of the different dialects used in the counties and districts under the jurisdiction of city *j*. The second is population-weighted dialect diversification, calculated based on the population situation of different dialects. The calculation for this is $Dialectdiversity2_j = 1 - \sum_{k=1}^n R_{kj}^2$, where R_{kj} represents the proportion of the population using dialect *k* in city *j*, and *n* represents the number of dialects used in city *j*. This indicator represents the probability of any two individuals in a city speaking different dialects. The higher the dialect diversity, the smaller the $\sum_{k=1}^n R_{kj}^2$ and the larger the *Dialectdiversity2_j*.

Controls_{i,j,t} represents a set of control variables. The main control variables selected in this paper are as follows: (1) Enterprise size (*LnSize*) is expressed using logarithmically standardized total enterprise assets ($\ln(1 + \text{total enterprise assets})$). (2) The age of the enterprise (*Age*) is represented by the operation time of the enterprise (current year – start year + 1). (3) The enterprise asset–liability ratio (*Leverage*) is expressed as the ratio of total liabilities to total assets of the enterprise. (4) The company's wage level (*LnWage*) is measured by the logarithm of the ratio of the company's payable employee compensation to the number of employees. (5) Enterprise value (*Tobin*) is expressed using the Tobin's Q value of the enterprise. (6) Enterprise performance (*ROA*) is expressed as the ratio of a company's after-tax net profit to its total assets. φ_{year} , $\varphi_{province}$, and $\varphi_{industry}$ are the fixed effects of year, province, and industry, respectively. Effectively controlling these objects is of great significance for further solving the “mismatch correspondence” of panel data and enhancing the accuracy of empirical results. ε_{it} is the random error term.

3.2. Data

The research data in this paper comes from the matching sample of two data segments. One dataset originates from Xu et al. (2015), comprising dialect data at the city level obtained from the Chinese Dialect Dictionary. This dialect data underwent direct matching, manual proofreading, and allocation to municipal administrative regions and newly established county-level administrative regions. The other segment is enterprise-level data obtained from the 2011–2021 China Stock Market & Accounting Research (CSMAR) Database. This database was developed to meet the requirements of academic research, drawing on professional standards from internationally renowned databases such as the Center for Research in Security Prices (CRSP), Standard & Poor's Compustat, the New York Stock Exchange's Daily Trade and Quote (TAQ), and tailored to suit China's specific national circumstances. It is the first economic and financial database in China, providing a rich sample of Chinese listed companies and important indicators including internal production, R&D, and operation. This paper determines the time period based on data availability, matches the information on the listed companies with dialect indicators, and removes abnormal data samples. The descriptive statistics of relevant indicators are shown in Table 1.

4. Empirical test

4.1. Baseline regression results

Table 2 reports basic test results on the correlation between dialect diversity and enterprise employment level using the sample data on Chinese listed companies from 2011 to 2021. The results in columns (1) and (3) show that under the regression tests dominated by core variables, the impact of core explanatory variables represented by dialect quantity and diversity index on the employment level of enterprises are significantly positive at the 1% statistical level. The empirical results after adding the control variables are shown in columns (2) and (4), with the core explanatory variables remaining significantly positive at the 1% statistical level. This indicates that regional dialect diversity has a significant enhancing effect on the employment level of enterprises.

The results of the baseline regression can be potentially explained by the fact that the economic development promotion effect and the production level improvement effect of enterprises or teams that exist in an environment with dialect diversity have been verified by relevant literature (Lazear, 1999; Ottaviano & Peri, 2005; Trax et al., 2015). Dialect diversity can broaden the production and innovation capacity of regions and enterprises by fostering stronger integration of information, quality, and capabilities. This provides the basic conditions for expanding regional economic development and the scale of enterprise production and increasing the input and utilization of labor factors. From the perspective of enterprises' internal operations, improving dialect diversity plays a crucial role in enhancing production and innovation, which are the core sources of employee employment in enterprises. Improving production

Table 1
Descriptive statistics.

Variable	n	Mean	Std	Min	Max
<i>LnEmploy</i>	40,947	7.443	1.314	4.419	11.231
<i>Dialectdiversity1</i>	40,947	0.212	0.196	0.0008	0.767
<i>Dialectdiversity2</i>	40,947	1.704	0.735	1	5
<i>LnSize</i>	32,314	22.241	1.443	19.441	27.216
<i>Age</i>	32,314	18.163	5.978	1	63
<i>Leverage</i>	32,314	0.430	0.218	0.051	0.943
<i>LnWage</i>	32,314	9.602	1.127	5.679	12.576
<i>Tobin</i>	32,314	2.038	1.373	0.856	9.167
<i>ROA</i>	32,314	0.036	0.069	−0.299	0.273

Table 2
Baseline regression results.

	(1)	(2)	(3)	(4)
	<i>LnEmploy</i>			
<i>Dialectdiversity1</i>	0.180*** (0.039)	0.140*** (0.026)		
<i>Dialectdiversity2</i>			0.035*** (0.012)	0.023*** (0.008)
Control Variables	No	Yes	No	Yes
Year	Yes	Yes	Yes	Yes
Province	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes
R ²	0.17	0.72	0.17	0.72
n	40,947	32,314	40,947	32,314

Note: *** denotes $p < 0.01$, ** denotes $p < 0.05$, and * denotes $p < 0.1$. Figures in parentheses are standard errors.

efficiency and innovation capability directly impacts employment by expanding the scale of enterprise production and innovation and further enhancing the investment level of related factors. This results in a significant improvement in the labor force, which is one of the most critical elements.

However, not all studies confirm the promoting effects of dialect diversity on regional economy and enterprise production innovation. Some studies find that dialect diversity has negative effects, such as communication barriers and reduced trust. Therefore, the results of this research could actually stem from the combined impacts of both favorable and harmful effects on dialect diversity, along with more immediate factors. This requires in-depth exploration in the mechanism testing section. Nevertheless, the baseline regression results of this study provide essential complementary insights to existing research.

4.2. Mechanism tests

4.2.1. Expansion of production scale

From the perspective of the impact of dialect diversity on economic development and enterprise production, dialect diversity has a significant promoting effect on a country's total economic output (Ottaviano & Peri, 2005; Ratna et al., 2009). From the micro perspective, this effect forms the foundation for driving the core production of enterprises. Operating income is the core proxy indicator of enterprise production scale, and this paper employs it as a mechanism variable for testing. Dialect diversity also has a significant productivity improvement effect at the enterprise level, improving enterprise efficiency, reducing enterprise costs, expanding enterprise production scale, and increasing operating revenue. Therefore, the expansion of enterprise scale is also a key direct influencing factor enabling enterprises to expand factor inputs, increase employment scale, and increase employment numbers (Mao & Wang, 2023).

This paper uses the logarithmic normalization of the operating income of listed companies (*LnIncome*) to test its mediating effect. Table 3 demonstrates that when enterprise income (*LnIncome*) is taken as the dependent variable, the regression coefficients of the independent variables *Dialectivity1* and *Dialectivity2* are significantly positive at the 1% statistical level. When the level of employment of enterprises (*LnEmployment*) is used as the dependent variable, the regression coefficients of the independent variable *LnIncome* are significantly positive at the 1% level. This confirms dialect diversity's mechanism of production scale expansion: dialect diversity enhances the employment level of enterprises by expanding their production scale.

Table 3
Mechanism test of production expansion.

	(1)	(2)	(3)	(4)	(5)	(6)
	<i>LnIncome</i>				<i>LnEmploy</i>	
<i>Dialectdiversity1</i>	0.171*** (0.048)	0.176*** (0.039)				
<i>Dialectdiversity2</i>			0.029* (0.015)	0.033*** (0.012)		
<i>LnIncome</i>					0.690*** (0.003)	0.479*** (0.005)
Control Variables	No	Yes	No	Yes	No	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes
Province	Yes	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes	Yes
R ²	0.24	0.51	0.23	0.51	0.73	0.77
n	33,893	32,312	33,893	32,312	33,893	32,312

Note: *** denotes $p < 0.01$, ** denotes $p < 0.05$, and * denotes $p < 0.1$. Figures in parentheses are standard errors.

4.2.2. Expansion of innovation scale

Innovation represents another crucial aspect besides production, also serving as a means for the positive impact of dialect diversity to be exerted. Dialect diversity fundamentally enhances the level of knowledge exchange and technological diversity, and its positive impact on corporate innovation has been confirmed by many studies (Jacobs, 1961; Qian, 2013; Pan et al., 2017). Like production, an increase in the scale of enterprise innovation will also enhance the absorption and application level of innovation factors such as R&D personnel. Therefore, this study uses logarithmically standardized enterprise R&D expenditure as a proxy variable for enterprise innovation scale for mechanism testing and reports the results in Table 4. When using enterprise R&D expenditure (*LnR&D*) as the dependent variable, the regression coefficients of the independent variables *Dialectdiversity1* and *Dialectdiversity2* are significantly positive at the 1% statistical level. When using the level of employment of enterprises (*LnEmployment*) as the dependent variable, the regression coefficients of the independent variable *LnR&D* are significantly positive at the 1% level. This confirms dialect diversity's mechanism of expanding the R&D scale: dialect diversity enhances the employment level of enterprises by expanding the scale of R&D expenditure.

4.3. Further testing

4.3.1. Element intensity

As a cultural characteristic, the employment impact of dialect diversity depends on the communication and cooperation behavior of labor and scientific researchers. In addition, the structural characteristics between labor and other important elements, such as capital and technology, are also key factors affecting the employment effect of dialect diversity. Therefore, constructing the ratio to labor force, this paper uses the *K_intensity* index and the *R&D_intensity* index, as well as their interaction terms with dialect diversity, to test the effect of element intensity. The results in Table 5 show that the regression coefficients of the interaction term between dialect diversity and element intensity (*Dialectdiversity1* × *K_intensity*, *Dialectdiversity2* × *K_intensity*) are significantly negative at the 1% statistical level. The regression coefficients of the interaction term between dialect diversity and R&D intensity (*Dialectdiversity1* × *R&D_intensity*, *Dialectdiversity2* × *R&D_intensity*) are significantly negative at the statistical levels of 1% and 5%, respectively. This indicates that for enterprises with high capital and R&D intensity, the promotion effect of dialect diversity on employment is relatively weak. The profound significance lies in the fact that the level of productive labor in enterprises serves as the core channel for the diverse employment effects of dialects.

Compared to enterprise capital factors, labor factors have a greater ability to ensure the positive impact of dialect diversity. Therefore, while empirically, enterprises with higher capital ratios have stronger production scale expansion effects, their indirect effect on employment is significantly lower than the direct promotional impact of labor factors themselves. However, compared to R&D and innovation factors, enterprise productive factors can ensure stronger dialect diversity employment effects. This indicates that the impact of dialect diversity on employment is significantly higher in the enterprise production sector than in the innovation sector. This could be attributed to the fact that personnel in the R&D and innovation departments have a high technical threshold, resulting in a relatively low positive impact of technological diversity formed by dialect diversity on innovation. In contrast, the labor force enhancement effect of dialect diversity is more direct, with greater room for improvement and better results. In summary, the intensity of productive labor factors in enterprises is critical in determining the effect of dialect diversity on employment enhancement.

4.3.2. Type of ownership

State-owned enterprises and collective enterprises account for a considerable proportion of Chinese listed companies. Due to differences in recruitment requirements, work intensity, and work environment between the public and non-public sectors, ownership categories have become an important factor in the employment effect of dialect diversity for enterprises. Therefore, this paper conducts a classification test based on the type of enterprise ownership. As shown in Table 6, regression coefficients of dialect diversity variables are not significant in state-owned and collective enterprise samples. For other types of enterprises, such as private enterprises and

Table 4
Mechanism test of innovation expansion.

	(1)	(2)	(3)	(4)	(5)	(6)
	<i>LnR&D</i>				<i>LnEmploy</i>	
<i>Dialectdiversity1</i>	0.092* (0.049)	0.095* (0.053)				
<i>Dialectdiversity2</i>			0.049*** (0.015)	0.041** (0.016)		
<i>LnR&D</i>					0.545*** (0.003)	0.158*** (0.004)
Control Variables	No	Yes	No	Yes	No	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes
Province	Yes	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes	Yes
R ²	0.21	0.32	0.21	0.32	0.52	0.75
n	33,809	26,612	33,809	26,612	33,809	26,612

Note: *** denotes $p < 0.01$, ** denotes $p < 0.05$, and * denotes $p < 0.1$. Figures in parentheses are standard errors.

Table 5

Regression results of element intensity.

	(1)	(2)	(3)	(4)
	<i>LnEmploy</i>			
<i>Dialectdiversity1</i>	0.154*** (0.026)	0.116*** (0.027)		
<i>Dialectdiversity1</i> × <i>K_intensity</i>	−0.004*** (0.0004)			
<i>Dialectdiversity1</i> × <i>R&D_intensity</i>		−0.008*** (0.002)		
<i>Dialectdiversity2</i>			0.023*** (0.008)	0.011*** (0.001)
<i>Dialectdiversity2</i> × <i>K_intensity</i>			−0.0002*** (0.00006)	
<i>Dialectdiversity2</i> × <i>R&D_intensity</i>				−0.001** (0.0004)
Control Variables	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes
Province	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes
R ²	0.72	0.74	0.72	0.74
n	32,307	25,790	32,307	25,790

Note: *** denotes $p < 0.01$, ** denotes $p < 0.05$, and *p denotes < 0.1 . Figures in parentheses are standard errors.**Table 6**

Regression results of ownership.

	(1)	(2)	(3)	(4)
	<i>LnEmploy</i>			
<i>Dialectdiversity1</i>	State = 0 0.179*** (0.030)		State = 1 0.072 (0.049)	
<i>Dialectdiversity2</i>		0.027*** (0.010)		0.015 (0.015)
Control Variables	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes
Province	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes
R ²	0.67	0.67	0.76	0.76
n	20,750	20,750	11,226	11,226

Note: *** denotes $p < 0.01$, ** denotes $p < 0.05$, and * denotes $p < 0.1$. Figures in parentheses are standard errors.

foreign-funded enterprises, the regression coefficients of dialect diversity variables are significantly positive at the 1% statistical level. This indicates that in terms of recruitment requirements, private and foreign-funded enterprises generally have more flexible employee recruitment plans, while state-owned enterprises may have to comply with strict and clear recruitment regulations; therefore, the employment enhancement effect is more pronounced for private and foreign-funded enterprises than state-owned enterprises. In terms of work intensity, private and foreign-funded enterprises, due to their greater emphasis on costs and benefits, generally have higher

Table 7

Regression results of region.

	(1)	(2)	(3)	(4)
	<i>LnEmploy</i>			
<i>Dialectdiversity1</i>	East = 1 0.265*** (0.032)		East = 0 −0.125*** (0.044)	
<i>Dialectdiversity2</i>		0.063*** (0.011)		−0.026** (0.012)
Control Variables	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes
Province	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes
R ²	0.72	0.72	0.73	0.73
n	22,733	22,733	9581	9581

Note: *** denotes $p < 0.01$, ** denotes $p < 0.05$, and * denotes $p < 0.1$. Figures in parentheses are standard errors.

work intensity and working hours than state-owned enterprises. As a result, the production expansion effect of dialect diversity tends to be greater for these enterprises, while the expansion effect for state-owned enterprises is relatively less significant. In terms of work environment, state-owned enterprises typically maintain relatively stable work systems, while private and foreign-funded enterprises often exhibit greater creativity and work flexibility. This dynamic makes dialect diversity more effective in private and foreign-funded enterprises.

4.3.3. Type of region

The regional characteristics of China are a key factor affecting enterprise operations and labor flow, and play an important role in the employment effect of dialect diversity. In this regard, the sample of enterprises is divided into two categories: the eastern region (East = 1) and other regions, including the central, western, and northeastern regions (East = 0), with empirical tests carried out for each designated region. As shown in Table 7, dialect diversity significantly improved the employment of enterprises in the eastern region, but suppressed the employment of enterprises in other regions. The results show that the eastern region of China has a higher level of economic development and has obvious advantages in innovation, education, transportation, infrastructure, and urbanization development. This creates conditions for the influx and agglomeration of the labor force, thereby facilitating the employment promotion effect of dialect diversity.

4.4. Robustness testing

4.4.1. Instrumental variable test

In this study, dialect diversity is based on regional-level data while enterprise employment level is based on micro-level data, which helps avoid endogeneity problems caused by reverse causality to a certain extent. However, there is still a possibility of general endogeneity caused by model setting and omitted variables. Therefore, this paper employs the instrumental variable method to control for possible endogeneity in the model. This paper refers to the approach of Pan et al. (2017) and uses the regional average terrain slope as the instrumental variable for dialects. Terrain slope is a naturally formed exogenous variable that satisfies the principle of selecting exogenous variables not related to the dependent variable and residual term. In general, the larger the terrain slope, the higher the degree of regional segmentation, and the easier it is to form diverse language customs. Therefore, the exogenous variable selection requirement of being closely related to explanatory variables is satisfied. This paper uses the urban average terrain slope for instrumental variable testing. The results displayed in Table 8 demonstrate that the regression coefficients of the core explanatory variables *Dialectivity1* and *Dialectivity2* remain significantly positive at the 1% level. This indicates that after addressing endogeneity issues, dialect diversification still has a significant promoting effect on the employment level of enterprises. Furthermore, the coefficients of urban average terrain slope in the first stage of regression are significantly positive, fully verifying the effectiveness of the instrumental variable. These tests effectively prove the robustness of the baseline results in this paper.

4.4.2. Alternative regression method

In addition to endogeneity, the empirical method is another important factor that affects the robustness of empirical results. Therefore, this paper further tests the robustness of the results using panel regression based on the ordinary least squares regression results as an important supplement and control to the baseline regression results. As shown in Table 9, the regression coefficients of the core independent variables *Dialectivity1* and *Dialectivity2* remain significantly positive at the 1% level, further confirming the promotion effect of dialect diversity on the employment level of enterprises. The results of this test further verify the robustness of the baseline regression results in this paper.

5. Conclusions and policy remarks

Under the policy goals of perpetuating and protecting Chinese dialects and stabilizing employment, exploring the employment effects of dialect diversity is of great practical importance in enabling China to fully leverage its diversity-related cultural advantages, enhance regional employment capacity, and improve people's livelihoods. In both enterprise production and innovation, the impact of dialect diversity on enterprise employment has consistently been a central concern requiring thorough testing and in-depth exploration. Therefore, this paper uses regional dialect data and listed company data from 2011 to 2021 to thoroughly examine the influence of regional dialect diversity on enterprise employment and finds that there is a significant positive correlation between them.

Building upon existing research, this paper examines and identifies two mechanisms of production and innovation scale expansion effects. This proves that greater dialect diversity can enhance productivity and innovation, improve the total output value of enterprise products and technology, and thereby create higher employment demand and improve employment levels. In addition, this paper further examines the impact of factor intensity and ownership types and finds that compared to capital and R&D innovation factors, labor and productive factors can ensure stronger dialect diversity employment effects in enterprises. Therefore, in enterprises with higher factor intensity and R&D strength, the promotion effect of dialect diversity on employment is relatively weak. This study also finds that there are significant differences between public and non-public sectors in terms of recruitment requirements, work intensity, and work environment. This results in a significant employment effect of dialect diversity in private and foreign-funded enterprises, whereas the effect is non-significant in state-owned and collective enterprises.

Based on its findings, this paper proposes several relevant policy recommendations. First, according to the needs for employment improvement and dialect protection in China, the employment promotion effect of regional dialect diversity should be effectively leveraged. The government should explore the synergy and linkage effects between dialect protection policies and regional

Table 8

Regression results of instrumental variable.

	(1)	(2)	(3)	(4)
	<i>LnEmploy</i>			
First stage				
Slope	0.132*** (0.004)	0.120*** (0.004)	0.446*** (0.013)	0.417*** (0.014)
F	1102.37	741.88	1230.96	880.24
Second stage				
<i>Dialectdiversity1</i>	0.947*** (0.244)	0.713*** (0.172)		
<i>Dialectdiversity2</i>			0.280*** (0.072)	0.205*** (0.050)
Control Variables	No	Yes	No	Yes
Year	Yes	Yes	Yes	Yes
Province	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes
R ²	0.17	0.71	0.17	0.71
n	40,947	32,314	40,947	32,314

Note: *** denotes $p < 0.01$, ** denotes $p < 0.05$, and * denotes $p < 0.1$. Figures in parentheses are standard errors.**Table 9**

Results of the alternative regression method.

	(1)	(2)	(3)	(4)
	<i>LnEmploy</i>			
<i>Dialectdiversity1</i>	0.306*** (0.067)	0.172*** (0.047)		
<i>Dialectdiversity2</i>			0.096*** (0.017)	0.089*** (0.016)
Control Variables	No	Yes	No	Yes
Year	Yes	Yes	Yes	Yes
Province	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes
R ²	0.14	0.51	0.14	0.18
n	40,947	32,314	40,947	32,314

Note: *** denotes $p < 0.01$, ** denotes $p < 0.05$, and * denotes $p < 0.1$. Figures in parentheses are standard errors.

employment capacity enhancement policies. While steadfastly promoting and popularizing the national common language and writing system, the government should also aim to improve communication, inclusiveness, and recognition levels in regions with diverse dialects. To strengthen the integration of knowledge, culture, and creativity, the protection, development, and utilization of language resources should be promoted. A language environment and cultural atmosphere that is inclusive internally and open to the outside world, and that creates ongoing labor demand and continuously attracts labor inflows should be developed. The continuous exploration and improvement of policy paths for dialect diversity will result in improvement in key areas, such as urban inclusivity, attractiveness, innovation, and entrepreneurship culture. This will lead to an increase in the employment capacity of cities.

Second, in combination with the internal mechanism, the government should effectively harness the diversity of dialects to drive regional production and innovation, thereby expanding the space for labor and human capital aggregation. By prioritizing employment in macroeconomic regulation policies and integrating the effects of regional culture and team productivity improvement with industrial policies, the production capacity of various industries and market entities can be augmented through reduced costs and increased efficiency. Ensure the market- and policy-oriented supply–demand balance of investment, finance, and labor markets and enhance employment absorption capacity. Enterprises should strive to continually strengthen the integration and interplay between culture and innovation. They should seize important opportunities like digital transformation; enhance the role of cultural diversity in R&D, innovation accumulation, and new technology creation; actively pursue high-quality talent with scientific and technological innovation backgrounds; and drive new employment dynamics in novel business scenarios.

Third, the employment effect of dialect diversity should be continuously optimized at the enterprise level. This can be accomplished by strengthening the management of production and innovation factors, including the labor force of enterprises; optimizing the allocation of R&D, capital, and labor; tracking, organizing, and managing employee work performance, development and training; and researching the behavioral intentions of labor. To fully leverage the positive impact of cultural diversity on production and R&D, enterprises could explore enhancements in labor and human capital management systems. This includes creating conditions that facilitate communication and cooperation between labor and R&D teams. Enterprises should also aim to maximize the efficiency of utilizing cultural diversity, enhancing the positive externalities of creative accumulation while reducing the negative externalities caused by barriers such as trust and communication. Finally, enterprises should create a human resource management system based on

a modern corporate governance framework, aligning with the objectives of the new round of state-owned enterprise reform and the strategic performance goals of enterprises. This will enable enterprises to continuously optimize talent selection, evaluation, distribution, and constraint mechanisms through market-oriented approaches, thereby overcoming any productivity and innovation limitations posed by cultural diversity.

Credit author statement

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References

- Alesina, A., & Ferrara, E. L. (2002). Who trusts others? *Journal of Public Economics*, 85(2), 207–234.
- Alesina, A., & Ferrara, E. L. (2005). Ethnic diversity and economic performance. *Journal of Economic Literature*, 43(3), 762–800.
- Alesina, A., Michalopoulos, S., & Papaioannou, E. (2012). *Ethnic inequality*. NBER working papers No. 18512.
- Bleakley, H., & Chin, A. (2004). Language skills and earnings: Evidence from childhood immigrants. *The Review of Economics and Statistics*, 86(2), 481–496.
- Carlson, H. K., & Mchenry, M. A. (2006). Effect of accent and dialect on employability. *Journal of Employment Counseling*, 43(2), 70–83.
- Chen, Z., Lu, M., & Xu, L. (2014). Returns to dialect: Identity exposure through language in the Chinese labor market. *China Economic Review*, 30, 27–43.
- Falck, O., Heblich, S., Lameli, A., & Südekum, J. (2012). Dialects, cultural identity, and economic exchange. *Journal of Urban Economics*, 72(2–3), 225–239.
- Florida, R. (2002). *The rise of the creative class*. New York: Basic Books.
- Glaeser, E. L., Kallal, H. D., Scheinkman, J. A., & Shleifer, A. (1992). Growth in cities. *Journal of Political Economy*, 100(6), 1126–1152.
- Gong, Y., Chow, I. H., & Ahlstrom, D. (2011). Cultural diversity in China: Dialect, job embeddedness, and turnover. *Asia Pacific Journal of Management*, 28, 221–238.
- Hambrick, D. C., Cho, T. S., & Chen, M. J. (1996). The influence of top management team heterogeneity on firms' competitive moves. *Administrative Science Quarterly*, 41(4), 659–684.
- Hong, L., & Page, S. E. (2001). Problem solving by heterogeneous agents. *Journal of Economic Theory*, 97(1), 123–163.
- Jacobs, J. (1961). *The death and life of great American cities*. New York: Random House.
- Lazear, E. P. (1999). Globalisation and the market for team-mates. *The Economic Journal*, 109(454), 15–40.
- Lee, N. (2011). Ethnic diversity and employment growth in English cities. *Urban Studies*, 48, 407–425.
- Lee, S. Y., Florida, R., & Gates, G. (2010). Innovation, human capital, and creativity. *International Review of Psycho-Analysis*, 14(3), 13–24.
- Liu, Y., Jiao, Y., & Xu, X. (2020). Promoting or preventing labor migration? Revisiting the role of language. *China Economic Review*, 60, Article 101407.
- Liu, Y., Xu, X., & Xiao, Z. (2015). The pattern of labor cross-dialects migration. *Economic Research Journal*, 50(162), 134–146.
- Mao, Q., & Wang, Y. (2023). Employment effects of ESG: Evidence from Chinese listed companies. *Economic Research Journal*, 58(7), 86–103.
- Milliken, F. J., & Martins, L. L. (1996). Searching for common threads: Understanding the multiple effects of diversity in organizational groups. *Academy of Management Review*, 21(2), 402–433.
- Ottaviano, G. I. P., & Peri, G. (2005). Cities and culture. *Journal of Urban Economics*, 58(2), 304–337.
- Pan, Y., Xiao, J., & Dai, Y. (2017). Cultural diversity and enterprises' innovation: A study based on the perspective of dialects. *Journal of Financial Research*, 10, 146–161.
- Qian, H. (2013). Diversity versus tolerance: The social drivers of innovation and entrepreneurship in US cities. *Urban Studies*, 50(13), 2718–2735.
- Ratna, N. N., Grafton, R. Q., & Kompas, T. (2009). Is diversity bad for economic growth? Evidence from state-level data in the US. *The Journal of Socio-Economics*, 38(6), 859–870.
- Si, X., Liu, Y., & Wang, J. (2023). Dialect diversity and labor income share in China. *Economic Systems*, 47(4), Article 101145.
- Sjaastad, L. A. (1962). The costs and returns of human migration. *Journal of Political Economy*, 70(5), 80–93. Part 2.
- Sparber, C. (2009). Racial diversity and aggregate productivity in U.S. Industries: 1980–2000. *Southern Economic Journal*, 75(3), 829–856.
- Trax, M., Brunow, S., & Südekum, J. (2015). Cultural diversity and plant-level productivity. *Regional Science and Urban Economics*, 53, 85–96.
- Xiong, J. C., Yang, Z. L., Wang, X., & Chan, K. C. (2023). Does dialect diversity affect entrepreneurial activities? Evidence from China. *Economic Modelling*, 128, Article 106525.
- Xu, X., Liu, Y., & Xiao, Z. (2015). Dialect and economic growth. *China Journal of Economics*, 2(2), 1–32.