



Jin Zhu Zhe Chi? Geographical Peer Effect and CSR: Evidence Based on Postal Code

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Abstract. China, with its vast territory and unbalanced regional development, presents a compelling case for studying whether geographical location influences CSR fulfillment and its potential to enhance corporate value. This study uses A-share listed companies from 2010-2020 and employs ordinary least squares (OLS) and instrumental variables (IV) methods. Results show a geographical peer effect, where regions with higher CSR tend to have higher corporate values. It also finds that regional economic conditions, education, and innovation levels impact the CSR peer effect. CSR levels generally converge towards a higher common standard, with central and western regions typically below average. A boundary effect is observed in CSR's impact on corporate value, while CSR generally boosts value, the relationship is nonlinear, and beyond a certain threshold, excessive CSR can marginally decrease firm value.

Keywords: Geographic Location, Postal Code, Corporate Social Responsibility, Firm Value, Instrumental Variable.

1 INTRODUCTION

At 2020, Chinese President Xi Jinping emphasized the importance of corporate social responsibility (CSR), urging companies to adhere to their economic, legal, social, and moral obligations. Originating from Oliver Sheldon's 1924 concept and incorporated into China's Company Law in 2006, CSR has seen varied uptake among China's top 300 companies by 2022, with an average CSR Development Index of 36.4 and over 45% rated three-star or higher, yet many still remain "on the sidelines". Regional disparities highlight the necessity to investigate the geographical impact of CSR and its relationship with corporate value^[1-3]. Scholars analyze CSR's proximity effect from four perspectives: using Haversine's formula to measure distances between companies and central cities^[4], examining peer effects within geographic and industrial realms focusing on stakeholder pressures^[5] and poverty alleviation^[6], and exploring the tie between CSR and corporate capital structure through spatial measurement^[7]. Opinions on CSR's impact on corporate value differ; some suggest it enhances value by improving reputation and reducing costs^[1], others argue it depletes resources and reduces value^[2], while some see no correlation^[3]. This study employs postal codes and the instrumental variable method to provide empirical evidence of

CSR's regional peer impact and influencing factors, and its non-linear relationship between CSR and corporate value, advocating for strategic CSR management to optimize long-term corporate value.

2 THEORETICAL ANALYSIS AND RESEARCH HYPOTHESIS

Geographical location impacts company factors like financing and transaction costs^[4], reducing information asymmetry and enhancing communication, which lowers costs^[8]. Proximity facilitates the acquisition of "soft information" and strengthens social networks, helping firms reduce uncertainty and stay competitive^[9]. Accordingly, Hypothesis 1 is proposed: Geographical location influences CSR, indicating a regional peer effect.

Regarding the influencing factors of the peer effect, Li^[10] found that the degree of effective information transmission and the level of corporate governance would promote the corporate ESG peer effect, Chen^[11] found that both the intensity of governmental regulation and media attention would diminish the regional peer effect of corporate bleaching green behaviors, and the CSR peer effect might be affected by the level of regional economic development, education, and innovation^[12-14]. Therefore, hypothesis 2 was proposed: regional economic development, education and innovation level will affect CSR regional peer effect.

Engaging in CSR not only garners financial support and enhances stakeholder relationships but also boosts corporate value by aligning stakeholder interests and reducing information asymmetries^[15]. Additionally, effective CSR strategies can improve resource utilization and corporate reputation, subsequently increasing corporate value. Thus, hypothesis 3 is proposed: CSR enhances corporate value.

3 RESEARCH DESIGN

3.1 Sample Selection and Data

This study selects companies from 2010 to 2020, using zip codes to measure geographical location. This differs from studies that categorize by provinces, enhancing objectivity. Excluding financial, insurance, and unstable companies, and those with missing data, the study compiled an unbalanced panel of 5,651 companies and 21,139 observations. Data was sourced from Hexun.com and CSMAR, and analysis was performed using Excel and Stata.16. And the details of the relevant variables in this paper are shown in Table 1.

Table 1. Variable definition

Type	Name	Definition
Explained variable	Corporate social responsibility(CSR)	Corporate social responsibility score from Hexun.com
	Corporate value(Tobin's q)	Market value/total assets

Explanatory variables	Average corporate social responsibility (MCSR)	Calculate the average CSR of proximity companies based on the first three zip codes and including more than 10 sample companies.
Moderator variables	Economic development level (PGDP)	PGDP by province
	Educational level (Edu)	Percentage of people in higher education by province
	Innovation level (Patent)	Number of patent applications by province
	Return on assets (ROA)	Net profit/total assets
	Firm size (SIZE)	Logarithmic total assets of the company
Control variables	Leverage ratio (LEV)	Total liabilities/total assets
	Capital expenditure rate (Capexrate)	Capital expenditure/total assets
	Equity balance (Dual)	When the chairman and general manager are one, take 1, otherwise, take 0.
	The nature of property rights (SOE)	State-owned enterprises take 1, otherwise take 0.
	The company's age (List)	Firm's establishment period
	Industry and Year	Industry and Year as dummy variable

3.2 Model Setting

The study explores the effect of geographical location on CSR using OLS regression. The regression model (1) is structured as follows:

$$CSR_{i,t} = \alpha_0 + \alpha_1 MCSR_{i,t} + \alpha_2 Controls_{i,t} + \sum \alpha_i Year_i + \sum \alpha_j Industry_j + \varepsilon_{i,t} \quad (1)$$

To further test the influencing factors of CSR peer effect, model (2) is constructed:

$$CSR_{i,t} = \gamma_0 + \gamma_1 MCSR_{i,t} + \gamma_2 MCSR * PGDP/Edu/Patent_{i,t} + \gamma_3 Controls_{i,t} + \sum \gamma_i Year_i + \sum \gamma_j Industry_j + \varepsilon_{i,t} \quad (2)$$

Additionally, the study explores CSR's impact on firm value using 2SLS regression to handle endogeneity. The study constructs regression model (3):

$$Tobin' q_{i,t} = \beta_0 + \beta_1 CSR_{i,t} + \beta_2 Controls_{i,t} + \sum \beta_i Year_i + \sum \beta_j Industry_j + \varepsilon_{i,t} \quad (3)$$

4 EMPIRICAL RESULTS

4.1 Descriptive Statistic

Table 2 presents the descriptive statistics. The CSR shows a mean of 24.45 and a wide range from -18.45 to 90.01, indicating significant variability in CSR performance among companies. The MCSR of proximate firms also varies widely, from 11.34 to 63.22, suggesting regional CSR disparities. Tobin's q ranges from 0.674 to 76.82 with a mean of 2.076, reflecting diverse market valuations. Other control variables also show significant variation, affecting listed companies' values.

Table 2. Descriptive statistics

Variable	Obs.	Mean	Median	Std. Dev.	Min	Max
CSR	21,139	24.45	22.56	14.96	-18.45	90.01
MCSR	21,139	28.06	28.18	6.01	11.34	63.22
Tobin's q	21,139	2.076	1.611	1.996	0.674	76.82
ROA	21,139	4.835	4.419	16.40	-156.1	2 079
SIZE	21,139	22.14	21.95	1.35	16.52	28.64
LEV	21,139	40.80	45.39	43.35	-167.4	861.2
Capexrate	21,139	4.952	3.522	4.881	0	64.19
Dual	21,139	0.322	0	0.467	0	1
SOE	21,139	0.352	0	0.478	0	1
List	21,139	15.36	13	7.826	2	32

4.2 Geographical Location and Corporate Social Responsibility

The Impact of Geographical Location Based on Dummy Variables. This paper creates a location dummy variable based on the first three same zip codes for joint significance testing. The objective is to assess the joint significance of this dummy variable. The results show a joint F-statistic of 8.92 for the location dummy, decisively rejecting the null hypothesis and confirming its significance, indicating a substantial impact of geographical location on regional CSR. Altering the zip code granularity or company count within zip codes consistently yields F-statistics above 0, indicating the significant influence of geographical location on CSR.

The CSR Geographical Peer Effect. The article applies Bouwman's methodology^[16] to explore the peer effect on CSR, focusing on the top three ZIP codes each with at least 10 companies. It measures the independent variable as the MCSR score within these ZIP codes. Regression analysis in Table3 shows a significant positive correlation at the 1% level, all models exclude the firm's CSR from the calculation. Further analysis with industry MCSR as a control reveals significant positive industry peer effect, indicating that these are as impactful as regional peer effect. The study enhances the robustness of its findings by requiring at least 20 firms, confirming a significant positive correlation between MCSR and CSR in subsequent models, even when controlling for industry effects.

Table 3. Geographical location and CSR and Influencing factors of CSR geographic peer effect

Variable	(1)At least 10 firms	(2)At least 10 firms	(3)At least 20 firms	(4)At least 20 firms	(5)economic development level	(5) education level	(6)innovation level
MCSR	0.470*** (20.04)	0.469*** (20.19)	0.501*** (18.10)	0.496*** (18.14)	0.474*** (18.95)	0.473*** (19.45)	0.410*** (14.17)
Industry MCSR		0.702*** (23.73)		0.662*** (23.68)			
MCSR*PGDP					0.000** (2.27)		
MCSR*edu						0.582*** (4.26)	

MCSR*patent							-0.000*** (-3.53)
Constant	-61.232*** (-30.22)	-73.808*** (-40.53)	-61.473*** (-28.17)	-70.247*** (-37.47)	-61.160*** (-30.02)	-61.215*** (-29.95)	-59.783*** (-28.90)
Industry	YES	NO	YES	NO	YES	YES	YES
Controls/Year	YES	YES	YES	YES	YES	YES	YES
Observations	21,139	21,139	16,758	16,758	21,139	21,139	21,139
R-squared	0.247	0.255	0.338	0.345	0.247	0.248	0.248

Influencing Factors of CSR Geographical Peer Effect. In order to explore the influencing factors of geographic peer effect, the economic development level, education level and innovation level of different provinces are considered so as to further explore the relationship between geographic location and CSR. The results are shown in Table 3 model (4)(5)(6), where the level of economic development and the level of education promote the CSR geographic peer effect, and the level of innovation attenuates the CSR geographic peer effect.

4.3 Research on Convergence of CSR Based on Geographical Location

Convergence studies in this paper, following Ding et al.^[17], assess CSR trends across different regions using β -convergence. Results in Table 4, using OLS and fixed effect models, show significant negative correlations at the 1% level, indicating CSR is overall converging, with regions narrowing the CSR gap and moving towards their respective targets. Fig.1 divides the MCSR into high and low groups, with 11,182 data for high group and 9,957 for low, reflecting a trend towards greater corporate social commitment. However, disparities persist, particularly in central and western regions, suggesting these areas need more focus on CSR.

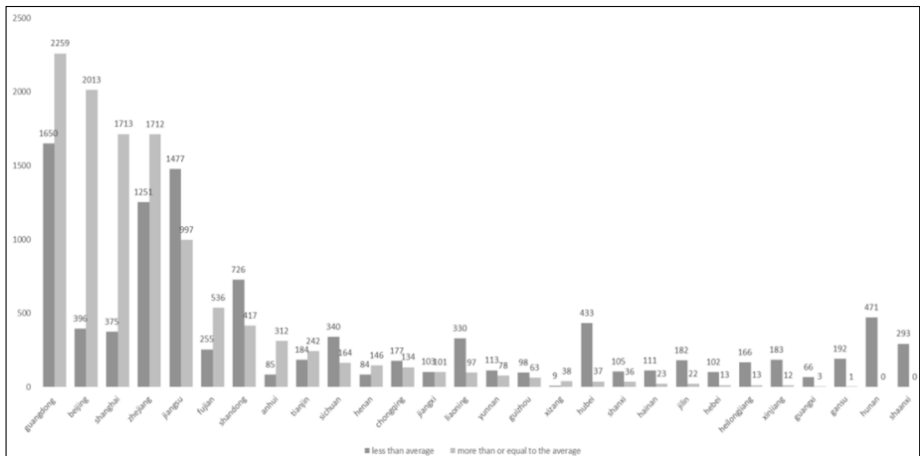


Fig. 1. Social responsibility of provincial subgroups

Table 4. β -Convergence test

Variable	OLS model		Fixed effects model	
	Absolute β convergence	Conditional β convergence	Absolute β convergence	Conditional β convergence
CSR(i-1)	-0.414*** (-68.73)	-0.510*** (-84.90)	-0.381*** (-64.89)	-0.524*** (-89.20)
MCSR after excluding firm i		0.193*** (6.73)		0.516*** (34.09)
Controls		YES		YES
Constant	11.470*** (7.98)	-23.104*** (-10.31)	8.652*** (49.12)	-33.711*** (-21.06)
Observations	16,728	16,728	16,728	16,728
Zip code/Industry/Year	YES	YES		

4.4 Corporate Social Responsibility and Corporate Value

This study investigates the relationship between CSR and firm value, exploring the causal direction which remains uncertain due to potential reciprocal effects. The current study employs IV approach, utilizing geographical variables based on zip code to mitigate endogeneity issues, as inspired by Chintrakarn^[18]. The MCSR of proximate firms serves as the IV. Results from the two-stage least squares analysis in Table 5 show that in model (1), the adjusted CSR scores positively correlate with Tobin’s q, significantly at the 1% level, suggesting that higher CSR is associated with higher firm value. To mitigate potential extremes in the mean, the median replaces the MCSR, and the outcomes of (2) are significantly positive at the 1% level, substantiating hypothesis 2 of the article.

Table 5. Relationship between CSR and corporate value

Variable	(1)Full-sample	(2)Full-sample	(3)Low CSR	(4)High CSR	(5)Higher CSR	(6)The highest CSR
CSR	0.020*** (0.007)	0.018*** (0.006)	0.046*** (0.018)	-0.001 (0.006)	0.143 (0.418)	-0.029*** (0.009)
Constant	14.218*** (0.433)	14.110*** (0.409)	18.652*** (1.065)	10.638*** (0.435)	15.513 (17.507)	11.179*** (0.760)
Controls/Industry/Year	YES	YES	YES	YES	YES	YES
Observations	21,139	21,139	9,957	11,182	6,948	4,234
R-squared	0.180	0.182	0.147	0.206		0.151

To validate the relationship between CSR and corporate value, CSR is categorized into low and high groups based on average values. Using 2SLS regression, Table5’s model (3) shows a significant positive correlation between CSR scores and Tobin’s q for the low CSR group at the 1% level. Conversely, the high CSR group shows a weakly negative correlation in model (4), suggesting that while CSR typically enhances firm value, this effect diminishes or reverses at higher levels. Further splitting the high CSR group into higher and the highest CSR reveals varying impacts, a weak positive correlation for higher CSR and a significant negative correlation for the high-

est CSR in models (5) and (6). This indicates a non-linear relationship where CSR benefits firm value up to a point, after which it can become detrimental.

4.5 Robustness Checks

Changing the sample measure. To confirm the robustness of previous results, proximity is tested using the first four zip codes, each with at least 10 sample firms. Each model excludes the CSR score of the firm *i*. Results in Table 6 show, models (1) and (2) show a significant positive correlation with CSR score of firm *i* at the 1% significance level. The study increased the minimum number of firms from 10 to 20, based on the first four zip codes, models (3) and (4) correlate positively with the CSR scores of firm *i* at a 1% significance level. These show that our results are robust.

Table 6. The MCSR, median CSR and the CSR of specific company

Variable	(1)4-digit At least 10	(2)4-digit At least 10	(3)4-digit At least 20	(4)4-digit At least 20	(5)3-digit At least 10	(6)4-digit At least 10	(7)3-digit At least 20	(8)4-digit At least 20
MCSR	0.422*** (16.49)	0.410*** (16.20)	0.548*** (15.23)	0.534*** (15.06)				
Median CSR					0.512*** (22.05)	0.394*** (16.06)	0.574*** (20.99)	0.545*** (16.61)
Industry MCSR		0.737*** (23.07)		0.717*** (20.92)				
Constant	-57.371*** (-23.81)	-66.814*** (-32.37)	-63.115*** (-20.36)	-69.411*** (-27.93)	-59.623*** (-30.00)	-55.167*** (-23.17)	-60.373*** (-28.40)	-60.109*** (-19.94)
Industry	YES	No	YES	No	YES	YES	YES	YES
Controls/Year	YES	YES	YES	YES	YES	YES	YES	YES
Observations	14,340	14,340	8,627	8,627	21,139	14,340	16,758	8,627
R-squared	0.251	0.259	0.351	0.357	0.250	0.251	0.342	0.354

Replacing the Average with the Median. To address potential distortions from extreme CSR values, this study uses the median CSR of firms in close geographical proximity. Table 6 outlines the determination of median CSR in four models, model (5) and (6) cover the top three and four zip codes respectively with at least 10 firms each, while model (7) and (8) increase this minimum to 20 firms for the same zip codes. Each model excludes the CSR score of the firm *i*. Results show a significant positive correlation at the 1% level between the median CSR and the CSR of firm *i*.

Reverse Causality. The research uses the earliest year’s CSR scores as IV, asserting these could not have been influenced by later scores. Regression analyses of these baseline scores against the CSR of firm *i*, presented in Table 7, show significant positive relationships in models (1) and (2) at the 1% level. Further analyses with increased company minimums in models (3) and (4) suggest a reduced potential for reverse causality, indicating minimal endogenous bias.

Table 7. Results of the test for reverse causality、 CSR and corporate value

Variable	(1)3-digit At least 10	(2)3-digit At least 10	(3)4-digit At least 20	(4)4-digit At least 20	(5)Tobin's q	(6)Tobin's q	(7)Large enterprises	(8)Small enterprises
Earliest average	0.105*** (6.80)		0.067*** (3.01)					
Earliest median		0.234*** (13.44)		0.179*** (7.66)				
CSR					0.109*** (0.025)	0.022** (0.010)		
MCSR							0.473*** (0.044)	0.409*** (0.040)
Constant	-	-	-	-51.260*** (-17.11)	18.558*** (1.273)	14.340*** (0.572)	-69.048*** (3.923)	-38.154*** (4.296)
Controls/Industry/Year	YES	YES	YES	YES	YES	YES	YES	YES
Observations	21,139	21,139	8,627	8,627	21,139	21,139	10,570	10,569
R-squared	0.235	0.239	0.334	0.338	0.172	0.177	0.376	0.144

Instrumental Variables Change Measurement Methods. The study uses the MCSRscore of proximity firms in the earliest year of the sample (excluding the CSR of firm i) serves as an IV to confirm CSR’s impact on firm value, yielding significant results in table7 model (5).To address potential outliers in the average, the MCSR was substituted with the median. This adjustment yielded significantly positive results at the 5% level in model (6), thereby affirming the robustness of the preceding findings.

Heterogeneity Analysis. Using Chen’s methodology^[11], enterprises are categorized into large and small based on median size. Results in Table 7 models (7)(8) show a significantly positive CSR geographic peer effect at the 1% level, with a larger coefficient for large enterprises. This suggests that the CSR geographic peer effect is more pronounced in larger enterprises, likely due to their focus on maintaining a strong reputation and competitive position.

5 CONCLUSIONS

This study, analyzing A-share listed companies from 2010 to 2020 using OLS and 2SLS methods, found: (1) CSR demonstrates a geographical peer effect based on zip codes, correlating positively with corporate value and influenced by regional economic conditions, education, and innovation. (2) CSR levels tend to align towards a higher standard, particularly in central and western areas, but (3) excessively high CSR can diminish value.

The policy recommendations are: (1) Enhance regional CSR by supporting leading firms and promoting proactive disclosure to influence peers and attract investors. (2) Regional differences such as economic, education and innovation levels influence the

peer effect of CSR, focus should be placed on the impact of the above factors on CSR and CSR in the central and western regions to raise it to a higher common level. (3) Address the boundary effect in CSR by encouraging lower-performing enterprises to enhance their CSR efforts for reputational and value benefits, while advising higher-performing firms to balance the costs and benefits of further CSR investments to maximize corporate value.

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