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Historic preservation and firms' green innovation: evidence from China

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ABSTRACT

Historic preservation policies have gained increasing attention for their role in shaping urban development, yet their broader impacts remain understudied. Using China's Historic City designation policy as a quasi-natural experiment, we employ a difference-in-differences approach to examine the causal relationship between historic preservation and firms' green innovation. We find that the Historic City title promotes firms' green innovation, with the impact being especially strong in cities with rich historic preservation sites. This effect acts by enhancing firms' nationalism and strengthening environmental regulations. Our findings provide valuable policy implications, suggesting that historic preservation policies can be an effective tool for fostering sustainable urban development.

KEYWORDS

Green innovation; historic preservation; nationalism; porter hypothesis

JEL CLASSIFICATION

O31; Q01; Q58

I. Introduction

Historic preservation is increasingly prevalent in urban policies. However, a persistent debate exists between the goals of urban development and those of preservation policies (Avrami 2016). Previous studies have noted its negative impacts on urban development, such as reduced housing productivity (Waights 2019) and lower industrial output (Liu, Yan, and Zhang 2024), with a limited focus on its positive impacts. This imbalanced focus may lead to an incomplete understanding of the value of historic sites, potentially reducing governments' efforts towards historic preservation.

Recently, green innovation has been strongly emphasized by governments worldwide. However, due to its externalities, firms often invest less than the socially optimal level (Karimi Takalo, Sayyadi Tooranloo, and Shahabaldini Parizi 2021). Historic preservation may address this challenge through two mechanisms. First, preservation of historic sites can strengthen national identity and heighten nationalism (Anderson 1991). This nationalism may prompt firms to prioritize national interests (Druckman 1994). For example, existing research indicates that nationalism can lead firms to emphasize national logic over market or corporate logics (Edman et al. 2024) and enhance their ESG performance (Xiao and Lin 2024). Similarly, nationalism may encourage firms to connect more closely with national needs and fulfil social responsibilities through increased investment in green innovation. Second, historic preservation often involves environmental protection. According to the Porter hypothesis, strict environmental regulations may also induce green innovation (Cohen and Tubb 2018). However, whether historic preservation effectively promotes firms' green innovation requires further empirical analysis.

As one of the world's oldest and most enduring civilizations, China possesses a rich historical and cultural heritage that continues to strengthen the national identity of the Chinese people. To further protect these historic sites and enhance national cohesion, China's central government has awarded the title of Historic City to cities with historically valuable sites and mandated that local governments implement historic preservation. According to the *Regulations on the Protection of Historic Cities, Towns, and Villages*, there are two core preservation approaches. First, cities awarded the title should undertake the documentation, restoration, and preservation of historic sites. These efforts enhance the visibility

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of these sites and thereby foster local nationalism. Second, these cities are required to implement strengthened environmental regulations, such as prohibiting disruptive activities in protected areas and requiring the preservation of surrounding natural landscapes and environments. These preservation approaches may have positive effects on firms' green innovation. As the designation of a historic city is a national-level decision that is uncertain and exogenous to local firms' decisions, this provides an opportunity to examine the impact of historic preservation on firms' green innovation, as well as to explore the mechanisms of nationalism and environmental regulation.

We use the awarding of the Historic City title in cities as a quasi-natural experiment. Employing a difference-in-differences (DID) approach with firm-level data from 2000–2022, we find that the title promotes firms' green innovation. Mechanism analysis reveals a significant increase in firms' nationalism, indicating that the title promotes green innovation by enhancing firms' nationalism, leading them to prioritize national interests. Additionally, environmental administrative penalties rise significantly, with the title effect being more pronounced in firms with higher pollutant emissions, suggesting that stricter environmental regulation also plays an important role.

We make two key contributions. First, our paper contributes to the literature by providing evidence on the positive effects of historic preservation policies. Previous studies predominantly argue that preservation policies may constraint urban development, with substantial empirical evidence revealing its negative effects(Liu, Yan, and Zhang 2024). Our work reveals an unexplored positive dimension by documenting how these policies stimulate local firms' green innovation.

Second, this paper contributes to the growing literature on urban green development. While existing research has examined various determinants of urban sustainability, including financial technology development (Gao, Tan, and Duan 2024), climate policy uncertainty (Gao, Zhou, and Liu 2024), and environmental information disclosure (Tan, Gao, and Liu 2024), little attention has been paid to the role of historic preservation policies. Our study fills this gap by incorporating historic preservation into the green innovation framework.

II. Empirical strategy

Data

We select China's A-share listed firms from 2000 to 2022 as the research sample. The time of each city being awarded the Historic City title is sourced from the official website of the Chinese government, while other data come from CSMAR and CNRDS databases. The sample selection process and the summary statistics for the main variables are detailed in Appendix I, Table SA1 and SA2.

Identification design

We examine the impact of Historic City title on firms' green innovation through a staggered DID approach. The basic model is given below:

$$GI_{it} = \alpha + \beta Historic_City_{ct} + \gamma Controls + \lambda_i + \mu_c + \theta_t + \varepsilon_{ict}$$

where GI_{it} represents the logarithm of green invention patent applications plus one independently filed by firm i in year t. $Historic_City_{ct}$ is a dummy variable that equals 1 if city c was awarded Historic City title in year t or thereafter and 0 otherwise. *Controls* is a set of control variables, with detailed information provided in Appendix I, Table SA2. λ_i, μ_c, and θ_t represent firm, city and year fixed effects, respectively. ε_{ict} is the random error term.

III. Empirical results

Baseline results

Table 1 presents the baseline results from Eq. (1). Column (1) reveals that the Historic City title increases firms' green innovation. Specifically, we divide the cities into two groups according to the mean number of historic preservation sites. Columns (2) and (3) show that the title's effect is stronger in cities with more preservation sites, with coefficients between groups significantly different at the 1% level, further supporting the positive effect of the title on green innovation. Figures

Table 1. Baseline results.

	Full sample	More preservation sites	Less preservation sites
	(1)	(2)	(3)
	GI	GI	GI
Historic_City	0.071*	0.082**	0.058
	(0.040)	(0.035)	(0.115)
Controls	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes
City FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Adj. R-squared	0.559	0.521	0.579
Observations	14,438	6,447	7,990
Group difference p-value		0.000***	

Cluster standard errors at the city level are in parentheses. *$p < 0.1$, **$p < 0.05$, ***$p < 0.01$. The Chow test is employed to examine the differences in coefficients between groups.

SA1, SA2, and Table SA3 in Appendix II present detailed parallel trend test, placebo test and additional robustness checks, all of which consistently support our baseline findings.

Mechanisms

First, we examine the nationalism mechanism. Cities awarded the Historic City title engage in preservation of historic sites, which enhances cultural heritage visibility and fosters local nationalism. This nationalistic sentiment promotes firms' responsibility to the nation, encouraging them to fulfil social obligations while pursuing economic interests (Druckman 1994). With China's advocacy for green development, such nationalism motivates firms' green innovation. For example, BYD's 2022 annual report states that 'the Group actively responds to China's carbon initiatives by ceasing fossil fuel vehicle production and focusing exclusively on new energy vehicle development... contributing to China's transformation into a global automotive power'.[1] This strategic transformation demonstrates how nationalistic sentiment drives concrete green innovation actions. Through this channel, local nationalism leads to increased firms' green innovation.

To test this mechanism, we replace the baseline model's dependent variable with firms' rhetorical nationalism. This index is measured by the weighted ratio of nationalism-related words in firms' annual reports through textual analysis (Yue, Zheng, and Mao 2024). The results in Table 2 show that the title significantly increases the overall nationalism index, with the strongest effect on nationalism related to national revival. This is because national revival is China's dominant agenda and is also the primary theme of firms' nationalism(Yue, Zheng, and Mao 2024).

Second, we investigate whether the Historic City title promotes firms' green innovation through stricter environmental regulations. To protect the

Table 2. Mechanism analysis of firms' nationalism.

	(1) Nationalism	(2) National revival	(3) National pride	(4) Corporate role	(5) Anti-foreign
Historic_City	0.083**	0.095**	0.059	0.008	−0.033
	(0.041)	(0.038)	(0.038)	(0.044)	(0.046)
Controls	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes
City FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Adj. R-squared	0.432	0.292	0.437	0.404	0.305
Observations	10,735	10,735	10,735	10,735	10,735

Cluster standard errors at the city level are in parentheses. *$p < 0.1$, **$p < 0.05$, ***$p < 0.01$.

[1]Source: BYD Company Limited Annual Report 2022, p.10. Available at http://www.cninfo.com.cn/new/disclosure/detail?orgId=gshk0001211&announcementId=1216246589&announcementTime=2023-03-29.

Table 3. Mechanism analysis of a city's environmental regulation.

	(1)	(2)
	Penalty	GI
Historic_City	94.191***	−0.048
	(33.521)	(0.068)
Historic_City×Pollutant emissions		0.122*
		(0.070)
Controls	Yes	Yes
Firm FE	No	Yes
City FE	Yes	Yes
Year FE	Yes	Yes
Adj. R-squared	0.414	0.597
Observations	1,708	12,632

Cluster standard errors at the city level are in parentheses. *$p < 0.1$, **$p < 0.05$, ***$p < 0.01$. Environmental penalty data are city-level, so column (1) uses city-level analysis, reducing the sample size and omitting firm fixed effects. The level of pollutant emissions is controlled in column (2).

original landscape of historic cities, local governments impose strict controls on land use and industrial activities that may affect the environment (Liu, Yan, and Zhang 2024). According to Porter's Hypothesis, environmental regulations impose operational constraints that drive firms to innovate, developing products and processes that meet environmental standards while enhancing economic performance. A substantial body of empirical literature has validated the innovation-inducing effect of environmental regulations on green innovation(Cohen and Tubb 2018).

Using the number of environmental administrative penalties as a proxy for environmental regulations, the results in Table 3 reveal that the title increases penalties, suggesting the implementation of stricter regulations. Additionally, the effect of the title on green innovation is stronger for firms with higher pollutant emissions, providing additional evidence for the regulatory mechanism.

IV. Conclusion

Using the awarding of the Historic City title as a quasi-natural experiment, we find that historic preservation facilitates firms' green innovation, especially in cities with rich historic sites. Mechanism analysis finds that enhanced nationalism and stricter environmental regulation contribute to these positive effects.

Our findings suggest that governments should integrate historic preservation policies into the framework of urban green development. Specifically, governments can pursue this objective through two key strategies: first, governments should emphasize nationalism during preservation efforts, such as by implementing heritage education programmes-; second, governments should guide green innovation for firms in historic districts, such as by providing financial and technical support.

Author contributions

CRediT: **Fan Zhang:** Data curation, Formal analysis, Methodology, Visualization, Writing – review & editing; **Yue Yuan:** Conceptualization, Writing – original draft, Writing – review & editing.

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