Political Hierarchy and Regional Economic Development: Evidence from a Spatial Discontinuity in China

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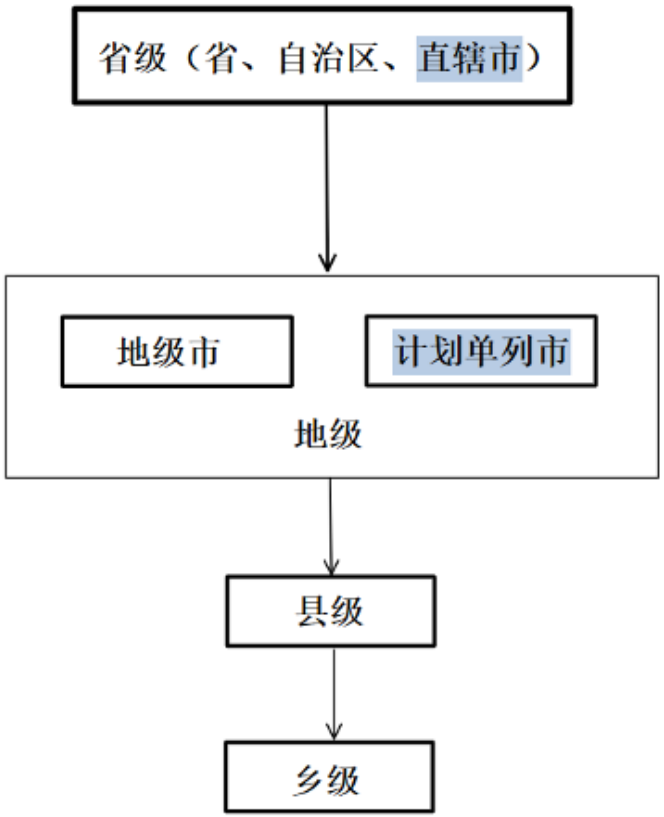
引入

- 政府阶级内政治权力分配对治理和区域经济发展至关重要（Markevixh and Zhuravskaya, 2011; Mookherjee, 2015; Bardhan, 2016）。
- 一个国家内，不同城市拥有不同政治地位，城市政府官员拥有不同决策权力。
- 根据经典的分权理论，赋予地方政府官员权力可以改善社会福利，因为他们拥有信息优势，可以因地施策，并受到跨辖区竞争的约束（Hayek, 1945; Tiebout, 1956; Oates, 1972; Qian and Roland, 1998）。
- 也有学者认为，权力下放会诱发更高的腐败风险，以及增加精英俘获风险（Bardhan and Mookherjee, 2000; Ferraz and Finan, 2008; Bandiera et al., 2009）。

- 由于难以衡量分权中的非财政要素，所以大多数研究都聚焦于对财政分权的效果上（Treisman, 2007; Gadenne and Singhal, 2014; Mookherjee, 2015），缺少关于地方政府的政治级别如何影响地方发展的证据。
- 本文：
  - 主要关注地方政府级别提升对经济增长的影响。
  - 采用断点回归作为工具以此更好地识别因果效应。
- 空间 RDD——平滑性假设。

2.1 中国地方政府级别



- 下级领导由上一级政府直接任命。
- 上级政府有权分配低一级政府的财政收入。
- 政府的决策权非常依赖于其在政治体系中的地位。
- 重庆：计划单列市——1997.3.14 与相邻的涪陵、万县、黔江三个地级市合并，作为直辖市。
  - 原因

- 偏好的异质性 vs 规模经济减小。
  - 符合地区特征的公共品 vs 提供公共品的成本。
  - 政治代理问题：腐败、精英俘获、中央管理和协调成本。
- 制定地方政策时有更大的自主权。
- 财政留存率更高。
- 中央对地方政府的监督和奖惩。
- 重庆人口有 3000 万，不太会出现规模经济减小。
- 只增加了一个省级单位，中央政府处理信息成本的增加也很小。

- 30km 和 50km 的宽带。
- 城镇级别时间序列测量的中国经济增长数据缺失：
  - 1992-2013 年的卫星夜间灯光数据。
  - 灯光亮度与人均 GDP 的相关系数为 0.67，光强增加 1% 大约对应 GDP 增加 0.3%（Henderson, V., Storeygard, A., Weil, D.N., 2012. Measuring economic growth from outer space. Am. Econ. Rev. 102, 994–1028.）。

数据集	时间	内容	衡量指标/用途	来源
卫星夜间灯光强度	1992-2013	城镇层面光度测度	经济增长	美国国家海洋和大气管理局
乡镇经济绩效	2013	镇级工业人均产值、城镇化率、非农就业率	2013年 镇级经济	《中国县乡统计年鉴》 （乡卷）
镇级公共产品	2013	镇级道路、学校、医院分布情况	政府问责指标	谷歌地图
企业层面普查数据	2008	企业基本财务报表		中国统计局
企业调查	2005	企业执照和注册数量、公司与地方政府的关系	企业营商环境	世界银行
个体层面人口普查数据	2002 2005	2000：乡镇层面民族构成 2005：个体迁移信息	确定边界处城镇民族构成相似 排除人口流动对经济影响	人口普查
中国地市县公共财政统计数据	1994-2005	县政府组成、社会经济变量（人口、城镇化率、工业产出）	县级财政支出构成	中国财政部、 《中国县域统计年鉴》
县级公共资金滥用信息	2003-2009		政府问责指标	《中国审计年检》
地形数据		高度、坡度等	排除地理因素对经济影响	ArcGIS

实证策略

- 四川和重庆全体乡镇数据有相当大的处理前不平衡。
- DID 会存在遗漏变量偏差。

Table A2
Summary statistics of pre-treatment characteristics for all towns in Chongqing and Sichuan.

	All towns of Chongqing	All towns of Sichuan	Difference (s.e.)
Light intensity in 1996	0.873	1.327	−0.454(0.181)**
Elevation (meter)	652.208	1269.275	−617.067(39.849)***
Slope (%)	13.517	13.321	0.196(0.303)
Ethnic minority population share	0.148	0.188	−0.040(0.010)***
Number of towns	933	4155	

Notes: This table provides a comparison of pre-treatment characteristics between Chongqing and Sichuan towns. *, **, and *** indicate statistical significance at 10%, 5%, and 1% levels, respectively.

Table A4
DID event study results on the full sample of Sichuan and Chongqing towns.

	Dependent variable: $ln(0.01 + LightIntensity_{it})$
Chongqing*1992	−0.328***
	(0.0740)
Chongqing*1993	−0.476***
	(0.0771)
Chongqing*1994	−0.187***
	(0.0643)
Chongqing*1995	0.0300
	(0.0672)
Chongqing*1997	0.00514
	(0.0562)

Table A4 (*continued*)

	Dependent variable: $ln(0.01 + LightIntensity_{it})$
Chongqing*1998	0.744***
	(0.0969)
Chongqing*1999	0.288***
	(0.0714)
Chongqing*2000	0.402***
	(0.0828)
Chongqing*2001	0.748***
	(0.0841)
Chongqing*2002	1.343***
	(0.0915)
Chongqing*2003	1.119***
	(0.0926)
Chongqing*2004	1.293***
	(0.104)
Chongqing*2005	1.475***
	(0.136)
Chongqing*2006	1.444***
	(0.118)
Chongqing*2007	1.779***
	(0.131)
Chongqing*2008	1.788***
	(0.109)
Chongqing*2009	1.001***
	(0.148)
Chongqing*2010	1.553***
	(0.160)
Chongqing*2011	1.630***
	(0.175)
Chongqing*2011	1.849***
	(0.165)
Chongqing*2013	1.636***
	(0.149)
Town fixed effect	YES
Year fixed effect	YES
Observations	112,024
R-squared	0.793

Notes: County-level clustered standard errors are reported in parentheses. *, **, and *** indicate statistical significance at 10%, 5%, and 1% levels, respectively.

- 空间 RDD 的基线回归方程：

$$Y_i = \beta_0 + \beta_1 Chongqing_i + f(geographiclocation_i) + \varepsilon_1 \quad (1)$$

- 其中 Y_i 为 i 城镇感兴趣的变量（如夜间灯光强度）：

$$Y_i \equiv \ln(0.01 + LightIntensity_{i,2013}) - \ln(0.01 + LightIntensity_{i,1996})$$

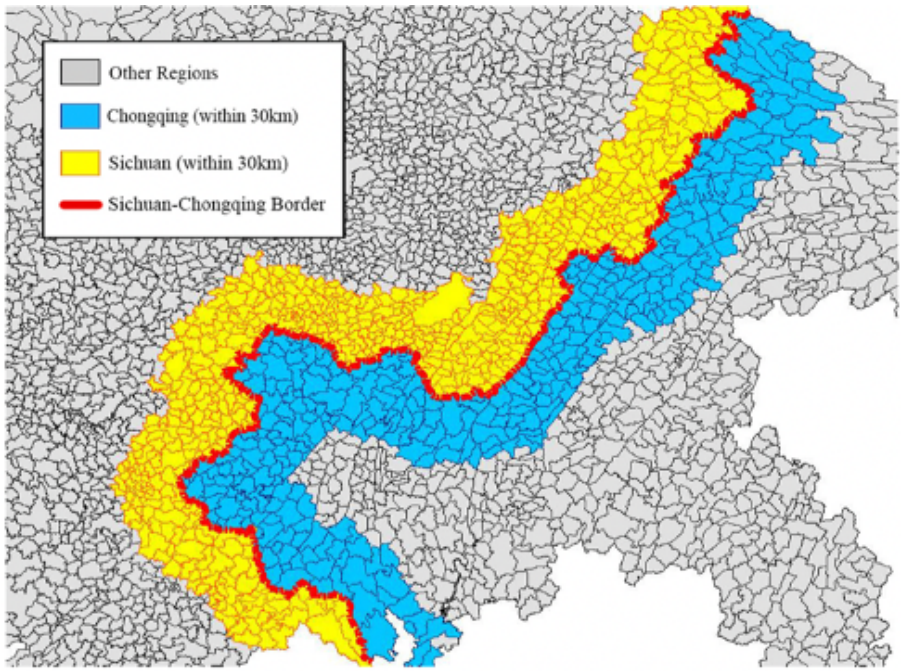


Fig. 2. Distribution of towns within the 30-kilometer bandwidth.

Table 2
Balance test.

	Chongqing	Sichuan	Mean Difference (s.e.)
	(1)	(2)	(3)
	Mean values		
Panel A. town-level variables within 30 km bandwidth			
Light intensity in 1996	0.704	0.764	−0.060 (0.218)
Elevation (meter)	505.530	458.497	47.033 (80.209)
Slope (%)	9.205	8.310	0.894 (2.001)
Distance to Chongqing Downtown (km)	126.794	142.989	−16.196 (25.513)
Distance to Chengdu Downtown (km)	285.987	254.320	31.667 (31.663)
Ethnic minority population share	0.003	0.012	−0.009 (0.011)
Observations	279	467	
Panel B. county-level variables for full sample			
Per capita GDP in 1996 (yuan, in logarithm)	8.098	8.012	0.086 (0.100)
Per capita industrial output in 1996 (yuan, in logarithm)	7.580	7.346	0.235 (0.201)
Per capita fiscal revenue in 1996 (yuan, in logarithm)	4.722	4.713	0.009 (0.099)
Urbanization rate in 1996 (%)	78.495	81.663	−3.168 (3.006)
Observations	43	178	

Notes: *, **, and *** indicate statistical significance at 10%, 5%, and 1% levels, respectively. The county-level clustered standard errors are reported in parentheses in column(3).

Figure: 30km 带宽处理特征差异

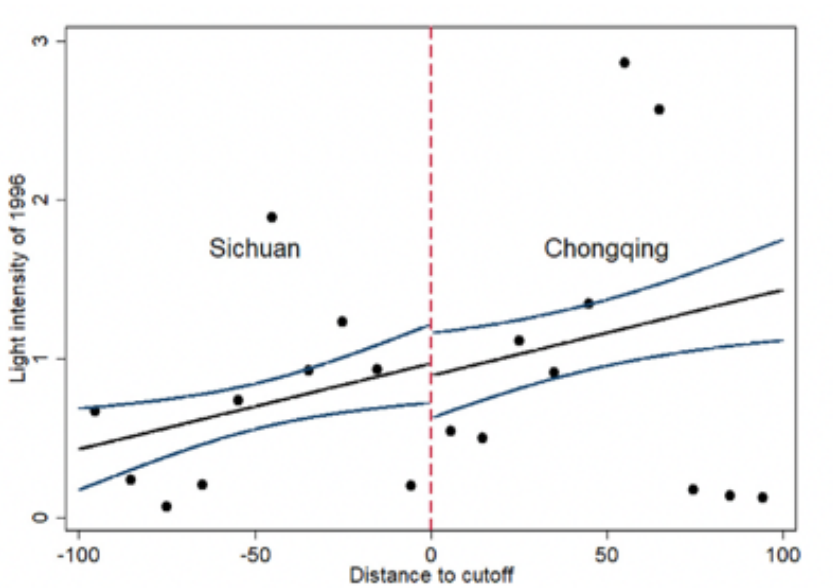


Fig. 3. Balance of initial development level across the border. *Notes:* This figure shows the single dimension RD graphs. The x-axis denotes the distance from a town centroid to the Chongqing–Sichuan border, where negative numbers refer to the control group (Sichuan). The dark dots show growth rates averaged over 10 km wide bins in distance from the border. The black lines fit local linear regressions within 100 km bandwidth on both sides of the boundary and the blue lines denote 95 percent confidence interval.

Figure: 1996 年光强跨越边界平滑程度

- 1992-2013 光强动态变化：

$$Y_{i,t} \equiv \ln(0.01 + LightIntensity_{i,t}) - \ln(0.01 + LightIntensity_{i,1996})$$

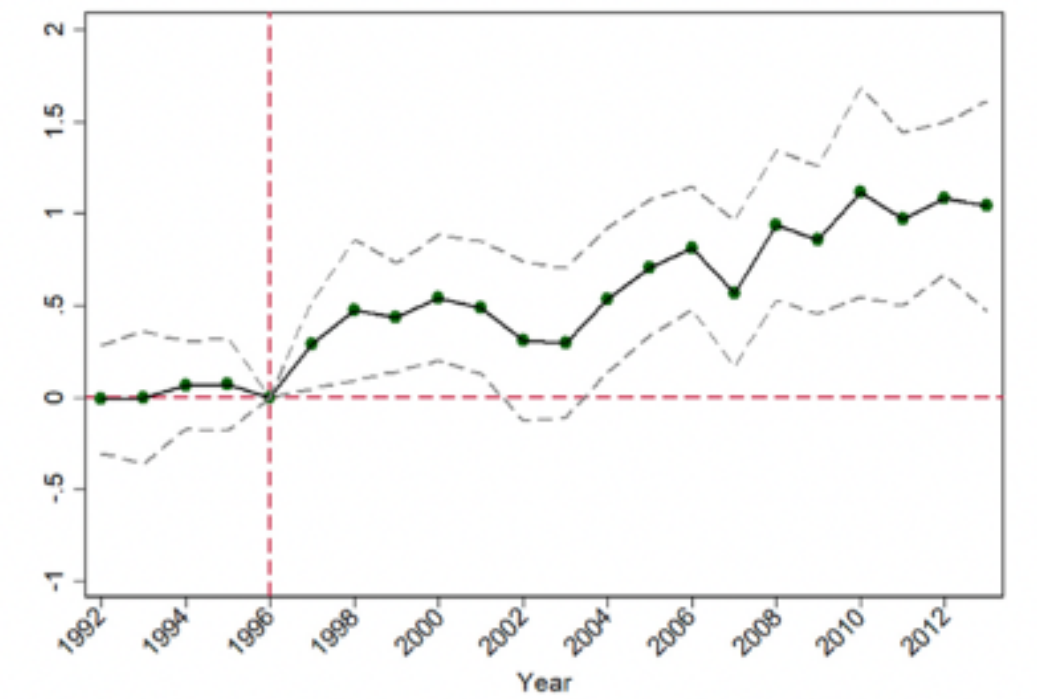


Fig. 4. Dynamics of the effects on light intensity growth. *Notes*: Point estimates are reported under alternative time windows. The basic line is for 1996. The solid line plots the point estimate of a separate estimation of β_1 in Eq. (1) and the dash lines denote 95 percent confidence interval.

Figure: 平行趋势检验

- 重庆的地位提升带动 GDP 增长 1.8%。

Table 3
Baseline RD results.

Sample within	Dependent variable: light intensity growth from 1996-2013					
	Local linear approach		Local quadratic approach		Global polynomial approach	
	<30 km (1)	<50 km (2)	<30 km (3)	<50 km (4)	Full Sample (5)	Full Sample (6)
Chongqing	1.038***	1.170***	1.028***	1.199***	1.036***	1.022***
	(0.291)	(0.295)	(0.287)	(0.308)	(0.234)	(0.239)
Polynomial	Linear	Linear	Quadratic	Quadratic	Cubic	Quartic
Observations	746	1,188	746	1,188	5,088	5,088
R-squared	0.104	0.087	0.117	0.094	0.034	0.033

Notes: The dependent variable is $ln(0.01 + LightIntensity_{i,2013}) - ln(0.01 + LightIntensity_{i,1996})$. All regressions include two-dimensional geographic controls. The county-level clustered standard errors are reported in parentheses. *, **, and *** indicate statistical significance at 10%, 5%, and 1% levels, respectively.

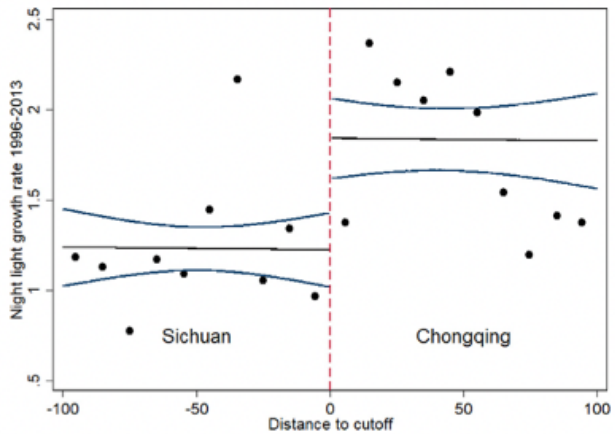


Fig. 5. Discontinuity in growth rate of light intensity from 1996 to 2013. *Notes:* The x-axis denotes the distance from a town centroid to the Chongqing–Sichuan border, where negative numbers refer to the control group (Sichuan). The dark dots show growth rates averaged over 10 km wide bins in distance from the border. The black lines fit local linear regressions within 100 km bandwidth on both sides of the boundary, and the blue lines denote 95 percent confidence interval.

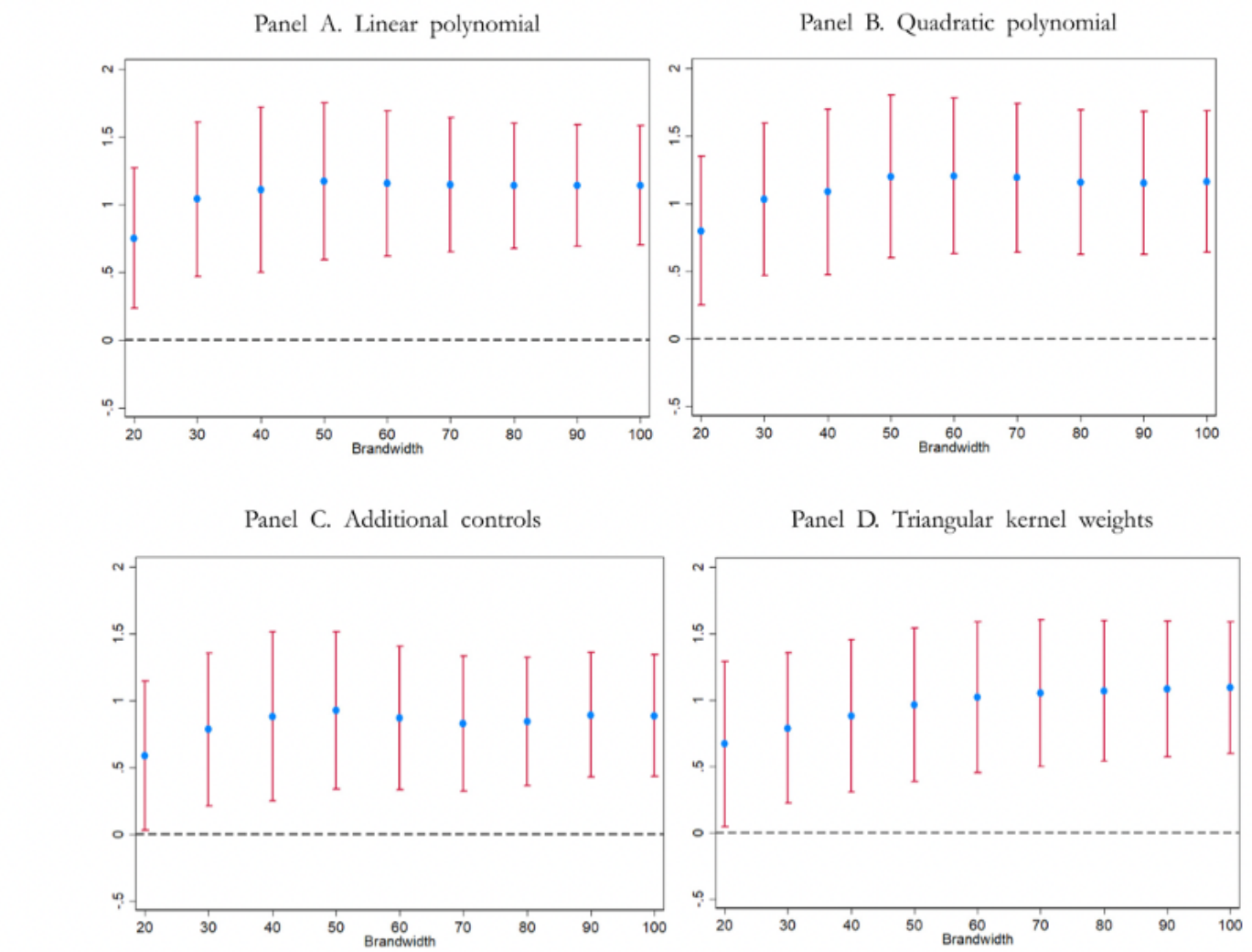


Fig. 6. Robustness to alternative bandwidths and model specifications. *Notes*: Each point plots the point estimate of a separate estimation of β_1 in Eq. (1) along with the 95 percent confidence interval, ranging from 20-km to 100-km bandwidths. Panel A plots estimates using linear polynomials in latitude and longitude. Panel B plots estimates from equivalent regressions but using second-order polynomials in latitude and longitude. Panel C plots estimates additionally controlling for elevation, slope, and a series of segment dummies. Panel D shows results using triangular kernel weights to give higher weight to observations that are closer to the boundary.

- 西移、东移原边界 30km。

Table 4
Placebo tests.

	Dependent variable: light intensity growth from 1996-2013	
Sample within	Move the true boundary 30 kilometers westward (1)	Move the true boundary 30 kilometers eastward (2)
East of the falsified border	−0.086	0.256
	(0.249)	(0.404)
Observations	881	517
R-squared	0.069	0.068

Notes: The dependent variable is $ln(0.01 + LightIntensity_{i,2013}) - ln(0.01 + LightIntensity_{i,1996})$. We set a 30 km bandwidth. All regressions include two-dimensional geographic controls. The county-level clustered standard errors are reported in parentheses. *, **, and *** indicate statistical significance at 10%, 5%, and 1% levels, respectively.

- 随机生成边界 1000 次。

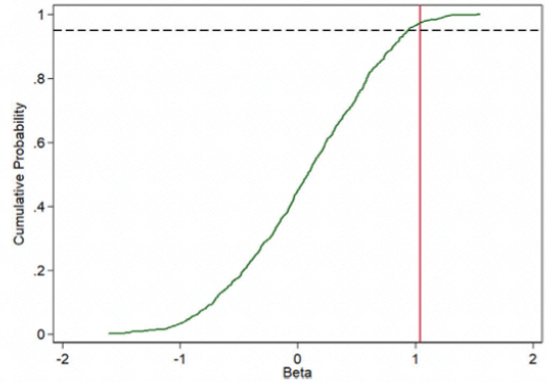


Fig. 7. The cumulative distributions function of coefficients from a simulation of 1000 random placebo borders. *Notes*: The y-axis indicates the point in the distribution and the x-axis for the value of the coefficients. The vertical lines show the value of the Chongqing dummy in our baseline RD estimations ($\widehat{\beta_1} = 1.038$, see Column (1) of Table 3). The dashed horizontal lines cross the y-axis at the 95 percent of the cumulative distribution.

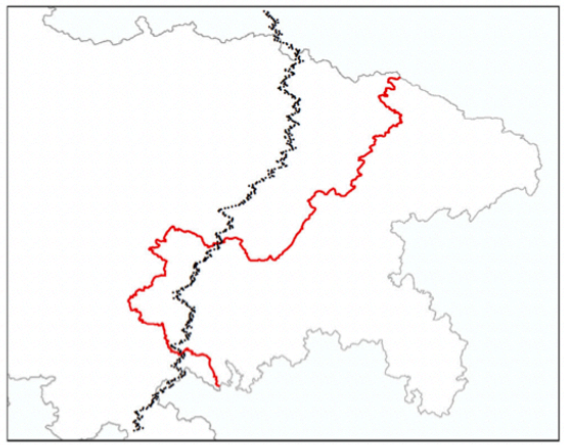


Fig. A6. One simulated placebo border. *Notes*: The red line is the true Chongqing-Sichuan border and each small black dot represents a randomly generatec boundary point.

- 人口从控制组迁徙到处理组的负外部性？

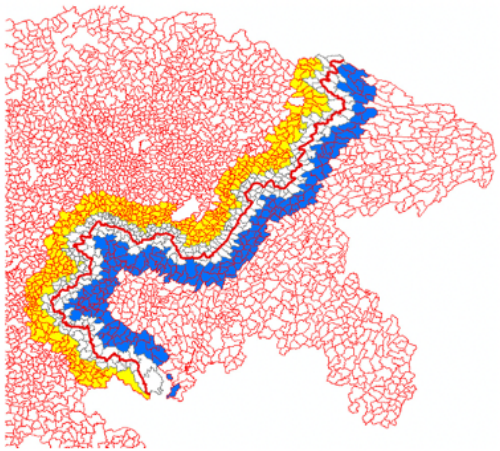


Fig. 8. Spatial exclusion approach. *Notes:* The red line marks the border between Sichuan and Chongqing. The blue and yellow shaded areas are towns in our boundary sample that belong to treated and non-treated areas, respectively. We eliminate towns within 10 kilometers of the boundary, which are represented by the blank area.

Table 5
Test on displacement effects.

Dependent variable: light intensity growth from 1996-2013						
Sample within	<30 km			<50 km		
	Baseline	Exclude towns within 2*10 km across boundary	Exclude towns within 2*5km across boundary	Baseline	Exclude towns within 2*10 km across boundary	Exclude towns within 2*5km across boundary
	(1)	(2)	(3)	(4)	(5)	(6)
Chongqing	1.038***	1.418***	1.199***	1.170***	1.506***	1.315***
	(0.291)	(0.342)	(0.275)	(0.295)	(0.314)	(0.276)
Observations	746	476	622	1,188	918	1,064
R-squared	0.104	0.126	0.113	0.087	0.095	0.091
Test on equality with the baseline estimate		p = 0.2731	p = 0.5609		p = 0.2886	p = 0.6012

Notes: The dependent variable is $ln(0.01 + LightIntensity_{i,2013}) - ln(0.01 + LightIntensity_{i,1996})$. All regressions include two-dimensional local linear geographic controls. The last row reports the p-value of the Wald test on equality with the baseline estimate. The county-level clustered standard errors are reported in parentheses. *, **, and *** indicate statistical significance at 10%, 5%, and 1% levels, respectively.

- 缓解四川政府在管理过多人口和面积的压力——β_1 被低估。

Table A7
Balance test between Sichuan and its neighboring provinces.

Dependent variable	Light intensity in 1996	Elevation (meter)	Slope (%)	Ethnic minority population share
	(1)	(2)	(3)	(4)
Panel A: Sichuan vs Gansu				
Sichuan	−0.0405	97.57	−0.266	0.0759
	(0.0413)	(144.3)	(3.322)	(0.0580)
Observations	126	126	126	109
R-squared	0.013	0.889	0.539	0.732
Panel B: Sichuan vs Guizhou				
Sichuan	−0.217	−38.97	−1.535	−0.0202
	(0.163)	(57.70)	(1.414)	(0.0163)
Observations	168	168	168	162
R-squared	0.026	0.641	0.273	0.430
Panel C: Sichuan vs Shaanxi				
Sichuan	0.00104	−14.29	−0.231	0.00131
	(0.110)	(141.7)	(2.065)	(0.00158)
Observations	171	171	171	158
R-squared	0.013	0.001	0.227	0.014
Panel D: Sichuan vs Qinghai				
Sichuan	0.0333	−72.40	−1.102	0.0113
	(0.0237)	(76.21)	(2.018)	(0.0141)
Observations	44	44	44	37
R-squared	0.027	0.704	0.232	0.062
Panel E: Sichuan vs Yunnan				
Sichuan	0.944*	−161.1	−0.555	0.129*
	(0.525)	(127.3)	(1.328)	(0.0749)
Observations	524	524	524	485
R-squared	0.024	0.658	0.107	0.391

Notes: This table reports balance test results from estimating RD regression with pre-treatment variables as dependent variables. We use the sample of towns within 30 km bandwidth to the boundary. Because some towns have been merged after 2000, the number of observations is smaller in column 4 than in columns 1–3. County-level clustered standard errors are reported in parentheses. *, **, and *** indicate statistical significance at 10%, 5%, and 1% levels, respectively.

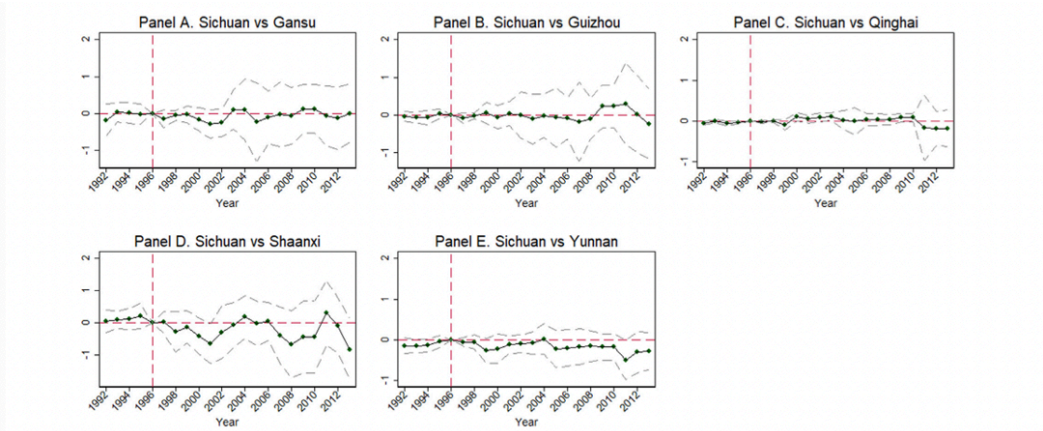


Fig. 9. Dynamics in the effects on light intensity: Sichuan and its neighboring provinces. *Notes*: The base line is 1996. The solid line plots the point estimate of a separate estimation of β_1 in Eq. (1) (the treatment variable now changes to $Sichuan_i$; a dummy equals 1 if the town is in Sichuan territory), and dash lines denote a 95 percent confidence interval.

- 重庆地位提升带来的经济促进效果：北部 > 南部。

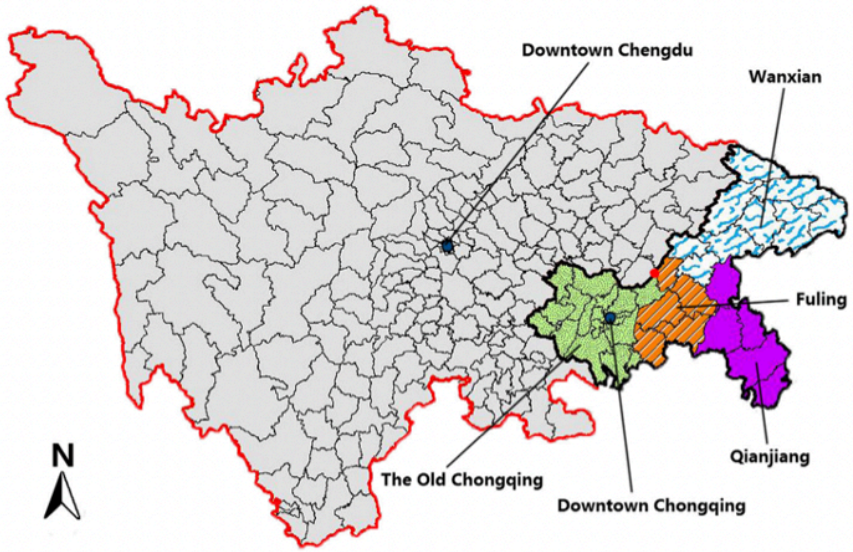


Fig. 1. Map of Chongqing and Sichuan. *Notes:* This figure displays the spatial distribution of Sichuan and Chongqing. The gray area is Sichuan province, while the colored part is Chongqing municipality. Chongqing municipality has jurisdiction over the former Chongqing independent-planning city (the green area), and three former prefectures: Wanxian (the blue-lined area), Qianjiang (the purple area), and Fulin (the orange-lined area). Downtown Chongqing and downtown Chengdu (the capital of Sichuan province) are labeled.

Table 6
Heterogeneity between the north and south border.

	Dependent variable: light intensity growth from 1996-2013			
	North border		South border	
Sample within	<30 km (1)	<50 km (2)	<30 km (3)	<50 km (4)
Chongqing	1.059***	1.431***	0.579*	1.051***
	(0.318)	(0.318)	(0.335)	(0.357)
Observations	291	484	510	847
R-squared	0.059	0.036	0.034	0.042

Notes: The dependent variable is $ln(0.01 + LightIntensity_{i,2013}) - ln(0.01 + LightIntensity_{i,1996})$. All regressions include two-dimensional geographic controls. We divide the boundary to into two segments. The south boundary is between the former Chongqing independent-planning city and Sichuan, and the north boundary divides Fuling, Qianjiang, and Wanxian with Sichuan. A more intuitive display is shown in Fig. 1. The county-level clustered standard errors are reported in parentheses. *, **, and *** indicate statistical significance at 10%, 5%, and 1% levels, respectively.

- 2013 年截面数据：重庆总体上经济发展水平较高。

Table 7
Town-level economic output in 2013.

Dependent variable	Per Capita industrial output in 2013 (yuan, in in logarithm) (1)	Urbanization rate in 2013 (2)	Non-farm employment rate in 2013 (3)
Chongqing	0.623*	0.0801***	0.0805***
	(0.361)	(0.0257)	(0.0243)
	519	539	554
Observations	0.092	0.088	0.154
R-squared	0.071	0.010	0.071

Notes: We use the sample of towns within a 30 km bandwidth to the Sichuan–Chongqing boundary. All regressions include two-dimensional geographic controls. The county-level clustered standard errors are reported in parentheses. *, **, and *** indicate statistical significance at 10%, 5%, and 1% levels, respectively.

- 1994-2005 年县政府数据。
- t 年与 1996 年行政支出（或建设和基础设施投资）占比之差。

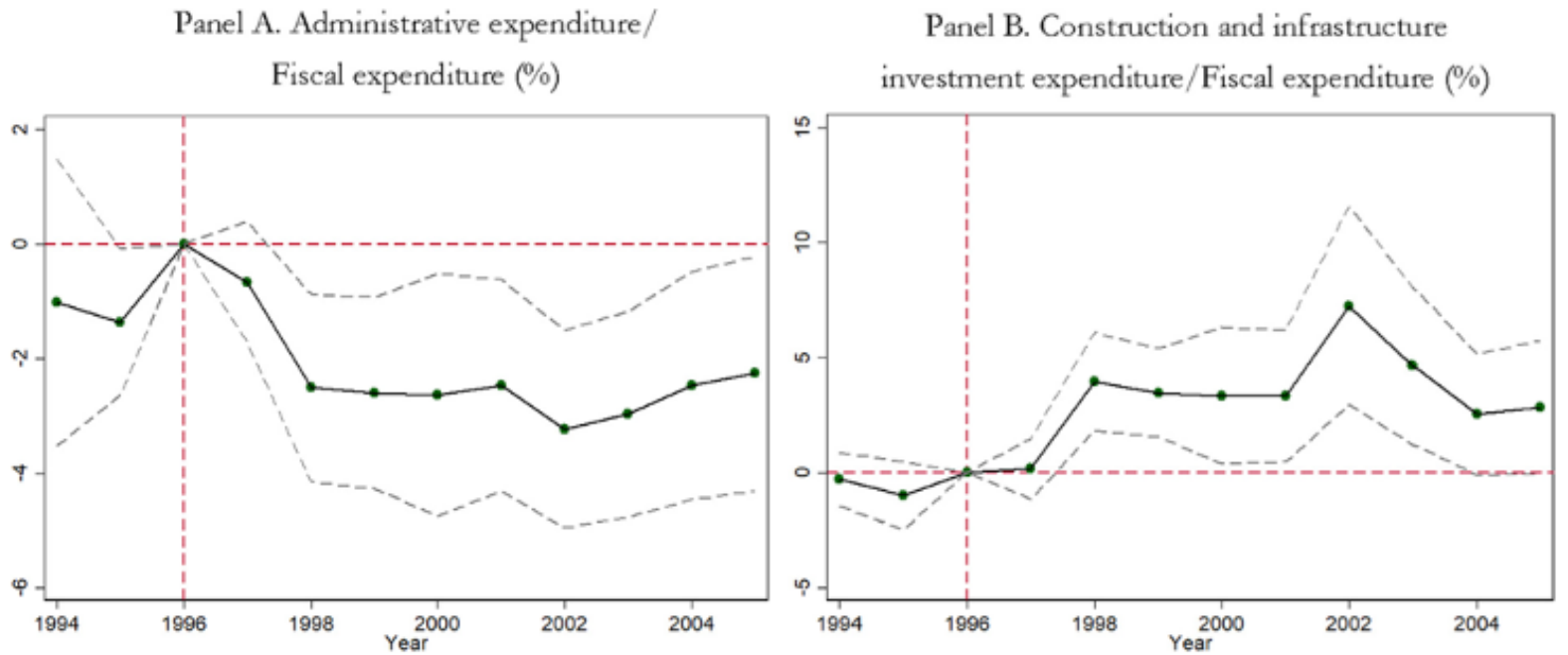


Fig. 10. Dynamics of the effects on the composition of county-level fiscal expenditure. *Notes*: Point estimates are reported under alternative time windows. The basic line is for 1996. The solid line plots the point estimate of a separate estimation of β_1 in global polynomial approach with cubic RD polynomials and the dash lines denote 95 percent confidence interval.

- 川渝所有县域的混合截面样本。
- 公共资金滥用金额除以财政支出。

Table 8
Misused public funds detected by auditing institutions from 2003 to 2009.

Dependent variable	Amount of misused public funds/Fiscal expenditure (1)
Chongqing	−3.962***
	(1.300)
Observations	1,454
R-squared	0.130

Notes: The sample includes all counties in Chongqing and Sichuan, and we employ the global polynomial approach with cubic RD polynomials. *, **, and *** indicate statistical significance at 10%, 5%, and 1% levels, respectively.

7.3 2013 年乡镇级别公共产品供给

- 30km 带宽内，重庆一侧的城镇有更多当地道路、学校和医院。
- 国道建设由中央政府负责。

Table 9
Provision of public goods at the township level in 2013.

Dependent variable	Per Capita length of local roads in 2013 (1)	Per Capita length of national roads in 2013 (2)	Per Capita number of schools in 2013 (3)	Per Capita number of hospitalsin 2013 (4)
Chongqing	0.562***	0.0225	0.534***	0.557***
	(0.108)	(0.206)	(0.155)	(0.148)
	551	551	551	551
Observations	0.052	0.019	0.050	0.062
R-squared	0.071	0.010	0.071	0.010

Notes: We use the sample of towns within a 30 km bandwidth to the Sichuan–Chongqing boundary. All regressions include two-dimensional geographic controls. The county-level clustered standard errors are reported in parentheses. *, **, and *** indicate statistical significance at 10%, 5%, and 1% levels, respectively.

- 企业需要的许可证和注册数量衡量企业营商环境：

$$Y_{ij} = \beta_0 + \beta_1 Chongiqng_i + f(geographiclocation_j)\alpha X_i + \varepsilon_{ij}$$

- 重庆企业遭遇的牌照限制比四川少。
- 国有企业与民营企业的准入。

Table 10
Business environment and firm entry.

Dependent variable:	Number of licenses and registrations required for a firm in 2005 (1)	Town-level Number of SOEs established between 1997 and 2008 (2)	Town-level Number of private firms established between 1997 and 2008 (3)
Chongqing	−3.684***	0.455***	1.607***
	(1.245)	(0.149)	(0.321)
Control variables	YES	YES	YES
Observations	700	746	746
R-squared	0.079	0.034	0.101

Notes: All regressions include two-dimensional geographic controls. The control variables in Column (1) also include the logarithm of firm sales, type of firm ownership, firm age, and industry dummies. The geographic locations are county-level in Column (1) and town-level in Columns (2)-(3). The county-level clustered standard errors are reported in parentheses. *, **, and *** indicate statistical significance at 10%, 5%, and 1% levels, respectively.

对其他解释的检验

- 1994 年启动 vs 1997 年边境效应。
- 剔除受三峡工程影响的 9 个城镇：

Table 11
Test on alternative explanations: Drop towns inundated by the Three Gorges Project.

	Dependent variable:light intensity growth from 1996-2013	
Sample within	<30 km	<50 km
	(1)	(2)
Chongqing	1.020***	1.157***
	(0.289)	(0.295)
Observations	737	1,154
R-squared	0.106	0.088

Notes: The dependent variable is $ln(0.01 + LightIntensity_{i,2013}) - ln(0.01 + LightIntensity_{i,1996})$. All regressions include two-dimensional local linear geographic controls. We eliminate towns that were inundated by the Three Gorges Project. The county-level clustered standard errors are reported in parentheses. *, **, and *** indicate statistical significance at 10%, 5%, and 1% levels, respectively.

- 湖北宜昌：

Table 12
Placebo Test: Yichang and Chengdu.

	Dependent variable: light intensity growth from 1996-2013			
Sample within	<30 km (1)	<50 km (2)	<30 km (3)	<50 km (4)
Yichang	−0.047	0.118		
	(0.294)	(0.260)		
Chengdu			0.120	0.043
			(0.240)	(0.235)
Observations	120	171	544	796
R-squared	0.124	0.110	0.015	0.017

Notes: The dependent variable is $ln(0.01 + LightIntensity_{i,2013}) - ln(0.01 + LightIntensity_{i,1996})$. All regressions include two-dimensional local linear geographic controls. In Columns (1) and (2), we conduct an RD analysis using the border between Yichang prefecture and other prefectures in Hubei province. The treatment dummy $Yichang_i$ equals 1 if town i is in Yichang territory. In Columns (3) and (4), we conduct an RD analysis using the border between Chengdu city and other prefectures in Sichuan. The treatment dummy $Chengdu_i$ equals 1 if town i is in Chengdu territory. The county-level clustered standard errors are reported in parentheses. *, **, and *** indicate statistical significance at 10%, 5%, and 1% levels, respectively.

8.2 城市核心区域向外围的溢出效应？

- 重庆核心区域没有比外围增长更快。

Table A9
Do core and periphery areas in Chongqing have differential economic growth?

	Dependent variable: light intensity growth from 1996-2013	
	(1)	(2)
Distance to Chongqing downtown (in log form)	−0.228	−0.118
	(0.171)	(0.193)
Distance to Chongqing border (in log form)		0.227
		(0.156)
Elevation(meter)	−1.62e-05	−4.53e-06
	(0.000382)	(0.000416)
Slope (%)	−0.0726**	−0.0929***
	(0.0271)	(0.0287)
Observations	706	706
R-squared	0.068	0.075

Notes: The dependent variable is $ln(0.01 + LightIntensity_{i,2013}) - ln(0.01 + LightIntensity_{i,1996})$. We use the full sample of Chongqing towns. County-level clustered standard errors are reported in parentheses. *, **, and *** indicate statistical significance at 10%, 5%, and 1% levels, respectively.

- 证伪测试（if true，则成都核心光强显著高于边境）。

Table 12
Placebo Test: Yichang and Chengdu.

	Dependent variable: light intensity growth from 1996-2013			
Sample within	<30 km (1)	<50 km (2)	<30 km (3)	<50 km (4)
Yichang	−0.047	0.118		
	(0.294)	(0.260)		
Chengdu			0.120	0.043
			(0.240)	(0.235)
Observations	120	171	544	796
R-squared	0.124	0.110	0.015	0.017

Notes: The dependent variable is $ln(0.01 + LightIntensity_{i,2013}) - ln(0.01 + LightIntensity_{i,1996})$. All regressions include two-dimensional local linear geographic controls. In Columns (1) and (2), we conduct an RD analysis using the border between Yichang prefecture and other prefectures in Hubei province. The treatment dummy $Yichang_i$ equals 1 if town i is in Yichang territory. In Columns (3) and (4), we conduct an RD analysis using the border between Chengdu city and other prefectures in Sichuan. The treatment dummy $Chengdu_i$ equals 1 if town i is in Chengdu territory. The county-level clustered standard errors are reported in parentheses. *, **, and *** indicate statistical significance at 10%, 5%, and 1% levels, respectively.

- 中央政府主动提供更多转移支付？

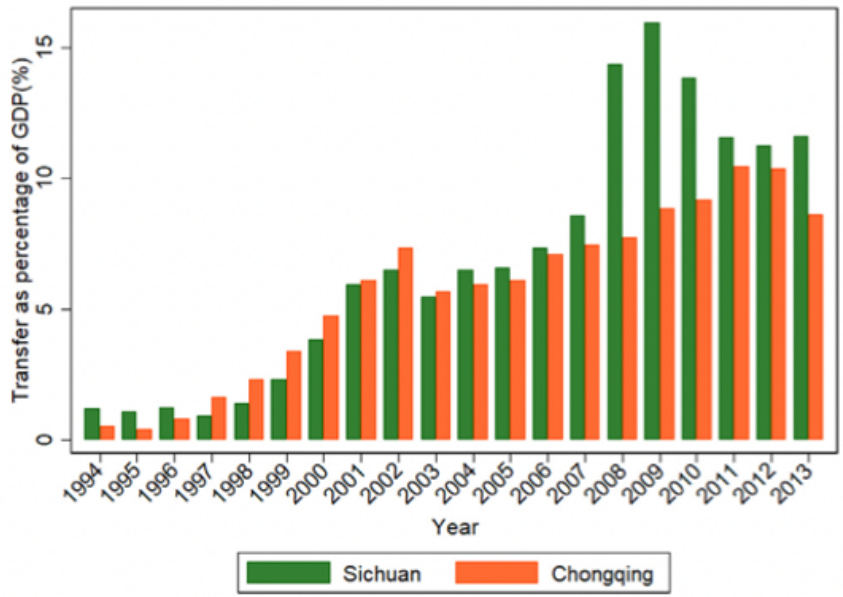


Fig. 11. Transfers received as a percentage of GDP. *Notes:* This figure shows transfers received by Sichuan and Chongqing from the central government as a percentage of GDP.

- 重庆政治地位的提升是 1997 年以来重庆经济增长较快的重要原因。

结论

- 1996-2003 重庆城镇跨境经济活动显著增加。
- 重庆地方官员比四川有更高的问责制，制定了更有利于经济增长的政策。
- 在专制国家，良好奖惩制度有利于限制权力下放导致的地方腐败和精英俘获等带来的负面影响。
- 限制：只有一个案例研究。
  - 经济上：提升过多地级市为省级增加行政成本，公共产品提供的规模效应降低，处理跨辖区溢出效应难度更大，中央政府更难处理信息和协调地方政府。
  - 政治上：提升过多地级市为省级，地级市官员将失去一些政治权利。

6.2. Robustness checks

Fig. 6 illustrates the robustness of our results to alternative bandwidths and model specifications. First, Panel A reports the point estimates (vertical axis) based on Eq. (1) for different bandwidth values between 20–100 kilometers in 10-km increments (horizontal axis). Thin lines stemming from the point estimates show 95 percent confidence intervals. Second, Panel B plots estimates from equivalent regressions, but use second-order polynomials in latitude and longitude. Third, Panel C examines robustness after including additional control variables (i.e., the segment dummies along with town-level elevation and slope). We split the Chongqing–Sichuan boundary into five segments of equal length and generate the indicator function $Seg_S(s = 1, 2, \cdots, 5)$ that equals 1 if town i is closest to segment s, and 0 otherwise. Controlling for segment dummies enables us to compare towns across the same segment of the boundary. Fourth, the baseline regressions use no weighting for observations. Additionally, we check robustness using triangular kernel weights to give higher weight to observations that are closer to the boundary and report the results in Panel D. In all cases, the estimates of β_1 are remarkably robust.[23]

Finally, the above results are primarily at the town-level, and we divide the satellite images of nighttime light intensity into each town. As a robustness check, we divide the images into a grid of 0.1 × 0.1 cells (approximately 9.6 km × 9.6 km).[24] The advantage of this classification is that the unit of analysis is now of equal size and evenly distributed on both sides. However, it is a less meaningful unit. Appendix Table A5 reports estimates using the cell-level sample. All specifications indicate a positive and highly significant effect of Chongqing's promotion on economic activity.

```
use data_si_chong,clear

matrix C=J(9,2,0)

forvalues i=1/9{
  qui reg ln_diff_2013_1996 new xcenter ycenter slope elevation seg1 seg2
seg3 seg4 if distance<=(`i'+1)*10,cluster(county)
  matrix a`i'=e(b)
  matrix b`i'=e(V)
  scalar C`i'1=a`i'[1,1]
  scalar C`i'2=sqrt(b`i'[1,1])
  matrix C[`i',1]=C`i'1
  matrix C[`i',2]=C`i'2
}

mat2txt, matrix(C) saving (matrixc) replace
insheet using matrixc.txt,clear
rename c1 coff
rename c2 se
gen low=coff-1.96*se
gen high=coff+1.96*se
egen v2=group(v1)
gen bw=(v2+1)*10
graph twoway (rcap low high bw  ,lcolor(cranberry) mcolor(midred) msymbol
(0) mlabcolor(black))|| (scatter coff bw, mcolor(midblue) msymbol(0)
mlabcolor(black)) ,yline(0, lpattern(dash) lcolor(black))  legend(off)
xtitle("Brandwidth") xlabel(20(10)100) ylabel(-0.5(0.5)2) scheme(s1color)
```

Thanks!