The Oriental City:

Political Hierarchy and Regional Development in China, AD 1000-2000

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Motivation: an example

In A.D. 1000, Kaifeng had an estimated urban pop. around 1 million.

- the most prosperous city in China and arguably the largest in the world (Mote 2003, Morris 2013).
- London, $<$10K

In 2015, Kaifeng's GDP is ranked 129th among Chinese cities and 12th within Henan province.

Not so puzzling (Hartwell 1967, Heng 1999). Kaifeng:

- lost the political prestige as the national capital in the 12th century $\&$ further lost the status of the provincial capital in the 20th century
- exemplifies the model of "the Oriental city" bequeathed by Max Weber (Weber 1921).

Motivation: the question & the challenges

The Oriental city vs. the Occidental city (Weber 1921)

- politics vs. market in economic geography

Since Weber, scholars have studied how politics shape economic geography.

- e.g., De Long and Shleifer 1993, Ades and Glaeser 1995, Davis and Henderson 2003...
- less studied than the role of markets

The challenge: most rely on cross-sectional variation (e.g., capitals)

- difficult to know what drives the political status of certain regions.

This paper: political hierarchy in China, 1000-2000

China: fertile research ground for politics and economic geography

- a stable political hierarchy system (province-prefecture-county)
- regime changes systematically altered the political importance of regions
  - national and prov capitals vary across regimes

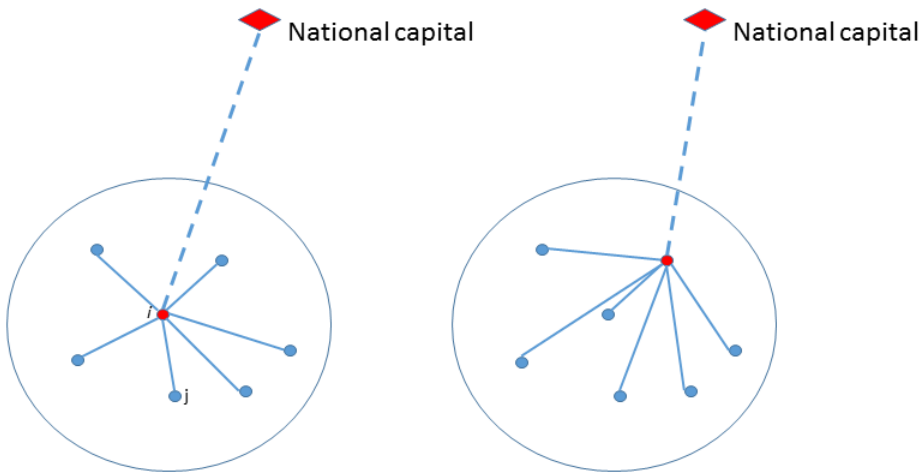
By tracing the evolution of prov cap. and economic activities, we hope to

- understand how politics shape economic geography;
- speak to the research on persistence of economic activities in the long run.
  - locational fundamentals (David and Weinstein 2002, Miguel and Roland 2011)
  - large economic shocks (Redding, Sturm, and Wolf 2011, Bleakley and Lin 2012, Kline and Moretti 2013, Michaels and Rauch 2016, Hanlon 2017)

Bottom line: economic advantages driven by political factors do not necessarily persist. ▸ Relationship to the literature

Preview

1. Why did provincial capitals get relocated?
   - regime changes $\rightarrow$ national capital relocation and provincial boundary redivision
   - the ruler minimizes the costs of gathering taxes and information: according to the logic of political control
   - hierarchical dist.: to their peer prefectures $\&$ to the national capital.
   - to guide our analysis on the effects of capital status



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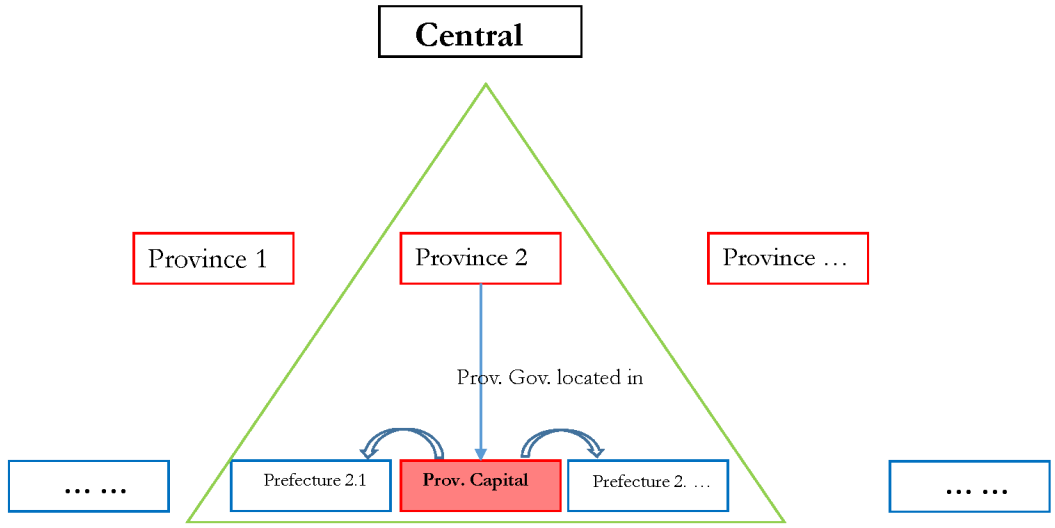
   - hierarchical dist.: to their peer prefectures $\&$ to the national capital.
   - to guide our analysis on the effects of capital status
2. Do gaining and losing capital status matter?
   - Yes, both matter.
   - 40-50% change in population density (and urbanization rates).
   - based on 11-period pop. data in 1078, 1102, 1580, 1776, 1820, 1851, 1910, 1964, 1982, 1990, and 2000.
3. Why does capital status matter?
   - The spatial hierarchy mirrors the political hierarchy.
   - Evidence: change in capital status affects the position (e.g., centrality) in the transportation networks.

Outline

Background: administrative hierarchy & capitals

1. China's administrative system is amazingly stable.
   - A.D. 1000-2000, China has been using a hierarchical system



   - Each province has one capital except in the Song.
     - The center limited the power of local governments by spatially separating fiscal affairs, judicial affairs, and welfare (Mostern 2011).
     - Usually 2 capitals, one for fiscal affairs and welfare, the other for judicial affairs.
     - Good to have more candidates to start with. Will use both in the baseline and either for robustness.

Background: administrative hierarchy & capitals

1. China's administrative system is amazingly stable.
   - A.D. 1000-2000, China has been using a hierarchical system
2. A prefecture's political status can vary greatly.
   - (i) Our analysis: 63 out of 261 pref. have ever been a prov. capital.

- 8 have always been capitals;
- 11 gained capital status once;
- 36 lost capital status once;
- 8 experienced multiple changes.

Background: administrative hierarchy & capitals

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2. A prefecture's political status can vary greatly.
   - (i) Our analysis: 63 out of 261 pref. have ever been a prov. capital.
   - (ii) (Six major) regimes & national capitals
     - Song (960-1127): Kaifeng (central China) coexisted with other states
     - Yuan (1271-1368): Beijing (northern China)
     - Ming (1368-1644): Nanjing (central-south China) [1]
     - Qing (1644-1912): Beijing
     - the Republic (1912-1949): Nanjing
     - the People's Republic (1949-now): Beijing
   - (iii) Re-defining provincial boundaries ▸ Two principles

[1] a double-capital (Nanjing-Beijing) system since 1421

Background: administrative hierarchy & capitals

Relocation of national capitals and revidision of provinces affected the relative location of a prefecture.

- Ex 1: Changsha lost and regained its capital status.
- Ex 2: Luzhou lost and did not regain its capital status.

1078 1580 1820

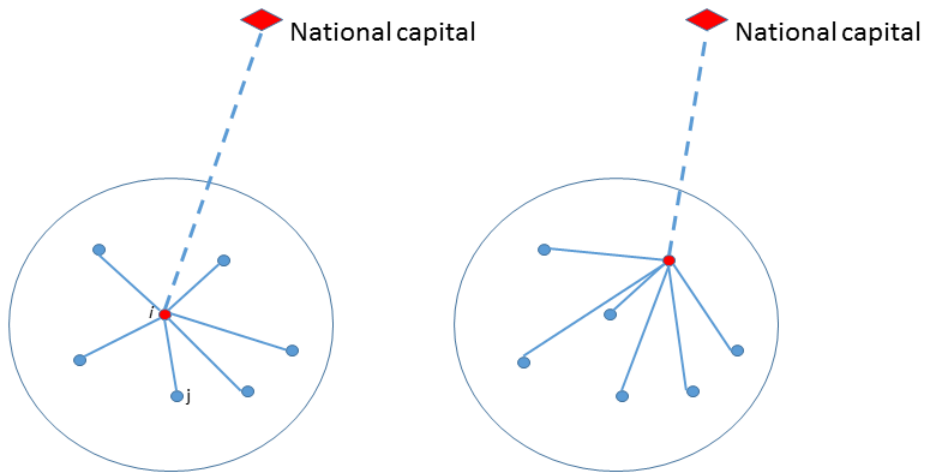
Changes in provincial capital: a simple algorithm

The decision maker: the central government who cares about

- governing a province
- gathering resources and information from the province

Two types of costs become important, the costs of

- gathering resources from all pref in a prov to the prov capital
- delivering part of them to the national capital



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The central government's problem:

$$\underset{i}{\operatorname{argmin}}\, HierDist_{i,t} \equiv \sum_{j=1}^{N} A_j D_{i,j,t} + \lambda \sum_{j=1}^{N} A_j D_{i,NationalCap,t}$$

- $D_{i,j,t}$: dist from pref i to another pref j in the same prov.
- $D_{i,NCap,t}$: dist from pref i to the national capital.
- A_i: scale, e.g. area
- $\lambda \in [0,1]$: the share to deliver to the center

We term the weighted sum **hierarchical distance**. ▸ alternative

Hierarchical distance: remarks

We take prov boundary as given when considering changes in capitals.

- documented by administrative histories (e.g., Zhang 1739)
- if the center only wanted to elevate a pref's status, it could do so without changing boundaries. But we observe boundary changes accompany capital changes.

The choice of λ in $\sum_{j=1}^{N} A_j D_{i,j,t} + \lambda \sum_{j=1}^{N} A_j D_{i,NationalCap,t}$

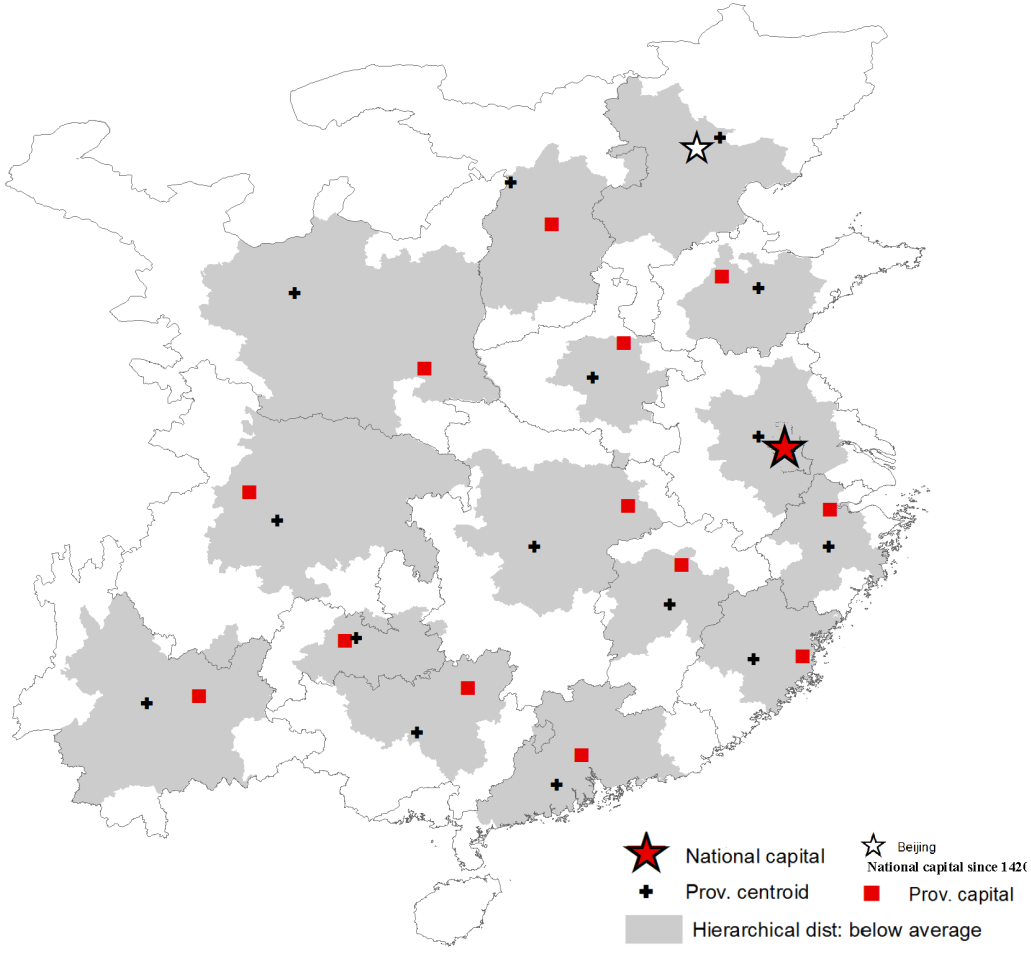
- start from $\lambda = 0.19$ – highest R-squared in the following specification

$$ProvCap_{i,t} = \theta HierDist_{i,t} + Prefecture_i + year_t$$ ▸ Figure

- also vary λ from 0 to 1.
- $\lambda = 0$: capital in the prov centroid
- $\lambda > 0$: deviate toward the national capital

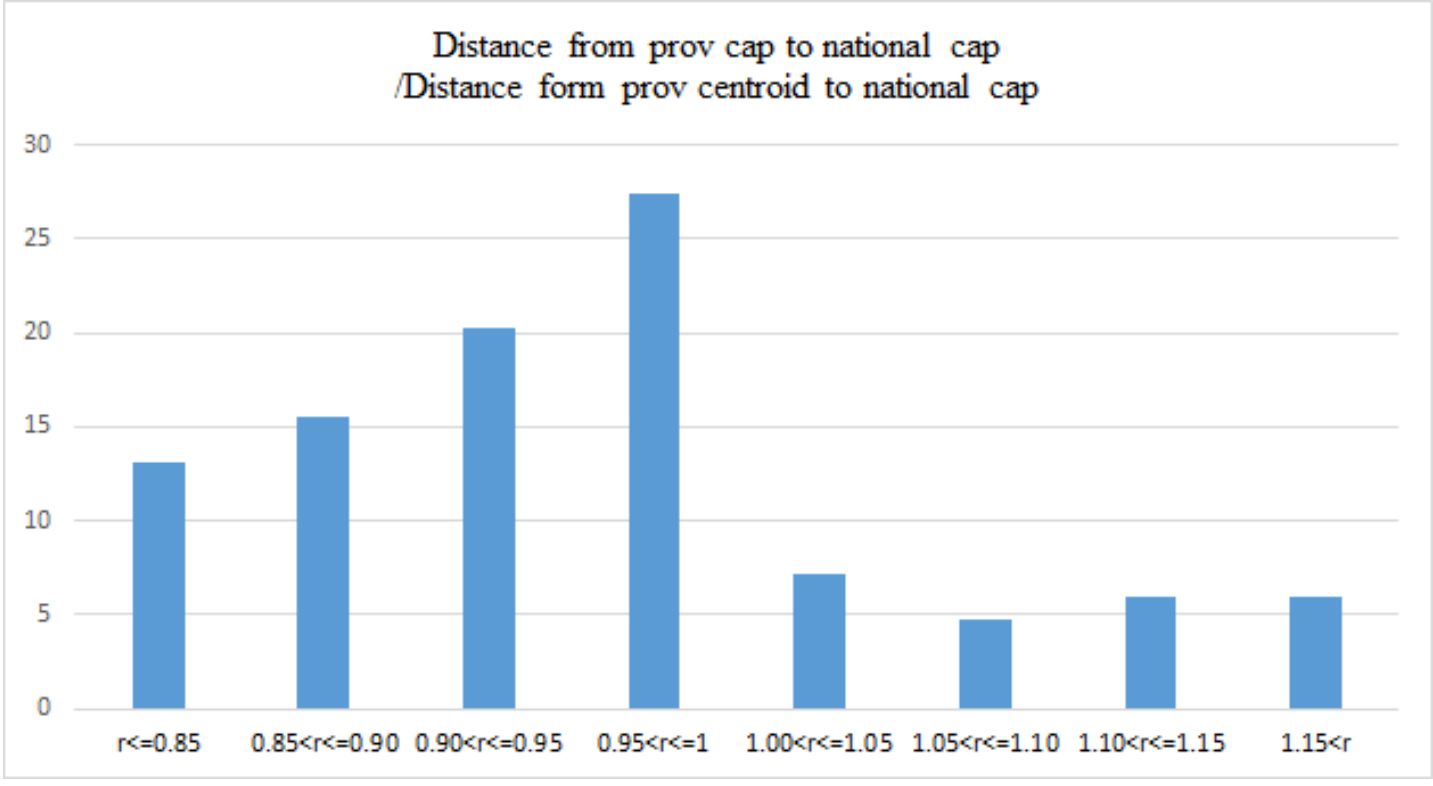
Hierarchical distance: depiction 1

The capitals deviate from prov. centroid toward the national capital.
We see orbits around the national capital ▸ More



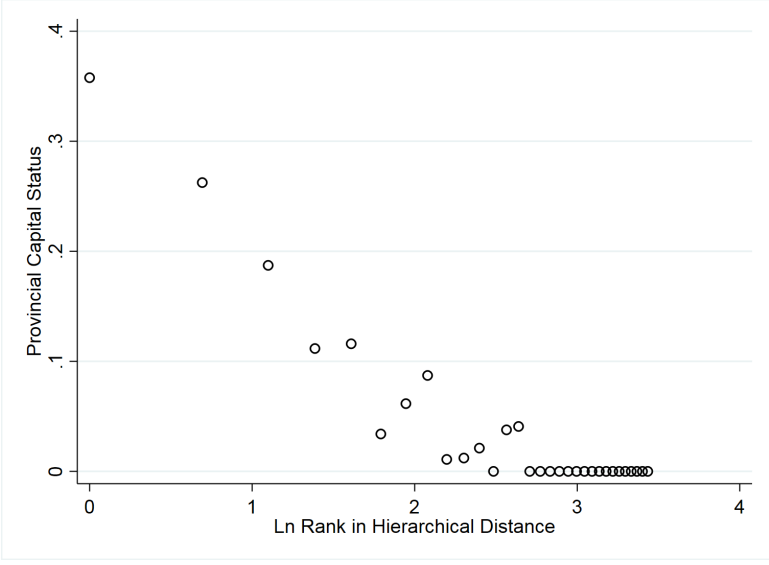
Hierarchical distance: depiction 2

Distance from prov cap to national capital / Distance from prov centroid to national capital: less than 1



Hierarchical distance: depiction 3

(ln) Rank in Hierarchical Distance vs. Prob. of Being Capital



Summary

Part I: Why Did Capitals Change?

- Regime changes $\rightarrow$ national capital relocation + boundary redivision $\rightarrow$ provincial capital relocation
- Prov capital relocation is not random but follows the logic of political control, and hierarchical dist. provides us a measure to describe the political logic:
  - Later we will show that rank in hierarchical distance is a reasonable instrument for capital status.

Outline

Economic development and capital status

(i) Population density 1078-2000

- baseline: 1078, 1102, 1580, 1776, 1820, 1851, 1910, 1964, 1982, 1990, and 2000 ▸ Trend
- other years: 1393, 1880, 1953
  - not far from the deadliest wars in the world (Mongolian conquest, Taiping Rebellion, WWII).
  - included as robustness check

(ii) Urbanization: 1580, 1820, 1964, 1982, 1990, and 2000

(iii) Capitals and boundaries

- CHGIS (2007): Ming–2000.
- We digitize the map in Song based on the Treatise of the Nine Regions from the Yuanfeng Reign.

Note: To build a panel dataset

- first fix the boundary based on prefectures in 2000.
- also conduct grid-level analysis.

Control variables: prefecture characteristics

Allow the impact of the time-invariant variables to vary over time.

(i) geographical features

- whether a pref. contains a plain (slope in a 0.25×0.25 grid $< 1^{\circ}$)
- whether it is on a major river/on the coast
- its slope, elevation, longitude, latitude

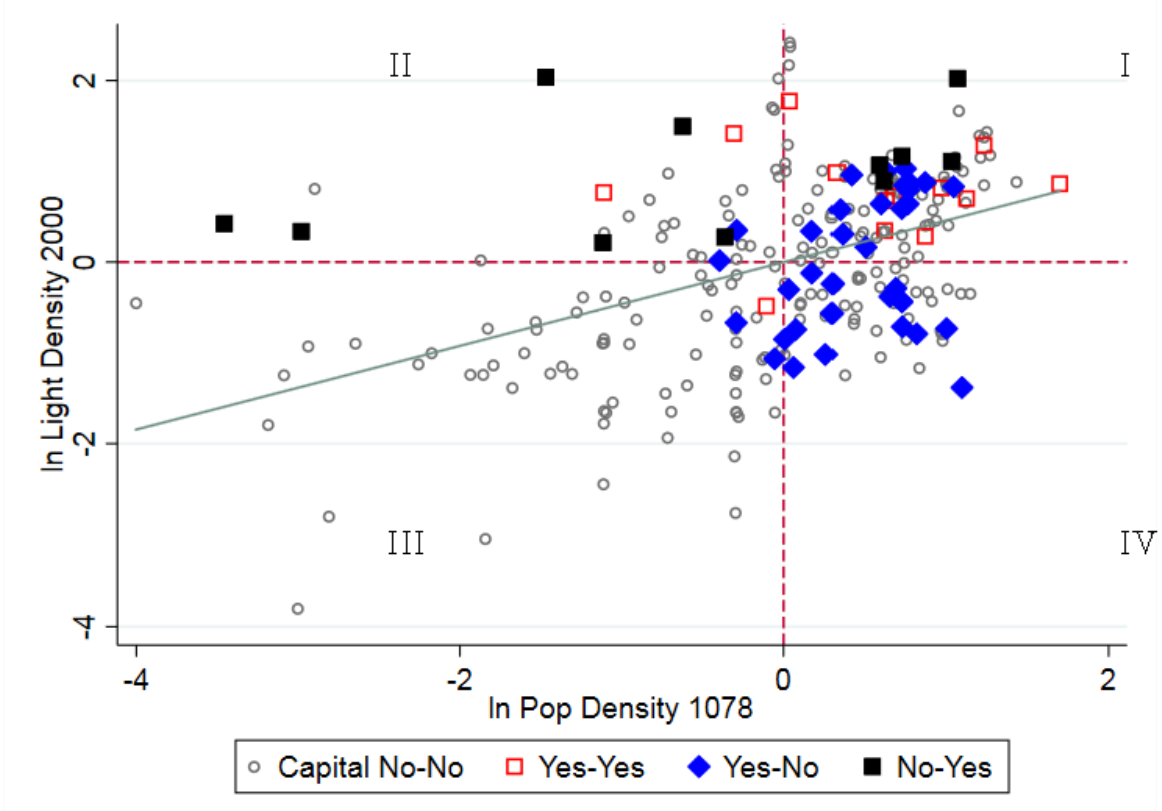
(ii) agriculture

- suitability for wheat, rice, fox millet, maize, sweet potato

(iii) Skinner's 9-physiographic macroregions ▸ map

- based on geomorphological features: north, northwest, lower/mid/upper Yangtze, southeast coast, lingnan, Yun-Gui, Manchuria
- Provincial boundaries emerged as a result of a series of "administrative accidents" (Skinner 1977).

Descriptive: pop density in 1078 vs. lightness (or pop) density in 2000



Three patterns

- some persistence
- systematic changes with change in capital status – will test it (part II).
- heterogeneity within those that lost status – will explain (part III).

Outline

1. Background and A Simple Algorithm
2. Data and Descriptive Pattern
3. Empirical Results
   - Differences-in-differences: 1078-2000
   - IV estimates
   - Additional results
4. From Political Hierarchy to Spatial Hierarchy
5. Conclusions

DID analysis

1. Using data from 1078, 1102, 1580, 1776, 1820, 1851, 1910, 1964, 1982, 1990 and 2000:

$$\ln PopDensity_{i,t} = \beta Capital_{i,t} + \alpha_i + \gamma_t + \theta \mathbf{X}_i \times \gamma_t + \theta' \pi_m \times \gamma_t + \epsilon_{i,t}$$

   - i: prefecture; t year
   - $\mathbf{X}_i$: three sets of pref. characteristics
   - m: 9-regions (as provinces are not stable)

2. Can also look at $\Delta lnPopDensity$ vs. $\Delta Capital$
   - useful to differ losing from gaining capital status
   - if a pref. became a capital due to certain advantages, losing status may not matter.

DID results

Capital status $\rightarrow$ 40%-50% increase in pop density

	ln Pop Density				Δ ln Pop Density			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Prov. Capital	0.518***	0.484***	0.432***	0.433***				
	(0.125)	(0.106)	(0.102)	(0.101)				
Δ Prov. Capital					0.414***	0.321***		
					(0.106)	(0.082)		
Gaining Status							0.459**	0.476***
							(0.220)	(0.156)
Losing Status							-0.392***	-0.242**
							(0.116)	(0.094)
L. ln Pop Density						-0.344***		-0.345***
						(0.017)		(0.017)
Year FE * Crop suit.				Y	Y	Y	Y	Y
Year FE * Geography			Y	Y	Y	Y	Y	Y
Year FE * ln Area		Y	Y	Y	Y	Y	Y	Y
Year FE * Region FE	Y	Y	Y	Y	Y	Y	Y	Y
Pref. FE	Y	Y	Y	Y				
Year FE	Y	Y	Y	Y	Y	Y	Y	Y
Observations	2,871	2,871	2,871	2,871	2,610	2,610	2,610	2,610
R-squared	0.771	0.841	0.856	0.865	0.656	0.738	0.656	0.739
#Prefectures	261	261	261	261	261	261	261	261
Magnitude: gaining vs. losing capital (p-value):							0.790	0.203

Two reasons to emphasize the finding on losing status.

DID: pre-trends

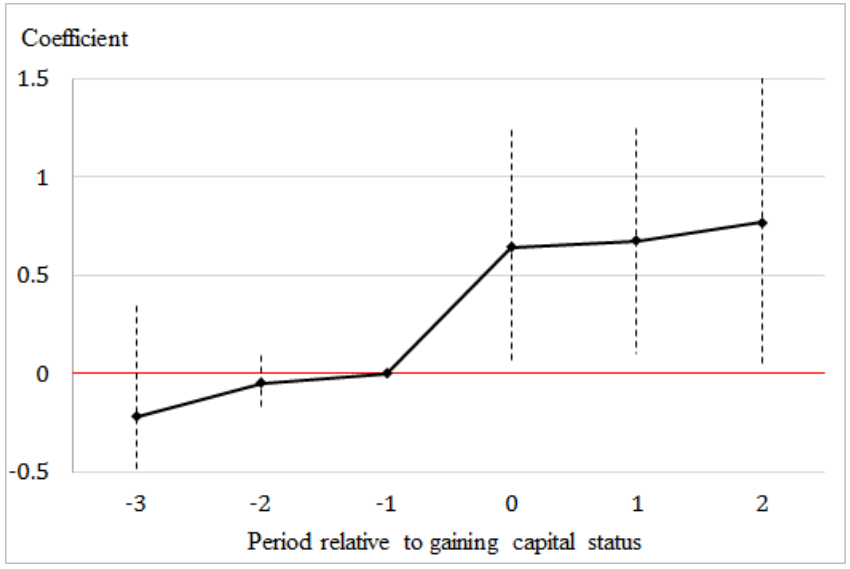


Figure 1: *

Gaining Status

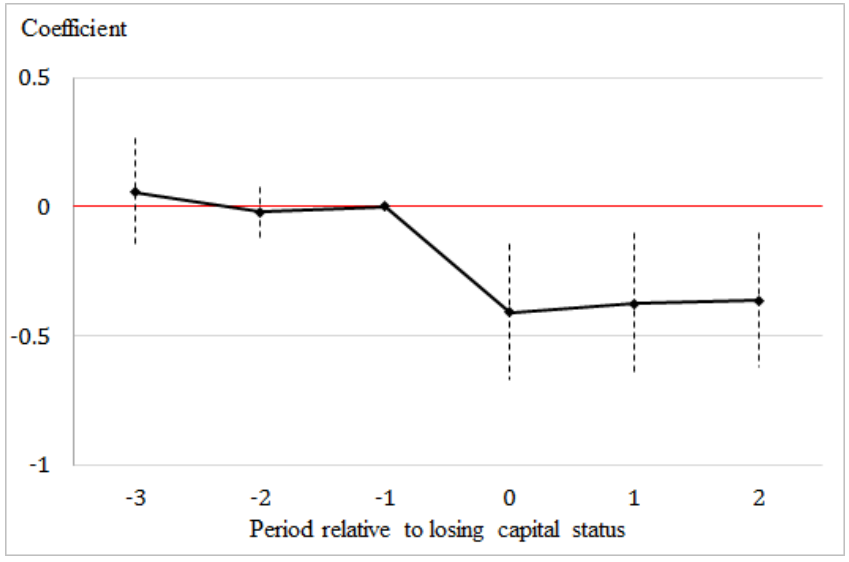


Figure 2: *

Losing Status

No high-frequency data for a thousand years

- weakness: not possible to pin down the number of years.
- advantage: the pre-trends consider very long periods.

Robust to considering period length ▸ results

IV approach

The rank in hierarchical distance provides us an instrument for capital status if it

1. affects capital status – yes in Part I.
2. is driven by regime change, not any pref's characteristics – testable.
3. affects development only via capital status (exclusion restriction).

On condition 2: $\Delta \ln$ RankHierDist is driven by regime changes.

- $\Delta \ln$ RankHierDist is uncorr. with past (change) in pop density. ▸ More
- The impacts on losing and gaining status are symmetric. ▸ More
  - Again, the finding on losing status is reassuring.

On condition 3, we conduct four sets of tests

IV estimates

First-stage:

$$Capital_{i,t} = \delta lnRankHierDist_{i,t} + \alpha_i + \gamma_t + \theta \mathbf{X}_i \times \gamma_t + \theta' \pi_m \times \gamma_t + \epsilon_{i,t},$$

Second-stage:

$$\ln PopDen_{i,t} = \beta' \widehat{Capital}_{i,t} + \alpha_i + \gamma_t + \theta \mathbf{X}_i \times \gamma_t + \theta' \pi_m \times \gamma_t + \epsilon_{i,t},$$

Comparing OLS estimate - 0.433

	(1)	(2)
Dependent Var.: ln Pop Density		
	Reduced-form	IV
Prov. Capital		0.663***
		(0.201)
ln Rank in Hierarchical distance	-0.069***	
	(0.022)	
All controls	Y	Y
F-Stat (Weak instrument test)		145.9

▸ First-stage

IV Estimates: Exclusion Restriction?

Rank in hierarchical distance matters even without capital status. Tests:

1. check whether it matters for the never-capital prefs ▸ results
2. exploit placebo hier. distances due to changes in natl capitals ▸ results
3. use one component as the instrument and examine whether the other has any direct effect ▸ results

   - $argmin_j HierDist_{i,t} = \lambda(\sum_{j=1}^{N} A_j D_{i,j,t} + \sum_{j=1}^{N} A_j D_{i,NationalCap,t}) + (1-\lambda) \sum_{j=1}^{N} A_j D_{i,j,t}$

Rank in hier. dist. is correlated with dist. to other economic centers. Test:

- include distances to economic centers ▸ results

Additional results

1. Using capital-ever subsample ▸ results
2. Urbanization (instead of pop density)
   - urbanization in 1580, 1820, 1964, 1982, 1990, 2000 ▸ results
3. Grid-level analysis (instead of pref in 2000) ▸ results
4. Dropping any period ▸ results
5. Other changes: deadly wars ▸ results

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Part II: Capital Status Matters.

- Both gaining and losing capital status matter.
- The finding on losing status implies that economic advantages driven by political factors do not necessarily persist.

Outline

Why does capital status matter?

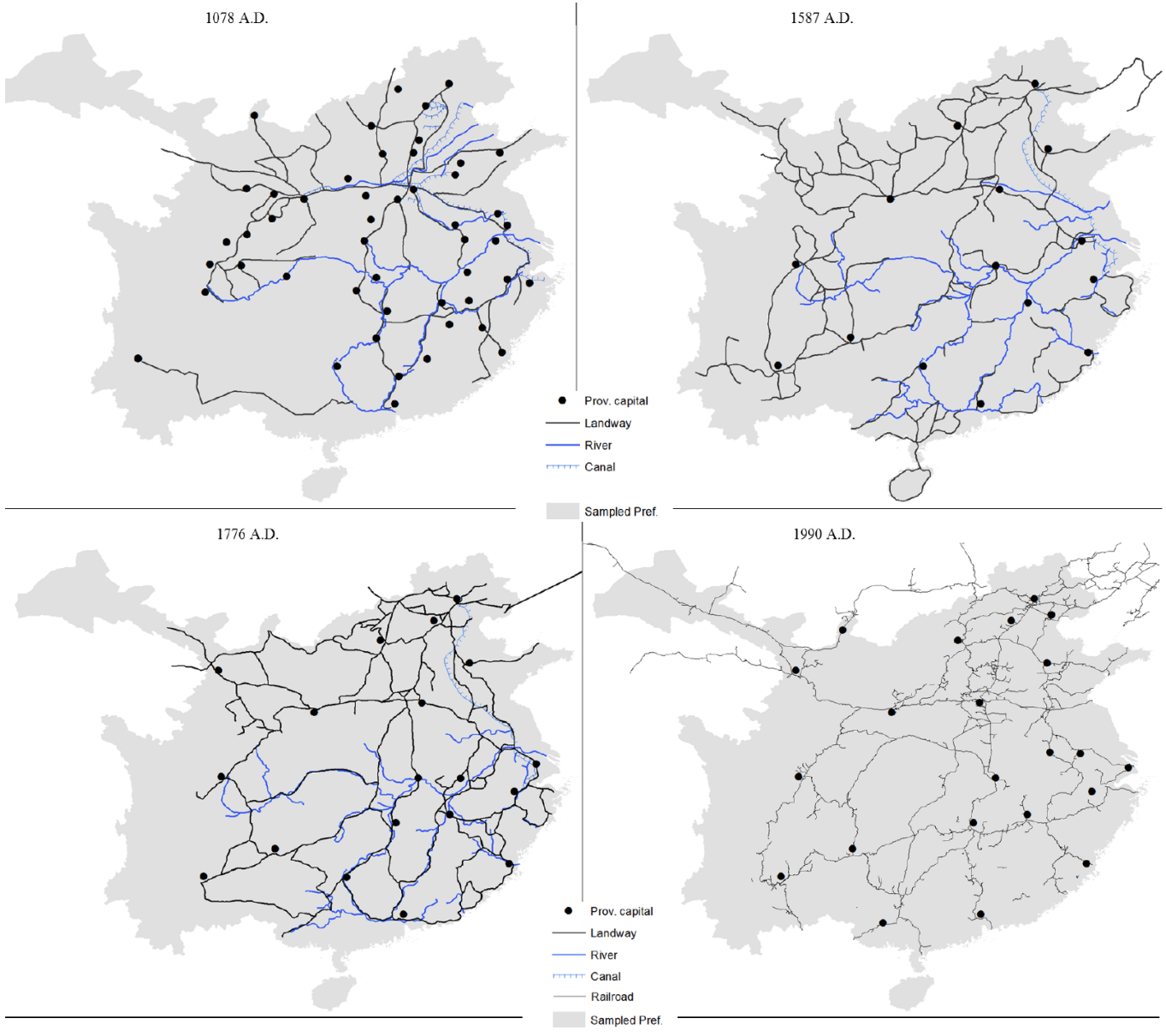
Our take: in a centralized political regime, the ruler gathers & distributes information and resources through a political hierarchy.

- The spatial importance of a region mirrors its status in the political hierarchy.

Testable: the transportation networks

- The government has been the largest single investor in transportation facilities.
- Historical transportation networks
  - comprised of the Grand Canal (connecting many waterways) + a state courier system (supported by post offices)
  - used for the flow of information, revenues, and personnel on which the state relied (Brook 1998)
  - costly to maintain
- Modern transportation networks are much more complicated.
  - We choose to focus on railway because it is monopolized by the state.

Transportation networks in Song, Ming, Qing and 1990



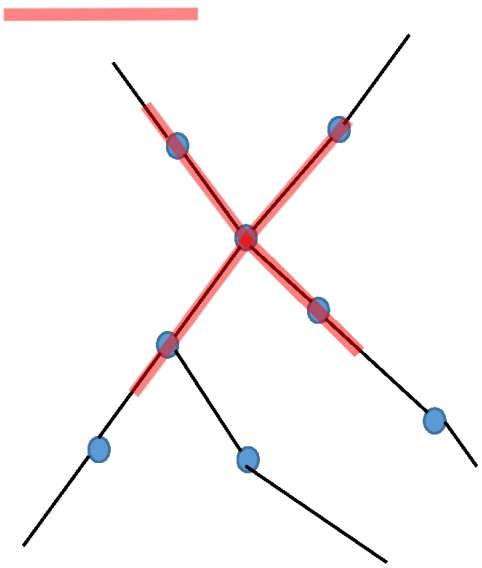
Transportation networks: measurement

Just count...

- being connected or not, # roads, length etc.

Useful network characteristics to capture the hierarchy:

Within a given search radius, how many ...



$$Gravity_i^r = \sum_{j \neq i, d_{i,j} \leq r} \frac{W_j}{e^{\beta d_{i,j}}}$$

- smaller r/larger β: more local
- $d_{i,j}$ shortest distance btw. i and j in the network
- W_j: all equal to 1 or wgt by area

Transportation networks: descriptive patterns

standardized gravity across the political hierarchy:

	Standardized gravity			
	Song	Ming	Qing	1990
National Capital	3.30 (Kaifeng)	2.08 (Nanjing)	0.38 (Beijing)	0.59 (Beijing)
Provincial capitals	0.58	0.34	0.55	0.40
	(0.74)	(0.76)	(0.85)	(0.97)
Non-capital prefectures	-0.15	-0.03	-0.04	-0.04
	(0.98)	(1.00)	(1.00)	(1.00)

Transportation: capital status and spatial gravity

Dependent var.: std gravity

	(1) Gravity	(2) Gravity	(3) Δ Gravity	(4)	(5) Gravity (no restriction of r)	(6)	(7)
	β=1, r=500, W=1				β=1 W=1,	β=1 W=area	β=10 W=1
Prov. Capital	0.413***	0.361***			0.312***	0.315***	0.293***
	(0.086)	(0.089)			(0.093)	(0.094)	(0.103)
Δ Prov. Capital			0.334***				
			(0.106)				
Gaining Capital Status				0.403**			
				(0.176)			
Losing Capital Status				-0.302**			
				(0.137)			
Year FE * Crop suit.		Y	Y	Y	Y	Y	Y
Year FE * Geography		Y	Y	Y	Y	Y	Y
Year FE * ln Area	Y	Y	Y	Y	Y	Y	Y
Year FE * Region FE	Y	Y	Y	Y	Y	Y	Y
Pref. FE, Year FE	Y	Y			Y	Y	Y
Observations	1,044	1,044	783	783	1,044	1,044	1,044
R-squared	0.178	0.293	0.302	0.302	0.239	0.259	0.210
#Prefectures	261	261	261	261	261	261	261

No pre-trends ▸ More

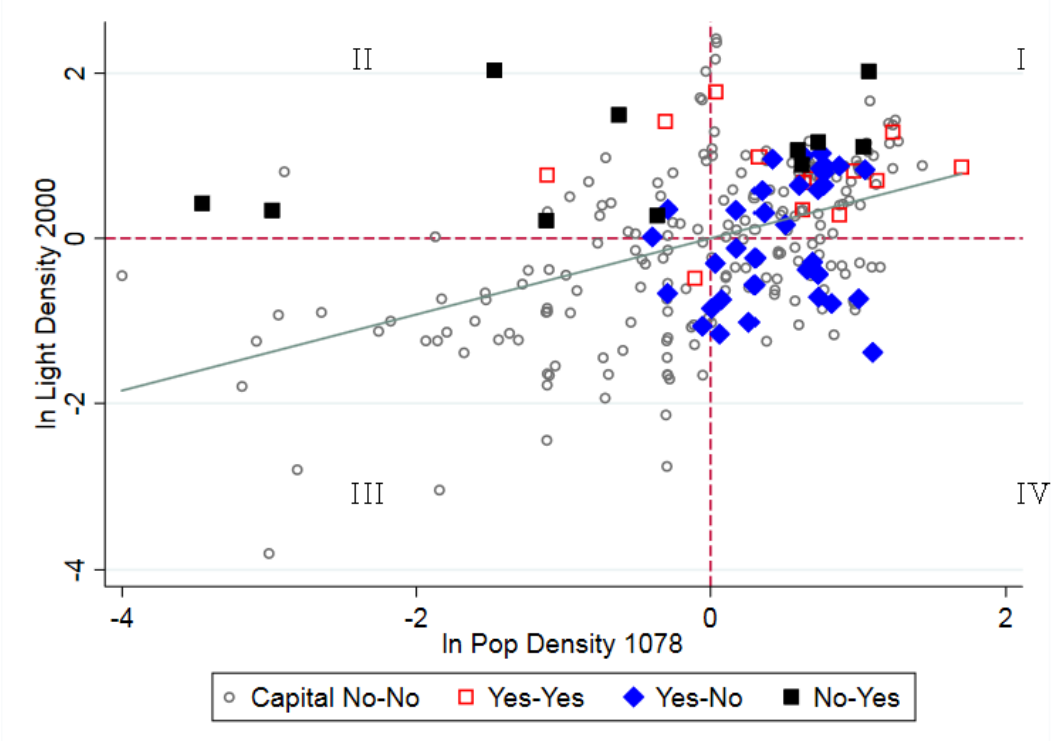
Further evidence from heterogeneous effects

Transportation matters for reallocation of resources – difficult to measure.

- Less important for prefs with more natural advantages. ▸ results

Heterogeneity within those that lost capital status.

- Crop suitability of those remain above average is 15-20% higher.



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Part II: Capital Status Matters.

- Both gaining and losing capital status matter.
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Part III: Why Does Capital Status Matter?

- The spatial hierarchy mirrors the political hierarchy: via the construction/maintenance of transportation

Conclusions

Regime changes btw 1000-2000 systematically altered the relative importance of different regions in the political hierarchy

- an opportunity to study how politics shape economic geography

We find economic advantages driven by political factors do not persist.

- one perspective to link the cross-sectional political economy literature with those emphasizing path dependence using long-term data.

The underlying logic: the spatial hierarchy mirrors the political hierarchy.

May be applied to centralized regimes (e.g., the Ottoman Empire), less so in decentralized regimes.

Thanks

Relationship to the literature

- **spatial distribution of economic activities in the long run**
  - Davis and Weinstein 2002, Miguel and Roland 2011;
  - Redding et al. 2011, Bleakley and Lin 2012, Kline and Moretti 2013...
  - Our findings are different because they are driven by political factors.
- **the political economy of regions/cities**
  - De Long and Shleifer 1993, Ades and Glaeser 1995, Davis and Henderson 2003, Galiani and Kim 2011, Campante and Do 2014
  - Ours: exploit multiple changes and uncover factors underlying the changes

Other related research:

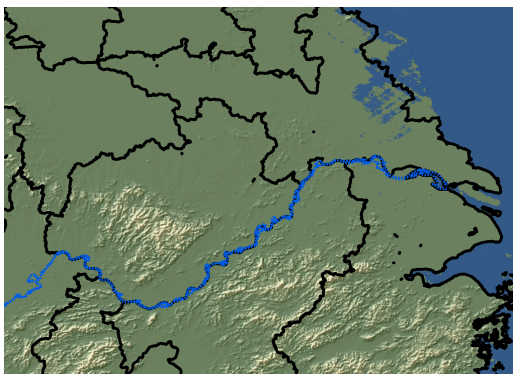
- the importance of market access
  - e.g., Redding and Sturm 2008, Donaldson and Hornbeck 2015
  - **Ours: political status $\rightarrow$ infrastructure $\rightarrow$ market access**
- causes and consequences of national/subnational divisions
  - Alesina and Spolaore 1997, Gennaioli and Rainer 2007, Michalopoulos and Papaioannou 2013 back

Two principles of defining provincial boundaries

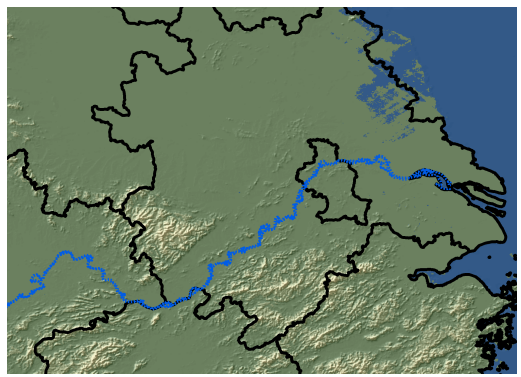
- *following mountains and rivers* (随山川形便)
- *interlocking like dog's teeth* (犬牙交错)

Evolution

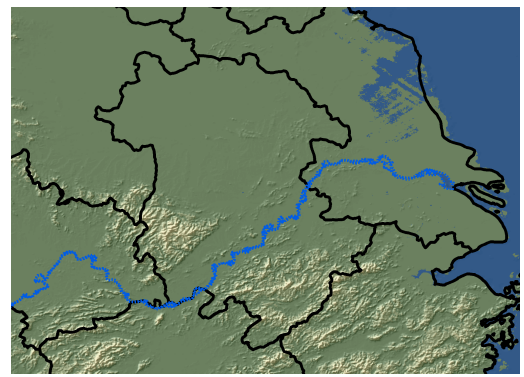
- In the Song, prov. boundaries by large followed rivers and mountains.
- Mongolians (the Yuan) used interlocking to an extreme.
- Later regimes gradually adjusted the boundaries.
- In China proper: 28 prov in Song, 10 in Yuan, 14 in Ming, 18 in Qing, 24 today.



1078



1580



1820

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A simple algorithm

$$\underset{i}{\operatorname{argmin}}\, HierDist_{i,t} \equiv \sum_{j=1}^{N} A_j D_{i,j,t} + \lambda \sum_{j=1}^{N} A_j D_{i,NationalCap,t}$$

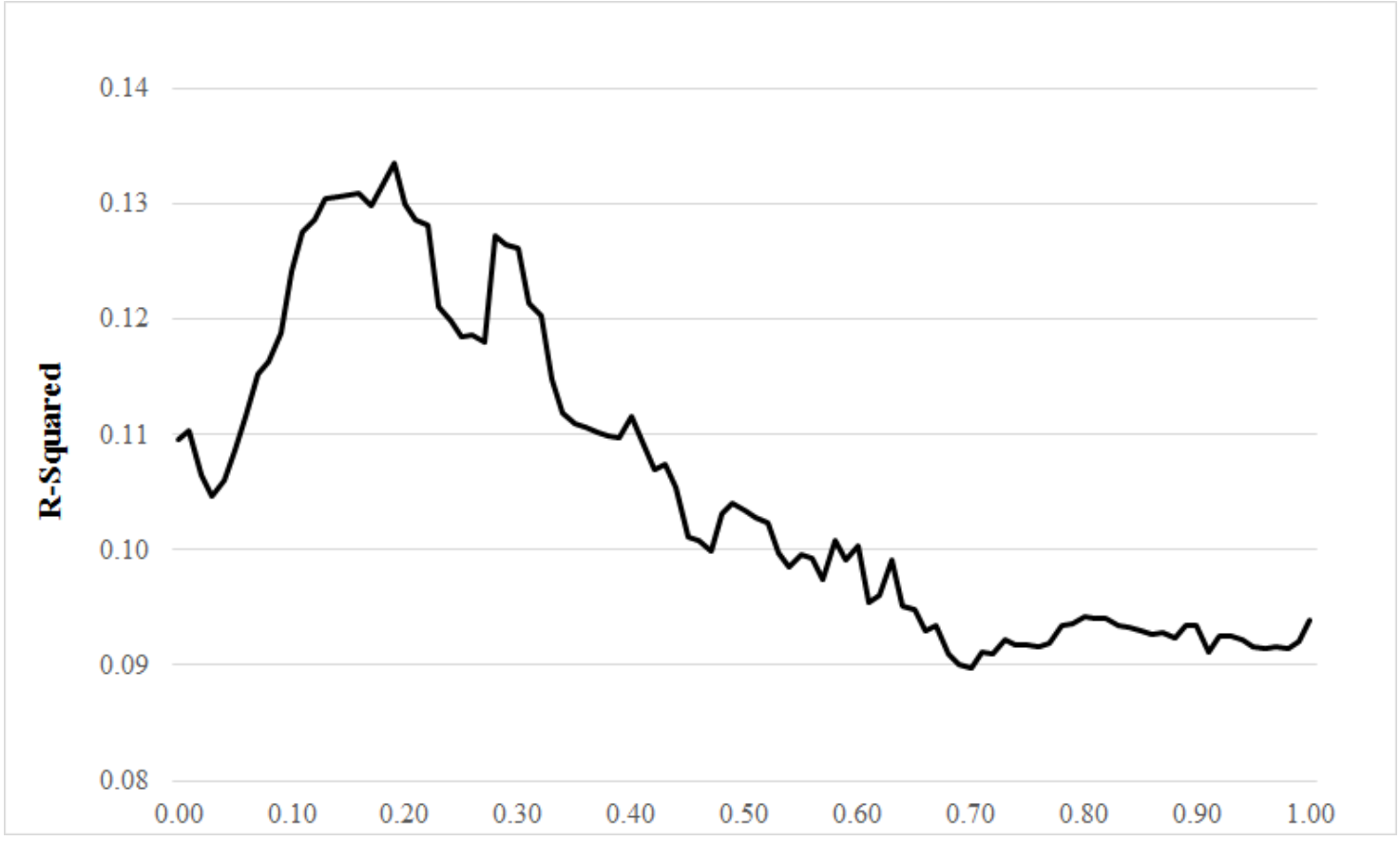
$$= \lambda(\sum_{j=1}^{N} A_j D_{i,j,t} + \sum_{j=1}^{N} A_j D_{i,NationalCap,t}) + (1-\lambda) \sum_{j=1}^{N} A_j D_{i,j,t}$$

back

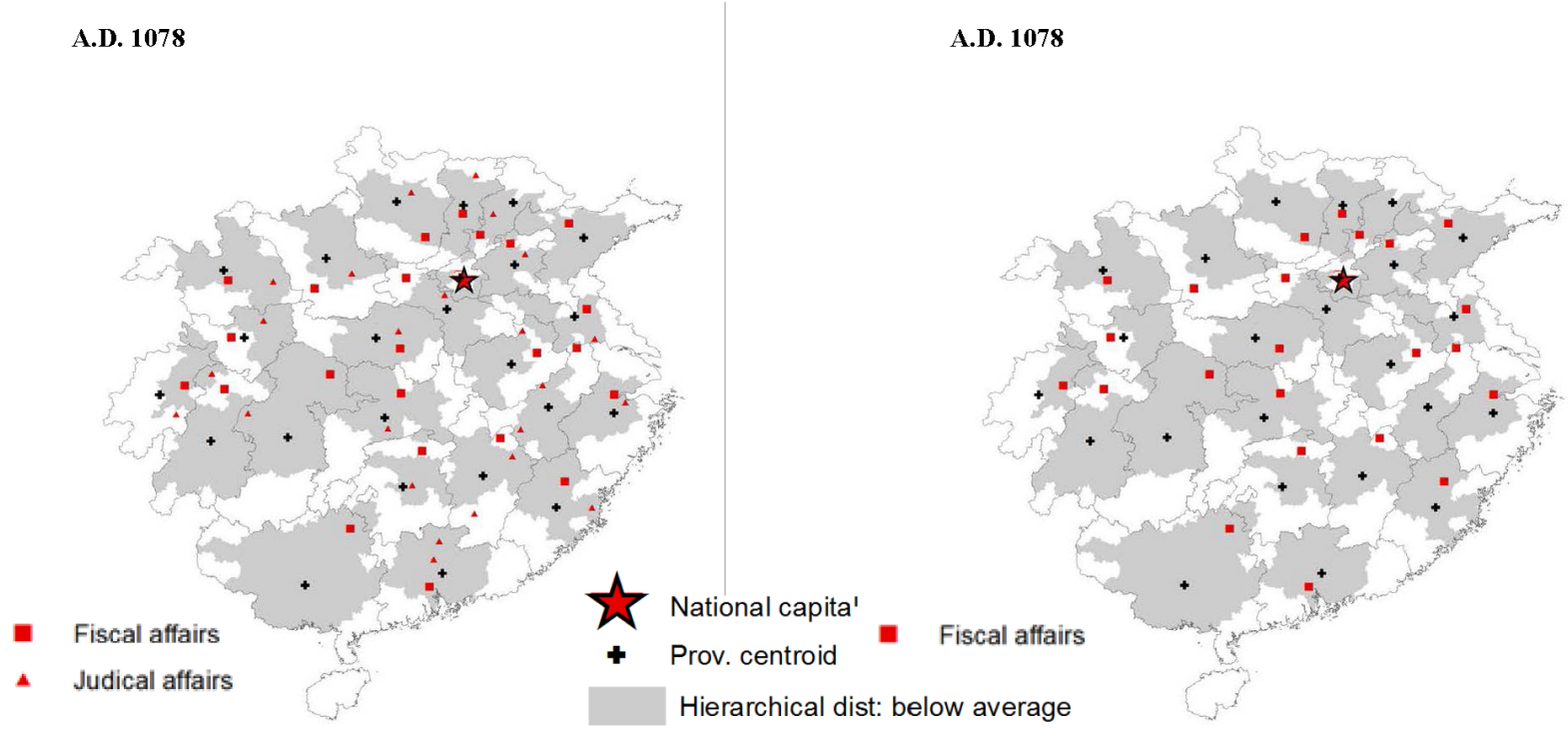
Optimal λ

$$ProvCap_{i,t} = \theta HierDist_{i,t} + Prefecture_i + year_t$$

back



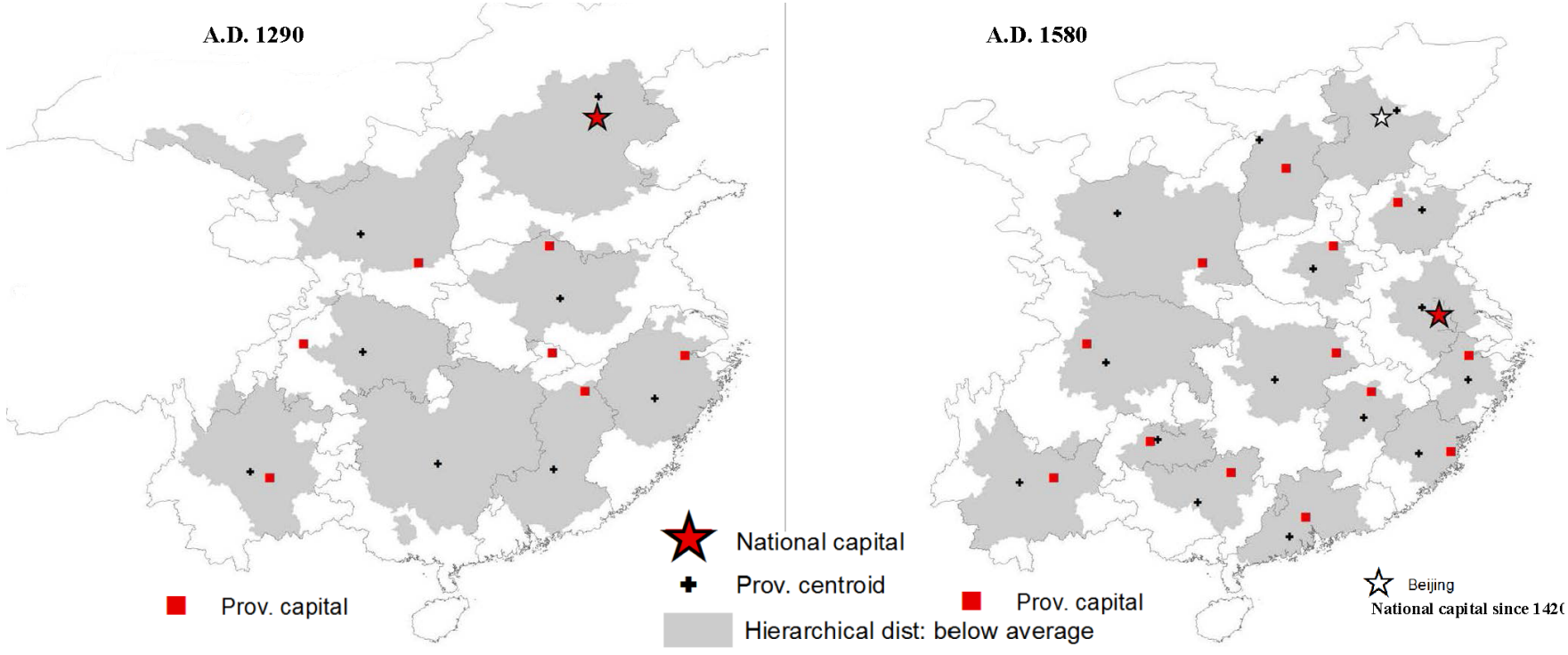
Hierarchical distance: depiction 2



The capitals deviate from prov. centroid toward the national capital.
We see orbits around the national capital

back

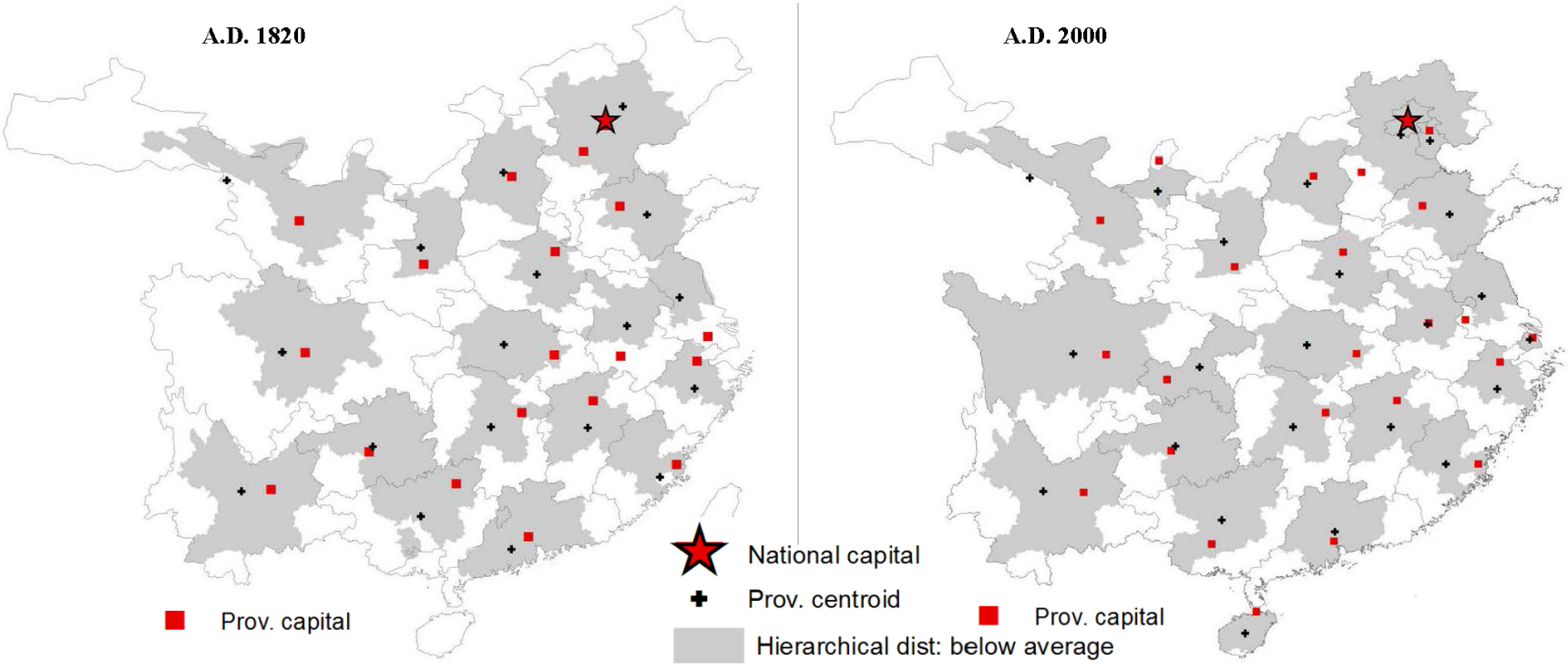
Hierarchical distance: depiction 2



The capitals deviate from prov. centroid toward the national capital.
We see orbits around the national capital

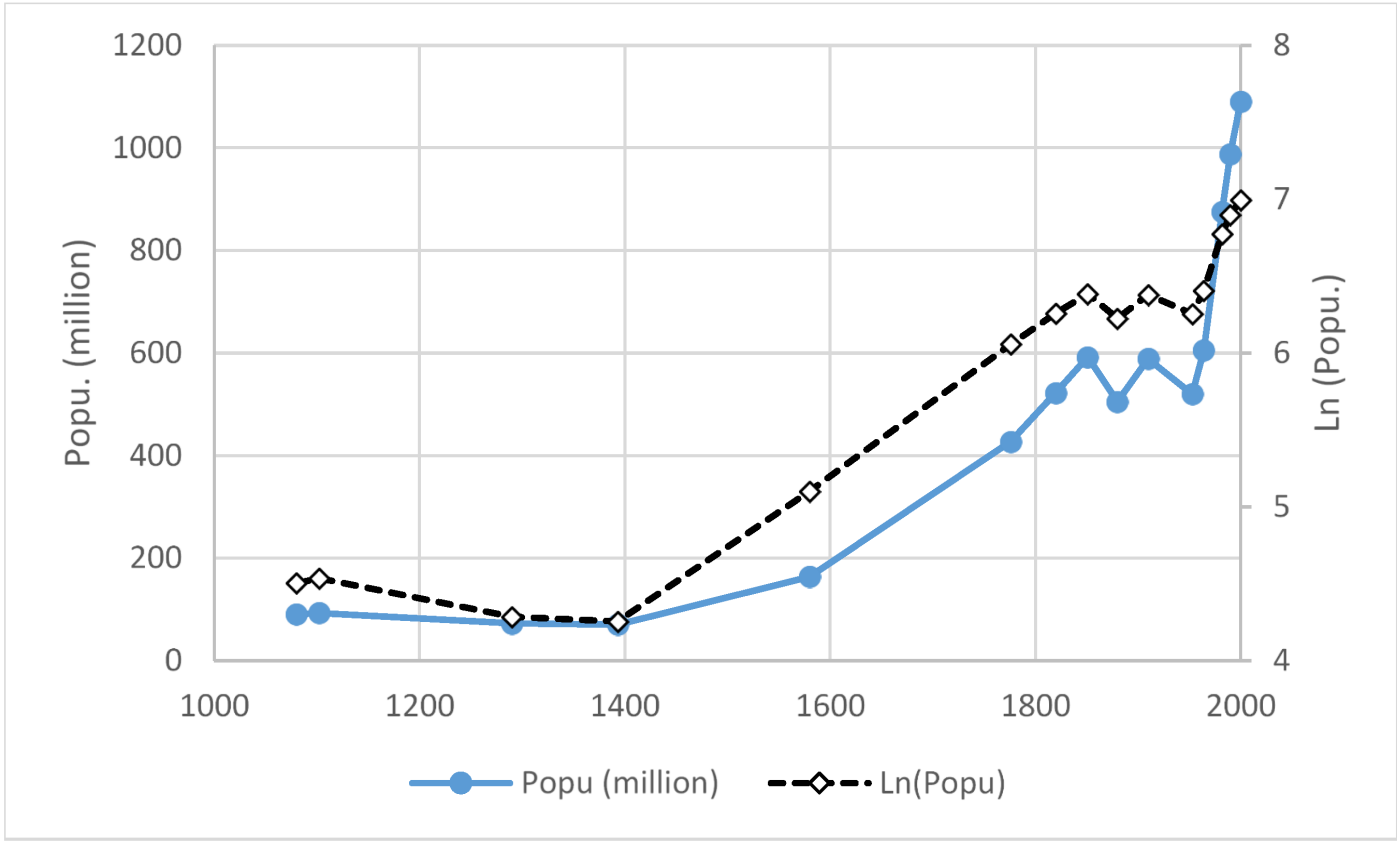
back

Hierarchical distance: depiction 2



The capitals deviate from prov. centroid toward the national capital.
We see orbits around the national capital back

population trend

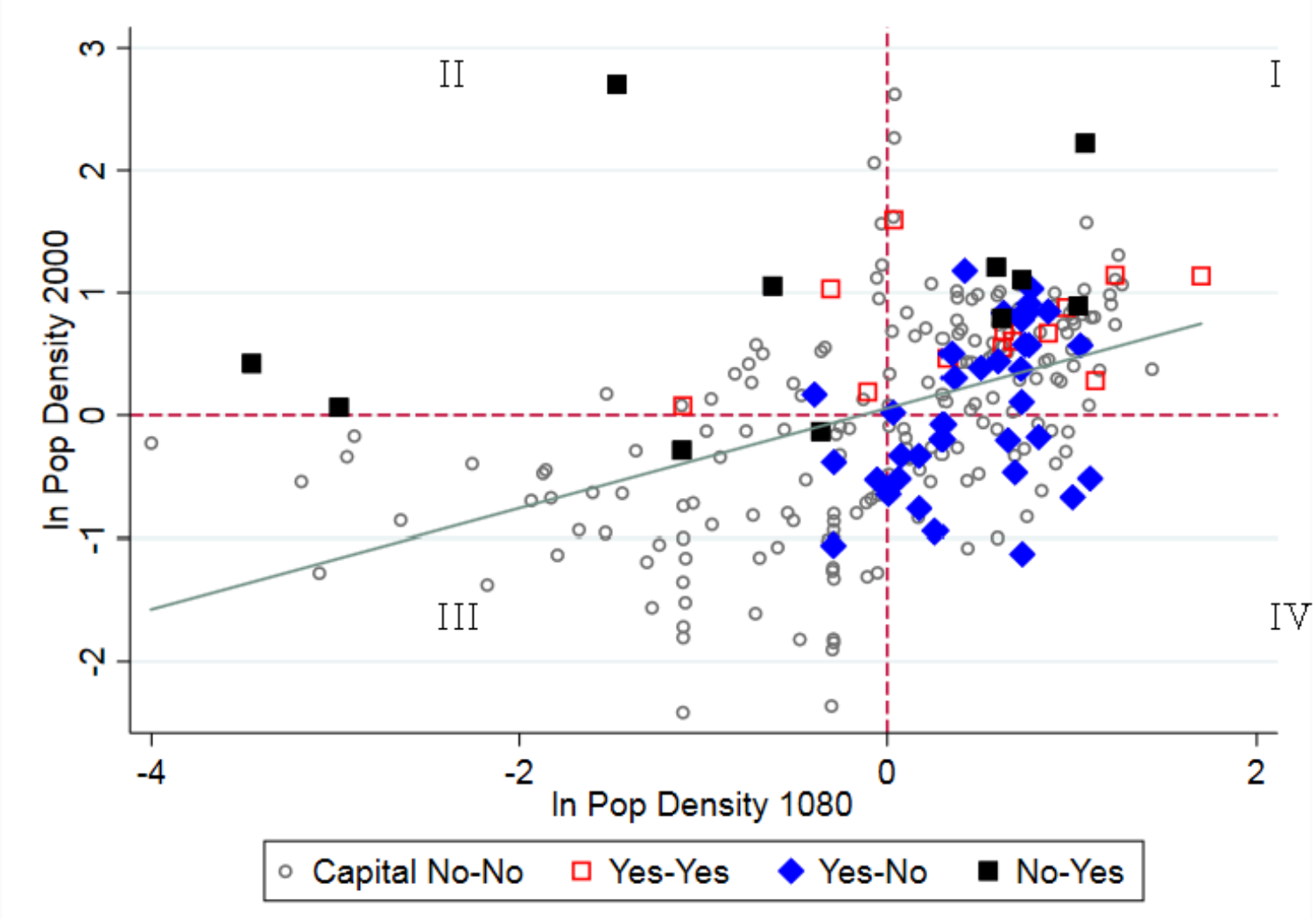


back

Macroregions

back

Pop Density 1078 vs. Pop Density 2000



back

DID: pre-trends

1. period by period, using β_{-1} as reference

$$\ln PopDensity_{i,t} = \sum_{\tau=-3+}^{2+} \beta_\tau Capital_{i,\tau} + \alpha_i + \gamma_t + \theta \mathbf{X}_i \times \gamma_t + \theta' \pi_m \times \gamma_t + \epsilon_{i,t}$$

2. consider period length $\Delta Yr_{i,t}$

$$\ln PopDensity_{i,t} = \rho_1 PRE_{i,t} + \rho_2 PRE_{i,t} \times \Delta Yr_{i,t} + \rho_3 POST_{i,t} + \rho_4 POST_{i,t} \times \Delta Yr_{i,t} + \alpha_i + \gamma_t + \theta \mathbf{X}_i \times \gamma_t + \theta' \pi_m \times \gamma_t + \epsilon_{i,t},$$

Pre-trend II

back

	(1)	(2)	(3)
Pre-Gaining	0.005		-0.002
	(0.128)		(0.127)
Pre-Gaining * Time trend	0.773		0.717
	(0.556)		(0.558)
Post-Gaining	0.509**		0.506**
	(0.218)		(0.221)
Post-Gaining * Time trend	0.615		0.562
	(0.879)		(0.901)
Pre-Losing		-0.038	-0.039
		(0.051)	(0.051)
Pre- Losing * Time trend		-0.405	-0.351
		(0.284)	(0.293)
Post- Losing		-0.359**	-0.364**
		(0.157)	(0.158)
Post- Losing * Time trend		-0.055	0.004
		(0.209)	(0.214)
All controls	Y	Y	Y
Observations	2,783	2,783	2,783
R-squared	0.865	0.862	0.867
#Prefectures	253	253	253

change in HierDis vs. pre-change conditions

back

	Δ ln Rank in Hierarchical Distance					
	(1)	(2)	(3)	(4)	(5)	(6)
l. ln Pop Density	-0.031		-0.059			
	(0.032)		(0.061)			
l2. ln Pop Density		0.008	0.036			
		(0.020)	(0.034)			
l. Δ ln Pop Density				-0.044		-0.036
				(0.041)		(0.038)
l2. Δ ln Pop Density					0.011	0.002
					(0.011)	(0.011)
All controls	Y	Y	Y	Y	Y	Y
Observations	2,610	2,349	2,349	2,349	2,088	2,088
R-squared	0.301	0.300	0.302	0.301	0.197	0.199
#Prefectures	261	261	261	261	261	261

change in HierDis vs. change in cap status

back

		Seemingly Unrelated Regression	
	ΔCapital Status	Losing	Gaining
$\Delta \ln$ Rank in Hierarchical Distance	-0.057***	0.031***	-0.026***
	(0.019)	(0.005)	(0.004)
All controls	Y	Y	Y
Observations	2,610	2,610	2,610
R-squared	0.183	0.298	0.196
#Prefectures	261	261	261

IV: First-stage

back

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
First-stage: Provincial Capital								
ln Rank Hier. dist.		-0.104***	-0.153***	-0.085***	-0.088***	-0.097***	-0.100***	-0.105***
		(0.009)	(0.012)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)
ln Rank H dist. KF * Post-			0.076***					
			(0.013)					
ln Rank H dist. NJ * Pre-				-0.084***				
				(0.014)				
ln Rank H dist. BJ * Pre-					-0.085***			
					(0.014)			
ln Rank H dist. to econ region						-0.037***		
						(0.009)		
ln Rank H dist. to Shanghai							-0.024**	
							(0.010)	
ln Rank H dist. to Guangzhou								0.002
								(0.009)
All controls		Y	Y	Y	Y	Y	Y	Y
Observations	2,871	2,871	2,871	2,871	2,871	2,871	2,871	2,871
R-squared	0.861	0.864	0.864	0.863	0.864	0.864	0.863	0.863
# Prefectures	261	261	261	261	261	261	261	261
F-Stat		145.9	164.6	87.5	96.2	122.0	128.5	143.2

Placebo test 1: by subsample

ln Rank Hierarchical dist does not matter for the never-capital prefs.

	(1)	(2)
	ln Pop Density	
Sample	Ever-Capital	Never-Capital
ln Rank in Hierarchical distance	-0.159***	0.006
	(0.037)	(0.029)
All Controls	Y	Y
Observations	693	2,178
R-squared	0.917	0.864
#Prefectures	63	198

back

Placebo test 2: using change in national cap. to obtain placebo ranks

In Rank Hierarchical distance to national capital when they were not capitals: no impact on population density

	(1)	(2)	(3)	(4)	(5)
Dependent Var.: ln Pop Density					
	Reduced-form	IV	IV	IV	IV
Prov. Capital		0.663***	0.624***	0.688***	0.638**
		(0.201)	(0.190)	(0.261)	(0.249)
ln Rank in Hierarchical distance	-0.069***				
	(0.022)				
ln Rank in H dist. KF * Post-			-0.006		
			(0.024)		
ln Rank in H dist. NJ * Pre-				0.012	
				(0.047)	
ln Rank in H dist. BJ * Pre-					-0.013
					(0.046)
All controls	Y	Y	Y	Y	Y
F-Stat (Weak instrument test)		145.9	164.6	87.5	96.2

back

Placebo test 3: two-components - over-identification test

$$HierDist_{i,t} = \lambda\left(\sum_{j=1}^{N} A_j D_{i,j,t} + \sum_{j=1}^{N} A_j D_{i,NationalCap,t}\right) + (1-\lambda)\sum_{j=1}^{N} A_j D_{i,j,t}$$

	(1)	(2)	(3)	(4)	(5)
Dependent var.:	ln Rank in Hierarchical distance ($\lambda = 0.19$)	ln Pop Density			
		Reduced-form	IV	IV	IV
Prov. Capital			0.761**	0.907***	0.844***
			(0.358)	(0.305)	(0.207)
ln Rank in H dist. ($\lambda = 1$)	0.280***	-0.042**		0.008	
	(0.010)	(0.021)		(0.029)	
ln Rank in H dist. ($\lambda = 0$)	0.769***	-0.066***	-0.011		
	(0.011)	(0.023)	(0.037)		
All controls	Y	Y	Y	Y	Y
First-stage: Provincial Capital					
ln Rank in H dist. ($\lambda = 1$)			-0.056***	-0.056***	-0.056***
			(0.008)	(0.008)	(0.008)
ln Rank in H dist. ($\lambda = 0$)			-0.073***	-0.073***	-0.073***
			(0.009)	(0.009)	(0.009)
All controls			Y	Y	Y
Observations	2,871	2,871	2,871	2,871	2,871
R-squared	0.819	0.861	0.862	0.860	0.861
# Prefectures	261	261	261	261	261
F-Stat (Weak instrument test)			46.1	64.9	69.7
Over-identification test (P-value)					0.778

back

Placebo test 4: hierarchical distance to economic center

None explains the role of hierarchical distance

Dependent Var.: ln Pop Density	(1)	(2)	(3)	(4)	(5)
	Reduced-form	IV	IV	IV	IV
Prov. Capital		0.663***	0.631***	0.726***	0.681***
		(0.201)	(0.220)	(0.215)	(0.203)
ln Rank in Hierarchical distance	-0.069***				
	(0.022)				
ln Rank in H dist. to major econ region			-0.017		
			(0.024)		
ln Rank in H dist. to the East (Shanghai)				0.036	
				(0.026)	
ln Rank in H dist. to the South (Guangzhou)					0.012
					(0.022)
All controls	Y	Y	Y	Y	Y
F-Stat (Weak instrument test)		145.9	122.0	128.5	143.2

back

Capital ever

	Capital-ever Prefectures				Capital-ever Prefs + Comparison Group			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
					Neighbors<100 km		Propensity Score Matching	
Prov. Capital	0.470***	0.426***	0.280**	0.295***	0.467***	0.341***	0.512***	0.375***
	(0.151)	(0.132)	(0.105)	(0.110)	(0.126)	(0.104)	(0.129)	(0.127)
Capital-ever * Year FE						Y		Y
Year FE * Crop suitability				Y		Y		Y
Year FE * Geography			Y	Y		Y		Y
Year FE * ln Area		Y	Y	Y		Y		Y
Year FE * Region FE	Y	Y	Y	Y	Y	Y	Y	Y
Pref. FE	Y	Y	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y	Y	Y
Observations	693	693	693	693	1,397	1,397	1,221	1,221
R-squared	0.778	0.880	0.904	0.919	0.798	0.914	0.781	0.878
#Prefectures	63	63	63	63	127	127	111	111

back

Determinants of capital ever

	(1) OLS	(2) OLS	(3) OLS	(4) OLS	(5) OLS	(6) OLS	(7) Probit
Plain	0.228***	0.238***	0.235***	0.233***	0.231***	0.248***	0.224***
	(0.046)	(0.056)	(0.060)	(0.060)	(0.060)	(0.061)	(0.048)
Main River	0.152***	0.113**	0.149**	0.162**	0.163**	0.169**	0.154***
	(0.050)	(0.056)	(0.066)	(0.068)	(0.068)	(0.066)	(0.056)
ln Area			-0.062	-0.055	-0.054	-0.099	-0.090
			(0.087)	(0.088)	(0.088)	(0.098)	(0.075)
Coastal			0.003	0.002	0.002	-0.003	-0.010
			(0.023)	(0.023)	(0.023)	(0.026)	(0.027)
Slope			0.034	0.032	0.032	0.028	0.030
			(0.039)	(0.039)	(0.039)	(0.046)	(0.042)
ln Elevation			0.014	0.007	0.006	0.014	0.015
			(0.012)	(0.014)	(0.014)	(0.013)	(0.014)
Latitude			0.005	0.010	0.011	-0.010	-0.010
			(0.015)	(0.016)	(0.016)	(0.017)	(0.016)
Longitude			0.003	-0.030	-0.033	0.003	0.005
			(0.039)	(0.047)	(0.046)	(0.039)	(0.040)
ln Calories: Old World Crops				0.032			
				(0.028)			
ln Calories: All Crops					0.035		
					(0.027)		
Suitability: wheat						-0.011	-0.007
						(0.047)	(0.043)
Suitability: rice						-0.065	-0.069
						(0.051)	(0.044)
Suitability: maize						0.084**	0.087*

Urbanization

Dependent Var.	(1)	(2)	(3)	(4)	(5)	(6)
	Urbanization Ratio		ln Urban Pop		ln Rural Pop	
Prov. Capital	11.011***	10.934***	0.636***	0.595***	0.197**	0.186**
	(2.100)	(2.287)	(0.166)	(0.151)	(0.081)	(0.094)
Year FE * Crop suit.		Y		Y		Y
Year FE *Geography		Y		Y		Y
Year FE * Ln Area	Y	Y	Y	Y	Y	Y
Year FE * Region FE	Y	Y	Y	Y	Y	Y
Pref. FE, Year FE	Y	Y	Y	Y	Y	Y
Observations	1,531	1,531	1,531	1,531	1,531	1,531
R-squared	0.782	0.814	0.879	0.892	0.845	0.872
# Prefectures	261	261	261	261	261	261

back

Dropping Periods

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
		Baseline							
Prov Capital		0.429***	0.366***	0.415***	0.519***	0.397***	0.469***	0.410***	0.547***
		(0.102)	(0.128)	(0.109)	(0.116)	(0.127)	(0.100)	(0.119)	(0.134)
All controls		Y	Y	Y	Y	Y	Y	Y	Y
Observations		2,871	2,349	2,610	1,827	1,827	1,044	783	522
R-squared		0.865	0.856	0.866	0.889	0.836	0.875	0.822	0.913
#Prefectures		261	261	261	261	261	261	261	261
Song	1080	Y		Y	Y	Y	Y	Y	Y
	1102	Y		Y	Y	Y			
Ming	1580	Y	Y		Y	Y	Y	Y	
Qing	1776	Y	Y	Y		Y			
	1820	Y	Y	Y		Y			
	1851	Y	Y	Y		Y	Y	Y	
	1910	Y	Y	Y		Y			
P R China	1964	Y	Y	Y	Y				
	1982	Y	Y	Y	Y				
	1990	Y	Y	Y	Y				
	2000	Y	Y	Y	Y		Y		Y

back

Grid-level Data

1×1 degree

	ln Pop Density				Δ ln Pop Density	
	(1)	(2)	(3)	(4)	(5)	(6)
Prov. Capital	0.328***	0.328***	0.304***	0.295***		
	(0.065)	(0.065)	(0.059)	(0.054)		
Δ Prov. Capital					0.293***	
					(0.053)	
Gaining Capital status						0.225***
						(0.083)
Losing Capital status						-0.344***
						(0.063)
Year FE * Crop suitability				Y	Y	Y
Year FE * Geography			Y	Y	Y	Y
Year FE * ln Area		Y	Y	Y	Y	Y
Year FE * Region FE	Y	Y	Y	Y	Y	Y
Grid FE, Year FE	Y	Y	Y	Y		
Observations	3,971	3,971	3,971	3,971	3,610	3,610
R-squared	0.797	0.797	0.825	0.836	0.526	0.526
# grids	361	361	361	361	361	361

back

Including the years after deadly wars

	ln Pop Density				Δ ln Pop Density			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Prov. Capital	0.502***	0.489***	0.432***	0.440***				
	(0.119)	(0.101)	(0.097)	(0.098)				
Δ Prov. Capital					0.420***	0.339***		
					(0.105)	(0.086)		
Gaining Capital Status							0.457**	0.471***
							(0.218)	(0.164)
Losing Capital Status							-0.401***	-0.272***
							(0.117)	(0.100)
L. ln Pop Density						-0.292***		-0.293***
						(0.017)		(0.017)
Year FE * Crop suitability				Y	Y	Y	Y	Y
Year FE * Geography			Y	Y	Y	Y	Y	Y
Year FE * ln Area		Y	Y	Y	Y	Y	Y	Y
Year FE * Region FE	Y	Y	Y	Y	Y	Y	Y	Y
Pref. FE	Y	Y	Y	Y				
Year FE	Y	Y	Y	Y	Y	Y	Y	Y
Observations	3,654	3,654	3,654	3,654	3,393	3,393	3,393	3,393
R-squared	0.782	0.849	0.866	0.874	0.718	0.789	0.718	0.789
# prefectures	261	261	261	261	261	261	261	261
Magnitude: gaining vs. losing capital (p-value):							0.825	0.305

back

Gravity: Pre-trends

back

	Standardized Gravity		
	(1)	(2)	(3)
Gaining Pre-2	0.038		0.056
	(0.151)		(0.154)
Gaining Post-1	0.610**		0.593**
	(0.252)		(0.258)
Gaining Post-2	0.495***		0.461**
	(0.184)		(0.182)
Losing Pre-2		0.128	0.126
		(0.212)	(0.216)
Losing Post-1		-0.329**	-0.318**
		(0.156)	(0.156)
Losing Post-2		-0.390***	-0.374***
		(0.123)	(0.123)
All controls	Y	Y	Y
Observations	1,016	1,016	1,016
R-squared	0.274	0.276	0.283

Further evidence from heterogeneous effects

Transportation matters for reallocation of resources – difficult to measure.

- Less important for prefs with more natural advantages. back

	ln Pop Density				Δ ln Pop Density	
	(1)	(2)	(3)	(4)	(5)	(6)
Prov. Capital	0.454***	0.444***	0.457***	0.443***		
	(0.103)	(0.102)	(0.102)	(0.101)		
Prov. Capital * max suitability (old world)	-0.169**					
	(0.083)					
Prov. Capital * max suitability (old+new)		-0.139*				
		(0.084)				
Prov. Capital * avg. suitability (old world)			-0.169**			
			(0.079)			
Prov. Capital * avg. suitability (old+new)				-0.150*		
				(0.078)		
Δ Prov. Capital					0.436***	
					(0.110)	
Δ Prov. Capital * max suitability (old world)					-0.186*	
					(0.096)	
Gaining Capital Status						0.444**
						(0.210)
Losing Capital Status						-0.431***
						(0.127)
Gaining Status * max suitability (old world)						-0.193*
						(0.110)
Losing Status * max suitability (old world)						0.179
						(0.149)