The Innovation Cost of Short Political Horizons

Evidence from Local Leaders' Promotion in China

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Research Question

Does the political horizon of a local leader matter for policy choice?

- Government can affect economic growth with policies in the short and long run
  - Financing science and other policies in support of Innovation translate into growth with a delay, while infrastructure projects may boost short-term growth
  - Politicians who chose policies take into account their expected horizons
- Hypothesis: politicians who expect fast promotion may underinvest in innovation

Setting: Chinese City Leaders and Innovation Policies

- Can impact innovation through fiscal/financial/administrative tools ▸ policy framework
- Uncertain tenure
  - Make career progression if/when moved up in the hierarchy
  - Both economic performance and political connections matters for promotion

What's the effect of tenure expectation on innovation policies?

Roadmap of Talk

Empirical Design

Data and Measurements

Results and Discussions

Conclusion

Exploit Political Connection as Identifying Variation

- Endogeneity problem:policies affect the length of tenure

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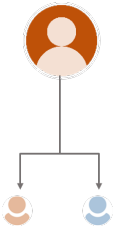

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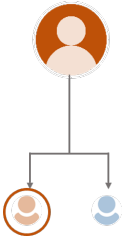

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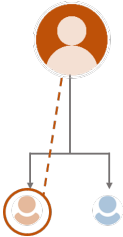

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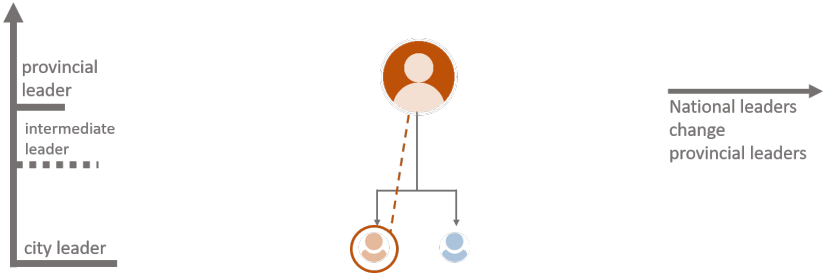

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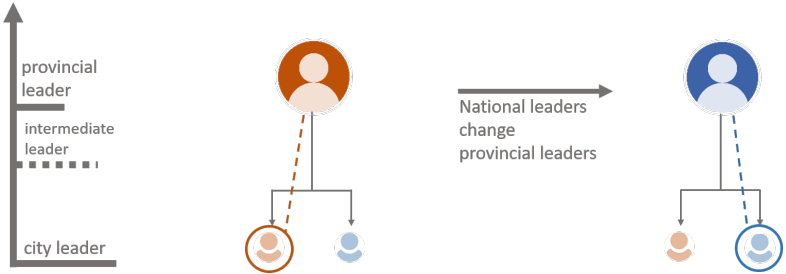

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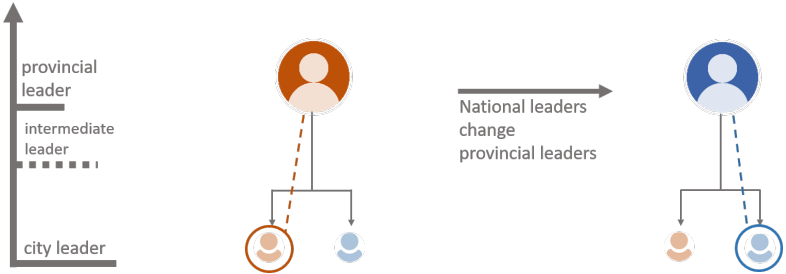
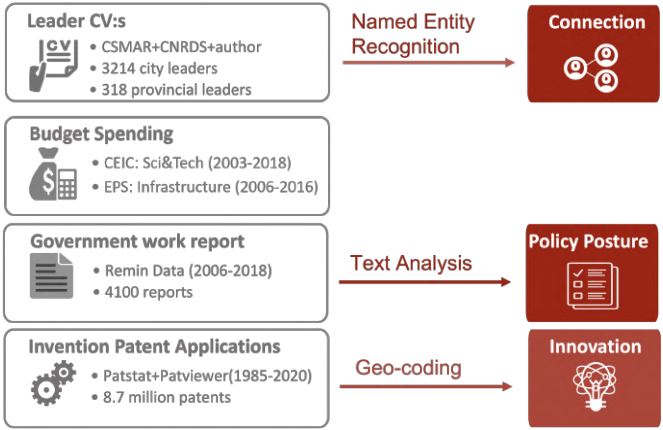


- Isolate selection from treatment by controlling for the timing of switching connection

Data



▸ CV example ▸ summary statistics of leader features ▸ summary statistics of outcomes

Measurements: Political Connections and Policy Posture

Subordinate-superior Ties in CV:s Network as Connection

- L is connected to H if L used to work as a **direct subordinate appointed** by H
  - **direct subordinate**: H's position supervised L's position directly
  - **appointed**: H arrived before L

▸ formula ▸ alternative functional form of valuing work connection ▸ other form of connections

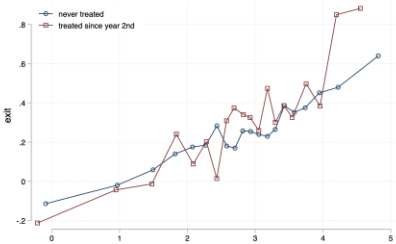
Policy Measures Using Government Work Report

$$\text{Posture of policy} = \frac{\text{length of sentences on policy}}{\text{length of document}}$$

▸ topic classification ▸ correlation between policy posture and real outcomes

Finding 1/3: Connected Leaders Have Shorter Expected Tenure

Exiting rate by term year, NC v.s. NN among T>1&switch at 1



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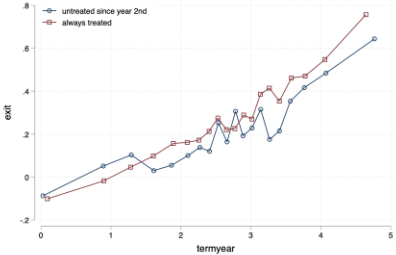
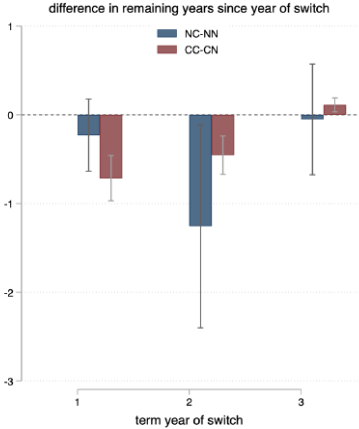


Remaining years at spell level



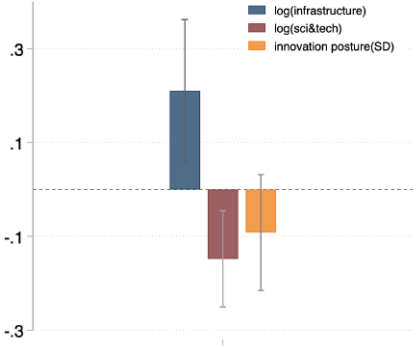
▸ specification for dynamic exiting

▸ other connections

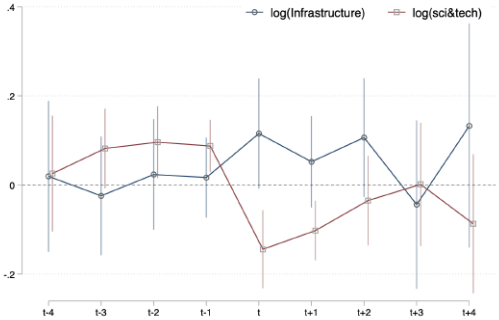
Findings 2/3: Fast-over-slow Policy Pursuit

⇑infrastructure,⇓ sci&tech spending and priority of innovation

Reduced-form



Event study: log(Gov.spending)

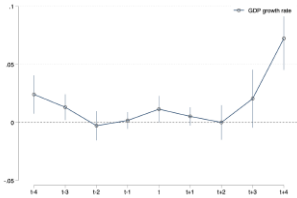


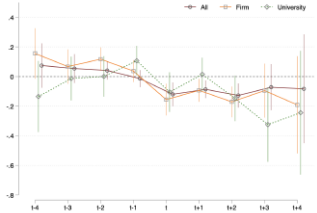
▸ Reduced form specification ▸ Reregession table

▸ Event study design

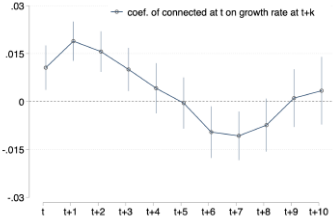
Findings 3/3: Short-run Growth at the Cost of Future Innovation

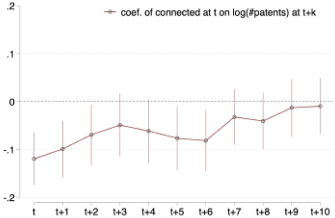
Event study results: GDP growth rate v.s. log(# patents)





Dynamic effect from t till t+10 (IRF)





▸ pretends

Interpretation and Discussions

Connected → Shorter horizon → Fast-over-slow policy - - - → Less innovation

Exclusion restriction

- No Difference in resource transfer ▸ Fiscal resource
- Unlikely to be driven by promotion ▸ Placebo test

Alternative mechanisms

- Rent-seeking or risk-seeking through infrastructure developments?

How policy impacts innovation?

- Both direct effect and indirect effects at play ▸ Heterogeneous effects: edu v.s. firm

Conclusion and Implication

To conclude

- With a novel exogenous variation in political connection as identifying variation
- Show that connected leaders have shorter expected tenure and invest in short-run growth-enhancing policies at the cost of longer-term innovation

Implications for China's economic transition

- Bureaucratic incentives may erect an institutional barrier for the transition from "made-in-China" towards "innovated-in- China"
- Substituting innovation with infrastructure lowers future growth when China is approaching the technology frontier

Appendix

Local Government's Policies on Innovation

back

National Government Guide...

- Five-year plans
- National Mid-to-long-term Plan for Science and Technology (2006-2020)

Local Governments Implement... with Discretion

- Direct financing through budget spending and off-budget spending
- Indirect financing through tax refund, credit and public procurement
- Platforms/organzations to facilitate innovation

the example of Dongguan

The Example of Dongguan ▸ back

The Program of Technology Dongguan (2005-2010)

- 5 Billion RMB (1.8%) from city government's budget
- to subsize firm's technology upgrade

Dongguan Songshan Lake Science Park

- Indirect financial support+platform

2000: farmland

2002: first highway

2020: >1500 tech-firms

CV Example

back

周先旺

留言

1980.12 湖北省建始县青花公社党委办公室干事

1981.09 湖北省建始县青花公社团委副书记、高坪区团委书记

1985.10 共青团湖北省建始县委副书记

NER method

```
{'org_name': ('共青团县委',),
 'OfficeCls': 'cyl',
 'job_title': ('副书记',),
 'TitleCls': 'vice-head',
 'locID': '422822',
 'RankValue': '1-Deputy-Section-Head'}
```

...

2003.02 湖北省恩施州委副书记、州长（其间：2007.03-2008.

2008.02 湖北省商务厅厅长、党组书记、省外资办主任

2012.11 湖北省黄石市委书记

2014.01 湖北省黄石市委书记、市人大常委会主任

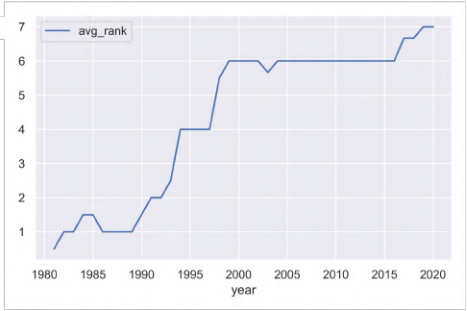
2017.03 湖北省副省长，黄石市委书记、市人大常委会主任

2017.04 湖北省副省长

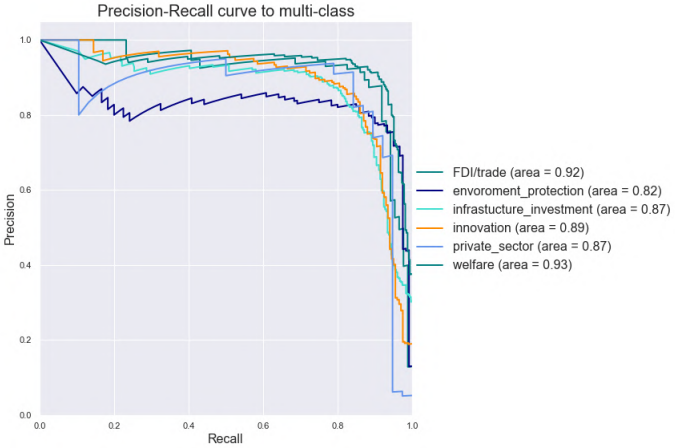
2018.05 湖北省武汉市委副书记、副市长、代市长

2018.09 湖北省武汉市委副书记、市长

2021.01 湖北省政协党组成员

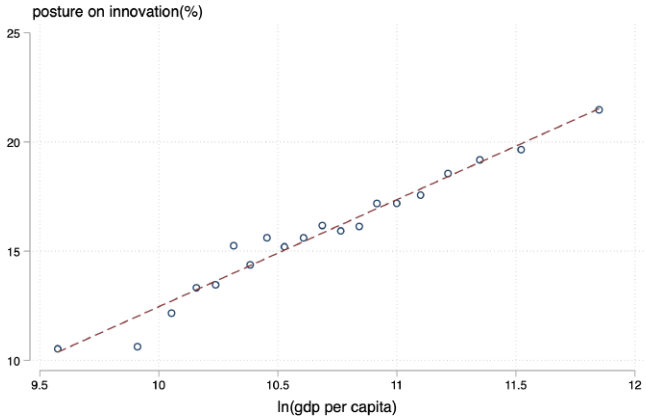


Text Classification back



Correlation between Text Measurement and Real Outcomes

back



Summary Statistics of Outcome Variables

back

	Statistic					Share of Variation	
Variables	Count	Mean	Std	5th Percentile	95th Percentile	Within	Between
Innovation Outcome							
# of Patents	6015	989.80	3664.48	4.00	4453.00	0.56	0.44
Firm	6015	589.58	2664.50	0.00	2415.00	0.54	0.46
University	6015	154.14	701.09	0.00	719.00	0.54	0.46
GDP Growth Rate(%)	5171	13.09	8.85	0.60	26.55	0.94	0.06
Policy Outcome							
Budget Spending (million yuan)							
Infrastructure	2575	1097.01	2320.50	50.49	4541.80	0.39	0.61
Sci &Tech	3658	533.27	1751.03	11.98	2064.90	0.47	0.53
Innovation Posture(%)	3824	12.28	6.49	3.62	24.61	0.74	0.26

Summary Statistics of Leader Features ▸ back

	Statistic					Share of Variation	
Variables	Count	Mean	Std	5th Percentile	95th Percentile	Within	Between
Leader Features (city-year panel)							
$Connected^{start}$	6209	0.80	0.40	0.00	1.00	0.78	0.22
$Connected^{start\ psecretary}$	6090	0.62	0.49	0.00	1.00	0.76	0.24
$Connected^{start\ mayor}$	5935	0.57	0.50	0.00	1.00	0.75	0.25
$Connected$	6211	0.68	0.47	0.00	1.00	0.81	0.19
$Connected^{psecretary}$	6086	0.47	0.50	0.00	1.00	0.82	0.18
$Connected^{mayor}$	5959	0.50	0.50	0.00	1.00	0.80	0.20
$STEM^{psecretary}$	6269	0.37	0.48	0.00	1.00	0.77	0.23
$STEM^{mayor}$	6269	0.35	0.48	0.00	1.00	0.77	0.23
$FastTrack^{psecretary}$	6229	0.32	0.47	0.00	1.00	0.79	0.21
$FastTrack^{mayor}$	6133	0.29	0.46	0.00	1.00	0.79	0.21
$Age^{psecretary}$	6086	52.20	3.79	45.00	58.00	0.77	0.23
Age^{mayor}	5986	50.31	4.01	43.00	56.00	0.75	0.25
Turonver Outcome (finished city-leader spell)							
$TermLen^{psecretary}$	1935	3.69	1.77	1.08	6.92	0.81	0.19
$TermLen^{mayor}$	2078	3.42	1.66	1.08	6.25	0.74	0.26
$Promoted^{psecretary}$	1953	0.39	0.49	0.00	1.00	0.76	0.24
$Promoted^{mayor}$	1978	0.33	0.47	0.00	1.00	0.82	0.18

Subordinate-superior Ties in CV:s Network as Connection

back

set of years when i-j work as subordinate-superior in the past

$$Connected_{i,t} = 1 \left\{ \left(\sum_{\underbrace{j \in sup(i,t)}_{\text{current superiors}}} ||\overbrace{T_{i,j,t-1}}^{\text{set of years when i-j work as subordinate-superior in the past}}|| \right) >= 1 \right\}$$

A speedy method to search through the network of leaders' career trajectories

1. Parse CV as a list of job events using NLP-NER method
2. Define the matrix of position hierarhcy H based on administration rules
3. Create the matrix of assignment status $Position(t)$ for all politicians at time t
4. Find subordinate-superior ties using $Position(t) \cdot H \cdot (Position(t)')$

Alternative Function forms of Connection Intensity

back

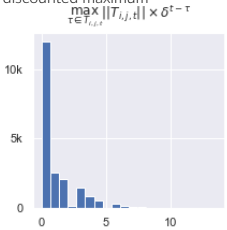
Denote $\omega_{i,j,t}$ as the connection intensity between i and j at time t

Monotonicity Constraints

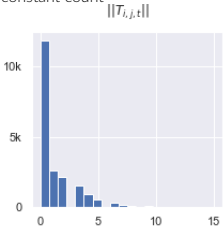
- $\omega_{i,j,t}$ is non-decreasing in $||T_{i,j,t}||$, conditional on τ_{min} and τ_{max}
- $\omega_{i,j,t}$ is non-decreasing in τ_{max}, conditional on $||T_{i,j,t}||$ and τ_{min}
- $\omega_{i,j,t}$ is non-decreasing in τ_{min}, conditional on $||T_{i,j,t}||$ and τ_{max}

Eligible Function Forms and Histogram of $\omega(T_{i,j,t})$

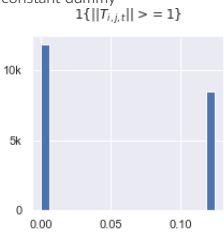
discounted maximum



constant count



constant dummy



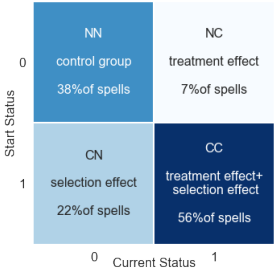
Distribution and Correlation between Different Types of Connection

back

Identification: Within-city Shocks in Connection

back

To isolate selection from treatment



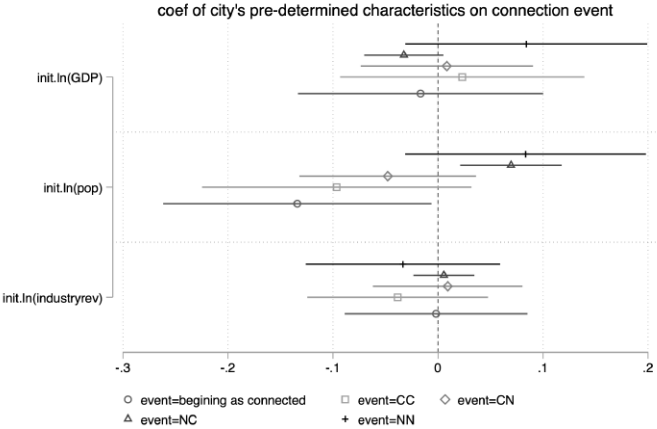
Assumption

- Conditional on selection, the timing of switching connection is exogenous to outcomes

who becomes connected | Whether cities select into having connected leaders | when do superiors change

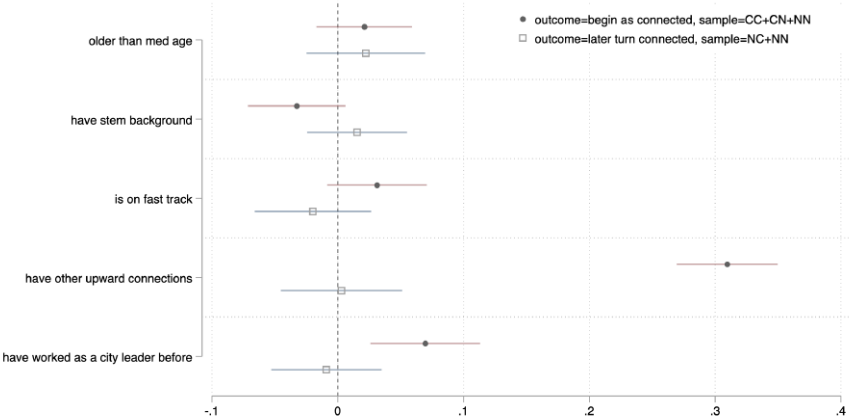
Which Cities Receive Connected Leaders? back

$$ConnEvent_{c,s} = \eta_1' X^0_{c,s} + \eta_2' \Delta y^0_{c,s} + CityFE + TrendFE + unobservable$$



Who Starts as Connected back

$$ConnEvent_{i,c} = X_i\Omega + \tau_{t_{i,c}} + \delta_c + \varepsilon_{i,c}$$



When do Superiors Changes back

Specification for Dynamic Exiting ▸ back

Tenure and Promotion

whether i has stayed for S years in office

$$\pi_{i,c,t} = \gamma * Connected_{i,c,t} + \gamma^{start} * \underbrace{Connected_{i,c}^{start}}_{\text{whether starting as connected}} + \gamma_s * \overbrace{S_{i,c,t}} + X_{i,c,t}\Gamma + \delta_c + \tau_t + u_{i,c}$$

leader, city, year

- γ = the contemporaneous effect of connection on turnover outcome, holding constant selection

▸ Connection status over years in term

Alternative Specification for city outcome

back

Policies, Growth and Innovation

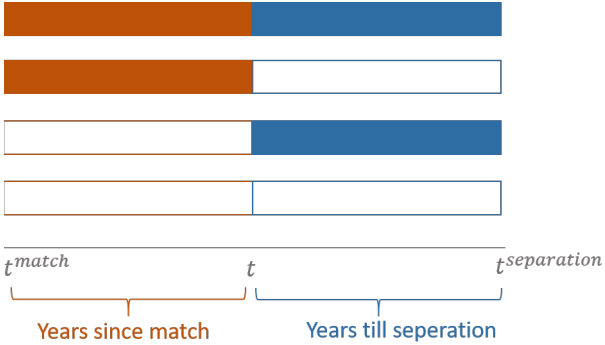
$$y_{c,t} = \theta * Connected_{c,t} + \theta^{start} * Connected^{start}_{c,t} + \theta_s * S_{c,t} + X_{c,t}\Theta + \eta_c + \xi_t + \varepsilon_{c,t}$$

- θ = the contemporaneous effect of connection on city outcome

Connection status over years at city level
Alternative Event Study Design for City Outcomes

Main Specification: an Event Study Design for City Outcomes

back

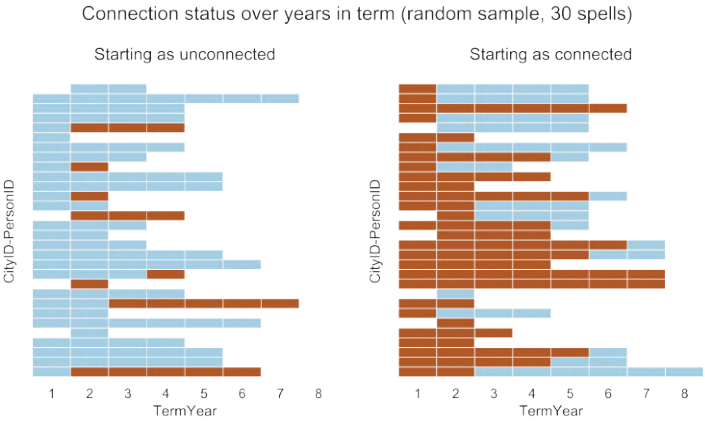


$$y_{c,t} = \sum_{k=1}^{k=5} \theta_{-k} 1\{\text{k Yrs before } SupArrival^{next}\} * Connected_{c,t}^{next}$$
$$+ \sum_{k=1}^{k=5} \theta_{k} 1\{\text{k Yrs after } SupArrival\} * Connected_{c,t} + Controls + FEs + u_{c,t}$$

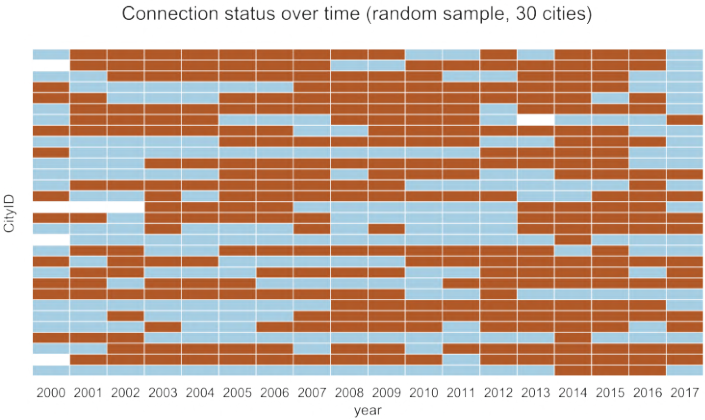
Connection Status over Years in Term at Spell Level

back

- 5.6% spells are staggered treated and 35% are never treated
- 23% are staggered untreated and 35% is always treated



Connection Status over Years at City Level back



Findings 2: The Pursuit of Infrastructure over Innovation

back

	log(Gov Spending)		Policy Posture(SD)
	Infrastructure	Sci&Tech)	Innovation
Variables	(1)	(2)	(3)
Connected	0.0687*	-0.0997***	-0.0739**
	(0.041)	(0.032)	(0.037)
Connected^{start}	-0.0721	0.0370	-0.0133
	(0.049)	(0.041)	(0.049)
Observations	2,391	4,262	3,311
R-squared	0.865	0.935	0.707
Mean	6.103	4.581	-0.019
City and year FE	X	X	X
Controls	X	X	X
SE Cluster	City	City	City

⇑ 6.8% in spending on infrastucture

⇓ 10% in spending on sci&tech

⇓ 0.074 (SD) in policy posture

Effect of Other type of Connections on Turnovers

back

	Leave			Promoted		
Variables	(1)	(2)	(3)	(1)	(2)	(3)
$ShareUni$	-0.0129			0.0416*		
	(0.022)			(0.023)		
$ShareHometown$		0.0120			0.0393*	
		(0.018)			(0.023)	
$ShareBoth$			-0.0022			0.0320*
			(0.014)			(0.016)
$STEM$	-0.0074	-0.0075	-0.0073	0.0130	0.0127	0.0129
	(0.008)	(0.008)	(0.008)	(0.009)	(0.009)	(0.009)
$1\{Age > 50\}$	0.0411***	0.0410***	0.0410***	-0.0351***	-0.0358***	-0.0354***
	(0.008)	(0.008)	(0.008)	(0.009)	(0.009)	(0.008)
Observations	12,668	12,495	12,668	10,160	10,149	10,160
R-squared	0.268	0.245	0.268	0.096	0.094	0.096
Mean	0.087	0.087	0.087	0.087	0.087	0.087
City and year FE	X	X	X	X	X	X
Controls	X	X	X	X	X	X
SE Cluster	City	City	City	City	City	City

Pre-trends for IRF dynamics back

$$y_{t-k} = \theta_k * Connected_{c,t} + \theta_k^{start} * Connected_{c,t}^{start} + X_{c,t-k}\Theta_k + \delta_c + \tau_{t-k} + \varepsilon_{c,t-k}$$

	t-1	t-2	t-3	t-4	t-5
Variables	(1)	(2)	(3)	(4)	(5)
Panel A: Grow Rate in GDP					
Connected	-0.0023	-0.0075***	-0.0048	-0.0008	0.0015
	(0.003)	(0.003)	(0.003)	(0.003)	(0.004)
$Connected^{start}$	0.0137***	0.0082*	-0.0009	-0.0045	-0.0017
	(0.004)	(0.004)	(0.004)	(0.004)	(0.005)
Observations	3,748	3,700	3,602	3,488	3,335
R-squared	0.547	0.539	0.521	0.468	0.429
Mean	0.133	0.138	0.143	0.152	0.159
Panel B: log(# of invention patents application)					
Connected	-0.0054	0.0093	0.0215	0.0092	0.0185
	(0.030)	(0.029)	(0.030)	(0.029)	(0.029)
$Connected^{start}$	-0.0383	-0.0056	-0.0111	0.0381	-0.0028
	(0.046)	(0.042)	(0.042)	(0.042)	(0.043)
Observations	3,753	3,704	3,608	3,501	3,349
R-squared	0.934	0.929	0.928	0.928	0.928
Mean	5.357	5.142	4.943	4.749	4.576
City and Year FE	X	X	X	X	X
Controls	X	X	X	X	X
SE Cluster	City	City	City	City	City

Effects on Resource Transfer ▸ back

	log(Total Fiscal Transfer)	Depdency on Debt Total Infra.Dev	Depdency on Pro.Gov Fiscal Infra.Dev
Variables	(1)	(2)	(3)
Connected	0.0193	0.0109	0.0075
	(0.019)	(0.010)	(0.007)
Connected^{start}	-0.0421	-0.0021	0.0024
	(0.026)	(0.013)	(0.010)
Observations	4,826	4,453	1,394
R-squared	0.926	0.375	0.469
Mean	8.440	0.216	0.055
City and year FE	X	X	X
Controls	X	X	X
SE Cluster	City	City	City

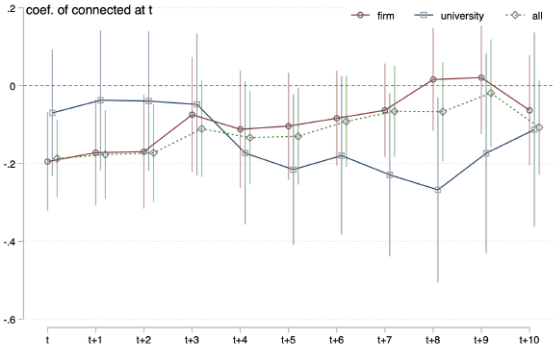
Horizon v.s. Promotion Prospect

back

	Turnover Outcome		log(Gov Spending)		Policy Posture (SD)
	Exit	Promoted	Infrastructure	Sci&Tech	Innovation
Variables	(1)	(2)	(3)	(4)	(5)
Connected	0.0472***	0.0115	0.2107***	-0.1480***	-0.0918
	(0.015)	(0.011)	(0.077)	(0.052)	(0.063)
Connected∗Old	-0.0183	0.0397***	-0.1988**	0.0891	0.0236
	(0.020)	(0.015)	(0.100)	(0.061)	(0.071)
$Connected^{start}$	-0.0401**	-0.0182	-0.4254***	0.0811	0.1078
	(0.016)	(0.011)	(0.119)	(0.090)	(0.093)
$Connected^{start}*Old$	-0.0197	-0.0473***	0.3829***	-0.0696	-0.1543
	(0.021)	(0.016)	(0.142)	(0.104)	(0.105)
Old	0.0576***	-0.0333***	-0.1706	-0.0197	0.0911
	(0.013)	(0.009)	(0.121)	(0.083)	(0.092)
Observations	11,730	11,730	1,126	4,262	3,034
R-squared	0.287	0.121	0.896	0.935	0.712
Mean	0.245	0.098	6.402	4.581	-0.010
City and year FE	X	X	X	X	X
Controls	X	X	X	X	X
Init.Cond.Depvar			X	X	X
SE Cluster	City	City	City	City	City

- More prominent pursuit of infrastructure-over-innovation among young leaders
- Unlikely to be driven by promotion

Direct Effect v.s. Indirect Effect back



- Heterogenous response likely to be driven by difference in
  - Dependency on government's direct funding support
  - Time frame of innovation activities

Implications for from "made-in-China" to "innovated-in-China" back

$\Downarrow$ 1 year in tenure $\longrightarrow$

$\Downarrow$ Patents 25%

$\Downarrow$ Long-run Growth 1.2 pp

$\Uparrow$ Short-run Growth 1 pp