

# INDUSTRIAL POLICY: PAST, PRESENT AND FUTURE

Ann Harrison

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# Motivation

# Chang'an Avenue in the 1950s



# Chang'an Avenue Today



# *Seoul in the 1950s*

**Cheonggye river, and the biggest slum in Seoul**



Source: Aving, network

# Seoul in 2015

**Cheonggyecheon in 2015: a decade earlier, Mayor Lee Myungbak removed the highway and recovered the riverfront**

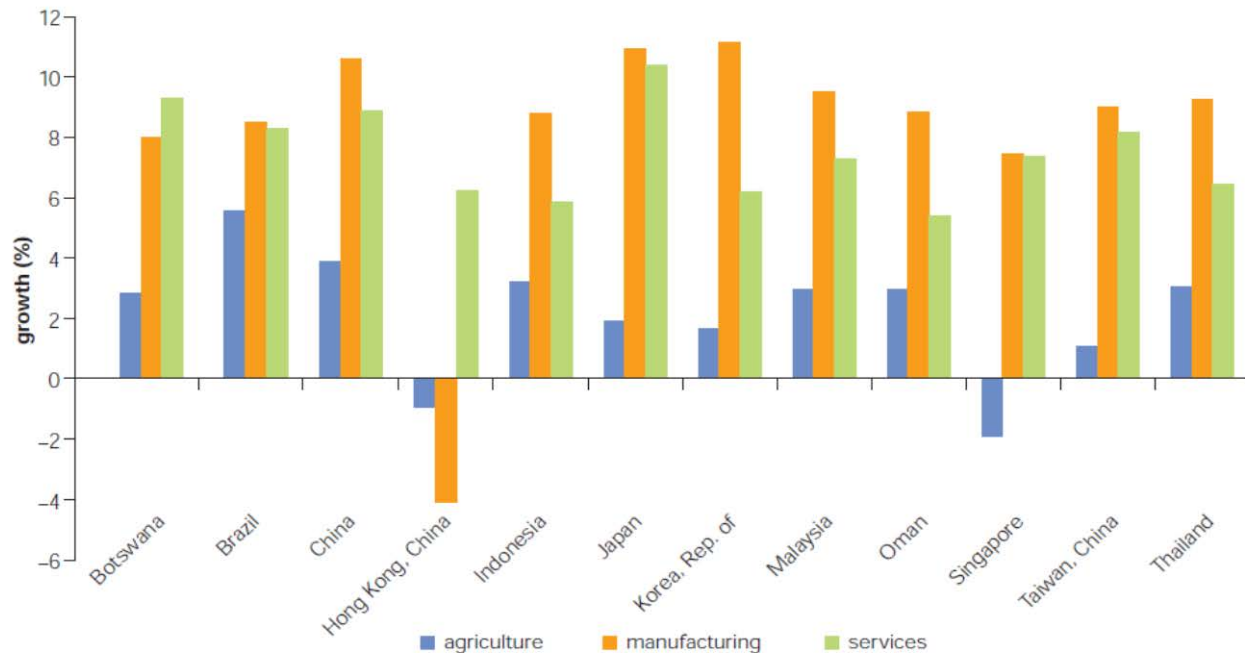


Source: [www.cityclock.org](http://www.cityclock.org)

# **What Role for Industrial Policy in this Transformation?**

# Countries that grew over 7 % annually for 25 years used Industrial Policy (Growth Commission Report, 2008)

Figure 7 Growth Rates by Sector





# Robert Barro's 2016 list of success cases:

## Interventionist Asia Rules

Table 4

### Convergence Success Stories

#### Middle-Income and Upper-Income Successes

Country	Real per capita GDP, 1990 (2011 U.S. dollars)	Real per capita GDP, 2014 (2011 U.S. dollars)
<b>Middle-Income Successes</b>		
China	1500	12600
Indonesia	4500	10000
Peru	5300	11400
Thailand	6400	13900
Uruguay	9800	19900
<b>almost met criteria for middle-income success:</b>		
Costa Rica	7300	14200
<b>Upper-Income Successes</b>		
Chile	9200	22000
Ireland	22500	46600
Korea (South)	12100	33600
Malaysia	10200	23800
Poland	10100	24000
Singapore	34300	79000
Taiwan*	13700	37900
<b>almost met criteria for upper-income success:</b>		
Hong Kong	27000	52600

Did success cases succeed because of industrial policy ? Or would they be doing even better without it?



Benchmark Shanghai Composite Index has dropped nearly 40 % since June of 2015

# Outline

- The Past
  - France under Louis XIV and Napoleon
  - Japan
- The Present
  - Case Studies: the IDB's perspective
  - China
  - India
- The Future
  - Green Industrial Policy
- Conclusions

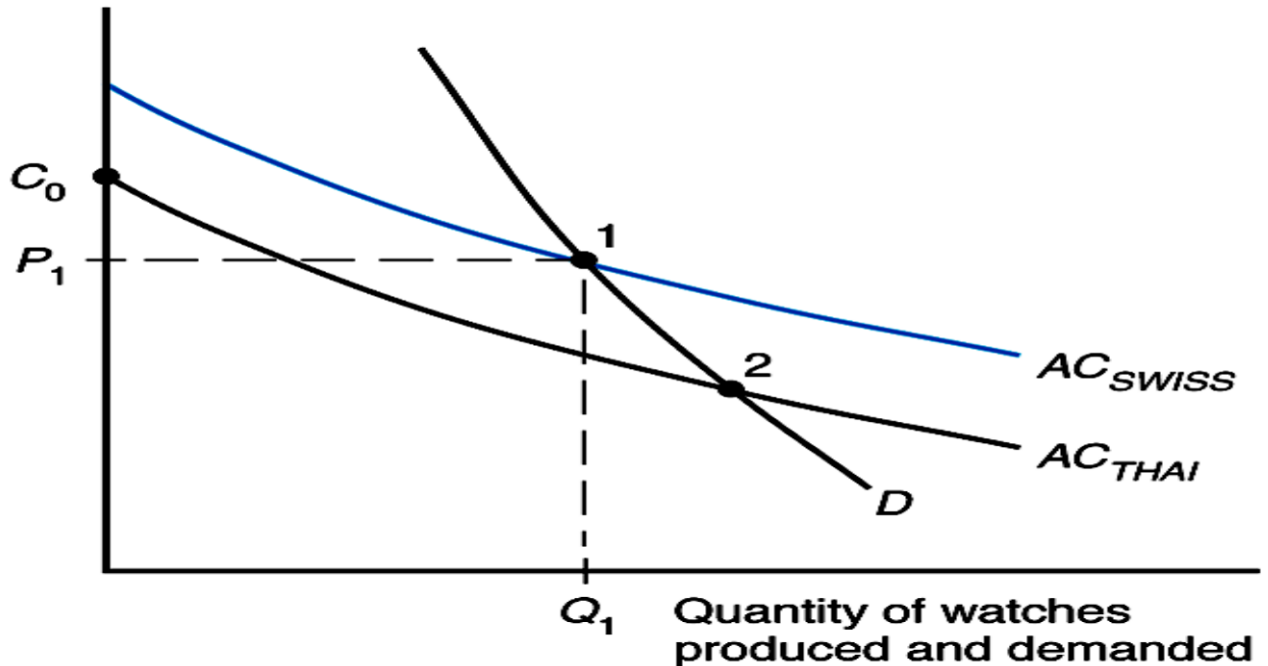
# What do we mean by Industrial Policy ?

## (Harrison and Rodriguez-Clare (2010))

- Working definition: any intervention which shifts incentives away from policy neutrality (beyond the ones associated with optimal taxes or revenue constraints)
- A broad conception of IP, which spans a range of policies both “hard” and “soft”
  - Hard
    - Tariffs and subsidies
    - Tax breaks for new businesses or FDI
  - Soft
    - Trade promotion
    - Infrastructure provision
    - Overcoming coordination failures

# Latent comparative advantage as a reason to engage in industrial policy

Price, cost (per watch)





# The Past

# Vincent Cronin, Louis XIV (p. 160)

- “France must manufacture everything she had hitherto imported. In short, she must become an industrial country—not in two or three generations, but now, at once, virtually overnight, for Louis was impatient for greatness.”



# France's Industrial Revolution under Louis XIV (1660s)

- Bringing in talented immigrants with subsidies
  - ▣ Cloth makers and weavers from Flanders
  - ▣ Metal workers from Germany
  - ▣ Weavers and leather-workers from Spain
  - ▣ Steel workers from England
  - ▣ Sugar Refiners from Holland and Germany
- Doubling of import tariff in 1667
- Facilitating measures: promotion of scientific knowledge through establishment of the world's first scientific journal; infrastructure investment in roads and canals; reduction of customs barriers between provinces to promote competition



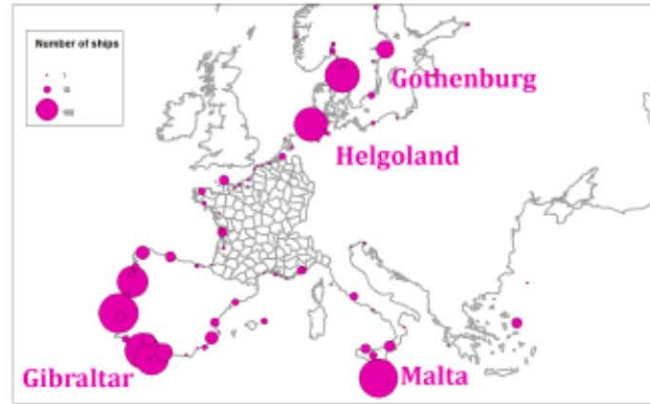
# The Napoleonic Wars (1803-1815)

- France imposes a blockade on Britain, the leader in mechanized cotton spinning looms
- Leads to a quasi-natural experiment, whereby the price of imported yarn (and consequently the gains from adopting the new mechanized spinning loom) in different regions of France are essentially randomized.
- Did temporary protection lead to short term gains in technology adoption? Long term gains?

# Reka Juhasz's empirical strategy



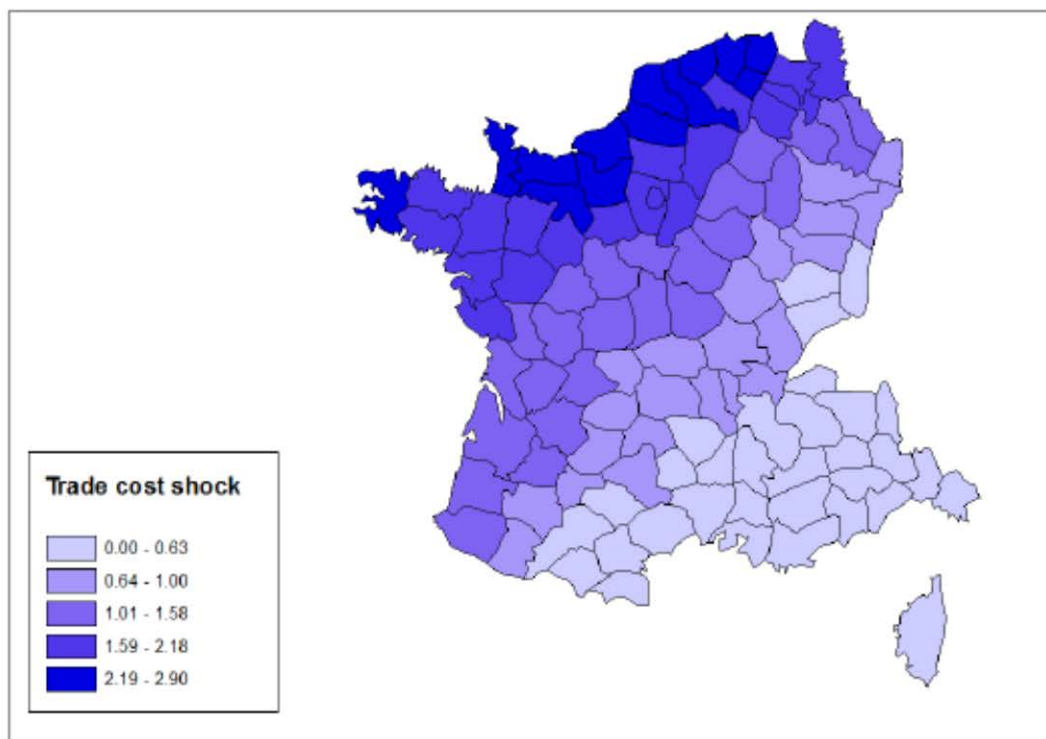
(a) 1802 (pre-blockade)



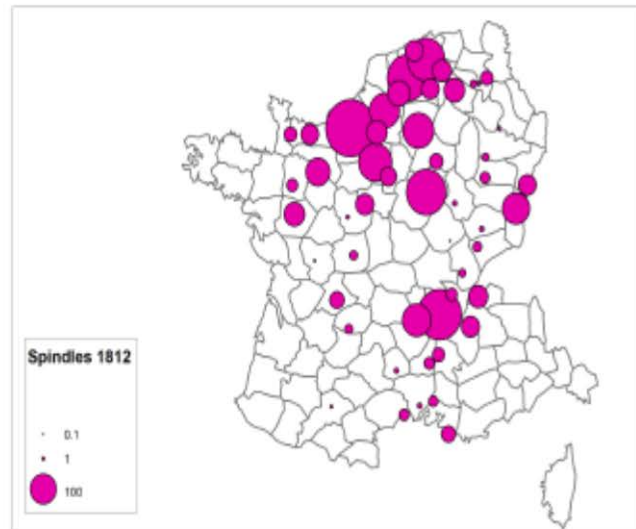
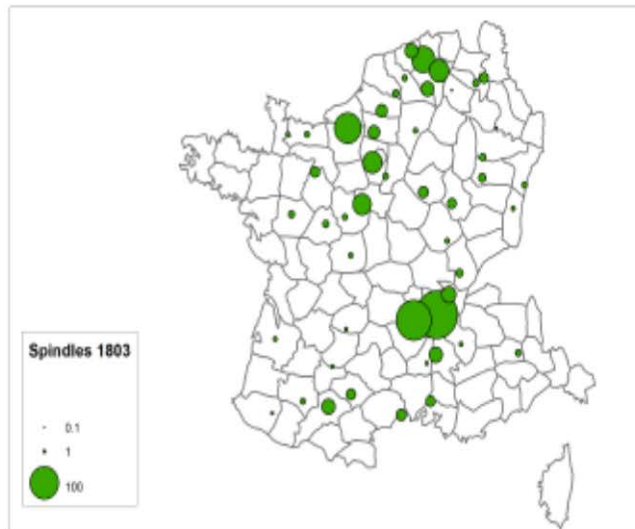
(b) 1809 (blockade)

Figure 1: Number of ships travelling between the given port and Britain

# Blockade increases trade costs for provinces closest to England



# Short Run Effects on Technology Adoption as Measured by Spindles



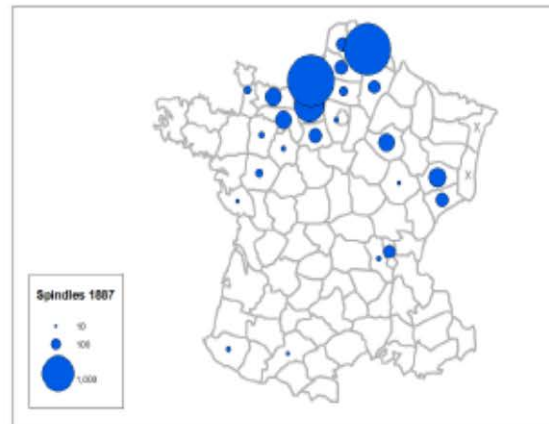
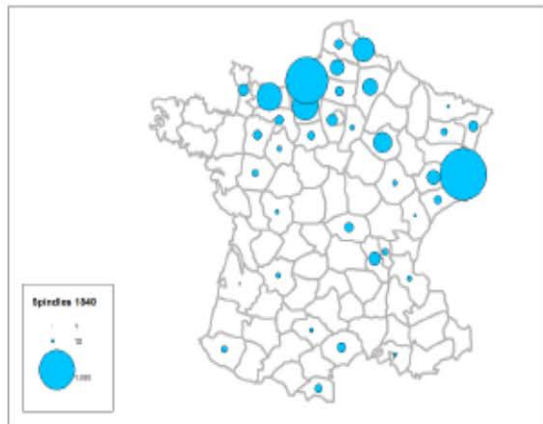
(a) Spindles per '000 inhabitants, 1803

(b) Spindles per '000 inhabitants, 1812

Table 1: Short-run effect of trade protection on mechanized cotton spinning capacity

	Dependent variable: Spindles per thousand inhabitants						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Effective distance	33.11*** <i>0.464</i> (9.775) {6.371}	33.14*** <i>0.465</i> (9.875) {6.408}	34.69*** <i>0.486</i> (10.38) {6.774}	24.44** <i>0.343</i> (10.83) {7.207}	32.70*** <i>0.458</i> (9.707) {6.350}	41.50*** <i>0.582</i> (12.44) {8.607}	38.29*** <i>0.537</i> (12.98) {8.323}
Streams		-0.336 (1.533)					-1.574 (2.173)
Coal			-4.571 (3.723)				3.502 (5.877)
Market potential				41.10* (21.60)			30.13 (29.99)
Knowledge access					41.42*** (15.33)		35.44 (21.92)
Literacy						49.25** (21.32)	31.65 (19.09)
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Departmental FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	176	176	176	176	176	126	126
Number of dept	88	88	88	88	88	63	63
Adj. R-squared	0.330	0.326	0.336	0.351	0.361	0.412	0.444

# Long Run Effects Persist 100 years



(a) Spindles per '000 inhabitants, 1840    (b) Spindles per '000 inhabitants, 1887

# Beason and David Weinstein on Japan (Review of Economics and Statistics 1996)

TABLE 5.—IMPACT OF TARGETING ON PRODUCTIVITY GROWTH  
DEPENDENT VARIABLE IS TORNVIST MEASURE OF TFP GROWTH

Period	1960–1990	1960–1990 Slow Growers	1960–1990 Fast Growers	1960–1990
<i>DTAX</i> (–1)	–0.00409	–0.00523	0.00435	–0.00395
	–2.880	–3.051	1.097	–2.800
<i>DTAX</i> (–5)	0.00003	0.00060	–0.00776	0.00017
	0.023	0.421	–2.224	0.143
<i>DJDB</i> (–1)	0.00396	0.00469	–0.00616	0.00403
	3.670	3.900	–0.973	3.740
<i>DJDB</i> (–5)	0.00032	0.00032	–0.00223	0.00003
	0.250	0.224	–0.405	0.025

# Results for Growth and Investment

TABLE 7.—IMPACT OF TARGETING ON GROWTH AND CAPITAL ACCUMULATION

Period	Growth Rate 1960–1990	Capital Accumulation 1960–1990
<i>DTAX</i> (– 1)	– 0.00428	– 0.00321
	– 1.66083	– 2.01585
<i>DTAX</i> (– 5)	0.00064	– 0.00194
	0.28606	– 1.40366
<i>DJDB</i> (– 1)	0.00400	0.00336
	2.03922	2.77253
<i>DJDB</i> (– 5)	– 0.00129	– 0.00050
	– 0.55980	– 0.35052
<i>DTAR</i> (– 1)	– 0.00485	– 0.00294
	– 3.39704	– 3.33518
<i>DTAR</i> (– 5)	– 0.00063	– 0.00042
	– 0.68598	– 0.73845
<i>DSUB</i> (– 1)	0.01210	– 0.00066
	1.99041	– 0.17652
<i>DSUB</i> (– 5)	0.00723	0.01300



# Their “spin” on the results

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*Abstract*—This paper explores the usage of various industrial policy tools in Japan. Contrary to the conventional wisdom, we find that a disproportionate amount of Japanese targeting occurred in low growth sectors and sectors with decreasing returns to scale. In addition, we find no evidence that productivity was enhanced as a result of industrial policy measures.



What Would be a good approach  
to evaluating success of IP?

# Randomizing access to export markets to test for learning by exporting

## Exporting and Firm Performance: Evidence from a Randomized Trial\*

David Atkin<sup>†</sup>

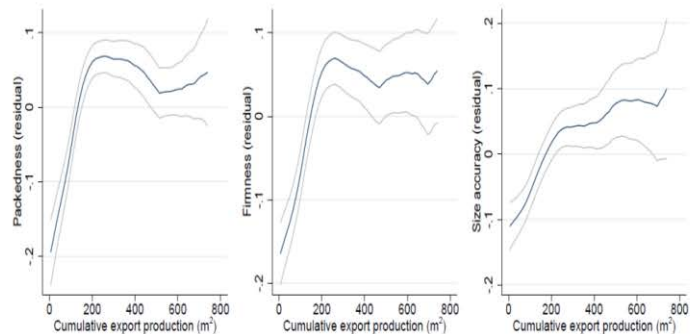
Amit K. Khandelwal<sup>‡</sup>

Adam Osman<sup>§</sup>

Figure 1: Production Technology



Figure 7: Learning Curves using High-Frequency Order-Book Data, Sample 2 Takeup Firms





# The Present



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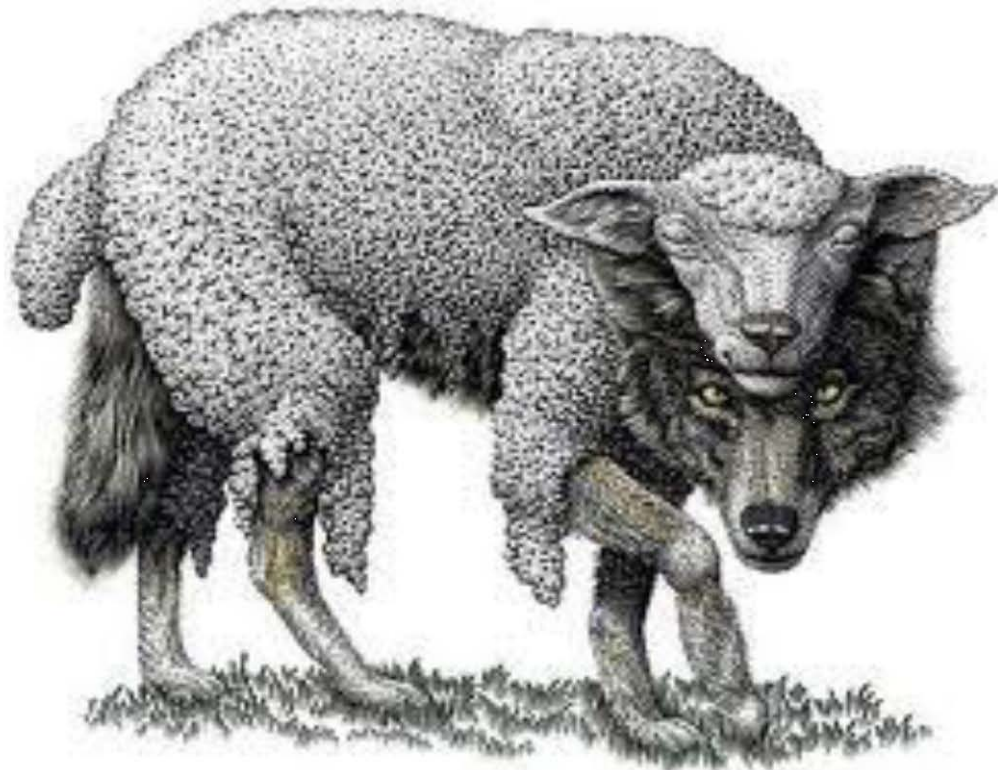
**Edited by**

**Gustavo Crespi,  
Eduardo Fernandez-Arias  
and Ernesto Stein**

**DEVELOPMENT IN THE AMERICAS**



# The IDB renames industrial policy “Productive Development Policies”



# The IDB presents a Typology of PDP interventions

31

- Rather than emphasizing a single dimension, they classify them in different categories, along two dimensions:
- *Scope*: horizontal (broad-based) or vertical (sector-specific)
- *Type of intervention*: public inputs (e.g. phytosanitary control) or market interventions (subsidies)

# A Typology of PDP Interventions

HORIZONTAL

VERTICAL

32

Public  
Inputs



Market  
Interventions



SOURCE: IDB



# The IDB doubts that countries can pick winners, especially with weak institutions



## Fearful of risky “vertical” bets, the IDB and others propose instead:

- Regulations to enforce higher quality standards
- Public investment
- Attracting FDI through provision of infrastructure
- Technical assistance, prizes, grants for projects proposed by producers
- Inviting sector and cluster organizations to come forward (not relying on gov't)
- Conferences to facilitate transmission of product knowledge and export business practices (Hallak)

(see IDB on “Export Pioneers”; JC Hallak JDE; Harrison and Rodriguez-Clare)

# Strong institutions are critical

35

- Industrial policies are complex and risky. They require:
  - Process of discovering right policies
  - Long time horizons so that policies can work
  - Collaboration with private sector, which opens the door to capture and rent seeking
  - Close cooperation across government agencies
- Institutional capabilities vary greatly across countries, so policies that work in one context may not work in others.
- Different policies require different capabilities
- Don't bite off more than you can chew

**In my own research, I focus on  
China and India's experiences  
with “Hard” Industrial Policies**

# Aghion, Cai, Dewatripont, Du, Harrison, Legros (American Economic Journal October 2015)

*American Economic Journal: Macroeconomics* 2015, 7(4): 1–32  
<http://dx.doi.org/10.1257/mac.20120103>

## Industrial Policy and Competition<sup>†</sup>

By PHILIPPE AGHION, JING CAI, MATHIAS DEWATRIPONT, LUOSHA DU,  
ANN HARRISON, AND PATRICK LEGROS\*

# Theme: industrial policy works when it promotes competition

- Why sectoral policy may complement, rather than destroy, competition:
  - ▣ Competition weeds out bad projects, thus reduces the danger of picking the wrong winner
  - ▣ Sectoral focus preserves competition among firms that would otherwise differentiate horizontally (ie across products rather than within the same product line)
- We seek to show that the more intense product market competition within sectors, then the more innovation-enhancing industrial policy will be
- IP basically is an instrument for combatting a very specific market failure: insufficient competition, which means there is not enough innovation.

# Dataset

- Chinese industrial firms from NBS: annual survey of all enterprises with more than 5 million RMB sales
- Annual data for 1998 through 2007
- Firm-specific reporting on subsidies, tax holidays, loans.
- Tariff dataset from the World Integrated Trading Solution (WITS). Level of aggregation is 3 digit level: too high to be subject to city-level lobbying from any one industry

# To test whether IP combined with competition generates innovation we calculate a new policy Herfindahl

- *Herf\_subsidy*: measures sectoral dispersion of subsidies, loans, or tax holidays. We construct a Herfindahl index using firm subsidy or tax holiday shares within a sector but excluding the own firm subsidy.

$$Herf\_subsidy_{irjt} = \sum_{i \in j} \left( \frac{Subsidy_{irjt}}{Sum\_subsidy_{rjt}} \right)^2$$

- This measure allows us to explore how targeting within a sector works best.
- To make a bigger number “better”, we make competition equal to  $1 - Herf\_subsidy$



# Estimation and Identification

$$(8) \ln TFP_{ijrt} = \theta_1 Z_{ijt} + \theta_2 S_{jt} + \beta_m \text{CompHerf}_{imjrt} + \alpha_m \Omega_{mrt} + \ell_i + d_t + \epsilon_{ijt}$$

- Dependent Variable is a firm level measure of log TFP
- First industrial policy measure is CompHerf which varies by industrial policy  $m$ , firm  $l$ , sector  $j$ , region  $r$ , and  $t$
- Second industrial policy measure  $\Omega$  is the correlation between initial competition in the region and the industrial policy  $m$  across all sectors.
- Firm level controls  $Z$  include ownership, firm FEs
- Sector controls  $S$  include FDI, tariffs, competition, exports

# Core Results

Table 4. Competitiveness of Industrial Policies and Firm Productivity

VARIABLES	(8)
	Dependent Variable: Log TFP_OP
comp_herfsubsidy	0.0319*** (0.00918)
comp_herftax	0.0861*** (0.0249)
comp_herfinterest	0.0669*** (0.0190)

Table 5. The Impact of the Competitiveness of Industrial Policies on Firm TFP: Weighted Herfindhal

VARIABLES	(2)	(3)	(4)
Dependent Variable is TFP	TFP_OP	TFP OP	TFP_OP
	No Weight	Size Weight	Youth Weight
comp_herfsubsidy	0.0319***		
	(0.00918)		
comp_herftax	0.0861***		
	(0.0249)		
comp_herfinterest	0.0669***		
	(0.0190)		
comp_herfsubsidy_weightsize		0.0255***	
		(0.00909)	
comp_herftax_weightsize		0.0555***	
		(0.0124)	
comp_herfinterest_weightsize		0.0616***	
		(0.00983)	
comp_herfsubsidy_weightage			0.102***
			(0.0313)
comp_herftax_weightage			0.0781***
			(0.0255)
comp_herfinterest_weightage			0.0541**

# We show that targeting **younger** enterprises yields more gains



# Robustness Tests

- Revenue-based TFP is potentially flawed even with sector-level price indices due to potential heterogeneity in prices within a sector, possibly due to heterogeneity in mark-ups or quality.
- Solution: firm-specific prices (1998-2003)
- TFP using two-step OP approach also potentially biased in first stage if policies omitted. Omitted variable bias in first stage yields mis-measured input price coefficients.
- Solution: introduce policies in first stage of OP procedure.

# AEJ (2015) Take Aways

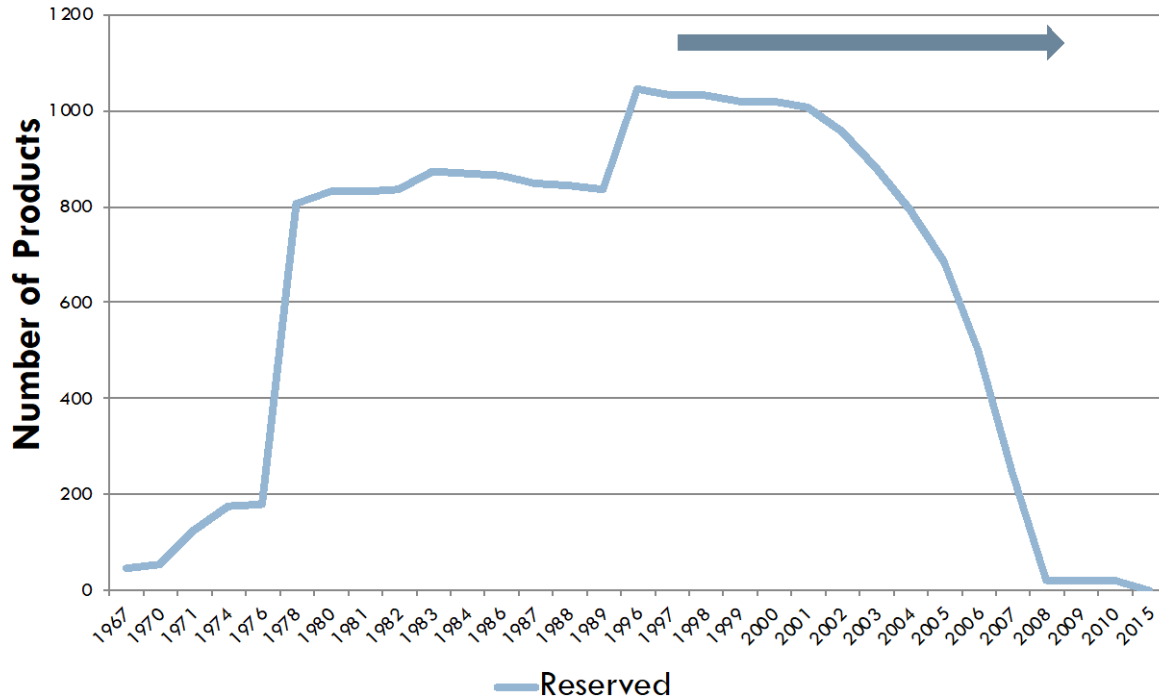
- Industrial policy when implemented either in competitive sectors or in a way that promotes competition (“focus”) leads to more innovation and growth.
- We use Chinese census data to see if the predictions of the theory are consistent with evidence.
- Firm-level innovation (as measured by TFP growth) is higher as a result of subsidies, tax holidays, and low interest loans when they are allocated more competitively.
- Tariff protection always associated with lower productivity growth, even when targeted at more competitive sectors
- The positive impact of subsidies is three times higher when subsidies are systematically allocated to younger firms. In general, targeting younger firms yields much bigger productivity increases. Entry promotion is key.

# Martin, Harrison, and Nataraj, AER 2017

- India promotes small and medium enterprises (SMEs) as a way to foster employment growth.
- The mechanism was small scale reservation which restricted operations of some products to SMEs.
- Beginning in 1998, India eliminated this policy.
- Martin, Harrison, and Nataraj, “In with the Big, Out with the Small”, (American Economic Review) look at impact of phasing out small scale reservation.

# For India, we explore the impact of dismantling one of many industrial policies: Small Scale Reservation

## Number of Products Reserved for Small Firms





# We begin by examining impacts on establishment-level outcomes using the Annual Survey of Industries (ASI)

49

Difference-in-differences framework for 2000 through 2007 exploits differences in when products were de-reserved

$$y_{it} = \beta \text{Deres}_{it} + \alpha_i + \alpha_t + \omega_{it}$$

$y_{it}$  log of employment, output, capital, productivity, wage for establishment  $i$ , time  $t$

$\text{Deres}_{it}$  =1 if establishment's main SSI product has been dereserved

$\alpha_i$  establishment fixed effects

$\alpha_t$  year fixed effects

To disentangle effects of de-reservation from product switching, we classify establishments as *incumbents* or *entrants*

50

***Incumbent***: establishment observed making SSI product *before* it was de-reserved

***Entrant***: establishment observed making SSI product only *after* it was de-reserved

$$y_{it} = \gamma \text{Deres}_{it} * \text{Incumbent}_i + \rho \text{Deres}_{it} * \text{Entrant}_i + \alpha_t + \text{EntryYear}_i * \alpha_t + \alpha_i + \varepsilon_{it}$$

# Growth is driven by entrants into product space

51

	$\log(\text{Labor})$	$\log(\text{Output})$	$\log(\text{Capital})$	$\log(\text{Wage})$	$\log(\text{Q/L})$
Incumbent X	-0.0211**	-0.0186	-0.0105	0.00177	-0.0153
$\dagger \geq \text{year de-reserved}$	(0.00949)	(0.0128)	(0.0106)	(0.00509)	(0.0102)
Entrant X	0.0739***	0.230***	0.0847***	0.0705***	0.178***
$\dagger \geq \text{year de-reserved}$	(0.0194)	(0.0327)	(0.0255)	(0.0139)	(0.0276)
No. Obs.	298,984	294,157	292,998	296,575	294,157
No. Establishments	130,397	128,033	127,822	128,986	128,033
$R^2$	0.008	0.014	0.004	0.027	0.009
Year FE	Yes	Yes	Yes	Yes	Yes
Year of Entry X Year FE	Yes	Yes	Yes	Yes	Yes
Establishment FE	Yes	Yes	Yes	Yes	Yes

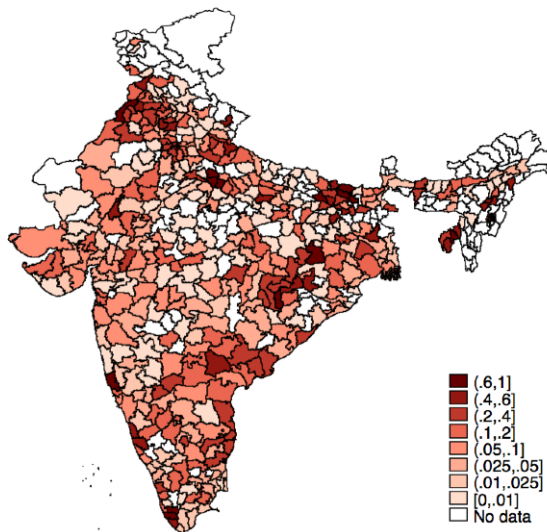
Notes: Results from establishment-level regressions. Dependent variables are shown in column headings. " $\dagger \geq \text{year de-reserved}$ " is a dummy variable that takes the value of 1 if the product associated with the establishment is removed from the list of reserved products. "Incumbent" indicates that the establishment previously made the product when it had reserved status. "Entrant" indicates that the establishment only made the product after it had been de-reserved. "Q/L" indicates labor productivity (real output divided by number of employees). Errors are clustered at the establishment level. \*, \*\* and \*\*\* represent significant at the 10%, 5% and 1% levels respectively.

# We construct a measure of exposure to reform at the district level and measure its change for 2000-2007

53

$$\Delta y_d = \frac{\sum_i (\beta_i \Delta FrDeres_i) + \mu_d}{\Delta FrDeres_d}$$

$$\Delta y_d = \beta \Delta FrDeres_d + \mu_d$$



# District-level results confirm an increase in employment, output

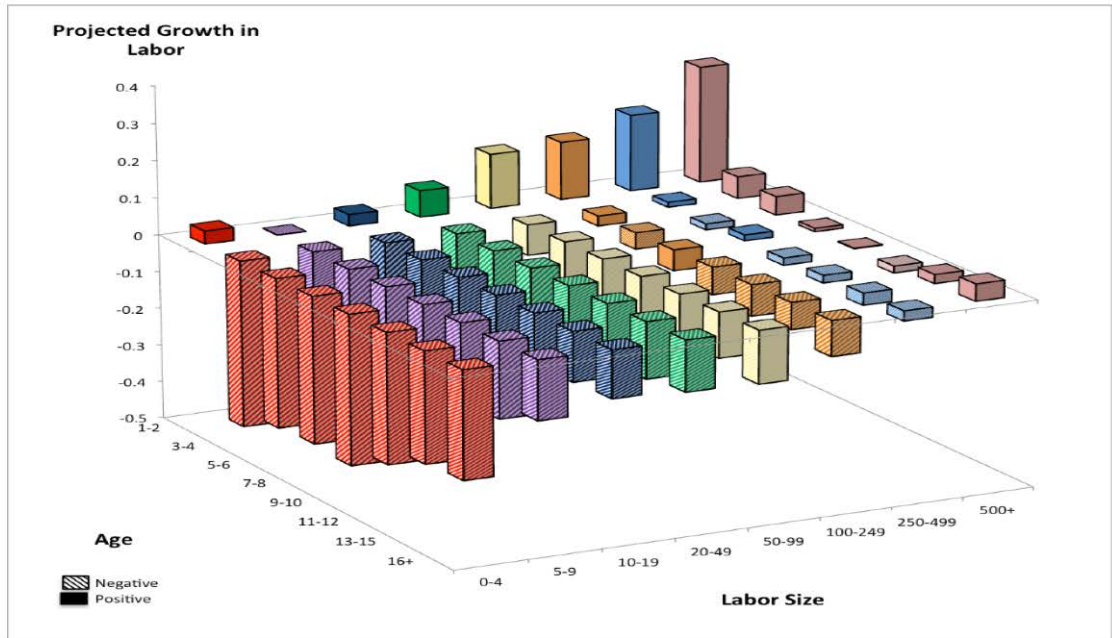
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	$\Delta \log(\text{Labor})$	$\Delta \log(\text{Output})$	$\Delta \log(\text{Capital})$	$\Delta \log(\text{Wage})$	$\Delta \log(\text{Q/L})$
$\Delta$ Fraction de-reserved	0.786***	0.770**	0.644	0.173	-0.153
	(0.262)	(0.332)	(0.450)	(0.133)	(0.245)
$\Delta$ Fraction de-reserved of neighboring districts	-0.484	-1.083**	-0.805	-0.152	-0.599**
	(0.396)	(0.429)	(0.579)	(0.169)	(0.294)
Pro-employer state	-0.0384	-0.0894	0.219**	0.0231	-0.0510
	(0.0721)	(0.0707)	(0.0969)	(0.0313)	(0.0567)
% Literacy	-0.00552	-0.0029	-0.0116*	0.000229	0.00229
	(0.00358)	(0.00341)	(0.00595)	(0.00173)	(0.00286)
% Scheduled caste/tribes	0.00116	-0.000737	-0.00233	0.00143	-0.00190
	(0.00241)	(0.00250)	(0.00316)	(0.00127)	(0.00216)
Control for labor force composition	Yes	Yes	Yes	Yes	Yes
$R^2$	0.190	0.071	0.128	0.045	0.114
No. Observations	339	339	339	339	339

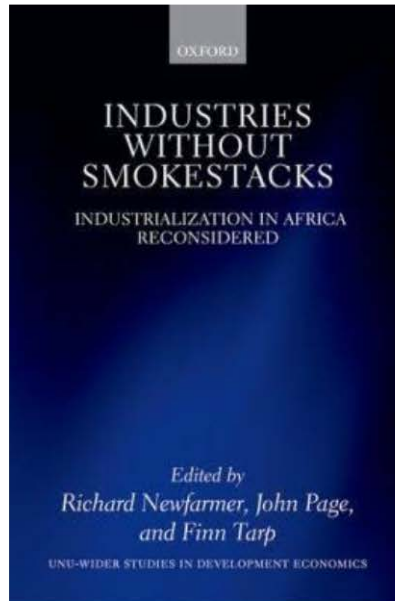
# In general, young and large firms generate more employment growth: SSR penalized those firms



Young, big firms generate most employment growth



# Industrial Transformation without Industry: Lessons of IP in Emerging Markets

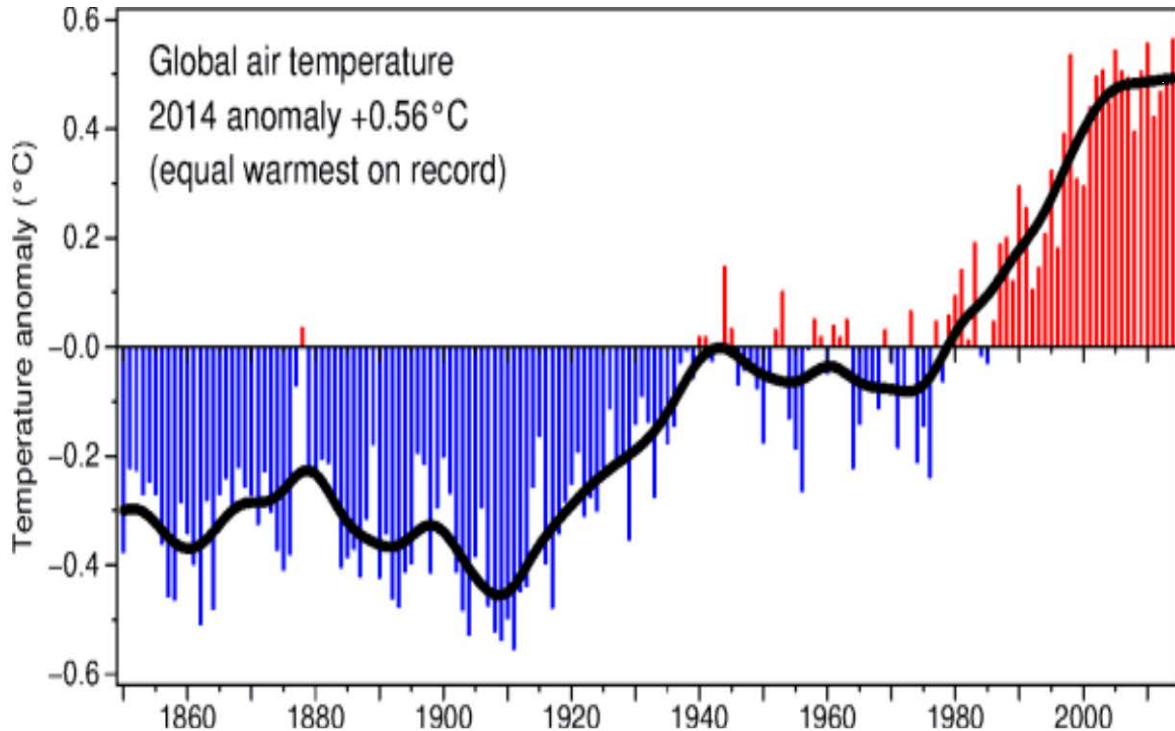




# The Future



# Climate Change is Biggest Market Failure in History of Humanity (Stern)



# Green Industrial Policy (Rodrik (2015))

- Easiest Market Failure to identify: governments measure pollution, energy use and climate change
- Sadly, however, first best instruments—a carbon tax or offsets to price the externality—are rarely used
- What policies to use instead?
- Are institutions strong enough?

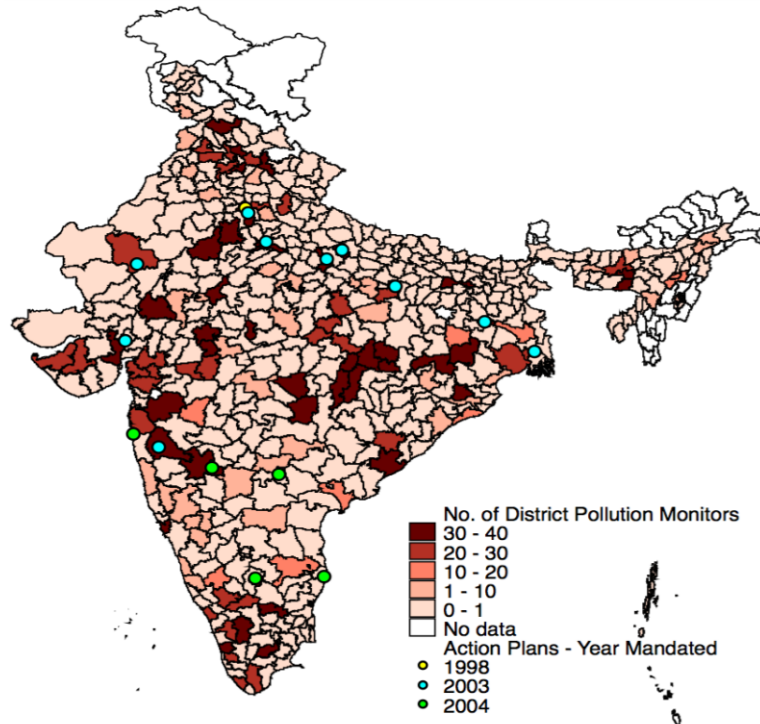
Green  
Growth



# Harrison, Martin, Nataraj, Annual Review of Resource Economics, apply insights from IP literature to green IP

- Link instrument to problem
  - ▣ Price the externality through carbon taxes or tradeable permits
  - ▣ Unexpected consequences of indirect support to renewables like feed-in tariffs and green subsidies
- Horizontal policies: high performance standards without necessarily “picking winners”
- Encourage competition and new entrants
- Make the support temporary
- Tailor solution to strength of local institutions

# India relied too much on Command and Control Policies (CAC) instead of prices



Source: Harrison, Hyman, Martin and Nataraj (2015), NBER Working Paper

# Higher Coal prices Reduced SO<sub>2</sub> emissions....

Table 11: Effect of Action Plans on District-Level SO<sub>2</sub> by Urban/Rural

VARIABLES	(1)	(2)	(3)	(4)
	log(SO <sub>2</sub> ) Urban	log(SO <sub>2</sub> ) Urban	log(SO <sub>2</sub> ) Rural	log(SO <sub>2</sub> ) Rural
SCAP	0.0395 (0.134)	-0.0923 (0.166)	-0.471*** (0.143)	-0.281** (0.106)
Stacked time trend		0.00498 (0.0642)		-0.122 (0.0843)
SCAP X Trend		0.0396 (0.103)		0.100 (0.0892)
Log Price coal industry	-0.256** (0.117)	-0.263** (0.116)	-0.184*** (0.0604)	-0.171** (0.0657)
Coal use power plants (M tons)	0.0305 (0.0404)	0.0365 (0.0423)	-0.105 (0.104)	-0.108 (0.0997)
Observations	331	331	308	308
R <sup>2</sup>	0.202	0.213	0.192	0.199
Number of District	50	50	51	51
District FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes

# But had smaller negative effects on productivity....

Table 7: Effect of Action Plans on TFP, by HPI and Size

VARIABLES	(1) OLS	(2) ACR (RevShare)	(3) ACR (CostShare)	(4) OP
SCAP X HPI X Large	-0.0326*** (0.00834)	-0.0306*** (0.0108)	-0.0285*** (0.0105)	-0.0192* (0.00980)
SCAP X HPI X Not Large	-0.0127 (0.0101)	-0.00791 (0.00835)	-0.00714 (0.00862)	-0.0107 (0.00963)
SCAP X Not HPI X Large	0.00701 (0.0123)	-0.000194 (0.0109)	0.000764 (0.00954)	0.0128 (0.0156)
SCAP X Not HPI X Not Large	0.0186*** (0.00620)	0.0130* (0.00678)	0.0167*** (0.00544)	0.0166*** (0.00524)
Stacked Time Trend	0.00755** (0.00293)	0.00663 (0.00412)	0.00951** (0.00369)	0.0104*** (0.00391)
SCAP X Trend	-0.00832** (0.00371)	-0.00661 (0.00484)	-0.0101** (0.00418)	-0.0112** (0.00440)
Log coal price (district)	-0.0183** (0.00733)	-0.00257 (0.00603)	-0.00798 (0.00622)	-0.0170** (0.00714)
Observations	291,397	296,119	296,119	296,012
$R^2$	0.007	0.011	0.015	0.003
Number of Estab	86,542	88,196	88,196	88,135
Establishment FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes

Harrison, Hyman, Nataraj, and Martin suggest more use of price-based interventions to supplement CAC



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# Some Thoughts on the Use of Industrial Policy



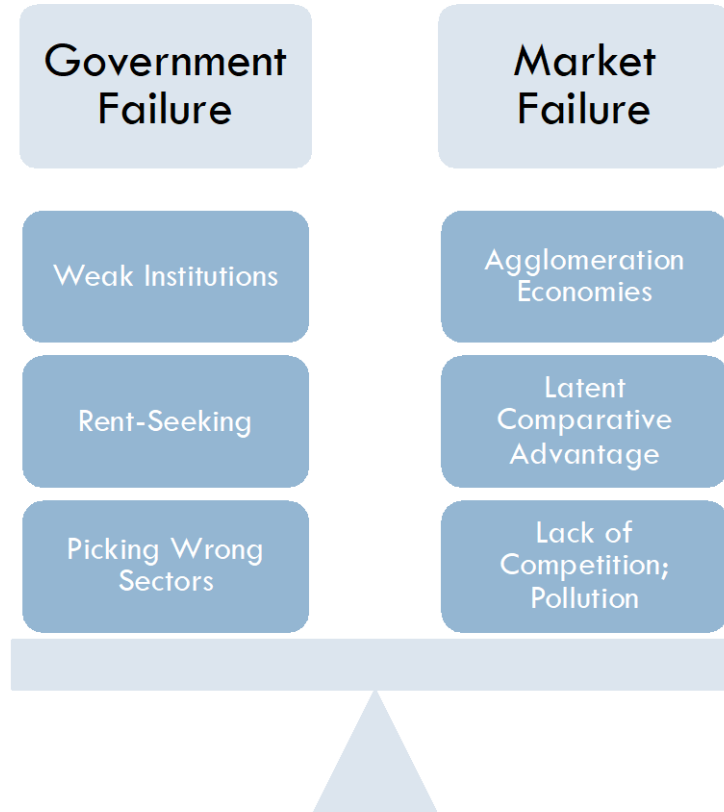
# Industrial Policy is Back



# Competition combined with Industrial Policy is Key



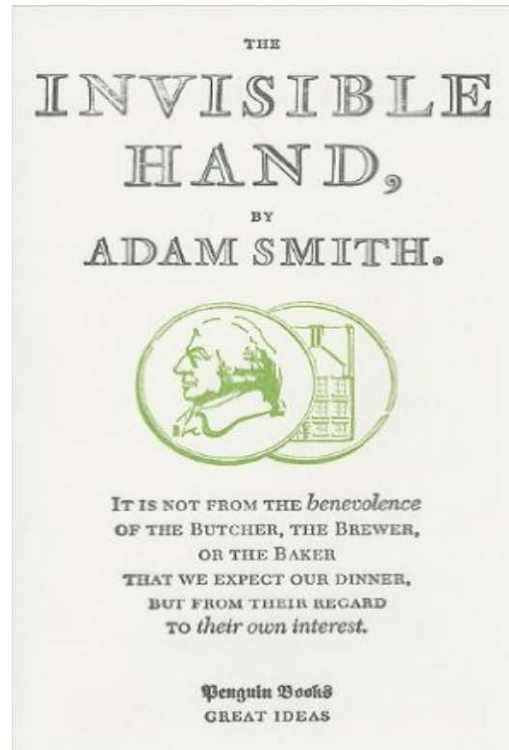
# Weighing Government versus Market Failure



# Don't pick winners if Institutions are Weak



# But Relying on the Invisible Hand is not the Answer Either...



# Conclusions

- History is full of cases showing both successful and unsuccessful uses of industrial policy
- Countries are using it more than ever today
- Successful interventions require
  - ▣ Identifying the market failure
  - ▣ Picking the right instruments
  - ▣ Appropriate Institutions
  - ▣ Competition