Industrial Policy:

The Empirics of The Infant Industry Argument

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BREAD - IGC PhD Lectures on Firms and Development

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IPG

What is industrial policy?

IP is intentional state action directed at changing the structure of the domestic economy

- Goal oriented (e.g., industrialization, green energy transition, supply chain resiliency)
- "Vertical", selective policies: targeted at specific sectors (e.g., textiles) or activities (e.g., R&D)

Today, we examine one strand of industrial policy: the infant industry argument

Link to this course: Why are some countries rich and some countries poor?

Through the lens of the infant industry argument poor countries are stuck in a "bad" equilibrium

Under free trade, they specialize in low-growth sectors

- They don't produce the right things (resource allocation)
- They don't produce them very well (productivity)

Government intervention can move the country to the "good" equilibrium

- Change what is produced
- Change how well it is produced

Key prediction: certain industries may become competitive in the long run if they are given temporary trade protection

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Infant industry protection has been controversial for centuries

The view from outside economics: IP works and it's necessary

"Every economically successful society has been guilty, in its formative stages, of protectionism. Outside of the anomalous offshore port financial havens such as Hong Kong and Singapore, there are no economies in the world that have developed to the first rank through policies of free trade"

Joe Studwell 2013 p.68 "How Asia Works"

- US and Germany industrialized behind high tariff walls and other forms of IP
- 20th century growth miracles (Japan, South-Korea, Taiwan, most recently China) feature much IP

... But many other countries also experimented with IP with more modest results (e.g. Latin America)

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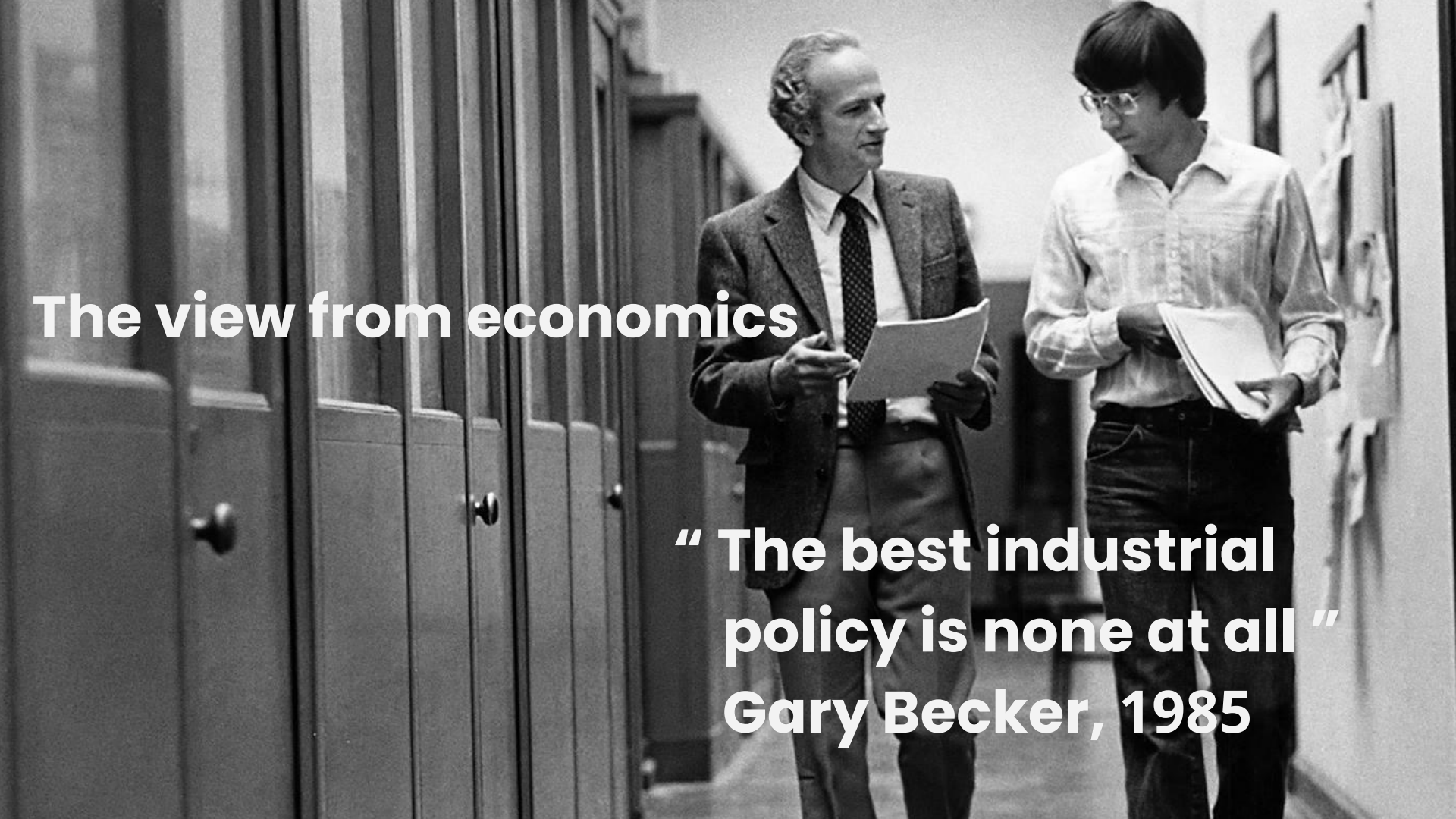
The view from economics
“ The best industrial policy is none at all ”
Gary Becker, 1985

The view from economics: Don't do it!

- Market failure vs. government failure
  - Information failures
  - Rent-seeking and other political economy problems
- A deeply held belief that free trade is conducive to growth
  - Many (but not all!) our models predict that the effect of trade on growth is positive

…. However, the empirical evidence for this has been extremely thin (see Harrison and Rodriguez-Clare 2010)

Until recently, not an active area of research in econ

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Roadmap

1. Conceptual framework: The theoretical justification for IP
2. From theory to empirics
3. Empirics: Identifying the economic mechanism
    a. Juhász (2018 AER) Temporary Protection and Technology Adoption
    b. Lane (2022 cond acc. QJE) Manufacturing Revolutions: Industrial Policy and Industrialization
4. Empirics: Understanding implementation
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5. Concluding thoughts

The infant industry argument: Sketch

Justification relies on the existence of market failures

Typically, external economies of scale, but other justifications possible

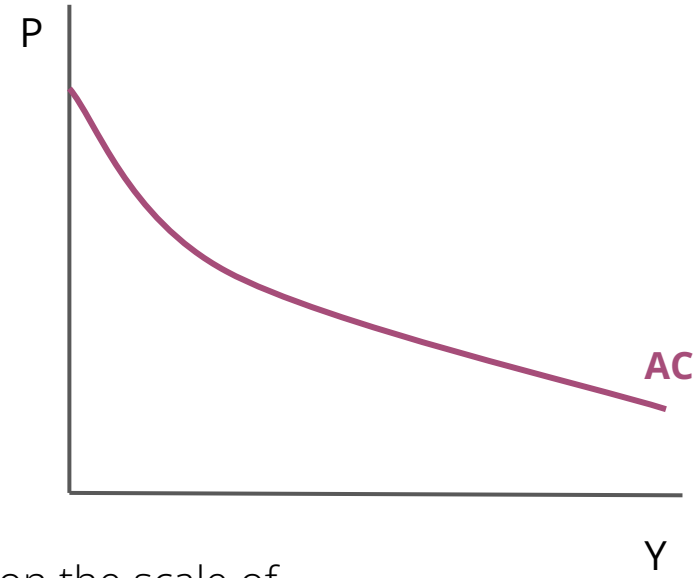
Let's fix ideas.

Production function of representative firm:

$$y = Al$$

$$\downarrow$$

$$A = \lambda g(L)$$



Key is that labor productivity depends positively on the scale of domestic industry: g'(L)>0

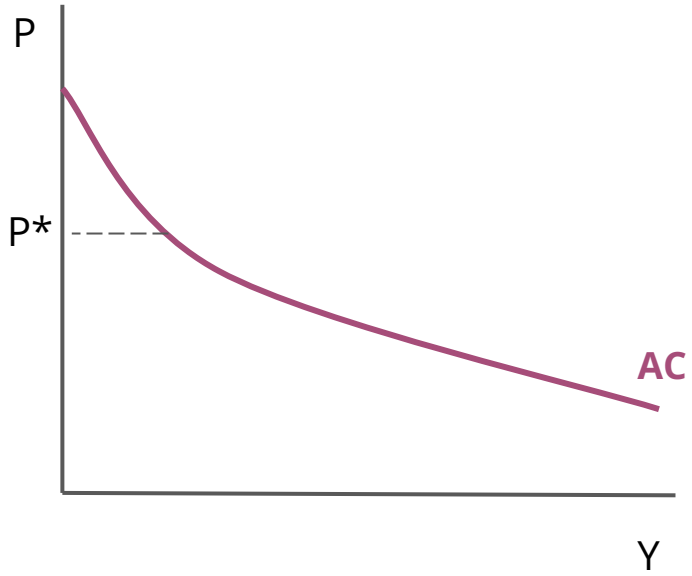
The infant industry argument: Sketch

Justification relies on the existence of market failures

Typically, external economies of scale, but other justifications possible

For a small open economy that produces no Y:

- Firms do not want to enter at free trade price P*
- A sufficiently large tariff or subsidy would make it profitable for firms to enter
- The tariff only needs to be temporary!



Toy model of the infant industry mechanism

(from Harrison and Rodriguez-Clare 2010)

- Two goods (i = 1,2), one factor of production in fixed supply (L)
- Small open economy, "South", takes prices $p^* = \frac{p_2}{p_1}$ as given
- Good 1 is produced with CRS at the firm level, no aggregate externalities.

$$y_1 = \lambda_1 l_1$$

- Good 2 is also produced with CRS at the firm level, but there are aggregate externalities.

$$y_2 = \underbrace{\lambda_2(1 + \alpha \min(\bar{L}, L_2))}_{\text{Labor productivity}} l_2$$

Multiplicity of equilibria and the case for intervention

For $p^* \leq \frac{\lambda_1}{\lambda_2} \leq \theta p^*$, where $\theta \equiv 1 + \alpha \bar{L}$

- There is multiple equilibria: complete specialization in either good 1 or good 2 is an equilibrium
- Equilibrium with specialization in good 2 is superior: it yields a higher wage
- South has a latent comparative advantage in 2
- A temporary tariff can move the economy from the “bad” equilibrium to the “good” equilibrium
- This may be welfare enhancing

Notes about the theoretical justification for IP

- More generally, the process is dynamic: productivity today depends on cumulative output to date (Redding 1999)
- Are these externalities reasonable?
  - Static external economies of scale and dynamic learning by doing externalities
  - Large literature suggests important localization benefits (e.g. Rosenthal-Strange 2004)
  - In reality, the process is unlikely to be completely passive as our models assume, but this is not well understood and more research is needed (more on this later)
- Tariffs not the most efficient way of correcting the market failure but often the only one that is feasible (Melitz 2005)

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What does IP “treatment” mean?

When we think about evaluating industrial policy in the real world, there are really two layers of treatment. It’s typically hard to isolate them.

1. Economic mechanism
    - Is the infant industry mechanism empirically relevant?
    - Are market failures in the targeted sector really there? Are they big?
2. Implementation
    - Can the policymaker identify the right sector?
    - Is the policy measure effective? E.g. Does a tariff set the right incentives for firms? Is an export subsidy better?
    - Political economy and institutional environment: Is the implementation of IP effective? Is it thwarted by special interests/rent seeking?

Empirical studies will usually (but not always) estimate both together: should expect mixed findings

The empirical challenge of evaluating IP

IP is hard to observe.

- Is a tariff implemented to raise revenue? ToT? Special interests? IP?
- Are other non-tariff measures of IP observed?

⇒ *Most convincing work uses industry specific studies*

Want to evaluate long run outcomes (recall dynamic learning by doing externalities)

⇒ *All recent work evaluates medium/long term outcomes*

Credible research design crucial: IP is inherently endogenous

- Policymaker is not targeting industries at random. Not obvious which way the bias will go (Rodrik 2007).

Literature has focused on three broad questions

1. Is the infant industry mechanism empirically relevant?

This is really about the economic mechanism. Are market failures empirical relevant? Do they seem big?

⇨ *Most recent progress here.*

2. Does industrial policy target the right sectors?

Gets at the question of whether in reality the policymaker can target the right sectors

⇨ *Some recent work.*

3. What is the effect of industrial policy on a country's economic performance?

⇨ *Very little progress.*

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Is the infant industry mechanism empirically relevant?

Single industry studies with information on the context of policies

First generation studies use a model to simulate the counterfactual of no protection Baldwin and Krugman (1986, 1989), Hansen, Jensen, and Madsen (2003), Head (1994), Irwin (2000), Luzio and Greenstein (1995)

Modern structural work focuses on detecting IP, estimating productivity and global welfare effects Kalouptsidi (2018), Jia Barwick, Kalouptsidi and Zahur (2021)

Modern reduced form work leverages natural experiments to estimate the counterfactual of “no-IP” Juhász (2018) Hanlon (2020), Mitrunen (2020), Lane (2022)

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Juhász (2018 AER) Temporary Protection and Technology Adoption

Key ideas

Examine one layer of treatment at a time: only the economic mechanism

- Instead of actual industrial policy, a natural experiment that mimics tariff protection of an infant industry

Identification

- Move the cross-country identification challenge to within country, which is more credible

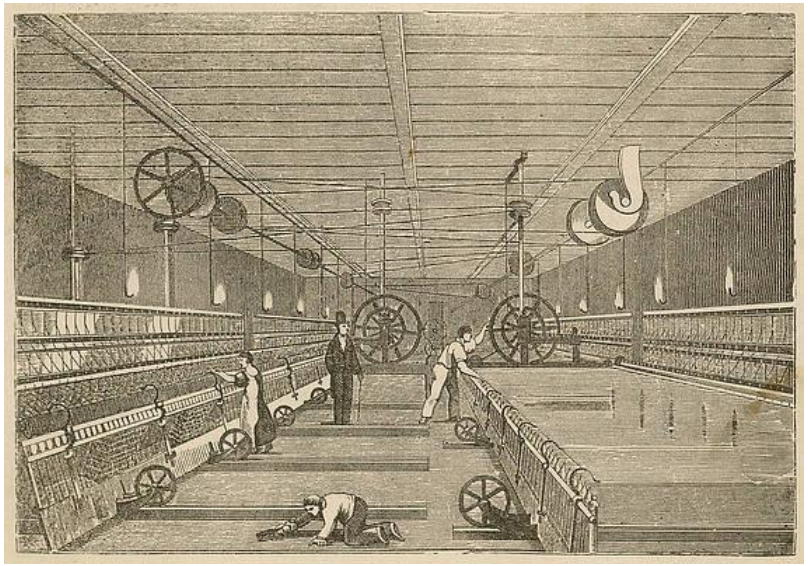
Context: The development of mechanized cotton spinning in 19th century France during the Napoleonic blockade against Britain

Mechanized cotton spinning: “the iPhone of the 19th century”

Flagship industry of the first IR. Invented in Britain.

SPINNING BY HAND WITH A SINGLE SPINDLE.

Old technology: handspinning, rural cottage industry



New technology: mechanized spinning in factories

The industry: Mechanized cotton spinning

Mechanized cotton spinning in France a good candidate for infant industry

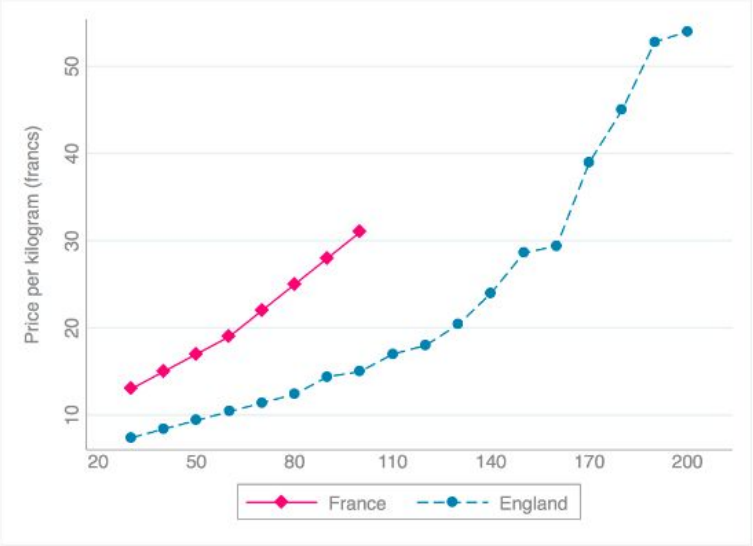
- Pre-mechanization: France Britain's closest European competitor (both dwarfed by India)
- Britain invents mechanized cotton spinning in late 18th century: huge productivity effects
- Case for large LBD externalities (more on this later)
- French firms acquire technology before 1789, but are not competitive
- Possible take: historical accident gives Britain a first mover advantage (further down the industry-wide AC curve)

Research question: What is the effect of temporary trade protection on the French cotton spinning industry?

- Finding a good counterfactual for all of France is very hard
- Better: could we get within country variation in protection from Britain?

French cotton yarn not competitive with British pre-blockade

France produced low counts (quality) at a higher price. Doesn't look like it produced higher count (quality) yarn



Price per kg (francs) of different count cotton yarn in France and England, 1806/07. X-axis plots count of the yarn, a measure of quality.

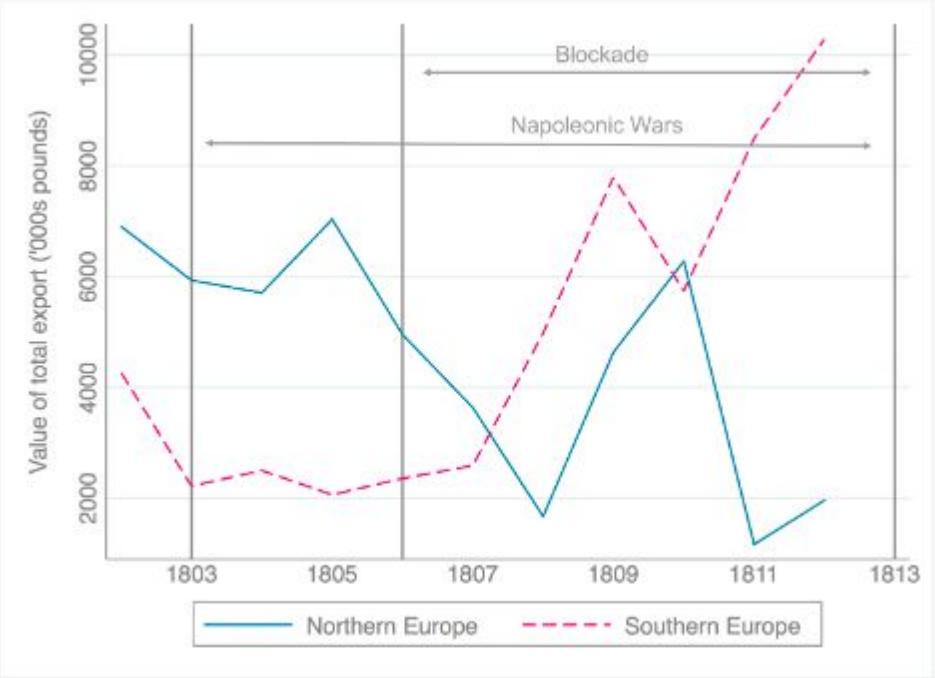
Exogenous variation: The Napoleonic Blockade

- A common form of infant industry protection is a tariff
- Geography is a natural barrier to trade that mimics tariff protection
- The Napoleonic Blockade attempted to block British goods from Continental Europe
- However, the blockade only partially succeeded in keeping British trade out of Europe
- Instead of stopping trade, it diverted it to more costly and more circuitous routes

The blockade did not stop British goods from entering the Continent

The blockade did not cut off British exports

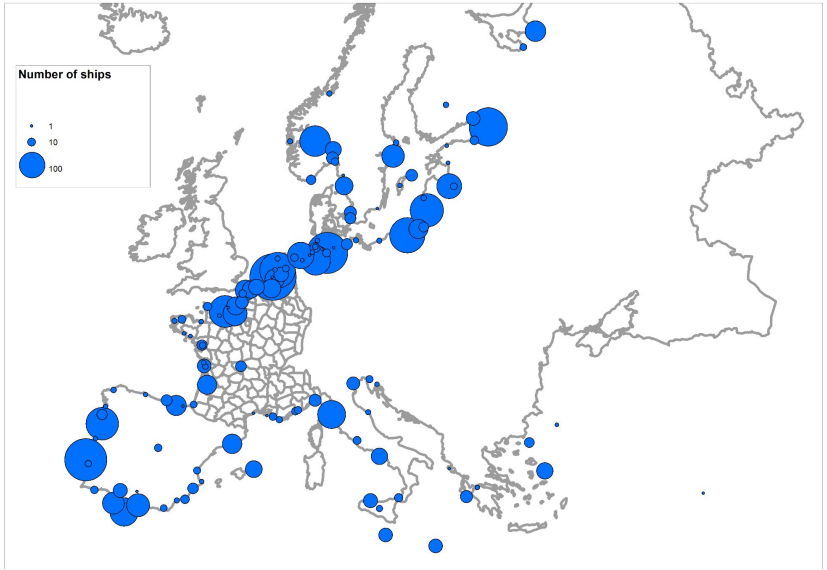
Trade did not stop, rather the direction changed



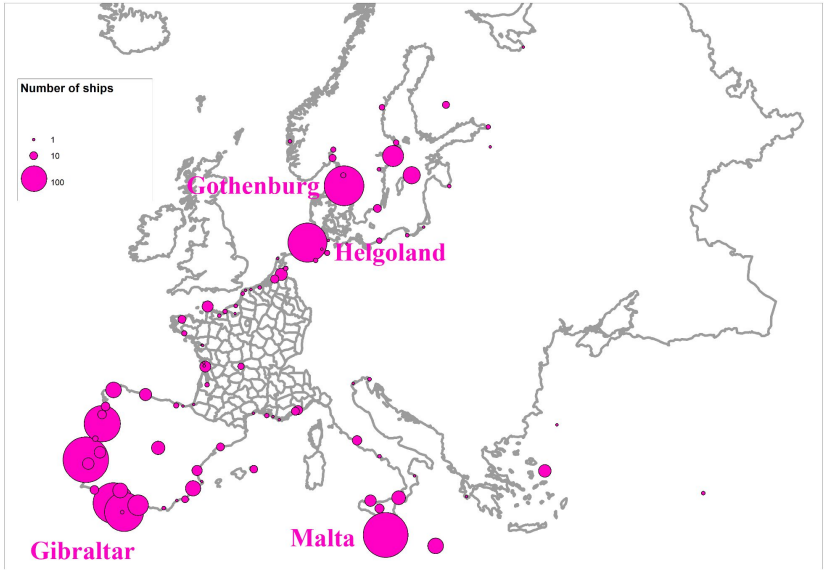
Exports of British merchandise and other products (official values). Crouzet (1987) p. 885

Variation in blockade effectiveness at the port level

Smuggling via stable ports outside of the French Empire accessible to Great Britain



Port usage, “Before blockade” (1802)

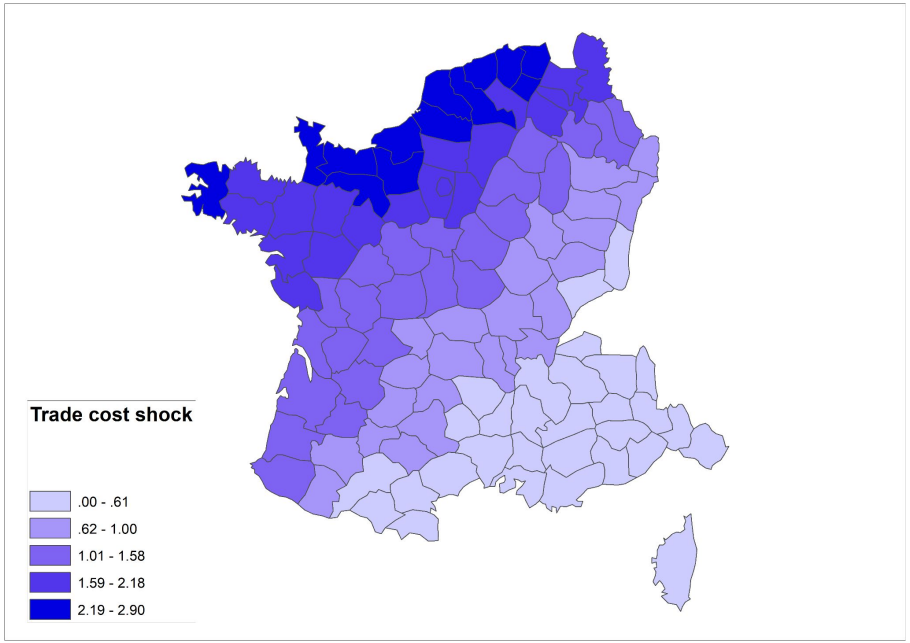


Port usage, “Blockade” (1809)

Source: Lloyd’s List

Quantifying variation in exposure to British competition

- Unrestricted shortest route prior to Napoleonic Wars
- Restricted to smuggling routes during the Napoleonic Wars
- Trade cost shock = $lnD_{it} - lnD_{it-1}$



Identifying the infant industry mechanism in two steps

1. **Short run** Did regions which became better protected from trade increase capacity in mechanized cotton spinning?
   - Not obvious that producers scale up in the new technology
   - Can also do handspinning (c.f. Sauré 2007)

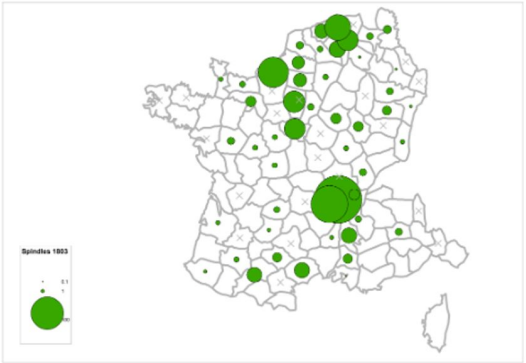
2. **Long-run** Did the effects persist after pre-blockade variation in trade protection was restored?
   - Did temporary protection change the long-run profitability of production?

Empirical Strategy Short Run

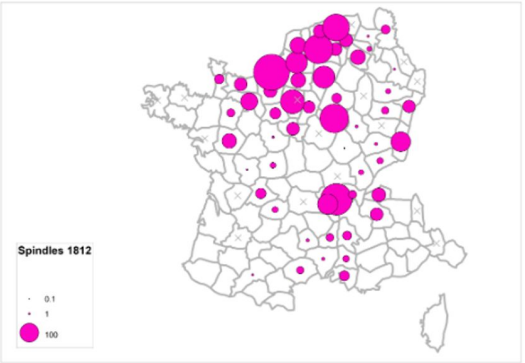
- Question: Did protection render mechanized cotton spinning profitable in the short run?
- Baseline specification $S_{it} = \alpha_i + \delta_t + \gamma lnD_{it} + \epsilon_{it}$
- Identifying assumption: More and less exposed regions of France would have trended similarly in the absence of the trade cost shock
  - Are the north and south of France really comparable?
  - Is there another shock correlated with the trade cost shock driving the results?

Variation used Spindles per capita before and after

- Between 1803 and 1812 spinning capacity increased fourfold
- Development highly uneven



(a) Spindles per ’000 inhabitants, 1803



(b) Spindles per ’000 inhabitants, 1812

Notes: “X” denotes missing observations.

Short run effects of temporary trade protection

- Regions subject to higher level of protection increased capacity more
- No differential effect on capital labor ratios or type of machine used
- No similar effect on placebo industries less intensively traded with Britain

	(1) Spind.	(2) K/L	(3) Mach.	(4) Wool	(5) Leather
Effective distance	33.47***	-0.07	-0.02	-2.25	-0.02
	0.47	*-0.07*	*-0.06*	*-0.07*	*-0.13*
	(9.80)	(0.26)	(0.10)	(2.93)	(0.01)
	{10.00}			{3.11}	
Time FE	Yes	Yes	Yes	Yes	Yes
Department FE	Yes	Yes	Yes	Yes	Yes
Observations	176	78	74	138	116
Num. clusters (dept)	88	39	37	69	58
Num. clusters (gen)	40			32	
Adj. R-squared	0.34	0.33	0.11	0.18	0.05

Standardized coefficients in italics. Standard errors clustered at the level of the department in parentheses, standard errors clustered by généralités in curly brackets. Notation for statistical significance based on robust standard errors clustered at the level of the department as follows: *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Empirical strategy Long run within country

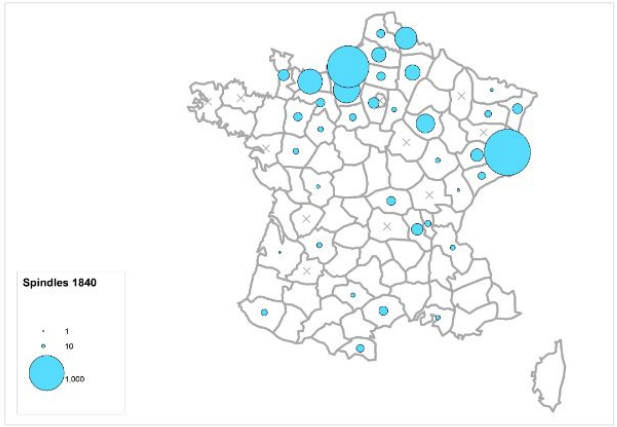
- Question: Did short-run protection affect the long-term profitability of mechanized cotton spinning?
- Outcomes of interest: persistence and “aggregate” regional effects
- Baseline specification

$$Y_{it} = \alpha_0 + \beta_{0t} S_{i(1812)} + \eta_{it}$$

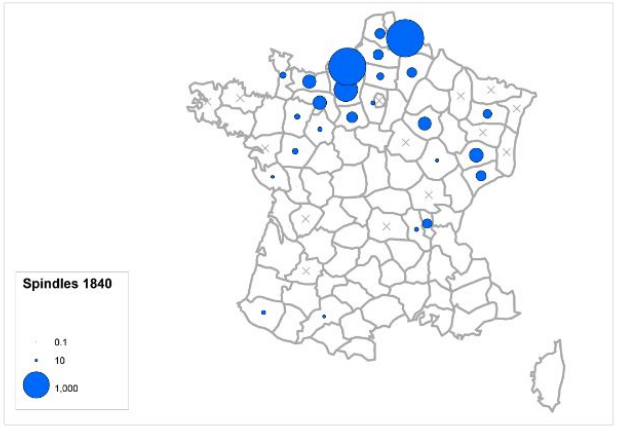
- IV strategy: Trade cost shock solves the endogeneity of the location of cotton spinning
- Identifying assumption: Trade cost shock uncorrelated with other determinants of the location of industry

Persistence in location 1840-1887

Between 1803 and 1887 spinning capacity increased fivefold



(a) Spindles per '000 inhabitants, 1840



(b) Spindles per '000 inhabitants, 1887

Notes: "X" denotes missing observations. Alsace ceded to Germany in 1871

Medium-term persistence in the location of cotton spinning activity

	Dependent variable: Spindles per thousand inhabitants							
	OLS				2SLS			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
DepVar measured in	1840	1840	1887	1887	1840	1840	1887	1887
Spindles 1812	3.04	2.47	4.75	5.06	2.12	2.68	4.72	4.85
	(0.99)	(0.93)	(1.54)	(1.71)	(1.27)	(0.93)	(1.26)	(1.39)
	{0.99}	{0.93}	{1.57}		{1.27}	{0.94}	{1.29}	
Spindles 1803	-2.95	-1.55	-4.69	-4.86	-1.61	-1.85	-4.64	-4.57
	(1.53)	(1.01)	(2.17)	(2.42)	(1.56)	(1.04)	(1.68)	(1.84)
Literacy		71.18		-16.63		60.98		-4.29
		(55.35)		(92.54)		(55.34)		(95.46)
Market potential		2.67		-33.57		-15.75		-16.38
		(109.61)		(132.55)		(104.61)		(129.33)
Knowledge access		-141.21		-159.55		-140.59		-159.00
		(83.05)		(108.88)		(78.31)		(101.80)
Coal		-27.19		12.23		-27.43		12.76
		(20.57)		(44.00)		(18.84)		(41.19)
Streams		-11.19		-16.85		-10.45		-17.54
		(5.80)		(10.08)		(4.86)		(8.34)
Observations	70	63	67	61	70	63	67	61
Adjusted R-squared	0.39	0.61	0.61	0.61				
KP F-stat					12.78	10.35	15.21	10.15
Num. clusters (gen)	34	30	33	29	34	30	33	29

Robust standard errors in parentheses, standard errors clustered by généralités in curly brackets. The latter is not reported in cases where the number of généralités is less than 30.

What is the effect on the regional economy?

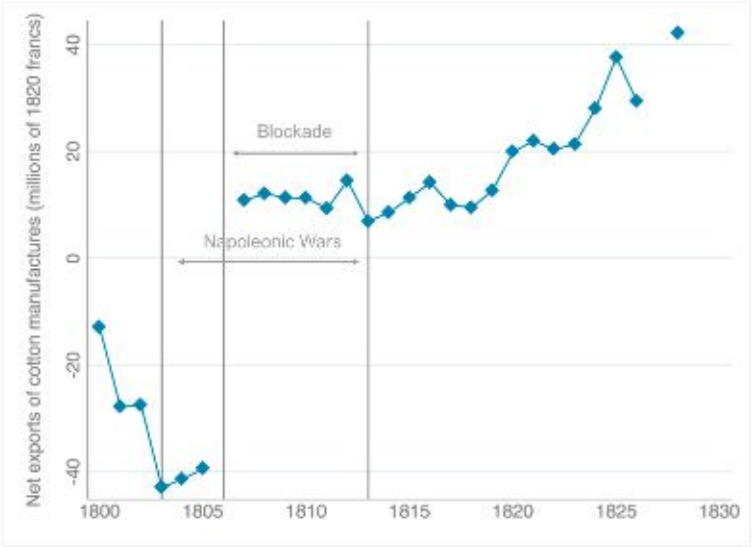
Exogenous exposure to trade protection increased industrial value-added up to the beginning of the second IR in 1896.

	Dependent variable: Natural logarithm of industrial value added per capita							
	OLS				2SLS			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
DepVar measured in	1860	1896	1930	2000	1860	1896	1930	2000
Spindles 1812	0.0037	0.0025	0.0040	0.0025	0.0075	0.0010	0.0016	0.0031
	0.3925	*0.2394*	*0.3965*	*0.2527*	*0.7987*	*0.0937*	*0.1590*	*0.3128*
	(0.0012)	(0.0012)	(0.0016)	(0.0012)	(0.0026)	(0.0026)	(0.0030)	(0.0026)
	{0.0013}	{0.0013}	{0.0016}	{0.0012}	{0.0021}	{0.0025}	{0.0028}	{0.0025}
Spindles 1803	0.0035	0.0048	0.0046	0.0053	-0.0020	0.0070	0.0081	0.0044
	(0.0020)	(0.0019)	(0.0020)	(0.0017)	(0.0035)	(0.0036)	(0.0041)	(0.0032)
Observations	68	66	68	68	68	66	68	68
Adjusted R-squared	0.2414	0.1369	0.2772	0.1718				
KP F-stat					12.60	15.25	12.60	12.60
Num. clusters (gen)	33	32	33	33	33	32	33	33

Robust standard errors in parentheses, standard errors clustered by généralités in curly brackets.

Did the industry become competitive at international prices?

- Not great data to test this. Suggestive evidence at best.
- France went from being a net importer to a net exporter of cotton textiles.



French net exports of cotton manufactures (millions of 1820 francs)

Evaluation

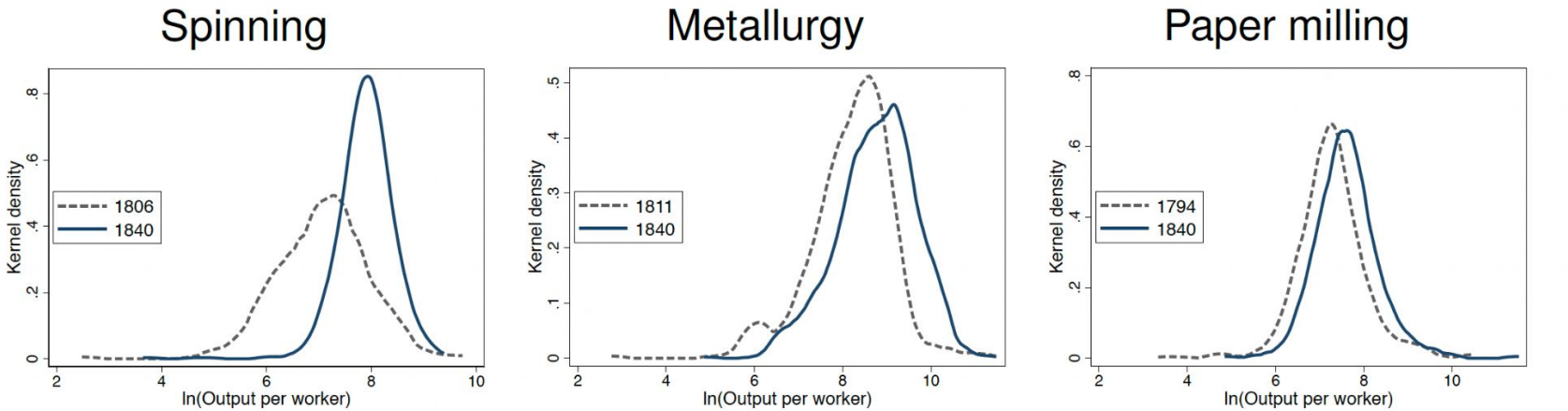
Why did temporary protection work in this case?

- Initial differences between Britain and France small (“all else” sufficiently similar)
- Entrepreneurs actually wanted to mechanize. They only needed a little help. Often states are trying to “strongarm” entrepreneurs into entering a new sector.
- Protection happened because of war. Very uncertain as to whether protection would last. In reality, the “escape competition” effect of tariff protection is important (e.g., see Shu and Steinwender 2019).

What learning did the entrepreneurs do? Can we look at what cotton spinning plants were doing?

Juhász, Squicciarini and Voigtländer (2021) Technology Adoption and Productivity Growth: Evidence from Industrialization in France

Paper helps understand what French cotton spinning plants needed to learn and how that took place.

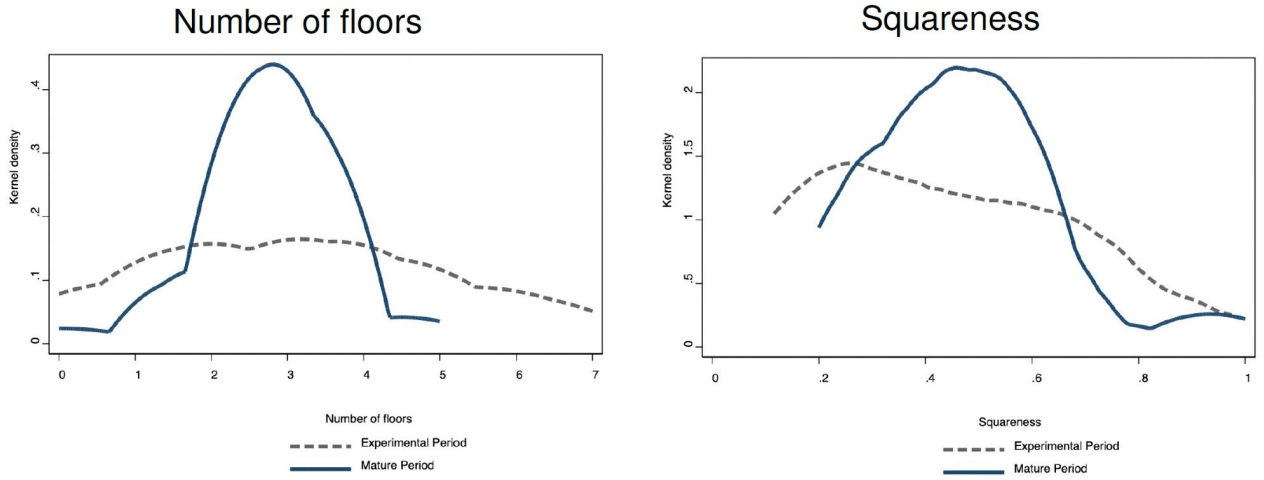


Initial productivity using the new technology was poor. Many plants in cotton spinning very unproductive (fat lower tail)

- Highlights that we need long term outcomes when evaluating IP. 82% increase in productivity between 1806-1840; **after** adoption of mechanized cotton spinning

Cotton spinners were undertaking costly experimentation

- Initial experimentation followed by technology diffusion in mill layout
- Getting mill design right increased probability of plant survival
- Paper contains evidence consistent with spatial diffusion of knowledge



Notes: Number of floors and squareness capture aspects of mill design for about 60 cotton spinning plants. “Experimental period” is pre-1820, “mature period” is post-1820.

Evaluation (cont.)

Previous results shed some light on how learning took place in this context.

It is not passive as many of our LBD models of infant industry assume.

More research is needed to understand *how* technology adoption takes place as this goes hand-in-hand with infant industry promotion

- Echoes Eric Verhoogen's points from Lecture 2. More detailed case-studies needed as opposed to focusing on TFP.
- Important also for policy. Tariffs and other NTM-s may be very blunt tools. We could design better policy if we better understood the microeconomics of technology adoption.

Concluding thoughts: Did we throw the baby out with the bathwater? What does this episode really teach us about industrial policy?

My take: this study is evidence that the infant industry mechanism can work in a quasi-lab setting. Next step, can it work when the policy-maker is actually doing IP?

Roadmap

1. Conceptual framework: The theoretical justification for IP
2. From theory to empirics
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    b. Lane (2022 cond acc. QJE) Manufacturing Revolutions: Industrial Policy and Industrialization in South-Korea
4. Empirics: Understanding implementation
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5. Concluding thoughts

Reevaluating the role of IP in East Asia

Literature seeing a long overdue reappraisal of the role of IP in the East-Asia growth miracle

Economics literature in the 1990s Yoo 1993, Noland 1993, Lee 1996, Beason and Weinstein 1996, Lawrence and Weinstein 2001

- Targeted sectors did not outperform untargeted ones
- Infamous World Bank (1993) report concluded E-Asia ascended by getting market fundamentals right.

Recent literature using careful identification, new theory, better data has reached different conclusions

- Liu (2019 QJE) China, S-Korea sectoral interventions had a positive aggregate effect
- Pons-Benaiges (2017) Japan targeted IP towards sectors with externalities.
- Lane (2022), Choi, Levchenko (2022), Kim, Lee and Shin (2021) empirically evaluates the HCI chemical drive in South Korea

Park Chung Hee (South Korea)

Lane (2022) Manufacturing Revolutions: Industrial Policy and Industrialization in South-Korea

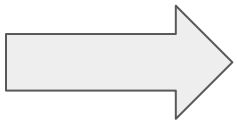
South Korea and the HCI drive

Textbook case of a country attempting to shift its comparative advantage

Very little experience in heavy industry. CA was textiles and other light manufacturing.

- Economists said that the HCI plan was a lunacy
- WB and others unwilling to give loans
- Pohang steel mill financed with Japanese war reparations

Import substitution was the mainstream view on development policy (c.f. Irwin 2021). SK did not have the internal market to sustain HCI.



No one but the government willing to bet that they have a latent comparative advantage in heavy industry

So how did they pull it off?

The “ natural experiment ” :

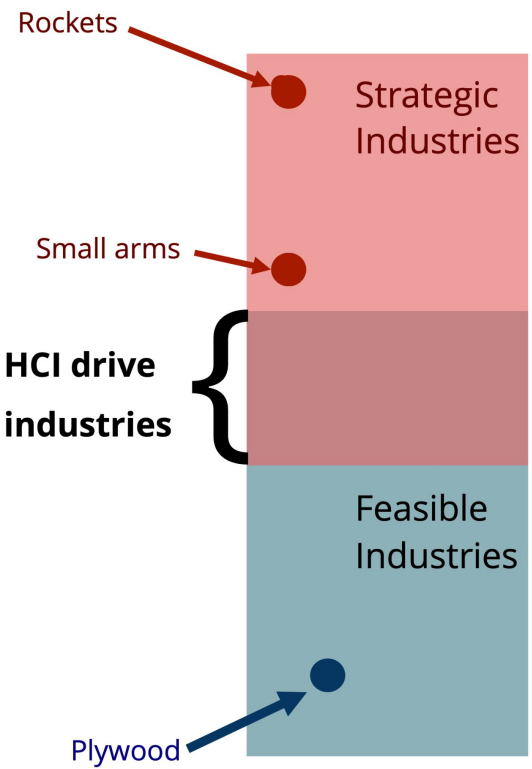
1973 Crisis.

Launches dictatorship &

industrial big push for military self-sufficiency

1979 End.

The HCI push



Use two levers:

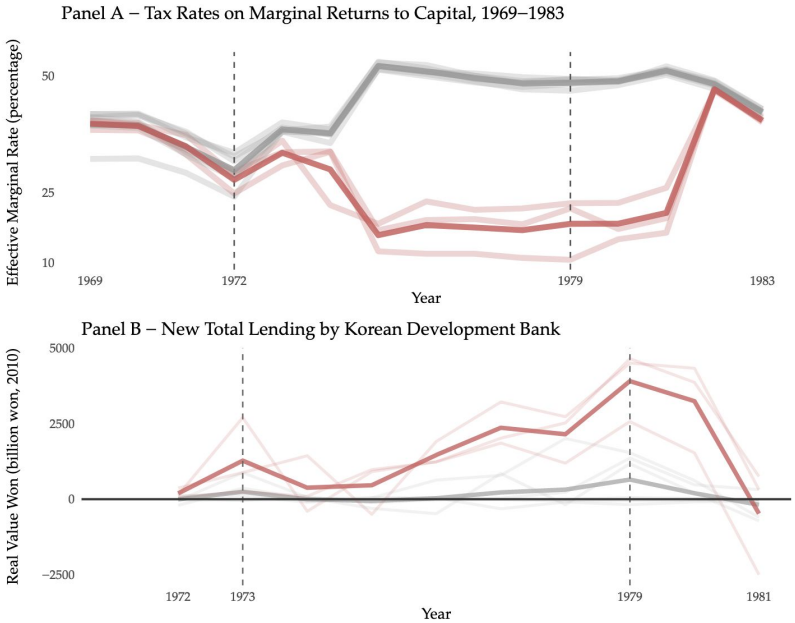
1) investment promotion +

2) trade policy to steer resources and economic activity to treated sectors.

Goal:

Shift *light → heavy industrial* economy capable of one day producing domestic arms.

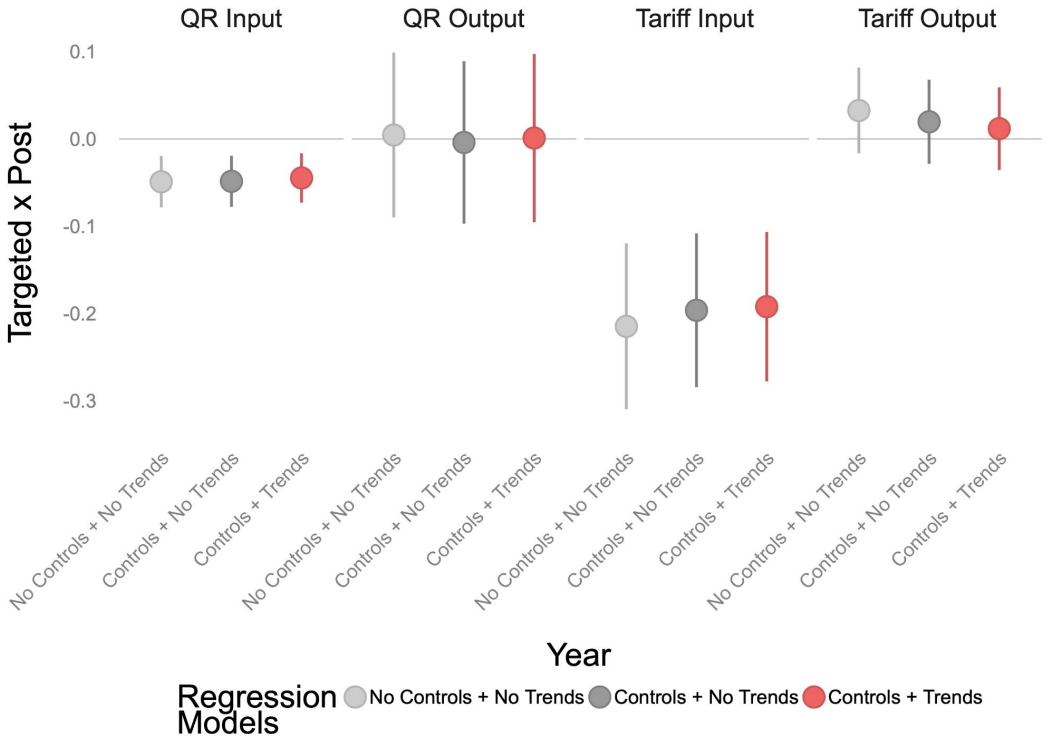
What IP do they use? State pours money into HCI through tax policy and lending



HCI sectors (red)
Non-HCI sectors (gray)

Trade policy used in the form of lower input tariffs

Input Duties Versus Output Protection



- Cutting input tariffs **major policy** used by SK, not overt output market protection.
- In line with growing evidence on impact of protection on ind. dev.:

  Amiti-Konings 2007
  Topalova-Khandelwal 2011
- Lurking in the background, export promotion, though not a huge paper trail for explicit policies ("administrative guidance")

Empirical Strategy

Research question: *What are the impacts of industrial policy on the targeted sectors and industrial development?*

Estimate (DiD) differences between **targeted v. non-targeted** industries, relative to 1972, for each year 1967-1986.

$$Y_{it} = \sum_j \beta_j \, \text{Targeted}_i \times \text{Time}_t^j + \alpha_i + \lambda_t + \mathbf{X}'_{it}\theta + \epsilon_{it}$$

Identifying assumption: Treated sectors would have evolved similarly to untreated sectors in the absence of treatment.

- The fact that no lender was willing to fund this suggests these sectors were not on the cusp of taking off.

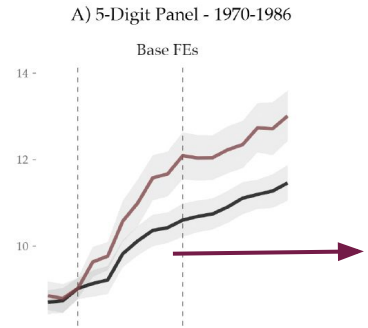
Evaluate the effects of industrial policy in 2 ways.

1. Direct Effects - Impact of industrial policy on industrial development in targeted sectors.

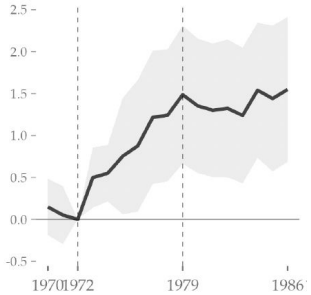
2. Network Effects - Key: impact beyond targeted sectors, through input-output linkages [ala Hirschman 1958]

1. Direct Effects of the HCI drive

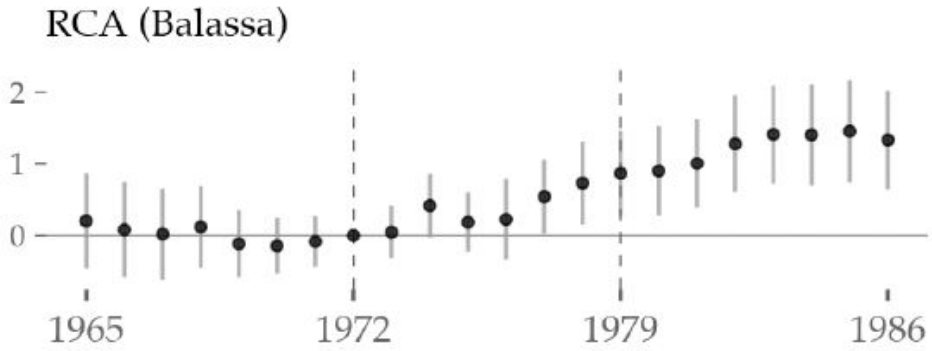
Large effects on output. Some evidence of effects on productivity. Shifting RCA!

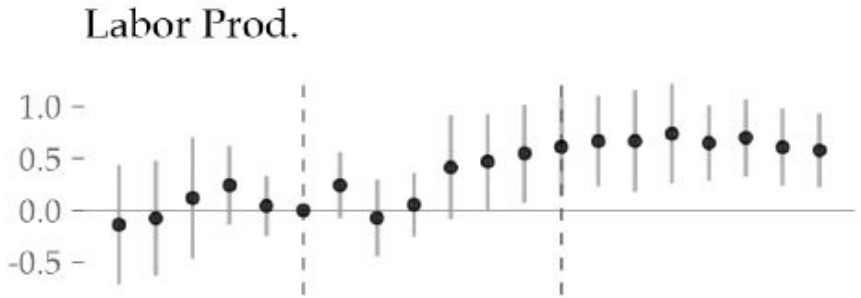


Doesn't seem like untreated sectors are being crowded out



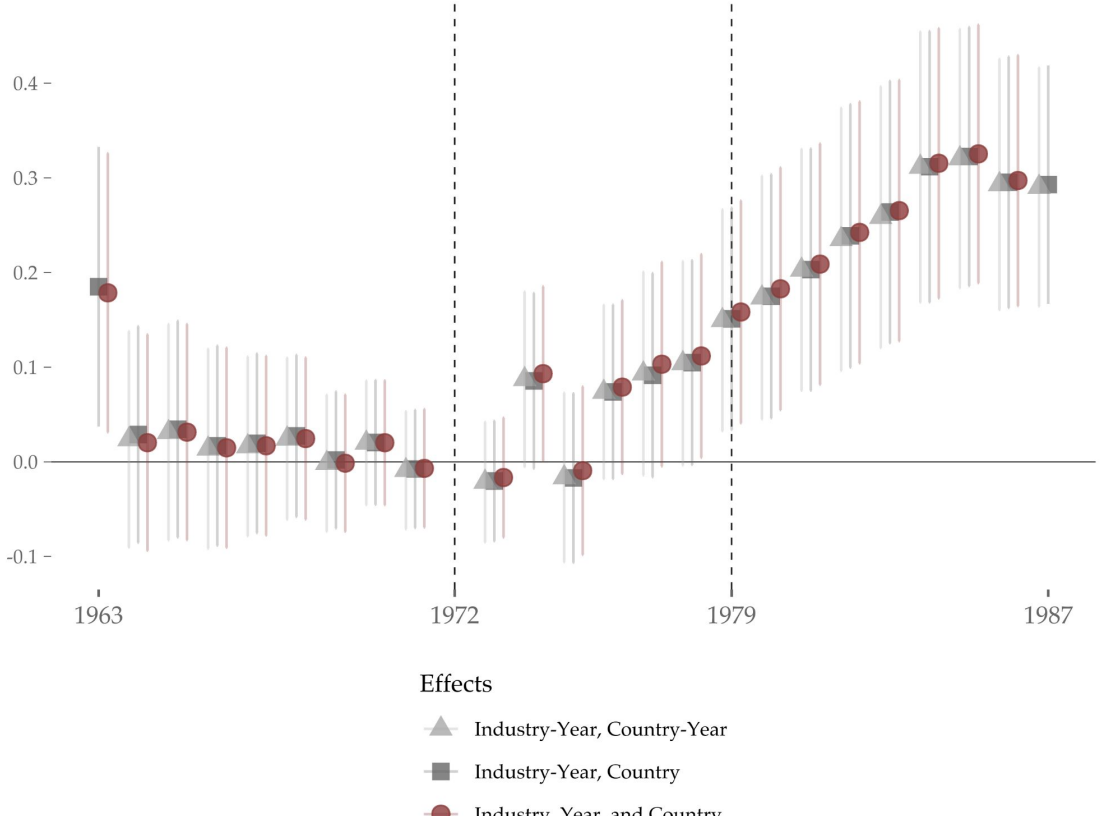
Industrial Output, HCI (red) and non-HCI (black)





1. Direct Effects: Triple diff with ROW

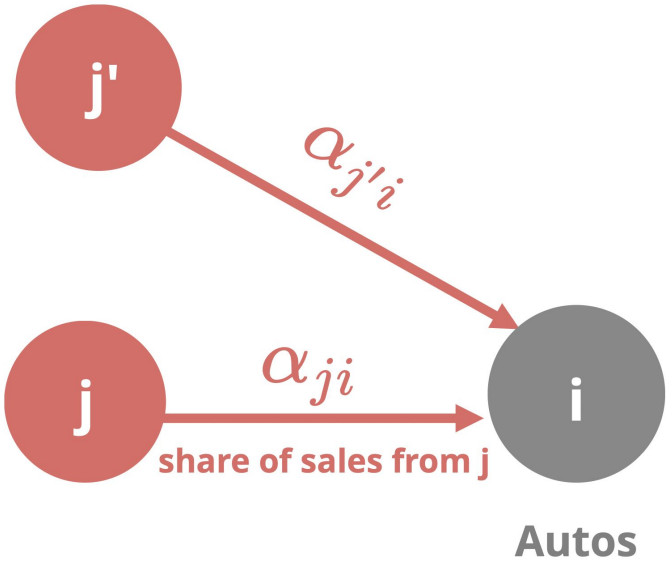
Revealed Comparative Advantage of Targeted SK Sectors vs. World.



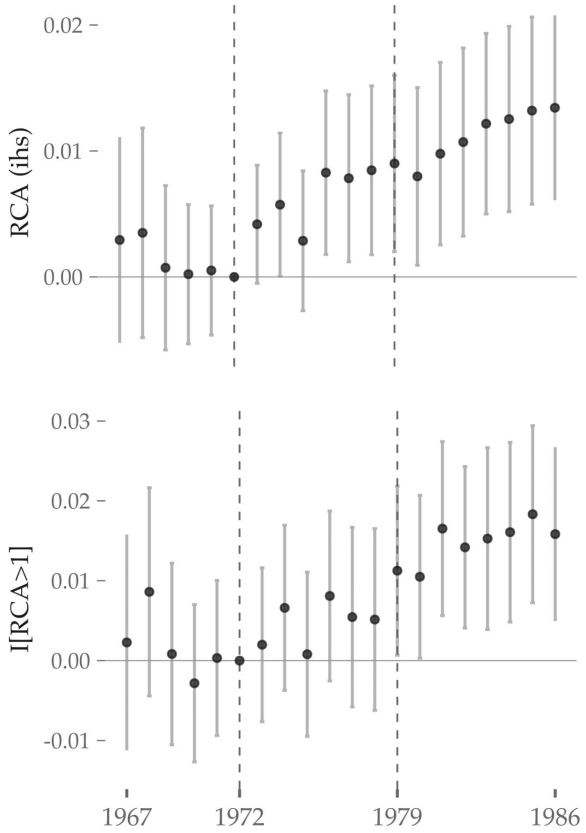
- SK did what many countries are not able to do.
- Inspired competitive entry into world export markets through use of IP.

2. Indirect Effects: Positive effects on RCA downstream

Find forward linkage effects - Industrial development promotes downstream growth.



$$\text{Forward Links}_i = \sum_{j \in \text{HCI}} \alpha_{ji}$$



IP in South Korea was likely exceptional

Blonigen Economic Journal 2014: Impact of industrial policies on downstream exports

Table 3

Effects of Steel Industrial Policies on Downstream Sectors' Export Values

	Full sample	Developed countries	Less-developed countries	Asian countries
Steel industrial policies × steel input share	−0.075 (0.053)	0.015 (0.086)	−0.136 (0.073)	0.041 (0.115)
Country-year fixed effects	Yes	Yes	Yes	Yes
R^2	0.20	0.16	0.18	0.36
F-statistic (p-value)	167.77 (0.000)	127.43 (0.000)	147.87 (0.000)	391.70 (0.000)
Observations	364,150	211,900	100,400	51,850

Question remains:

How and why are some countries able to do good IP and others not?

IP in South Korea was likely exceptional

Blonigen Economic Journal 2014: Impact of industrial policies on downstream exports

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Question remains:

How and why are some countries able to do good IP and others not?

So how did South-Korea pull this off?

- Crisis solved a lot of the political economy problems in getting HCI push off the ground

    A lot of what the state did to promote HCI was extraordinary and may have been difficult to implement in “normal times”

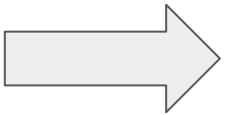
- Capitalists’ incentives were aligned with the state: HCI push increased military security for the South

Taking Stock

- Infant industry mechanism seems empirically relevant
  - HCI drive in SK managed to engineer a remarkable shifting in comparative advantage
- However, both episodes are somewhat unique/"synthetic"
  - The stars needed to align . In SK, the policy may not have happened but for the 1973 crisis
  - Similar to Mitrunen (2021): natural experiment replicating IP in the context of a national emergency

Caveat: welfare evaluation outside the scope of these papers, but Choi, Levchenko (2022) find aggregate benefits for Korea)

My take: These papers make the case that infant industry is something we should worry about, particularly in developing countries.



We need to start evaluating IP as implemented in the real world

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Two types of empirical questions

(Juhász, Lane, Oehlsen, Perez 2022)

1. **One set of questions is about testing economic mechanisms (progress)**
    - Are market failures relevant? Do individual cases work?

2. **But another set of questions is about real-world implementation (little evidence)**
    - Are government failures relevant? E.g. political economy and informational issues.
    - Questions involve comparing instances of IP.
    - Analyses likely requires multiple episodes.

The challenge of measuring IP

(Juhász, Lane, Oehlsen, Perez 2022)

IP is not directly observable

Consider tariffs,

- A textbook instrument of industrial policy
- … But also used to raise revenue *(Cage and Gadenne 2018)* and for ToT rationales *(Broda, Limao, and Weinstein 2008)*

- Without additional information, hard to know if a tariff is an industrial policy.
- Problem compounded: many policies can be used as industrial policy.

In Juhasz *et al.*, we focus measurement and basic facts

1. Measurement.
    - New, text-based approach to measuring industrial policy using supervised machine learning + policy description database.
    - Proof of concept → construct measures of IP by country-industry-year

2. Basic stylized facts.

Our approach

Departs from using policy measures *per se* [*e.g.* tariffs] … and turns to the language of policy [*e.g.* policy text].

Why?

- IP is state action directed at changing the structure of an economy.
- This **goal-oriented state action** is often **conveyed in language**.

Goal oriented action conveyed in language

Consider this summary of a Chinese industrial subsidy programme:

> "In the PRC Ministry of Industry and Information Technology's policy released on the 1st of March 2017, a plan is laid out to **boost growth in the Chinese battery industry**, specifically, batteries for automobiles [...]"

Policymaker: changing composition of economic activity by boosting a particular sector.

Examples: Language stating IP goals

- " 'The Programme 'National Champions' was developed as part of the framework [...] of the President of the Republic of Kazakhstan, Mr. Nazarbayev."
- "The Thailand Board of Investment approved on June 10, 2009 further incentives aimed at making Thailand the automobile manufacturing hub in Asia."
- "Uzbekistan plans to invest within next 5 years about 1.4 billion US dollars to the domestic automobile industry. [...] The automobile industry was announced to be one of the priorities of the industrial development "
- " In the New Growth Strategy of Japan (2010), the Japanese government announced that it would promote the use of Japanese wood instead of foreign wood."
- "On 6 June 2009, the Ministry of Information Industry (MII) of the People's Republic of China (PRC) issued a Planning Release [...] The release [...] seeks to provide guidance on maintaining and strengthening the PRC's position in the global ship-building industry."
- "On 29 May 2012, the Ministry of Textiles approveda INR 35,000 crores (USD 6 billion) restructuring package for the debt owed by the domestic textile industry […] The stated goal of the scheme is to improve the participating companies' working capital positions."

Goal oriented action conveyed in language

As opposed to this Thai subsidy programme with other goals:

> “The Thai Ministry of Commerce announced a reduction in rice-growing zones **to stabilise rice prices** [...] In addition, the Ministry has encouraged rice mills to purchase paddy directly from the farmers in an effort to supplement the farmers' income [...]”

Policymaker wants to stabilize rice prices in response to an oversupply of rice.

Our approach

"In the PRC Ministry of Industry and Information Technology's policy released on the 1st of March 2017, a plan is laid out to boost growth in the Chinese battery industry, specifically, batteries for automobiles. [...]"

VS.

"The Thai Ministry of Commerce announced a reduction in rice-growing zones to stabilise rice prices [...]."

Uses NLP to discern *industrial policy goals* of policies *at scale*

Use this to make indices of IP.

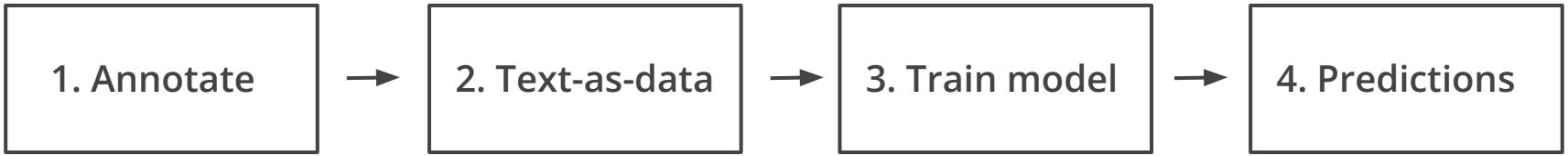
Data: Use common source of mass textual data.

GLOBAL TRADE ALERT

Use: GTA database, independent org. monitoring intl. policies impacting trade. Policy surveillance on mass scale.

→ **Key:** textual summaries of ***any*** economic policy **discriminating against foreign commercial interests.**

Four step workflow (simplified)



We get our function $f : X_{text} \rightarrow Y$ using a four-step supervised learning workflow.

Step 4. Prediction: Validate our model in many ways.

Most predictive coefficients

β *Coefficient*	*Feature name*
13.9	tech
13.7	green
12.7	project
10.9	export
10.2	million
10.1	plant
9.8	lobster
9.5	loan
9.4	technology
9.2	development

Rank terms with largest coefficients.

Logistic regressions allows us to see words predictive of IP

Several of the feature names - **e.g., tech, technology, development, green** - are words reasonably associated with industrial policy.

What we have learnt: A Preview of the Stylized Facts

1. IP in our data is more prevalent in rich countries. Very little in LDC-s that we can measure.

2. Policy tools are typically narrowly targeted (often at individual firms) and technocratic.

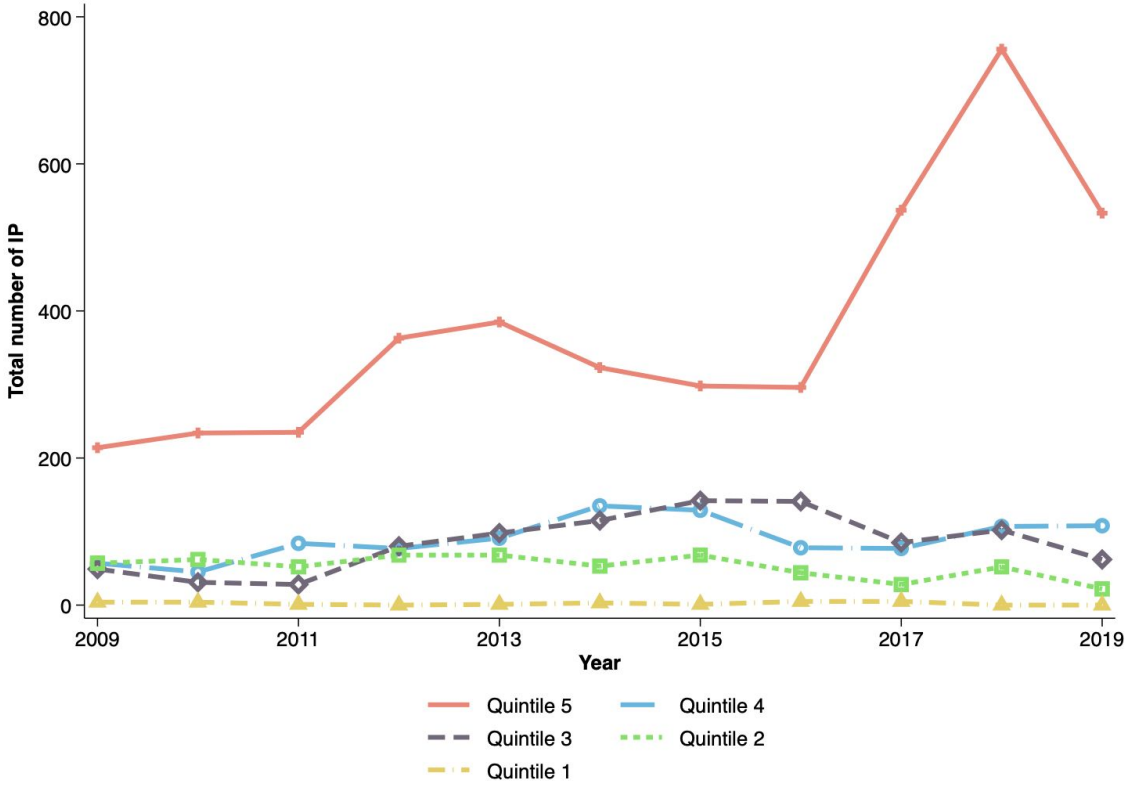
   IP is expensive! Poorer countries use tariffs.

3. IP correlated with RCA in rich countries. No correlation between IP and RCA in lower income deciles.

1. IP use

Richest countries dominate IP in our data.

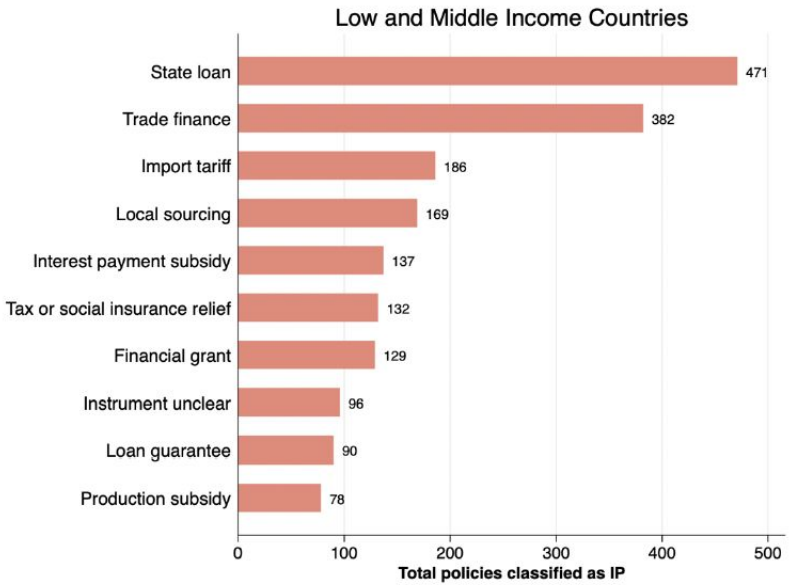
Total number of IP through time, by income quintile

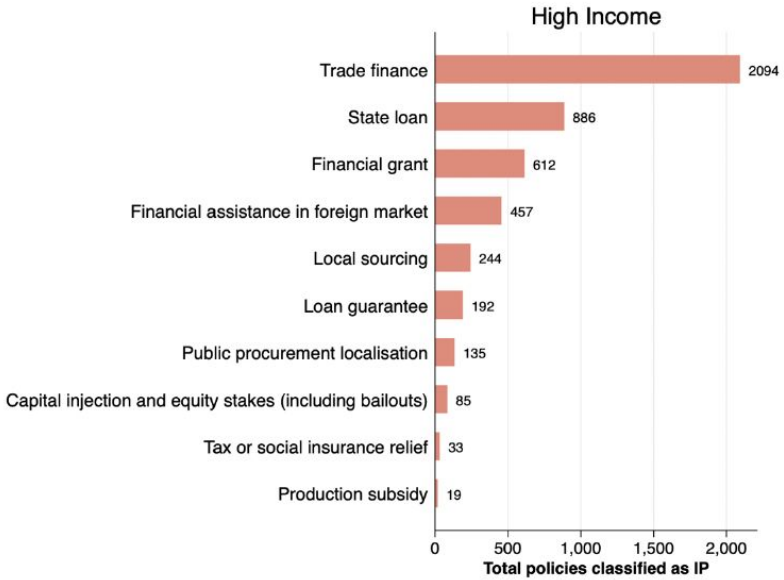


Quintiles based on 2010 GDP per capita. Higher quintiles are higher income.

2. Policy measures

A lot of overlap in the type of measures used across the income distribution. Import tariffs are a notable exception





3. What sectors do they target?

IP is correlated with RCA, *but only for rich countries*

Independent Variables	(1) IP = 1	(2) IP = 1	(3) IP = 1	(4) IP = 1
RCA	0.00011***		0.00002	
	(0.00004)		(0.00002)	
RCA > 1		0.00933***		0.00080*
		(0.00252)		(0.00043)
GDPpc > Median × RCA			0.00041**	
			(0.00018)	
GDPpc > Median × RCA > 1				0.01662***
				(0.00475)
CtryxYear FE	Yes	Yes	Yes	Yes
Observations	195261	195261	168586	168586
R-squared	0.347	0.348	0.346	0.347
Mean d_IP	0.017	0.017	0.019	0.019
# of Countries	183	183	158	158

Notes: Standard errors are clustered at the country level.

Concluding thoughts: we need so much more research on IP!

1. Recent progress in identifying the economic mechanism.
   - Market failures are important! But how? Micro studies using plant data should focus on understanding potential frictions in technology flows, technology adoption etc.
2. It also seems likely that getting IP implementation right is very hard.
   - Designing institutions that overcome PE issues is probably key (analogy with monetary policy)
   - We should be a lot more open to experimentation and have a higher tolerance for failure.
3. How will the changing landscape of globalization affect developing countries?
   - Tariffs will often be the only viable tool for doing IP, these are also the most easily observable.

References

Amiti, M., & Konings, J. (2007). Trade Liberalization, Intermediate Inputs, and Productivity: Evidence from Indonesia. *American Economic Review*, *97*(5), 1611–1638.

Amsden, A. H. (1992). *Asia's Next Giant: South Korea and Late Industrialization* (Second). Oxford University Press.

Barwick, P. J., Kalouptsidi, M., & Zahur, N. B. (2019). *China's industrial policy: An empirical evaluation*. National Bureau of Economic Research.

Beason, R., & Weinstein, D. E. (1996). Growth, economies of scale, and targeting in Japan (1955-1990). *Review of Economics and Statistics*, *78*(2), 286–295.

Blonigen, B. A. (2016). Industrial Policy and Downstream Export Performance. *The Economic Journal*, *126*(595), 1635–1659.

Broda, C., & Weinstein, D. W. (2004). Variety Growth and World Welfare. *American Economic Review*, *94*(2), 139–144.

Cagé, J., & Gadenne, L. (2018). Tax revenues and the fiscal cost of trade liberalization, 1792-2006 ☆. *Explorations in Economic History*, *70*, 1–24. https://doi.org/10.1016/j.eeh.2018.07.004

Crouzet, F. (1987). L'economie Britannique et le Blocus Continental: 1806–1813. Paris: Presses Universitaires de France.

Evans, P. B. (1995). *Embedded Autonomy: States and Industrial Transformation*. Princeton University Press.

Hanlon, W. W. (2020). The Persistent Effect of Temporary Input Cost Advantages in Shipbuilding, 1850 to 1911. *Journal of the European Economic Association*, *18*(6), 3173–3209.

Hansen, J. D., Jensen, C., & Madsen, E. S. (2003). The Establishment of the Danish windmill Industry: Was It Worthwhile. *Review of World Economics*, *139*(2), 324–347.

References - cont'd

Head, K. (1994). Infant Industry Protection in the Steel Rail Industry. *Journal of International Economics*, *37*(3), 141–165.

Hirschman, A. O. (1958). *The Strategy of Economic Development* (Third). Yale University Press.

Irwin, D. A. (2000). Did Late-Nineteenth-Century U.S. Tariffs Promote Infant Industries? Evidence from the Tinplate Industry. *The Journal of Economic History*, *60*(2), 335–360.

Johnson, C. (1982). *MITI and the Japanese Miracle: The Growth of Industrial Policy: 1925-1975*. Stanford University Press.

Juhász, R. (2018). Temporary Protection and Technology Adoption: Evidence from the Napoleonic Blockade. *American Economic Review*, *108*(11), 3339–3376.

Juhász, R., Squicciarini, M., & Voigtländer, N. (2020). Technology Adoption and Productivity Growth: Evidence from Industrialization in France. *SSRN Electronic Journal*.

Juhász, R., Lane, N., Oehlsen, E. and Pérez (2022). The Who, What, When and How of Industrial Policy: A Text-Based Approach. *SSRN Electronic Journal*.

Kalouptsidi, M. (2018). Detection and Impact of Industrial Subsidies: The Case of Chinese Shipbuilding. *The Review of Economic Studies*, *85*(2), 1111–1158.

Lane, N. (2022). Manufacturing Revolutions: Industrial Policy and Industrialization in South Korea. *SSRN Electronic Journal*.

Lee, J.-W. (1996). Government Interventions and Productivity Growth. *Journal of Economic Growth*, *1*(3), 391–414.

Liu, E. (2019). Industrial Policies in Production Networks. *Quarterly Journal of Economics*, *134*(4), 1883–1948.

References - cont'd

Luzio, E., & Greenstein, S. (1995). Measuring the Performance of a Protected Infant Industry: The Case of Brazilian Microcomputers. *The Review of Economics and Statistics*, *77*(4), 622–633.

Melitz, M. J. (2005). When and how should infant industries be protected? *Journal of International Economics*, *66*(1), 177–196.

Mitrunen, M. (2021). *Industrial Policy, Structural Change, and Intergenerational Mobility:Evidence from the Finnish War Reparations*.

Noland, M. (1993). The Impact of Industrial Policy on Japan's Trade Specialization. *The Review of Economics and Statistics*, *75*(2), 241–248.

Redding, S. (1999). Dynamic Comparative Advantage and the Welfare Effects of Trade. *Oxford Economic Papers*, *51*(1), 15–39.

Rosenthal, S. S., & Strange, W. C. (2004). Evidence on the Nature and Sources of Agglomeration Economies. *Handbook of Regional and Urban Economics*, *4*, 2119–2171.

Sauré, P. (2007). Revisiting the infant industry argument. *Journal of Development Economics*, *84*(1), 104–117.

Shu, P., & Steinwender, C. (2019). The Impact of Trade Liberalization on Firm Productivity and Innovation. *Innovation Policy and the Economy*, *19*, 39–68.

Studwell, J. (2013). *How Asia Works: Success and Failure in the World's Most Dynamic Region*. Grove Press and Grove/Atlantic, Inc.

Topalova, P., & Khandelwal, A. (2011). Trade Liberalization and Firm Productivity: The Case of India. *The Review of Economics and Statistics*, *93*(3), 995–1009.

Wade, R. (1990). *Governing the market: Economic theory and the role of government in East Asian industrialization*.