Industrial Policy

ECON 871

What is Industrial Policy (IP)?

Recent defnition by Juhász, Lane and Rodrik (2023): *We define industrial policies as those government policies that explicitly target the transformation of the structure of economic activity in pursuit of some public goal.*

These “public goals” may include...

- Stimulate innovation, productivity, or growth.
- Promote climate transition.
- Help lagging regions of the economy.
- Promote exports or import substitution.

Rationales for Industrial Policy

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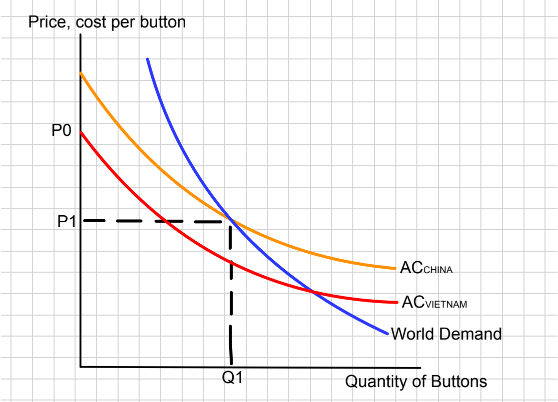
3. **Activity-Specific Public Inputs.**
   - Government chooses between building roads or enlarging ports.

Rationales for Industrial Policy

One specific example is **infant industry protection.**

- New industries (usually in developing countries) need protection against competive pressures until they mature and develop economies of scale.



Why is Industrial Policy Controversial?

Economists agree that targeting externalities is a good thing. However, industrial policy has a bad reputation. Why?

Two main objections:

1. **Information Shortcomings:** In the real world, it is hard for the government to measure the precise location and magnitude of the market failure in order to target it appropriately.

2. **Political Capture:** Industrial policy opens the door to lobbying and political influence.

Industrial policy is often described as a government's attempt to "pick winners."

Why is Industrial Policy Controversial?

Historical examples contain both success stories and failures, fodder for each side of the debate:

In developing countries:

- **Success:** Asian growth “miracle.”
- **Falure:** Latin American and African attempts at import substitution policies.

In the U.S., there have been a few success stories and a bunch of big failures:

- **Success:** DARPA
- **Failures:** Solyndra, Foxconn (WI), a bunch of others...

Empirical Evidence Challenges

Hard to provide systematic empirical evidence of success for two primary reasons:

1. **How do you define "success"?**
   - Want a policy that alleviates the market failure without causing too many other distortions.
   - Say steel tariffs boost steel production, but creates distortions in the car industry. Is that successful IP?
   - We don't really have a good answer for this one.

2. **Data**—hard to find comparable policies across countries and over time to compare.

Data and Measurement Issues

Problem 1: Industrial policies can be complex objects. Juhász et al. (2023) provides the example of the Chinese shipbuilding industry:

China's 11th National 5-year Economic Plan for 2006-2010 identified shipbuilding as a "strategic industry." With the goal of becoming the largest shipbuilding nation within a decade, China deployed a multitude of policy instruments, including production subsidies, investment subsidies, and entry subsidies. There were also changes along the way.

- Single sectoral strategy.
- Many different tools.
- Tools in use changed over time.

Data and Measurement Issues

Problem 2: Specific policy instruments may sometimes be used for IP, sometimes not.

- If we knew import tariffs were always used for IP, we could study the effects of all import tariffs.
- However, policy tools, like import tariffs, have other possible goals:
  - Raising revenue.
  - Political economy/lobbying motives.
- **Key point:** It is not just the policy that matters, but the *intent* of the policy.

Some Cool New Data

Juhász, Lane, Oehlsen and Pérez (2022) have created a new dataset of industrial policies at the **country-industry-year** level.

- Use a publicly available policy inventory called the **Global Trade Alert database (GTA)**.
  - Launched in 2009 when people worried the financial crisis would lead to worldwide protectionist measures like what happened in 1930.
  - Tracks records of unilateral commercial policy interventions since November 2008. (Now, more than 52000 records.)
  - Records contain descriptions of the the policies implemented.
- Use natural language processing to ascertain the *objectives* of the policymakers and identify when a policy has industrial policy goals vs alternative objectives.

Some Cool New Data

Let's look at a few examples. Are these IP or not?

- *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.*

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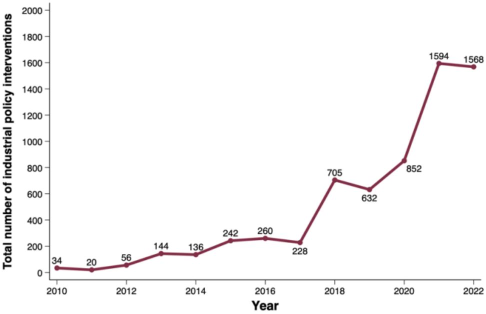
Some Cool New Data

With this new dataset, Juhász et al. (2022) show that industrial policies have been on the rise:

Figure 3.1. Time trend of industrial policies



Causal Identification

Recent set of papers attempting to causally identify effects of industrial policy.

Empirical Challenge: Defined by Rodrik (2012) and adapted by Juhász et al. (2023).

- Define some underlying level of economic performance, g, to be a negative function of some **market failure parameter** $\theta \in [0, 1]$:

  $$g(\theta) = (1 - \theta)A$$

  where A is a state variable that affects economic performance.

- For example: g could be the rate of economic growth, A the level of productivity.

Causal Identification

- Now suppose the government can implement at subsidy, s, that (at least partially) alleviates the distortion.
- The subsidy comes with a fiscal cost, $\varphi\alpha(s)$, where $\alpha(s)$ is a rising and convex function of s.
- With the policy in place, the $g(\cdot)$ function can be rewritten:

$$g(s, \theta, \varphi) = (1 - \theta(1 - s))A - \varphi\alpha(s)$$

- We can denote the socially optimal value of the policy, s, as the value that solves:

$$g_s(s, \theta, \varphi) = \theta A - \varphi'\alpha(s) = 0$$

(Because of the cost, we won't simply fully offset θ with s.)

Causal Identification

- The government may also reap other benefits from imposing the subsidy, i.e., political benefits. Denote these alternative benefits by the function $\pi(s)$, which is maximized by some level of $s = s^{\text{pol}}$.

- The government will choose s to maximize some weighted average of political and social value:

$$\max_{s} \; u(s; \theta, \varphi) = \lambda g(s, \theta, \varphi) + \pi(s)$$

  where λ is the relative weight put on social benefits.

- The government chooses s^{gov} as the solution to the FOC:

$$\lambda g_s(s, \theta, \varphi) + \pi'(s) = \lambda \left[\theta A - \varphi \alpha'(s)\right] + \pi'(s) = 0$$

Causal Identification

With this simple model in mind, the **endogeneity problem** becomes clear:

- We do not directly observe the market failures (θ), government capability (φ), or weight (λ).
- All we observe is how economic performance (g) varies with the policy (s).
- But, s is highly endogenous to economic, administrative, and political determinants.

Causal Identification

Suppose, for example the government actually chooses subdies for the "right" reasons—the level is determined by the presence of market failures. Using our model:

$$\frac{ds^{\text{gov}}}{d\theta} = \frac{A}{\varphi\alpha''(s^{\text{gov}})} > 0$$

That is, subsidies will increase with the market failure. BUT

$$\frac{dg}{d\theta} = -(1 - s^{\text{gov}})A < 0$$

Growth will be lower when the market failures are greater, becuase the government won't fully offset the market failure.

So, studying correlations between g and s will indicate that industrial policy is making the economy worse off.

Causal Identification

Even if we can identify random "shocks" to the subsidies, i.e., we can express:

$$s^{\text{gov}} = s^{gov^*} + \varepsilon_s$$

and look at correlations between g and ε_s, we will be identifying the effects of subsidy "shocks" on economic performance.

- Government randomly sprinkling subsidies of various amounts across the economy.
- Is this really informative about whether real-world industrial policy is effective?

What Have People Done?

Two examples of recent papers that have empirically evaluated specific instances of industrial policy:

- Juhász (2018)—mechanized cotton industry in 19th century France.
- Lane (2022)—Heavy and Chemical Industries in South Korea in the 1970s.
- Small, but growing, literature.

Juhász (2018)

Question: Can temporary protection spur the development of an infant industry?

Natural Experiment: Temporary trade protection on the mechanized cotton-spinning industry across regions of the French Empire during and after the Napoleonic Wars (1803-15).

- During the wars, a blockade of Britain was implemented, attempting to stop British goods from entering Continental Europe.
- In reality, blockades had holes—trade was displaced to more circuitous/less reliable routes.
  - More of an impact on the North of France than on the South.
- Plausibly exogenous shock to the cost of trading with Britain that varied across regions.

Juhász (2018)

The mechanized cotton spinning industry was an important, fast growing industry in Britain.

- Technology was invented and developed in Britain in the late 18th century.
- Not adopted on a wide scale in France despite having an initially similar cotton industry.
- By the beginning of the Napoleonic wars, France was not competitive in the mechanized cotton spinning industry.

Two-Part Question:

- **Short-Run:** Did (exogenous) trade protection lead to the adoption of mechanized cotton-spinning technology in France?
- **Long-Run:** What happened to the industry after temporary protection ended?

Juhász (2018)

To estimate the **short-run** effects of temporary protection on mechanized-spinning technology adoption, she runs the following:

$$S_{it} = \alpha_i + \delta_t + \gamma \ln D_{it} + \epsilon_{it}$$

- S_{it} is a measure of mechanized spinning capacity in region i at time t.
- $\ln D_{it}$ is the log of the *effective distance* to Britain in region i at time t.
- $\gamma > 0$ implies that increased protection (via increased distance) increases technology adoption.

Juhász (2018)

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	33.47	33.48	34.78	24.73	32.96	42.18	38.82
	0.47	*0.47*	*0.49*	*0.35*	*0.46*	*0.52*	*0.48*
	(9.80)	(9.89)	(10.47)	(10.90)	(9.75)	(12.54)	(13.23)
	{10.00}	{10.06}	{10.58}	{11.07}	{10.01}	{13.50}	{13.46}
Streams X 1812		-0.14					-1.16
		(1.50)					(2.17)
Coal X 1812			-3.93				4.11
			(4.21)				(7.47)
Market potential X 1812				41.05			30.19
				(21.58)			(30.19)
Knowledge access X 1812					40.87		34.90
					(15.22)		(21.79)
Literacy X 1812						46.41	27.79
						(21.16)	(18.86)
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Department FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	176	176	176	176	176	126	126
Adjusted R-squared	0.34	0.33	0.34	0.36	0.37	0.42	0.45
Num. clusters (dept)	88	88	88	88	88	63	63
Num. clusters (gen)	40	40	40	40	40	30	30

Dependent variable: Spindles per thousand inhabitants in department i at time t. Departmental population held constant at its 1811 level. Effective distance is measured as the natural logarithm of the shortest route to London for each department i at time t. Controls (all interacted with an indicator variable which takes the value of one in 1812 and is zero otherwise): Literacy measured as the proportion of men able to sign their wedding certificate in 1786; Coal is the inverse of log distance to the nearest coalfield; Streams is defined as the natural logarithm of mean streamflow (m3/s); Knowledge access is defined as market access to universities in 1802; Market potential is defined as market access to urban population in 1800. Standardized coefficients in italics. Standard errors clustered at the level of the department in parentheses, standard errors clustered by généralités in curly brackets. The number of observations differ across columns because of missing observations for the literacy measure. For further details on the data, see Online Appendix A.3.

- Interquartile shift leads to increase in spinning capacity equal to average capacity in 1812 across all regions.
- Shock equivalent to moving a region from along the English Channel to the Spanish Border. (About 400 km.)

Juhász (2018)

To estimate the **persistence** of these effects, she estimates the following IV specification:

$$Y_{it} = \alpha_0 + \beta_{0,t} S_{i(1812)} + \eta_{it}$$
$$S_{i(1812)} = \alpha_1 + \beta_1 \Delta \ln D_i + \omega_i$$

Results: Having one additional spindle per capita in 1812 due to the trade shock leads to:

- 2.1-3.4 additonal spindles in 1840.
- 4.7-6.2 additional spindles in 1887.

Overall: Example of a case where temporary protection leads to adoption of technology (short-run) and long-run development of an industry.

Lane (2022)

Lane (2022) studies another episode of industrial policy: the **Heavy and Chemical Industry (HCI) Drive** in South Korea between 1973 and 1979.

Nice natural experiment for many reasons:

- HCI Drive was initiated and stopped suddenly in 1972 and 1979, respectively. (Temporary)
- Cause of initiation was political, rather than driven by economic conditions:
  - Nixon proposed to withdraw US forces from South Korea, which was relying on the US for protection.
  - Korean President Park promoted heavy and chemical industries to modernize military capabilities.
  - Ended after Park was assasinated in 1979.
- Regional variation—targeted the southeastern part of the country, and developed industrial complexes in those regions.

Lane (2022)

Main **industrial policy instrument:** *directed foreign credit.*

- 1962 Foreign Capital Inducement Act—Korean government restricted firms' direct foreign financial transactions to exercise more control over BOP.
- Government granted access to foreign credit to targeted firms in the HCI Drive, guaranteeing loans at favorable interest rates.
- Valuable to firms because domestic financial markets were underdeveloped.

Data:

- Newly digitized industry level data from a Korean Manufacturing Census.
- Targeted firms defined by matching industries that appeared in the legislation to the data.
- Trade data from UN Comtrade.

Lane (2022)

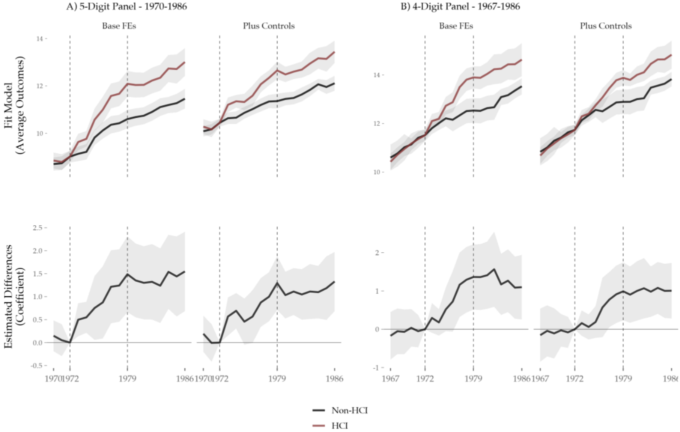
Empirical Strategy: Diff-in-diff comparing HCI (treatment) to non-HCI (control) sectors over time.

$$Y_{it} = \alpha_i + \tau_t + \sum_{j \neq 1972} \beta_j \left(\text{Targeted}_i \times \text{Year}_t^j \right) + \sum_{j \neq 1972} X_i' \times \text{Year}_t^j \Omega_j + \epsilon_{it}$$

- Y_{it} is an industrial development outcome in manufacturing industry i, year t.
- Targeted is an indicator for whether the industry was a targeted HCI industry.
- Changes are taken relative to the pre-treatment year 1972.
- Time and sector fixed effects.

Lane (2022)

Figure 3: Differences in Industrial Output (Real Value Shipped), HCI v. Non-HCI Industry



Note: Figure shows dynamic differences-in-differences estimates for the relationship between HCI and real value of output shiped. Top row plots averages for HCI (red) and non-HCI industry (black), or the fit DD model. Bottom row shows dynamic DD estimates. Panel A corresponds to estimates for detailed (short) 5-digit level panel. Panel B corresponds to estimates for aggregate (long) 4-digit level panel. 'Base FEs' are baseline regressions with two-way fixed effects. 'Plus Controls' are specifications with full pre-treatment controls, interacted with time effects. Estimates are relative to 1972, the year before the HCI policy. 1973 is the start of HCI. The line at 1979 demarcates the fall of the Park regime. Standard errors are clustered at the industry-level and corrected for heteroskedasticity. Confidence bands are in light grey and are 95 percent confidence intervals.

Lane (2022)

Summary of Results:

1. Significant positive impacts of IP across many development outcomes—output, labor productivity, employment growth, export performance.

2. HCI promoted a shift in long-term dynamic comparative advantage of targeted industries:
   - Persistent increase in export *shares*
   - Treated industries were 13 percent more likely to achieve comparative advantage in global markets than other manufacturing exports over the same period.

3. Some spillover impacts through production networks.

Industrial Policy Resurgence

Industrial policy is experiencing a resurgence:

- **CHIPS and Science Act**
- **Inflation Reduction Act**
- **European Battery Alliance**
- Japan's strategic supply chain initiatives

Important to understand many aspects of these policies:

- When can they help?
- When do they do more harm than good?
- What happens if multiple countries are trying to promote the same sector (semi-conductors)?

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