Protectionism and Industrialization in Colonial India

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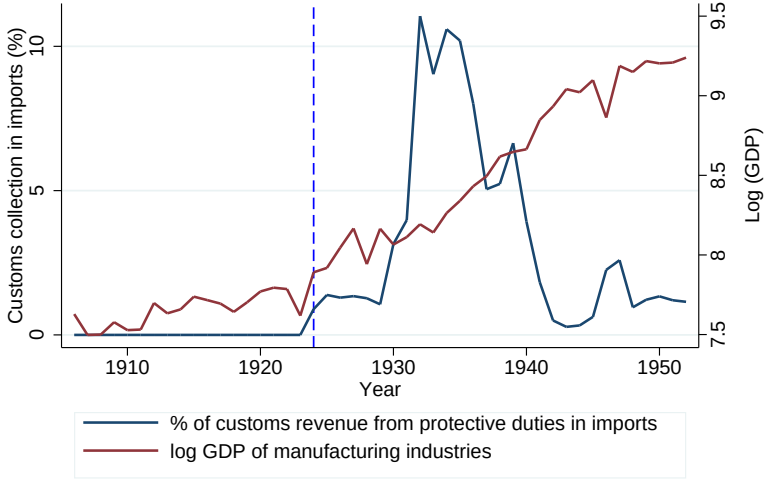
Was Temporary Protectionism a "big push" to Indian Industries?



1924: Discriminatory Protection Policy
GDP: Gross Domestic Product from Manufacturing Industries at 1948-1949 prices
Customs collection in imports: % of revenue from import duties in total value of imports

Contributions and Main Findings

- Estimate the causal effect of the temporary trade protection policy on the industrial development of India
- Were the British free trade principles a hindrance to Indian industrial growth?
- Test whether the infant industry argument in theory is empirically applicable
- Newly digitized data
- **Findings:** Persistent effect of the policy on LR industry performance
  - $\uparrow$ in value of output, capital acquisitions, employment, value added, number of establishments, scale and productivity
  - policy explains 3.37% of the overall change in the Indian GDP during 1946 to 1958

Temporary Protection Policy

- Combination of revenue and protective duties
- Products of 11 industries were granted protection based on the following conditions:
  - natural advantages (like abundant supply of raw-materials, cheap power, sufficient supply of labour or a large home market)
  - important for national defense or otherwise required by the state
  - unable to develop without protection
  - would eventually be able to face world competition without protection
- Process:

- industry claim $\rightarrow$ Govt. $\rightarrow$ Tariff Board enquiry $\rightarrow$ duties proposed $\rightarrow$ final decision of Govt. grant protection $\rightarrow$ progress enquiry $\rightarrow$ supplementary protection / reduction

Summary of Protected and Not Protected Industries

Industries	Year of Tariff Board Enquiry and Recommendations for Protection	Year of Government Actions and Protection Act Implemented	Years of enquiry on progress, tariff amendments, supplementary protection/extension
Iron and Steel and its subsidiaries	1923	1924	1927, 1928, 1930, 1931, 1934
Cotton Textiles	1926-1927	1927, 1930	1933, 1934
Sugar	1930	1932	1938, 1939
Paper and Paper Pulp	1924	1925	1932
Matches	1926	1928	1934
Salt	1929	1931	1932, 1933, 1935, 1936
Heavy Chemicals	1928	1931	
Wire and Wire Nail	1926, 1931	1932	
Plywood and Tea Chests	1927	1927	
Magnesium Chloride	1928	1931	1937
Gold Thread	1930	1931	
Sericulture	1932	1934	
Cement	1924	Denied Protection	
Woollen	1934	Denied Protection	
Glass	1931-1932	Denied Protection	
Coal	1925	Denied Protection	
Oil	1928	Denied Protection	
Electric Wires and Cables	1931	Denied Protection	

Panel of Industrial Outcomes, Trade & Customs Data Digitized

- **Industrial Outcomes (1946-1958)**: by industry value of output, capital, inputs, employment, number of factories, value added by manufacture
- **Industrial Outcomes (1920-1937)**:
  - enumeration of factories, average daily number of workers employed by region (British Provinces and Indian States), year, and industry
  - production by industry and products
- **Trade Statistics (1920-1939)**:
  - **Customs Data**: customs tariffs by type and articles, customs revenues raised by products
  - **Trade Flows**: value and quantity of exports and imports by articles and countries, and regional share

Annual Statements of Sea-Borne Trade of British India

GROSS amount of CUSTOMS duty COLLECTED on the PRINCIPAL and other articles of IMPORTED MERCHANDISE subject to duty, in each OFFICIAL year from 1926-27 to 1930-31—concluded

ARTICLES	1926-27	1927-28	1928-29	1929-30	1930-31
	R	R	R	R	R
SCHEDULE II—IMPORT TARIFF—*concluded*					
PART VII—*concluded*					
Articles which are liable to protective duty at special rates—concluded					
III.—Articles wholly or mainly manufactured—*concluded*					
METALS—IRON AND STEEL—*contd.*					
STEEL, bar and rod, not otherwise specified	48,46,214	30,994	—	—	—
(i) of British manufacture	—	4,12,953	8,91,069	6,24,598	4,12,178
(ii) not of British manufacture	—	29,46,029	25,35,333	27,36,025	13,02,251
STEEL, STRUCTURES, fabricated partially or wholly, not otherwise specified, if made mainly or wholly of steel bars, sections, plates—or sheets, for the construction of buildings, bridges, tanks, waterworks, pro-tiles, towers and similar structures or for parts thereof, but not including builders' hardware, etc.	11,16,102	93,417	—	—	—
(i) of British manufacture	—	10,06,033	10,07,233	8,74,311	7,53,927
(ii) not of British manufacture	—	5,63,473	1,27,957	1,28,632	1,07,993
Tin plates and tinned sheets, etc.	18,03,243	22,215	—	—	—
Tin plate cuttings	729	—	—	—	—
†STEEL, tin plates and tinned sheets, including tin taggers and cuttings of such plates, sheets or taggers	—	11,78,420	18,06,313	15,09,271	8,19,940†
Total of III.—Articles wholly or mainly manufactured	2,76,93,069	2,96,47,578	2,63,45,033	2,13,33,130	1,43,89,359
Paper, pasteboard and stationery—					

Identifying the Long-Run Effects of Protection on Industries

$$Y_{it} = \beta * asinh(\text{Customs Revenue}_i) + \lambda_t + e_{it} \quad (1)$$

$$\text{Customs Revenue}_i = \sum_{t_i}^{1939} \sum_{p \in i} \text{Customs Revenue}_{ipt}$$

where,

$$\text{Customs Revenue}_{ipt} \begin{cases} > 0, & \text{if industry } i \text{ is protected since time } t_i \\ = 0, & \text{if industry } i \text{ is never protected} \end{cases}$$

Inverse hyperbolic sine transformation $asinh(x) = log(x + \sqrt{x^2 + 1})$

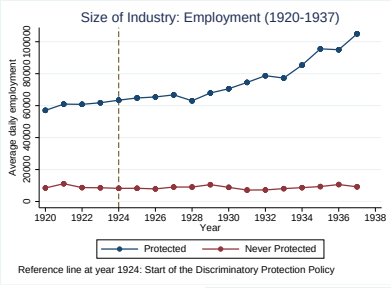
p denotes products of industry i in year t

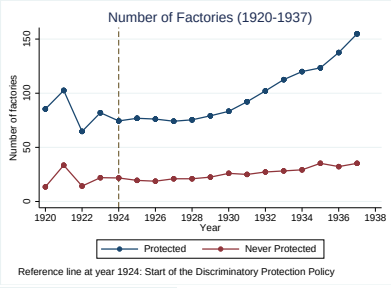
Y_{it} is log of the industry outcome computed for 1946-1958 period

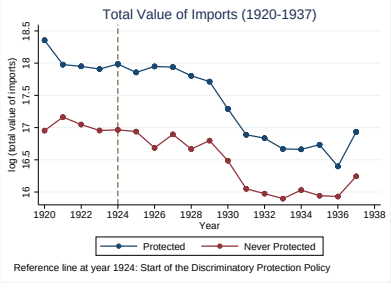
Threat to Identification: Selection Problem

- **(+) selection and overestimation of true effect**:
  - protection if granted selectively to industries with quicker predicted productivity growth
- **(-) selection and underestimation of true effect**:
  - selection influenced by political factors
  - protection given selectively to lagging sectors
- The strict selection process and conditions ensured that the protection was granted to strategic yet feasible industries
- **Sample selection:** Industries that applied for protection comprising of winners (received protection) and losers (rejected protection)

Industrial Characteristics Before The Policy







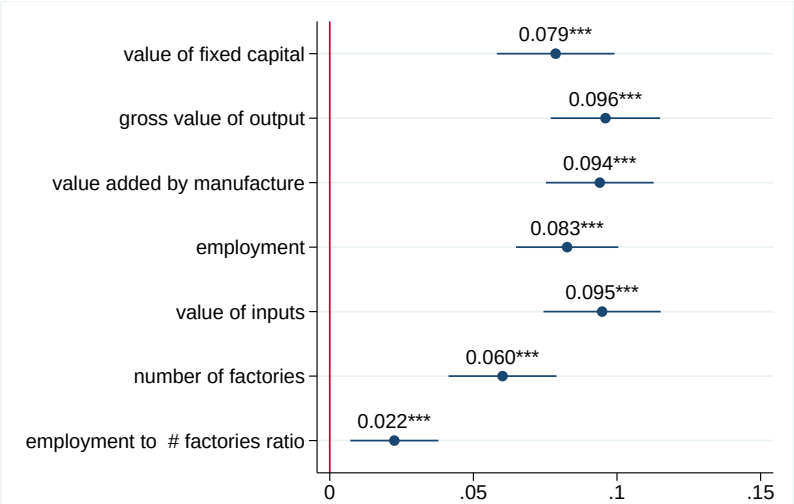
Pre-Policy Trend Analysis

$$Y_{i(1920-1923)} = \alpha * \text{trend} + \beta D_i + \lambda D_i * \text{trend} + e_{it}$$

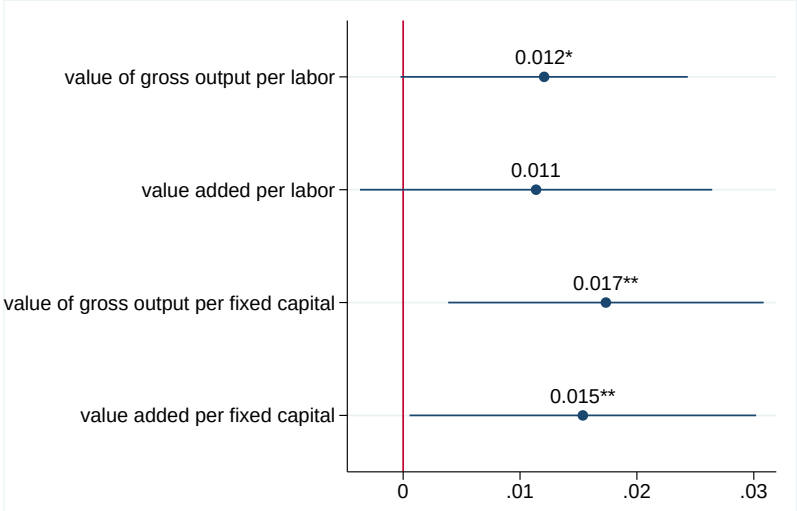
	log (employment)	log (number of factories)	log (value of imports)
$D_i = 1$	0.304	1.216	1.331
	(1.062)	(0.810)	(0.882)
trend	-0.062	0.124	-0.011
	(0.223)	(0.132)	(0.204)
$D_i = 1 * trend$	0.063	-0.202	-0.125
	(0.396)	(0.279)	(0.308)
Observations	44	44	52

$D_i = 1$ for industries that gets protected at some point after 1923, 0 if never protected

Effects of Protection on Long-Run Industry Outcomes

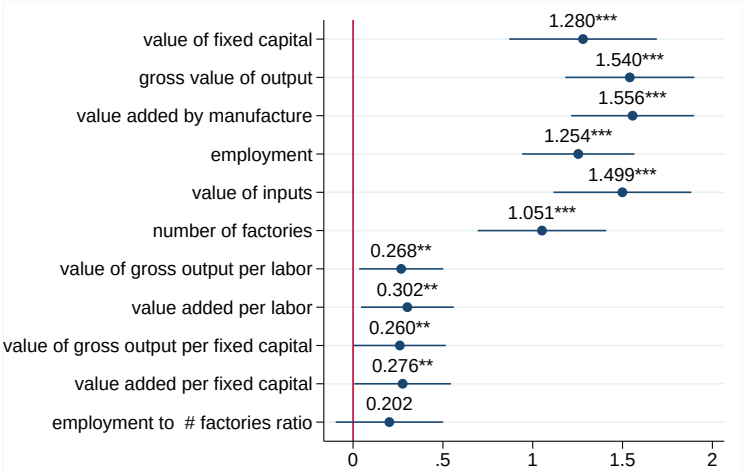


Effects of Protection on Long-Run Industry Productivity



Robustness Check: Binary Treatment

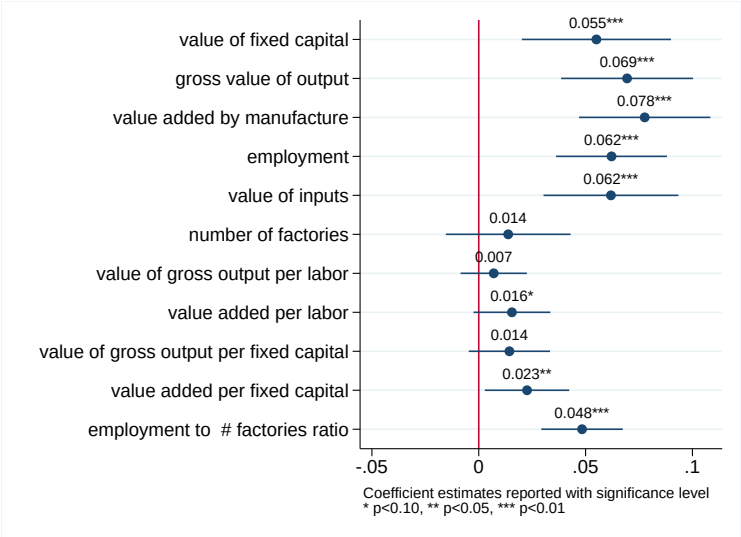
$$Y_{it} = \beta * protect\_dummy_i + \lambda_t + e_{it}$$



Coefficient estimates reported with significance level
* p<0.10, ** p<0.05, *** p<0.01

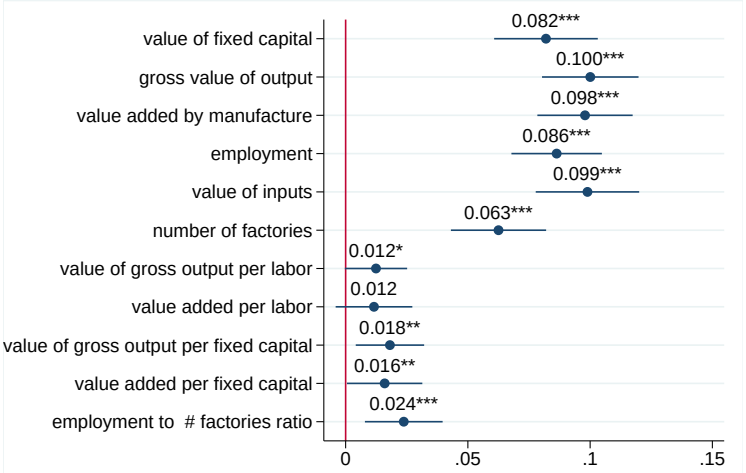
Robustness Check: Duration of Treatment

$$Y_{it} = \beta * protection\_duration_i + \lambda_t + e_{it}$$



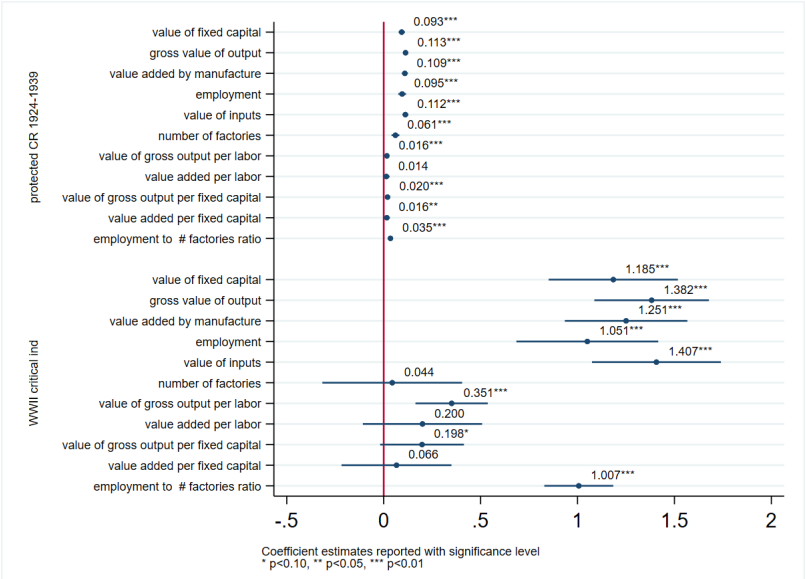
Robustness Check: Alternative Transformation of Treatment

$$Y_{it} = \beta * log(1 + \text{Customs Revenue}_i) + \lambda_t + e_{it}$$



Coefficient estimates reported with significance level
* p<0.10, ** p<0.05, *** p<0.01

Robustness: Impact of WWII



Conclusion

- Evidence of dynamic learning effects and IRS for the industries that received greater protection
  - Significant expansion in value of output, capital acquisitions, employment, value added (VA), number and scale of establishments
  - Exhibited ↑ capital and labor productivity (explains 14% of the overall change)
  - Policy explains 154% of the overall change in industry-VA and 3.37% of the overall change in Indian GDP during 1946-1958
- British unrestrained trade policy did impede India's industrial growth
- Efficacy of protective tariffs on industrial development is contingent on time, institutional context and conditions prevailing during the policy implementation

Future Research

- Examine how protection to the industries have translated to the development of the regions of their location (agglomeration economies)
- Extending the data beyond 1958 to examine the persistence of the effects
- Welfare implications of the policy
- Indirect spillover effects on upstream/downstream industries
- Estimate the effect of protection on total factor productivity of the industries

Thank You!

Appendix

Contemporaneous Effects of Protection on Domestic Industries

First Stage:

$$\text{Imports}_{it} = \delta_i + \lambda_t + \beta_1 * \text{Tariffs}_{it} + e_{it} \tag{2}$$

Second stage:

$$Y_{it} = \alpha_i + \gamma_t + \beta_2 * \widehat{\text{Imports}}_{it} + u_{it} \tag{3}$$

Tariffs used as an instrument: Import weighted average ad-valorem tariffs imposed on products of industry i in time t

Threats to Identification

- Within industry heterogeneity in the timing and degree of protection
- OLS: Endogeneity of domestic production and foreign imports (changes in local demand, business cycles)
- Endogeneity of tariffs (political factors, industry selection, tariff a function of industry-specific characteristics)

Short-Run Effects of Protection on Industrial Employment

	OLS	OLS: Reduced Form	2SLS: First Stage	2SLS: Second Stage
	log (average daily employment) (1)	log (average daily employment) (2)	log (value of imports) (3)	log (average daily employment) (4)
log (value of imports)	-0.384***			-0.565***
	(0.073)			(0.150)
(-) Tariffs		-0.482***	0.852***	
		(0.142)	(0.199)	
Observations	226	226	226	226
Industry Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
First Stage F-Statistic			18.33	

Robustness: SR Effects Using Time Varying Treatment DID

$$Y_{it} = \alpha_i + \gamma_t + \beta * policy_{it} + u_{it}$$

	production growth $[\log(y_t) - \log(y_{t-1})]$		log (average daily employment)
	(1)	(2)	(3)
policy	0.09***	0.13**	0.41***
	(0.03)	(0.06)	(0.12)
Industry Fixed Effects	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes
Observations	512	512	226

Column (1) $policy_{it} = 1$ when the product within an industry gets protection, 0 otherwise
Column (2) & (3) $policy_{it} = 1$ once the industry i in year t receives protection, 0 otherwise

Variable Creation: Tariff Aggregation and Weighting

1. Products subjected to differential duties for UK and Non-UK imports:

$$\text{Tariffs}_{ipt} = \frac{\sum_{p \in i} \text{tariffs}_{iptc} * \text{Imports}_{iptc}}{\sum_{p \in i} \text{Imports}_{iptc}}; \text{c: UK/Non-UK}$$

2. Broader product groups with some product types protected (P) and some unprotected (NP):

$$\text{Tariffs}_{ipt} = \frac{(\text{P tariffs}_{ipt} * \text{P Imports}_{ipt}) + (\text{NP tariffs}_{ipt} * \text{NP Imports}_{ipt})}{\sum_{p \in i} \text{Total Imports}_{ipt}}$$

3. Average tariffs at industry level from product level tariffs

$$\text{Tariffs}_{it} = \frac{\sum_{p \in i} \text{tariffs}_{ipt} * \text{Imports}_{ipt}}{\sum_{p \in i} \text{Imports}_{ipt}}$$

Process of Tariff Determination

- Degree of protection to be granted:

- import price - domestic fair selling price = duties proposed by the Indian Tariff Board

- "fair selling price"- determined based on the estimates of company's
  -works costs,
  -overhead charges, and
  -manufacturer's profit

A.—CUSTOMS TARIFF—*concld.*

PART VII.—Articles which are liable to protective duty at special rates—*concld.*

No.	Names of Articles	Rate of duty
	METALS—IRON AND STEEL—*concld.*	
154	STEEL, tinplates and tinned sheets, including tin taggers and cuttings of such plates, sheets or taggers.	Rs. 46 per ton.
	PAPER, PASTEBOARD AND STATIONERY.	
155	PRINTING PAPER (excluding chrome, marble, flint, poster and stereo), all sorts which contain no mechanical wood pulp or in which the mechanical wood pulp amounts to less than 65 per cent. of the fibre content.	One anna per pound.
156	WRITING PAPER—	
	(*a*) Ruled or printed forms (including letter paper with printed headings) and account and manuscript books and the binding thereof.	One anna per pound or 15 per cent. *ad valorem*, whichever is higher.
	(*b*) All other sorts	One anna per pound.
	YARN AND TEXTILE FABRICS.	
156A	Cotton piece-goods (other than fents of not more than nine yards in length)—	
	(*a*) plain grey, that is, not bleached or dyed in the piece, if imported in pieces which either are without woven headings or contain any length of more than nine yards which is not divided by transverse woven headings—	
	(i) of British manufacture	15 per cent. *ad valorem* or 3½ annas per pound, whichever is higher.
	(ii) not of British manufacture	30 per cent. *ad valorem* or 3½ annas per pound, whichever is higher.
	(*b*) Others—	
	(i) of British manufacture	15 per cent. *ad valorem*.
	(ii) not of British manufacture	30 per cent. *ad valorem*.
157	Matches—	

Tariff Board Proposals Versus Government Actions

Class	Tariff Board's Action	Government's Action	Number	Industries/Subsection of Industries
A	Tariff Board recommended protection by duties or bounties	Government accepted	25	Steel (4 enquiries), Plywood & Tea Chests, Sugar (1 enquiry), Sulphur (tariff equality), Printer's Ink (tariff equality), Wagon-Building, Matches, Paper (1 technical, substantive), Cotton (1 anti-dumping, 1 substantive and 1 reduction of duty), Salt, Magnesium Chloride (2 enquiries), Gold Thread, Wire and Wire Nails, Removal of revenue duty of Pig Iron, Steel Rails, and tariff equality (3 enquiries into other industries)
B	Tariff Board recommended protection by duties or bounties	Government modified proposals	11	Paper (2 substantive), Steel (1 anti-dumping and 2 substantive), Shipbuilding, Electric Wires and Cables (tariff equality), Sericulture, Sugar, other Tariff equality (2 enquiries)
C	Tariff Board recommended protection by duties or bounties	Government rejected Tariff Board's proposals	6	Cement, Cotton (1 anti-dumping), Heavy chemicals, Glass, Sericulture and the Woollen industry
D	Tariff Board rejected the claim to protection	Government accepted Tariff Board's proposals	7	Magnesium Chloride, Spelter (technical), Wire and Wire Nails, Coal, Oil, Electric Wires and Cables (substantive), and shuttles (tariff equality)
E	Tariff Board rejected the claim to protection	Government intervened	0	

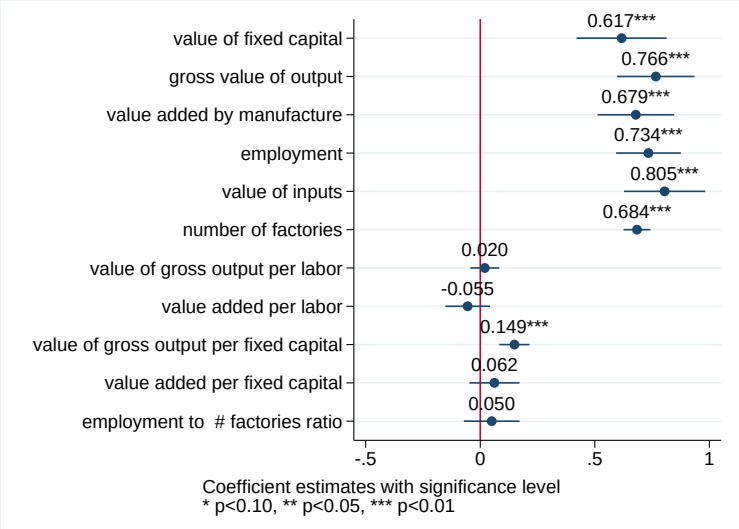
Notes: (i) The information in the parenthesis in Column 5 refers to the reason for enquiry)

(ii) Out of the 25 enquiries (row 1), 13 of them were in connection with substantive protection

(iii) Enquiries in Class B: Industries like Steel, Sugar, Sericulture, Paper went through the nibbling process of the Government

Long-Run Effects of Overall Customs on Industrial Outcomes

$$Y_{it} = \beta * log(\sum_{t_i, p \in i}^{1939} \text{Total Customs Revenue}_{ipt}) + \lambda_t + e_{it}$$



Back-of-The-Envelope Calculations

- Policy could explain 3.37% of the overall ΔGDP during 1946-1958

  $= w * \hat{\beta}_{\text{IVA}} * \text{mean(asinh(Customs Revenue))}/\Delta\text{log GDP}$

  where, w is the share of manufacturing GDP in total GDP during 1946-1958

- Policy could explain 154% of the overall change in IVA during 1946-1958

  $= \hat{\beta}_{\text{industry value added}} * \text{mean(asinh(Customs Revenue))}/\Delta\text{log value added by manufacture}$

  IVA: industry value added

Literature: Trade Protection & Other Industrial Policies

- **Structural Approach**: Baldwin & Krugman (1986, 1988), Head (1994), Irwin (2000), Hansen et al. (2003)

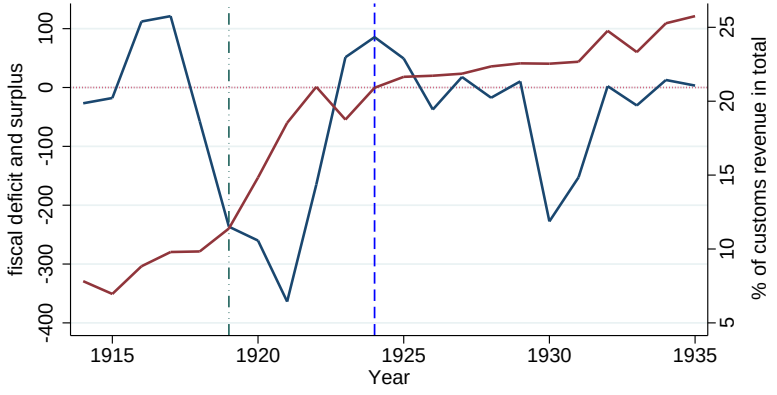
  Mixed Results:
  (+): output and productivity gains
  (–) : net welfare loses

- **Reduced-Form Approach**: natural/quasi-natural experiments

  (+) SR and LR effects of protection:
  Harris et. al (2015), Juhasz (2018), Lane (2017), Choi & Levchenko (2021), Kim et al. (2021)
  (–) Goldberg et. al (2009, 2010), Topalova & Khandelwal (2011)

- **Impact of interwar protectionist policies**:
  - **Empirical**: Effect on **trade flows**-
    Wolcott (1991) (cotton-textile industry), Arthi et. al (2020) (all industries)
  - **Descriptive**: Adarkar (1941), Chatterji (1983), Bagchi (2000), Roy (2017)

Institutional Context: Conditions Prevailing Post WWI



1924: Start of the Protection Policy
1919: India's attainment of Fiscal Autonomy
1914-1918: WWI

Log-ihs Elasticity

The log-ihs elasticities are calculated using $\frac{\beta x}{\sqrt{x^2+1}}$

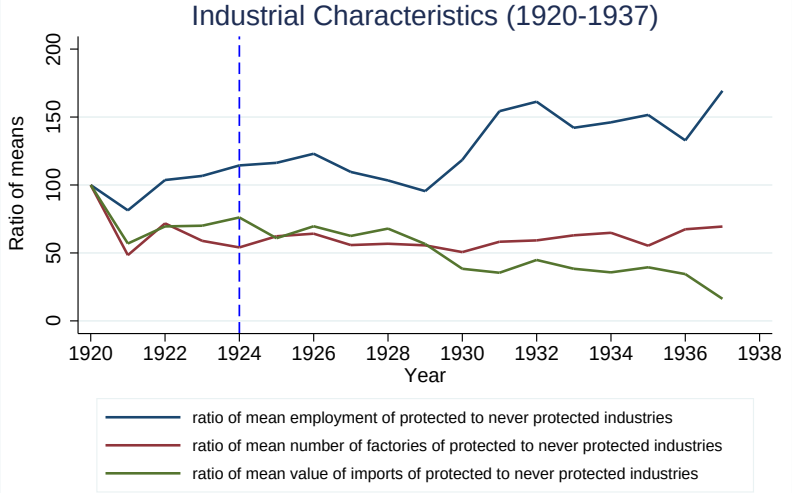
For $\lim_{x\to\infty} \frac{x}{\sqrt{x^2+1}} = 1$

Therefore, for larger values of x, ihs approximates log-log model elasticities which is β. (See Aihounton & Henningsen (2021))

Mechanisms of Infant Industry Argument

- **Static Gains**
  - import restrictions$\rightarrow \uparrow$ domestic market demand $\rightarrow \uparrow$ scale of production
  - economies of scale
  - increased profitability $\rightarrow$ investments in capital and technology
  - spillover effects within industry and across interlinked industries
- **Dynamic Gains**
  - effects of learning-by-doing and economies of scale
    - cumulative output rises more quickly, gains in productivity, experience, cost falls, prises falls

Industrial Characteristics Before The Policy



Reference line at 1924: Start of the protection policy
Variables are indexed at year 1920 (1920=100)

India Under The British Raj

Distribution of World Manufacturing Output 1750–1980 (% shares of total)

	*India**	*China*	*Third World*	*Developed Countries*
1750†	24.5	32.8	73.0	27.0
1800	19.7	33.3	67.7	32.3
1830	17.6	29.8	60.5	39.5
1860	8.6	19.7	36.6	63.4
1880	2.8	12.5	20.9	79.1
1900	1.7	6.2	11.0	89.0
1913	1.4	3.6	7.5	92.5
1928	1.9	3.4	7.2	92.8
1938	2.4	3.1	7.2	92.8
1953	1.7	2.3	6.5	93.5
1980	2.3	5.0	12.0	88.0

Comparative per-capita Levels of Industrialization* (index numbers)

	India	*Japan*	*Developed Countries*
1750	7	7	8
1800	6	7	8
1830	6	7	11
1860	3	7	16
1880	2	9	24
1900	1	12	35
1913	2	20	55
1928	3	30	71
1938	4	51	81
1953	6	40	135
1980	16	353	344

India Under The British Raj

Year	GDP (Millions of 1900 dollars)	GDP per capita (1990 dollars)	Average % GDP Growth	Census year	Population (million)	Average annual population growth rate (%)
1850	125,681	533	—	1851	177.9	
1870	134,882	533	0.354	1861		
1890	163,341	584	0.962	1871	203.4	0.58
1900	170,466	599	0.428	1881	250.2	2.07
1910	210,439	697	2.129	1891	279.6	1.11
1920	194,051	635	−0.807	1901	283.9	0.15
1930	244,097	726	2.321	1911	303	0.65
1940	265,455	686	0.842	1921	305.7	0.09
1947	213,680	618	−3.052	1931	338.2	1.01