Input Tariffs, Speed of Contract Enforcement, and the Productivity of Firms in India

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Motivation

- India undertook dramatic trade reforms in 1991.
  - Average tariffs fell from 152.1% in 1990 to 23.2% in 2003 (Ahsan and Mitra, 2011).
- Significant growth in the import of intermediate inputs (Goldberg, Khandelwal, Pavcnik, Topalova, 2010).
  - The import of intermediate inputs grew by 227% between 1987 and 2000.
  - The import of final goods increased by 90% over the same period.
- This growth was driven by products that were unavailable prior to the reforms (Goldberg et al., 2010).

Imported Inputs & Productivity

- Growing evidence that access to imported inputs raises firm productivity.
  - Topalova and Khandelwal (2011, India); Amiti and Konings (2007, Indonesia); Schor (2004, Brazil)
- However, the ability of firms to access newer and better inputs from abroad will depend on the level of domestic contract enforcement.
- It is likely that input tariff liberalization and contract enforcement are complimentary.

Research Question

- I use objective measures of the speed of contract enforcement at the state-level in India (*judicial efficiency*).
  - Main proxy: fraction of cases that are resolved within a year.
- I exploit this variation in contract enforcement to examine whether, for a given drop in input tariffs, firms in states with more rapid contract enforcement see larger productivity gains.
- The results give us a better sense of the heterogeneous effects of trade liberalization.

Why is there Cross-State Variation in Contract Enforcement?

- State governments have administrative control over the state judiciary. Limited supervision from the Supreme Court.
- This creates significant differences in judicial efficiency across states.
- The common law system in India $\longrightarrow$ differences in interpretation of rules and procedures across states.
- Thus, India provides a good setting in which to examine cross-state differences in contract enforcement.

Are Courts Relevant for Indian Firms?

- How complex is production among Indian firms?
- Do Indian firms use courts to resolve disputes?
- The primary firm-level data I use does not allow us to examine these questions.
- However, we can use the 2005 *Enterprise Surveys* conducted by the World Bank to get a handle on this.

Production Complexity Among Indian Firms

Among importing firms in the *Enterprise Surveys* sample:

1. 51.1% use more than 5 input suppliers.
2. 76.7% use relationship-specific inputs.
3. 25.7% report courts as an obstacle to doing business.
4. 24.5% have been involved in court cases over the past three years.
5. 14.1% have used courts to resolve disputes.

Importance of Courts for Access to Imported Inputs

- Purchase of imported inputs, particularly relationship-specific ones, require contracts.
- There is greater risk associated with contracts where the buyer is in a state with an inefficient judiciary.
  - If court delays are significant enough it may not be worthwhile for the input supplier to pursue the matter in court.
- It follows that firms in states with more inefficient judiciaries will have a more difficult time forming relationships with foreign input suppliers.
- The implications of inefficient judiciaries are the same even if Indian firms mainly negotiate with local banks over financing to purchase foreign inputs. That is, the foreign firm is paid in full prior to shipment.

Hypothesis

- Lower input tariffs will raise the variety of foreign inputs *available* to all domestic firms.
- However, firms in states with more efficient judiciaries will be able to *acquire* a wider variety of these inputs.
- Given that productivity is increasing in the range of inputs used, it follows that:

Hypothesis

The positive effect of lower input tariffs on productivity will be stronger for firms in states with more efficient judiciaries.

Contract Enforcement Data

- Source: Indian National Crime Records Bureau's annual *Crime in India* report.
  - Information on the duration of cases brought before state courts in any given year.
  - Used to calculate the fraction of cases that were resolved within a year.
- Main benefit $\longrightarrow$ it is an objective measure of judicial efficiency.
- On average, about 26% of cases are resolved within a year. There is significant cross-state variation: 4% in Bihar and Uttar Pradesh and 49% in Tamil Nadu.

Bias in Contract Enforcement Data

- It can be argued that firms in states with slow courts may refrain from pursuing a contractual dispute through the judicial system.
- In such a situation the speed of the court system will be overstated.
- However, I find that my primary measure of judicial efficiency is positively correlated with:
  1. Alternate measures of judicial efficiency
  2. A *World Bank* ranking of state business environment.
  3. A subjective survey-based measure of judicial quality.

Firm-Level Data

- Source: Prowess database.
  - Used previously by Khandelwal and Topalova (2011) and Goldberg et al. (2010).
- Includes all firms traded on India's major stock exchanges as well as other public sector enterprises.
- Sample comprises 60 to 70 percent of output in the organized industrial sector (Goldberg et al., 2010).
- Strength: provides data on a panel of firms over an extended period of time.
- Weakness: not representative of small and informal Indian firms.

Tariff Data

- The data on output tariffs are at the three-digit level and are an extension of Hasan, Mitra, and Ramaswamy (2007).
- I use the 2003-2004 Indian IO table to convert these to input tariffs.
- Firm-level and contract enforcement data are available for the period 2003-2007. However, the tariff data are only available until 2003.
- The final sample includes 3,597 firms with a total of 6,331 observations over the period 2003-2004.

Calculating TFP

- In stage 1 of my estimation strategy I estimate firm-level total factor productivity, TFP.
- I do so using the Levinsohn and Petrin (2003) approach.
  - Use of a proxy to control for unobserved productivity in a Cobb-Douglas production function.
  - Addresses *simultaneity bias*.
- The production function estimates allow me to back out firm-level TFP.

Econometric Specification

- I then estimate the following regression:

$$tfp_{ijst} = \alpha + \beta_1 InputTariff_{jt-1} + \beta_2 JudicialEfficiency_{st}$$

$$+\beta_3 InputTariff_{jt-1} * JudicialEfficiency_{st} + \beta_4 X_{ijst}$$

$$+\theta_j + \theta_s + \theta_t + \nu_{ijst}$$

- X_{ijst} controls for firm size, age, and ownership.
- β_3 is the coefficient of interest.

Baseline Results

	Dependent Variable: Ln (TFP)					
	(1)	(2)	(3)	(4)	(5)	(6)
Input Tariff$_{t-1}$	-0.66	0.36	0.33	0.35	0.31	
	(0.850)	(0.879)	(0.875)	(0.881)	(0.876)	
Judicial Efficiency		0.63	1.61	0.98	2.38*	0.65
		(0.503)	(2.275)	(0.777)	(1.410)	(0.469)
Input Tariff$_{t-1}$ * Judicial		-2.64**	-2.57**	-2.65**	-2.46**	-2.67**
Efficiency		(1.265)	(1.244)	(1.268)	(1.251)	(1.270)
Capital Intensity * Judicial			-1.14			
Efficiency			(2.496)			
Skill Intensity * Judicial				-1.26		
Efficiency				(1.977)		
Log of Concentration Ratio *					-0.15	
Judicial Efficiency					(0.116)	
Industry * Time Effects	No	No	No	No	No	Yes
Observations	6,233	6,233	6,229	6,229	6,229	6, 233

Endogeneity of Judicial Efficiency

- Both TFP and judicial efficiency may be correlated with the economic and political conditions of a state.
- I take several steps to address this:
  1. I include state fixed effects in the baseline.
  2. I control for alternate state characteristics and its interaction with input tariffs.
  3. I include state * time effects.

Alternate State Channels

Dependent Variable: Ln(TFP)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Alternate Channel:	Ln(State GDP per capita)	Distance to Port	Flexible Labor Laws	Business Environment	Financial Development	Infrast-ructure	State * Time Effects
Input Tariff$_{t-1}$	-2.49	0.35	0.42	0.85	0.49	0.03	0.78
	(5.953)	(0.863)	(0.915)	(1.019)	(0.992)	(1.031)	(0.866)
Judicial Efficiency	0.74	0.64	0.62	0.56	0.57	0.75	
	(0.492)	(0.497)	(0.498)	(0.559)	(0.505)	(0.515)	
Input Tariff$_{t-1}$ *	-2.82**	-2.67**	-2.58**	-2.32*	-2.47**	-3.06**	-2.75**
Judicial Efficiency	(1.276)	(1.269)	(1.252)	(1.283)	(1.254)	(1.335)	(1.348)
Observations	6,233	6,220	6,233	6,169	6,233	6,220	6,233

Note: In columns (1) - (5) alternate channels are interacted with input tariffs.

Selection of High TFP Firms in High Judicial Efficiency States

- Bias due to self-selection of high TFP firms in states with high judicial efficiency.
- There are several features of the data that mitigate such concerns:
  1. There is no evidence that high TFP firms locate in states with more rapid contract enforcement.
  2. I also do not observe any systematic agglomeration in the data.
  3. That is, industries are fairly evenly distributed across all states.

Propensity Score Matching

- To further address concerns about selection I use propensity-score matching to create a "control" group.
  - This will attenuate any bias due to *observable* differences between the two groups.
- Treatment: firms in states at or above the median judicial efficiency.
- Control: firms in states below the median judicial efficiency.
- I match firms based on one-year lagged firm size indicators, age and age squared (both in natural logarithm), lagged foreign and government ownership indicators, and lagged TFP.
- I use the nearest neighbor approach with *replacement*.
- This process matches 1,382 treatment firms to 736 control firms.

Matched Sample Regression

- I estimate the following regression:

$$tfp_{ijst} = \alpha^M + \beta_1^M InputTariff_{jt-1} + \beta_2^M InputTariff_{jt-1} * Treatment_i$$
$$+\theta_j^M + \theta_s^M + \theta_t^M + \nu_{ijst}^M$$

- $Treatment_i = 1$ if firms are in states at or above the median level of judicial efficiency and 0 otherwise.
- As $Treatment_i$ is a function of the propensity score, I report bootstrapped standard errors (100 repetitions).

Matched Sample Results

Dependent Variable: Ln(TFP)				
	(1)	(2)	(3)	(4)
		Matched Sample		
Additional Controls		Ln(State GDP per capita)	Business Environment	State * Time Effects
Input Tariff$_{t-1}$	0.66	-0.08	0.89	0.01
	(1.405)	(5.859)	(1.335)	(1.202)
Input Tariff$_{t-1}$ * Treatment	-1.27***	-1.29***	-1.26***	-1.49***
	(0.403)	(0.344)	(0.375)	(0.462)
Observations	3,884	3,884	3,851	3,884

Endogeneity of Tariffs

- Protection can be targeted towards efficient or lagging industries.
- In either case, the overall effect of tariffs will be biased.
- Trade policy during early 2000's was not influenced by external IMF pressure.
- I examine whether past industry characteristics, including productivity, predict current tariffs.
  - I do not find a statistically significant relationship between input tariffs and a number of past industry characteristics.
- I use an IV strategy adapted from Goldberg and Pavcnik (2005).
  - I convert my estimating equation to first differences.
  - I then use past input tariffs to instrument current differenced input tariffs.
  - The results broadly support the previous findings.

Robustness Checks

- The results are robust to alternate measures of TFP.
  1. TFP Index: $TFP_{firm} - \bar{TFP}_{industry}$
  2. TFP OLS
  3. TFP based on balanced panel
- The results are robust to using NTB's in place of tariffs.
- The results are also qualitatively robust to alternate measures of judicial efficiency.
  1. Pendency ratio
  2. Confidence in state judiciary
- I also run a series of sensitivity tests.

Conclusion

- The results in this paper strongly support the notion of complementarities between judicial efficiency and the productivity gains from lower input tariffs.
- For a 10 percentage point decline in input tariffs:
  - Firms in the state at the 75th percentile of judicial efficiency experience a 5.8 percent increase in productivity.
  - Firms in the state at the median level of judicial efficiency experience a 2.3 percent increase in productivity.
- Implication $\longrightarrow$ we understate the true productivity gains from lower input tariffs when we ignore the existence of judicial inefficiency.