Notes about Topalova (AEJ: Applied Economics 2010): "Factor Immobility and Regional Impacts of Trade Liberalization: Evidence on Poverty from India"

Seminario Avanzado de Comercio

José Pulido

Universidad del Rosario

2018 Term 2

Introduction

- Goal: assess the impact of trade liberalization on inequality in country where labor mobility is extremely low
- Similar idea to Autor, Dorn and Hanson (2013)
- Look at trade liberalization episode in India in 1991, following macroeconomic crisis and imposed as condition for IMF loans
- Large reduction in tariffs and NTB's:
    - reduced average and standard deviation of tariffs (make them more similar across sectors)
    - imports went from 13 to 19% of GDP
    - no evidence of tariff changes being related to industry characteristics (no political economy factors)
    - large tariff cuts in industries with large initial tariffs (although apparently not in percentage terms?)
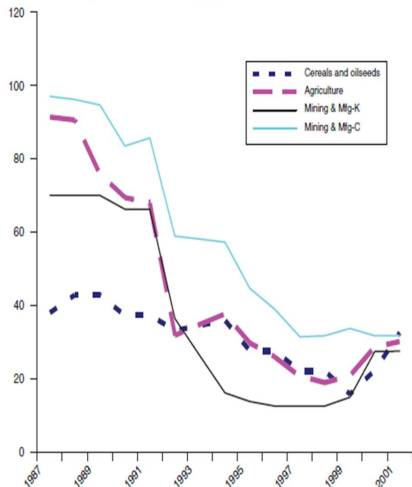
Reduction in tariffs: Average

Panel A. Average nominal tariffs
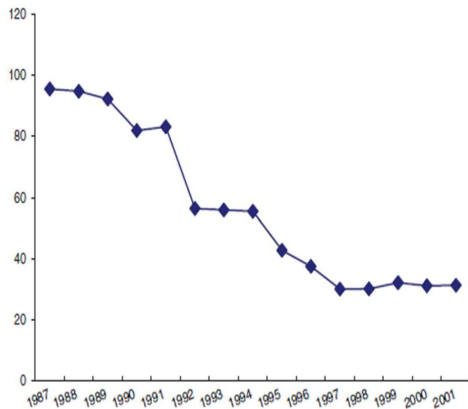
Reduction in tariffs: Now more similar across sectors

Panel B. Tariffs by broad industrial category

Legend:
- Cereals and oilseeds
- Agriculture
- Mining & Mfg-K
- Mining & Mfg-C

Data

- Household survey data for expenditure, occupation, industrial affiliation 4 years from 1983 to 1999-2000
- Variables aggregated in 450 districts (rural) and 77 regions (urban)
- District and region-level poverty measures
- Tariffs at disaggregated level: 5000 product lines in the Indian Trade Classification Harmonized System
- Match to industrial sectors (National Industrial Classification)
- NTB's (non-tariff barriers): share of products within industry that can be imported without a license
- Data on industrial production at the state level

Descriptive statistics (I)

| | Rural (N = 366) | | | | Urban (N = 62) | | | |
| | 1987/88 | | 1999/00 | | 1987/88 | | 1999/00 | |
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Poverty rate	0.373	0.193	0.242	0.139	0.214	0.120	0.122	0.070
Log per capita consumption	5.054	0.246	5.759	0.263	5.449	0.199	6.250	0.217
Scaled tariff	0.083	0.082	0.026	0.022	0.198	0.073	0.069	0.026
Unscaled tariff	0.883	0.096	0.305	0.061	0.892	0.067	0.312	0.038
NTB–share of free HS codes	0.010	0.017	0.038	0.043	0.018	0.008	0.111	0.046
FDI	0.000	0.000	0.219	0.118	0.000	0.000	0.286	0.104
Licensed industries	0.339	0.160	0.091	0.154	0.394	0.128	0.117	0.130
Number of banks per 10,000 people	0.650	0.266	0.785	0.327	0.703	0.290	0.843	0.331

Descriptive statistics (II)

Initial district characteristics	Mean	SD		Mean	SD
Share literate	0.368	0.137		0.622	0.073
Share SC/ST	0.291	0.162		0.157	0.065
Share farming	0.814	0.105		0.159	0.070
Share manufacturing	0.056	0.045		0.217	0.077
Share mining	0.005	0.014		0.013	0.024
Share service	0.065	0.037		0.260	0.053
Share trade	0.033	0.020		0.215	0.033
Share transport	0.013	0.012		0.083	0.025
Share construction	0.013	0.014		0.053	0.017
Poverty rate change in the 80s	−0.060	0.161		−0.225	0.098
Log per capita consumption change in the 80s	0.321	0.178		0.381	0.155

Empirical specification

- Outcome variable y_{dt} in district d at time t
- Specification

$$y_{dt} = \alpha + \beta \ Tariff_{dt} + Post_t + \delta_d + \varepsilon_{dt}$$

- Construct tariff variable $Tariff_{dt}$ at the district level: average tariff weighted by share of pop employed in that industry
- Part of population employed in non-traded sector (particularly poor)
- In $Tariff_{dt}$ NT sector has zero tariffs, so it could be very low for districts with large poor population (usually employed in NT sector)
- Two possible instruments

1. Instrument $Tariff_{dt}$ with similar measure, but only using population employed in traded goods to construct weights ($TrTariff_{dt}$)
2. Instrument with $TrTariff_{d,1987} \times Post_t$ (higher initial tariff industried experienced larger cuts)

First stage

TABLE 2—FIRST STAGE: RELATIONSHIP BETWEEN SCALED AND NONSCALED TARIFFS

	Rural		Urban	
	(1)	(2)	(3)	(4)
Traded tariff	0.314***	0.576***	0.632***	1.096***
	[0.092]	[0.060]	[0.178]	[0.391]
Traded tariff × post		0.290***		0.343
		[0.044]		[0.250]
R^2	0.84	0.86	0.95	0.95
N	728	728	127	127

Notes: Standard errors (in brackets) are clustered at the state-year level. Regressions are weighted by the number of households in a district. All specifications include a post-reform indicator. Columns 1 and 2 include district fixed effects, while columns 3 and 4 include region fixed effects.

***Significant at the 1 percent level.
**Significant at the 5 percent level.
*Significant at the 10 percent level.

Second stage: Rural

TABLE 3A—TRADE LIBERALIZATION, POVERTY, AND AVERAGE CONSUMPTION IN RURAL INDIA

Data	Pre & post (1)	Pre & post (2)	Pre & post (3)	Pre & post (4)	Pre only (5)	Pre & post (6)	Pre & post (7)	Pre & post (8)
Panel A. Dependent variable: poverty rate								
Tariff	−0.242*		−0.710***	−0.467*	0.038	−0.479**	−0.424*	−0.381***
	[0.122]		[0.250]	[0.247]	[1.000]	[0.236]	[0.229]	[0.139]
Traded tariff		−0.223**						
		[0.084]						
NTB (share of free HS codes)						0.073		
						[0.202]		
Panel B. Dependent variable: log average per capita consumption								
Tariff	−0.055		0.512	0.677*	−0.085	0.683*	0.657*	0.583**
	[0.353]		[0.639]	[0.400]	[0.463]	[0.373]	[0.333]	[0.216]
Traded tariff		0.161						
		[0.207]						
NTB (share of free HS codes)						−0.036		
						[0.248]		
IV with traded tariff	No	No	Yes	Yes	Yes	Yes	Yes	Yes
IV with traded tariff and initial traded tariff	No	No	No	No	No	No	No	Yes
District indicators	Yes	Yes	Yes	Yes	NA	Yes	Yes	Yes
Initial district conditions × post	No	No	No	Yes	NA	Yes	Yes	Yes
Region indicators	NA	NA	NA	NA	Yes	NA	NA	NA
Initial region indicators × post	NA	NA	NA	NA	Yes	NA	NA	NA
Other reforms controls	No	No	No	No	No	No	Yes	Yes
N	728	728	728	728	128	728	728	728

Notes: Standard errors (in brackets) are clustered at the state-year level. Regressions are weighted by the number of households in a district. All specifications include a post-reform indicator. Initial district conditions that are interacted with the post-reform indicator include percentage of workers in a district employed in agriculture, employed in mining, employed in manufacturing, employed in trade, employed in transport, and employed in services (construction is the omitted category), as well as the share of district's population that is schedule caste/tribe, the percentage of literate population, and state labor laws indicators. Other reform controls include controls for industry licensing, foreign direct investment, and number of banks per 1,000 people. Regressions in column 5 replace all district-level variables with their equivalents at the regional level and use only pre-reform data for the outcomes of interest.

***Significant at the 1 percent level.
**Significant at the 5 percent level.
*Significant at the 10 percent level.

Second stage: Urban

TABLE 3B—TRADE LIBERALIZATION, POVERTY, AND AVERAGE CONSUMPTION IN URBAN INDIA

Data	Pre & post (1)	Pre & post (2)	Pre & post (3)	Pre & post (4)	Pre only (5)	Pre & post (6)	Pre & post (7)	Pre & post (8)
Panel A. Dependent variable: poverty rate								
Tariff	−0.221		−0.600*	−2.908	4.478*	−1.93	−0.239	−0.239
	[0.302]		[0.311]	[1.756]	[2.349]	[1.794]	[1.347]	[1.347]
Traded tariff		−0.379						
		[0.237]						
NTB (share of free HS codes)						0.215		
						[0.380]		
Panel B. Dependent variable: log average per capita consumption								
Tariff	0.015		−0.419	6.011***	−5.629**	3.676**	0.851	0.857
	[0.383]		[0.771]	[1.861]	[2.494]	[1.484]	[2.020]	[2.018]
Traded tariff		−0.265						
		[0.428]						
NTB (share of free HS codes)						−0.830*		
						[0.478]		
IV with traded tariff	No	No	Yes	Yes	Yes	Yes	Yes	Yes
IV with traded tariff and initial traded tariff	No	No	No	No	No	No	No	Yes
Region indicators	Yes	Yes	Yes	Yes	Yes	Yes	yes	Yes
Initial region indicators × post	No	No	No	No	Yes	Yes	Yes	Yes
Pre-reform trend × post	No	No	No	No	No	Yes	yes	Yes
Other reforms controls	No	No	No	No	No	No	yes	Yes
N	127	127	127	126	125	124	124	124

Notes: Standard errors (in brackets) are clustered at the state-year level. Regressions are weighted by the number of households in a region. All specifications include a post-reform indicator. Initial region conditions that are interacted with the post-reform indicator include percentage of workers in a district employed in agriculture, employed in mining, employed in manufacturing, employed in trade, employed in transport, employed in services (construction is the omitted category), the share of district's population that is schedule caste/tribe, the percentage of literate population, and state labor laws indicators. Other reform controls include controls for industry licensing, foreign direct investment, and number of banks per 1,000 people. Regressions in column 5 use only pre-reform data for the outcomes of interest.

***Significant at the 1 percent level.
**Significant at the 5 percent level.
*Significant at the 10 percent level.

Results: Summary

- In rural areas: average tariff rate cut 5.5 percentage points $\implies$ $-5.5 \times (-0.71) = 3.6$ percentage points increase in poverty
- In urban areas same magnitude, but less consistently significant
- Important point about IV: $Tariff_{dt}$ in OLS regression captures the effect of being a district with a large traded sector (initially rich)
  - initially rich sectors grow more and get highest reductions in $Tariff_{dt}$ just because tariff cuts affect largest share of population
  - this logic would imply consumption $\uparrow$ with tariff cuts (column 1 of table 3A and 3B)
  - when IV find opposite result so OLS is downward biased
- Control for pre-reform characteristics interacted with dummy for post-reform to control for characteristics that may have a time-varying effect (industrial composition, share of literate etc)
  - smaller effects in rural sample, larger effects in urban

Robustness

- Potential problem with pre-existing district-specific trends that may be correlated with tariff cuts
- Falsification exercise (column 5): regress changes in poverty (1983-1987) on future trade liberalization (1987 to 1997)
  - ok in the rural sample
  - problem in the urban sample: pre-poverty declined more in regions that would eventually experience larger tariff cuts
- Address related paper by Hasan, Mitra and Ural (2007): they don't find effect on poverty of trade liberalization when analyzing data at a more aggregate level
  - they also introduce NTB's and they claim this is what drive differences
  - here including NTB's (share of products traded freely) does not affect result and has the same effect on poverty
- Control for other reforms: average share of license industries and industries open to FDI

Mechanisms

- What kind of trade model could be behind these results?
- Specific factor model with the sector where poor people work being hit by relative price decline (workers immobile in the short run)
- Immobile factors would explain findings$\Longrightarrow$ look at mobility both across regions and across sectors

Migration patterns

TABLE 4—MIGRATION PATTERNS IN RURAL AND URBAN INDIA

	All		Men		Women	
	1987	1999	1987	1999	1987	1999
Panel A. Rural						
Place of birth different than place of residence	0.232	0.244	0.075	0.069	0.399	0.427
Moved within the past 10 years	0.102	0.097	0.048	0.040	0.160	0.156
Moved within the past 10 years, excluding migration within the same district and within the same sector (i.e., rural to rural and urban to urban)	0.032	0.036	0.021	0.021	0.044	0.051
Moved within the past 10 years from urban to rural	0.013	0.013	0.011	0.011	0.015	0.016
Moved within the past 10 years because of employment, excluding migration within the same district and within the same sector	0.005	0.004	0.009	0.007	0.002	0.001
Panel B. Urban						
Place of birth different than place of residence	0.329	0.333	0.268	0.256	0.396	0.418
Moved within the past 10 years	0.185	0.174	0.164	0.151	0.209	0.199
Moved within the past 10 years, excluding migration within the same district and within the same sector (i.e., rural to rural and urban to urban)	0.132	0.131	0.121	0.118	0.144	0.146
Moved within the past 10 years from rural to urban	0.080	0.076	0.070	0.065	0.091	0.089
Moved within the past 10 years because of employment, excluding migration within the same district and within the same sector	0.042	0.033	0.071	0.058	0.011	0.006

Regressions of migration on tariffs

TABLE 5—MIGRATION, POPULATION, AND TARIFFS IN RURAL INDIA

	All (1)	Men (2)
Panel A. Dependent variable: share of in-migrants from outside district/sector		
Tariff	0.066	0.059
	[0.071]	[0.091]
Panel B. Dependent variable: log population		
Tariff	−0.006	−0.014
	[0.152]	[0.158]
N	728	728

Notes: Standard errors (in brackets) are clustered at the state-year level. Regressions are weighted by the number of households in a district. Tariff is instrumented with traded tariff. All regression include contols for district and year fixed effects and initial district conditions that are interacted with the post-reform indicator (see notes to Table 3 for details). Data in panel A are from the forty-third and fifty-fifth rounds of the NSS; data in panel B are from the 1991 and 2001 census.

  ***Significant at the 1 percent level.
  **Significant at the 5 percent level.
  *Significant at the 10 percent level.

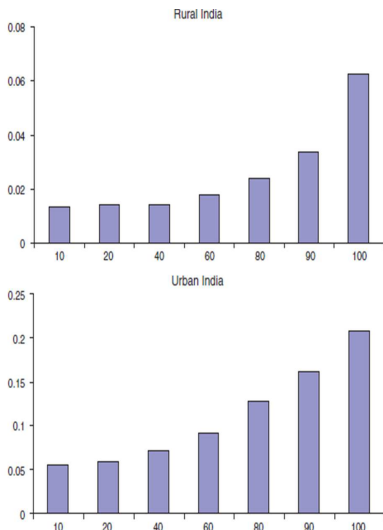# Migration by levels of consumption (heterogeneous effects)

Figure 2. Probability of Having Moved within the Past 10 Years
by Percentiles of Per Capita Consumption
(excluding migration within the same district and within the same sector)

Regressions of migration on tariffs by levels of consumption

TABLE 6—TRADE LIBERALIZATION AND PER CAPITA HOUSEHOLD CONSUMPTION
ACROSS THE CONSUMPTION DISTRIBUTION IN RURAL INDIA

	10th percentile (1)	20th percentile (2)	40th percentile (3)	60th percentile (4)	80th percentile (5)	90th percentile (6)
Panel A. District level						
Tariff	0.698**	0.673*	0.346	0.383	0.5	0.443
	[0.339]	[0.344]	[0.278]	[0.336]	[0.440]	[0.482]
N	728	728	728	728	728	728
Panel B. Region level						
Tariff	1.514***	1.287***	0.66	0.386	0.232	0.106
	[0.482]	[0.439]	[0.452]	[0.402]	[0.361]	[0.553]
N	124	124	124	124	124	124

Notes: Standard errors (in brackets) are clustered at the state-year level. Regressions are weighted by the number of households in a district/region. Tariff is instrumented with traded tariff. All regressions include contols for district/region and year fixed effects and initial district/region conditions that are interacted with the post-reform indicator (see notes to Table 3 for details).
***Significant at the 1 percent level.
**Significant at the 5 percent level.
*Significant at the 10 percent level.

So poor are not mobile and most strongly hit by a cut in tariffs

Adjustments in labor vs prices

TABLE 7—REALLOCATION, PRICES, AND TARIFFS

	Employment share (1)	Capital share (2)	Log employment (3)	Log capital (4)	Log output (5)
Panel A. Reallocation					
Tariff	0 [0.000]	−0.001 [0.001]	−0.036 [0.056]	−0.115 [0.109]	−0.066 [0.068]
Production sector indicators	Yes	Yes	Yes	Yes	Yes
Year indicators	Yes	Yes	Yes	Yes	Yes
Data source	ASI	ASI	ASI	ASI	ASI
N	1,473	1,473	1,473	1,473	1,473

	Log wholesale price index	Log real workers wage	"Production sector premium rural"	"Production sector premium urban"	Log agricultural wages
Panel B. Prices					
Tariff	0.096*** [0.031]	0.080*** [0.027]	0.131 [0.206]	0.143** [0.071]	1.034** [0.422]
Production sector indicators	Yes	Yes	Yes	Yes	No
District indicators	No	No	No	No	Yes
Year indicators	Yes	Yes	Yes	Yes	Yes
Data source	WPI	ASI	NSS schedule 10, 38th, and 55th rounds	NSS schedule 10, 43rd, and 55th rounds	Esther Duflo and Pande (2007)
N	4,201	1,472	222	230	2,684

Notes: Standard errors (in brackets) are clustered at the production sector level in panel A and columns 1–4 in panel B. Standard errors are clustered at the district level in column 5 of panel B. Regressions are weighted by the log employment in the production sector of panel A and column 2 of panel B, and by the inverse of the standard error of the production sector premium estimate in columns 3 and 4 of panel B. Tariff is instrumented with traded tariff in column 5 of panel B.

Summary

- Little labor reallocation across sectors
- All adjustment in prices and wages
- Employment hard to adjust due to rigid labor protection laws
- Factors could not reallocate fast enough out of sectors hit hardest by tariff cuts:
  - poor farmers hit by cut on tariffs on agricultural goods, did not get absorbed quickly enough into other sectors