India's Trade Liberalization and Regional Labor Market Dynamics

Mehtabul Azam[1] Vipul Bhatt[2]

[Preliminary and Incomplete: Do not cite]

Work in progress

Abstract

In this paper we study the medium and long run effects of India's 1991 trade reforms on local labor markets. Using regional variation in the industry composition and variation in tariff reductions across industries, we compare labor market outcomes between regions facing larger and smaller tariff reductions. For this purpose we use Census data and district as a proxy for the local labor market. We find that districts that experienced greater reduction in tariffs experienced increase in employment. More importantly this effect becomes larger over time. We find evidence for a relative increase in wages in the medium term but no such effect in the long term.

JEL Codes: F13, F14, F16

Keywords: Trade reforms, Employment, Labor market

[1] Department of Economics, Oklahoma State University, Stillwater OK 74078. Email- mazam@okstate.edu

[2] Department of Economcis, James Madison University, Harrisonburg VA 22807. Email- bhatvx@jmu.edu

1. Introduction

In this paper we study the evolution of local labor market outcomes in India following the trade reforms of 1991 where tariffs on many industries were drastically reduced. The decline in tariff was roughly 30 percentage points at two-digit national industrial classification (NIC) level between 1991-1997.[3] Previous studies on India's trade reforms have argued for the exogneity of these reforms both in terms of timing as well as implementation across industries.[4]

In this paper we follow Topalova (2007) and identify the effect of trade reforms by exploiting the variation in industrial composition across districts in 1991 and variation in tariffs across industries as as over time. Consequently, different districts faced differential exposure to trade reforms of 1991. Districts with a greater concentration of industries that experienced a larger decline tariffs would be more exposed to the pro-competitive forces as well as access to imported inputs that followed the trade reforms. Hence, differences between districts with larger and smaller exposure gives us a measure of the relative effect of trade liberalization. In addition by adding data from two censuses since 1991, we are able to provide a measure of medium term as well as long term effect of trade reforms on local labor markets.

Using the district as a proxy for local labor markets and decennial Indian census data, we find large positive and increasing effects of tariff reductions on formal employment in districts facing larger tariff declines. More importantly, these effects increased in magnitude over time. For instance, by 2001 districts that experienced a 10 percentage point reduction in tariffs saw a relative increase in

---

[3] Author's calculation.

[4] For example, Topalova (2010), Topalova and Khandelwal (2011), Hasan et al. (2012), Kumar and Mishra (2008)). For a detailed background on the nature of the trade reforms in India please see Topalova (2010).

formal employment of 3.06 percentage points. By 2011 this gap expanded to 5.08 percentage point, which is roughly 1.6 times larger. This finding is in sharp contrast to the standard theory that predicts that factor reallocation will mitigate any regional differences in labor market outcomes over time. Further, we find that these districts also experienced a relative increase in wages in the medium term but this effect disappears roughly two decades after the 1991 reforms. Overall our results indicate that trade-induced productivity gains may have contributed to increased employment and wages in the medium term for districts disproportiantely impacted by the trade liberalization.

The remainder of the paper is organized as follows. Section 2 provides a brief review of the related literature. Section 3 discusses data and methodology used in this paper. Section 4 presents our main findings and a brief discussion.

2. Related Literature

In this section we provide a brief review of the existing literature that has investigated the effect of India's 1991 reforms on the domestic economy.

Hasan et al. (2012) use state-level data for India and show that trade liberalization led to decline in urban unemployment in states with more flexible labor markets and larger share of employment in net exporter industries. They also used industry-level data and find that workers employed in industries that experienced greater reduction in tariffs were less likely to be unemployed. Kumar and Mishra (2008) use variation in industry wage premiums and tariff reductions across industries and over time to study the impact of India's trade reforms on the industry wage structure. They find that the industry wage premium is negatively related to the exposure of industries to trade liberalization. This is consistent with the view that firms experiencing higher productivity due to

liberalization may pass these increases to workers as higher wages. Similarly, Mehta and Hasan (2012) find that most of the increase in wage inequality between 1993 and 2004 in India was due to changes in wage and skill premiums that are not related to the trade reforms of 1991. Finally, Topalova (2010) exploits the differential exposure of districts to India's 1991 trade liberalization caused by differences in sectoral composition across districts. She finds that there was a decline in poverty in both urban and rural areas. However, rural districts with greater exposure to tariff reductions experienced a slower decline in poverty and lower consumption growth when compared to rural districts with smaller exposure to liberalization.

Our paper is also related to the literature that documents effect of trade liberalization on productivity. One channel through which trade can affect labor markets is by increasing in the productivity of firms through access to new and better quality inputs. These productivity increases in turn can be passed on to workers as higher wages and can also lead to greater employment. Topalova and Khandelwal (2011) document an increase in firm-level productivity in India following the 1991 trade reforms. However, they find that reductions in input tariffs by allowing access to better inputs had a greater role in increasing firm productivity than the increased competition resulting from reduction in final goods tariffs. Nataraj (2011) complements this finding finds that final good tariff reductions primarily raised productivity of small informal manufacturing firms where as input good tariff reductions raised productivity of large, formal manufacturing firms. Goldberg et al. (2010) use firm-level data for India and find that access to new inputs to lower input tariffs accounted for a large proportion of new products introduced by domestic firms.

3. Data and Methodology

3.1. Data

We use employment and population data at the district level from Decennial Census of 1981, 1991, 2001, and 2011. Our sample consist of 452 districts in India. In order to determine the initial regional industrial composition we use the 1991 census that reports employment at the three-digit National Industrial Classification (NIC) code by district. The labor force share in output for each industry is calculated from the Annual Survey of Industries (ASI) collected in 1990. The tariff data is available at the six-digit level of the Indian Trade Classification Harmonized System (HS)for more than 5,000 product lines. Following the literature on India, we match these product lines to NIC codes using the concordance of Debroy and Snathanam (1993) providing a relatively precise measure of average sector-level tariffs.

Data on earnings are derived from the large-scale employment surveys collected by National Sample Survey Organistion (NSSO). Specifically, we use the employment and unemployment surveys collected in 1987, 1999, 2004, and 2011. These nationwide surveys sample approximately 120,000 households per round. We use the NSS0 for these four rounds data to estimate district wages for each year.

3.2. Methodology

In this section we provide a discussion of the empirical framework underlying the analysis presented in the paper. First, we define the district level exposure to tariff reduction in India. Following Dix-Carneiro and Kovak (2017) we define the regional labor demand shock resulting from tariff reduction as follows:

$$DTR_d = -\sum_i \beta_{di}\, \Delta\, \ln(1+\tau_i) \qquad (1)$$

where, $\beta_{di} = \frac{\lambda_{di}\frac{1}{\phi_i}}{\sum_j \lambda_{dj}\frac{1}{\phi_j}}$. Here, d indexes districts and i indexes 3-digit NIC industries in our sample. ϕ_i denotes the cost share of nonlabor factors, λ_{di} is the initial regional labor allocation to industry i. Finally, τ_i is the tariff rate in industry i and Δ denotes the long difference in tariffs from 1991-1996, the period during which India experiences large scale reduction in tariffs.

Table 1 provides the average and the distribution of the tariff reduction across districts. The average decline across 452 districts in our sample was 4.4%. However, there is a lot of variation across districts. For example, a district at the 10th percentile experienced a tariff reduction of 0.7% whereas a district at the 90th percentile faced a 11.1 percentage point decline.

In order to measure the effect of trade liberalization, we compare labor market outcomes of districts facing large tariff reductions to those in districts facing smaller reductions. For this purpose we estimate the following specification:

$$Y_{dt} - Y_{d,1991} = \delta_t DTR_d + \alpha_{st} + \epsilon_{dt} \qquad (2)$$

Here, Y_{dt} is the district-level outcome of interest at time t, such as formal employment. $Y_{d,1991}$ is the initial district-level outcome. DTR_d is the exposure of the district to tariff reduction.[5] α_{st} denotes state fixed effects that are allowed to vary over time. $Y_{d,1991} - Y_{d,1981}$ captures the pre-liberalization trend in the outcome variable at district level. We estimate this specification separately for each $t \in \{2001, 2011\}$. We interpret the change in a district's outcome between

[5] Topalova (2010) computes the district level expsoure to tariff as the average nominal tariff at time t weighted by initial employment share of industry i at in district d. Our results remain qualitatively similar when using her measure of regional tariff exposure.

2001 and 1991 as the medium term effect, and between 2011 and 1991 as the long term effect of trade liberalization.

To understand mechanism underlying the positive effect of tariff reduction on employment we estimate the following equation that allows for a differential effect for districts where the majority of employment in 1991 was in intermediate goods industries:

$$Y_{dt} - Y_{d,1991} = \delta_t DTR_d + \gamma_t DTR_d \times Majority_{d,1991} + \alpha_{st} + \epsilon_{dt} \qquad (3)$$

Here $Majority_{d,1991}$ is an indicator variable that takes value of 1 if the 1991 share of intermediate goods industries in total district employment is larger than that of the consumption goods industries.

4. Main findings

4.1. Impact of tariff reduction on district employment and wages.

Table 2 presents the estimates of the effect of tariff reductions on district level formal employment. Columns 1–2 examine changes in fromal employment from 1991 to 2001, columns 3–4 examine changes from 1991 to 2011, and columns 5-6 examine changes from 1981-2001. Columns 2, 4, and 6 add state fixed effects to control for any state-specific policy that might affect outcomes for all districts in the same state. In each case we find a positive coefficient on DTR indicating that districts facing larger tariff redictions experience relative increase in formal employment. For example, a coefficient of 0.306 in column (2) of Panel A implies that a district facing a 10 percentage point larger tariff reduction experienced a 3.06 percentage point larger proportional increase in formal employment from 1991 to 2001. The estimate of 0.508 in column (4) indicates that the gap

in formal employment expanded to 5.08 percentage points by 2011. We also find that there was no significant relationship between our measure of exposure to trade liberalization and changes in total employment between 1991-1981. This gives us confidence that our findings are not driven by pre-existing trends in employment in these districts.

One possibility for increased employment in these districts could be that there was an increase in working age population during the same time period. To investigate this further, in Panel (B) we repeat our analysis for changes in total employment in the working age group and in Panel (C) we provide results for changes in the total working age population. Results in Panel (B) more or less confirm our results from Panel (A), with a relative increase in employment in districts which experienced a larger decline in tariffs. From Panel (C) we find that there was a positive relationship between total working age population and tariff reduction in the medium term but not in the long run. Hence, we believe that although part of the medium term impact on total employment can be attributed to population growth, in the long run most of the observed increase in district employment can be attributed to trade liberalization.

Next we use NSS data from 1987, 1999, 2004, and 2011 rounds to estimate the impact of tariff reduction on wages. For this purpose, for each year in our sample, we first estimate the district wage premia, which is the natural log of wages in a district, after controlling for age, education, and other characteristics of the regional workforce. We then use change in this variable as regional outcome in equation (2). The results of this exercise are presented in Table 3. We find that in the medium term there is weak evidence for a relative increase in wages in district facing a larger decline in tariffs. For example, from Column (2) we observe that after accounting for state fixed effects, a 10 percentage point

decline in tariff would increase wages by 2.3%. However, this effect is not statistically significant. Further, in the long run we find that the effect on wages disappears.

4.2. Mechanism

In order to understand what drives the positive effect on employment, we borrow from the literature on firm-level productivity and trade liberalization in India. This literature finds that most of the productivity increase due to tariff reductions was due to better access to imported inputs. Hence, industries in the intermediate goods sector experienced an increased in productivity that created greater employment in districts with a higher concentration of such industrie.

[INCOMPLETE]

References

Debroy, B, and A. T. Snathanam. 1993. “Matching Trade Codes with Industrial Codes.” *Foreign Trade Bulletin* XXIV (1):5–27.

Dix-Carneiro, Rafael, and Brian K. Kovak. 2017. “Trade Liberalization and Regional Dynamics.” *American Economic Review* 107 (10):2908–46.

Goldberg, Pinelopi Koujianou, Amit Kumar Khandelwal, Nina Pavcnik, and Petia Topalova. 2010. “Imported Intermediate Inputs and Domestic Product Growth: Evidence from India*.” *The Quarterly Journal of Economics* 125 (4):1727–67.

Hasan, Rana, Devashish Mitra, Priya Ranjan, and Reshad N. Ahsan. 2012. “Trade Liberalization and Unemployment: Theory and Evidence from India.” *Journal of Development Economics* 97 (2):269–80.

Kumar, Utsav, and Prachi Mishra. 2008. “Trade Liberalization and Wage Inequality: Evidence from India.” *Review of Development Economics* 12 (2):291–311.

Mehta, Aashish, and Rana Hasan. 2012. “The Effects of Trade and Services Liberalization on Wage Inequality in India” 23:75–90.

Nataraj, Shanthi. 2011. “The Impact of Trade Liberalization on Productivity: Evidence from India’s Formal and Informal Manufacturing Sectors.” *Journal of International Economics* 85 (2):292–301.

Topalova, Petia. 2007. “Trade Liberalization, Poverty and Inequality: Evidence from Indian Districts.” In *Globalization and Poverty*, edited by Ann Harrison, 291–336. Chicago: University of Chicago Press.

———. 2010. “Factor Immobility and Regional Impacts of Trade Liberalization: Evidence on Poverty from India.” *American Economic Journal: Applied Economics* 2 (4):1–41.

Topalova, Petia, and Amit Khandelwal. 2011. “Trade Liberalization and Firm Productivity: The Case of India.” *The Review of Economics and Statistics* 93 (3):995–1009.

Table 1: Regional tariff reduction

	Percentile						
	Mean	10	25	50	75	90	95
DTR	0.044	0.007	0.012	0.022	0.049	0.111	0.196

Table 2: Effect of tariff on district employment and population

	1991-2001		1991-2011		1981-1991	
	(1)	(2)	(3)	(4)	(5)	(6)
A) Change in log total employment:						
DTR	0.104	0.306***	0.112	0.508*	-0.019	-0.100
	(0.136)	(0.110)	(0.220)	(0.255)	(0.098)	(0.062)
State fixed effects	N	Y	N	Y	N	Y
Districts	452	452	452	452	427	427
R-Sqaure	0.003	0.347	0.002	0.272	0.000	0.260
B) Change in log of total employment (15-59):						
DTR	0.106	0.274**	0.072	0.425	-	-
	(0.135)	(0.114)	(0.222)	(0.258)		
State fixed effects	N	Y	N	Y	-	-
Districts	452	452	452	452	-	-
R-Sqaure	0.003	0.341	0.001	0.261		
C) Change in log of working age population (15-59):						
DTR	0.188	0.198	-0.105	0.004	0.053	0.054
	(0.138)	(0.121)	(0.242)	(0.249)	(0.125)	(0.075)
State fixed effects	N	Y	N	Y	N	Y
Districts	452	452	452	452	427	427
R-Square	0.015	0.170	0.002	0.238	0.002	0.246

Note:

i) Standard errors are clustered at state-region level (73 clusters).

ii) There is no data on working age population for 1981-1991.

Table 3: Effect of tariff reduction on district wage premia

	1987-1999		1987-2004		1987-2011	
	(1)	(2)	(3)	(4)	(5)	(6)
DTR	0.498**	0.055	0.450***	0.222	0.199	-0.033
	(0.217)	(0.235)	(0.162)	(0.224)	(0.181)	(0.210)
State fixed effects	N	Y	N	Y	N	Y
Districts	403	403	404	404	405	405
R-Squared	0.025	0.277	0.022	0.245	0.003	0.239