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**Trade Liberalization and MSME Framework:
Impact on Firm Productivity and Markups**

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Abstract

This paper examines the effects of tariff and non-tariff reductions on firm-level productivity and markups of large as well as Micro, Small and Medium Enterprises (MSMEs) in India's manufacturing sector for the 1999-2009 period. We calculate input and final goods tariffs, effective rates of protection (ERP) and non-tariff barriers (NTBs) for broad product groups using information from India's Exim Policy of 1997-2003 and 2004-09 to examine this impact. We use a balanced as well as unbalanced firm-level panel data set, while taking into account firm, industry, state and time-specific factors. By using fixed effect models and Heckman's two-step estimation procedure, we find that trade liberalization is associated with improved firm-level productivity for large firms whereas this is not the case for MSMEs. We posit that this might be due to the relative disadvantages that Indian MSMEs face which prevent them from benefiting from trade liberalization. We also find that productivity gains arising from the sourcing of imported inputs have been greater than those arising from increased product competition and that NTB liberalization has had a greater impact compared to tariff liberalization on firm-level productivity. Markups are found to have declined due to increased final goods competition. Changes in MSME legislation and classification of firms are also found to have a bearing on firm performance.

Key words: *Manufacturing, Small Scale Industry, Total factor productivity, Trade Reform*

JEL Classifications: *L6, D24, L1, F13*

¹ This paper builds upon the doctoral thesis work by Subhadip Mukherjee and supervised by Rupa Chanda at IIM Bangalore.

1. Introduction

There exists a large body of literature which examines the effects of trade liberalization on the productivity of Indian manufacturing at both the industry and firm levels. Most of these studies, such as Goldar and Kumari (2003), Das (2004), Balakrishnan et. al (2006), Topalova and Khandelwal (2011), observe the performance of various industry groups over time, specifically focusing on either the post 1981 or post 1991 periods, when Indian manufacturing experienced a substantial reduction in tariffs. The aforementioned studies and other existing cross-country and country-specific studies such as (Goldberg et al., 2010b; Sivadasan, 2009; Loecker et al., 2016) also find that imported intermediate inputs, which are relatively cheaper and superior in quality have had a significant beneficial impact on industry or firm-level productivity following the introduction of trade reforms. Various industry level characteristics such as product variety, market concentration, import intensity, etc. (Mallick and Marques, 2008) and firm-level characteristics such as size, age, ownership structure, etc. (Topalova and Khandelwal, 2011) have also shaped the relationship between trade reforms and firm productivity.

Most of these existing studies, however, have either concentrated on large firms or as in the case of a few studies such as Nataraj (2011) and Kathuria et. al. (2012), have compared the effects of trade liberalization on firm level productivity between organized and unorganized firms over time. Mukherjee and Chanda (2017) while examining the differential effects of EXIM policy, 2004-09 on firm-level productivity and profitability between non-food and non-agro based firms and food and agro-based firms, found that trade liberalization mainly benefited large as opposed to Small and Medium sized firms post 2004.² But none of these earlier studies have focused on the independent marginal effects of a reduction in input and

² Mukherjee and Chanda (2017) by using *Difference-in-Difference* model examine the differential effects of EXIM policy, 2004-09 on firm-level productivity and profitability between non-food and non-agro based firms, which experienced significant trade liberalization and food and agro-based firms, which remained relatively protected.

final goods tariffs (input, final goods), the ERP and Non-Tariff Barriers (NTBs) on firm productivity and markups for large versus MSME firms.

In this paper we address these gaps in the literature. We examine the effects of trade liberalization on registered MSMEs *versus* large firms³ and also examine the marginal effects of a reduction in both tariffs and NTBs⁴ on firm level productivity and markups for large vs MSME firms over the 1999 to 2009 period, with specific focus on the relatively recent EXIM policies (EXIM Policy, 1997-2003 and EXIM Policy, 2004-09) in India.⁵ We take into account industry and state level unobserved time varying factors which are likely to shape this impact.

Our paper is placed within the broader literature on new-new trade theory by Melitz (2003), Costantini and Melitz (2008) and Bernard et. al. (2003) and others, which stresses the importance of firm-heterogeneity in shaping the impact of trade and trade policy changes on firm performance. It builds upon the existing literature on trade liberalization and firm and industry level performance in India in four ways.

Firstly, it confirms the findings of several earlier studies such as Goldar and Kumari (2003), Das (2004), Balakrishnan et. al (2006), Sivadasan (2009), Topalova and Khandelwal (2011), Loecker et. al (2012), Hasan (2002), Bas and Berthou (2011), Ahsan (2013), Kato (2009), Goldberg et. al (2010a), Kathuria (2002) and Parameswaran (2010) that firm, industry and time-specific factors such as the level of technology, extent of modernization and access to credit are important in shaping the impact of trade liberalization at the industry or firm level.⁶

³ See, Table 2.1 for the definition of MSMEs in India, pre and post 2006. This paper analyses the impact based on both definitions.

⁴ It is important to highlight that there are very few existing empirical studies in India, which examine the effects of NTBs on firm performance due to inherent measurement issues.

⁵ “Exim Policy or Foreign Trade Policy is a set of guidelines and instructions established by the Director General of Foreign Trade (DGFT) in matters related to the import and export of goods in India. The Foreign Trade Policy of India is guided by the Export Import Policy, known in short as EXIM Policy, of the Indian Government and is regulated by the Foreign Trade Development and Regulation Act, 1992. DGFT is the main governing body in matters related to Exim Policy. The main objective of the Foreign Trade (Development and Regulation) Act is to provide the development and regulation of foreign trade by facilitating imports into and augmenting exports from India. The Foreign Trade Act has replaced the earlier law known as the Imports and Exports (Control) Act 1947.”- <http://www.exim-policy.com/>

⁶ See, Mukherjee and Chanda (2019) which highlights the implications of financial, operational and technological constraints for MSME performance.

It specifically shows this result to hold in the context of MSMEs versus large firms and thus confirms the importance of firm-heterogeneity as outlined in new-new trade theory.

Secondly, this paper goes beyond tariff liberalization to highlight the importance of non-tariff liberalization by specifically calculating the incidence of NTBs for different industries and examining the direct effect of the level of non-tariff protection on firm performance, including for MSMEs. Earlier studies such as Topalova and Khandelwal (2011) have examined the role of non-tariff protection by grouping industries broadly as high or low non-tariff protection sectors but have not incorporated the specific incidence of NTBs nor examined the same for MSME firms in particular.

The third contribution of this paper is that it extends the findings of studies such as Nataraj (2011) and Kathuria et. al (2012) on trade liberalization and firm productivity in the Indian context by showing that tariff liberalization has had a differential impact on the productivity of not only formal versus informal firms but also for registered MSMEs as opposed to large firms in India.

Finally, by using a panel dataset, which provides information on a panel of firms over a long time period, including information on financial variables and on product and industry characteristics at the firm level, this paper enables one to track firm-level performance over time and the impact of changes in trade policy. In addition to assessing the impact of trade liberalization on productivity, it also assesses the impact on markups and highlights the role of industry classification and legislation in shaping these effects.

The rest of the paper is organized as follows. Section 2 discusses the data sources and some associated concerns as well the broad methodology used for the empirical analysis. Section 3 presents the estimation strategy and analysis of the results. It summarizes the key findings. Sections 4 and 5 discuss robustness and endogeneity issues, respectively, Finally, Section 6

concludes the paper with some policy recommendations and possible extensions of this research.

2. Data Sources and Broad Methodology

We use a firm-level balanced panel data (842 firms *11 year= 9262) for 1999-2009 period and later supplement this analysis by using an unbalanced panel (larger) dataset for checking robustness. The firm-level information for different variables (for example, sales revenue, total assets, labour expenditure, power and fuel expenditure, raw material expenditure and capital employed) are extracted from the Prowess database (version 4.12) provided by the Centre for Monitoring Indian Economy (CMIE). The industry-level information for different variables is extracted from Industry Analysis Service and Economic Outlook, the two online databases provided by the CMIE.⁷ All tariff related information is collected from the TRAINS-WITS online database provided by World Bank. Moreover, we also measure the NTB data by using the import conditions data from the Director General of Foreign Trade (DGFT) database, and import data, from the Ministry of Commerce and Industry, Department of Commerce, Government of India.

We use a fixed effects model to determine the relationship between different trade liberalization indicators (such as tariffs and NTBs) and firm-level productivity, after taking into account unobserved firm, year, industry and state level heterogeneity. This approach is helpful for identifying the marginal effects of trade policy on firm performance across different types of firms, based on their size (mainly two groups, MSME and large) and how these effects are

⁷ There are advantages to using the CMIE Prowess database compared to other possible datasets on Indian manufacturing firms, such as the Annual Survey of Industries (ASI), as also pointed out by Goldberg et. al (2010b) and Kalirajan and Bhaide (2005). First, the CMIE Prowess dataset due to its panel structure enables us to track firm performance over time, which is not possible in the ASI database, which provides repeated cross-section data. Second, Prowess records comprehensive information of all financial variables and contains product and industry-level information by firms. Finally, the firm-level data span India's trade liberalization period from 1991 to 2009 when tariff and non-tariff barriers were significantly reduced. Thus, the Prowess data enables us to understand firm performance in the context of trade liberalization and also helps us to assess the differential impact across industries. However, its two drawbacks are the absence of employment data and the limited availability of micro firms in the dataset.

influenced by unobserved time varying industry and state-specific factors. We apply this methodology first to all firms⁸ and then repeat for different sub-groups of firms, namely, large firms and MSMEs. The firm grouping is done based on investment in plant and machinery, as per the standard definition provided by the Ministry of Micro, Small and Medium Enterprises (MSME Act 2006). This is unlike the approach used in previous studies such as Topalova and Khandelwal (2011), Majumdar (1997), Thomas and Narayanan (2012), Kumar et al. (2001) and Balakrishnan et.al (2006), which categorize firms into small, medium and large, based on sales, market share or total assets. The detailed classification of Indian micro, small, medium firms before and after 2006 is provided in Table 2.1.

Table 2.1: Classification of MSMEs in India

Classification	Investment Ceiling for Plant, Machinery or Equipment* [@]	
	Manufacturing Enterprises	Service Enterprises
Micro	Up to Rs.2.5 million (\$50,000)	Up to Rs.1 million (\$20,000)
Small	Above Rs.2.5 million (\$50,000) & up to Rs.50 million (\$ 1mn)	Above Rs.1 million (\$20,000) & up to Rs.20 million (\$0.4 mn)
Medium	Above Rs.50 million (\$ 1mn) & up to Rs.100 million (\$2 mn)	Above Rs.20 million (\$0.4 mn) & up to Rs.50 million (\$ 1mn)

* Fixed costs are obviously higher.

Definitions before 2, October 2006

Classification	Investment Ceiling for Plant & Machinery or Fixed Assets*	
	Manufacturing Enterprises	Service Enterprises
Micro	Up to Rs.2.5 million (\$50,000)	Up to Rs.10 lakh (\$20,000)
Small	Above Rs.2.5 million (\$50,000) & up to Rs.10 million (\$0.2 mn)	—
Medium	Not defined	Not defined

Note: * Excluding land and building.

[@] \$1 = Rs.50 (April 2009) based on the exchange rate indicated by the MSME at the time of introducing the MSME Act, 2006.

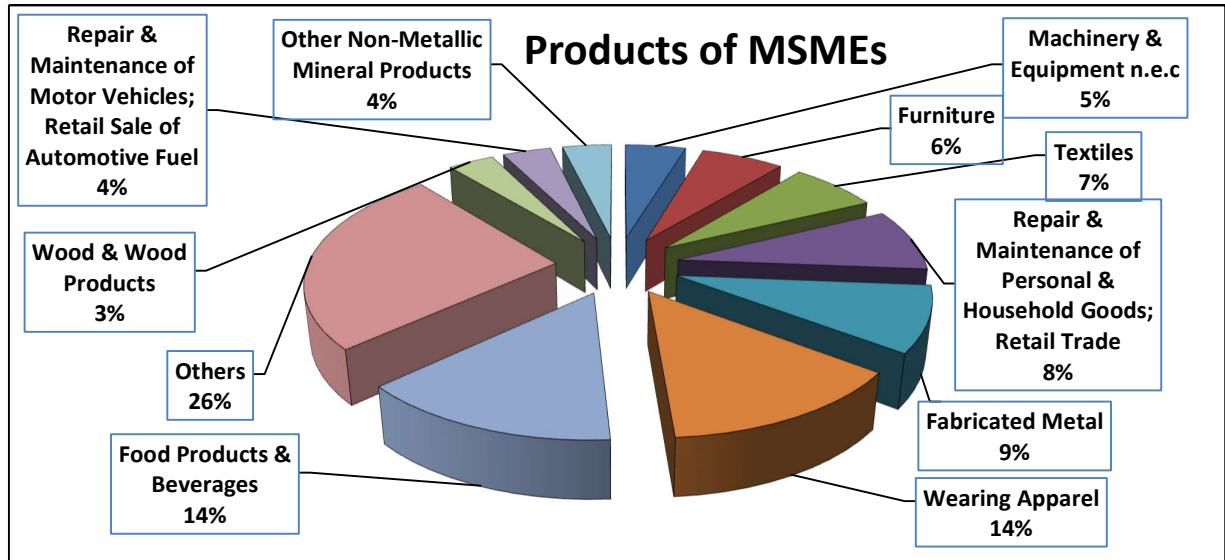
Source: Micro, Small, Medium Enterprises in India, an Overview, Ministry of Micro, Small & Medium Enterprises, 2010 (GOI)

In our study, we have taken firm-level data from the Prowess database for five broad industries, namely, food & agro-based products, Textiles, Leather products, Metals & Metal products and

⁸ From here onwards, when we say “all” firms, it means that all kinds of firms, namely, large firms and MSMEs are grouped together.

Machinery and Equipment. These five industries cumulatively account for the maximum share of MSME firms in India. Figure 2.1 indicates the importance of the above five industries in determining the overall performance of India's MSME sector.

Figure 2.1: Share of different industries in the MSME Sector



Source: Final Report of the Fourth All India Census of Micro, Small & Medium Enterprises 2006-07: Registered Sector.

2.1. Measuring Trade reforms

We examine the effects of a reduction in tariff and non-tariff barriers on the aforementioned 5 broad industries with respect to firm-level productivity over the 1999-2009 period. We extract final goods tariff data across industries and use the input-output table to calculate the industry-level input tariff and the effective rate of protection (ERP) to measure industry-level trade protection on both the input and output sides. Moreover, we also calculate NTBs for these industry groups by using the import coverage ratio to capture their effects on firm productivity over time. In Appendix A, we discuss the measurement of tariff non-tariff barriers, export propensities and other firm-level performance indicators in detail.

2.2. Measuring firm-level markup and physical total factor productivity (TFPQ)

We estimate firm-level markup and physical total factor productivity (TFPQ) following the approach used by Dai and Cheng (2018) while estimating the latter for Chinese manufacturing firms. The estimation of firm-level markup and TFPQ is summarized in the following steps:

Step 1: At first, we estimate output elasticities by assuming a flexible translog production function with Hicks-neutral productivity, highlighted in equation (2.1):

$$\begin{aligned} q_{it} = & \beta_m m_{it} + \beta_k k_{it} + \beta_l l_{it} + \beta_p p_{it} + \beta_{mm} m_{it}^2 + \beta_{kk} k_{it}^2 + \beta_{ll} l_{it}^2 + \beta_{pp} p_{it}^2 + \\ & \beta_{mk} m_{it} k_{it} + \beta_{ml} m_{it} l_{it} + \beta_{mp} m_{it} p_{it} + \beta_{mkl} m_{it} k_{it} l_{it} + \beta_{mkp} m_{it} k_{it} p_{it} + \\ & \beta_{mlp} m_{it} l_{it} p_{it} + \omega_{it} + \varepsilon_{it} \end{aligned} \quad (2.1)$$

where lower case represents logarithm of the uppercase variables (Q_{it} , M_{it} , K_{it} , L_{it} and P_{it} , which denote sales revenue, raw materials expenses, capital expenses, labour expenses and power and fuel expenses, respectively). Firm productivity is denoted as ω_{it} while ε_{it} is the error term.⁹

Using Akerberg, Caves, and Frazer (2015)'s two-step estimation procedure which is a modified control function approach of Levinsohn and Petrin (2003), we consistently estimate the output elasticities and finally Revenue Productivity (ω_{it}) after controlling the simultaneity problem in choosing labour, capital and other factor inputs based on their current productivity levels.

⁹ We use deflated sales revenue, capital spending and different input expenditures as proxies for the physical quantities of output, capital and intermediate inputs, respectively, following the literature on productivity estimation. To get the deflated values of sales, compensation to employees, power and fuel expenditure, capital employed, raw material expenditure, we use industry-specific wholesale price indices, keeping 2004 as the base year to accord with the 1999-2009 period covered by our study. All the industry specific-wholesale price indices are obtained from the Economic Adviser, Ministry of Commerce and Industry, Government of India. http://www.eaindustry.nic.in/wpi_revision_0405.asp

**Table 2.2: LP (ACF Corrected) Translog Production Function Estimation
for different types of Firms**

VARIABLES	(1) All Firms	(2) Large Firms	(3) MSME Firms	(4) Mixed Firms
In_Deflated_Compensation	0.1799262*** (0.0229362)	0.0416*** (0.00937)	0.140*** (0.00833)	0.0376*** (0.00662)
In_Deflated_Power_Fuel	0.1785457*** (0.0223749)	0.103*** (0.00722)	0.311*** (0.00488)	0.0797*** (0.00814)
In_Deflated_Capital_Employed	0.0433173*** (0.0146124)	0.239*** (0.00685)	0.0188*** (0.00595)	-0.0219** (0.00968)
In_Deflated_RM_Expences	0.4633465*** (0.0204283)	0.378*** (0.0101)	0.336*** (0.00593)	0.451*** (0.00778)
In_Deflated_Compensation ²	0.0483093** (0.0233728)	0.0261*** (0.00627)	0.00884 (0.0109)	0.0173 (0.0174)
In_Deflated_Compensation * In_Deflated_Power_Fuel	0.0100675 (0.0218)	-0.00759 (0.00683)	-0.0262*** (0.00618)	-0.0332*** (0.00932)
In_Deflated_Compensation * In_Deflated_Capital_Employed	0.0618242*** (0.0225634)	0.0838*** (0.00537)	0.0676*** (0.00726)	0.0520** (0.0211)
In_Deflated_Compensation * In_Deflated_RM_Expences	-0.028554 (0.0240022)	-0.0428*** (0.00824)	-0.0927*** (0.00818)	-0.0147** (0.00741)
In_Deflated_Power_Fuel ²	0.0590171** (0.0301751)	0.00565 (0.00873)	0.0493*** (0.00779)	0.0222* (0.0131)
In_Deflated_Power_Fuel * In_Deflated_Capital_Employed	-0.008991 (0.023694)	-0.0211* (0.0113)	-0.0752*** (0.00654)	-0.0319*** (0.00940)
In_Deflated_Power_Fuel * In_Deflated_RM_Expences	-0.020577 (0.0157291)	-0.0418*** (0.00565)	-0.00753 (0.00726)	0.0268*** (0.00964)
In_Deflated_Capital_Employed ²	0.0758159*** (0.0175996)	-0.00207 (0.01000)	0.0561*** (0.00706)	0.0275 (0.0178)
In_Deflated_Capital_Employed * In_Deflated_RM_Expences	-0.073941*** (0.0106244)	-0.0299*** (0.00799)	-0.0437*** (0.00567)	-0.0516*** (0.00426)
In_Deflated_RM_Expences ²	0.022038 (0.0497018)	0.0589*** (0.0132)	0.0465*** (0.00686)	0.0644*** (0.0102)
Observations	9,262	5,181	2,024	2,057
Number of groups	842	471	184	187

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Step 2: Once we get the estimates for firm-level output elasticities with respect to various inputs used in our translog production function and Revenue Productivity (TFPR), in the last step, following De Loecker and Warzynski (2012)'s approach, we can recover firm-level markup (μ_{it}) using equation 2.2,

$$\mu_{it} = \frac{\theta_{it}^M}{\alpha_{it}^M} \quad (2.2)$$

where θ_{it}^M denotes the output elasticity with respect to intermediate materials and α_{it}^M denotes the share of expenditures on intermediate material inputs in total sales revenue. While α_{it}^M can be directly calculated using the indicators in our data, θ_{it}^M can only be obtained by estimating the production function. Equation 2.3 provides an illustration of the estimation of firm-level output elasticity with respect to material input expenses for all firms, which uses the estimated coefficients of Column 1 in Table 2.2:

$$\begin{aligned} \text{Output_Elasticity_RM}_{it} = & .4633465 + 2 * .0220379 * \ln_RM_Expences_{it} - .0739407 * \\ & \ln_Capital_{it} - .0285541 * \ln_Compensation_{it} - .0205769 * \ln_Power_Fuel_{it} + .0618242 * \\ & \ln_Compensation_{it} * \ln_Capital_{it} + .0100675 * \ln_Compensation_{it} * \ln_Power_Fuel_{it} - \\ & .0089914 * \ln_Power_Fuel_{it} * \ln_Capital_{it} \end{aligned} \quad (2.3)$$

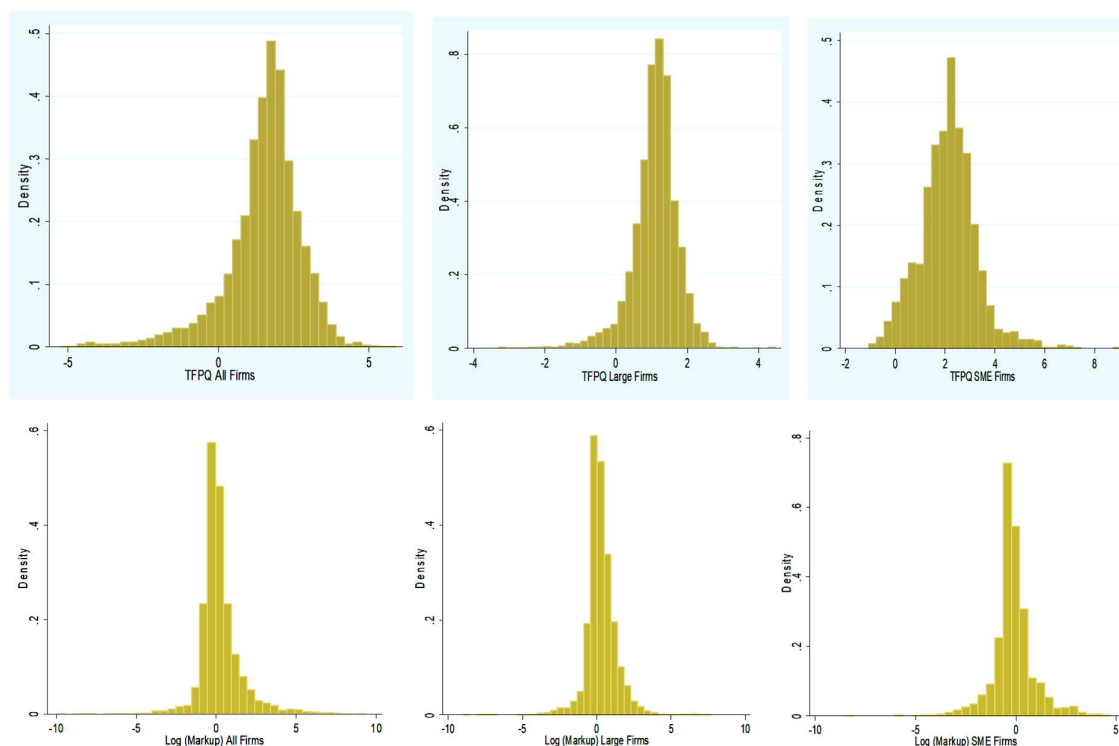
Step 3: In our final step we measure firm-level physical productivity (TFPQ)¹⁰ (Foster, Haltiwanger and Syverson, 2008) from the estimated firm-level TFPR and Markups using Equation 2.4:

$$TFPQ_{it} = TFPR_{it} - Markup_{it} \quad (2.4)$$

where $TFPR_{it}$ denotes the estimated revenue productivity (ω_{it}) (obtained in step 1) and $Markup_{it}$ is the markup estimate (μ_{it}) in logarithm ((obtained in step 2). $TFPQ_{it}$ denotes physical productivity, which is the difference between log revenue productivity and the log of the estimated markup. Figure 2.2 gives the distribution of Firm-level TFPQ and Mark-up for All, Large and MSME Firms.

¹⁰ It should be noted that the total factor productivity we have estimated in Step 1 is based on sales revenue rather than physical output. Hence, it could create a measurement bias as firms may differ in terms of their pricing. So, we follow Marin and Voigtlander (2013)'s approach to obtain firm-level physical productivity (TFPQ) using firm-level TFPR and Markups, which have been estimated in Steps 1 and 2, respectively. For further details see, Dai and Cheng (2018), pp. 3-4

Figure 2.2: Histogram of Firm-level TFPQ and Mark-up for All, Large and MSME Firms



3. The Estimation Strategy and Analysis

3.1 Model Specifications

We examine the effects of trade liberalization on firm-level productivity in Indian manufacturing over the study period. Existing studies, which examine the effects of trade liberalization on both firm and industry level productivity of India's manufacturing sector, provide inconclusive results, with some showing positive effects on firm-level productivity while other studies find either negative or no effects. These previous studies also reveal that the effects of trade liberalization vary across industries and across trade regimes. However, the main limitation is that apart from very few studies such as Khandelwal and Topalova (2011) and Nataraj (2011) etc., almost all studies focus on large firms due to the lack of availability of an appropriate database for MSME firms. In our analysis, we include MSMEs alongside large

firms to capture the effects of trade liberalization on firm-level productivity across different groups of firms. We use a balanced panel dataset throughout as it helps us to examine the firm-dynamics for a fixed set of large and MSME firms over the 1999 to 2009 period.¹¹

We make use of a fixed effects approach to determine the effects of tariff and non-tariff liberalization while taking into account unobserved firm, year and state level heterogeneity. The final fixed effects models for firm-level productivity are specified in equations (3.1) and (3.2). Equation (3.1) determines the effects of varying industry-level tariffs, while equation (3.2) determines the effects of the industry-level NTB indices, on firm-level productivity. These models also control for firm and year fixed effects.

$$\begin{aligned}
 \text{Productivity}_{ijt} = & \\
 & \alpha + \tau \text{ input or, final goods tariff or, ERP}_{jt-1} + \beta \text{ Total Asset}_{ijt} \\
 & + \gamma \text{Age}_{ijt} + \delta \text{Age}^2_{ijt} + \theta \text{Export Propensity}_{jt} + c_i + \lambda_t \\
 & + \varepsilon_{ijt}
 \end{aligned} \tag{3.1}$$

$$\begin{aligned}
 \text{Productivity}_{ijt} = & \\
 & \alpha + \tau \text{ NTB Index}_{jt} + \beta \text{ Total Asset}_{ijt} + \gamma \text{Age}_{ijt} + \delta \text{Age}^2_{ijt} \\
 & + \theta \text{Export Propensity}_{jt} + c_i + \lambda_t \\
 & + \varepsilon_{ijt}
 \end{aligned} \tag{3.2}$$

In our fixed effects models on productivity, we control with firm age, age square, firm size (total asset used as proxy variable) and industry-level export propensity, apart from the main variables of interest (i.e., lagged tariff or NTB Index).

¹¹ However, we have further extended our analysis by using a larger unbalanced panel dataset to check the robustness of our results. See, the robustness section.

3.2 *Results and Discussion of the Fixed Effects Models*

One of the important objectives of the study is to examine how various types of tariffs (final goods and input tariffs) and NTBs affect firm-level productivity of Indian manufacturing firms and to identify their relative and combined impact.

We first examine the independent effects of final goods tariff and input tariffs and their combined effects on firm productivity, as presented in Table 3.1. Next, we examine the independent effects of both input and output tariffs as well as of NTBs, and their combined effects on firm productivity, as presented in Table 3.2. Finally, in Table 3.3 we represent the relative impact of final goods and input tariffs (as measured by the Effective Rate of Protection) versus NTBs on firm-level productivity for different types of Indian manufacturing firms over the 1999 to 2009 period.¹²

As discussed earlier, these model estimates first reflect the performance of all firms together, and then reflect the performance of large and MSME firms, separately. Although, we estimate various versions of these models, we present and discuss in this section only the final versions.¹³ Firm fixed effects include firm age, age square, total assets (as a proxy for firm size), industry-level export propensity and all year dummies. It should also be noted that in each of the regressions, the standard errors are clustered at the firm level.

The coefficients of the tariff variables clearly suggest that Indian firms have benefited in terms of improved physical productivity through the input channel while, the output channel has exposed them to greater foreign competition and has had a negative impact on productivity. For instance, in our final model where we take both input and final goods tariffs, (Table 3.1

¹² Columns 4, 8 and 12 represent the results for those firms (mixed), which have shifted from being MSMEs to large firms and vice-versa at different points of time during our study period. We have further explored the dynamics of these particular categories of firms later in the robustness section.

¹³ See, Section 5, Tables 5.1 to 5.2 for the results of the Heckman 2-step models, where we control for possible trade policy (both with respect to tariffs and NTBs) endogeneity of firm-level productivity (noted by few existing studies such as Khandelwal and Topalova, 2011) due to sample selection bias. The results of our Heckman models remain symmetric with our main fixed effect models. Hence, the main results remain robust.

Column 9) the estimated tariff coefficients highlight that a one percent reduction in input tariffs increases firm-level productivity by 0.0297 percent, while a one percent reduction in final goods tariffs decreases firm-level productivity by 0.0191 percent, due to increased competition. Moreover, the comparison of the impact of tariff liberalization between two types of firms based on their investments in plant and machinery (Column 10 *versus* Column 11), clearly suggests that although the effects of tariff liberalization on physical productivity is significant for large firms, the effect is minimal for MSMEs and that this effect is only through the input channel. The estimated tariff coefficients in Table 3.1, Column 10 highlight that for large firms, a one percent reduction in input tariff increases firm-level productivity by 0.0215 percent, while a one percent reduction in final goods tariffs decreases firm-level productivity by 0.0114 percent, due to increased competition. These findings corroborate earlier studies such as Goldberg, et.al. (2010a), Sivadasan (2009), Loecker et.al. (2012) which find evidence of increased market competition and reduced markups for domestic producers in India following the reduction in final goods tariffs.

We also find that the positive effect of a reduction in lagged input tariffs is greater (almost double) in magnitude than the negative effect of reducing final goods tariffs (i.e., 0.021 percent versus 0.011 percent). This result clearly shows that trade liberalization has had a greater impact on firm performance through the input channel, i.e., through the sourcing of inputs as opposed to the final goods channel of increased competition from final goods imports. The estimated coefficients for lagged input tariffs are similar to those obtained by Topalova and Khandelwal (2011) and Nataraj (2011).

Our results thus indicate that large firms are the main gainers in terms of productivity following trade liberalization. The latter is likely to be due to their continuous adoption of new, better quality and more diversified intermediate inputs and improved techniques in their production process, as noted in earlier studies such as Ethier (1982), Grossman and Helpman (1991) and

Rivera-Batiz and Romer (1991). Table 3.1 also highlights a positive and significant role of industry-level export intensity in improving firm-level productivity for large firms. This is consistent with the literature, which finds that more export-oriented firms are likely to be more productive.

We next extend our analysis to compare the impact of tariff versus NTB liberalization on firm productivity during 1999 to 2009 period.¹⁴ Our results in Table 3.2 indicate that NTB liberalization has been more important than tariff liberalization in improving the physical productivity of All firms as well as large firms. The latter result is consistent with the findings of Goldberg and Pavcnik (2007), Topalova and Khandelwal (2011) which highlight the importance of NTB reduction in developing countries like India. In contrast, NTB liberalization does not improve the productivity of MSME firms, as also found in the case of final goods tariff reduction. This differential impact of NTB liberalization for large versus MSME firms can be explained by the former's access to high quality and cheap intermediate imported inputs, particularly, with the removal of Quantitative Restrictions (QRs) on imports of previously prohibited industrial and agricultural items.¹⁵ MSMEs, on the other hand, remained relatively protected from NTB liberalization due to small-scale sector reservations wherein certain products were reserved for MSMEs, though at the cost of efficiency.¹⁶

Overall, a comparison of the results presented in Tables 3.1 and 3.2 indicate that all firms and in particular large firms have benefited from tariff as well as NTB liberalization while MSMEs

¹⁴ The usual NTB indices would give 0's for free import products; here in our constructed NTB index we assign a value of 0 for prohibited import products, hence the reverse formulation (i.e. an inverted NTB index).

¹⁵ It is important to note that India was forced by the WTO to remove QRs on imports across a wide range of industries (over 700 items) in 2001. The removal of QRs resulted in a sharp increase in product variety in the domestic market

¹⁶ Harrison et. al (2011) note that the small-scale sector reservations enabled MSMEs to remain protected from NTB liberalization, although these same reservations impeded their output and employment growth. For more details regarding product reservation policies for MSME firms and their phasing out over time, see the following links, <http://dcmsme.gov.in/publications/reserveditems/respol.htm> and <http://dcmsme.gov.in/publications/reserveditems/resvex.htm>

have not benefited.¹⁷ This is likely to be due to factors such as lack of demand (cited by 41.94 percent of MSMEs), shortage of working capital (20.49 percent), and management problems (11.48 percent) as well as other factors such as traditional production methods, poor management of assets, poor access to credit, and technological inefficiencies, among other factors.¹⁸ The coefficients for the industry-level export-propensity variable in case of large firms indicate that productivity is positively and significantly affected by export-orientation. Consistent with previous firm level studies, we also observe a non-linear relationship between firm age and productivity. In sum, our main findings highlight the importance of firm-characteristics, such as, firm size (i.e., Large vs MSME) in shaping the effects of trade liberalization across industries over the 1999-2009 period.

Although we control for any firm and year specific heterogeneity using fixed effect models, some state-specific policies may affect our main findings.¹⁹ Thus, to confirm the robustness of our main findings we extend our analysis by introducing state-year interaction effects in our main fixed effects models. Tables 3.4 to 3.6 present the results for our main models after controlling for any unobserved firm and year-specific heterogeneity, and any other unobserved macro-economic shocks which might affect our main results.²⁰ The results remain symmetric with our baseline results. The coefficients for lagged final goods and input tariffs and NTBs in Column 10 of Table 3.5, indicate the significant effect of tariff as well as NTB liberalization on firm-level physical productivity for large firms but not for MSME firms (Column 11). Thus, our findings remain robust after incorporating state-year effects.

¹⁷ The negative coefficients for input tariffs and the positive coefficients for final goods tariffs in Columns 9 and 10, respectively, are larger in Table 3.2 compared to those in Table 3.1, which highlights a relatively stronger positive effect of tariff liberalization (both input and output sides) in the presence of lower NTBs.

¹⁸ See Coad and Tamvara (2012), Kamesam (2003), Venkataramany and Fox (2009) and other studies, which highlight the aforementioned challenges faced by Indian MSME firms. Mukherjee and Chanda (2019), based on a merged 3rd (2001-02) and 4th (2006-07) census panel dataset for registered Indian manufacturing MSMEs finds that various firm-level structural constraints such as traditional power sources, unorganized operating structure, poor product quality and lack of technological knowledge have prevented Indian MSMEs from realizing the productivity gains from trade liberalization.

¹⁸ See Table 2.1 for further details of MSME classification prior to and after 2006.

¹⁹ Hasan et.al. (2012) discusses how state-level tariff, NTB and other policy reforms can affect firm-level productivity and employment.

²⁰ In this regard, it is important to note that various Development Commissions across Indian states govern any domestic policy changes that affect MSMEs. Thus, if any significant state-level policy changes happened for MSMEs during our study period, they could affect our results.

Table 3.1: TFPQ_TRANSLOG_ACF_LP and Final Goods Tariff and Input Tariff

VARIABLES	(1) All Firms TFPQ	(2) Large Firms TFPQ	(3) MSME Firms TFPQ	(4) Mixed Firms TFPQ	(5) All Firms TFPQ	(6) Large Firms TFPQ	(7) MSME Firms TFPQ	(8) Mixed Firms TFPQ	(9) All Firms TFPQ	(10) Large Firms TFPQ	(11) MSME Firms TFPQ	(12) Mixed Firms TFPQ
Input_Tariff_Industry_Wise_1					-0.00210 (0.00480)	-0.00495* (0.00279)	-0.0104 (0.00946)	-0.0185* (0.0105)	-0.0297*** (0.00806)	-0.0215*** (0.00503)	-0.0300* (0.0169)	-0.0233 (0.0174)
Output_Tariff_Industry_Wise_1	0.00130 (0.00297)	-0.00142 (0.00171)	-0.00499 (0.00630)	-0.0103 (0.00628)					0.0191*** (0.00465)	0.0114*** (0.00288)	0.0139 (0.0112)	0.00325 (0.00948)
Deflated_Total_Asset	-0.000200 (0.000131)	-0.000121 (8.91e-05)	-0.00332 (0.00201)	-0.000235* (0.000126)	-0.000207 (0.000131)	-0.000125 (8.87e-05)	-0.00336* (0.00198)	-0.000254* (0.000129)	-0.000204 (0.000131)	-0.000122 (8.79e-05)	-0.00337* (0.00197)	-0.000259* (0.000134)
age	-0.000429 (0.0101)	-0.0290*** (0.00559)	-0.0214 (0.0209)	-0.0575** (0.0245)	-0.00601 (0.00940)	-0.0313*** (0.00520)	-0.0227 (0.0191)	-0.0566** (0.0231)	0.00530 (0.00979)	-0.0243*** (0.00533)	-0.0149 (0.0207)	-0.0549** (0.0240)
age_square	0.000193* (0.000109)	0.000218*** (5.60e-05)	0.000130 (0.000206)	0.000649*** (0.000240)	0.000206* (0.000109)	0.000221*** (5.56e-05)	0.000143 (0.000204)	0.000663*** (0.000240)	0.000197* (0.000109)	0.000214*** (5.51e-05)	0.000134 (0.000205)	0.000663*** (0.000240)
Export Propensity Industry Wise	0.0175*** (0.00396)	0.0112*** (0.00232)	0.00440 (0.0104)	0.00650 (0.00896)	0.0176*** (0.00407)	0.00990*** (0.00240)	0.000263 (0.0110)	-0.000204 (0.00929)	0.00558 (0.00343)	0.00270 (0.00231)	-0.00837 (0.00845)	-0.00216 (0.00774)
Constant	0.984*** (0.289)	1.527*** (0.168)	2.641*** (0.578)	2.740*** (0.622)	1.194*** (0.275)	1.652*** (0.162)	2.738*** (0.531)	2.802*** (0.615)	0.969*** (0.287)	1.513*** (0.167)	2.563*** (0.573)	2.770*** (0.632)
Firm Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	8,392	4,646	1,577	1,660	8,392	4,646	1,577	1,660	8,392	4,646	1,577	1,660
R-squared	0.035	0.056	0.007	0.048	0.035	0.058	0.008	0.050	0.038	0.063	0.009	0.050
Number of Firms	842	470	177	176	842	470	177	176	842	470	177	176

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 3.2: Relative and Combined Effects on: TFPQ_TRANSLOG_ACF_LP and NTB and Final Goods Tariff & Input Tariff

VARIABLES	(1) All Firms TFPQ	(2) Large Firms TFPQ	(3) MSME Firms TFPQ	(4) Mixed Firms TFPQ	(5) All Firms TFPQ	(6) Large Firms TFPQ	(7) MSME Firms TFPQ	(8) Mixed Firms TFPQ	(9) All Firms TFPQ	(10) Large Firms TFPQ	(11) MSME Firms TFPQ	(12) Mixed Firms TFPQ
Input_Tariff_Industry_Wise_1	-0.00585 (0.00484)	-0.00665** (0.00286)	-0.0117 (0.00951)	-0.0202* (0.0106)					-0.0300*** (0.00804)	-0.0216*** (0.00502)	-0.0308* (0.0170)	-0.0232 (0.0174)
Output_Tariff_Industry_Wise_1					-0.00110 (0.00300)	-0.00246 (0.00175)	-0.00576 (0.00630)	-0.0114* (0.00637)	0.0168*** (0.00463)	0.0104*** (0.00285)	0.0136 (0.0112)	0.00205 (0.00969)
New_Inverted_NTB_Industry_Wise	0.0354*** (0.00748)	0.0151*** (0.00527)	0.0171 (0.0180)	0.0198 (0.0142)	0.0332*** (0.00747)	0.0135** (0.00523)	0.0157 (0.0179)	0.0197 (0.0145)	0.0334*** (0.00748)	0.0136*** (0.00526)	0.0167 (0.0180)	0.0196 (0.0144)
Deflated_Total_Asset	-0.000214* (0.000129)	-0.000129 (8.89e-05)	-0.00326 (0.00198)	-0.000236* (0.000130)	-0.000206 (0.000129)	-0.000124 (8.93e-05)	-0.00322 (0.00201)	-0.000215* (0.000127)	-0.000210 (0.000129)	-0.000126 (8.81e-05)	-0.00327* (0.00196)	-0.000239* (0.000135)
age	-0.0230** (0.0103)	-0.0383*** (0.00582)	-0.0316 (0.0227)	-0.0658*** (0.0249)	-0.0177 (0.0111)	-0.0359*** (0.00621)	-0.0299 (0.0242)	-0.0673** (0.0266)	-0.0120 (0.0108)	-0.0313*** (0.00593)	-0.0238 (0.0239)	-0.0646** (0.0262)
age_square	0.000213** (0.000109)	0.000222*** (5.50e-05)	0.000146 (0.000204)	0.000669*** (0.000242)	0.000201* (0.000108)	0.000219*** (5.56e-05)	0.000133 (0.000206)	0.000656*** (0.000242)	0.000205* (0.000108)	0.000215*** (5.47e-05)	0.000137 (0.000206)	0.000669*** (0.000242)
Export Propensity Industry Wise	0.0166*** (0.00404)	0.00943*** (0.00238)	0.00108 (0.0112)	-0.00160 (0.00924)	0.0180*** (0.00398)	0.0114*** (0.00233)	0.00565 (0.0106)	0.00580 (0.00893)	0.00599* (0.00346)	0.00290 (0.00233)	-0.00738 (0.00867)	-0.00283 (0.00767)
Constant	-1.691** (0.664)	0.429 (0.461)	1.338 (1.529)	1.172 (1.296)	-1.690** (0.664)	0.443 (0.460)	1.364 (1.544)	1.134 (1.288)	-1.719*** (0.664)	0.422 (0.461)	1.198 (1.551)	1.170 (1.295)
Firm Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	8,392	4,646	1,577	1,660	8,392	4,646	1,577	1,660	8,392	4,646	1,577	1,660
R-squared	0.040	0.063	0.009	0.053	0.040	0.060	0.007	0.050	0.043	0.066	0.010	0.053
Number of Firms	842	470	177	176	842	470	177	176	842	470	177	176

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 3.3: TFPQ_TRANSLOG_ACF_LP and ERP and NTB

VARIABLES	(1) All Firms TFPQ	(2) Large Firms TFPQ	(3) MSME Firms TFPQ	(4) Mixed Firms TFPQ	(5) All Firms TFPQ	(6) Large Firms TFPQ	(7) MSME Firms TFPQ	(8) Mixed Firms TFPQ	(9) All Firms TFPQ	(10) Large Firms TFPQ	(11) MSME Firms TFPQ	(12) Mixed Firms TFPQ
New_Inverted_NTB_Industry_Wise					0.0312*** (0.00761)	0.0106** (0.00516)	0.00271 (0.0183)	0.000524 (0.0160)	0.0318*** (0.00746)	0.0113** (0.00513)	0.0122 (0.0180)	0.0146 (0.0146)
ERP_Industry_Wise_1	0.00148 (0.00190)	-8.17e-05 (0.00114)	-0.00185 (0.00406)	-0.00626* (0.00370)					0.000687 (0.00189)	-0.000411 (0.00114)	-0.00193 (0.00405)	-0.00653* (0.00373)
Deflated_Total_Asset	-0.000198 (0.000131)	-0.000117 (8.93e-05)	-0.00325 (0.00204)	-0.000212* (0.000125)	-0.000160 (0.000139)	-9.39e-05 (9.47e-05)	-0.00223 (0.00205)	-0.00029** (0.000148)	-0.000201 (0.000130)	-0.000119 (8.96e-05)	-0.00317 (0.00205)	-0.000196 (0.000127)
age	0.00132 (0.00964)	-0.0261*** (0.00535)	-0.0161 (0.0207)	-0.0532** (0.0222)	-0.0107 (0.00751)	-0.0305*** (0.00459)	-0.0130 (0.0152)	-0.0398** (0.0158)	-0.0124 (0.0102)	-0.0309*** (0.00575)	-0.0216 (0.0232)	-0.0592** (0.0238)
age_square	0.000192* (0.000109)	0.000214*** (5.62e-05)	0.000109 (0.000207)	0.000627*** (0.000239)	0.000180* (0.000103)	0.000226*** (5.79e-05)	9.98e-05 (0.000170)	0.000530* (0.000273)	0.000192* (0.000108)	0.000215*** (5.60e-05)	0.000108 (0.000207)	0.000629*** (0.000240)
Export Propensity Industry Wise	0.0163*** (0.00405)	0.0107*** (0.00242)	0.00541 (0.0103)	0.00901 (0.00893)	0.0190*** (0.00408)	0.0114*** (0.00240)	0.00582 (0.0109)	0.00627 (0.00930)	0.0167*** (0.00405)	0.0109*** (0.00244)	0.00636 (0.0105)	0.00845 (0.00888)
Constant	0.938*** (0.251)	1.417*** (0.145)	2.435*** (0.510)	2.551*** (0.509)	-1.735** (0.673)	0.495 (0.459)	2.027 (1.611)	2.130 (1.458)	-1.730** (0.688)	0.476 (0.467)	1.398 (1.586)	1.319 (1.294)
Firm Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	8,392	4,646	1,577	1,660	9,230	5,103	1,731	1,815	8,392	4,646	1,577	1,660
R-squared	0.035	0.056	0.006	0.045	0.038	0.058	0.005	0.034	0.040	0.058	0.006	0.047
Number of Firms	842	470	177	176	842	471	179	176	842	470	177	176

Robust standard errors in parentheses
 *** p<0.01, ** p<0.05, * p<0.1

Table 3.4: State-Year-TFPQ_TRANSLOG_ACF_LP and Final Goods Tariff and Input Tariff

VARIABLES	(1) All Firms TFPQ	(2) Large Firms TFPQ	(3) MSME Firms TFPQ	(4) Mixed Firms TFPQ	(5) All Firms TFPQ	(6) Large Firms TFPQ	(7) MSME Firms TFPQ	(8) Mixed Firms TFPQ	(9) All Firms TFPQ	(10) Large Firms TFPQ	(11) MSME Firms TFPQ	(12) Mixed Firms TFPQ
Input_Tariff_Industry_Wise_1					0.000240 (0.00520)	-0.00309 (0.00293)	-0.0108 (0.0116)	-0.0222** (0.0110)	-0.0242*** (0.00878)	-0.0196*** (0.00549)	-0.0282 (0.0184)	-0.0305 (0.0203)
Output_Tariff_Industry_Wise_1	0.00243 (0.00321)	-0.000348 (0.00180)	-0.00517 (0.00782)	-0.0119* (0.00648)					0.0169*** (0.00505)	0.0114*** (0.00317)	0.0125 (0.0125)	0.00567 (0.0110)
Deflated_Total_Asset	-0.000180 (0.000129)	-0.000113 (8.66e-05)	-0.00375* (0.00215)	-0.000375** (0.000188)	-0.000185 (0.000129)	-0.000116 (8.62e-05)	-0.00378* (0.00212)	-0.000397** (0.000187)	-0.000182 (0.000130)	-0.000113 (8.60e-05)	-0.00381* (0.00211)	-0.000406** (0.000191)
age	-0.0236* (0.0140)	-0.0195** (0.00864)	-0.0306 (0.0355)	-0.0837 (0.0544)	-0.0277** (0.0135)	-0.0216** (0.00845)	-0.0316 (0.0337)	-0.0831 (0.0546)	-0.0188 (0.0137)	-0.0150* (0.00855)	-0.0256 (0.0346)	-0.0809 (0.0540)
age_square	0.000103 (0.000111)	0.000169*** (5.56e-05)	0.000103 (0.000222)	0.000526** (0.000233)	0.000113 (0.000111)	0.000173*** (5.53e-05)	0.000111 (0.000220)	0.000550** (0.000234)	0.000105 (0.000111)	0.000166*** (5.50e-05)	0.000101 (0.000223)	0.000552** (0.000235)
Export Propensity Industry Wise	0.0156*** (0.00442)	0.00955*** (0.00240)	0.00482 (0.0130)	0.0105 (0.0110)	0.0166*** (0.00444)	0.00901*** (0.00237)	0.000482 (0.0133)	0.00262 (0.0106)	0.00599* (0.00364)	0.00184 (0.00238)	-0.00721 (0.0105)	-0.000781 (0.00885)
Constant	1.729*** (0.418)	1.305*** (0.248)	2.991*** (1.071)	3.517** (1.425)	1.822*** (0.402)	1.412*** (0.249)	3.008*** (0.990)	3.612** (1.460)	1.651*** (0.406)	1.294*** (0.259)	2.933*** (0.990)	3.579** (1.439)
Firm Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
State-Year Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	8,147	4,501	1,557	1,594	8,147	4,501	1,557	1,594	8,147	4,501	1,557	1,594
R-squared	0.076	0.135	0.078	0.145	0.075	0.136	0.079	0.148	0.078	0.140	0.079	0.149
Number of Firms	817	455	175	169	817	455	175	169	817	455	175	169

Robust standard errors in parentheses
 *** p<0.01, ** p<0.05, * p<0.1

Table 3.5: State-Year-TFPQ_TRANSLOG_ACF_LP and NTB and Final Goods Tariff & Input Tariff

VARIABLES	(1) All Firms TFPQ	(2) Large Firms TFPQ	(3) MSME Firms TFPQ	(4) Mixed Firms TFPQ	(5) All Firms TFPQ	(6) Large Firms TFPQ	(7) MSME Firms TFPQ	(8) Mixed Firms TFPQ	(9) All Firms TFPQ	(10) Large Firms TFPQ	(11) MSME Firms TFPQ	(12) Mixed Firms TFPQ
Input_Tariff_Industry_Wise_1	-0.00313 (0.00526)	-0.00449 (0.00302)	-0.0120 (0.0116)	-0.0230** (0.0112)					-0.0244*** (0.00876)	-0.0197*** (0.00549)	-0.0289 (0.0185)	-0.0305 (0.0204)
Output_Tariff_Industry_Wise_1					0.000246 (0.00325)	-0.00120 (0.00186)	-0.00595 (0.00780)	-0.0125* (0.00665)	0.0148*** (0.00501)	0.0106*** (0.00315)	0.0121 (0.0125)	0.00509 (0.0113)
New_Inverted_NTB_Industry_Wise	0.0328*** (0.00776)	0.0128** (0.00545)	0.0209 (0.0199)	0.00984 (0.0157)	0.0309*** (0.00773)	0.0114** (0.00541)	0.0199 (0.0197)	0.00943 (0.0161)	0.0310*** (0.00774)	0.0115** (0.00543)	0.0206 (0.0199)	0.00930 (0.0160)
Deflated_Total_Asset	-0.000191 (0.000129)	-0.000120 (8.65e-05)	-0.00364* (0.00212)	-0.000388** (0.000187)	-0.000186 (0.000129)	-0.000116 (8.69e-05)	-0.00361* (0.00215)	-0.000365* (0.000189)	-0.000188 (0.000129)	-0.000116 (8.62e-05)	-0.00367* (0.00211)	-0.000397** (0.000191)
age	-0.0434*** (0.0140)	-0.0275*** (0.00897)	-0.0424 (0.0349)	-0.0876 (0.0552)	-0.0395*** (0.0145)	-0.0252*** (0.00921)	-0.0412 (0.0365)	-0.0883 (0.0551)	-0.0348** (0.0142)	-0.0208** (0.00910)	-0.0364 (0.0356)	-0.0854 (0.0547)
age_square	0.000120 (0.000111)	0.000175*** (5.49e-05)	0.000119 (0.000220)	0.000554** (0.000236)	0.000111 (0.000111)	0.000171*** (5.53e-05)	0.000111 (0.000221)	0.000530** (0.000234)	0.000113 (0.000111)	0.000168*** (5.48e-05)	0.000110 (0.000223)	0.000555** (0.000236)
Export Propensity Industry Wise	0.0157*** (0.00441)	0.00867*** (0.00236)	0.00136 (0.0135)	0.00193 (0.0106)	0.0161*** (0.00444)	0.00978*** (0.00243)	0.00617 (0.0132)	0.0101 (0.0109)	0.00645* (0.00366)	0.00204 (0.00240)	-0.00611 (0.0107)	-0.00109 (0.00874)
Constant	-0.838 (0.755)	0.377 (0.491)	1.354 (1.949)	2.775 (1.994)	-0.775 (0.758)	0.402 (0.491)	1.315 (1.987)	2.695 (1.962)	-0.731 (0.767)	0.382 (0.493)	1.218 (1.974)	2.786 (1.957)
Firm Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
State-Year Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	8,147	4,501	1,557	1,594	8,147	4,501	1,557	1,594	8,147	4,501	1,557	1,594
R-squared	0.080	0.139	0.080	0.149	0.080	0.137	0.079	0.145	0.082	0.142	0.081	0.149
Number of Firms	817	455	175		817	455	175	169	817	455	175	169

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 3.6: State-Year-TFPQ_TRANSLOG_ACF_LP and ERP and NTB

VARIABLES	(1) All Firms TFPQ	(2) Large Firms TFPQ	(3) MSME Firms TFPQ	(4) Mixed Firms TFPQ	(5) All Firms TFPQ	(6) Large Firms TFPQ	(7) MSME Firms TFPQ	(8) Mixed Firms TFPQ	(9) All Firms TFPQ	(10) Large Firms TFPQ	(11) MSME Firms TFPQ	(12) Mixed Firms TFPQ
New_Inverted_NTB_Industry_Wise					0.0308*** (0.00791)	0.00984* (0.00526)	0.00876 (0.0203)	-0.00747 (0.0168)	0.0305*** (0.00768)	0.0100* (0.00527)	0.0171 (0.0199)	0.00385 (0.0160)
ERP_Industry_Wise_1	0.00190 (0.00204)	0.000569 (0.00122)	-0.00200 (0.00489)	-0.00645 (0.00390)					0.00120 (0.00203)	0.000304 (0.00123)	-0.00200 (0.00489)	-0.00652 (0.00396)
Deflated_Total_Asset	-0.000179 (0.000130)	-0.000110 (8.68e-05)	-0.00371* (0.00217)	-0.000355* (0.000195)	-0.000142 (0.000138)	-8.83e-05 (9.36e-05)	-0.00264 (0.00205)	-0.000501** (0.000213)	-0.000183 (0.000129)	-0.000112 (8.72e-05)	-0.00359 (0.00218)	-0.000351* (0.000196)
age	-0.0229* (0.0138)	-0.0173** (0.00856)	-0.0264 (0.0355)	-0.0794 (0.0522)	-0.0407*** (0.0114)	-0.0254*** (0.00848)	-0.0322 (0.0293)	-0.0529 (0.0438)	-0.0366*** (0.0140)	-0.0216** (0.00898)	-0.0343 (0.0364)	-0.0811 (0.0524)
age_square	0.000104 (0.000111)	0.000165*** (5.57e-05)	8.70e-05 (0.000221)	0.000493** (0.000233)	0.000107 (0.000105)	0.000180*** (5.71e-05)	8.31e-05 (0.000188)	0.000462* (0.000256)	0.000106 (0.000110)	0.000166*** (5.56e-05)	9.02e-05 (0.000220)	0.000493** (0.000234)
Export Propensity Industry Wise	0.0144*** (0.00452)	0.00870*** (0.00257)	0.00603 (0.0133)	0.0125 (0.0110)	0.0176*** (0.00452)	0.0102*** (0.00241)	0.00596 (0.0133)	0.00946 (0.0112)	0.0149*** (0.00453)	0.00889*** (0.00259)	0.00709 (0.0135)	0.0123 (0.0110)
Constant	1.740*** (0.395)	1.213*** (0.255)	2.715*** (0.943)	3.314** (1.335)	-0.812 (0.759)	0.498 (0.506)	1.936 (1.954)	3.051 (1.860)	-0.808 (0.782)	0.397 (0.498)	1.264 (2.010)	2.969 (1.970)
Firm Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
State-Year Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	8,147	4,501	1,557	1,594	8,961	4,945	1,709	1,744	8,147	4,501	1,557	1,594
R-squared	0.076	0.135	0.077	0.141	0.076	0.152	0.080	0.139	0.080	0.137	0.078	0.141
Number of Firms	817	455	175	169	817	456	177	169	817	455	175	169

Robust standard errors in parentheses
 *** p<0.01, ** p<0.05, * p<0.1

3.3 *Summarizing the main findings*

Our results for the baseline model and extensions can be summarized as follows:

- Tariff and NTB liberalization have had a positive and significant impact on firm-level productivity in Indian manufacturing.
- Productivity gains have been mainly through the input channel.
- NTB liberalization has had a stronger effect than tariff reductions.
- These effects have, however, been limited to large firms. MSMEs have not experienced productivity gains due to trade liberalization.

We conclude that large firms have been able to realize productivity gains from trade liberalization due to their advantageous position over MSMEs on a variety of firm-level attributes.

4. MSME Definition and Firm Performance

In this section we extend our analysis by using a larger unbalanced panel dataset for the 1999 to 2009 period. We assess the robustness of our results by analyzing the data in two ways.

First, we bifurcate our data between large and MSME firms based on the definition used prior to the MSME Act 2006, wherein the level of investment in plant and machinery for the year 1999 (starting point) is used to categorize each firm as either Large or MSME. We then analyze the effects of tariff and NTB liberalization on firm-level productivity and markups for All, Large and MSME firms, after controlling for firm, year and state-year unobserved heterogeneity (Tables 4.1 to 4.3).²¹

Second, we bifurcate our data based on the definition used in the MSME Act 2006. We use the level of investment in plant and machinery for the year 2006 (the policy year) to categorize

²¹ See Table 2.1 for further details of MSME classification prior to and after 2006.

each firm as either large or MSME and then analyze the effects of tariff and NTB liberalization on the productivity and markups for All, Large and MSME firms, after controlling for firm, year and state-year unobserved heterogeneity (Tables 4.4 to 4.6).²²

This extended analysis has the following advantages:

1. It helps us to validate the earlier findings from our main models for a larger dataset (3,105 firms spanning the 1999 to 2009 period giving us around 19,506 observations).
2. It helps us to validate the importance of policy changes concerning the classification of MSMEs, using the pre 2006 and 2006 definitions, in shaping the relationship between trade liberalization and firm level productivity. This is relevant at a time when MSME legislation is being widely debated in India and also growing recognition of its importance in influencing MSME performance with respect to technology adoption, marketing, and product development.²³
3. It helps us to extend our earlier analysis to examine the effect of tariff and non-tariff liberalization through both the final goods and input channels, on *firm-level markups* for the 1999 to 2009 period. We are also able to validate the findings of significant papers in this domain, including Goldberg, et.al. (2010a), Sivadasan (2009), Loecker et.al. (2012), which find evidence of increased market competition and reduced markups for domestic producers in India, following the reduction in final goods tariffs.

²² We discuss only the final versions of the analysis for both TFPQ and Mark-ups. All the preliminary analysis (with firm and year fixed effects) is provided in Appendix B (Tables B.1 to B.6 for firm-level TFPQ and Tables B.7 to B.12 for Firm-level Mark-ups).

²³ As in our earlier analysis, we group the data across Large, MSME and Mixed firms, where the latter group includes those firms which moved from MSME to large and vice-versa as per the MSME, Act 2006, during our study period. Here we have grouped the firms as either MSME or large based on the different definitions prior to and after 2006. This enables us to incorporate firm-level dynamics while capturing the effects of trade liberalization on firm performance in terms of both TFPQ and mark-ups. More recently, in 2018, the Union cabinet of India approved changes in the classification of MSMEs from an investment-based limit to the amount of annual turnover. But this classification is yet to be enforced by amendment.

4.1 Results with pre-2006 definition

Table 4.1 represents the effects of both input and final goods tariffs on firm-level physical productivity (TFPQ) (Columns 1-3) and markups (Columns 4-6). The coefficients for final goods tariff clearly indicate that the negative effects of competition on firm-level TFPQ, due to reduction in import tariffs, have resulted in lower firm-level mark-ups for Indian manufacturing firms during the study period.²⁴ Besides, the coefficients for input tariffs highlight that the positive significant impact of reduced input tariffs on firm-level productivity has not resulted in higher firm-level markups. It is interesting to note that as with our main findings, the effects of tariff liberalization on firm performance (both in terms of TFPQ and Markups) are less significant for MSME firms (i.e., at the 10 percent level) than in the case of large firms (i.e., at the 1 percent level), based on the pre 2006 MSME definition in India.²⁵

Table 4.2 shows the combined effects of both tariff and non-tariff liberalization on firm-level productivity and markups. It gives a similar picture. The coefficients for tariffs and NTBs in case of large firms indicate the relatively larger and significant impact of a reduction in NTBs compared to other tariff barriers on firm-level physical productivity during the 1999 to 2009 period. However, we see that, as with input tariff liberalization, NTB reductions have not affected firm-level Markups across all firms. In case of MSME firms, reduction in industry-level NTBs has not affected either firm-level productivity or Markups. Thus, in Table 4.3, the coefficients for ERP (which measures the net effect of a reduction in final goods and input tariffs) remain significant for large firms in reducing firm-level markups, while they are

²⁴ We also extend this analysis by using the Heckman's 2-step models, where we control for possible productivity endogeneity (noted by few studies such as Topalova and Khandelwal, 2011) arising from sample selection bias. The results of our Heckman models, presented in Section 5, Tables 5.3 and 5.4, remain symmetric with those of our main fixed effect models for the unbalanced panel data using the pre 2006 definition. Hence, the main analyzed results again remain robust.

²⁵ In TFPQ analysis, the final goods and input tariffs coefficients both remain significant at 1 percent level for large firms, while the significance levels are at 5 and 10 percent levels, respectively, for MSME firms. Similarly, in Markup analysis, the final goods tariff coefficient is significant at 1 percent level for large firms, while for MSME firms it remains insignificant, probably due to reservation policies for MSME firms in India.

insignificant for MSME firms.²⁶ This corroborates the findings of Goldberg, et.al. (2010a), Sivadasan (2009), Loecker et.al. (2012).

Table 4.1: TFPQ_TRANSLOG_ACF_LP and Markup and Final Goods

Tariff and Input Tariff (1999 definition)						
VARIABLES	(1) All Firms TFPQ	(2) Large Firms TFPQ	(3) MSME Firms TFPQ	(4) All Firms Markup	(5) Large Firms Markup	(6) MSME Firms Markup
Input_Tariff_Industry_Wise_1	-0.0158*** (0.00409)	-0.0155*** (0.00405)	-0.0965* (0.0562)	-0.00858 (0.00662)	-0.00918 (0.00679)	0.0287 (0.0490)
Output_Tariff_Industry_Wise_1	0.00951*** (0.00228)	0.00872*** (0.00230)	0.0551** (0.0264)	0.00933** (0.00451)	0.0108** (0.00464)	-0.0234 (0.0235)
Deflated_Total_Asset	1.17e-05 (6.67e-05)	-6.86e-06 (7.13e-05)	0.00176 (0.00448)	-8.30e-06 (5.56e-05)	2.53e-05 (6.94e-05)	-0.00831*** (0.00306)
Age	-0.00881 (0.00789)	-0.00897 (0.00792)	-0.114** (0.0569)	0.0367*** (0.0102)	0.0402*** (0.0101)	0.0167 (0.0690)
age_square	9.11e-05** (4.47e-05)	9.21e-05** (4.28e-05)	0.00129 (0.00129)	-0.000343*** (7.10e-05)	-0.000368*** (7.18e-05)	-0.000517 (0.00133)
Export Propensity Industry Wise	0.00184 (0.00194)	0.00121 (0.00189)	-0.0436* (0.0258)	0.00468 (0.00413)	0.00494 (0.00421)	0.0252 (0.0277)
Constant	1.849*** (0.199)	1.836*** (0.185)	4.994*** (1.131)	-1.029*** (0.263)	-1.156*** (0.240)	-0.845 (1.352)
Firm Fixed Effects	YES	YES	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES	YES	YES
State-Year Effects	YES	YES	YES	YES	YES	YES
Observations	19,506	18,525	519	19,506	18,525	519
R-squared	0.035	0.037	0.354	0.032	0.036	0.362
Number of Firms	3,105	2,942	101	3,105	2,942	101

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 4.2: TFPQ_TRANSLOG_ACF_LP and Markup and NTB and Final Goods Tariff & Input Tariff (1999 definition)

VARIABLES	(1) All Firms TFPQ	(2) Large Firms TFPQ	(3) MSME Firms TFPQ	(4) All Firms Markup	(5) Large Firms Markup	(6) MSME Firms Markup
Input_Tariff_Industry_Wise_1	-0.0167*** (0.00416)	-0.0163*** (0.00413)	-0.0960* (0.0561)	-0.00883 (0.00676)	-0.00973 (0.00692)	0.0286 (0.0492)
Output_Tariff_Industry_Wise_1	0.00904*** (0.00224)	0.00837*** (0.00228)	0.0551** (0.0264)	0.00919** (0.00441)	0.0105** (0.00455)	-0.0234 (0.0235)
New_Inverted_NTB_Industry_Wise	1.274*** (0.383)	1.053*** (0.378)	-1.619 (4.533)	0.388 (0.601)	0.786 (0.593)	0.0874 (4.345)
Deflated_Total_Asset	8.95e-06 (6.63e-05)	-9.31e-06 (7.09e-05)	0.00177 (0.00449)	-9.12e-06 (5.59e-05)	2.35e-05 (6.99e-05)	-0.0083*** (0.00306)
age	-0.0146* (0.00798)	-0.0137* (0.00798)	-0.108* (0.0625)	0.0349*** (0.0102)	0.0366*** (0.0101)	0.0164 (0.0702)
age_square	9.64e-05** (4.44e-05)	9.59e-05** (4.26e-05)	0.00126 (0.00130)	-0.000342*** (7.11e-05)	-0.000366*** (7.19e-05)	-0.000516 (0.00132)
Export Propensity Industry Wise	0.00198 (0.00195)	0.00123 (0.00192)	-0.0442* (0.0252)	0.00472 (0.00413)	0.00495 (0.00420)	0.0252 (0.0276)
Constant	0.770** (0.384)	0.946** (0.378)	6.456 (4.081)	-1.357** (0.614)	-1.821*** (0.601)	-0.924 (4.018)
Firm Fixed Effects	YES	YES	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES	YES	YES
State-Year Effects	YES	YES	YES	YES	YES	YES
Observations	19,506	18,525	519	19,506	18,525	519
R-squared	0.036	0.038	0.354	0.032	0.036	0.362
Number of Firms	3,105	2,942	101	3,105	2,942	101

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

²⁶ It is important to note that like our main findings, the results show that the coefficients of ERP remain insignificant for the analysis of firm-level TFPQ (Columns 1-3, Table 3.9) for all types of firms.

Table 4.3: TFPQ_TRANSLOG_ACF_LP and Markup and ERP and NTB (1999 definition)

VARIABLES	(1) All Firms TFPQ	(2) Large Firms TFPQ	(3) MSME Firms TFPQ	(4) All Firms Markup	(5) Large Firms Markup	(6) MSME Firms Markup
New_Inverted_NTB_Industry_Wise	1.113*** (0.370)	0.866** (0.363)	-1.697 (4.614)	0.544 (0.609)	0.970 (0.602)	-0.0914 (4.251)
ERP_Industry_Wise_1	0.000642 (0.000675)	0.000321 (0.000672)	0.00921 (0.00955)	0.00270** (0.00109)	0.00327*** (0.00111)	-0.00560 (0.00905)
Deflated_Total_Asset	1.49e-05 (6.67e-05)	-3.26e-06 (7.12e-05)	0.00201 (0.00396)	-8.37e-06 (5.59e-05)	2.44e-05 (6.99e-05)	-0.00838*** (0.00298)
age	-0.0147* (0.00791)	-0.0138* (0.00789)	-0.122* (0.0639)	0.0330*** (0.0102)	0.0347*** (0.0101)	0.0215 (0.0673)
age_square	9.03e-05** (4.44e-05)	8.96e-05** (4.27e-05)	0.00185 (0.00118)	-0.000340*** (7.06e-05)	-0.000364*** (7.14e-05)	-0.000604 (0.00115)
Export Propensity Industry Wise	0.00722*** (0.00175)	0.00650*** (0.00182)	-0.0195 (0.0288)	0.00653 (0.00413)	0.00677 (0.00425)	0.0185 (0.0289)
Constant	0.830** (0.385)	1.032*** (0.378)	5.929 (4.191)	-1.474** (0.628)	-1.971*** (0.615)	-0.692 (4.066)
Firm Fixed Effects	YES	YES	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES	YES	YES
State-Year Effects	YES	YES	YES	YES	YES	YES
Observations	19,506	18,525	519	19,506	18,525	519
R-squared	0.034	0.035	0.346	0.032	0.036	0.362
Number of Firms	3,105	2,942	101	3,105	2,942	101

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

4.2 Results with 2006 definition

We present our results based on the MSME Act 2006 definition in Tables 4.4 to 4.6.²⁷ On comparing earlier findings for the pre MSME Act 2006 definition and our main model with these results, we find that they remain similar for both the definitions. Tariff liberalization in final goods results in increased competition, a decline in firm-level TFPQ, and reduced firm-level mark-ups in Indian manufacturing. A one percent reduction in the final goods tariffs leads to a decline in firm-level productivity and markups of around 0.009 percent and 0.93 percent, respectively, for all firms. In line with earlier findings, our results with the 2006 MSME definition again indicate that input tariff reductions have resulted in higher firm-level productivity but that this has not resulted in higher firm-level markups. Our results again

²⁷ We also extend this analysis by using Heckman's 2-step models to control for possible trade policy (both with respect to tariffs and NTBs) endogeneity on firm-level productivity, as explained earlier. The results of our Heckman models, presented in Section 5, Tables 5.5 and 5.6, remain symmetric with our main fixed effect models for the unbalanced panel data using the post 2006 definition (i.e., MSME Act 2006). Hence, the main analyzed results remain robust.

remain less significant in case of MSME firms (i.e., at the 5 percent level) than for large firms (i.e., at the 1 percent level).²⁸

A comparison of the results for MSMEs under the two definitions suggests a positive impact of the revised definition (an increase in the investment cap on plant and machinery for MSME firms) on firm-level physical productivity following input tariff liberalization. This positive impact can be attributed to the fact that the upward revision in investment limits under the 2006 definition has allowed MSMEs to address their technological needs by growing larger.²⁹

The results presented in Table 4.5, which show the combined effects of both tariff and NTB liberalization on firm-level productivity and markups, provide interesting insights. Firstly, similar to our findings with the pre-2006 MSME definition and our main model, the coefficients for tariffs and NTBs for all firms indicate a relatively larger and significant impact of a reduction in NTBs compared to other tariff barriers on firm-level physical productivity. Secondly, as with input tariff liberalization, a comparison of the coefficients for NTB in Column 3 of Tables 4.2 and 4.5, indicates a significant positive effect of the revised definition under the MSME Act, 2006 on physical productivity of Indian MSMEs following NTB liberalization.³⁰ The negative and highly significant coefficient for NTB in Column 6 of Table 4.5, however, suggests that a one percent reduction in industry-level NTB reduces firm-level markups by 2.281 percent for MSME firms, due to increased competition. This reflects the difficulties faced by Indian MSMEs in facing competition following import tariff liberalization, even with the revised MSME definition, in that constraints relating to technology, financing,

²⁸ In TFPQ analysis, both the final goods and input tariff coefficients remain significant at the 1 percent level for large firms, while both remain significant at the 5 percent level for MSME firms. However, in the Markup analysis, the final goods tariff coefficients remain insignificant for both large and MSME firms.

²⁹ See, Mazumdar (2017) for a discussion of the benefits from higher investment limits and the implications of changes in legislation for MSME performance.

³⁰ It has been noted in the popular media that enhanced investment limits under the MSME Act 2006 allowed enterprises to continue as MSMEs while enabling them to grow and to address their technological needs which larger size permits. See, Mazumdar (2017)

quality, marketing and others which have been pointed out in studies and policy discourse, continue to hold back MSMEs in India³¹

This finding is more prominent in Columns 5 and 6 of Table 4.6, where we present the combined effects of ERP and NTBs on firm-level markups for Large and MSME firms, respectively. The coefficients for NTB suggest that a one percent point reduction in NTBs decreases firm-level markups by 2.288 percent for MSME firms as opposed to an increase of 1.586 percent for Large firms. This confirms the presence of gains to large firms over MSME firms in terms of markups, following NTB liberalization. The coefficients for ERP further suggest a relatively smaller negative effect on the markups of large firms (0.00326) due to increased competition, compared to their MSME (0.00332) counterparts.

Table 4.4: TFPQ_TRANSLOG_ACF_LP and Markup and Final Goods Tariff and Input Tariff (2006 definition)

VARIABLES	(1) All Firms TFPQ	(2) Large Firms TFPQ	(3) MSME Firms TFPQ	(4) All Firms Markup	(5) Large Firms Markup	(6) MSME Firms Markup
Input_Tariff_Industry_Wise_1	-0.0158*** (0.00409)	-0.0195*** (0.00432)	-0.0242** (0.00943)	-0.00858 (0.00662)	0.00299 (0.00821)	-0.0132 (0.0113)
Output_Tariff_Industry_Wise_1	0.00951*** (0.00228)	0.0104*** (0.00241)	0.0141** (0.00550)	0.00933** (0.00451)	0.00605 (0.00573)	0.00878 (0.00755)
Deflated_Total_Asset	1.17e-05 (6.67e-05)	-4.21e-05 (7.96e-05)	0.00235*** (0.000649)	-8.30e-06 (5.56e-05)	5.28e-05 (8.12e-05)	-0.00149* (0.000863)
age	-0.00881 (0.00789)	-0.00735 (0.00673)	-0.0101 (0.0145)	0.0367*** (0.0102)	0.0385*** (0.0103)	0.0296* (0.0161)
age_square	9.11e-05** (4.47e-05)	0.000158*** (4.67e-05)	0.000221* (0.000116)	-0.000343*** (7.10e-05)	-0.000474*** (9.13e-05)	-0.000265** (0.000117)
Export Propensity Industry Wise	0.00184 (0.00194)	0.00114 (0.00187)	0.000666 (0.00433)	0.00468 (0.00413)	0.00478 (0.00522)	0.00475 (0.00609)
Constant	1.849*** (0.199)	1.504*** (0.170)	2.176*** (0.308)	-1.029*** (0.263)	-0.963*** (0.263)	-0.814** (0.360)
Firm Fixed Effects	YES	YES	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES	YES	YES
State-Year Effects	YES	YES	YES	YES	YES	YES
Observations	19,506	12,755	6,242	19,506	12,755	6,242
R-squared	0.035	0.060	0.064	0.032	0.048	0.072
Number of Firms	3,105	2,009	1,017	3,105	2,009	1,017

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

³¹ See, Panda and Roy (2019) for a discussion of the factors constraining MSME performance and changes required in the legislative framework or MSMEs for their economic and financial sustainability.

Table 4.5: TFPQ_TRANSLOG_ACF_LP and Markup and NTB and Final Goods Tariff & Input Tariff (2006 definition)

VARIABLES	(1) All Firms TFPQ	(2) Large Firms TFPQ	(3) MSME Firms TFPQ	(4) All Firms Markup	(5) Large Firms Markup	(6) MSME Firms Markup
Input_Tariff_Industry_Wise_1	-0.0167*** (0.00416)	-0.0202*** (0.00437)	-0.0263*** (0.00947)	-0.00883 (0.00676)	0.00217 (0.00839)	-0.0116 (0.0115)
Output_Tariff_Industry_Wise_1	0.00904*** (0.00224)	0.00998*** (0.00240)	0.0140** (0.00544)	0.00919** (0.00441)	0.00560 (0.00560)	0.00886 (0.00749)
New_Inverted_NTB_Industry_Wise	1.274*** (0.383)	0.948** (0.403)	2.941*** (0.931)	0.388 (0.601)	1.121 (0.750)	-2.281** (1.104)
Deflated_Total_Asset	8.95e-06 (6.63e-05)	-4.47e-05 (7.93e-05)	0.00232*** (0.000628)	-9.12e-06 (5.59e-05)	4.97e-05 (8.18e-05)	-0.00147* (0.000847)
age	-0.0146* (0.00798)	-0.0115* (0.00687)	-0.0241 (0.0152)	0.0349*** (0.0102)	0.0335*** (0.0104)	0.0405** (0.0164)
age_square	9.64e-05** (4.44e-05)	0.000161*** (4.65e-05)	0.000237** (0.000115)	-0.000342*** (7.11e-05)	-0.000471*** (9.14e-05)	-0.000278** (0.000116)
Export Propensity Industry Wise	0.00198 (0.00195)	0.00114 (0.00189)	0.00142 (0.00429)	0.00472 (0.00413)	0.00479 (0.00521)	0.00416 (0.00608)
Constant	0.770** (0.384)	0.703* (0.386)	-0.340 (0.860)	-1.357** (0.614)	-1.909** (0.752)	1.136 (1.064)
Firm Fixed Effects	YES	YES	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES	YES	YES
State-Year Effects	YES	YES	YES	YES	YES	YES
Observations	19,506	12,755	6,242	19,506	12,755	6,242
R-squared	0.036	0.061	0.070	0.032	0.048	0.074
Number of Firms	3,105	2,009	1,017	3,105	2,009	1,017

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 4.6: TFPQ_TRANSLOG_ACF_LP and Markup and ERP and NTB (2006 definition)

VARIABLES	(1) All Firms TFPQ	(2) Large Firms TFPQ	(3) MSME Firms TFPQ	(4) All Firms Markup	(5) Large Firms Markup	(6) MSME Firms Markup
New_Inverted_NTB_Industry_Wise	1.113*** (0.370)	0.646* (0.388)	2.749*** (0.936)	0.544 (0.609)	1.586** (0.768)	-2.288** (1.112)
ERP_Industry_Wise_1	0.000642 (0.000675)	0.000356 (0.000808)	-0.000285 (0.00153)	0.00270** (0.00109)	0.00326** (0.00141)	0.00332* (0.00178)
Deflated_Total_Asset	1.49e-05 (6.67e-05)	-3.62e-05 (7.98e-05)	0.00237*** (0.000621)	-8.37e-06 (5.59e-05)	4.42e-05 (8.19e-05)	-0.00143* (0.000858)
age	-0.0147* (0.00791)	-0.0110 (0.00683)	-0.0259* (0.0151)	0.0330*** (0.0102)	0.0299*** (0.0103)	0.0440*** (0.0164)
age_square	9.03e-05** (4.44e-05)	0.000154*** (4.71e-05)	0.000232** (0.000114)	-0.00034*** (7.06e-05)	-0.00046*** (9.13e-05)	-0.00028** (0.000116)
Export Propensity Industry Wise	0.00722*** (0.00175)	0.00764*** (0.00185)	0.0107** (0.00444)	0.00653 (0.00413)	0.00295 (0.00520)	0.00567 (0.00650)
Constant	0.830** (0.385)	0.829** (0.388)	-0.252 (0.862)	-1.474** (0.628)	-2.171*** (0.776)	1.018 (1.061)
Firm Fixed Effects	YES	YES	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES	YES	YES
State-Year Effects	YES	YES	YES	YES	YES	YES
Observations	19,506	12,755	6,242	19,506	12,755	6,242
R-squared	0.034	0.057	0.067	0.032	0.047	0.075
Number of Firms	3,105	2,009	1,017	3,105	2,009	1,017

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

4.3 Summarizing the findings

The above analysis with a larger dataset and based on different definitions of MSME yields results that are robust. They remain similar to our main results.

- We observe that although there is an increase in firm-level productivity across various types of Indian manufacturing firms following trade liberalization, there is not much impact on firm-level markups.
- We find a relatively larger positive impact of NTB liberalization compared to tariff liberalization on firm-level productivity.
- We find a dual effect of tariff liberalization- a positive effect through the input channel and a negative effect through the output channel on firm productivity.
- A comparison of our results based on the pre 2006 and 2006 MSME Act definitions shows that the upward revision in the investment cap has helped MSME firms in improving their productivity following trade liberalization.
- MSMEs have not been able to withstand competition following NTB liberalization and have exhibited a lower level of markups through our study period. In contrast, Large firms, in some cases, have been able to translate their higher productivity into higher markups following NTB liberalization.

5. Addressing trade policy endogeneity

Although our above findings remain robust across various specifications (including unobserved firm, year and state level heterogeneity), we extend our analysis further to control for potential trade policy endogeneity on productivity that could arise due to sample selection bias when categorizing firms based on investment in plant and machinery (MSME Act, 2006). We use Heckman's 2-step estimation procedure to control for possible productivity endogeneity (also noted in Topalova and Khandelwal, 2011).³² We check the robustness of our findings across

³² It should be noted that we have used a novel approach to address the endogeneity issue which could arise due to subdivision of the sample between Large and MSME based on MSME classification (please see, page 160 of James J. Heckman (1979, pp. 153-161) 'Sample Selection Bias as a Specification Error', for further details. However, we have also performed the usual Dynamic Panel System GMM (Blundell and Bond, 1998) approach to control trade policy endogeneity (which arises due to reverse causality between last period's industry level tariff rates on current period's firm-level productivity or markups during our study period. The dynamic panel results remain symmetric

different data sets (both balanced and unbalanced) and across different definitions for grouping firms under the Large or MSME categories. The Heckman's Two step Model can be explained by the following system of equations which uses all the aforementioned variables:

$$\begin{aligned}
 \log \text{ productivity}_{ijt} &= \alpha_1 + \beta_1 \text{input trarif} f_{jt-1} + \beta_2 \text{Final Goods trarif} f_{jt-1} \\
 &+ \beta_3 \text{NTB Index}_{jt} + \beta_4 \text{Size}_{ijt} + \beta_5 \text{age}_{ijt} + \beta_6 \text{age}^2_{ijt} \\
 &+ \beta_7 \text{Export Propensity}_{jt} + C_i + \tau_t + \lambda_{ij} + \varepsilon_{ijt} \quad \text{if } \rho_{ijt} > 0 \\
 \log \text{ productivity}_{ijt} &= 0 \quad \text{if } \rho_{ijt} \leq 0
 \end{aligned} \tag{5.1}$$

Here, ρ_{ijt} is the latent variable (unobserved) variable, which denotes the probability of having positive productivity change for the *firm i from industry j* in period *t*. It can be estimated by using following selection equation:

$$\begin{aligned}
 \rho_{ijt} &= \mu_1 + \pi_1 \text{input trarif} f_{jt-1} + \pi_2 \text{Final Goods trarif} f_{jt-1} + \pi_3 \text{NTB Index}_{jt} \\
 &+ \pi_4 \text{Size}_{ijt} + \pi_5 \text{age}_{ijt} + \pi_6 \text{age}^2_{ijt} + \pi_7 \text{Export Propensity}_{jt} \\
 &+ \varphi_1 \log \text{ productivity}_{ijt-1} + \varphi_2 \log \text{ productivity}_{ijt-2} \\
 &+ u_{ijt}
 \end{aligned} \tag{5.2}$$

Or,

$$\begin{aligned}
 \rho_{ijt} &= \mu_1 + \pi_1 \text{input trarif} f_{jt-1} + \pi_2 \text{Final Goods trarif} f_{jt-1} + \pi_3 \text{NTB Index}_{jt} + \\
 &\pi_4 \text{Size}_{ijt} + \pi_5 \text{age}_{ijt} + \pi_6 \text{age}^2_{ijt} + \pi_7 \text{Export Propensity}_{jt} + \\
 &\varphi_1 \log \text{ productivity}_{ijt-1} + \varphi_2 \log \text{ productivity}_{ijt-2} + \varphi_3 \log \text{ Markup}_{ijt-1} + \\
 &\varphi_4 \log \text{ Markup}_{ijt-2} + \\
 &u_{ijt}
 \end{aligned} \tag{5.3}$$

$$\text{Here, } \text{Corr}(\varepsilon_{ijt}, u_{ijt}) = \rho_{\varepsilon u}; \quad SE(\varepsilon_{ijt}) = \sigma$$

In the Heckman's two step estimation procedure, we first estimate ρ_{ijt} (i.e., the probability of positive productivity change) using a Probit regression model for equations 5.2 or 5.3.³³ Once we estimate ρ_{ijt} we then calculate the inverse Mill's ratio (λ_{ij}) which is a product of $\rho_{\varepsilon u}$ and

with our main results. Due to space constraints we did not provide the results of our dynamic panel (with lags 1 and 2), which could be obtained from the authors upon request.

³³ We have explored the two important sources of trade policy endogeneity, i.e., lagged productivity (equation, 5.2) or both lagged productivity and mark-up (equation 5.3), which may cause the self-selection behaviour of firms in terms of upgrading their productivity in the subsequent period following increased investments or imports of high-quality intermediate inputs.

σ . The estimated λ_{ij} gets placed on the right-hand side of equation (5.1) as an exogenous variable and subsequently we estimate equation (5.1) in Step 2.

The Heckman's two step estimation procedure allows us to remove sample selection bias which occurs due to a firm's self-selection behavior in improving productivity, which depends on the 1st and 2nd lag of its productivity as well as markup status. This creates a trade policy endogeneity problem. In the present analysis of firm productivity across different types of firms, our model incorporates the sample of both positive as well as zero firm-level productivity improvement cases across manufacturing firm. This allows us to avoid sample selection bias and the endogeneity problem.

Tables 5.1 and 5.2 provide the Heckman estimation results for all firms for a balanced panel dataset with 1st and 2nd lag productivity as well as markup status. Tables 5.3 and 5.4 provide the Heckman estimations for all firms using the pre-2006 definition for an unbalanced panel dataset. Finally, Tables 5.5 and 5.6 provide the Heckman estimations for all firms using the 2006 definition for an unbalanced panel dataset. In all three cases, our results remain consistent with the findings of our main fixed effects models, indicating their robustness across specifications.³⁴

³⁴ Along with the Heckman's two step estimation for firm-level productivity, we have also estimated firm level-mark-up for all types of firms using the Heckman procedure. The results remain symmetric with our main findings. Due to space constraints, these results are not included in this paper but can be obtained from the authors upon request.

**Table 5.1: TFPQ, Input & Final-Goods Tariffs and NTBs (with TFPQ-Lag-1 and Lag-2)
(Balanced Panel)**

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	TFPQ All Firms	TFPQ All Firms	TFPQ Large Firms	TFPQ Large Firms	TFPQ MSME Firms	TFPQ MSME Firms	TFPQ All Firms	TFPQ All Firms	TFPQ Large Firms	TFPQ Large Firms	TFPQ MSME Firms	TFPQ MSME Firms
	Regression	Selection	Regression	Selection	Regression	Selection	Regression	Selection	Regression	Selection	Regression	Selection
Input_Tariff_Industry_Wise_1	-0.0273*** (0.00526)	0.0308** (0.0154)	-0.0262*** (0.00571)	0.0484* (0.0273)	9.83e-05 (0.0124)	-0.0391 (0.0255)	-0.0257*** (0.00548)	0.0285 (0.0194)	-0.0217*** (0.00602)	0.0342 (0.0324)	0.00283 (0.0158)	-0.0454 (0.0318)
Output_Tariff_Industry_Wise_1	0.0120*** (0.00313)	-0.0160* (0.00821)	0.0147*** (0.00342)	-0.0222* (0.0133)	6.04e-05 (0.00761)	0.0107 (0.0146)	0.00996*** (0.00307)	-0.0145 (0.0103)	0.0122*** (0.00344)	-0.0140 (0.0157)	-0.00110 (0.00875)	0.0208 (0.0178)
New_Inverted_NTb_Industry_Wise	0.0161*** (0.00534)	0.0197 (0.0234)	0.0120** (0.00601)	-0.00832 (0.0313)	-0.00235 (0.0136)	-0.0198 (0.0278)	0.0156*** (0.00563)	0.0142 (0.0372)	0.00969* (0.00569)	0.0116 (0.0472)	-0.00211 (0.0153)	0.0217 (0.0387)
Deflated_Total_Asset	-0.000194 (0.000207)	0.000161 (0.000130)	-0.00121** (0.000601)	-0.000555** (0.000219)	-0.00154 (0.000968)	0.0580 (0.0455)	-0.000218 (0.000199)	6.46e-06 (0.000143)	-0.00120** (0.000569)	-0.000476* (0.000287)	-0.00155* (0.000846)	0.0534 (0.0550)
age	-0.00416 (0.00610)	0.00747 (0.00729)	-0.0211*** (0.00668)	0.0296*** (0.00886)	0.00469 (0.0139)	0.0148 (0.0129)	-0.000526 (0.00661)	0.0131 (0.00805)	-0.0176*** (0.00669)	0.0361*** (0.0109)	0.00782 (0.0185)	0.0179 (0.0149)
age_square	-4.40e-05 (7.41e-05)	-7.57e-05 (7.74e-05)	0.000124* (6.94e-05)	-0.00033*** (9.73e-05)	0.000130 (0.000172)	-0.000208* (0.000107)	-1.74e-05 (8.63e-05)	-0.000131 (8.31e-05)	0.000113 (8.47e-05)	-0.00035*** (0.000125)	0.000179 (0.000229)	-0.000234* (0.000138)
Export Propensity Industry Wise	0.00502* (0.00258)	0.00464 (0.00322)	0.000975 (0.00321)	0.00384 (0.00425)	-0.00571 (0.00637)	0.000668 (0.00794)	0.00556** (0.00255)	0.00516 (0.00364)	0.00299 (0.00327)	0.00912* (0.00494)	-0.00491 (0.00627)	0.00469 (0.00996)
ln_TFPQ_TRANSLOG_ACF_LP = L1,		0.684*** (0.0493)		0.600*** (0.0731)		0.109 (0.114)		0.938*** (0.111)		0.850*** (0.168)		-0.138 (0.290)
ln_TFPQ_TRANSLOG_ACF_LP = L2,								-0.295** (0.117)		-0.0748 (0.172)		0.122 (0.261)
Constant	-0.762 (0.471)	-0.103 (2.364)	-0.206 (0.511)	2.634 (3.092)	0.688 (1.285)	3.780 (2.875)	-0.866 (0.539)	0.400 (3.731)	-0.109 (0.515)	0.588 (4.703)	0.576 (1.474)	-0.434 (4.020)
Rho		-0.321*** (0.0720)		-0.209*** (0.0674)		-0.453 (0.359)		-0.246*** (0.0791)		-0.127*** (0.0349)		-0.625* (0.350)
Lambda		-1.185*** (0.0502)		-1.351*** (0.0711)		-1.215*** (0.148)		-1.245*** (0.0570)		-1.390*** (0.0753)		-1.232*** (0.171)
Firm Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	7,540	7,540	4,417	4,417	1,522	1,522	6,666	6,666	3,940	3,940	1,312	1,312
Censored obs	130	130	46	46	59	59	88	88	34	34	41	41
Uncensored obs	7410	7410	4371	4371	1463	1463	6578	6578	3906	3906	1271	1271
Wald chi2	133.2***	133.21***	140.7***	140.7***	28.49**	28.49**	141.79***	141.79***	141.1***	141.1***	23.86**	23.86**

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

**Table 5.2: TFPQ, Input & Final-Goods Tariffs and NTBs (with TFPQ-Lag-1 and Lag-2 & Markup-Lag-1 and Lag-2)
(Balanced Panel)**

VARIABLES	(1) TFPQ All Firms	(2) TFPQ All Firms	(3) TFPQ Large Firms	(4) TFPQ Large Firms	(5) TFPQ MSME Firms	(6) TFPQ MSME Firms	(7) TFPQ All Firms	(8) TFPQ All Firms	(9) TFPQ Large Firms	(10) TFPQ Large Firms	(11) TFPQ MSME Firms	(12) TFPQ MSME Firms
	Regression	Selection	Regression	Selection	Regression	Selection	Regression	Selection	Regression	Selection	Regression	Selection
Input_Tariff_Industry_Wise_1	-0.0273*** (0.00526)	0.0306** (0.0155)	-0.0262*** (0.00570)	0.0431 (0.0278)	-0.000197 (0.0125)	-0.000842 (0.0244)	-0.0257*** (0.00548)	0.0283 (0.0193)	-0.0217*** (0.00602)	0.0340 (0.0333)	0.00326 (0.0162)	-0.00253 (0.0302)
Output_Tariff_Industry_Wise_1	0.0120*** (0.00313)	-0.0160* (0.00821)	0.0147*** (0.00342)	-0.0204 (0.0134)	2.84e-05 (0.00771)	-0.00807 (0.0138)	0.00996*** (0.00307)	-0.0144 (0.0103)	0.0122*** (0.00344)	-0.0150 (0.0163)	-0.00146 (0.00896)	0.00164 (0.0160)
New_Inverted_NTB_Industry_Wise	0.0161*** (0.00534)	0.0193 (0.0232)	0.0119** (0.00601)	-0.0101 (0.0313)	-0.00249 (0.0136)	-0.0239 (0.0305)	0.0156*** (0.00563)	0.0136 (0.0365)	0.00969* (0.00569)	0.0123 (0.0475)	-0.00237 (0.0153)	0.0232 (0.0441)
Deflated_Total_Asset	-0.000194 (0.000207)	0.000158 (0.000132)	-0.00121** (0.000601)	-0.000586*** (0.000223)	-0.00151 (0.000930)	0.000321 (0.0115)	-0.000218 (0.000199)	1.08e-05 (0.000147)	-0.00120** (0.000570)	-0.000533* (0.000292)	-0.00151* (0.000802)	-0.00194 (0.00849)
age	-0.00416 (0.00610)	0.00724 (0.00716)	-0.0211*** (0.00667)	0.0241*** (0.00879)	0.00457 (0.0137)	0.00236 (0.0119)	-0.000523 (0.00661)	0.0138* (0.00802)	-0.0176*** (0.00669)	0.0347*** (0.0116)	0.00767 (0.0184)	0.0128 (0.0150)
age_square	-4.40e-05 (7.41e-05)	-7.39e-05 (7.65e-05)	0.000124* (6.94e-05)	-0.000279*** (0.000102)	0.000126 (0.000172)	-8.80e-05 (0.000109)	-1.74e-05 (8.63e-05)	-0.000137* (8.29e-05)	0.000113 (8.47e-05)	-0.000333** (0.000134)	0.000182 (0.000225)	-0.000178 (0.000148)
Export Propensity Industry Wise	0.00502* (0.00258)	0.00449 (0.00308)	0.000968 (0.00321)	0.00564 (0.00504)	-0.00544 (0.00634)	-0.00695 (0.00837)	0.00556** (0.00255)	0.00499 (0.00345)	0.00298 (0.00328)	0.00964* (0.00576)	-0.00450 (0.00625)	0.000204 (0.0113)
ln_TFPQ_TRANSLOG_ACF_LP = L1,		0.689*** (0.0542)		0.655*** (0.0755)		0.489*** (0.101)		0.978*** (0.125)		0.965*** (0.176)		0.564*** (0.195)
ln_TFPQ_TRANSLOG_ACF_LP = L2,								-0.346** (0.135)		-0.165 (0.192)		-0.168 (0.237)
ln_Firm_level_Markup = L1,		0.0112 (0.0601)		0.134 (0.0869)		0.505*** (0.0812)		0.133 (0.215)		0.458*** (0.167)		0.809*** (0.165)
ln_Firm_level_Markup = L2,								-0.152 (0.217)		-0.422** (0.188)		-0.296 (0.199)
Constant	-0.763 (0.471)	-0.0651 (2.330)	-0.206 (0.511)	2.906 (3.085)	0.701 (1.282)	4.513 (3.152)	-0.866 (0.538)	0.458 (3.653)	-0.109 (0.515)	0.587 (4.727)	0.598 (1.474)	-0.526 (4.582)
Rho		-0.322*** (0.0742)		-0.225*** (0.0738)		-0.224 (0.300)		-0.239*** (0.0769)		-0.115*** (0.0331)		-0.609** (0.309)
Lambda		-1.185*** (0.0502)		-1.351*** (0.0711)		-1.226*** (0.139)		-1.245*** (0.0570)		-1.390*** (0.0753)		-1.237*** (0.168)
Firm Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	7,540	7,540	4,417	4,417	1,522	1,522	6,666	6,666	3,940	3,940	1,312	1,312
Censored obs	130	130	46	46	59	59	88	88	34	34	41	41
Uncensored obs	7410	7410	4371	4371	1463	1463	6578	6578	3906	3906	1271	1271
Wald chi2	133.21***	133.21***	140.76***	140.76***	28.49**	28.49**	141.79***	141.79***	141.08***	141.08***	23.86**	23.86**

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 5.3: TFPQ, Input & Final-Goods Tariffs and NTBs (with TFPQ-Lag-1 and Lag-2)
(Unbalanced Panel, pre 2006 Definition, 1999 Status)

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	TFPQ All Firms	TFPQ All Firms	TFPQ Large Firms	TFPQ Large Firms	TFPQ MSME Firms	TFPQ MSME Firms	TFPQ All Firms	TFPQ All Firms	TFPQ Large Firms	TFPQ Large Firms	TFPQ MSME Firms	TFPQ MSME Firms
	Regression	Selection	Regression	Selection	Regression	Selection	Regression	Selection	Regression	Selection	Regression	Selection
Input_Tariff_Industry_Wise_1	-0.0127*** (0.00243)	-0.00223 (0.00796)	-0.0131*** (0.00263)	-0.00331 (0.00824)	-0.0256 (0.0190)	-0.0430 (0.0500)	-0.0194*** (0.00335)	-0.00872*** (0.00261)	-0.00893*** (0.00270)	-0.00782 (0.0104)	-0.0107 (0.0206)	-0.0527 (0.0635)
Output_Tariff_Industry_Wise_1	0.00688*** (0.00136)	0.00148 (0.00419)	0.00666*** (0.00145)	0.00344 (0.00439)	0.0130 (0.0106)	-0.00795 (0.0277)	0.00874*** (0.00184)	0.00497*** (0.00143)	0.00452*** (0.00147)	0.00612 (0.00553)	0.00685 (0.0113)	-0.00131 (0.0337)
New_Inverted_NTB_Industry_Wise	1.019*** (0.213)	1.984** (0.872)	0.980*** (0.236)	1.957** (0.903)	-1.142 (1.739)	4.998 (5.836)		0.797*** (0.228)	0.763*** (0.259)	1.664 (1.356)	-0.983 (2.070)	9.364 (6.012)
Deflated_Total_Asset	-3.45e-05 (4.64e-05)	0.00454*** (0.00126)	-3.83e-05 (5.29e-05)	0.00496*** (0.00125)	0.000385 (0.00125)	0.0331 (0.0225)	1.06e-05 (3.13e-05)	-4.82e-05 (4.23e-05)	-5.22e-05 (4.83e-05)	0.00358*** (0.00113)	0.000538 (0.00122)	0.101* (0.0561)
age	-0.00827*** (0.00275)	0.00784** (0.00318)	-0.00931*** (0.00287)	0.00912*** (0.00334)	-0.000886 (0.0156)	-0.0536** (0.0237)	-0.00491*** (0.00177)	-0.00279 (0.00296)	-0.00415 (0.00374)	0.00990*** (0.00316)	-0.0286 (0.0174)	-0.0508** (0.0246)
age_square	9.23e-05** (3.93e-05)	-8.93e-05** (3.80e-05)	8.81e-05** (3.71e-05)	-9.21e-05** (4.00e-05)	-0.000149 (0.000312)	0.000605* (0.000329)	-1.93e-05 (2.34e-05)	7.61e-05* (4.19e-05)	7.00e-05* (3.91e-05)	-7.65e-05* (4.28e-05)	0.000675 (0.000469)	0.000434 (0.000323)
Export Propensity Industry Wise	0.000889 (0.000496)	-0.0101*** (0.00110)	0.000429 (0.00112)	-0.00916*** (0.00121)	0.00154 (0.00866)	-0.000242 (0.0113)	-0.00311*** (0.000523)	0.00263** (0.000523)	0.00222* (0.00114)	-0.0123*** (0.00140)	0.000654 (0.00842)	-0.0131 (0.0135)
ln_TFPQ_TRANSLOG_ACF_LP = L1,		0.176*** (0.0422)		0.224*** (0.0432)		0.341*** (0.0915)				0.359*** (0.119)		-2.750*** (0.622)
ln_TFPQ_TRANSLOG_ACF_LP = L2,										-0.129 (0.141)		2.104*** (0.727)
Constant	-0.197 (0.188)	-0.348 (0.870)	-0.142 (0.209)	-0.430 (0.899)		-1.601 (5.901)	0.763*** (0.0454)	-0.166 (0.211)	-0.103 (0.241)	-0.0189 (1.353)	2.374 (2.056)	-5.399 (5.890)
Rho		-0.219*** (0.0760)		-0.279*** (0.0852)		0.146 (0.808)		-0.278*** (0.0857)		-0.294*** (0.0967)		1.072 (0.696)
Lambda		-1.788*** (0.0336)		-1.747*** (0.0421)		-1.645*** (0.111)		-1.865*** (0.0398)		-1.814*** (0.0490)		-1.776*** (0.152)
Firm Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	17,252	17,252	16,398	16,398	441	441	13,661	13,661	13,001	13,001	320	320
Censored obs	800	800	770	770	30	30	522	522	504	504	19	19
Uncensored obs	16452	16452	15628	15628	411	411	13139	13139	12497	12497	301	301
Wald chi2	279.04***	279.04***	266.83***	266.83***	24.25*	24.25*	254.46***	254.46***	256.35***	256.35***	23.11*	23.11*

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

**Table 5.4: TFPQ, Input & Final-Goods Tariffs and NTBs (with TFPQ-Lag-1 and Lag-2 & Markup-Lag-1 and Lag-2)
(Unbalanced Panel, pre 2006 Definition, 1999 status)**

VARIABLES	(1) TFPQ All Firms	(2) TFPQ All Firms	(3) TFPQ Large Firms	(4) TFPQ Large Firms	(5) TFPQ MSME Firms	(6) TFPQ MSME Firms	(7) TFPQ All Firms	(8) TFPQ All Firms	(9) TFPQ Large Firms	(10) TFPQ Large Firms	(11) TFPQ MSME Firms	(12) TFPQ MSME Firms
	Regression	Selection	Regression	Selection	Regression	Selection	Regression	Selection	Regression	Selection	Regression	Selection
Input_Tariff_Industry_Wise_1	-0.0127*** (0.00243)	0.000138 (0.00804)	-0.0131*** (0.00263)	-0.00128 (0.00830)	-0.0256 (0.0190)	-0.0430 (0.0500)	-0.00873*** (0.00261)	-0.00439 (0.0105)	-0.00891*** (0.00270)	-0.00598 (0.0105)	-0.00879 (0.0210)	-0.0225 (0.0661)
Output_Tariff_Industry_Wise_1	0.00687*** (0.00137)	-0.000416 (0.00420)	0.00665*** (0.00145)	0.00179 (0.00440)	0.0130 (0.0106)	-0.00795 (0.0277)	0.00497*** (0.00143)	0.00255 (0.00550)	0.00451*** (0.00147)	0.00450 (0.00556)	0.00583 (0.0115)	-0.0187 (0.0342)
New_Inverted_NTB_Industry_Wise	1.021*** (0.213)	2.354*** (0.879)	0.980*** (0.236)	2.292** (0.915)	-1.142 (1.739)	4.998 (5.836)	0.795*** (0.227)	2.748** (1.309)	0.756*** (0.258)	2.121 (1.368)	-1.046 (2.083)	10.23 (6.263)
Deflated_Total_Asset	-3.41e-05 (4.63e-05)	0.00483*** (0.00137)	-3.78e-05 (5.29e-05)	0.00524*** (0.00135)	0.000385 (0.00125)	0.0331 (0.0225)	-4.80e-05 (4.23e-05)	0.00318*** (0.00119)	-5.19e-05 (4.83e-05)	0.00391*** (0.00124)	0.000565 (0.00122)	0.0732*** (0.0236)
age	-0.00825*** (0.00275)	0.00255 (0.00324)	-0.00931*** (0.00287)	0.00367 (0.00343)	-0.000886 (0.0156)	-0.0536** (0.0237)	-0.00277 (0.00296)	0.00560 (0.00372)	-0.00413 (0.00316)	0.00563 (0.00390)	-0.0283 (0.0175)	-0.0594** (0.0251)
age_square	9.23e-05** (3.92e-05)	-4.04e-05 (3.82e-05)	8.83e-05** (3.72e-05)	-3.90e-05 (4.12e-05)	-0.000149 (0.000312)	0.000605* (0.000329)	7.61e-05* (4.19e-05)	-4.22e-05 (4.23e-05)	7.00e-05* (3.91e-05)	-3.21e-05 (4.49e-05)	0.000662 (0.000470)	0.000575 (0.000363)
Export Propensity Industry Wise	0.000831 (0.00104)	-0.00580*** (0.00133)	0.000376 (0.00111)	-0.00485*** (0.00135)	0.00154 (0.00866)	-0.000242 (0.0113)	0.00256** (0.00110)	-0.0081*** (0.00152)	0.00217* (0.00114)	-0.0079*** (0.00153)	0.00155 (0.00842)	-0.0156 (0.0122)
ln_TFPQ_TRANSLOG_ACF_LP = L1,		0.352*** (0.0424)		0.400*** (0.0392)		0.164 (0.476)		0.406*** (0.133)		0.609*** (0.119)		-2.481** (1.134)
ln_TFPQ_TRANSLOG_ACF_LP = L2,									-0.0297 (0.142)	-0.215 (0.147)		2.141** (0.967)
ln_Firm_level_Markup = L1,		0.196*** (0.0156)		0.196*** (0.0157)		0.341*** (0.0915)		0.224*** (0.0503)		0.277*** (0.0491)		0.193 (0.336)
ln_Firm_level_Markup = L2,								-0.0455 (0.0534)		-0.0998* (0.0515)		0.0793 (0.417)
Constant	-0.200 (0.188)	-0.650 (0.876)	-0.142 (0.209)	-0.690 (0.908)	2.423 (1.708)	-1.601 (5.901)	-0.165 (0.211)	-1.008 (1.309)	-0.0963 (0.240)	-0.441 (1.363)	2.426 (2.063)	-6.243 (6.143)
Rho		-0.143** (0.0616)		-0.219*** (0.0808)		0.146 (0.808)		-0.223*** (0.0853)		-0.288*** (0.0857)		1.032 (0.688)
Lambda		-1.790*** (0.0333)		-1.750*** (0.0417)		-1.645*** (0.111)		-1.867*** (0.0393)		-1.814*** (0.0488)		-1.779*** (0.151)
Firm Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	17,252	17,252	16,398	16,398	441	441	13,661	13,661	13,001	13,001	320	320
Censored obs	800	800	770	770	30	30	522	522	504	504	19	19
Uncensored obs	16452	16452	15628	15628	411	411	13139	13139	12497	12497	301	301
Wald chi2	280.43***	280.43***	267.47***	267.47***	25.61**	25.61**	255.98***	255.98***	256.17***	256.17***	30.12***	30.12***

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

**Table 5.5: TFPQ, Input & Final-Goods Tariffs and NTBs (with TFPQ-Lag-1 and Lag-2)
(Unbalanced Panel, 2006 Definition)**

VARIABLES	(1) TFPQ All Firms	(2) TFPQ All Firms	(3) TFPQ Large Firms	(4) TFPQ Large Firms	(5) TFPQ MSME Firms	(6) TFPQ MSME Firms	(7) TFPQ All Firms	(8) TFPQ All Firms	(9) TFPQ Large Firms	(10) TFPQ Large Firms	(11) TFPQ MSME Firms	(12) TFPQ MSME Firms
	Regression	Selection	Regression	Selection	Regression	Selection	Regression	Selection	Regression	Selection	Regression	Selection
Input_Tariff_Industry_Wise_1	-0.0127*** (0.00243)	-0.00223 (0.00796)	-0.0164*** (0.00305)	-0.00196 (0.0105)	-0.0150*** (0.00533)	-0.00117 (0.0136)	-0.00872*** (0.00261)	-0.00625 (0.0104)	-0.0136*** (0.00318)	0.0181 (0.0135)	-0.0101* (0.00564)	-0.0268 (0.0176)
Output_Tariff_Industry_Wise_1	0.00688*** (0.00136)	0.00148 (0.00419)	0.00810*** (0.00171)	0.00287 (0.00539)	0.0102*** (0.00323)	-0.00740 (0.00724)	0.00497*** (0.00143)	0.00444 (0.00544)	0.00662*** (0.00174)	-0.00682 (0.00699)	0.00702** (0.00316)	0.00728 (0.00929)
New_Inverted_NTB_Industry_Wise	1.019*** (0.213)	1.984** (0.872)	0.789*** (0.277)	2.682** (1.155)	1.191*** (0.446)	0.850 (1.386)	0.797*** (0.228)	2.332* (1.303)	0.661** (0.293)	3.618** (1.686)	1.086** (0.499)	1.023 (2.012)
Deflated_Total_Asset	-3.45e-05 (4.64e-05)	0.00454*** (0.00126)	-7.43e-05 (0.000139)	0.000280 (0.000247)	-0.000282 (0.000386)	-0.00126 (0.000851)	-4.82e-05 (4.23e-05)	0.00299*** (0.00106)	-9.50e-06 (0.000115)	0.000116 (0.000206)	-0.000314 (0.000334)	0.00170 (0.00388)
age	-0.0082*** (0.00275)	0.00784** (0.00318)	-0.0141*** (0.00346)	0.0104*** (0.00387)	-0.0103* (0.00554)	0.000512 (0.00531)	-0.00279 (0.00296)	0.0100*** (0.00363)	-0.0118*** (0.00366)	0.0104** (0.00435)	-0.0115 (0.00732)	0.00377 (0.00619)
age_square	9.23e-05** (3.93e-05)	-8.9e-05** (3.80e-05)	0.000105*** (3.80e-05)	-8.43e-05* (4.59e-05)	0.000201** (8.72e-05)	-4.73e-05 (6.01e-05)	7.61e-05* (4.19e-05)	-8.4e-05** (4.14e-05)	9.32e-05** (4.19e-05)	-7.82e-05 (4.90e-05)	0.000319** (0.000125)	-5.50e-05 (6.60e-05)
Export Propensity Industry Wise	0.000889 (0.000496)	-0.0101*** (0.00110)	0.00149 (0.000547)	-0.0104*** (0.00137)	0.000859 (0.00113)	-0.012*** (0.00215)	0.00263** (0.000523)	-0.0124*** (0.00130)	0.00247* (0.000577)	-0.0123*** (0.00160)	0.00389 (0.00117)	-0.0159*** (0.00246)
ln_TFPQ_TRANSLOG_ACF_LP = L1,		0.176*** (0.0422)		0.266*** (0.0565)		0.103 (0.0641)		0.174 (0.127)		0.422*** (0.126)		-0.156 (0.157)
ln_TFPQ_TRANSLOG_ACF_LP = L2,								0.0251 (0.133)		-0.128 (0.154)		0.273** (0.118)
Constant	-0.197 (0.188)	-0.348 (0.870)	-0.0162 (0.247)	-1.035 (1.148)	0.261 (0.394)	1.091 (1.392)	-0.166 (0.211)	-0.632 (1.304)	0.0315 (0.276)	-1.939 (1.681)	0.277 (0.462)	1.023 (2.026)
Rho		-0.219*** (0.0760)		-0.381*** (0.120)		-0.0312 (0.0260)		-0.278*** (0.0857)		-0.273** (0.126)		0.0111 (0.0289)
Lambda		-1.788*** (0.0336)		-1.755*** (0.0482)		-1.609*** (0.0972)		-1.865*** (0.0398)		-1.842*** (0.0502)		-1.713*** (0.101)
Firm Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	17,252	17,252	11,266	11,266	5,499	5,499	13,661	13,661	8,999	8,999	4,268	4,268
Censored obs	800	800	471	471	323	323	522	522	330	330	206	206
Uncensored obs	16452	16452	10795	10795	5176	5176	13139	13139	8669	8669	4062	4062
Wald chi2	279.04***	279.04***	317.53***	317.53***	84.81***	84.81***	254.46***	254.46***	299.78***	299.78***	70.50***	70.50***

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

**Table 5.6: TFPQ, Input & Final-Goods Tariffs and NTBs (with TFPQ-Lag-1 and Lag-2 & Markup-Lag-1 and Lag-2)
(Unbalanced Panel, 2006 Definition)**

VARIABLES	(1) TFPQ All Firms	(2) TFPQ All Firms	(3) TFPQ Large Firms	(4) TFPQ Large Firms	(5) TFPQ MSME Firms	(6) TFPQ MSME Firms	(7) TFPQ All Firms	(8) TFPQ All Firms	(9) TFPQ Large Firms	(10) TFPQ Large Firms	(11) TFPQ MSME Firms	(12) TFPQ MSME Firms
	Regression	Selection	Regression	Selection	Regression	Selection	Regression	Selection	Regression	Selection	Regression	Selection
Input_Tariff_Industry_Wise_1	-0.0127*** (0.00243)	0.000138 (0.00804)	-0.0165*** (0.00305)	-0.00148 (0.0105)	-0.0150*** (0.00533)	0.00798 (0.0137)	-0.0087*** (0.00261)	-0.00439 (0.0105)	-0.0136*** (0.00318)	0.0180 (0.0138)	-0.0101* (0.00564)	-0.0180 (0.0175)
Output_Tariff_Industry_Wise_1	0.00687*** (0.00137)	-0.000416 (0.00420)	0.00810*** (0.00170)	0.00157 (0.00541)	0.0102*** (0.00323)	-0.0123* (0.00721)	0.00497*** (0.00143)	0.00255 (0.00550)	0.00661*** (0.00174)	-0.00827 (0.00711)	0.00700** (0.00316)	0.00195 (0.00930)
New_Inverted_NTB_Industry_Wise	1.021*** (0.213)	2.354*** (0.879)	0.794*** (0.276)	2.906** (1.159)	1.191*** (0.447)	1.360 (1.407)	0.795*** (0.227)	2.748** (1.309)	0.661** (0.293)	3.926** (1.699)	1.084** (0.500)	1.081 (2.027)
Deflated_Total_Asset	-3.41e-05 (4.63e-05)	0.00483*** (0.00137)	-7.34e-05 (0.000139)	0.000183 (0.000250)	-0.000283 (0.000386)	-0.00145* (0.000761)	-4.80e-05 (4.23e-05)	0.00318*** (0.00119)	-8.99e-06 (0.000115)	4.89e-05 (0.000216)	-0.000315 (0.000334)	0.000622 (0.00309)
age	-0.0082*** (0.00275)	0.00255 (0.00324)	-0.0141*** (0.00346)	0.00489 (0.00386)	-0.0103* (0.00554)	-0.00261 (0.00562)	-0.00277 (0.00296)	0.00560 (0.00372)	-0.0118*** (0.00366)	0.00498 (0.00449)	-0.0115 (0.00732)	0.00259 (0.00639)
age_square	9.23e-05** (3.92e-05)	-4.04e-05 (3.82e-05)	0.000105*** (3.80e-05)	-3.82e-05 (4.45e-05)	0.000201** (8.72e-05)	-6.50e-06 (6.33e-05)	7.61e-05* (4.19e-05)	-4.22e-05 (4.23e-05)	9.32e-05** (4.19e-05)	-3.15e-05 (4.99e-05)	0.000319** (0.000125)	-3.09e-05 (6.84e-05)
Export Propensity Industry Wise	0.000831 (0.00104)	-0.0058*** (0.00133)	0.00141 (0.00135)	-0.00563*** (0.00161)	0.000844 (0.00215)	-0.00833*** (0.00249)	0.00256** (0.00110)	-0.0081*** (0.00152)	0.00240* (0.00140)	-0.0073*** (0.00183)	0.00394* (0.00239)	-0.012*** (0.00292)
ln_TFPQ_TRANSLOG_ACF_LP = L1,		0.352*** (0.0424)		0.389*** (0.0613)		0.302*** (0.0677)		0.406*** (0.133)		0.577*** (0.134)		0.275* (0.149)
ln_TFPQ_TRANSLOG_ACF_LP = L2,								-0.0297 (0.142)		-0.147 (0.170)		0.0331 (0.121)
ln_Firm_level_Markup = L1,		0.196*** (0.0156)		0.159*** (0.0176)		0.263*** (0.0299)		0.224*** (0.0503)		0.219*** (0.0605)		0.482*** (0.0935)
ln_Firm_level_Markup = L2,								-0.0455 (0.0534)		-0.0566 (0.0633)		-0.287*** (0.103)
Constant	-0.200 (0.188)	-0.650 (0.876)	-0.0204 (0.247)	-1.171 (1.152)	0.261 (0.395)	0.613 (1.410)	-0.165 (0.211)	-1.008 (1.309)	0.0311 (0.275)	-2.169 (1.693)	0.280 (0.462)	0.940 (2.042)
Rho		-0.143** (0.0616)		-0.303** (0.144)		-0.0132 (0.0189)		-0.223*** (0.0853)		-0.226* (0.131)		-0.0580 (0.0658)
Lambda		-1.790*** (0.0333)		-1.759*** (0.0477)		-1.609*** (0.0972)		-1.867*** (0.0393)		-1.844*** (0.0496)		-1.713*** (0.101)
Firm Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	17,252	17,252	11,266	11,266	5,499	5,499	13,661	13,661	8,999	8,999	4,268	4,268
Censored obs	800	800	471	471	323	323	522	522	330	330	206	206
Uncensored obs	16452	16452	10795	10795	5176	5176	13139	13139	8669	8669	4062	4062
Wald chi2	280.43***	280.43***	317.31***	317.31***	83.59***	83.59***	255.98***	255.98***	299.22***	299.22***	69.33***	69.33***

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

6. Conclusion: Policy Inferences and Extensions

An important component of India's economic reforms has been trade liberalization. The Indian economy has undergone significant reduction in both import tariffs and NTBs over the 1999 to 2009 period, with the successive implementation of the EXIM Policies of 1997-2003 and 2004-2009. This paper finds that trade liberalization has had a positive impact on firm-level productivity in Indian manufacturing. However, this effect has not been uniform across all segments of manufacturing firms.

We find that large firms have successfully extracted most of the benefits of trade liberalization and that these benefits have mainly accrued through the input channel, i.e., through the increased availability of better quality and cheaper imported intermediate inputs in the production process. In contrast, MSMEs have not experienced productivity gains following trade liberalization. This is likely to be due to increased competition from domestic and imported substitutes. The analysis also shows that the effect of input tariff reduction has been greater than that of final goods tariff reduction even for MSMEs. We also find that tariff and non-tariff liberalization have reduced firm-level markups for domestic producers in India following the reduction in final goods tariffs, due to increased product competition. NTB liberalization is found to have had a significant positive impact on the productivity of large firms but not for MSMEs. We posit that these differences in the effects of tariff and non-tariff liberalization for large versus MSME firms is due to various differences in their characteristics in terms of their structure and operations, technological readiness, credit worthiness, marketability, export and import orientation.

We validate our findings by extending our dataset and by using different definitions for classifying MSMEs based on changes in the MSME legislation pre and post 2006. We find that an upward revision in the investment cap has helped MSME firms to improve their productivity

following trade liberalization. This is likely to be due to their ability to upgrade and adopt technology as well as access resources for in-house innovation under more relaxed investment limits.

The findings provide several useful takeaways for policy makers. First, they indicate that the MSME segment faces constraints that prevent them from taking advantage of trade liberalization, both on the output and input fronts. As highlighted in other studies and in policy discussions, Indian MSMEs face operational, structural, financial and technological characteristics. Our study suggests the need to focus on the MSME segment to specifically address the various constraints they face.

Second, our analysis indicates that while much of the focus of studies on trade liberalization is on the competition creating effects in final product markets, the potential gains to firms due to the sourcing of a greater variety and scale of imported intermediate inputs are also important. Hence, from a policy standpoint, liberalization of tariff and non-tariff barriers on imported intermediates requires attention. Such an understanding would also help to address an issue often raised by some sectors of Indian industry, i.e., the inverted duty structure and disincentive to value addition that arises from an anomalous reduction in final goods tariffs while intermediate tariffs remain high.

Third, firm, industry and state-specific constraints are important for shaping the effects of trade liberalization. Hence, policies are needed to alleviate these constraints if the benefits of trade liberalization are to be realized.

Fourth, how MSMEs are defined has a bearing on the impact of trade policies. Our results indicate the benefits that can accrue from introducing more flexible limits on investment for MSMEs and the importance of periodically revising definitions and also introducing other

criteria such as turnover for classifying MSMEs. This would enable firms to adapt to changing requirements.

Several extensions are possible to this study. While our analysis has indicated the importance of structural and other constraints faced by MSMEs, which impede their ability to benefit from trade liberalization, future extensions will need to better understand these constraints and the mechanisms through which they affect MSME performance, in the context of trade liberalization. The recent policy discourse on issues such as technology, financing, marketing and skilling which are seen as constraining MSMEs, confirms the need for such an analysis. Another extension would be to focus on the implications of the legislative and policy framework for MSMEs, not only in terms of the definition of MSMEs but also aspects such as financing, registration, business facilitation and various MSME schemes, on their performance. Such analysis can help inform the proposed reforms in incentives and policies concerning MSMEs in India.

References

- Ahsan, R.N. 2013. "Input tariffs, speed of contract enforcement, and the productivity of firms in India." *Journal of International Economics* 90: 181–192.
- Akerberg, D.A., Caves, K. and Frazer, G., 2015. "Identification properties of recent production function estimators". *Econometrica*, 83(6), pp.2411-2451.
- Annual report of Ministry of Micro, Small and Medium Enterprises, Government of India 2010-11.
- Arellano, M. and Olympia Bover. 1995. "Another look at the instrumental variable estimation of error-components models." *Journal of Econometrics*, 68(1):29-51.
- Arellano, M., and Stephen Bond, 1991. "Some Tests of Specification for Panel Data: Monte Carlo Evidence and an Application to Employment Equations," *Review of Economic Studies*, 58(2):277-297.
- Aw, B.Y, Xiaomin Chen, Mark J. Roberts. 2001. "Firm-level evidence on productivity differentials and turnover in Taiwanese manufacturing," *Journal of Development Economics*, 66(1): 51–86.
- Balakrishnan, P., M. Parameswaran, K. Pushpangadan and M. Suresh Babu. 2006. "Liberalization, Market Power, and Productivity Growth in Indian Industry." *The Journal of Policy Reform*, 9:1: 55-73.
- Bas, M. and Antoine Berthou. 2011. "The Decision to Import Capital Goods in India: Firms' Financial Factors Matter." *Centre d'études prospective et d'informations internationales (CEPII), Working Paper No 2011 – 06*.
- Bernard, A., Jonathan Eaton, J. Bradford Jensen, and Samuel S. Kortum. 2003. "Plants and Productivity in International Trade." *American Economic Review*, 93(4), September: 1268-1290.
- Coad, A and Jaganaddha Pawan Tamvada. 2012. "Firm growth and barriers to growth among small firms in India." *Small Bus Econ*, 39: 383–400.
- Corden, W.M. 1966. "The Structure of a Tariff System and the Effective Protective Rate." *Journal of Political Economy*, (74)3: 221-237.
- Costantini, J. and M. Melitz. 2008. "The Dynamics of Firm-Level Adjustment to Trade Liberalization," in E. Helpman, D. Marin, and T. Verdier (eds.), *The Organization of Firms in a Global Economy*. Cambridge, MA, Harvard University Press: 107-141.
- Dai, X. and Cheng, L., 2018. The impact of product innovation on firm-level markup and productivity: evidence from China. *Applied Economics*, 50(42), pp.4570-4581.
- Das, D. K. 2003. "Quantifying trade barriers: has protection declined substantially in Indian manufacturing." *Economic and Political Weekly, January 31st Issue*.
- Das, D. K. 2004. "Manufacturing productivity under varying trade regimes, 1980-2000." *Economic and Political weekly* (2004): 423-433.
- Debroy B. and A. T. Santhanam. 1993. "Matching Trade Codes with Industrial Codes," *Foreign Trade Bulletin* 24(1), 5-27.
- De Loecker, J. and Warzynski, F., 2012. Markups and firm-level export status. *American Economic Review*, 102(6), pp.2437-71.

- Ethier, W., J., 1982. "National and International Returns to Scale in the Modern Theory of International Trade," *The American Economic Review*, 72(3):389-405.
- Final Report on Fourth All India Census of Micro, Small & Medium Enterprises 2006-2007: Registered Sector (GOI.)
- Foster, Lucia, John Haltiwanger, and Chad Syverson. 2008. "Reallocation, firm turnover, and efficiency: selection on productivity or profitability?" *American Economic Review* 98(1): 394-425.
- Goldar, B and Anita Kumari. 2003. "Import liberalization and productivity growth in Indian manufacturing industries in the 1990s." *The Developing Economies*, XLI-4 : 436–60.
- Goldberg, P.K., Amit Khandelwal, Nina Pavcnik and Petia Topalova. 2010a. "Multi-product Firms and Product Turnover in the Developing World: Evidence from India." *Review of Economics and Statistics*, 92(4): 1042-1049.
- Goldberg, P.K., Amit Kumar Khandelwal, Nina Pavcnik and Petia Topalova. 2010b. "Imported Intermediate Inputs and Domestic Product Growth: Evidence from India." *The Quarterly Journal of Economics*, 125(4): 1727-1767.
- Goldberg, P. K., and Nina Pavcnik. 2007. "Distributional effects of globalization in developing countries." *Journal of Economic Literature*, XLV: 39–82.
- Grossman, G, and Elhanan Helpman.1991. "Innovation and growth in the global economy," MIT Press, Cambridge.
- Hansen, L.P., 1982. "Large sample properties of generalized method of moments estimators." *Econometrica* 50: 1029–1054.
- Harrison, A., L. Martin, S. Nataraj. 2011. "Learning versus Stealing: How Important are Productivity Reallocations to India's Productivity Growth?" Policy Research Working Paper 5761. World Bank. Washington, DC. August
- Hasan, R. 2002. "The impact of imported and domestic technologies on the productivity of firms: panel data evidence from Indian manufacturing firms." *Journal of Development Economics* 69(1): 23–49.
- Heckman, James J. 1979. "Sample selection bias as a specification error." *Econometrica: Journal of the Econometric Society* (1979): 153-161.
- Kamesam, Vepa, 2003. "Speech at the OECD, Workshop on Entrepreneurship in a Global Economy : Strategic Issues and Policies at Budapest in the panel Identifying the Real Policy Issues in the Session on Improving Financing for Entrepreneurship and MSMEs". September 9.
- Kathuria,V. 2002. "Liberalization, FDI and Productivity spillovers- an analysis of Indian manufacturing firms" *Oxford Economic Papers*, 54 (4): 688-718.
- Kathuria, V., S.N. Rajesh Raj and Kunal Sen. 2012. "The effects of economic reforms on manufacturing dualism: Evidence from India." *Journal of Comparative Economics*, 41(4): 1240-1262.
- Kato,A. 2009. "Product Market Competition and Productivity in the Indian Manufacturing Industry." *The Journal of Development Studies*, 45(10): 1579-1593.
- Kalirajan, K. and Shashanka Bhaide. 2005. "The post-reform performance of the manufacturing sector in India." *Asian Economic Papers* 3.2: 126-165.

- Koenker, R. and Gilbert Bassett, Jr. 1978. "Regression Quantiles." *Econometrica*, 46(1): 33-50.
- Kukenova, M, and Jose-Antonio Monteiro. 2009. "Spatial dynamic panel model and system GMM: a Monte Carlo investigation" No. 13405. *University Library of Munich, Germany*.
- Kumar, A.G, Kunal Sen and Rajendra R. Vaidya. 2001. "Outward Orientation, Investment and Finance Constraints: A Study of Indian Firms." *The Journal of Development Studies*, 37(4): 133-149.
- Levinsohn, J. and Amil Petrin. 2003. "Estimating Production Functions Using Inputs to Control for Unobservables." *The Review of Economic Studies*, 70(2): 317-341.
- Loecker, J.D. 2011. "Product Differentiation, Multi-Product Firms and Estimating the Impact of Trade Liberalization on Productivity," *Econometrica*, Vol. 79, No. 5, 1407–1451.
- Loecker, J.D., Pinelopi K. Goldberg, Amit K. Khandelwal and Nina Pavcnik. 2012. "Prices, Markups and Trade Reform." *NBER Working Paper No. 17925*.
- Mallik, S., Marques, H., 2008. Passthrough of exchange rate and tariffs into import prices of India: currency depreciation versus import liberalization. *Review of International Economics*, 16(4): 765-782.
- Majumdar, S.K. 1997. "The Impact of Size and Age on Firm-Level Performance: Some Evidence from India." *Review of Industrial Organization* 12: 231–241.
- Marin, A. G. and Nico Voigtländer. 2013. "Exporting and plant-level efficiency gains: it's in the measure." *National Bureau of Economic Research (NBER) 19033*.
- Martin, L.A., S. Nataraj, and A.E. Harrison. 2017. In with the big, out with the small: Removing small-scale reservations in India. *The American Economic Review* 107 (2): 354–386.
- Mazumdar, R. "MSME need Liberal Investment Limits," *Hindu BusinessLine*, October 19, 2017, <https://www.thehindubusinessline.com/opinion/MSMEs-need-liberal-investment-limits/article9916056.ece>
- Melitz, M. J. 2003. "The Impact of Trade on Intra-Industry Reallocations and Aggregate Industry Productivity," *Econometrica*, 71(6):1695-1725.
- Micro, Small, Medium Enterprises in India, an Overview, Ministry of Micro, Small & Medium Enterprises, 2010 (GOI.)
- Mukherjee, S., & Chanda, R. 2017. "Differential effects of trade openness on Indian manufacturing firms." *Economic Modelling*, 61, 273-292.
- Mukherjee, S., Chanda, R., 2016. "Impact of Trade Liberalization on Indian Textile Firms: A Panel Analysis." *International Trade and International Finance. Springer India*, 2016. 229-255.
- Mukherjee, S. & Chanda, R. 2019, Trade Liberalization and Indian Manufacturing MSMEs: Role of Firm Characteristics and Channel of Liberalization", *European Journal of Development Research (2019)*. <https://doi.org/10.1057/s41287-019-0196-1>.
- Nataraj, S. 2011. "The impact of trade liberalization on productivity: Evidence from India's formal and informal manufacturing sectors." *Journal of International Economics* 85: 292–301.

- Parameswaran, M. 2010. "International Trade and R&D Investment: Evidence from Manufacturing Firms in India." *International Journal of Technology and Globalisation*, 5(1): 43-60.
- Panda, S. and A. Roy. 2019. "RBI's Panel on MSMEs Bats for Stressed Fund," *Business Standard*, June 26, p. 1 and 9, https://www.business-standard.com/article/economy-policy/expert-panel-suggests-collateral-free-loans-of-rs-20-lakh-to-MSMEs-119062500585_1.html
- Pandey, M. 1999. NCAER Report on Trade Protection in India. National Council of Applied Economic Research, New Delhi, India.
- Rivera-Batiz, L. and Paul Romer, 1991. "Economic integration and Endogenous Growth," *Quarterly Journal of Economics* 106(2): 531-555.
- Sivadasan, J. 2009. "Barriers to Competition and Productivity: Evidence from India", *The B.E. Journal of Economic Analysis & Policy*, 9(1) ISSN (Online) 1935-1682, doi: 10.2202/1935-1682.2161.
- Topalova, P. and Amit Khandelwal. 2011. "Trade Liberalization and Firm Productivity: The Case of India." *Review of Economics and Statistics*, 93(3): 995–1009.
- Thomas, R. and K. Narayanan. 2012. "Productivity heterogeneity and firm level exports: case of Indian manufacturing industry." Presented at: *The 11th Annual GEP Postgraduate Conference 2012 Leverhulme Centre for Research on Globalisation and Economic Policy (GEP), University of Nottingham, United Kingdom.*
- Venkataramany, S.K. and Daniel Fox. 2009. "Globalization of Entrepreneurship: Overwhelming Institutional Response in Favor of MSMEs in India." *International Business & Economics Research Journal*, 8(3): 131-140.

Data Sources:

TRAINS-WITS online database for tariffs: <https://wits.worldbank.org/>

DGFT online data for import conditions: <http://dgft.gov.in/policies/import-policy>

CMIE Prowess database: <https://prowessiq.cmie.com/>

CMIE Prowess Industry Analysis Service and Economic Outlook: <https://industryoutlook.cmie.com/>

Ministry of Commerce, Government of India for import data- <http://commerce-app.gov.in/eidb/>

APPENDIX A

A.1. Measures of Tariff Protection³⁵

We calculate the industry-level input tariff and the effective rate of protection (ERP) by following Topalova and Khandelwal (2011) to measure the level of protection at the industry-level. This exercise enables us to measure the net effect of the tariff liberalization from both the input and the output sides. The calculation of input tariffs and ERP is done based on the 2-digit Industry level (SIC) final goods tariff (average MFN rate) data collected from the WITS database and the input-output table for the year 2007-08 from the Central Statistical Organization (CSO) database, Government of India.³⁶ The exact formulation of input tariff and ERP for the j^{th} industry at time t , as defined by Corden (1966) is given below:

$$\text{input tariff}_{jt} = \sum_s \alpha_{js} \text{final goods tariff}_{st} \quad (\text{A.1.1})$$

$$\text{ERP}_{jt} = (\text{final goods tariff}_{jt} - \text{input tariff}_{jt}) / 1 - \sum_s \alpha_{js} \quad (\text{A.1.2})$$

where α_{js} is the share of imported input s used in the value of output j ,

From the input-output table we firstly calculate the share of input i used in the value of output j at the 2-digit SIC level and then group them into 12 broad industry groups. Next, we calculate the sum total of the input share of each 2-digit component industry for 12 broad industry groups that contribute to each other's respective final output.³⁷ Then, by using equation (A.1.1), we calculate the input tariff for the 5 broad industry groups chosen (i.e., food and agro based industry, textile industry, machinery industry, metal industry and leather industry), which cumulatively represented around half of total production by MSME firms in 2006-07. After calculating the input tariffs, we also calculate their ERPs by using the formulation given in equation (A.1.2). The calculation of the input tariff for the leather industry for the year 1999 is provided in Table A.1 to illustrate the method used.

³⁵ The discussion of the methodology for tariff measurement is based on Mukherjee and Chanda (2017).

³⁶ Data on the final goods tariff 2-digit Standard Industrial Classification (SIC) level was extracted on 11/26/2013 1:50:18 AM from WITS-TRAINS, <http://wits.worldbank.org/WITS/WITS/Default-A.aspx?Page=Default>
http://mospi.nic.in/Mospi_New/upload/item_13_6oct09.htm (Input-Output Table)

³⁷ We have also followed the concordance by Debroy and Santhanam (1993) to identify these 12 broad industry groups.

Table A.1: Input Tariff Calculation for Leather Industry for the year 1999

Final Product (Final Goods Industry)	Inputs used (Input Industries)	Weightage of Input used (α_{is}) (in Percentage)*	Final Goods Tariff for Different Input Industries in 1999 (in Percentage)	Input Tariff of Leather Industry in 1999
Leather Industry	Food and Agro based Industries	23.36292	38.115	24.3640459
	Textiles Industry	3.072147	39.17	
	Leather Industry	33.30012	34.07	
	Metal Industry	0.693811	32.645	
	Machinery Industry	1.126637	29.31	
	Gems and Jewellery Industry	0.053775	39.02	
	Wood and Paper Industry	0.385946	31.4525	
	Chemical Industry	4.015183	29.275	
	Rubber and Plastic Industry	1.030198	37.67	
	Transport and Scientific Instruments industry	0.293954	32.735	
	Mineral Industry	0.00874	19.6	
	Agricultural Raw Products Industry	2.399705	22.92	
	$\sum_s \alpha_{js}$	69.7431		

*Note: In the table we did not give the exact input share of each 2-digit component industry due to space constraint, rather than given the sum total of the input share of each 2-digit component industry for all the 12 broad industry groups contributing in the production of Leather industry.

Source: Author's calculation based on the WITS database

A.2. Measures of Non-Tariff Barriers (NTB) ³⁸

As non-tariff barriers (NTB) have assumed importance in India in the last two decades with the decline in tariff rates, we consider both tariff and non-tariff barriers to capture the true extent of trade protection. Although, it is very hard to find a good dataset to measure NTBs, a few studies such as Das (2003) and Pandey (1999) have attempted to measure NTBs for the period 1980-2000, using the import coverage ratio. This measurement of NTB captures the relative restrictiveness of imports for different industries. The import coverage ratio is defined as the percentage of product imports within a category that is affected by an NTB. The formulation of the NTB coverage ratio in these studies is as follows:

Define $w_i = m_i / \sum m_i$ as the import weight, where $m_i =$ imports of the i^{th} commodity where $\sum m_i$ is the total imports.

Let $n_i = (1$ if there are NTB's

(0 if there are no NTB's.

³⁸ The discussion of the methodology for NTB measurement is based on Mukherjee and Chanda (2017).

Then, the NTB coverage ratio is defined as $\sum n_i w_i$. An alternative is to calculate simple averages of the coverage ratios.

The coverage ratio for each input-output sector has been calculated according to the following weighting scheme for each 8-digit tariff line and has been assigned a number:

0% if no NTB applies to the tariff line (i.e. if no licensing is required)

50% if imports are subject to special import licenses (SIL)

100% if imports are otherwise restricted or prohibited.

In our study, we use a similar idea, but the construction of the variable differs slightly. As the main objective is to examine the impact of the reduction (both partial and full) in non-tariff barriers on firm-level performance across various industries, instead of constructing the NTB coverage ratio, we have taken an inverted version of the NTB measure by reversing the weighting scheme for each 8-digit tariff line used by Pandey (1999) and Das (2003).³⁹ This is done to capture the effects of both partial and full removal of QRs on final and intermediate goods imports across industries for the period 1999-2009. We thus use a different weighting scheme for each 8-digit tariff line compared to the aforementioned studies, as given below.

100% if no NTB applies to the tariff line (i.e. if no licensing is required) ($n_i=1$)

50% if imports are restricted by different import licensing policies ($n_i=0.5$)

0% if imports are fully prohibited only ($n_i=0$)

The Industry-level Inverted NTB coverage ratio is thus defined as,

$$\text{Industry Inverted NTB}_j = \sum n_i w_i \quad (\text{A.2.1})$$

where, j stands for a particular 2-digit Industry and i represents a product line within that particular industry, $w_i = m_i / \sum m_i$ as the import weight, where $m_i =$ imports of the i^{th} 8 digit level commodity where $\sum m_i$ is the total import of the j^{th} industry.

This above scheme enables us to take into account the effects of those imported items (8-digit HS commodities) whose imports are either free or partially free. This is a value addition to

³⁹ The usual NTB index would give 0's for import free products. Hence, the reverse formulation was used in this study.

previously constructed NTB measures, which do not take into account those imported items whose imports are partially restricted.⁴⁰

Based on the above weighting scheme, we firstly assign an appropriate value to each 8-digit product for every year from 1999 to 2009. We next also calculate their import share at the 2-digit industry level for each of the years over this period. Then we apply these values to equation (A.2.1) to get the NTB index for the entire 2-digit industry as classified by the HS system, for the entire study period. Finally, we take a simple average of these inverted NTB values at the 2-digit level in each five broad industry group to get the inverted NTB values for the 5 selected industries.

In order to construct the NTB index, we have collected the data for import conditions (import policy) for each 8-digit product for the period 1999-2009 from the Director General of Foreign Trade (DGFT), Government of India.⁴¹ The import data for each 2 and 8 digit industry for the period 1999-2009 has been collected from the Ministry of Commerce and Industry, Department of Commerce, Government of India. Apart from the various tariff and non-tariff measures we have also calculated industry-level export propensities for all the aforementioned 5 broad industry groups, using equation A.2.2 and based on the industry-level import and export data collected from the WITS-UN COMTRADE database (World Bank) and the gross value of output data from the ASI database.

$$Export Propensity_{jt} = \frac{Export_{jt}}{GVO_{jt}} \times 100 \quad (A.2.2)$$

where, j = industry, t = time.⁴²

We also calculate yearly averages for all the firm-level variables used in our analysis. This is done for all types of firms separately to understand the differential trends in these firm-level variables across the two groups of firms (large, MSME). Appendix Tables A.2 to A.7 represent the trends in the yearly averages for sales revenue, raw materials expenses, compensation to employees, power and fuel expenses, capital employed and total assets, respectively, for all, large and MSME firms. For all these aforementioned variables, the MSME firms show a lower trend compared to their larger counterparts, indicating that large firms were at an advantage

⁴⁰ This is because in other previously constructed NTB measures, both prohibited and restricted imported items were considered to be fully protected and were assumed to have no imports happening over the years.

⁴¹ <http://www.eximkey.com/Sec/DGFT/ImportPolicy>

⁴² We have followed the standard definition of export propensity provided by the United Nations Conference on Trade and Development (UNCTAD) to calculate the same at the industry-level over time. See, http://unctad.org/en/PublicationsLibrary/ditctab2017d6_en.pdf

compared to MSMEs for the entire study period (1999-2009). The following section discusses in detail the model specifications and the findings from our analysis.

Table A.2: Average Yearly Sales Revenue across Various Firm Groups (Rs. mns)

Year	Average Yearly Sales Revenue for All Firms	Average Yearly Sales Revenue for Large Firms	Average Yearly Sales Revenue for MSME Firms
1999	22.46313	35.70553	3.793118
2000	23.88846	37.86525	3.82793
2001	24.13557	38.18843	4.007582
2002	26.51853	42.30947	3.895832
2003	28.20168	44.67345	4.036967
2004	30.94222	48.70812	4.393989
2005	35.62122	55.82828	4.931695
2006	41.80229	65.21098	6.117341
2007	45.86878	70.88179	6.787568
2008	46.79088	72.22414	6.894729
2009	49.24412	76.60252	7.434589

Source: Our calculation based on Prowess database

Table A.3: Average Yearly Raw Materials Expenses across Various Firm Groups (Rs. mns)

Year	Average Yearly Raw Materials Expenses for All Firms	Average Yearly Raw Materials Expenses for Large Firms	Average Yearly Raw Materials Expenses for MSME Firms
1999	8.69133	13.54113	1.871812
2000	9.198397	14.3066	1.878234
2001	9.534163	14.832	1.876148
2002	10.53506	16.53362	1.856735
2003	11.395	17.70887	1.938946
2004	12.95837	19.97761	2.237048
2005	15.6334	24.19305	2.520762
2006	18.83914	29.06315	3.268912
2007	21.31567	32.53273	3.712019
2008	22.16456	33.81046	3.67821
2009	23.44923	36.21996	3.972243

Source: Our calculation based on Prowess database

Table A.4: Average Yearly Compensation to Employees across Various Firm Groups (Rs. mns)

Year	Average Yearly Compensation to Employees for All Firms	Average Yearly Compensation to Employees for Large Firms	Average Yearly Compensation to Employees for MSME Firms
1999	1.962334	3.194274	0.328534
2000	2.176334	3.544864	0.351702
2001	2.184505	3.462649	0.358683
2002	2.246234	3.677609	0.295644
2003	2.441077	4.046388	0.275573
2004	2.030071	3.336514	0.272977
2005	2.22108	3.631537	0.291876
2006	2.463373	4.022389	0.315081
2007	2.940542	4.819715	0.32164
2008	3.037934	4.970118	0.332203
2009	3.353931	5.487039	0.376491

Source: Our calculation based on Prowess database

Table A.5: Average Yearly Power and Fuel Expenses across Various Firm Groups (Rs. mns)

Year	Average Yearly Power and Fuel Expenses for All Firms	Average Yearly Power and Fuel Expenses for Large Firms	Average Yearly Power and Fuel Expenses for MSME Firms
1999	1.143669	1.863567	0.105204
2000	1.28217	2.064954	0.115303
2001	1.292369	2.102047	0.118295
2002	1.39428	2.279719	0.118593
2003	1.361995	2.233633	0.112006
2004	1.353713	2.232804	0.116192
2005	1.54561	2.542878	0.123926
2006	1.620479	2.656123	0.122684
2007	1.683194	2.757687	0.12129
2008	1.711456	2.820501	0.121519
2009	1.80183	3.03045	0.133436

Source: Our calculation based on Prowess database

Table A.6: Average Yearly Capital Employed across Various Firm Groups (Rs. mns)

Year	Average Yearly Capital Employed for All Firms	Average Yearly Capital Employed for Large Firms	Average Yearly Capital Employed Expenses for MSME Firms
1999	18.72108	30.906	2.068598
2000	18.97821	31.21649	2.240849
2001	18.12648	29.70401	2.13871
2002	18.28207	30.08505	1.840934
2003	18.15507	29.93188	1.809772
2004	18.99545	31.1622	1.885529
2005	22.51618	36.6478	2.138963
2006	28.05588	45.72328	2.390383
2007	35.90967	57.88638	2.827776
2008	38.77528	62.09826	2.880883
2009	45.78983	73.68996	3.598082

Source: Our calculation based on Prowess database

Table A.7: Average Yearly Total Assets across Various Firm Groups (Rs. mns)

Year	Average Yearly Total Assets for All Firms	Average Yearly Total Assets for Large Firms	Average Yearly Total Assets for MSME Firms
1999	26.41284	43.76793	2.739966
2000	26.87703	44.30129	3.062809
2001	27.04595	44.65656	3.021824
2002	27.71327	45.92197	2.536875
2003	28.34709	47.04819	2.508478
2004	29.96694	49.48071	2.640277
2005	34.96889	57.19864	3.094907
2006	42.17916	68.91425	3.600138
2007	52.3063	84.58881	4.237836
2008	56.55382	90.92655	4.242033
2009	66.749	108.2202	5.294116

Source: Our calculation based on Prowess database

APPENDIX B

B.1 Results from Preliminary Fixed effects Model (firm and year) for firm-level TFPQ (Unbalanced data)

I. Analysis based on pre 2006 MSME definition (1999 status)

Table B.1: TFPQ_TRANSLOG_ACF_LP and Final Goods Tariff and Input Tariff

VARIABLES	(1) All Firms TFPQ	(2) Large Firms TFPQ	(3) MSME Firms TFPQ	(4) All Firms TFPQ	(5) Large Firms TFPQ	(6) MSME Firms TFPQ	(7) All Firms TFPQ	(8) Large Firms TFPQ	(9) MSME Firms TFPQ
Input_Tariff_Industry_Wise_1				-0.00212 (0.00190)	-0.00238 (0.00188)	-0.0325 (0.0234)	-0.0174*** (0.00375)	-0.0172*** (0.00384)	-0.123*** (0.0419)
Output_Tariff_Industry_Wise_1	0.000518 (0.00111)	0.000302 (0.00109)	-0.00886 (0.0149)				0.0106*** (0.00209)	0.0102*** (0.00214)	0.0656*** (0.0242)
Deflated_Total_Asset	1.42e-05 (6.76e-05)	-3.04e-06 (7.37e-05)	0.00332 (0.00405)	9.63e-06 (6.75e-05)	-7.51e-06 (7.36e-05)	0.00313 (0.00441)	9.63e-06 (6.71e-05)	-7.75e-06 (7.34e-05)	0.00313 (0.00449)
age	-0.00746** (0.00370)	-0.00865** (0.00369)	-0.0360 (0.0493)	-0.0103*** (0.00344)	-0.0113*** (0.00345)	-0.0422 (0.0441)	-0.00422 (0.00362)	-0.00544 (0.00362)	-0.00748 (0.0464)
age_square	0.000103** (4.33e-05)	9.75e-05** (4.11e-05)	4.47e-05 (0.000764)	0.000108** (4.33e-05)	0.000103** (4.11e-05)	-0.000109 (0.000701)	0.000105** (4.30e-05)	9.95e-05** (4.08e-05)	-0.000192 (0.000666)
Export Propensity Industry Wise	0.00725*** (0.00160)	0.00670*** (0.00167)	0.0208 (0.0223)	0.00704*** (0.00158)	0.00639*** (0.00166)	0.0101 (0.0200)	0.000898 (0.00178)	0.000452 (0.00175)	-0.0304 (0.0222)
Constant	1.739*** (0.0865)	1.746*** (0.0875)	3.220*** (0.977)	1.847*** (0.0841)	1.850*** (0.0849)	3.781*** (0.940)	1.749*** (0.0867)	1.756*** (0.0875)	3.333*** (0.971)
Firm Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	20,414	19,383	550	20,414	19,383	550	20,414	19,383	550
R-squared	0.010	0.009	0.069	0.010	0.010	0.077	0.012	0.012	0.093
Number of Firms	3,264	3,093	106	3,264	3,093	106	3,264	3,093	106

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table B.2: Relative and Combined Effects of Tariff and Non-Tariff Liberalization on TFPQ_TRANSLOG_ACF_LP

VARIABLES	(1) All Firms TFPQ	(2) Large Firms TFPQ	(3) MSME Firms TFPQ	(4) All Firms TFPQ	(5) Large Firms TFPQ	(6) MSME Firms TFPQ	(7) All Firms TFPQ	(8) Large Firms TFPQ	(9) MSME Firms TFPQ
Input_Tariff_Industry_Wise_1	-0.00385** (0.00196)	-0.00398** (0.00193)	-0.0312 (0.0235)				-0.0183*** (0.00381)	-0.0181*** (0.00390)	-0.122*** (0.0420)
Output_Tariff_Industry_Wise_1				-0.000440 (0.00113)	-0.000561 (0.00110)	-0.00796 (0.0149)	0.0101*** (0.00206)	0.00975*** (0.00212)	0.0651*** (0.0243)
New_Inverted_NTB_Industry_Wise	1.426*** (0.355)	1.299*** (0.357)	-1.921 (4.100)	1.256*** (0.347)	1.128*** (0.349)	-2.634 (4.078)	1.350*** (0.354)	1.229*** (0.358)	-1.494 (3.813)
Deflated_Total_Asset	6.87e-06 (6.69e-05)	-1.03e-05 (7.31e-05)	0.00302 (0.00445)	1.19e-05 (6.70e-05)	-5.25e-06 (7.32e-05)	0.00317 (0.00412)	7.01e-06 (6.65e-05)	-1.04e-05 (7.28e-05)	0.00305 (0.00452)
age	-0.0165*** (0.00365)	-0.0169*** (0.00369)	-0.0335 (0.0483)	-0.0134*** (0.00384)	-0.0139*** (0.00388)	-0.0240 (0.0519)	-0.0104*** (0.00373)	-0.0110*** (0.00378)	-0.00103 (0.0494)
age_square	0.000113*** (4.30e-05)	0.000107*** (4.08e-05)	-0.000138 (0.000711)	0.000107** (4.30e-05)	0.000101** (4.08e-05)	1.00e-06 (0.000768)	0.000110** (4.28e-05)	0.000103** (4.06e-05)	-0.000214 (0.000672)
Export Propensity Industry Wise	0.00682*** (0.00159)	0.00611*** (0.00167)	0.00972 (0.0190)	0.00764*** (0.00160)	0.00698*** (0.00168)	0.0196 (0.0205)	0.000989 (0.00180)	0.000442 (0.00178)	-0.0304 (0.0218)
Constant	0.635** (0.316)	0.748** (0.318)	5.491 (3.698)	0.676** (0.314)	0.791** (0.316)	5.574 (3.770)	0.607* (0.318)	0.717** (0.322)	4.666 (3.442)
Firm Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	20,414	19,383	550	20,414	19,383	550	20,414	19,383	550
R-squared	0.012	0.012	0.078	0.011	0.011	0.070	0.014	0.014	0.093
Number of Firms	3,264	3,093	106	3,264	3,093	106	3,264	3,093	106

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table B.3: NTB and ERP on TFPQ_TRANSLOG_ACF_LP

VARIABLES	(1) All Firms TFPQ	(2) Large Firms TFPQ	(3) MSME Firms TFPQ	(4) All Firms TFPQ	(5) Large Firms TFPQ	(6) MSME Firms TFPQ	(7) All Firms TFPQ	(8) Large Firms TFPQ	(9) MSME Firms TFPQ
New_Inverted_NTB_Industry_Wise				1.218*** (0.344)	1.080*** (0.347)	-2.946 (4.080)	1.173*** (0.342)	1.042*** (0.345)	-2.859 (4.036)
ERP_Industry_Wise_1	0.00111* (0.000657)	0.000932 (0.000647)	0.00543 (0.00879)				0.000826 (0.000651)	0.000671 (0.000639)	0.00523 (0.00890)
Deflated_Total_Asset	1.61e-05 (6.75e-05)	-1.09e-06 (7.37e-05)	0.00352 (0.00377)	1.29e-05 (6.70e-05)	-3.96e-06 (7.32e-05)	0.00326 (0.00394)	1.53e-05 (6.70e-05)	-2.05e-06 (7.33e-05)	0.00334 (0.00387)
age	-0.00532 (0.00351)	-0.00659* (0.00354)	-0.0133 (0.0497)	-0.0125*** (0.00291)	-0.0127*** (0.00299)	-0.0126 (0.0433)	-0.0100*** (0.00354)	-0.0107*** (0.00361)	-0.00187 (0.0505)
age_square	0.000100** (4.30e-05)	9.51e-05** (4.08e-05)	0.000152 (0.000824)	0.000106** (4.27e-05)	9.93e-05** (4.04e-05)	6.28e-05 (0.000806)	0.000103** (4.28e-05)	9.69e-05** (4.06e-05)	9.46e-05 (0.000816)
Export Propensity Industry Wise	0.00630*** (0.00164)	0.00586*** (0.00168)	0.0125 (0.0237)	0.00749*** (0.00157)	0.00680*** (0.00165)	0.0175 (0.0196)	0.00666*** (0.00163)	0.00612*** (0.00168)	0.0116 (0.0223)
Constant	1.681*** (0.0754)	1.688*** (0.0775)	2.450*** (0.836)	0.683** (0.315)	0.800** (0.317)	5.463 (3.685)	0.657** (0.318)	0.780** (0.321)	5.064 (3.783)
Firm Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	20,414	19,383	550	20,414	19,383	550	20,414	19,383	550
R-squared	0.010	0.010	0.069	0.011	0.011	0.069	0.012	0.011	0.070
Number of Firms	3,264	3,093	106	3,264	3,093	106	3,264	3,093	106

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

I. Analysis Based on 2006 MSME Definition

Table B.4: Final Good and Input Tariff Liberalization and TFPQ_TRANSLOG_ACF_LP

VARIABLES	(1) All Firms TFPQ	(2) Large Firms TFPQ	(3) MSME Firms TFPQ	(4) All Firms TFPQ	(5) Large Firms TFPQ	(6) MSME Firms TFPQ	(7) All Firms TFPQ	(8) Large Firms TFPQ	(9) MSME Firms TFPQ
Input_Tariff_Industry_Wise_1				-0.00212 (0.00190)	-0.00507** (0.00221)	-0.00134 (0.00429)	-0.0174*** (0.00375)	-0.0206*** (0.00403)	-0.0242*** (0.00866)
Output_Tariff_Industry_Wise_1	0.000518 (0.00111)	-0.00107 (0.00131)	0.00158 (0.00261)				0.0106*** (0.00209)	0.0107*** (0.00226)	0.0160*** (0.00502)
Deflated_Total_Asset	1.42e-05 (6.76e-05)	-3.70e-05 (8.17e-05)	0.00249*** (0.000721)	9.63e-06 (6.75e-05)	-4.23e-05 (8.15e-05)	0.00246*** (0.000736)	9.63e-06 (6.71e-05)	-4.28e-05 (8.13e-05)	0.00246*** (0.000719)
age	-0.00746** (0.00370)	-0.0197*** (0.00427)	-0.0120 (0.00810)	-0.0103*** (0.00344)	-0.0221*** (0.00389)	-0.0160** (0.00765)	-0.00422 (0.00362)	-0.0157*** (0.00416)	-0.00768 (0.00788)
age_square	0.000103** (4.33e-05)	0.000159*** (4.63e-05)	0.000183* (0.000108)	0.000108** (4.33e-05)	0.000164*** (4.60e-05)	0.000192* (0.000108)	0.000105** (4.30e-05)	0.000160*** (4.54e-05)	0.000186* (0.000107)
Export Propensity Industry Wise	0.00725*** (0.00160)	0.00868*** (0.00169)	0.00788* (0.00434)	0.00704*** (0.00158)	0.00748*** (0.00172)	0.00797* (0.00438)	0.000898 (0.00178)	0.00117 (0.00180)	-0.000979 (0.00417)
Constant	1.739*** (0.0865)	1.729*** (0.106)	2.135*** (0.180)	1.847*** (0.0841)	1.846*** (0.102)	2.275*** (0.175)	1.749*** (0.0867)	1.744*** (0.106)	2.138*** (0.180)
Firm Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	20,414	13,364	6,528	20,414	13,364	6,528	20,414	13,364	6,528
R-squared	0.010	0.020	0.015	0.010	0.021	0.015	0.012	0.024	0.017
Number of Firms	3,264	2,116	1,068	3,264	2,116	1,068	3,264	2,116	1,068

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table B.5: Relative and Combined Effects of Final Goods and Input Tariff Liberalization on TFPQ_TRANSLOG_ACF_LP

VARIABLES	(1) All Firms TFPQ	(2) Large Firms TFPQ	(3) MSME Firms TFPQ	(4) All Firms TFPQ	(5) Large Firms TFPQ	(6) MSME Firms TFPQ	(7) All Firms TFPQ	(8) Large Firms TFPQ	(9) MSME Firms TFPQ
Input_Tariff_Industry_Wise_1	-0.00385** (0.00196)	-0.00662*** (0.00228)	-0.00361 (0.00429)				-0.0183*** (0.00381)	-0.0213*** (0.00407)	-0.0264*** (0.00875)
Output_Tariff_Industry_Wise_1				-0.000440 (0.00113)	-0.00185 (0.00134)	0.000300 (0.00258)	0.0101*** (0.00206)	0.0102*** (0.00225)	0.0159*** (0.00500)
New_Inverted_NTB_Industry_Wise	1.426*** (0.355)	1.132*** (0.386)	2.575*** (0.861)	1.256*** (0.347)	0.905** (0.380)	2.417*** (0.853)	1.350*** (0.354)	1.032*** (0.388)	2.569*** (0.861)
Deflated_Total_Asset	6.87e-06 (6.69e-05)	-4.51e-05 (8.11e-05)	0.00244*** (0.000728)	1.19e-05 (6.70e-05)	-3.91e-05 (8.14e-05)	0.00248*** (0.000714)	7.01e-06 (6.65e-05)	-4.54e-05 (8.09e-05)	0.00244*** (0.000711)
age	-0.0165*** (0.00365)	-0.0270*** (0.00418)	-0.0279*** (0.00853)	-0.0134*** (0.00384)	-0.0240*** (0.00454)	-0.0235*** (0.00883)	-0.0104*** (0.00373)	-0.0204*** (0.00443)	-0.0196** (0.00859)
age_square	0.000113*** (4.30e-05)	0.000167*** (4.57e-05)	0.000206* (0.000107)	0.000107** (4.30e-05)	0.000162*** (4.60e-05)	0.000196* (0.000107)	0.000110** (4.28e-05)	0.000163*** (4.52e-05)	0.000200* (0.000107)
Export Propensity Industry Wise	0.00682*** (0.00159)	0.00717*** (0.00172)	0.00864** (0.00436)	0.00764*** (0.00160)	0.00890*** (0.00171)	0.00930** (0.00430)	0.000989 (0.00180)	0.00116 (0.00182)	-0.000277 (0.00416)
Constant	0.635** (0.316)	0.891*** (0.344)	0.0651 (0.762)	0.676** (0.314)	0.969*** (0.342)	0.0612 (0.765)	0.607* (0.318)	0.877** (0.346)	-0.0666 (0.769)
Firm Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	20,414	13,364	6,528	20,414	13,364	6,528	20,414	13,364	6,528
R-squared	0.012	0.023	0.019	0.011	0.021	0.018	0.014	0.026	0.021
Number of Firms	3,264	2,116	1,068	3,264	2,116	1,068	3,264	2,116	1,068

Robust standard errors in parentheses
 *** p<0.01, ** p<0.05, * p<0.1

Table B.6: NTB and ERP on TFPQ_TRANSLOG_ACF_LP

VARIABLES	(1) All Firms TFPQ	(2) Large Firms TFPQ	(3) MSME Firms TFPQ	(4) All Firms TFPQ	(5) Large Firms TFPQ	(6) MSME Firms TFPQ	(7) All Firms TFPQ	(8) Large Firms TFPQ	(9) MSME Firms TFPQ
New_Inverted_NTB_Industry_Wise				1.218*** (0.344)	0.721* (0.374)	2.434*** (0.858)	1.173*** (0.342)	0.703* (0.374)	2.417*** (0.857)
ERP_Industry_Wise_1	0.00111* (0.000657)	0.000488 (0.000796)	0.00105 (0.00146)				0.000826 (0.000651)	0.000272 (0.000795)	0.000820 (0.00144)
Deflated_Total_Asset	1.61e-05 (6.75e-05)	-3.35e-05 (8.18e-05)	0.00249*** (0.000721)	1.29e-05 (6.70e-05)	-3.51e-05 (8.14e-05)	0.00248*** (0.000715)	1.53e-05 (6.70e-05)	-3.44e-05 (8.16e-05)	0.00249*** (0.000708)
age	-0.00532 (0.00351)	-0.0164*** (0.00410)	-0.0119 (0.00763)	-0.0125*** (0.00291)	-0.0200*** (0.00317)	-0.0242*** (0.00721)	-0.0100*** (0.00354)	-0.0192*** (0.00421)	-0.0219*** (0.00829)
age_square	0.000100** (4.30e-05)	0.000155*** (4.61e-05)	0.000184* (0.000107)	0.000106** (4.27e-05)	0.000157*** (4.57e-05)	0.000197* (0.000106)	0.000103** (4.28e-05)	0.000156*** (4.60e-05)	0.000193* (0.000107)
Export Propensity Industry Wise	0.00630*** (0.00164)	0.00778*** (0.00173)	0.00725* (0.00428)	0.00749*** (0.00157)	0.00825*** (0.00168)	0.00938** (0.00430)	0.00666*** (0.00163)	0.00797*** (0.00174)	0.00858** (0.00423)
Constant	1.681*** (0.0754)	1.622*** (0.0928)	2.147*** (0.149)	0.683** (0.315)	1.018*** (0.345)	0.0638 (0.762)	0.657** (0.318)	1.012*** (0.347)	0.0167 (0.770)
Firm Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	20,414	13,364	6,528	20,414	13,364	6,528	20,414	13,364	6,528
R-squared	0.010	0.020	0.015	0.011	0.020	0.018	0.012	0.020	0.019
Number of Firms	3,264	2,116	1,068	3,264	2,116	1,068	3,264	2,116	1,068

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

B.2 Results from Preliminary Fixed Effects Model (firm and year effects) for Firm-Level Markup (Unbalanced data)

II. Analysis based on pre 2006 MSME definition (1999 status)

Table B.7: Impact of Final Goods and Input Tariff Liberalization on Firm-level Mark-up (log)

VARIABLES	(1) All Firms Markup	(2) Large Firms Markup	(3) MSME Firms Markup	(4) All Firms Markup	(5) Large Firms Markup	(6) MSME Firms Markup	(7) All Firms Markup	(8) Large Firms Markup	(9) MSME Firms Markup
Input_Tariff_Industry_Wise_1				0.00352 (0.00258)	0.00467* (0.00259)	-0.00490 (0.0189)	-0.0102* (0.00594)	-0.0106* (0.00611)	0.0403 (0.0357)
Output_Tariff_Industry_Wise_1	0.00360** (0.00176)	0.00441** (0.00176)	-0.00828 (0.0124)				0.00950** (0.00409)	0.0105** (0.00417)	-0.0326 (0.0228)
Deflated_Total_Asset	2.28e-05 (5.62e-05)	5.96e-05 (7.21e-05)	-0.00748** (0.00288)	2.02e-05 (5.64e-05)	5.70e-05 (7.23e-05)	-0.00742** (0.00298)	2.02e-05 (5.61e-05)	5.67e-05 (7.19e-05)	-0.00742** (0.00300)
age	0.0345*** (0.00516)	0.0397*** (0.00525)	-0.00742 (0.0345)	0.0310*** (0.00517)	0.0356*** (0.00530)	0.000482 (0.0319)	0.0364*** (0.00501)	0.0417*** (0.00510)	-0.0167 (0.0346)
age_square	-0.00038*** (7.04e-05)	-0.000398*** (7.09e-05)	-3.64e-05 (0.000623)	-0.00037*** (7.09e-05)	-0.000394*** (7.14e-05)	-3.09e-07 (0.000621)	-0.00038*** (7.07e-05)	-0.000397*** (7.12e-05)	4.09e-05 (0.000603)
Export Propensity Industry Wise	0.00950*** (0.00367)	0.00949** (0.00378)	0.00986 (0.0201)	0.0113*** (0.00397)	0.0118*** (0.00408)	0.00647 (0.0189)	0.00577 (0.00369)	0.00564 (0.00375)	0.0266 (0.0219)
Constant	-1.030*** (0.116)	-1.168*** (0.118)	0.107 (0.719)	-0.936*** (0.108)	-1.064*** (0.109)	-0.152 (0.670)	-1.024*** (0.116)	-1.162*** (0.117)	0.0703 (0.724)
Firm Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	20,414	19,383	550	20,414	19,383	550	20,414	19,383	550
R-squared	0.015	0.019	0.074	0.015	0.018	0.073	0.016	0.019	0.077
Number of Firms	3,264	3,093	106	3,264	3,093	106	3,264	3,093	106

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table B.8: Relative and Combined Effects of NTB and Tariff Liberalization on Firm-level Mark-up (log)

VARIABLES	(1) All Firms Markup	(2) Large Firms Markup	(3) MSME Firms Markup	(4) All Firms Markup	(5) Large Firms Markup	(6) MSME Firms Markup	(7) All Firms Markup	(8) Large Firms Markup	(9) MSME Firms Markup
Input_Tariff_Industry_Wise_1	0.00306 (0.00249)	0.00384 (0.00248)	-0.00595 (0.0197)				-0.0104* (0.00607)	-0.0110* (0.00624)	0.0387 (0.0367)
Output_Tariff_Industry_Wise_1				0.00340** (0.00164)	0.00399** (0.00163)	-0.00888 (0.0128)	0.00938** (0.00399)	0.0103** (0.00409)	-0.0321 (0.0231)
New_Inverted_NTB_Industry_Wise	0.385 (0.575)	0.680 (0.576)	1.600 (4.615)	0.260 (0.551)	0.544 (0.553)	1.752 (4.512)	0.314 (0.562)	0.606 (0.563)	1.390 (4.541)
Deflated_Total_Asset	1.94e-05 (5.67e-05)	5.55e-05 (7.27e-05)	-0.00733** (0.00298)	2.24e-05 (5.64e-05)	5.86e-05 (7.24e-05)	-0.00738** (0.00289)	1.96e-05 (5.63e-05)	5.54e-05 (7.23e-05)	-0.00735** (0.00299)
age	0.0293*** (0.00595)	0.0327*** (0.00610)	-0.00672 (0.0364)	0.0333*** (0.00561)	0.0371*** (0.00575)	-0.0154 (0.0384)	0.0349*** (0.00533)	0.0389*** (0.00548)	-0.0227 (0.0379)
age_square	-0.00037*** (7.09e-05)	-0.000392*** (7.14e-05)	2.35e-05 (0.000613)	-0.00038*** (7.04e-05)	-0.000397*** (7.09e-05)	-7.27e-06 (0.000612)	-0.00037*** (7.07e-05)	-0.000395*** (7.12e-05)	6.09e-05 (0.000594)
Export Propensity Industry Wise	0.0112*** (0.00395)	0.0116*** (0.00404)	0.00677 (0.0189)	0.00958*** (0.00371)	0.00962** (0.00381)	0.0106 (0.0200)	0.00579 (0.00369)	0.00563 (0.00374)	0.0266 (0.0219)
Constant	-1.263** (0.514)	-1.641*** (0.515)	-1.576 (4.110)	-1.250** (0.511)	-1.628*** (0.512)	-1.458 (4.066)	-1.289** (0.519)	-1.674*** (0.519)	-1.170 (4.067)
Firm Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	20,414	19,383	550	20,414	19,383	550	20,414	19,383	550
R-squared	0.015	0.018	0.073	0.015	0.019	0.075	0.016	0.019	0.077
Number of Firms	3,264	3,093	106	3,264	3,093	106	3,264	3,093	106

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table B.9: NTB and ERP on Firm-level Mark-up (log)

VARIABLES	(1) All Firms Markup	(2) Large Firms Markup	(3) MSME Firms Markup	(4) All Firms Markup	(5) Large Firms Markup	(6) MSME Firms Markup	(7) All Firms Markup	(8) Large Firms Markup	(9) MSME Firms Markup
New_Inverted_NTB_Industry_Wise				0.550 (0.590)	0.892 (0.595)	1.405 (4.473)	0.412 (0.571)	0.724 (0.574)	1.295 (4.409)
ERP_Industry_Wise_1	0.00264** (0.00107)	0.00315*** (0.00108)	-0.00677 (0.00798)				0.00254** (0.00102)	0.00297*** (0.00103)	-0.00668 (0.00800)
Deflated_Total_Asset	2.21e-05 (5.58e-05)	5.85e-05 (7.17e-05)	-0.00747** (0.00292)	1.46e-05 (5.66e-05)	4.94e-05 (7.26e-05)	-0.00729** (0.00303)	2.18e-05 (5.62e-05)	5.78e-05 (7.22e-05)	-0.00739** (0.00294)
age	0.0352*** (0.00495)	0.0403*** (0.00508)	-0.0112 (0.0345)	0.0261*** (0.00570)	0.0286*** (0.00588)	-0.00272 (0.0326)	0.0336*** (0.00535)	0.0375*** (0.00553)	-0.0164 (0.0368)
age_square	-0.00038*** (7.02e-05)	-0.000397*** (7.07e-05)	-4.66e-06 (0.000614)	-0.00037*** (7.05e-05)	-0.000385*** (7.10e-05)	6.17e-05 (0.000609)	-0.00037*** (7.01e-05)	-0.000395*** (7.06e-05)	2.11e-05 (0.000603)
Export Propensity Industry Wise	0.00800** (0.00362)	0.00777** (0.00372)	0.0153 (0.0214)	0.0107*** (0.00385)	0.0109*** (0.00395)	0.00825 (0.0194)	0.00813** (0.00365)	0.00795** (0.00375)	0.0157 (0.0214)
Constant	-1.021*** (0.0976)	-1.151*** (0.101)	0.111 (0.638)	-1.301** (0.520)	-1.691*** (0.522)	-1.582 (4.116)	-1.381*** (0.533)	-1.783*** (0.534)	-1.073 (4.089)
Firm Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	20,414	19,383	550	20,414	19,383	550	20,414	19,383	550
R-squared	0.016	0.019	0.075	0.015	0.018	0.073	0.016	0.019	0.075
Number of Firms	3,264	3,093	106	3,264	3,093	106	3,264	3,093	106

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

III. Analysis based on 2006 MSME definition

Table B.10: Final Goods and Input Tariff Liberalization on Firm-level Mark-up (log)

VARIABLES	(1) All Firms Markup	(2) Large Firms Markup	(3) MSME Firms Markup	(4) All Firms Markup	(5) Large Firms Markup	(6) MSME Firms Markup	(7) All Firms Markup	(8) Large Firms Markup	(9) MSME Firms Markup
Input_Tariff_Industry_Wise_1				0.00352 (0.00258)	0.0105*** (0.00322)	-0.00418 (0.00435)	-0.0102* (0.00594)	-0.00144 (0.00721)	-0.0168* (0.0102)
Output_Tariff_Industry_Wise_1	0.00360** (0.00176)	0.00742*** (0.00220)	-0.00118 (0.00287)				0.00950** (0.00409)	0.00824 (0.00501)	0.00884 (0.00675)
Deflated_Total_Asset	2.28e-05 (5.62e-05)	8.95e-05 (8.49e-05)	-0.00139 (0.000914)	2.02e-05 (5.64e-05)	8.95e-05 (8.53e-05)	-0.00142 (0.000907)	2.02e-05 (5.61e-05)	8.91e-05 (8.49e-05)	-0.00142 (0.000917)
age	0.0345*** (0.00516)	0.0532*** (0.00650)	0.0244*** (0.00811)	0.0310*** (0.00517)	0.0486*** (0.00658)	0.0228*** (0.00791)	0.0364*** (0.00501)	0.0535*** (0.00627)	0.0274*** (0.00799)
age_square	-0.00038*** (7.04e-05)	-0.00048*** (9.08e-05)	-0.00029*** (0.000112)	-0.00037*** (7.09e-05)	-0.00048*** (9.12e-05)	-0.00029*** (0.000112)	-0.00038*** (7.07e-05)	-0.00048*** (9.09e-05)	-0.00029*** (0.000113)
Export Propensity Industry Wise	0.00950*** (0.00367)	0.00453 (0.00452)	0.0119** (0.00603)	0.0113*** (0.00397)	0.00887* (0.00493)	0.0107* (0.00636)	0.00577 (0.00369)	0.00400 (0.00454)	0.00579 (0.00577)
Constant	-1.030*** (0.116)	-1.323*** (0.145)	-0.812*** (0.187)	-0.936*** (0.108)	-1.242*** (0.134)	-0.734*** (0.178)	-1.024*** (0.116)	-1.322*** (0.145)	-0.810*** (0.187)
Firm Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	20,414	13,364	6,528	20,414	13,364	6,528	20,414	13,364	6,528
R-squared	0.015	0.025	0.030	0.015	0.025	0.030	0.016	0.025	0.031
Number of Firms	3,264	2,116	1,068	3,264	2,116	1,068	3,264	2,116	1,068

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table B.11: Relative and Combined Effects of NTB and Tariff Liberalization on Firm-level Mark-up (log)

VARIABLES	(1) All Firms Markup	(2) Large Firms Markup	(3) MSME Firms Markup	(4) All Firms Markup	(5) Large Firms Markup	(6) MSME Firms Markup	(7) All Firms Markup	(8) Large Firms Markup	(9) MSME Firms Markup
Input_Tariff_Industry_Wise_1	0.00306 (0.00249)	0.00915*** (0.00305)	-0.00253 (0.00426)				-0.0104* (0.00607)	-0.00210 (0.00736)	-0.0152 (0.0104)
Output_Tariff_Industry_Wise_1				0.00340** (0.00164)	0.00662*** (0.00203)	-0.000142 (0.00275)	0.00938** (0.00399)	0.00781 (0.00489)	0.00888 (0.00671)
New_Inverted_NTB_Industry_Wise	0.385 (0.575)	1.015 (0.707)	-1.877* (1.002)	0.260 (0.551)	0.925 (0.674)	-1.967** (0.985)	0.314 (0.562)	0.938 (0.688)	-1.880* (1.003)
Deflated_Total_Asset	1.94e-05 (5.67e-05)	8.69e-05 (8.59e-05)	-0.00140 (0.000902)	2.24e-05 (5.64e-05)	8.73e-05 (8.55e-05)	-0.00138 (0.000909)	1.96e-05 (5.63e-05)	8.67e-05 (8.55e-05)	-0.00141 (0.000911)
age	0.0293*** (0.00595)	0.0442*** (0.00755)	0.0315*** (0.00946)	0.0333*** (0.00561)	0.0489*** (0.00707)	0.0339*** (0.00925)	0.0349*** (0.00533)	0.0492*** (0.00672)	0.0361*** (0.00893)
age_square	-0.00037*** (7.09e-05)	-0.00048*** (9.12e-05)	-0.00030*** (0.000113)	-0.00038*** (7.04e-05)	-0.00048*** (9.07e-05)	-0.00031*** (0.000112)	-0.00037*** (7.07e-05)	-0.00048*** (9.09e-05)	-0.00030*** (0.000113)
Export Propensity Industry Wise	0.0112*** (0.00395)	0.00859* (0.00486)	0.0102 (0.00642)	0.00958*** (0.00371)	0.00476 (0.00456)	0.0108* (0.00613)	0.00579 (0.00369)	0.00400 (0.00454)	0.00528 (0.00576)
Constant	-1.263** (0.514)	-2.099*** (0.633)	0.876 (0.894)	-1.250** (0.511)	-2.100*** (0.626)	0.876 (0.900)	-1.289** (0.519)	-2.109*** (0.635)	0.803 (0.915)
Firm Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	20,414	13,364	6,528	20,414	13,364	6,528	20,414	13,364	6,528
R-squared	0.015	0.025	0.032	0.015	0.026	0.031	0.016	0.026	0.032
Number of Firms	3,264	2,116	1,068	3,264	2,116	1,068	3,264	2,116	1,068

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table B.12: NTB and ERP on Firm-level Mark-up (log)

VARIABLES	(1) All Firms Markup	(2) Large Firms Markup	(3) MSME Firms Markup	(4) All Firms Markup	(5) Large Firms Markup	(6) MSME Firms Markup	(7) All Firms Markup	(8) Large Firms Markup	(9) MSME Firms Markup
New_Inverted_NTB_Industry_Wise				0.550 (0.590)	1.582** (0.737)	-1.975* (1.015)	0.412 (0.571)	1.333* (0.704)	-2.024** (1.009)
ERP_Industry_Wise_1	0.00264** (0.00107)	0.00406*** (0.00138)	0.00207 (0.00166)				0.00254** (0.00102)	0.00365*** (0.00130)	0.00226 (0.00164)
Deflated_Total_Asset	2.21e-05 (5.58e-05)	8.46e-05 (8.47e-05)	-0.00135 (0.000937)	1.46e-05 (5.66e-05)	7.31e-05 (8.62e-05)	-0.00138 (0.000908)	2.18e-05 (5.62e-05)	8.29e-05 (8.54e-05)	-0.00135 (0.000927)
age	0.0352*** (0.00495)	0.0509*** (0.00626)	0.0322*** (0.00787)	0.0261*** (0.00570)	0.0346*** (0.00732)	0.0341*** (0.00893)	0.0336*** (0.00535)	0.0456*** (0.00676)	0.0405*** (0.00901)
age_square	-0.00038*** (7.02e-05)	-0.00048*** (9.10e-05)	-0.00031*** (0.000112)	-0.00037*** (7.05e-05)	-0.00046*** (9.15e-05)	-0.00031*** (0.000112)	-0.00037*** (7.01e-05)	-0.00047*** (9.07e-05)	-0.00032*** (0.000112)
Export Propensity Industry Wise	0.00800** (0.00362)	0.00296 (0.00444)	0.00967 (0.00589)	0.0107*** (0.00385)	0.00711 (0.00475)	0.0108* (0.00628)	0.00813** (0.00365)	0.00331 (0.00448)	0.00856 (0.00597)
Constant	-1.021*** (0.0976)	-1.193*** (0.124)	-1.039*** (0.156)	-1.301** (0.520)	-2.274*** (0.647)	0.875 (0.894)	-1.381*** (0.533)	-2.350*** (0.658)	0.745 (0.919)
Firm Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	20,414	13,364	6,528	20,414	13,364	6,528	20,414	13,364	6,528
R-squared	0.016	0.024	0.030	0.015	0.024	0.031	0.016	0.025	0.032
Number of Firms	3,264	2,116	1,068	3,264	2,116	1,068	3,264	2,116	1,068

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1