Trade Liberalization and Productivity of Indian Manufacturing Firms

Bishwanath Golwar
Institute of Economic Growth, Delhi, India
b_goldar77@yahoo.com

Isha Chawla
Lakshmibai College, University of Delhi, Delhi, India

There have been several econometric studies on the impact of trade liberalization on firm productivity in developing countries and most found a positive effect of trade liberalization. Some studies (e.g., Schor, 2004; Amiti and Konings, 2007) have shown that in comparison with the competition effect of output tariff cuts, the tariff cuts on intermediate inputs had a larger impact on firm productivity through increased access to intermediate inputs.

For India, Topalova and Khandelwal (2011) found a positive effect of trade liberalization on firm productivity. Their empirical findings indicate that while the pro-competitive effect of import liberalization had a positive effect on firm productivity, the bigger impact emerged from the improved access to imported inputs, corroborating the findings of Schor (2004) and Amiti and Konings (2007).

A positive effect of trade liberalization on productivity in Indian manufacturing has been found by Goldar and Kumari (2003), Das (2006), and Mitra and Ural (2008), using industry-level or state-by-industry-level data. These studies as well as Topalova and Khandelwal (2011) have considered India's trade liberalization of the 1990s. In a recent study, based on industry level panel data for the period 1990-91 to 2009-10, Das (2016) has presented econometric evidence which indicates that the reforms of the 1990s and further changes made in the 2000s had a positive effect on manufacturing productivity in India.

This paper presents an analysis similar to Topalova and Khandelwal (2011), making use of firm (company) level data for the period 1997-98 to 2009-10. For studying the impact of trade reforms on firm productivity, the decade of the 2000s has an advantage over the previous decade. By the early 2000s, most quantitative restrictions on imports had been eliminated and the tariff rates had been brought down to such low levels that further cuts would put substantial competitive pressure on domestic manufacturing firms.

Methodology of Total Factor Productivity (TFP) Estimation

This study uses the firm-level database Prowess of the CMIE, drawing data for about 6000 manufacturing firms. Based on Levinsohn and Petrin (2003) methodology and two specifications of the production function (namely, gross output and value added), estimated separately for each two-digit industry or industry groups, estimation of firm level TFP for 1994-95 through 2009-10 has been done, using combined intermediate inputs as the proxy for unobserved productivity shocks.

The unbalanced panel is restricted to firms that are observed for at least three years; real output, real value added, real capital and the 'combined' real intermediate input (see below) are positive to allow for log transformations. Firm-year observations within each industry in the lower and upper 1 percentile of the distribution of three variables (capital/output; capital/labour; energy/output) are removed as are firms with extreme output/input variation or reversals from

year to year, thus restricting the sample to 57,697 observations (6,068 firms).

Nominal gross output is taken as sum of sales and change in stock of finished and semi-finished goods, which is suitably deflated to obtain real gross output. The value of raw materials is the sum of the value of raw materials, stores and spares, and the value of packaging and packing expenses. The value of energy is the sum of expenses on power, fuel and water charges. The value of services input is the sum of expenses on heterogeneous services comprising rent and lease rent, repairs and maintenance, insurance, outsourced manufacturing jobs, outsourced professional jobs, selling and distribution expenses, travel expenses, communication expenses, printing and stationary expenses and financial services. The nominal values of materials, energy and services have been suitably deflated – the deflators formed with the help input-output tables – then combined to get real intermediate input.

Nominal value-added is the nominal value of output minus the nominal value of intermediate input; real value added is obtained by double-deflation.

Drawing firm-level data on gross fixed assets, net fixed assets and depreciation from the company database, the Perpetual Inventory Method is applied to construct firm-level real net stock of capital. Real capital stock data used for the productivity analysis includes both physical assets and R&D capital stock. Labour input is derived by using a modified version of the 'ASI-based approach' which involves i) the computation of an average wage rate for various industries using ASI data and ii) dividing each firm's wage bill obtained from the company database by this computed average wage rate.

Econometric Model: Impact of Tariff Reform on TFP

The specification of the econometric model is similar to that used by Topalova and Khandelwal (2011). The dependent variable is ln(TFPijt), i.e. logarithm of TFP of i\'th firm in j'th three-digit industry in year t. The main explanatory variables are output tariff rates (for industry j in year t) [The rates of tariff are the same as those used in Das, 2016; kindly provided by Dr. D.K. Das for this study] and import intensity of the firm. Control variables include firm size (based on total assets), R&D intensity, royalty payment to sales ratio and export intensity. In addition, in some specifications of the model, the equity share of foreign promoter (to assess the impact of FDI) has been used as an explanatory variable (in this case, a shorter period, 2000-01 to 2009-10, is considered due to non-availability of equity details for earlier years).

Since panel data are used, the estimation of the equation specified has been done by the fixed effects model, with year dummies included. Also, the dynamic version of the model has been estimated by using the Arellano-Bond estimator.

The results obtained reveal a significant negative effect of tariff rate on TFP, implying thereby that tariff reforms caused TFP of Indian manufacturing firms to go up. Import intensity of firms is found to have a positive effect on firm productivity. These results are in conformity with the findings of Topalova and Khandelwal (2011). A positive effect of R&D, royalty expenditure and FDI on firm productivity is found.