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Productivity, firm size and trade liberalization in a partner country: Evidence from Korean firm-level data



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ABSTRACT

In this paper, I study the impact of partner-country tariffs on Korean firm-level productivity for the period from 2005 to 2009. I start by documenting that the rates at which total factor productivity, spending on technology, number of exporting firms, and exports grow are increasing with firm size. My results show that a reduction in China's tariffs induces Korean firms above median size to increase their productivity. Also, I find that the effect of any given tariff reduction is highest in the uppermost quartile of the firm-size distribution.

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1. Introduction

Total factor productivity (TFP), ever since its introduction by Solow in 1957, has been widely used to measure efficiency in all sectors. Even though earlier studies have focused on industry-level productivity, recent studies have looked more at firm-level productivity due to the greater availability of firm-level data.

In the international trade literature, empirical studies have focused primarily on the impact of trade liberalization on productivity and found that a reduction in input as well as output tariffs enhances productivity. Reductions in output tariffs can enhance productivity by inducing import competition, whereas cheaper imported inputs can produce productivity gains via learning, variety, and quality effects (Amiti & Konings, 2007). However, there is a gap in this literature. The effects of reductions in output tariffs in a trading partner country on total factor productivity have not yet been studied. The current study explores this relationship.

Productivity gains can be achieved as a result of economies of scale. When a trading partner country reduces its output tariff on the imports of a final good, the home country exports more of that good to the partner. This creates a scale effect that

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increases productivity. In addition, productivity gains can occur through the channels of the ‘selection effect’ and ‘technology adoption’ as in the seminal papers by Melitz (2003) and Bustos (2011), respectively. A reduction in a variable trade cost induces some firms that did not export before a tariff reduction in a partner country to enter into the export market. Also, trade liberalization in a partner country can increase productivity through the adoption of more advanced technologies, as in Bustos (2011).

In this paper, I study the impacts of China’s tariffs on Korean firm-level productivity. To look at the effects, I use Korean firm-level data derived from “Workplace Panel Surveys” (WPS) covering the period 2005–2009. The data set based on stratified sampling and collected in separate years includes the years 2005, 2007, 2008 and 2009. The surveys cover all Korean firms having 30 or more employees. Firms in the sample represent the actual size, industry and geographical distribution of firms in the population as recorded in the “Workplace Demographics Survey” issued by the National Statistical Office in Korea. The paper’s analysis restricts its focus mainly to single-plant firms in the manufacturing sector. The reason to limit our attention to single-plant firms is that only for such firms can we obtain fully consistent employment and financial information. Thus, I end up with an unbalanced 4-year panel of 1652 observations. Data on the output tariffs of Korea and its trading partners China, USA, the EU and Japan are taken from the World Trade Organization (WTO). The WTO provides the Most Favored Nation (MFN) tariff rates at the HS02 product level, which I have converted to the Korean Standard Industrial Classification (KSIC) at the two-digit level.

To test the hypothesis that output tariff liberalization in a partner country enhances firm-level productivity, I employ a two-stage approach. In the first stage, I calculate TFP at the firm level by using the methodology of Levinsohn and Petrin (2003). The TFP has been estimated separately for different industries.¹ In the second stage, I regress firm-level TFP on lagged China-tariff, firm-level control variables and some other effects, such as year and industry effects.

To investigate the effects of reductions in output tariffs in a trading partner country on total factor productivity, I first regress Korean firm-level TFP on the Chinese tariff and firm-level controlled variables. Firm-level controls include share of male workers, share of regular workers and share of workers above fifty years in total employment, age and foreign ownership. I also used industry and year effects in all specifications. The results show some evidence that trade liberalization in China has led to productivity gains for Korean manufacturing firms. More precisely, I find that a one percentage point tariff reduction leads to a 0.92% increase in the TFP relative to the average. While I am interested in how the impact of China’s tariffs on TFP varies by firm size, I find that firms above median size increase TFP as a result of a reduction in China’s tariffs. Moreover, results show that firms in the fourth quartile in Korea are more strongly affected by Chinese tariffs to increase their TFP than firms in the third quartile.

The rest of the paper is organized as follows. Section 2 provides the literature review. Section 3 describes an overview of trade policy in China. Section 4 describes Korean firm-level data and tariff data. Section 5 outlines the empirical strategy for identifying and estimating the effects of trade liberalization on total factor productivity. Section 6 presents the empirical results. Section 7 concludes.

2. The literature

2.1. The theoretical foundation

Many studies in the area of productivity and trade liberalization have found that lower output tariffs in a home country have enhanced productivity due to ‘import competition’ effects. They all draw upon theoretical models like Krugman (1979) and Helpman and Krugman (1985), where an increase in productivity occurs due to the scale effect. When there is trade liberalization in a trading partner country, domestic firms tend to increase exports, expand production scale and move down the cost curve (i.e., the scale effect). There is also another mechanism to increase productivity – namely, the selection effect. In this mechanism, some firms exit, and the market reallocates the released factors of production to the surviving firms. Since firms are symmetric in Krugman’s model, selection takes place on a purely random basis.

Melitz’s (2003) model incorporates the selection effect by introducing firm heterogeneity. Since firms have different levels of production capability, the more productive firms generate higher revenues and are more likely to enter the export market profitably due to exposure to trade. The more productive firms will expand by drawing resources from unproductive firms, which in turn forces the least productive firms to exit. This reallocation of market shares then leads to an average productivity gain. Also, some firms who did not export before trade liberalization in a trading partner country tend to start exporting after trade liberalization in a partner country due to a reduction in a variable trade cost.

Trade liberalization can enhance productivity through the adoption of more advanced technologies. According to Bustos (2011), more productive firms get higher revenues, which induce exporters to invest in new technologies. Only those firms with higher revenues are able to pay the fixed costs required to enter the export market profitably as a result of a reduction in tariffs in a partner country. Aw, Roberts and Xu (2011) developed a dynamic structural model by incorporating productivity as well as a producer’s decision to invest in R&D and participate in the export market. This model shows that a producer’s decision to invest in R&D and export is positively correlated with future productivity. Hence, when access to the export market increases as a result of tariff reduction in a partner country, firms observe an increase in productivity from larger market size and investments in exporting and innovation.

The above discussion leads me to propose the following hypothesis:

A tariff reduction in a trading partner country raises firm-level productivity.

¹ In some industries, there are not enough observations to estimate TFP by the LP method. To capture more observations in a sample, I estimate TFP in a group of similar industries.

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