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Learning by exporting effect in China revisited: An instrumental Approach ☆

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ABSTRACT

Does exporting increase the firm's productivity causally? Focusing on Chinese exporters over the period 1998-2007, we construct a new measure of firm-specific trade cost, based on the daily Baltic Dry Index (BDI), as an instrument of exports. The BDI is termed a leading trade cost indicator, reflecting the cost of utilizing dry bulk carriers which primarily consists of materials that function as raw material inputs to the production of finished goods. We find that a one percentage point expansion in exports raises firm total factor productivity by approximately 0.04 percentage point on average, which accounts for nearly 60 percent growth of the exporter's productivity over the period 1999-2007.

1. Introduction

As early as Sir Dennis Robertson (1940), trade openness has been characterized as an 'engine of growth' by which the goal of economic development and improving living standards can be achieved. At the macro level, the positive causal association that trade has on income has been encouragingly confirmed in the literature.[1] At the micro firm level, does the benefit of trade in lifting income levels extend to them as well? For instance, does exporting foster firm's productivity? [2] In this context, the answer is not always clear cut.

Following their path-breaking papers by Bernard and Jensen (1995, 1999), while researchers all over the world using firm-level data observe that exporters are more productive than non-exporters, however, the cause of this so-called export premium is still in debate. It may be the selection effect due to competition or the learning by exporting that drive productivity growth.[3] Generally,

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[1] See the works estimating the causal effect of trade on income by Frankel and Romer (1999), Irwin and Tervio (2002), Alcala and Ciccone (2004), Noguer and Siscart (2005), Romalis (2007), Feyrer (2009a, 2009b) as well as Lin and Sim (2013).

[2] Krugman (1992) proclaim that a country's ability to improve its standard of living over time depends almost entirely on productivity.

[3] If exporting yields significant productivity benefits (learning-by-exporting effect), the policy implications are quite different compared to exporting being advantageous because it selects the more efficient firms to compete internationally (selection effect), see Wagner (2007) and Harrison and Rodríguez-Clare (2010) for more details.

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Wagner (2007) notes that the self-selection hypothesis has been confirmed by various authors, while the evidence concerning the learning-by-exporting hypothesis is somewhat mixed.[4] However, in the literature revision of learning by exporting in developing countries, a significant positive effect of export experience on firm's productivity has been found in several case studies such as Aw, Chung, and Roberts (2000) for Korea, Van Biesebroeck (2005) for sub-Saharan 9 African countries, and De Loecker (2007) for Slovenia. Therefore, in this paper, we ask whether exporting will causally increase firm's performance in the world's largest developing and transition economy, China.[5] We have found that a one percentage point expansion in exports raises firm productivity by approximately 0.04 percentage point on average.

A main issue, often emphasized in the literature of identifying the learning-by-exporting effect, is that exporting is endogenous in the determination of firm performances, mainly due to the selection effect. To address this, we construct a new measure of trade cost as an external source of variation in exporting, which in turn is used to construct the within-firm estimate of the causal effect that exporting has on firm performance of China. Though earlier papers, for example, Kraay (1999), use firm data from China and find positive evidence for learning by exporting, they cannot distinguish clearly between the effects of exporting and the unobservable differences between exporting and non-exporting firms.

In order to address the selection bias, some studies used lags of firm performance as instruments, relying on assumptions about the underlying dynamic framework (Van Biesebroeck, 2005), however, since the decisions to export and how much to export are endogenous choices of the firm, these empirical specifications fail to convincingly isolate the causal effect of exporting on firm productivity. A series of recent studies use matching methods developed by Heckman, Ichimura, and Todd (1998) to address this endogeneity issue. They find significantly positive learning-by-exporting effects in various cases with China being included.[6]

However, matching can eliminate selection bias caused by observables but might not address bias associated with unobservable firm characteristics.[7] Therefore, our identification strategy using external trade cost as instruments can help us to address the selection bias in a more reliable way. In addition, papers using matching method usually look at the firm performance between exporters and non-exporters while our paper is looking at how exporting intensity affects firm performance across exporters.

In this regard, the most related paper is from Park, Yang, Shi, and Jiang (2010) who construct firm-specific exchange rate shocks based on the pre-crisis destinations of firms' exports during the Asian financial crisis for identification about the impact of exporting on firm performance in China. However, their instrument exploits a one-time shock relying on the special event in the past. The cross-sectional regression design makes it virtually infeasible to include firm-specific fixed effects while they can be included in our estimation strategy, which constructs an instrument for trade that draws on current, ongoing information. Thus, applying the rigorous panel data approach we can identify in our empirical analysis the effects of exports on firm productivity from, exclusively, the within-firm variation of the data.

In addition, our Baltic Dry Index (BDI)-based instrument contains ample time variation throughout the sample period as the BDI is a highly volatile time series, especially over the sample period 1999-2007 (See Fig. 1), whose volatility is related to China and is useful for generating sharp movements in exports in China.[8] Methodologically, our work is related to Lin and Sim (2013), which appears to be the first paper using BDI information. They study the effect that trade is income improving using country-level data while we study learning by exporting effect using firm-level data.[9]

The remainder of the paper is organized as follows. Section 2 discusses the construction of a measure of trade cost, based on the BDI, as an instrument for the firm exporting volume and the empirical strategy. Data ad some preliminary analyses of exporting premium are presented in Section 3. Section 4 presents the baseline results of our regression and Section 5 discusses some additional robustness checks. Section 6 concludes the paper.

2. The Baltic Dry Index and methodology

The Baltic Exchange has a long history going back to 1744 when it was first established through casual conversations between merchants and ships' captains at the Virginia and Baltick Coffee House in Threadneedle Street in London. In 1985, the Baltic Exchange launched the BDI, as a general indicator of shipment rates for dry bulk cargoes, mainly consisting of raw commodities such as grain, coal, iron ore, copper and other primary materials. Iron ore and coal are the two most important bulk commodities, comprising 27% and 26% of total dry bulk trade respectively, followed by grain at 14%. Every working day, a panel of international shipbrokers submits their view of current freight cost on various routes to the Baltic Exchange, and their assessment of the shipping rates are weighted together to create the index. Since its establishment, the BDI has become one of the foremost indicators on the cost of shipping and an accurate barometer on the volume of worldwide trade and manufacturing activity.

As can be seen in Fig. 1, the BDI is a highly volatile time series, especially over two periods-one over the period 2000-2006 and the other around 2008-2010, and the later documents the recent financial crisis, where it peaked in the second quarter of 2008 only to

[4] In this regard, Damijan and Kostevc (2006), as an example only, also fail to find the conclusive evidence of learning by exporting.

[5] Luong (2011) find no evidence of learning by exporting in the Chinese automobile sector.

[6] See, e.g., Girma, Greenaway, and Kneller (2004) for UK, De Loecker (2007) for Slovenia, Yang and Mallick (2010) for China, Masso and Vahter (2011) for Estonia, Ma, Tang, and Zhang (2011) and Du et al. (2012) for China.

[7] Moreover, Angrist and Pischke (2008, p51) point out that least square regression can actually be motivated as a computational device for a particular sort of weighted matching estimator.

[8] We will show that the high volatility of BDI during the sample period is largely driven by China in Section 2.

[9] Lin and Sim (2013) rely on BDI information to construct trade cost instruments to estimate the effect of trade on increasing income levels in least developed countries (LDCs) classified by United Nations, and they show the powerfulness of the instruments.