Trade Liberalization and Productivity Growth in Australian Manufacturing Industries

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Abstract

Although there has been a revival of interest in the trade-growth nexus, the impact of trade liberalization on productivity gains remains empirical, given the ambiguity in the literature on this issue. This paper examines the case for Australia using annual data of eight two-digit manufacturing industries from 1968-69 to 1994-95. Unlike earlier studies, total factor productivity growth is first decomposed into technological progress and gains in technical efficiency, and the effect of trade liberalization is then investigated separately on TFP growth, as well as on each of the components of TFP growth. The empirical finding that trade liberalization has a positive and significant effect on technological progress, but no significant effect on gains in technical efficiency, adds yet another dimension to the evaluation of trade liberalization policies. (JEL F1, L6, O3)

Introduction

The conventional wisdom that trade liberalization leads to productivity gains has found support from earlier studies, as well as recent studies, such as Dowrick [1994], Rodrik [1995], Harrison [1996], and Edwards [1998]. Proponents of trade liberalization argue that returns to entrepreneurial effort increase with exposure to foreign competition. However, Harrvylshyn [1990], Grossman and Helpman [1991], Rodrik [1992a, 1992b], and Tybout [1992] have questioned the importance of these supposed productivity gains. This skepticism stems from the view that trade liberalization might retard productivity growth by shrinking domestic firms' sales, which would in turn reduce the incentive for these firms to invest in technological efforts. Most skeptical of all are Rodriguez and Rodrik [1999], who voice serious doubts as to the very existence of an identifiable relationship between trade liberalization and productivity growth.

In the light of this debate, this study attempts to address Rodrik's [1995] lament on the cross country measurement of distortions by focusing on the effect of trade liberalization on a small open economy, Australia. Australia is a suitable case study because of its long history of protecting its domestic manufacturing sector. However, the post-1973 unilateral tariff reductions allowed Australia to show a reformed face with respect to trade liberalization. Most inter-temporal studies on Australian trade reform, such as Dixon and McDonald [1991], Chand [1999], Oczkowski and Sharma [1999], and Jayanthakumaran [1999], conclude that the impact of this trade liberalization on productivity gains is positive, although some of the studies only show a weak relationship.

This paper differs from the above mentioned studies by making two significant contributions. The first is in the measurement of productivity growth. While Dixon and McDonald

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[1991] and Jayanthakumaran [1999] used the partial labor productivity growth measure, Chand [1999] and Oczkowski and Sharma [1999] measured total factor productivity (TFP) growth using the non-frontier approach. Here, TFP growth is estimated using the frontier approach to overcome some drawbacks of the partial and non-frontier measures. The partial measure has long been criticized for not measuring overall changes in efficiency changes since it is affected by changes in the composition of inputs. TFP growth, on the other hand, allows for the impact of factor substitution as it considers the joint use of both capital and labor in production, but the non-frontier approach to TFP growth has two major problems. First, the residual TFP growth calculated using the growth accounting method in the non-frontier approach explains little, as it includes everything and anything of output growth not accounted for by input growth. This problem is avoided here as TFP growth from the frontier model is calculated using an algebraic decompositional analysis of output growth (see Appendix).

The second problem with the non-frontier approach is that it assumes the presence of technical efficiency [Atkinson and Cornwall, 1998]. Thus, its TFP growth measure is inaccurate, as it is synonymous with technological progress. But the literature on productivity growth has shown that TFP growth is composed of both technological progress and improvements in technical efficiency. Technological progress results from the advanced technology embodied in capital and is represented by the outward shifts in the production frontier over time. Increased technical efficiency, on the other hand, results from the more efficient use of technology and inputs (due to the accumulation of knowledge in the learning-by-doing process, diffusion of new technology, and improved managerial practice) and is represented by movements towards the best-practice frontier. Hence, by assuming technical efficiency, the non-frontier TFP growth is measured by frontier shifts only. In linking trade and productivity, Tybout [1992] states that it is a mistake to think of productivity growth as an orderly shift in the production function. Thus, the frontier approach, which identifies both the roles of technical efficiency and technological progress [Kalirajan and Shand 1994a] in industry performance, is used to obtain accurate TFP growth measures in this study.

The second contribution of this paper stems from the separate measures of technological progress and technical efficiency that constitute TFP growth. This allows the separate investigation of the impact of trade liberalization on each of these components of TFP growth, and so, enhances the analysis of policy implications. As technological progress and technical efficiency are analytically different concepts and could well move in opposing directions, there is no reason to expect trade liberalization to have a similar effect on both these components. Studies such as Pitt and Lee [1981], Nishimizu and Page [1991], Page [1984], Condon et al. [1985], Moran [1987], and Havrylyshyn [1991], which used the efficiency-frontier methodology to investigate the impact trade liberalization, did so using only the technical efficiency measure and ignored technological progress. The ignored interactions between these components of TFP growth may provide a consensus on the productivity effects of trade liberalization in studies of different countries. In addition, the effect of trade liberalization on an economy's productivity growth could take on a U-curve or an inverted U-curve relationship over time, if there are offsetting effects of trade liberalization on technological progress and technical efficiency that change over time.

The paper is organized as follows. The next section provides a brief summary of the type of assistance provided to the Australian manufacturing sector over time. Section three sets out the theoretical framework of the stochastic frontier model, and section four discusses the data sources. Section five presents the estimated production frontier and the measures of