

# The effects of openness, trade orientation, and human capital on total factor productivity

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## Abstract

We study the effects of openness, trade orientation, and human capital on total factor productivity for a pooled sample of developed and developing countries. Total factor productivity emerges from a parsimonious specification of the aggregate production function. Potential determinants of total factor productivity include measures of openness, trade orientation, and human capital. Higher openness benefits total factor productivity. Outward-oriented countries experience higher total factor productivity, over and above the positive effect of openness. Human capital generally contributes positively to total factor productivity. In poor countries, however, human capital interacts with openness to achieve a positive effect. © 2000 Elsevier Science B.V. All rights reserved.

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## 1. Introduction

Students of trade theory and policy have since the time of Adam Smith debated whether openness and trade liberalization provide the necessary ingredients for

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economic growth. Edwards (1993) describes the ebb and flow of this debate during the latter half of the twentieth century. Various protectionist theories captured the major attention of trade policy makers after World War II. During the last two decades, however, a growing body of empirical evidence has legitimized the role of market-oriented reforms and trade liberalization. Now, the International Monetary Fund and the World Bank make market-oriented reforms and trade liberalization a condition for financial aid.

The effect of openness and trade liberalization on economic growth remains a highly contentious issue, however.<sup>1</sup> Trade and exchange rate regimes interact with other economic and non-economic factors to affect changes in real per capita income.<sup>2</sup> Larger trade implies greater openness that facilitates the economy's adoption of more efficient techniques of production, leading to faster growth of total factor productivity and, hence, real per capita income.<sup>3</sup> The expansion of exports relaxes the foreign exchange constraint and allows for larger imports of key inputs in the production process. Finally, improvements in the terms of trade can exogenously increase output.

The empirical tests of the effects of openness and trade orientation on economic growth (e.g., Dollar, 1992; Sachs and Warner, 1995; Edwards, 1998) typically employ cross-section analysis. Edwards (1993) argues that "A more precise answer to this general question (how openness and trade orientation affect output growth) would require more detailed analysis relying, at least in part, on time series data, ..." (p. 1385, parentheses added) and to examining, among other things, "... the robustness of specific results ..." (p. 1390). We employ pooled cross-section, time-series data with robustness analysis to improve the likelihood of uncovering important links between openness and trade orientation and total factor productivity.<sup>4</sup>

The reemergence of the importance of growth theory has also refocused much of the debate toward how public policy can affect economic growth. The standard

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<sup>1</sup> Theoretical support for a positive linkage between trade liberalization and growth appears in the newer theories of endogenous growth such as Romer (1986) and Lucas (1988). Other authors such as Krugman (1994) and Rodrik (1995) are skeptical of the trade liberalization-growth nexus. Numerous empirical studies attempt to establish that nexus (e.g., Dollar, 1992; Sachs and Warner, 1995; Harrison 1996; Edwards, 1998). Rodriguez and Rodrik (1999) argue that the empirical evidence to date does not provide convincing evidence.

<sup>2</sup> Mankiw (1995) and Ventura (1997) argue that the process of equalization of factor prices internationally improves the substitutability of capital and labor, thus, improving growth prospects.

<sup>3</sup> Romer (1992) and Barro and Sala-i-Martin (1995), for example, make this argument.

<sup>4</sup> Harrison (1996), for example, argues that developing countries exhibit significant adjustments in trade regimes over time. Cross-section analysis misses those important policy changes. Moreover, she finds stronger results for her pooled cross-section, time series findings than her pure cross-section findings, supporting her observation.

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