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European Economic Review 49 (2005) 1637–1663

EUROPEAN  
ECONOMIC  
REVIEW

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# Relative wages and trade-induced changes in technology<sup>☆</sup>

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Received 28 August 2001; accepted 19 June 2003

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## Abstract

We develop a model where trade liberalization leads to skill-biased technological change, which in turn raises the relative return to skilled labor. When firms get access to a larger market, the relative profitability of different technologies changes in favor of the more skill-intensive technology. As the composition of firms changes to one with predominantly skill-intensive firms, the relative demand for skilled labor increases. This way, we establish a link between trade, technology and relative returns to skilled and unskilled labor.

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*JEL classification:* F12; F15; J31; O33

*Keywords:* Technology; Trade; Economic integration; Relative wages

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## 1. Introduction

Although the debate about the causes of increased wage inequality in industrialized countries has been going on for many years, no clear consensus has as yet emerged. The empirical literature has established a number of empirical facts, but theorists have not agreed on which theory, or theories, is consistent with these facts. In particular, there is still no consensus about the extent to which increased foreign competition through trade has played a role in what seems to be a shift in labor demand towards highly skilled

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<sup>☆</sup> This is a revised version of CEPR Discussion Paper No. 2677.

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workers and away from low-skilled workers. A number of studies have concluded that skilled-biased technological change seems to be the main driving force behind this development, whereas increased import competition from low-wage countries appears to have played only a minor role (e.g. Berman et al., 1994; Desjonqueres et al., 1999). However, it has also been pointed out that technological change may be driven by factors related to the increased integration of product markets (see e.g. Burda and Dluhosch, 2002; Haskel and Slaughter, 2001; Falvey and Reed, 2000; Neary, 2002a, b). Yet, the nature of a possible link between technological change and increased competition through trade remains largely unexplored.

In this paper, we explore such a link by developing a model of imperfect competition and intra-industry trade with heterogeneous firms utilizing technologies that differ in their relative use of skilled and unskilled labor. Two technologies are available: a “modern” one and a “traditional” one. The modern technology is associated with relatively high fixed costs and relatively low variable costs. Market integration (in the form of reduced trade costs) leads to an expansion of the market for the individual firm, and enhances the profitability of modern relative to traditional firms. As a consequence, the relative return to skilled labor increases, at the same time as the skill-intensity in the industry increases; a phenomenon that has been observed in the empirical literature but is hard to reconcile with traditional trade theory and the Heckscher-Ohlin-Samuelson model.

In our analysis, the exogenous change that triggers an expansion of trade and a change in technology is product market integration between similar economies. The resulting trade expansion is purely intra-industry in nature. Thus, unlike most of the literature on trade and income inequality, we focus on North–North trade rather than North–South trade. By focusing on market integration between industrialized countries, our model links trade liberalization to changes in technology in a way which we believe captures an important driving force behind the recent increase in the relative demand for skilled labor in these countries.

We show that product market integration may give rise to technological change—attained through a change in the composition of firms—which increases the relative demand for skilled labor. However, we also show that when trade costs fall below a certain threshold, at which all firms are using the more skill-intensive technology, and there can thus be no further change in the composition of firms, further trade liberalization leads to a fall in the relative return to skilled labor. The reason is that firms expand output by increasing their variable costs, which are relatively intensive in unskilled labor.

The rest of the paper is organized as follows: Section 2 gives a brief review of the related literature. Section 3 presents the basic features of the model. In Section 4, we analyze the relationship between market integration and technological change, and derive the impact on relative factor returns and factor intensities of increased economic integration. Finally, in Section 5 we offer some concluding remarks.

## **2. Related literature**

The empirical literature on the sources of an increased skill-premium in the industrialized countries is vast. A number of studies have been carried out using data from

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