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The digital divide: understanding the economics of new information and communication technology in the global economy[☆]

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Abstract

The digital revolution is engendering a global digital divide because of composition effects. Composition effects stem from the interaction between the direction of technological change and relative factors prices and are necessary to understand the comparative economics of new information and communication technology in the global economy. A comparative approach makes it possible to assessing the gaps among countries in their ability to take advantage of the new technologies, in terms of profitability of adoption and their impact on total factor productivity growth and global markets shares.

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1. Introduction

The digital revolution is engendering a global digital divide. It is more and more evident that the introduction of new information and communication technology (ICT) in the global economy parallels widening and ever increasing asymmetries among countries and even regions within countries. Such a new gap is worth a detailed analysis, which the tools elaborated in this work, might help.

ICT can be portrayed as a locally neutral general purpose technology, which consists both of a radical shift in the production functions of a large array of goods and a significant bias, at least for adopting countries. ICT in fact can be stylised as a non-neutral, capital and skilled labour intensive technology for most countries. Clearly it is a technology which exhibits significant bias effects when applied outside of the original context of first introduction and implementation, the US (David, 2001; Jorgenson, 2001; Quah, 2001; Brynolfsson and Kahin, 2001).

Much attention has been given in the economics of innovation tradition of analysis to the rate of technological change. Much less analysis has been focused upon the direction of the new technologies being introduced and to the structural characteristics of the economic systems into which the new technologies are being introduced. As a matter of fact the direction of technological change and the context of introduction interact in many ways and affect in depth the actual effects of technological change. When technological change is biased, the context of introduction plays a key role in assessing the effects in terms of total factor productivity growth.

When a new technology is biased, in that it favors the more intensive use of a production factor, the effects in terms of productivity growth will be stronger, the more abundant and hence less expensive the production factor. This dynamics has major effects, in terms of emerging asymmetries among firms and regions in the global competitive arena. Such asymmetric effects are reinforced and amplified by the dynamics of relative prices. When, with a given biased technology, relative factors prices, as distinct from absolute factor costs levels, change, average costs also change. Specifically all reductions in the costs of the most productive factor have direct effects in terms of a reduction of the production costs. Such changes in production costs, even if are not accounted by total factor productivity measures, have powerful effects upon the competitive advantage on global markets of rival firms based in heterogeneous factors markets.

Much current analysis of the effects of the new wave of technological change seems to miss the necessary systemic understanding of the structural characteristics of the economic system into which the new technologies are being introduced. More generally, too much attention has been paid to assessing the effects of the rates of technological change. Too little analysis instead, has been devoted to understanding the effects of the direction of technological change. Even more obscured has remained the issue of the interactions between the rate and the direction of technological change in a dynamic and complex context, one where factors costs are allowed to change in time and in space (Antonelli, 1995, 1999).

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