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Technological progress, structural change and productivity growth: a comparative study

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Abstract

The relationship between the economic structure of a country and its productivity growth has received a lot of attention in recent decades. For instance, several theoretical models in this area now suggest that countries that specialize in technologically progressive industries will enjoy high rates of growth compared to other countries. This paper focuses on the impact of specialization and structural changes on productivity growth in manufacturing, using a sample of 39 countries and 24 industries between 1973 and 1990. The results show that while structural change on average has not been conducive to productivity growth, countries that have managed to increase their presence in the technologically most progressive industry of this period (electronics) have experienced higher productivity growth than other countries. © 2000 Elsevier Science B.V. All rights reserved.

Keywords: Technological progress; Structural change; Productivity growth

1. Introduction

The relationship between the economic structure of a country and its productivity growth has received a lot of attention in recent decades. For instance, several theoretical models in this area now suggest that countries specializing in technologically progressive ('high tech') activities will enjoy high rates of productivity growth compared to other countries (see, e.g. Lucas, 1988, 1993; Grossman and Helpman, 1991). Countries specializing in 'low-tech' activities, on the other hand, should be

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expected to have relatively slow productivity growth. In a globalized world, this may not imply slower growth in welfare in the latter as long as differences in productivity growth are fully reflected in prices. However, if producers of high-tech products are able to keep most of the rewards from faster technological progress to themselves by controlling prices (Reinert, 1993), the prospects for countries specialized in low-tech may be rather bleak. In such a case, it may pay off for a country to change its pattern of specialization towards more promising areas through policy intervention, as suggested by Lucas (1988).

Despite the growing interest, and the novelty of some recent modeling efforts, this is not a new line of research. Arguably, the idea that the economic structure — and changes in this pattern — matters for growth is as old as economics itself (Reinert, 1993, 1995). Salter (1960), in his now classic work on productivity and technical change, emphasized that the scope for technological progress/productivity advance differ markedly across industries. Hence, ‘a flexible structure of production is an important element in the high rate of productivity increase, for it allows an economy to rapidly redistribute its resources so as to take maximum advantage of changing patterns of technological progress’ (ibid. p. 9). In his empirical analysis of UK productivity growth in the first half of the 20th century he showed that this flexibility, i.e. the ability to undertake structural change, was of great empirical importance: ‘This suggests that structural changes play a role equally important as increases in productivity within individual industries’ (ibid. p. 151). The growth-accounting literature (Denison, 1967; Chung and Denison, 1976) also emphasized structural change as a major impetus to growth¹. However, in contrast to the detailed analysis of Salter, these later studies focused mainly on the shift from agriculture to manufacturing. Consequently, the growth accounting literature has little to say about the possible impact of specialization and structural change within manufacturing on productivity growth. This holds also for the more recent exercises in this tradition (e.g. Young, 1995).

This paper focuses on the relationship between specialization, structural change and productivity growth in manufacturing in recent decades. The perspective is similar to that of Salter in the sense that we analyze the manufacturing sector as composed of a number of different industries. However, we share with Denison the comparative approach to studies of economic growth: the present sample includes 39 market economies (on different levels of development), basically all countries within this category for which data are available. The next section presents the data and shows how productivity growth differs across industries and countries. We also analyze the extent to which rapid productivity growth goes hand in hand with low price growth. Then we turn to the relationship between structural change and productivity growth, using both an accounting approach (shift-share methodology) and econometric testing. The final section outlines the main findings and discusses the implications for policy.

¹ For an overview see Fagerberg (1994).

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