

## **7 Trade, Human Capital and Innovation: The Engines of European Regional Growth in the 1990s**

Harald Badinger and Gabriele Tondl

*Vienna University of Economics and Business Administration, Austria*

### **7.1 Introduction**

Regional disparities have been a major policy concern in the European Union, in particular since its Southern enlargement. Widely known as the Union's cohesion problem, it gave rise to the implementation of EU regional policy supported by substantial financial assistance from the Union's budget. Although regional disparities have shown a tendency to decrease gradually, the regional convergence process has been interrupted several times. After the post 1975 period of divergence, a period of convergence set in with the accession of Southern countries to the EU and the warm-up phase of the EU's Internal Market 1986-1992. Thereafter, growth developments of the 1990s again suggest a modest convergence.

Given this background, this Chapter wishes to discover what has determined growth of EU regions in the 1990s and to offer an empirical assessment of this process. Hereby we shall particularly focus on endogenous growth factors, potential channels of technology transfer, and trade. These specific growth aspects have been only partially analyzed in regional growth studies for the EU (Fagerberg and Verspagen 1996; Fagerberg et al. 1997; Vanhoudt et al. 2000; Paci and Pigliaru 2001; Tondl 2001). A systematic assessment of regional growth based on an explicit endogenous growth model and trade theory is missing. Therefore, we shall combine theoretical aspects of the human capital and innovation growth literature (Lucas 1988, Romer 1990), catching-up theory (Abramovitz 1986, 1989) and trade and integration theory (Grossman and Helpman 1991; Baldwin 1993) in order to examine growth factors and mechanisms in EU regions. For our empirical analysis we have compiled a large dataset, with many variables not used thus far, for 159 regions in the 1990s, and will test the importance for regional growth of educational attainment, patenting activity, regional trade, and technological catching-up by estimating a spatial cross-section growth accounting model. In this model, growth is explained by factor accumulation, endogenous factors, technology transfer conditioned by endowment factors and transmitted by trade, and finally the growth of other

regions within a certain distance. As to the estimation, we use a spatial lag model (Anselin 1988) which optimally specifies the growth process of EU regions and use the general spatial two stages least squares estimator (GS2SLS) as suggested by Kelejian and Prucha (1998).

Our results indicate that the income growth of EU regions is above all determined by the fundamental growth factors physical capital and labour participation, but it is also to a great extent related to the growth performance of surrounding regions. High growth regions are close to other dynamic regions. Further, higher education attainment levels and changes are clearly associated with higher growth. Higher education is also an important prerequisite for technological catching-up by lagging regions. Finally, we find that a high foreign trade share contributes to regional growth, also by promoting technological catching-up.

The rest of the Chapter is structured as follows: Section 7.2 discusses the main issues raised in the Chapter and reviews the literature. Section 7.3 describes the model we estimate. Section 7.4 gives data definitions, discusses econometric procedures and presents the results of the estimation. Section 7.5 concludes.

## **7.2 Theoretical Arguments: How may Common Growth Factors Together with Trade and Economic Geography Factors Determine the Growth of EU Regions?**

The growth of European regions exhibits no distinct convergence mechanism, i.e. a growth surplus of poor regions vis-à-vis rich ones. Rather, it is the case that one can find high growth associated with both rich as well as poor regions.

This suggests that multiple growth paradigms govern regional growth in Europe. Evidently, a neoclassical convergence mechanism has helped poor regions to converge (European Commission 2000; Tondl 1999). Endogenous growth based concepts permitted rich regions to maintain a leading income position (Tondl 2001). In addition, European regions have become increasingly integrated with other European as well as global markets, particularly in the 1990s after the creation of the Single Market and the WTO Uruguay Round. Trade flows and other kinds of international interactions seem to have become substantial for EU regions and are likely to favour technology transfer on an international scale. Finally, since regions are not isolated economic entities, there is reason to assume that their growth may be linked to that of other regions.

We will examine these possible sources of European regional growth more closely and review the findings of the existing literature in order to extract the working hypotheses for our investigation.

First, given European regional income disparities and considering the neoclassical convergence hypothesis, one may suppose that physical capital accumulation should play an important role for the growth of lagging regions, especially as investment in a new generation of capital is also linked with technological advance (Kaldor 1961). Moreover, as a part of capital consists of