6 Research Human Capital, Investment and Trade: Further Empirical Evidence

Is nation-specific accumulation of ‘technical’ human capital the ultimate source of long-run output growth at the manufacturing level? Is catching-up in manufacturing’s productivity levels in the OECD context correlated with human and physical capital accumulation? How does trade performance over the long run relate to investment patterns in OECD manufacturing? What can one say about the relationship between endogenous sources of technology and trade performance over the long run? These are the questions that this chapter addresses.

So far, the empirical investigation has been centred on the long-run determinants of output growth across OECD manufacturing. This chapter makes a tentative examination of the sources of variation in research human capital, the proxy for endogenous technology, and other important variables used in the analysis. The former variable is, of course, a key right-hand-side variable in the growth regression equations of earlier chapters. The other variables of interest are: the average productivity gap (the catch-up term) and its rate of change; the average share of investment in sectoral GDP; and average net exports (a measure of trade performance or comparative advantage) over the long run. The latter two variables, although tested in the growth specification at some stage, have proved not to be relevant in the best fitted specification.

In relation to research human capital, data limitations do not allow one to estimate the determinants of its rate of change for the appropriate period nor, as would be desirable, to build a simultaneous equation system (for example a two-stage least squares). Rather, one is able partially to explore the endogeneity of the rate of change of research human capital for a much shorter period (1981–87) using the limited number of available observations. Overall, the problem of reverse causality is an important one when correlation among variables at the sectoral level are considered.

The empirical findings indicate that growth in nation-specific technical human capital is an important part of the explanation behind the rate of variation of research human capital, lending support to its interpretation as the ultimate source of variation in growth rates across countries. The speed
of the catching-up process in productivity levels is found to be negatively correlated with the initial level of human capital, and only weakly correlated with investment. On the other hand, investment share is positively correlated with net exports and with the initial labour productivity gap, but only for sectors in the G-O countries. Trade patterns are positively correlated with endogenous technology-related variables, but the resulting trade equation differs significantly between manufacturing sectors in the G-5 and G-O groups.

This chapter is structured as follows. Section 6.1 estimates the determinants of growth of research human capital and of the average catching up in productivity. Section 6.2 explores the determinants of investment patterns in OECD manufacturing. Section 6.3 examines the sources of long-term comparative advantage in an endogenous technology setting. Finally, section 6.4 provides a review of the findings and their implications, plus some remarks on how OECD patterns of investment and trade in manufacturing are shaped by consideration of endogenous sources of technology.

6.1 RESEARCH ACTIVITIES, HUMAN CAPITAL, AND THE CATCHING-UP HYPOTHESIS

This section examines the impact of national measures of human capital on the growth of research human capital and on productivity convergence rates.

The results described in Chapter 5 attested to the positive and significant effect of RSEs (the average number of research scientists and engineers at the sectoral level) on manufacturing output growth. These results provide robust support for central aspects of Romer’s (1990c) theory. However, when cross-industry, cross-country-level (not rates) differences in research human capital employed are explicitly considered in a growth equation, they are treated as an exogenous variable that is associated with variations in the rate of technological change.

The key question that arises, then, is what explains the dynamics of the RSE measure. I will address this issue by exploring the determinants of the growth in RSEs between 1981 and 1987. RSE data availability (see Appendix 1, Table 1.2) makes this restriction necessary.

Because the logarithm of RSE in 1981 is the regressor in the estimated growth equations (see Table 5.1), the regression analysis to be conducted in this section is not appropriate for building a two-stage least-squares model to account for the full endogeneity of RSEs. Rather, as stated above, we shall examine the determinants of the measure’s annual average