Reading productivity and economic trends

Part 5: The process of technology assimilation

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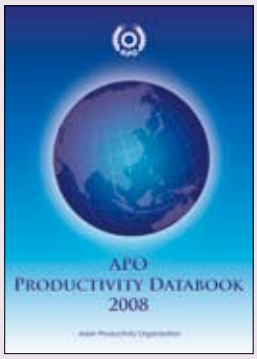
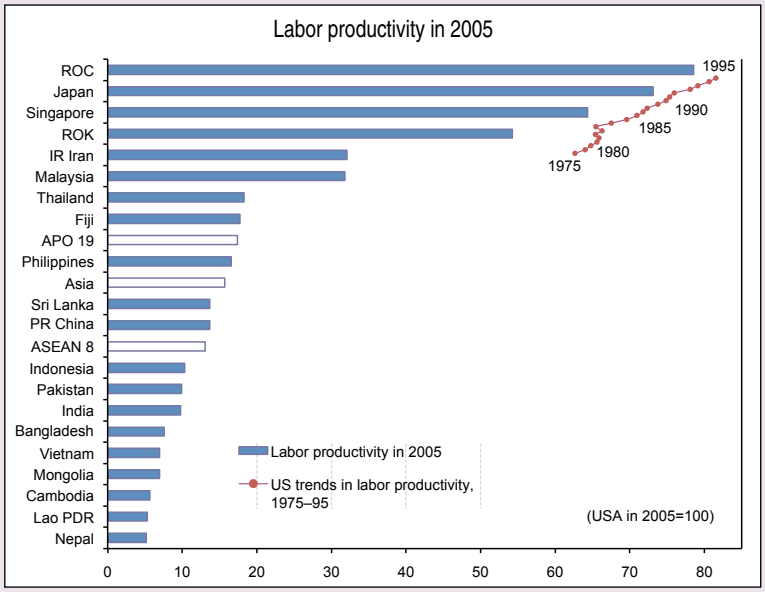


Technological transfer plays a key role in economic development. Part of the technological advancement is embodied in capital goods, which can be acquired through investment. But how to master the embodied technology to yield its full productivity potential in the host country is largely tacit and requires learning by doing. This process of technology assimilation can be slow, disruptive, and costly. How successful a country can be in this respect depends on its social and technological capabilities. Empirically, assimilation rates vary across countries, resulting in diverse development experience and outcomes.

As mentioned previously in this column, the Asian miracle was credited largely to input accumulation rather than to total factor productivity growth. Focusing on level comparisons of Asian and US manufacturing for the period 1963–1997, Marcel P. Timmer (*Journal of the Japanese and International Economies*, 2002; 16: 50–72) observed that labor productivity levels achieved by the Republic of China and Republic of Korea in 1997, even after a period of capital intensification, were lower than what the USA had achieved at similar levels of capital intensity. In other words, capital accumulation might have created the potential but was itself not a sufficient condition for performance; the same amount of capital was used more productively in the USA in the 1970s and 1980s than in the Republic of Korea and Republic of China in the 1990s. Although capital intensity was not covered in the *APO Productivity Databook 2008*, the accompanying chart shows that labor productivity at the whole economy level in the Republic of China was 79% that of the USA in 2005, whereas the Republic of Korea's in 2005 was 85% and 55% of the US 1975 and 2005 levels, respectively.

The USA's superior assimilation ability was also apparent in comparisons with Europe. The divergent productivity performance in the latter half of the 1990s was largely attributed to the failure of Europe to reap productivity gains from ICT investments compared with the USA. Empirical evidence therefore suggests that soft investment in organizational change, managerial skills, and human capital is required to complement the accumulation effort.



Given the diminishing possibilities for further productivity improvements with a particular technology, sustained growth must involve the continual introduction of new technology, new goods, and new activities. However, the pace of the climb up the technological ladder can be too fast if insufficient time is allowed for the assimilation process and learning costs are too high to be beneficial to productivity growth. On the other hand, countries can also be stagnant in productivity growth with the existing technology when the pace of technological change is too slow and new opportunities are not created. The right balance is difficult to judge a priori, and different industry sectors even within a country can display diverse capabilities in adopting new technologies and pushing the frontier. In general, flexibility of a country in resource allocation and factor markets with a well-educated workforce will be conducive to the process.

Contributors

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