

Productivity Growth of Resource Accumulation in the Cities of Japan

Topic: 714D Productivity and Efficiency (2)

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In society, accumulated social infrastructure such as buildings, roads, and railways are the basis for human life and productive activities (Fischer-Kowalski, 1998). The accumulated resources associated with buildings and infrastructure construction (the stocks of accumulated iron products, concrete, timber, etc.), however, differ substantially over cities (Tanikawa et al., 2015). In Japan, particularly since World War II, vast quantities of roadways and urban structures have been built, resulting in a massive accumulation of resources in cities (Tanikawa et al., 2015). It is unclear, though, how efficiently this accumulated investment of resources has been utilized. The present study employs a Data Envelopment Analysis (DEA) framework using a long-term panel data of the physical stocks of buildings and infrastructure (roadways and railways), labor force and gross output of Japanese 46 cities during the period of 1970 to 2010. This study analyzes the change in the efficiency of production resulting from the labor force and stock accumulation in Japan's cities for the study period in order to evaluate how this efficiency has changed over the years. In addition, by identifying cities where production efficiency has increased or decreased, the study explores possible ways of improving production efficiency in relation to the stock of resources in Japan. The results show that productivity change in each city, between 1970 and 1990, productivity increased in almost all of Japan's cities. One factor behind this was that the technical change—or in other words, the development of an efficient production frontier—gave rise to substantial productivity growth. On the other hand, between 1990 and 2010, productivity declined in approximately 80% of Japan's cities including big cities such as Tokyo, Osaka and so forth. One reason for this was that catch-up to the efficient production frontier failed to occur in any of these cities, while the frontier itself also retreated. It is clear from these results, therefore, that the productivity in most of Japanese cities peaked in 1990 and declined after 1990 steadily.