

On the Relationship between Labor Force Ageing and Productivity in Japan: Evidence from Prefecture Panel Data Approach

Keiji Hashimoto
Department of Economics
Otemon Gakuin University,
JAPAN
keiji@res.otemon.ac.jp

Abstract

In Japan, as well as almost of other developed countries, we are now experiencing the demographic change, due to the decreasing of numbers of children and the increase of the shares of aged people. How does it affect the labor productivity or the economic growth? In this study, using the panel data of Japanese prefectures and the econometric methods recently developed, the relationship between the labor force ageing and its labor productivity is investigated from the viewpoint of macroeconomic analysis.

Labor productivity depends on the amount of capital per worker in the economy, on the skills held by the workforce and on the ability of the economy to organize productive resources so as to maximize output (total factor productivity). As to the demographic factor related to the labor productivity, the older workers may be less productive, other things to be equal, than younger workers, typically because of the differences of easiness of new technology adoption. Preceding studies have reported that older workers are on average less productive than younger workers as a whole. Some of them, based on the evidence from various countries or industries including in Japan, showed that the age of the workers and their productivity is in an inverted U-shaped relationship. Almost of all the preceding studies focused only on the age of workers as one of the properties of labor.

In this study, targeting the Japanese economy, in addition to the age of workers, we introduce the factor of human capital, i.e. education attainments of the workers. Little attention to the effects of (higher) education to labor productivity has been given to the point in this research area.

Among a few of the preceding studies from the viewpoints above, Tang and Macload ("Labour Force Ageing and Productivity Performance in Canada," *Canadian Journal of Economics*, 2006), using the 10 Canadian provincial panel data 1981-2001, found that the older workers are *less productive* than younger workers, and the university 'premium' is also *less* for *older* workers than for younger workers. It is considered that these findings are quite interesting from the viewpoint of taking account of the role of human capital or education in the labor market.

We are also concerned with the relationship between labor force aging and its productivity, taking account of the education attainments of them in Japanese labor market. That is, the objective of this study is to empirically investigate the relationship between labor force ageing and productivity by concerning the following two questions: (1) Are older workers (aged 55 or over) less productive than younger workers (aged under 55)? and (2) is the university 'premium' in the productivity performance higher for younger workers than for older workers?

In order to consider these questions, the econometric models for the labor productivity function including the shares of the workers by education and age in total employment and other factors as explanatory variables are estimated and their estimating results are reported. Data on GDP, labor by age and education, capital stock and other variables for all 47 prefectures in Japan, covering 1977-2007(quinquennial), are extracted and derived from various sources at Japanese government.

Applying some econometric methods for panel data analysis, we found the opposite results related to the role of workers with higher education: Older workers are *less productive* than younger workers, but the university 'premium' is *higher* for *older* workers than for younger workers. These results are interesting and unique from the viewpoints of the roles of human capital or the effects of higher education in Japanese economy.

Key words: ageing, labor productivity, human capital, panel data, Japanese economy