Technology Innovation, Human Capital and R&D Effects on Economic Growth

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This paper analyzes the economic effects of the S&T Innovation, R&D, human resources and investment on the economic growth using 18 countries. We have obtained the somewhat mixed results on the existence of unit root roots in variables. While most of Pedroni cointegration tests show that there are no panel cointegration among the variables, Kao cointegration test shows that there is the panel cointegration among the variables such as GDP, human capital, R&D investment and patent. Kao cointegration test result shows that human capital, R&D investment, patent economic growth seem to have the panel cointegration or the long-run relationship among them as a whole.

The estimation results of individual OLS and panel estimation show that the human capital, R&D investment and technology innovation or patent had positively significant effects on economic growth or GDP.

Keywords: Technology, Innovation, R&D, Human Capital, Economic Growth
I. Introduction

Economic growth models are derived from the Solow model which asserts that various types of capital and labor are crucial for economic growth. Economic growth is fostered by increases in the amount of capital and labor as well as expansion in technology, which is enabled by both public and private R&D sectors.

The relationship between economic growth and R&D activities has been one of the most important topics in the economic growth literature that has focused on R&D activities as a requisite for endogenous growth, for example, Romer (1990), Grossman and Helpman (1991), Aghion and Howitt (1992, 2005) and Lucas (1988).

It is important that there is adequate accumulation of technology and innovation through R&D investments as it affects absorptive capacity, technological opportunities and intelligence poverty. Economic growth are supported by models based on research and development (R&D) activities or models in which economic growth is driven by technology and innovation with implications for R&D.

An expansion in the size of the R&D labor force is closely associated with economic growth; the fruits of R&D activities are also found to correlate positively with economic growth. However, despite previous research that has verified the possible existence of effects, empirical tests of a positive effect on growth at the national level, the size of the R&D sectors, or of other types of scale effects should be evidenced by endogenous growth models based R&D.

Without the controversy that comes with simplified model versions, mechanisms within the neoclassical growth model can be extended by including R&D. The major factors that relate to R&D productivity are investments in R&D education, research based on human capital, and technological innovation. The long-term per-capita economic growth is both driven and greatly affected by productivity growth. But not many applied macroeconomic models of economic growth have been tested yet using recent panel data.

Hence this paper examines and empirically analyzes whether the human capital, innovation, and R&D investment can affect the economic growth. To do this, we review the existing relevant literature. And then we will do the several empirical tests such as cointegration tests to analyze whether there is a long-run relationship among the human capital, innovation, R&D investment and the economic growth.

Thereafter, we will do the individual country OLS estimation and then the panel