

Evaluation of Knowledge Stocks of R&D Expenditures as Intangible Assets on Static/Dynamic TFP Measures by Input-Output Framework

Topic: Mathematical Analysis and Thematical Applications

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In the 21st century, the world has confronted substantial structural change from a top-down vertical division labor system to a flat and interconnected platform. Such change may drastically reconstruct the former production structure which were desirable so far. Since 2011, Japan's ministry of education, science & technology (MEXT) has proposed a 15-year project called Science for RE-designing Science, Technology and Innovation Policy Project (SciREX) to make evidence-based R&D policy evaluation. For making references for policy options, the SciREX Policy Analysis Intelligence System (SPIAS) was constructed with the following functions: i) SPIAS- \hat{I}^2 , a comprehensive R&D data-base consists of inputs (funding), research results, patents and productivity index by industry; ii) SPIAS-c, which try to make policy scenarios based on the data of SPIAS- \hat{I}^2 that linked by production efficiency parameters by industry; iii) SPIAS-e, an economic simulator to project the alternative policy options of the impacts on industrial sectors as well as macro economy during the year 2020-2050.

In this research, we compiled Japanese input-output table in which R&D expenditures were internalized as intangible capital investment, enabling the evaluation on intangible assets as knowledge stock by quantity and quality measures. By the process, R&D investment by government as well as industry that contribute to static/dynamic total factor productivity (TFP) improvement could be observed and coped accordingly to determine the production efficiency improvement by industry through industry linkage.

Finally, the simulation results of macro and sector indicators such as GDP, wage rate, fiscal deficit, working hour, price index, etc. will be shown the possible consequences of R&D expenditure under Japan's severe condition of aging society and shrinking population. It is to be stated that the purpose of such economic model does not serve for economic forecast, rather, the projection of economic indicators provides information about the change on socio-economy with implication of technology input and other policy measures to accommodate the structural change for obtaining sustainable development in a new social style.