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Determinants of national innovation capacity in developing countries: An empirical survey

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Abstract. National innovation capacity is seen as the main source of sustainable growth and prosperity of countries. National innovation capacity, being both an economic and political asset, is defined as the potential of a country to produce innovation. At the same time, measuring the capacity of national innovation provides important information about the dynamics of innovation in the field of economics. Also, it is seen that most of the studies on national innovation capacity have focused on developed countries. In this study, it is aimed to make an empirical analysis of the determinants of national innovation capacity in developing countries in comparison with developed countries. For this purpose, variables considered to be determinants of national innovation capacity are classified under three headings as national technological capability and infrastructure factors, external factors, and institutional factors. In most studies in the literature, national innovation capacity is represented only by the number of patents in the empirical analysis. However, in most of these studies, the disadvantages and deficient aspects of representing national innovation capacity only with the number of patents are mentioned and almost no alternative methods have been suggested. Based on the suggestions and methods in empirical studies, the national innovation capacity index is calculated and represented as a new output variable representing the national innovation capacity in the effort to fill the relevant gap in the literature. In the study, data in the period of 1996-2016 are analyzed by the panel data analysis method for 18 developing countries and 31 developed countries. The effects of national technological capabilities and infrastructure factors of national innovation capacity in developing countries are seen to be weak. At the same time, it is seen that external factors have a positive effect on national innovation capacity in these countries and this indicates the dependence on foreign technologies in the development of technological capabilities.

Keywords. National Innovation Capacity, National Technological Capability, Developing Countries, Panel Data Analysis.

JEL. O32, O33, C23.

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Highlights

* In this thesis, the conceptual and theoretical framework of technological development and the national innovation system is discussed.
* The economical evaluation of technological developments is made within the framework of Neoclassical and Evolutionary approach.
* Information is given on the characteristics, actors and capacity of the national innovation system.
* The determinants of national innovation capacity, national technological capability and infrastructure factors, external factors and institutional factors, and the economic effects of these factors are discussed in detail.
* As examples of successful development and catch up the national innovation systems in Germany, Japan and South Korea, and as examples of developing countries Russia, Brazil and Turkey's national innovation systems and development experiences are analyzed.
* As a new output variable representing national innovation capacity, the national innovation capacity index is calculated and this variable is used in the analysis.
* In the study, it is analyzed 18 developing countries and 31 developed countries in the period of 1996-2016 by panel data analysis method.
* Based on empirical analysis and country experiences, national innovation policy recommendations are made for developing countries.

Summary

Balance In this thesis, it is aimed to make an empirical analysis of the determinants of national innovation capacity in developing countries in comparison with developed countries.

Science, technology and innovation play a vital role in ensuring the sustainable growth and prosperity of countries. As the technology structure becomes more complex over time, innovation activities outweigh the individual efforts of companies. In this direction, companies interact with other companies and organizations on information, communication and various resources in a network structure to follow innovation processes. All actors in this structural network constitute all the elements of the production and use of information for economic purposes. For this reason, Evolutionary economists emphasized that the innovation process can only be understood by using the systems approach and developed a national innovation system approach for this purpose. "A national system of innovation is that set of distinct institutions which jointly and individually contribute to the development and diffusion of new technologies and which provides the framework within which governments form and implement policies to influence the innovation process (Metcalfe, 1995:38)." At the same time, the national innovation capacity is considered as the innovation potential of countries as both a political and an economic asset. Empirical studies have been made in the literature to measure national

innovation capacity and its determinants over time. However, it is seen that most of the studies on the determinants of national innovation capacity have been conducted on developed countries. In addition, it is seen that patents representing national innovation capacity are used in most of the empirical studies in the literature. At the same time, it is emphasized that using only patents to represent national innovation capacity has disadvantages in these studies. In these studies in the literature, alternative method trials and recommendations are also made. Based on these recommendations and method trials, in order to fill the relevant gap in the literature, the national innovation capacity index is calculated as a new output variable representing the national innovation capacity and this variable is used in the analysis. The national innovation capacity index is calculated by using domestic patents, trademarks, industrial design applications, the number of scientific and technical articles and the share of high technology exports in manufactured exports. In the study, it is analyzed 18 developing countries and 31 developed countries between 1996-2016 using panel data analysis method.

At the same time, variables that are considered to be determinants of national innovation capacity are classified under 3 headings as national technological capability and infrastructure factors, external factors, and institutional factors. As national technological capability and infrastructure factors; R&D, demand level, capital investments, human capital investments, human capital level, learning by doing, information and communication infrastructure, and R&D personel variables are included in the analysis. High technology product imports, license payments, foreign direct investment and openness are considered as external factors. In addition, as institutional factors, intellectual property rights protection, political stability and business freedom variables are included in the analysis. When the determinants of national innovation capacity are evaluated for developed and developing countries, it is seen that developed countries have a high effect on national technological ability and infrastructure variables such as R&D, human capital level, number of researchers, physical capital investments. These variables show that the main sources of innovation in developed countries are national technological ability and infrastructure factors. The low effect of R&D, human capital investments and human capital level and the insignificance of the number of researchers show that the effect of internal variables in determining innovation capacity has a weak effect in developing countries. At the same time, the positive and significant effect of high technology product imports and license payments indicates that external factors are more effective on the national innovation capacity in these countries.

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