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A COMPARISON OF THE INNOVATION PERFORMANCE OF TURKEY WITH THE EUROPEAN UNION

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ABSTRACT

Purpose – The aim of this study is to examine recent innovation performance of Turkey in comparison to the European Union member states and hence to determine in which dimensions Turkey lags behind the European Union countries.

Methodology – In order to investigate Turkey's innovation performance in comparison to the European Union member states European Innovation Scoreboard 2016 is descriptively analysed.

Findings-According to the results of the descriptive analysis, it is found that the innovation performance of Turkey has generally improved in recent years. However, Turkey falls behind the European Union countries in terms of a number of dimensions of the innovation performance.

Conclusion-Although Turkey has improved its innovation performance recently it still lags behind from the European Union countries with regard to the several dimensions of innovation. Thus, the policies which help firms to increase their innovation performance should be implemented in order to reach better outcomes in the future.

Keywords: Research and development, Innovation, Turkey, European Union
JEL Codes: O30, 040, 052

1. INTRODUCTION

Research and development and innovation have been regarded as the main determinants of economic growth and development both in theoretical and empirical spheres of the economics literature in recent years. Thus, developed and developing countries try to improve their innovation performance in order to reach high and sustainable economic growth and development rates. In recent years Turkey has implemented a number of policies which help firms to increase their innovation performance. As a result of these policies, Turkey has turned into moderate innovator from modest innovator according to the European Innovation Scoreboard 2016 (European Union, 2016c). However, Turkey still lags behind from the European Union member states with regard to the different dimensions of the innovation performance measured by the European Union (European Union, 2016b). Thus, Turkey should continue to implement the policies which aim to develop the innovation performance of the firms. This study investigates recent innovation performance of Turkey in comparison to the European Union countries in order to determine in which dimensions Turkey still falls behind the European Union member states. The remainder of the paper is structured as follows: In section 2 the relationship between innovation and economic growth and development has been explained by summarizing theoretical and empirical studies briefly. In Section 3 Turkey's recent innovation performance in comparison to the European Union countries has been analysed. Finally, in section 4 we conclude.

2. THE ROLE OF INNOVATION IN ECONOMIC GROWTH AND DEVELOPMENT

Research and development activities and innovation have been regarded as the main drivers of economic growth and development in recent years. As it is very well-known, the role of technology in economic growth and development has first been put forward by Ramsey (1928), Solow (1956) and Swan (1956). According to the Solow Model (Solow, 1956; Swan, 1956), which is the initial point of modern economic growth literature, since there are diminishing returns to capital and labour the marginal contribution of the increasing level of capital stock to economic growth will be smaller and smaller (Uppenberg, 2009). However, this model asserts that technological progress leads to a positive economic growth rate in the long-run because it eliminates the problem of diminishing returns to capital (Guloglu and Tekin, 2012). The main criticism about this model is that technological progress is not explained in the model (Guloglu and Tekin, 2012). In contrast to the Solow Model (Solow, 1956; Swan, 1956), Endogenous Economic Growth Models developed by Romer (1986, 1990), Lucas (1988), Grossman and Helpman (1990, 1991) and Aghion and Howitt (1992) put forward that technological progress is the main determinant of long-run economic growth. According to these models, technological developments generated in research and development industries are employed for production and lead to persistent increase in economic growth levels of the countries (Ulku, 2004). Endogenous Economic Growth Models suggest a number of reasons that explain why technological progress and knowledge are the main determinants of long-run economic growth. These reasons are as follows (Runiewicz-Wardyn, 2009):

- Knowledge is not exposed to “diminishing returns” because it can be used and shared indefinitely
- Technological progress and knowledge create positive externalities or spillover effects since these factors increase intangible resources of a society.

As it is clearly seen from the above explanations, both traditional economic growth models (Ramsey, 1928; Solow, 1956; Swan, 1956) and Endogenous Economic Growth Models (Romer, 1986, 1990; Lucas, 1988; Grossman and Helpman, 1990, 1991; Aghion and Howitt, 1992) emphasize the key role of technological progress and innovation in economic growth process. In line with these developments in the theoretical sphere, many studies examine the effects of technology and innovation on economic growth empirically. In an earlier review, Cameron (1998) surveys the results of empirical studies that examine the relationship between innovation and economic growth. According to his analysis, Cameron (1998) comes to the three conclusions: 1- Innovation contributes to economic growth significantly, 2- Significant spillover effects occur among countries, firms and industries and 3- Spillover effects are inclined to be localized, so domestic firms and economies gain more from innovation than foreign economies. Similarly, in a recent study Reamer (2014) reviews the literature on the effect of technological invention and innovation on economic growth from different perspectives such as economic history, innovation accounting, macroeconometric analysis and microeconometric analysis. By making a comprehensive survey of existing studies Reamer (2014) suggests that technological invention and innovation play a central role in economic growth. To summarize, it is clear that traditional and modern economic growth models underline the importance of technological progress and innovation in economic growth process and most of the empirical studies in the existing literature confirms this argument. Thus, it can be stated that technological progress and innovation are sine qua non in order to reach sustainable high economic growth rates both in developed and developing countries.

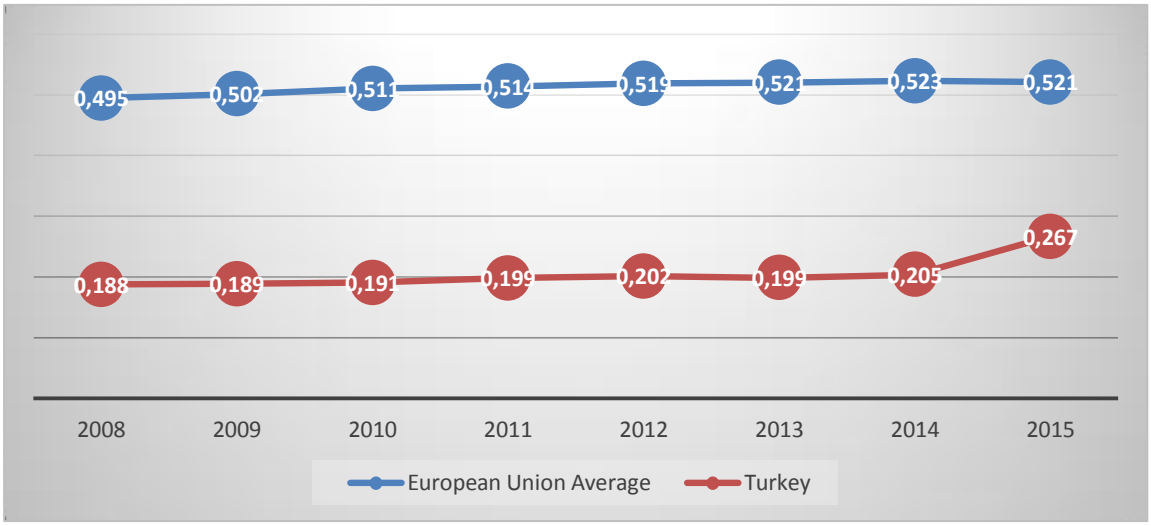
3. RECENT INNOVATION PERFORMANCE OF TURKEY IN COMPARISON TO THE EUROPEAN UNION

The main tool used by the European Union to evaluate the research and innovation performance of the member states and the actual/potential candidates of the union is the European Innovation Scoreboard. According to this scoreboard, innovation performance is measured by the Summary Innovation Index which consists of a number of indicators (European Union, 2016a). According to the summary index of 2015, member states and actual/potential candidates are grouped into four performance groups which are explained as follows (European Union, 2016a; European Union, 2016b):

- The first group is called innovation leaders which comprise of countries whose innovation performance is 20 percent higher than the European Union average. The countries fall into this group are Denmark, Finland, Germany, the Netherlands and Sweden.
- The second group is strong innovators which consist of countries that have innovation performance between 90 percent and 120 percent of the European Union average. These countries are Austria, Belgium, France, Ireland, Luxembourg, Slovenia and the United Kingdom.
- The third group is moderate innovators which include countries with an innovation performance between 50 percent and 90 percent of the European Union average. These countries are Croatia, Cyprus, the Czech Republic, Estonia, Greece, Hungary, Italy, Latvia, Lithuania, Malta, Poland, Portugal, Serbia, Slovakia, Spain and Turkey.
- The forth group is modest innovators which cover the countries whose innovation performance is less than 50 percent of the European Union average. These countries are Bulgaria and Romania.

As it is stated above, Turkey is in the group of moderate innovators in 2015. Without doubt, in order to evaluate the innovation performance of Turkey in comparison to the European Union countries it is required to investigate the course of this index for Turkey in recent years. Graph 1 shows the summary index for Turkey together with the European Union average over the period 2008-2015. As it is clearly seen from the graph, the innovation performance of Turkey is well below from the European Union average and it has been stable between 2008 and 2014. However, in 2015 the innovation index of Turkey has jumped to 26.7 percent which is a dramatic increase from the previous year. Together with this increase, Turkey has turned into moderate innovator from modest innovator (European Union, 2016c).

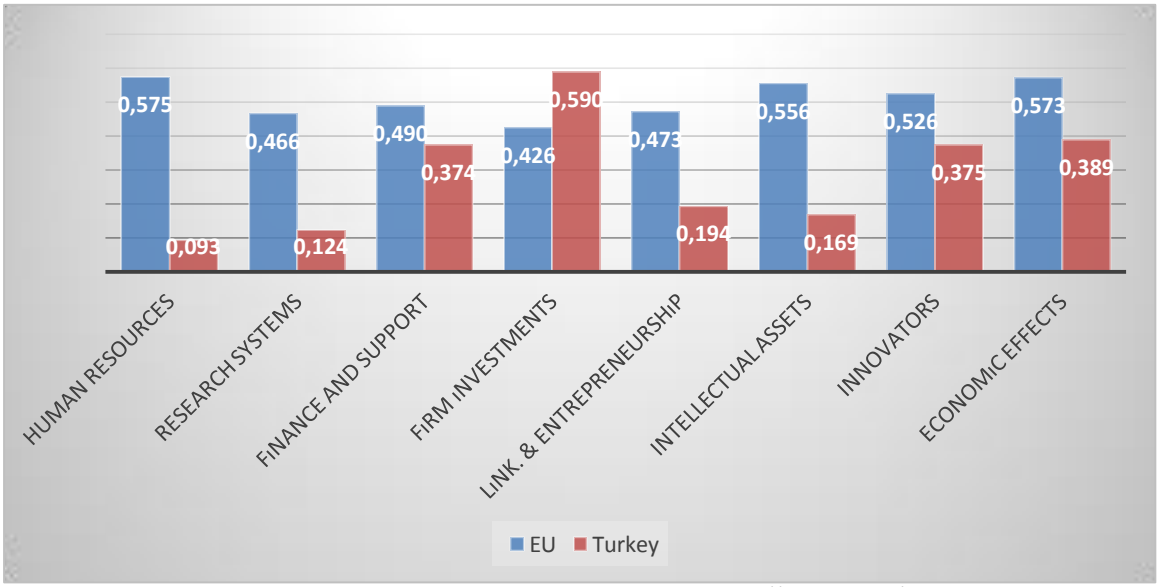
Graph 1: The Summary Innovation Index of Turkey and the European Union Average (2008-2015)



Source: European Union, 2016b, European Innovation Scoreboard 2016-Database, http://ec.europa.eu/DocsRoom/documents/17823, 01.05.2017.

Although Turkey has become a moderate innovator in 2015 the innovation performance of Turkey still lags behind from the European Union average for all dimensions apart from the firm investments (European Union, 2016c). Graph 2 shows the dimensions of the innovation performance for Turkey and the European Union average.

Graph 2: The Dimensions of the Innovation Performance for Turkey and the European Union Average (2015)



Source: European Union, 2016b, European Innovation Scoreboard 2016-Database, http://ec.europa.eu/DocsRoom/documents/17823, 01.05.2017.

According to Graph 2, the innovation performance of Turkey is very low in comparison to the European Union average in terms of human resources, research systems, linkages and entrepreneurship and intellectual assets. Human resources cover new doctorate graduates per 1000 population aged 25-34, percentage population aged 30-34 having completed tertiary education and percentage youth aged 20-24 having attained at least upper secondary level education (European Union, 2016b). When we investigate the sub-dimensions of human resources we find that Turkey is the last country among the European Union countries with regard to all of these sub-dimensions except scientific publications among the top 10 percent most cited publications worldwide and non-European Union doctorate students (European Union, 2016b). Hence, it can be argued that the innovation performance of Turkey in terms of human resources should be improved. Research systems include international scientific co-publications per million population, scientific publications among the top 10 percent most cited publications worldwide as percent of total scientific publications of the country and non-European Union doctorate students as percent of all doctorate students (European Union, 2016b). Similar to the human resources dimension, the performance of Turkey with regard to the sub-dimensions of research systems is below the European Union average (European Union, 2016b). While Turkey is the last country with regard to the international scientific co-publications it is the twenty fifth country among the European Union countries according to the scientific publications among the top 10 percent most cited publications worldwide (European Union, 2016b). In addition to this, in terms of the non-European Union doctorate students Turkey is the eighteenth country within the European Union countries (European Union, 2016b). Thus, in order to reach a better score for the research systems dimension Turkey should increase its international scientific co-publications, scientific publications among the top 10 percent most cited publications and non-European Union doctorate students.

The third dimension of the innovation performance is finance and support. Finance and support consist of public research and development expenditures as percent of GDP and venture capital investments as percent of GDP (European Union, 2016b). While there is no data for the venture capital investments as percent of GDP for Turkey the rank of Turkey is twenty-one among the European Union countries as regards to the public research and development expenditures as percent of GDP (European Union, 2016b). Although the performance of Turkey in finance and support dimension is better in comparison to the other dimensions it is still lower than the European Union average (European Union, 2016b). The fourth dimension of the innovation performance is firm investments. The performance of Turkey in terms of this dimension is better than the European Union average (European Union, 2016b). Firm investments cover business research and development expenditures as percent of GDP and non-research and development innovation expenditures as percent of turnover (European Union, 2016b). Although Turkey is the twenty first country according to the business research and development expenditures it is the first country among the European Union countries with regard to non-research and development innovation expenditures (European Union, 2016b). Non-research and development innovation expenditures have increased twelvefold from 2014 to 2015 and this is one of the reasons why Turkey has become a moderate innovator (European Union, 2016c).

Linkages and entrepreneurship include SMEs (small and medium sized enterprises) innovating in-house as percent of SMEs, innovative SMEs collaborating with others as percent of SMEs and public-private co-publications per million population (European Union, 2016b). For SMEs innovating in-house as percent of SMEs and innovative SMEs collaborating with others as percent of SMEs Turkey is ranked at the nineteenth and twenty sixth country among the European Union countries respectively (European Union, 2016b). As regards to the public-private co-publications per million population Turkey is the last country and the performance of Turkey for the linkages and entrepreneurship is well below the European Union average (European Union, 2016b). Intellectual assets cover patent applications per billion GDP, patent applications in societal challenges per billion GDP, community trademarks per billion GDP and community designs per billion GDP (European Union, 2016b). Whilst Turkey is the nineteenth country for patent applications it is the twenty second country among the European Union countries for patent applications in societal challenges (European Union, 2016b). However, with regard to the community trademarks and community designs Turkey is the last country among the European Union member states (European Union, 2016b). The last two dimensions of the innovation performance are innovators and economic effects. The sub-dimensions of innovators are SMEs introducing product or process innovations, SMEs introducing marketing/organizational innovations and employment in fast-growing enterprises (European Union, 2016b). Although the performance of Turkey with regard to the SMEs introducing marketing/organizational innovations is higher than the European Union average Turkey performs worse than most of the European Union countries in terms of the SMEs introducing product or process innovations and employment in fast-growing enterprises (European Union, 2016b).

The last dimension of the innovation performance is economic effects. Economic effects have five sub-dimensions (European Union, 2016b): 1- Employment in knowledge intensive activities as percent of total employment, 2- Medium and high-tech product exports as percent of total product exports, 3- Knowledge intensive services exports as percent of total service exports, 4- Sales of new to market and new to firm innovations as percent of turnover and 5- Licence and patent revenues from abroad as percent of GDP. There is no data for Turkey as regards to the licence and patent revenues from abroad and the performance of Turkey for the first three dimensions is well below the European Union average (European

Union, 2016b). However, sales of new to market and new to firm innovations are well above the European Union average and Turkey is ranked at the first among the European Union countries according to this sub-dimension of economic effects (European Union, 2016b). Sales of new to market and new to firm innovations have increased more than fourfold from 2014 to 2015 and this increase has caused Turkey to become a moderate innovator together with the rise in non-research and development innovation expenditures (European Union, 2016c).

To summarize, it can be argued that Turkey still lags behind from the European Union countries according to the most of the innovation performance indicators. Although the performance of Turkey has dramatically improved from 2014 to 2015 according to a number of indicators such as non-research and development innovation expenditures and sales of new to market and new to firm innovations Turkey still does not fall into the innovation leaders or strong innovators groups. Thus, new policies which help firms to increase their innovation performance should be implemented in order to reach better outcomes in the future.

4. CONCLUSION

Since the second half of 1980s research and development and innovation have been regarded as the main drivers of economic growth and development in theoretical models. Together with the developments in the theoretical sphere many empirical studies have examined the effects of research and development and innovation on economic growth and development in different countries. These studies generally find that research and development and innovation activities have positive effects on economic growth and hence confirm the arguments of the theoretical models. In recent years, Turkey has implemented a number of policies which aim to improve the research and development and innovation performance of the firms. As a result of these policies the innovation performance of Turkey has increased and Turkey has turned into moderate innovator from modest innovator among the European Union countries (European Union, 2016c). This improvement has stemmed from the developments in non-research and development innovation expenditures and sales of new to market and new to firm innovations (European Union, 2016c). Although the innovation performance of Turkey has progressed recently Turkey still lags behind the European Union countries according to the most of the innovation indicators. Hence, in order to reach better outcomes with regard to research and development and innovation policy measures which help firms to increase their research and development and innovation performance should be implemented in the future. Without doubt, together with the rising innovation performance Turkey will reach high economic growth and development rates.

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