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THE COMPARISON OF R&D INVESTMENT POLICIES BETWEEN TURKEY AND OECD MEDITERRANEAN COUNTRIES

TÜRKİYE VE OECD AKDENİZ ÜLKELERİNİN R&D YATIRIM POLİTİKALARININ KARŞILAŞTIRMASI

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ABSTRACT

Countries have different categories depending on their economic development. It is essential to use important indicators to classify countries as developed, developing and under developed, and prepare reports on these countries' economy. In this vein, research and development (R&D) is a significant indicator. This study aims to explore Turkey's deficiencies in R&D investment policy. A further step is to clarify constructive similarities and differences regarding R&D investment policy between Turkey and OECD Mediterranean countries. Hence, the paper covers constructive comparisons about four categories that are gross domestic expenditure on R&D, governments funding on R&D, foreign investors funding on R&D, and private sector funding on R&D. The study utilizes the data set drawn from OECD science, technology and innovation outlook 2016 covering the period 2006-2014. Therefore, while Turkey maintains a good position in gross domestic expenditure and government direct funds on R&D among OECD Mediterranean countries, it does not have adequate financing level of business enterprise expenditure, and foreign investment on R&D. The study has implications for Turkey's investment policy in R&D, OECD Mediterranean countries' investment policy in R&D, and the development of new strategies to overcome deficiencies in Turkey's R&D policy compared to other OECD Mediterranean countries. This paper helps understand the differences in R&D investment management between Turkey and OECD Mediterranean countries.

Keywords: *Investment Policies on R&D, Turkey, Mediterranean Countries in OECD*

Jel Codes: M15, M21.

ÖZ

Ülkeler ekonomik gelişmişlik düzeylerine göre farklı kategorilere sahiptirler. Ülkelerin gelişmiş, gelişmekte olan ve az gelişmiş olarak sınıflandırılmasında ve bu ülkelerin ekonomik düzeyleri üzerine raporların hazırlanmasında önemli göstergelerin kullanılması gerekmektedir. Bu sebepten, araştırma ve geliştirme (R&D) önemli bir göstergedir. Bu çalışmanın amacı Türkiye'nin R&D yatırım politikalarındaki eksiklerin keşfedilmesidir. Ayrıca, Türkiye ve OECD Akdeniz ülkeleri arasındaki R&D yatırım politikasına ilişkin yapısal benzerlik ve farklılıkları belirlemektir. Böylece, bu çalışma R&D'ye yönelik gayri safi yurtiçi harcama, hükümetlerin fonlaması, yabancı yatırımcıların yatırımları ve özel sektörün fonlamalarını içeren dört farklı kategoride yapısal karşılaştırmaları içermektedir. Bu çalışmada, 2006-2014 periyodunu kapsayan OECD bilim, teknoloji ve yenilik görünümü 2016 veri seti kullanılmıştır. Buna göre, Türkiye OECD Akdeniz ülkeleri arasında R&D'ye yönelik gayri safi yurt içi harcama ve hükümetin direk fonlaması bakımından iyi bir pozisyona sahipken, özel sektör ve yabancı yatırımcıların R&D yatırımları bakımından yeterli düzeyde finansal seviyeye sahip değildir. Bu çalışma Türkiye'nin ve OECD Akdeniz ülkelerinin R&D'ye yönelik yatırım politikalarının etkileri içermektedir. Ayrıca, Türkiye'nin diğer OECD Akdeniz ülkeleri ile karşılaştırıldığında R&D politikalarına yönelik tespit edilen eksiklerinin giderilmesi için yeni stratejilerin geliştirilmesine de etki edecektir. Bu çalışma, Türkiye ile OECD Akdeniz ülkeleri arasındaki R&D yatırım yönetimi farklılıklarının anlaşılmasına yardımcı olmaktadır.

Anahtar Kelimeler: *R&D'ye Yönelik Yatırım Politikaları, Türkiye, OECD Üyesi Akdeniz Ülkeleri*

Jel Kodları: M15, M21

INTRODUCTION

Research and Development (R&D) policy is one of the most important aspects of the innovation and technology management literature. There are many studies with different perspectives and focusing on research topics of R&D in the literature. Among these topics are R&D investment and cross boarding, cross-border merger and acquisitions, R&D spill over productivity, location matters, economic growth, and R&D public expenditures. Studies conducted on these topics provide different perspective on R&D.

R&D investment and cross boarding have been dealt with in a number of studies (Abdulrab, 2011; Blomstrom, 1991; Carlin & Mayer, 2003; Coccia, 2009; Goel & Ram, 2001; Meliciani, 2000; Romain & Pottelsberghe de la Potterie, 2003; Wang, 2010). Most of these studies used data sets drawn from the OECD countries. While some researchers supported the idea that investment impacts economic growth and R&D activities (Blomstrom, 1991; Carlin & Mayer, 2003; Meliciani, 2000; Wang, 2010), others claimed that states' economic intervention do not impact R&D activities (Coccia, 2009; Romain & Pottelsberghe de la Potterie, 2003). Wang (2010) suggested that R&D investments at national level influence the roles of patent rights protectioned international technology transfer. In the OECD countries where R&D activities are widespread, the positive impacts of these R&D activities on tertiary education and scientific research can be observed. On the other hand, while foreign technology inflow affects negatively domestic R&D development, patent rights protection and the income growth rate impacts positively on R&D investments. For instance, Meliciani (2000) examined whether research and investment activities influence patent production across countries or not. According to the results of this study, there were two important findings suggesting that research expenditure has much more impact on generating patents in the science-based industries, and investors prefer to make investment in supplier dominated and production intensive industries. Furthermore, Carlin and Mayer (2003) found strong relationship between countries' financial systems structure, industry characteristics and industrial investment growth. Also, Blomstrom (1991) provided information about the countries, which have the host country concept and the impact of this concept on spill over benefits and their various forms and discussed the effects of country policy on technology import and diffusion in the host economies.

Cross – border merger and acquisition on R&D is another interesting research topic in the R&D literature. Many researchers provided different perspectives on this topic (Bertrand & Zuniga, 2006; Falk, 2006; Reddy, 1997). Bertrand and Zuniga (2006) concluded that merger and acquisition waves do not have any significant impact on the R&D activities, and they just contributed to increasing R&D investments in some specific sectors. On the other hand, they suggested that merger and acquisitions' effect on R&D investment is not the same for domestic and cross countries' activities. In other words, domestic merger and acquisition activities diminish international collaborations and investments on R&D activities among corporations in medium technology intensive industries. The reason is that these local corporations fear about foreign takeovers and their negative impact on their local R&D activities. Falk (2006) dealt with this subject in his study on tax incentives. According to Falk, tax incentives that the government provide may have a positive impact on businesses' R&D spending regardless sector. In addition, universities' investments on the development of infrastructures for R&D activities may have a significant effect on the expenditures of business enterprise sector on R&D activities. Moreover, the direct R&D subsidies and high tech export share that the governments provide may have a positive relation with business sector R&D activities, but their effects seem to be fleeting in the short run.

Another interesting issue in the literature is R&D spill over productivity. There are many

studies on this topic (Abdulrab, 2011; Bertrand & Zuniga, 2006; Coe & Helpman, 1995; Engelbrecht, 1997; Fracasso & Marzetti, 2015; Hejazi & Safarian, 1999; Kinoshita, 2000; Le Bas & Sierra, 2002; Lin & Kwan, 2016; Park, 1995). A general trend in these studies is that R&D spill over influence the growth of domestic research activities, foreign productivity, foreign trade and channel and international transmission. Coe and Helpman (1995), Kinoshita, (2000), Le Bas and Sierra (2002) and Park (1995) provided information about the R&D spillovers' positive effects on domestic and international private research and productivity. On the other hand, Fracasso and Marzetti (2015) and Lin and Kwan (2016) suggested that R&D spillovers have positive impact on international knowledge transmission. Therefore, local firms may have skills to help them to compete with their rivals in international markets. Furthermore, Hejazi and Safarian (1999) concluded that trade and foreign direct investment increasingly affect R&D channels. According to the results of the study, both foreign direct investment and trade are effective factors increasing R&D channels, but foreign direct investment has a higher power than trade to for affecting the development of R&D channel.

The location matter is also an interesting research topic. Numerous researchers have taken on this topic in their studies (Blomstrom, 1991; Le Bas & Sierra, 2002; Porter & Stern, 2001). Overall, these studies suggested that the location play an increasingly significant role in creating and commercialization thanks to globalization day by day. Only focusing on internal factors would not produce fruitful results for firms to finish their R&D activities successfully. Instead, firms should host their R&D activities in the right location by considering external factors. These external factors are strong university-industry relations , large pools of trained scientists and engineers, various specific clusters for innovation environment, beneficial public policies for innovation activities and protection of intellectual property, tax-based incentives for innovation, innovation-based competition, and openness of economy to trade and investment (Porter & Stern, 2001). In addition, the location in knowledge transmission and R&D spillover are crucial issues for investors while making decisions on R&D investments (Le Bas & Sierra, 2002). Furthermore, investors may have evaluation criteria on host country depending on affiliates' technology imports and the diffusion of their technology (Blomstrom, 1991). The host country should be evaluated according to foreign investment and spillovers such as size of spillover, intra and inter industry spillovers.

Finally, economic growth is a popular topic in the literature. There are many studies conducted t on this topic (Bassanini, Scarpetta, & Visco, 2000; Temple, 2002; Wang, 2007). Bassanini et al. (2000) provided information about the developments in labour productivity relations with human capital accumulation, multifactor productivity, and changes in the composition fixed capital. According to their results, there is a strong relationship between improvements in multifactor productivity and accumulation knowledge and some tentative policy considerations. Moreover, Temple (2002) concluded that education has benefits for social capital.

Inshort, R&D is a topic that offers various perspectives to researchers. These are cross-border investment, cross-border merger and acquisition, R&D spillover productivity, location matters, and economic growth. This study aims to provide comparisons regarding R&D investment policies between OECD Mediterranean countries and Turkey in the period of 2006 -2014.To this aim, various investment and expenditure data obtained from OECD 2014 outlook dataset were used.. Therefore, this study may contribute to forming a better understanding of Turkey's position in R&D investment policy among OECD Mediterranean countries. Moreover, it provides information about the deficiencies in Turkey's R&D policy when compared to OECD Mediterranean countries.

1. GROSS DOMESTIC EXPENDITURE ON R&D

Gross domestic expenditure is an important factor in order to understand countries' R&D policy. Direct and indirect funding tools are the general classifications in gross domestic expenditure on R&D. Direct funding tools consist of competitive grants, repayable advances, debt finance, and equity finance. There are various kinds of the direct funding tool. More funding tool means that countries support R&D activities and these support tools are significant indicators of the development level of countries. In other words, if one country provides various support for R&D activities, this country may be viewed as a good destination for start-up firms, innovative entrepreneurs to make investment. Table 1 shows the amounts of gross domestic expenditure in OECD Mediterranean countries in the period from 2006 to 2014.

Table 1. Gross Domestic Expenditure on R&D in OECD Mediterranean Countries (Million constant USD PPPs)

	France	Greece	Israel	Italy	Slovenia	Spain	Turkey
2006	$47.029	$1.942	$8.928	$25.150	$991	$20.326	$8.456
2007	$47.545	$2.061	$8.613	$24.947	$1.021	$20.110	$9.412
2008	$48.524	$2.358	$8.663	$25.406	$1.170	$20.087	$10.079
2009	$50.565	$2.133	$9.279	$25.276	$1.388	$19.525	$11.213
2010	$50.765	$1.929	$9.834	$25.802	$1.434	$18.421	$12.224
2011	$52.191	$1.968	$10.224	$26.091	$1.421	$17.835	$13.040
2012	$52.203	$1.899	$10.701	$26.826	$1.343	$17.608	$14.427
2013	$53.894	$2.135	$11.164	$27.055	$1.274	$17.980	$15.673
2014	$54.297	$2.218	$11.558	$26.188	$1.198	$18.049	$16.673

(Source: OECD, 2017c)

France, Italy, Spain, Turkey have more amounts of expenditure than other countries, respectively. As a general trend, the amount of expenditure on R&D increased steadily for all countries in 2008. This increasing amount of expenditure on R&D continued in countries except for Greece and Spain. The amount of R&D expenditure decreased slightly, and there were a steady fluctuation in expenditures of Greece and Spain. In 2008, the amount of expenditures was $2 billion 258 million in Greece, and nearly $20 million 87 thousand in Spain, while it was only around 2 billion 133 million for Greece, and nearly 18 billion for Spain. Namely, the amount of R&D expenditures were nearly at the same level after six years period in both Greece and Spain. On the other hand, there was a gradual growth in the amount of gross domestic expenditure on R&D in France, Israel, Italy, and Turkey in the period between 2006 and 2014. France had the highest amount of gross domestic expenditure on R&D among these countries during this period. In 2006, the amount of expenditure on R&D was nearly $ 47 million, while the expenditure peaked around $54 million in 2014. Finally, the R&D expenditure amount steadily grew in Turkey during 8 years. In 2006, Turkey had the lowest level of expenditure on R&D with nearly $ 8.5 billion, while the expenditure on R&D amount was at the highest level with nearly $ 16.5 billion in 2016. In the first year, the amount of expenditure in Turkey was less than Israel, and Turkey ranked the fourth among OECD Mediterranean countries. However, the rank of Turkey raised one row by leaving Israel behind by being the third country in 2007 with $ 9 billion 412 million. Turkey maintained this ranking after years with the difference between Italy and Spain getting smaller. Chart 1 provides information about the comparison between Turkey's expenditure

on R&D policy and other OECD countries' average of expenditure on R&D policy. This chart may help to understand Turkey's expenditure policy by years.

Chart 1. The Comparison between Turkey and Other OECD Mediterranean Countries regarding Gross Domestic Expenditure on R&D

The chart covers the average variations between Turkey's expenditure amount on R&D and OECD Mediterranean countries' average amount on R&D in the period from 2006 to 2014.

As a general trend, Turkey's expenditure amount on R&D steadily increased between 2006 and 2014. In 2006, the amount of expenditure was the lowest with nearly 8 billion dollars, and it was almost half of OECD Mediterranean countries' the amount of average expenditure on R&D. On the other hand, the amount of expenditure rose gradually in 2007 with nearly 9.5 billion dollars, and Turkey's expenditure amount on R&D peaked in 2014 with nearly 18 billion dollars. This was the closest amount to the average in 2014.

The red colour bar indicates the average expenditure of OECD Mediterranean countries on R&D. Overall, there was gradually growth between 2006 and 2014. In 2006, the total amount was nearly 16 billion dollars and the amount of average expenditure on R&D rose slightly to 16 billion 264 million dollars in 2007. The average expenditure amount peaked in 2014 with nearly 18 billion 500 million dollars.

In general, there was a gradual growth in average expenditures of both Turkey and OECD Mediterranean countries during eight years. In earlier periods, the amount of expenditures on R&D was at a low level and was not sufficient when compared to other Mediterranean countries. However, the variation trend in the amount of gross domestic expenditure on R&D steadily changed in Turkey. The amount of expenditure nearly doubled from 2006 to 2014. On the other hand, Turkey still lagged behind Italy and Spain for dividing share of gross domestic expenditure on R&D.

2. Governments' Direct Funding for R&D

According to OECD countries self-assessment index (2014), Turkish government provides many different supporting tools to fund R&D business works. On one of these supporting tools is direct funding tools. These are competitive grants, repayable advances, and debt finance. Furthermore, these funding tools offer more amount than OECD countries' mean. In addition, equity finance and technology consult supports have as much amount as OECD countries' mean. Therefore, it can said that Turkish government has various direct supporting tools to help develop R&D practices and innovative entrepreneurs.

Table 2. Governments' Direct Funding for R&D in OECD Mediterranean Countries (Million constant USD PPPs)

	France	Israel	Italy	Slovenia	Spain	Turkey
2006	$3.347	$315	$914	$29	$1.399	$200
2007	$2.927	$335	$839	$40	$1.742	$323
2008	$3.439	$324	$786	$36	$2.024	$344
2009	$2.794	$327	$852	$77	$1.812	$552
2010	$2.800	$303	$799	$124	$1.737	$437
2011	$2.515	$227	$944	$154	$1.483	$421
2012	$2.717	$275	$977	$150	$1.250	$508
2013	$2.820	$255	$905	$138	$1.026	$520
2014	$2.910	$271	$911	$81	$917	$623

(Source: OECD, 2017b)

Table 2 gives information about the direct funding provided by the governments of OECD Mediterranean countries for R&D in the period between 2006 and 2014. These countries were France, Israel, Italy, Slovenia, Spain and Turkey. As a general trend, the amount of direct funding for R&D slightly fluctuated in all OECD Mediterranean countries. In the beginning of the period, there were higher amounts of direct funding for R&D in France, Spain, Italy, and Israel than other countries. On the other hand, Turkey outperformed Israel in the middle of period with increasing government direct funding for R&D.

France was the country with the highest amount of direct funding for R&D There was a nearly equal amount with the total of other countries funding during the period from 2006 to 2014. The amount of government direct funding was relatively high in 2006 for France. Then there was a steady fluctuation during the period. The funding peaked in 2008 with 3 billion four hundred thirty nine million dollars. After this year, the amount of funding decreased, and it was at its lowest with 2 billion five million dollars in 2011, then there was a slight growth during the period from 2012 to 2014 in France.

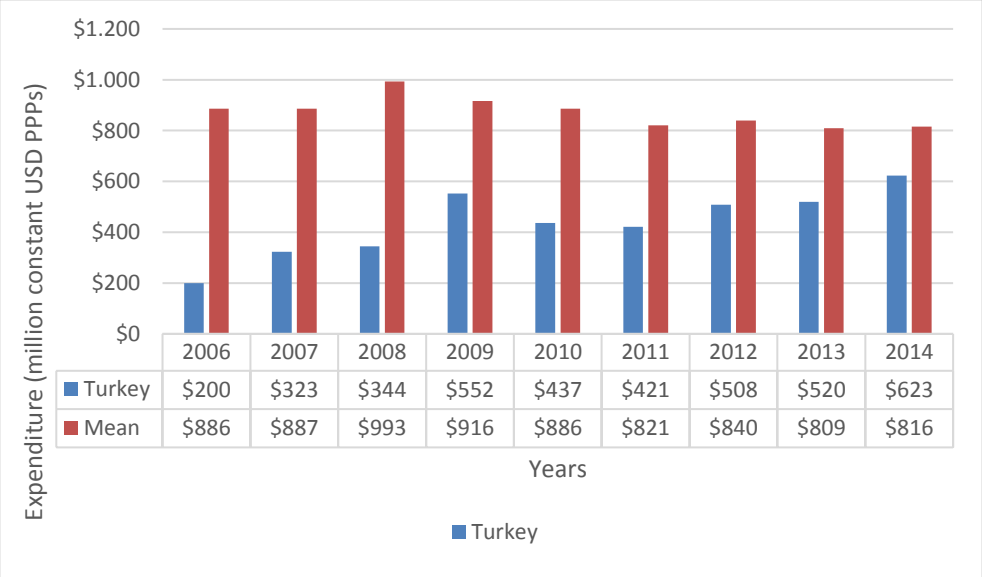
Spain and Italy were the countries, which came after France with the amount of government funding for R&D for this period. Spain had a higher amount of direct funding than Italy during that period. Both of these countries' direct funding amount for R&D fluctuated steadily. Spanish government direct funding amount was nearly a billion four million dollars, while Italy's direct funding for R&D was nine hundreds fourteen million dollars in 2006. After this period, the amount of direct funding in Spain increased considerably through 2008, and it hit the peak level for Spain with two billion twenty four million dollars in this year. While there was a significant increase in direct funding for R&D in Spain, it decreased steadily for Italy

in the same period. However, there was a gradually decrease in direct funding in Spain through 2013 with a billion twenty six thousand dollars, and the amount of direct funding was at the lowest level with nine hundred seventeen dollars in 2014. On the other hand, there was a steady fluctuation in Italy through 2013, and the amount of government's direct funding was nine hundred eleven million dollars, and this amount was similar to that of Spain.

Government direct funding amount for R&D in Turkey gradually increased during the period. In 2006, there was two hundred million dollars government funding for R&D, then it doubled with five hundred fifty two million dollars through 2009. The amount of government funding in Turkey continued to raise steadily. Finally, it was at its peak level with six hundred twenty three million dollars. Therefore, one may claim that Turkey did not only maintain its fourth ranking among the OECD Mediterranean

countries, but also narrowed the gap between Italy and Spain from year to year. Chart 2 gives information about the variation in Turkish government direct funding for R&D compared to other OECD Mediterranean countries.

Chart 2. The Comparison between Turkey and OECD Mediterranean Countries' Direct Funding for R&D (*Subsidies, grants, procurement



There is comparative information about government direct funding for R&D between Turkey and the mean of other OECD Mediterranean countries during the period from 2006 to 2014. As a general trend, the amount of government direct funding fluctuated steadily in Turkey and OECD Mediterranean countries. In 2006, there was a wide gap between Turkey and OECD Mediterranean countries' mean. It was around 670 million dollars. However, this gap closed through 2009, but the amount of direct funding in Turkey decreased in the following years until 2012. In the same periods, there was a slight decrease in direct funds in OECD Mediterranean countries. While the amount of direct funding remained constant in OECD Mediterranean countries, the amounts in Turkey increased in 2014. The amount of direct funding in Turkey was around six hundred twenty four million dollars in 2014. Therefore, Turkey caught up with the OECD Mediterranean countries by attaining a closer mean to the mean of these countries in 2014. Turkish government's direct supports for R&D

increased steadily for the last three years so much.

3. Business Enterprise Expenditures on R&D

According to the National Science, Technology and Innovation Strategy (UBTYS) from 2011 to 2016 by the Supreme Council for Science and Technology (SCST), Turkey has three main goals that are focusing on priority sectors; improving the design and implementation of STI policy and supporting innovation in firms, and entrepreneurship and small medium sized enterprises (SMEs) (European Council, 2013). To begin with priority sectors, nine main sectors are national priority in Turkey. These are automotive, machinery, and manufacturing technologies, energy, ICT, water, food, defence, aerospace, and health areas. Scientific and Technological Research Council in Turkey (TÜBİTAK) has announced over 100 direct support programmes for these priority sectors since 2012. In addition, design development is another important issue in Turkey's national science, technology and innovation strategy. This strategy is based on the centralization of business sectors and entrepreneurs since 2011. The policy makers in Turkey aim to improve public actors' numbers. Furthermore, these new actors could be integrated with the support mechanism thanks to target-oriented approach. In order to achieve this goal, a department was set up under the auspices of Ministry of Science, Industry, and Technology (MoSIT) for assessing R&D and innovation support programme's achievements by Turkish government.

Finally, supporting innovation, entrepreneurship, and SMEs is third strategy in Turkey's National Science, Technology and Innovation Strategy. MoSIT, science and technological research council launched many support programmes for supporting private sector investments on R&D. These are the venture capital (private equity) funding programme (1501), the individual entrepreneurship (Phased) support programme (1512) and the individual entrepreneurship multi-phased co-financing programme (1601). Some of these programmes were provided by the scientific and technological research council, and technological products promotion and marketing programme, the technological products investment support programme by MoSIT for entrepreneurship and SMEs. Table 3 presents information about the amount of business enterprise expenditures on R&D in OECD Mediterranean countries in the period from 2006 to 2014.

Table 3. Business Enterprise Expenditures on R&D in OECD Mediterranean Countries

	France	Greece	Israel	Italy	Slovenia	Spain	Turkey
2006	$26.486	$525	$6.140	$9.851	$479	$8.914	$1.923
2007	$27.718	$534	$7.334	$11.572	$476	$10.232	$2.908
2008	$29.200	$714	$7.229	$12.896	$628	$11.211	$3.425
2009	$30.687	$771	$7.101	$13.133	$658	$10.664	$3.546
2010	$32.063	$761	$7.188	$13.568	$789	$10.471	$4.195
2011	$34.170	$694	$7.980	$14.081	$1.048	$10.507	$4.857
2012	$35.408	$688	$8.789	$14.716	$1.145	$10.257	$5.742
2013	$37.503	$795	$9.272	$15.390	$1.194	$10.254	$6.512
2014	$38.056	$829	$9.609	$15.450	$1.157	$10.184	$7.533

(Source: OECD, 2017a)

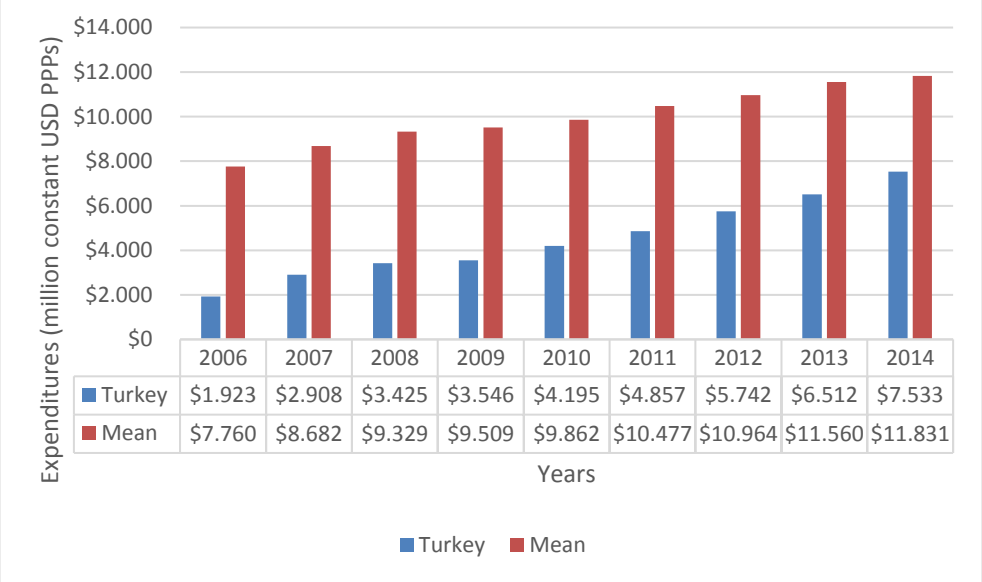
The countries whose amount of expenditure on R&D by business enterprises are revealed are France, Greece, Israel, Italy, Slovenia, Spain and Turkey. As a general trend, the amount of business expenditure increased for nearly all countries in the period between 2006 and 2014. The only exception was Spain. The amount of business expenditure-in Spain fluctuated steadily. On the other hand, France was the country with the

highest level of amount of expenditures on R&D by business enterprise among the OECD Mediterranean countries. Italy, Spain, Israel, and Turkey are followed this country, respectively. On the other hand, the amount of expenditure on R&D by business enterprise in France was higher than other countries. Moreover, the amount of private sector's investment on R&D in France was much higher than the total amount of business enterprise expenditure on R&D in other OECD Mediterranean countries in the majority of period. Furthermore, it seems that the amount of business enterprise expenditure on R&D was higher than governments' direct funds on R&D. France and Israel, which have serious business expenditure on R&D when compared to the amount of their direct foundation, were

leading countries at this point. It may be said that Turkey could be an attractive country to earn the trust of investors who make investment on R&D, but it is still not as good as France and Israel at this point.

Chart 3 provides information about business expenditure on R&D by comparing Turkey and OECD Mediterranean countries' mean values.

Chart 3. The Comparison of R&D Expenditure of Business Enterprise between Turkey and Mediterranean Countries.



	2006	2007	2008	2009	2010	2011	2012	2013	2014
Turkey	$1.923	$2.908	$3.425	$3.546	$4.195	$4.857	$5.742	$6.512	$7.533
Mean	$7.760	$8.682	$9.329	$9.509	$9.862	$10.477	$10.964	$11.560	$11.831

As a general trend, the business expenditure on R&D increased in both Turkey and OECD Mediterranean countries from year to year. In addition, the gap between Turkey and other OECD Mediterranean countries regarding business expenditure seemed to be closing in 2006, the mean amount of business expenditure on R&D in OECD Mediterranean countries was around 7 billion eight hundred dollars, while it was nearly a billion nine hundred fifty million dollars in Turkey. Namely, OECD Mediterranean countries' mean value of the business expenditure on R&D was three times more than that of Turkey i Turkey. The amount of business expenditure on R&D increased in both Turkey and other OECD countries in the period from 2006 to 2014. In 2014, the gap between Turkey and other OECD Mediterranean countries seemed to be closing. The amount of business expenditure's mean value was around 11

billion eight hundred fifty million dollars in OECD Mediterranean countries, while it was seven billion five hundred fifty million dollars in Turkey. Thus, Turkish government should develop new policies to increase investments on R&D in private sector. On the other hand, Turkey seems to have improved business expenditure on R&D for the last years. Therefore, it is highly likely that it is going to catch up with other OECD Mediterranean countries.

4. FOREIGN INVESTMENTS ON R&D

Foreign investments on R&D by foreign investors is another crucial issue in terms of Turkey's R&D policy performance. Table 4 gives information about the amount of foreign investors' investment in OECD Mediterranean countries during the period between 2006 and 2014.

Table 4. R&D investments by foreign investors in OECD Mediterranean Countries

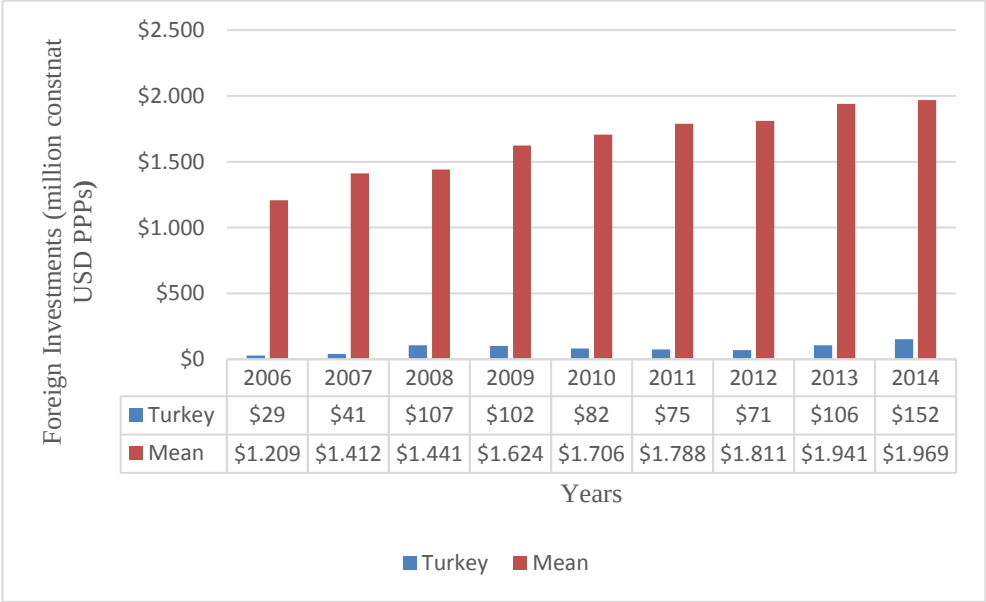
	France	Greece	Israel	Italy	Slovenia	Spain	Turkey
2006	$3.282	$110	$2.040	$1.913	$49	$1.037	$29
2007	$3.557	$119	$2.447	$2.335	$48	$1.338	$41
2008	$3.865	$135	$2.767	$1.981	$55	$1.174	$107
2009	$3.557	$186	$4.018	$2.329	$61	$1.112	$102
2010	$3.829	$229	$4.096	$2.472	$70	$1.167	$82
2011	$4.043	$290	$4.422	$2.268	$97	$1.321	$75
2012	$4.042	$300	$4.482	$2.417	$122	$1.241	$71
2013	$4.323	$299	$4.908	$2.493	$127	$1.328	$106
2014	$4.283	$293	$5.100	$2.508	$125	$1.322	$152

(OECD, 2017b)

The values presented in Table 3 reveal the amount of foreign investments on R&D in the OECD Mediterranean countries such as France, Greece, Israel, Italy, Slovenia, Spain, and Turkey in the period from 2006 to 2014. As a general trend, the amount of foreign investment on R&D increased from 2006 to 2014 for all countries. On the other hand, figures pertaining to some countries fluctuated, and others grew gradually. There was a steady fluctuation in France, Italy, Spain, and Turkey, while the amount of foreign investments on R&D in Greece, Israel, and Slovenia increased gradually. France, Israel, Italy, Spain, Greece, Turkey, Slovenia ranked respectively according to their amounts of foreign investment on R&D. France was the country with the highest-level amount of foreign investment on R&D. Generally, there was increasing trend in the amounts of foreign investment in France. In 2006, the amount of foreign investment on R&D was three billion two hundred eighty two million dollars. There was a gradually growth until 2009. In 2009, it seems there was a slight decrease in foreign investments on R&D in France, and then from this year to 2014, the amount of foreign investment on R&D rose gradually. On the other hand, there was a steady rise in the amount of foreign investment of Israel from year to year in the period between 2006 and 2014. In 2006, the amount of foreign investment was two billion forty million dollars in Israel, and then it grew steadily until 2009. In this year, the amount of foreign investment doubled with four billion eighteen million dollars. After this year, it increased through 2014. Finally, the amount of foreign investment on R&D was five billion one hundred million dollars. In addition, Italy and Spain had a steadily rising trend in the amount

of foreign investment. In 2006, Italy had one billion nine hundred thirteen million dollars, while Spain had one billion thirty-seven dollars. Then, there was a slight increase in the amount foreign R&D investment in both Italy and Spain through 2014. The amount of R&D investment on R&D was two billion five hundred eight dollars in Italy, and one billion three hundred twenty two million dollars in Spain. Finally, Turkey had a steady fluctuation during this period. In 2006, the amount of investment on R&D in Turkey was twenty nine million dollars. There was a steady growth with a hundred seven million dollars through 2008. Then, the amount of foreign investment decreased in the period from 2008 to 2012, and it increased through 2014. The amount of foreign investment on R&D was a hundred fifty two million dollars in 2014. The chart 4 helps understand the difference between Turkey and OECD Mediterranean countries.

Graph 4. Foreign Investment on R&D in Turkey and OECD Mediterranean Countries



As a general trend in OECD Mediterranean countries, the amount of foreign investment on R&D increased gradually during the period. However, Turkey had a steady fluctuation in the foreign investment on R&D. In 2008, the amount of foreign investment in OECD Mediterranean countries was a billion two hundred nine million dollars, while it was twenty nine million dollars in Turkey. On the other hand, the amount of foreign investment on R&D increased steadily until 2013. It was a billion seven hundred eighty eight million dollars for OECD Mediterranean countries, while it was seventy five million dollars in Turkey. Finally, it was a billion nine hundred sixty nine million dollars in OECD countries, but the amount of foreign investment on R&D was a hundred fifty two million dollars in Turkey. Therefore, it can said that the foreign investment on R&D in Turkey was not adequate when compared to the OECD Mediterranean countries in the period from 2006 to 2014.

CONCLUSION

In this study, a variety of investment and expenditure issues in R&D in the both Turkey and OECD Mediterranean countries were discussed. These issues were gross domestic expenditure on R&D, governments' direct funding on R&D,

foreign investment on R&D. The statistics pertaining to Turkey and OECD Mediterranean countries were compared to understand Turkey's and other OECD Mediterranean countries' R&D investment policy. According to gross domestic expenditure values on R&D, Turkey's performance gradually improved. - The average gross domestic expenditure of Turkey has almost caught up with the OECD Mediterranean countries' values. On the other hand, there was a steadily fluctuation in the government direct funding on R&D in both Turkey and other OECD Mediterranean countries for this period. It can be said that Turkey almost caught up with OECD Mediterranean countries' mean value of government direct funding R&D at the end of this period. Other important issue related to R&D is business enterprise expenditure. As a general trend in the period from 2006 to 2014, it seems that there was a gradual growth in the both Turkey and OECD Mediterranean countries. In the beginning of the period, the amount of business enterprise expenditure differed in Turkey and OECD Mediterranean countries. In other words, there was a lack of business expenditure on R&D in Turkey when compared to other OECD Mediterranean countries such as France, Italy, Spain, and Israel. However, it seems that business expenditure on R&D increased substantially in the period. Turkey was the country with the highest increase in business expenditure on R&D among OECD Mediterranean countries for this period. Finally, foreign investments on R&D is another important indicator in countries' performance. A general trend in the foreign investment on R&D in the OECD Mediterranean countries was a gradually growth. On the other hand, Turkey had a steady fluctuation in the foreign investments on R&D. In addition, by comparing the amounts of foreign investments on R&D in Turkey and OECD Mediterranean countries it can said that Turkey did not have an adequate level of foreign investment on R&D. Thus, policy makers in Turkey should focus on policies for increasing foreign investments on R&D. Finally, the amount of gross domestic expenditures in Turkey was as much as that of OECD Mediterranean countries'. In addition, government direct funding on R&D was about to catch up with OECD Mediterranean countries mean in the period. However, business enterprise expenditures and foreign investments on R&D were not sufficient when compared to OECD Mediterranean countries. Therefore, it can be understood that private sector and foreign investors might hesitate about making investment on R&D. Turkish government and policy makers should take care of private sector and foreign investors to improve their investments on R&D. They should increase financial supports, and indirect supports to attract more investments on R&D. This way, Turkey may catch up with the OECD Mediterranean countries and outperform them.

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