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## Who should really get government support: an analysis of Turkish SME cases

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**Abstract:** Small firms dominate the economy in terms of their share in employment and enterprise totals in most economies. Despite their central role in economic growth and their potential for innovation, the innovation activities these firms undertake are limited or unknown in contrast to many large firms. Most governments across the globe establish frameworks, create funds and revise their taxation and educational policies to stimulate the innovation activities of small firms. This study concerns the relationship between the innovation policies initiated by the Turkish Government to promote innovation among small businesses and the performance of these organisations at the firm level. We investigate the effect of support funds, for the innovativeness of SMEs given by the public agency of the Small and Medium Enterprises Development Organization, on the firms' net sales with respect to size, sector and location. Our results reveal support funds positively contribute to net sales with higher contributions in manufacturing firms relative to the firms from other industrial sectors. Size and location also matter for net sales. Firms that are relatively larger and those located in industrial zones and technology development centres established by the small business development organisation and universities create higher contributions.

**Keywords:** R&D; small business; innovation; government supports; firm performance.

**Reference** to this paper should be made as follows: Olcay, G.A. and Bulu, M. (2015) 'Who should really get government support: an analysis of Turkish SME cases', *Int. J. Knowledge-Based Development*, Vol. 6, No. 1, pp.34–49.

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This paper is a revised and expanded version of a paper entitled 'Are government supports effective in fueling innovativeness of SMEs in emerging countries? Evidence from Turkish case' presented at 6th International Conference for Entrepreneurship, Innovation and Regional Development, Istanbul, Turkey, 20–21 June 2013.

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## **1 Introduction**

Small firms are considered the engine of economic development and employment in most economies (Massa and Testa, 2008; Rothwell, 1989). Starting in the 1980s, the UK put significant effort in promoting small businesses where government assistance totalled £1.1 billion between 1980 and 1985, which was maintained during the out years (Curran, 2000). Small firms survive in the market to the extent they engage in innovation. However, small firms face many challenges in comparison to large firms. While large firms have structured processes for organising and managing innovation, small young firms usually do not have the resources or formal strategies for innovation (Bessant and Tidd, 2007). Many new small firms enter the market with new ideas for developing new processes and products, however, they do not last, exiting the markets in few years (De Jong and Marsili, 2006; Audretsch, 1995). Thus, the survival of such firms in the long run has been a challenge as they are the most exposed to the risk of early exit. However, small firms are the ones who most benefit from innovation to survive in the market as time lengthens (Cefis and Marsili, 2003).

Small firms with their small scale can quickly adapt to economic changes especially in the times of crises and they play a critical role in the development and growth of resilient economies throughout the world. However, small firms have difficulty in accessing the new technologies they require to innovate, obtaining finance and they lack the skills, know how and capital investment they need to perform innovative activities (OECD, 2004; Freel, 2000). In this context, national innovation policies play a critical role in SME development. Governments can influence the pace and nature of SME development with few techniques such as the influence on macroeconomic policies, the differential impact of government legislation on firms of different sizes and direct support programmes helping small firms overcome size related disadvantages (Smallbone and Welter, 2001). While governments' influence on the external environment is a more distinctive element in mature market economies, in transition economies direct support programmes and policies are crucial for SME development in the short run.

Creating the necessary institutional and legal conditions in terms of establishing frameworks, revising taxation and educational policies is definitely critical for the cultivation of SME innovation. However, the effectiveness of these policies has been uncertain. As Curran (2000) points out, the assessment of such policies has lagged behind their growth because of the difficulty of assessing these policies, as well, the widespread perception these initiatives receive results in economic growth and increased productivity.

This study examines the relationship between support funds for innovation offered to Turkish small and medium-sized enterprises (SMEs) and their performance metrics. Currently, Turkey has a large emerging economy realising rapid economic growth. The country is considered the future production base for medium-high and high-technology production for Europe and Asia putting forward the importance of small businesses in the innovative progress of the country (OECD, 2012). In the Turkish economy, SMEs comprise a large share of the total employment with 99.9% of the total number of enterprises and 81.3% of the total employment according to 2006 statistics provided by the OECD. Although SMEs comprise a large share of the overall employment and businesses in the Turkish economy, their performance is low in terms of the shares in total exports (9%) and value-add (27.3%) compared to their peers elsewhere in the world (Bascavusoglu-Moreau, 2011). The low scores of Turkish SMEs in innovation forced the Turkish Government to re-evaluate and develop new strategies for harnessing innovation and entrepreneurship among all businesses. Turkey is now at a milestone where the Turkish economy can take a step further towards achieving the goal of the Turkey 2023 vision by investing in R&D and innovation policies especially in small businesses that are viewed as the engine of the economy. To boost the exports and decrease the account deficit, the Turkish Government recently initiated various policies and support programmes that will help increase the competitiveness of Turkish companies and differentiate them in terms of new products and services.

The support programme for R&D, innovation and industrial applications, and the support programme for the development of technology and innovation are the two major programmes designed and implemented by the Small and Medium Enterprises Development Organization (KOSGEB) in Turkey. Initiating such support programmes is crucial to support small businesses; yet, there is a need to understand the role of these funds in initiating and accelerating the innovativeness of SMEs particularly in the early stages of their life cycle. While innovation can be linked to the business performance of SMEs based on previous empirical studies of firms across different countries, it is not clear how support funds initiate and foster the innovativeness of SMEs. The funds allocated for the purpose of increasing the innovation activities of SMEs need to be evaluated on an empirical basis to better understand their tangible effects on firm performance measures and their overall effects on the Turkish economy.

## **2 Research background**

Small firms play a key role in today's global economy in terms of their large share of the total workforce and in the number of firms. Although small firms have great potential for innovation, there are many barriers before innovation and growth. First and foremost, these enterprises do not have the financial power to compete with large and global firms. As well, SMEs lag well behind large enterprises based on the use of communication and information technologies, know-how and skill levels. SMEs face additional challenges arising from globalisation and the rate of technological change. These barriers eventually lower the competitive power of SMEs compared to their peers in similar industrial sectors. Thus, it is more difficult for SMEs to engage in research activities. Crepon et al. (1998), in an empirical study, show the chances a firm undertakes to increase its R&D in accordance with the size of the firm, its market share and diversification levels. SMEs naturally confront more obstacles with their lower market share and diversification level.

### *2.1 Understanding SMEs' Innovativeness*

There is no question SMEs' innovativeness is vital for all economies around the globe. Although there are views in the literature stating small firms are more innovative or are more efficient innovators than larger firms (Pavitt et al., 1987; Acs and Audretsch, 1990, 1993), most of these studies are inconclusive (Tether, 1998). It is obvious there is variation in the innovativeness of small firms (Hausman, 2005). These firms definitely face further challenges than do larger firms for expanding their innovative capabilities. Despite the increased policies to promote the innovativeness of SMEs, there is limited knowledge accumulated regarding how SMEs undertake innovative activities (Hoffman et al., 1998). Many questions remain to be answered to understand the forces leading to higher innovation activities in SMEs. Which factors contribute significantly to SMEs' innovativeness and in which ways do they contribute? What are the obstacles preventing innovation for SMEs? And, how different are these factors when compared to large firms?

Hausman (2005) suggests, on the one hand, less bureaucracy, closeness with customers and managers and superior operational experience can translate into greater innovativeness for SMEs. On the other hand, difficulty in adapting to changes in the market, holding the power of decision-making usually given to the owner or manager and the lack of financial resources make these firms less innovate. Turning external weaknesses into strengths can result in higher innovativeness for small firms. In support of this view, based on data collected on Dutch SMEs, Keizer et al. (2002) suggest, among many factors, the links to knowledge centres, entries to governmental innovation subsidy schemes and a relatively high R&D budget contribute significantly to the innovation efforts of the SMEs. It is important to note the first two significant determinants of innovation efforts are external factors and the environment of which SMEs can take advantage. When the innovativeness of the small firms are compared between developed and underdeveloped countries, Radas and Bozic (2009) determine the same factors such as market scope, the firm's market orientation and the presence of strategic, managerial and marketing changes are positively associated with the firm's innovativeness.

In clustering a sample of small manufacturing firms into innovative and non-innovative distinct groups, Khan and Manopichetwattana (1989) argue the distinction appears mostly because of the differences in the entrepreneurial characteristics of these firms. They identify two different groups of small innovative firms where the firms in the first group are significantly younger than average, more proactive, have greater willingness for risk taking and spend more on research. The second innovative group of firms is characterised by higher management quality employing higher scanning for decision-making and analysis, higher environmental dynamism, a higher number of educated executives and less centralised organisational structures. The study concluded that the abundance of resources in general does not correspond to successful innovation; however, the resources in R&D can trigger innovation in small firms.

New and young firms can be very creative as can be seen in the Patent Co-operation Treaty (PCT), which suggests a significant number of patent applications come from new firms with about 14% in the USA, 16% in Denmark and 22% in Norway (OECD, 2010). While young firms that are proactive, have strong external links, spend more on research can be very innovative, in most instances the empirical evidence is limited to the generalisation of these views. On one hand, SMEs are regarded as important developers of radical innovation by entrepreneurs based on self-reported data, but on the other hand,

it is difficult to identify SMEs innovativeness based on an object-based approach using the official data (Massa and Testa, 2008). Different perspectives concerning innovation by entrepreneurs, academics and policy makers highlight the difficulty in measuring the innovativeness of firms, especially small firms. As Pavitt et al. (1987) point out “the relationship between innovative activity and firm-size may well be increasingly u-shaped, rather than r-shaped,” strengthening the innovative capabilities of small firms in the earlier stages of their life cycle, which can be critical for boosting the innovativeness of these firms.

## *2.2 Strengthening the innovative capabilities of SMEs*

SMEs are challenged most when accessing resources and new technologies to innovate and commercialise their innovations and to further invest in R&D to stay competitive among their rivals including large enterprises. Finding remedies to SMEs’ challenges on the road to innovation is becoming one of the top priorities in governmental efforts of many countries (Jun et al., 2013; Radas and Bozic, 2009; Hoffman et al., 1998). SMEs should be supported by government policies to some extent at least at the early stages of their life cycle. SME innovativeness can be enhanced through deliberately chosen and practiced innovation directed policies (Keizer et al., 2002).

The comparative disadvantages of SMEs reflect on the failure rates of SMEs as well. According to the statistics by the United States Small Business Administration in 2010, three out of ten new businesses fail within two years of establishment and 49% fail within five years of establishment. The numbers are more or less the same across different countries. SMEs naturally lack abilities with their small scales and scarce resources (human and capital) enabling them to establish links to sources of outside knowledge. The productivity gap between small and large sized companies has been constantly increasing as SMEs lag in the use of innovative and newer technologies. Korea, Japan, Singapore and Israel develop policies to support high-growth SMEs. These high-growth companies are foreseen as the potential high innovators of the future, which can significantly contribute to the economic wealth by creating new jobs that are disproportionately larger than the so called ‘general SMEs’ (Lilischkis, 2011).

A recent study on international benchmarking of countries’ SME support programmes reveals leading countries support programmes have moved from helping SMEs to improve process and product capabilities to supporting their efforts to innovate and commercialise new technologies. Keizer et al. (2002) point to an important issue that SMEs should be encouraged by governments to maintain innovation directed policies to foster the innovativeness of these firms. According to a recent report on ‘International benchmarking of countries’ policies and programmes supporting SME manufacturers’ by the Information of Technology and Innovation Foundation (ITIF), such support programmes in the USA (MES), the UK (MAS) and Canada stimulated new jobs, total new sales and contributed to an increase in R&D growth and the capabilities of SMEs (Ezell and Atkinson, 2011). The Korean government developed an SME technology roadmapping programme in 2007 as a policy promoting the national innovation system. SME technology roadmaps have contributed to the strengthening of the capabilities of human resources, establishing R&D strategies and enhancing the success rate of commercialisation for small Korean firms (Jun et al., 2013). More governments are using R&D tax incentives to make their countries attractive locations for R&D investments, to maintain jobs, to increase R&D intensity and growth performance. R&D tax incentives

are especially crucial for small firms and start-ups as such firms will be more credit constrained when investing in new technologies, products and processes (Lentile and Mairesse, 2009; OECD, 2010).

Recently, there has been extensive support from many countries within the EU, Canada and Japan for jumpstarting innovation activities of small businesses (Ezell and Atkinson, 2011). These countries promote the innovativeness of SMEs in the manufacturing sector by offering technology acceleration programmes to promote technology adaption by SMEs and to support technology transfer, diffusion and commercialisation activities. While SMEs are granted R&D funds to back them up financially, next generation technical assistance is also provided in exporting, promoting energy-efficient manufacturing practices and in promoting continuous productivity improvement. Finally, for the practices of the SMEs to be most productive, programmes using multi-firm training are implemented and conference events are organised by a number of countries. Shapira (2008) points out the policies initiated by US and Japan policy makers such as framework actions, industrial services and regional clustering to stimulate innovation among manufacturing SMEs.

The increased interest to support SMEs in encouraging entrepreneurship and improving access to finance and new technologies is obvious; yet, there is a lack of studies that could substantiate the effectiveness of these policies in exploiting the capabilities of SMEs. As noted in the background report entitled 'Promoting entrepreneurship and innovative SMEs in a global economy' (OECD, 2004), there are limited high quality empirical studies allowing the analysis of important economic forces or policies over time making a poor empirical basis for SME policy. Systematic assessment and evaluation of such policies and support programmes are needed to improve the effectiveness of these policies. While, the allocation of funds change considerably even within the same country, it is essential to conduct comparable studies that are country-based and across countries, as well.

### *2.3 Measuring the Effect of Innovation on Firm Performance*

There are many studies in the literature on the relationship among innovation, productivity and firm performance. Although the consensus is around the positive impact of innovation on performance (Lev and Souggianis, 1996; Ettlíe, 1998), there are other studies stating the impact is not significant and it is difficult to quantify (Chan et al., 2001; Kandybin and Kihn, 2004; Jaruzelski et al., 2005). While this is the view from the perspective of mostly large and global firms, the situation is less clear from the point of the small and medium-sized firms. It is obvious R&D has been treated as the most common representative of innovation in the literature. Hall and Mairesse (2006) review a significant number of studies, which establish a positive link between R&D and productivity. These studies cover a wide range of firms across countries from the USA to Germany, Norway to Sweden and Italy. R&D definitely affects performance but forming R&D and finding resources to establish R&D is a greater issue on its own for SMEs compared to large and global firms. Hall et al. (2009) point this issue out claiming R&D itself does not capture all aspects of innovation, most of which occurs through other channels. By developing a structural model of innovation Hall et al. (2009) show R&D affects product and process innovation and in turn process innovation improves the firm's productivity where the effect is greater among young SMEs that are relatively smaller in size.

There is empirical evidence in the prior literature on the positive link between innovativeness and business performance and firm productivity of SMEs. Gray (2006) shows firms that innovate operate more profitably compared to firms that do not innovate using a data set of British SMEs. A similar effect of innovation on performance is established among Norwegian SMEs. Robinson and Stubberud (2011) establish the highly important effects of innovation for 3,233 innovative Norwegian SMEs, which are: increased range of goods and services, improved quality in goods and services, entering new markets or increasing market shares and improved flexibility of production or service provision using a survey data from the Eurostat Community Innovation.

Terziovski (2010) points to the disadvantages of SMEs related to innovation compared to large organisations. The resource limitations and informal strategies make SMEs more vulnerable compared to large firms in highly ambiguous business environments. Their results suggest innovation strategy and formal structure are the key drivers of innovation in manufacturing SMEs. Moreover, they conclude SMEs in manufacturing are less innovative than large manufacturing firms. In this direction, Acs and Audretsch (1988) present a model to investigate the degree to which innovative output is affected by different industry characteristics and the differences between small and large firms in response to innovativeness. Using a data set of a fairly large number, 8,074 innovations were released by the US Small Business Administration and the authors showed innovative output increases with the industry's R&D expenditures as well as the extent to which large firms comprise the industry.

### **3 Data and methodology**

Despite the many contributions in the field, there is no clear understanding how the government-initiated policies reflect on small firms' innovativeness and financial performance. Given R&D is linked to increased firm productivity and performance (Hall et al., 2009; Hall and Mairesse, 2006), the investment in small firms' innovativeness should result in innovation outputs and financial performance in some way. We propose an empirical approach to determine the effects of support funds on firm financial performance. We use multiple regression analysis to determine the effects of support funds on the dependent variable, firm net sales. Potentially, there are a multitude factors affecting the financial performance of SMEs besides innovation related measures. To account for this, we control for location, size of the firm and industrial sector in all our empirical models we developed in the following sections.

#### *3.1 Data and descriptive statistics*

We obtained firm-level support funds data including firm-level financial data from the KOSGEB. Support funds data were collected from 844 SMEs concentrated in industrial sectors such as manufacturing, construction, wholesale, information and communication technologies and professional, scientific and technological activities. There are only a few firms in some of the industrial sectors that span our firm level dataset; therefore, we classify firms into four main industries by collecting a relatively small number of firms in other industries: manufacturing, information and communication, professional, scientific and technological activities and other.

The main independent variables of this study are the two types of support funds for innovation: the support programme for R&D, innovation and industrial applications (*RDInnovInd*) and the support programme for the development of technology and innovation (*DevTechInnov*). While 581 firms have been granted by the support fund for R&D, innovation and industrial applications between the years 2010 and 2012, 328 firms are supported by the programme development of technology and innovation over the years 2009 to 2011. However, not all firms have been granted by both funds during the three years from 2009 to 2012.

**Table 1a** Type of support programme versus industrial sector

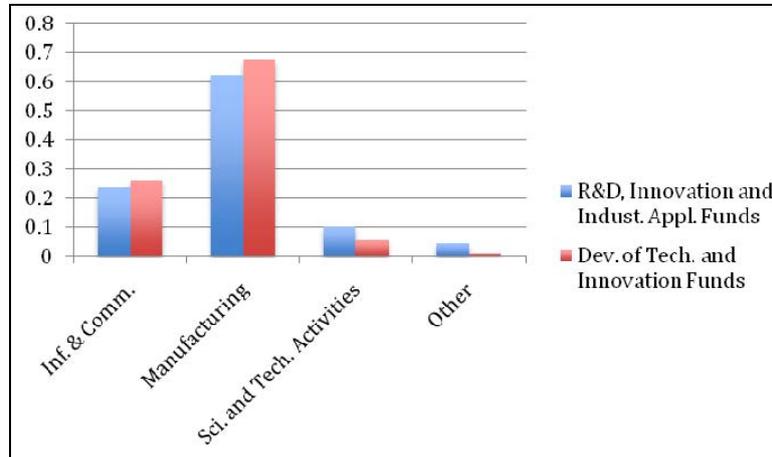
<i>Location</i>	<i>Type of support programme</i>	
	<i>R&amp;D, innovation and industrial applications support (% supported)</i>	<i>Development of technology and innovation support (% supported)</i>
Manufacturing	361 (62.13)	221 (67.38)
Inf. and comm.	136 (23.41)	85 (25.91)
Sci. and tech. activities	58 (9.98)	18 (5.49)
Other	26 (4.48)	4 (1.22)
Total	581	328

**Table 1b** Type of support programme versus location

<i>Location</i>	<i>Type of support programme</i>	
	<i>R&amp;D, innovation and industrial applications support (% supported)</i>	<i>Development of technology and innovation support (% supported)</i>
KOSGEB centre	130 (22.38%)	92 (28.05%)
Industrial zones	146 (25.13%)	65 (19.82%)
Tech. dev. zones and techno parks	108 (18.59%)	54 (16.46%)
Other	197 (33.91%)	117 (35.67%)
Total	581	328

Tables 1a and 1b give the characteristics of the sample, which provide a distribution of the firms with respect to the industrial sector and location for the two types of funds, separately. Figure 1 presents the partition of the funds across different industrial sectors. As Table 1a reveals a high percentage of the firms granted both funds lie within the manufacturing sector i.e., 62.13% and 67.38% for R&D, innovation and industrial applications support programme and development of technology and innovation support, respectively. Firms classified in information and communication sectors follow the manufacturing firms with the respective percentage shares of 23.41% and 25.91% for *RDInnovInd* and *DevTechInnov*, respectively.

**Figure 1** Partition of funds for R&D, innovation and industrial applications and development of technology and innovation with respect to industry sectors throughout 2009 to 2012 (see online version for colours)



Location as shown in Table 1b is specified by means of four different levels that are the KOSGEB technology development centres, industrial zones, technology development zones and techno parks and other locations. The KOSGEB established technology centres referred to as *Tekmer* collaborated with prestigious universities in major cities. Industrial zones comprise organised industrial zones and small industry zones. Technology development centres and technoparks are among the important interfaces enabling the knowledge produced at universities to diffuse to the tenants of the technology parks. Identifying location is important here as there are many firms in this data set located in technology development centres and techno parks established by the ministry of science, industry and technology to promote the innovativeness of SMEs. Various grants and soft loans, tax relief, exemptions and other tax-based support are provided to the tenants of these centres to boost their innovation activities.

Table 1b reveals 22.38% of all firms are supported through funds for R&D, Innovation and Industrial Applications are located in the KOSGEB technology development centres, whereas 18.59% are located in technology development zones. Corresponding percentages are 28.05% and 16.46% for firms supported through funds for the development of technology and innovation. There are also significant percentages of firms, respectively, 33.91% and 35.67% for the first and second fund located in other places. More detailed illustrations of the distribution of firms across different industrial sectors and locations are given in Tables 2a and 2b for each support fund separately.

A firm's innovative activities tend to stimulate net sales. Different measures of firm performance used in the previous literature are briefly summarised in Artz et al. (2010). Focusing on the net sales aspect of firm performance, we consider net sales as the dependent variable in this study. Because firm size contributes to the variation in firm performance (Kotabe et al., 2002), we control the firm size measuring the size as the logarithmic function of the total assets. To control the industry effects, we define a dummy variable for each industry. We chose other industrial sectors as base dummies. Thus, three binary dummy variables are defined to indicate the industrial sector of the firm: *DSecMfg*, *DSecInfComm* and *DSecSciTech*. Similarly, a dummy is associated with

the location of each firm. Technology development centres and technoparks are designated as the base dummies. Thus, *DKOSGEB*, *DIndustZones* and *DOther* represent the regions of the firms in our data set.

**Table 2a** Characteristics of the sample granted by the *R&D, innovation and industrial applications* support programme

Industry	Total number	Number of firms with respect to location			
		KOSGEB centres	Industrial zones	Tech. dev. zones and techno parks	Other
Manufacturing	361	57	138	45	121
ICT	136	46	1	41	48
Sci. and tech. activities	58	23	3	20	12
Other	26	4	6	2	14

**Table 2b** Characteristics of the sample granted by the *development of technology and innovation* support programme

Industry	Total number	Number of firms with respect to location			
		KOSGEB centres	Industrial zones	Tech. dev. zones and techno parks	Other
Manufacturing	221	45	64	24	88
ICT	85	38	-	25	22
Sci. and tech. activities	18	9	2	5	2
Other	4	-	1	-	3

**Table 3** Descriptive statistics of the major variables

	<i>RDInnov-Ind</i>	<i>DevTech-Innov</i>	<i>Total-funds</i>	<i>Net sales</i> (× 1,000)	<i>Total assets</i> (× 1,000)
<i>Manufacturing</i>					
Mean	54,864	31,853	49,632	2,115	1,948
Min	232	149	149	-61	-10
Max	345,900	210,000	524,460	50,560	29,503
Stdev	61,595	49,723	62,409	4,776	4,039
<i>Information and communication</i>					
Mean	29,070	9,916	24,101	481	446
Min	750	460	460	0	-18
Max	355,225	35,000	355,225	17,251	14,549
Stdev	34,931	5,786	31,007	1,680	1,522

Notes: *RDInnovInd* represents the funds for R&D, innovation and industrial applications, *DevTechInnov* represents the funds for development of technology and innovation, *TotalFunds* represent total support funds, All numbers are given in TL

**Table 3** Descriptive statistics of the major variables (continued)

	<i>RDInnov-Ind</i>	<i>DevTech-Innov</i>	<i>Total-funds</i>	<i>Net sales</i> (× 1,000)	<i>Total assets</i> (× 1,000)
<i>Sci. and tech. activities</i>					
Mean	37,846	10,298	33,029	517	364
Min	182	490	182	0	0
Max	198,742	46,886	198,742	26,279	9,327
Stdev	39,114	9,306	37,456	2,818	1,088
<i>Other</i>					
Mean	40,471	39,932	41,286	337	574
Min	1,125	595	595	0	0
Max	190,151	75,600	190,151	2,897	5,427
Stdev	38,803	38,587	38,715	741	1,269

Notes: *RDInnovInd* represents the funds for R&D, innovation and industrial applications, *DevTechInnov* represents the funds for development of technology and innovation, *TotalFunds* represent total support funds, All numbers are given in TL

Descriptive statistics of the major variables are provided in Table 3. We compute the mean, median and standard deviation of the support funds (*RDInnovInd* and *DevTechInnov*), total assets and net sales for samples of firms across different industrial sectors. The average for the funds for R&D, Innovation and Industrial Applications is highest for firms residing in the manufacturing sector with an average support of 54,864TL. Similarly, firms in the manufacturing sector have the highest average amount for the total amount of funds with 49,632TL.

### 3.2 Regression analysis

We investigated the effects of the support funds (funds for R&D, innovation and industrial applications and funds for development of technology and innovation) on firms' net sales. We tested the effect of two funds separately, which we refer to as model 1 and model 2. While firms in our data set have been granted through two different types of support funds by the KOSGEB, we have only three years of data for each type of the support funds. 581 firms received *RDInnovInd* funds between the years 2010 and 2012 while 328 firms received *DevTechInnov* funds between 2009 and 2011. We investigated the effect of the sum of two funds on firm net sales to increase the time span of the data. The regression equation takes the following form where *InnovFunds* reflects the *RDInnovInd*, *DevTechInnov*, or *TotalFunds*.

$$NetSales_{i,t} = \alpha_0 + \alpha_1 InnovFunds_{i,t} + \alpha_2 Size_{i,t} + \sum_k \alpha_3 Industry_{i,k} + \sum_j \alpha_4 Region_{i,j} + \varepsilon_{i,t}$$

The indices *i* and *t* represent the firm and the year, respectively.  $\varepsilon_{i,t}$  is the error term. Technology development zones and technoparks were chosen as base dummy for the

region whereas firms classified in industrial sectors referred to as *other*, include industrial sectors such as wholesale, construction and electricity, which were chosen as base dummy for the industrial sector.

**Table 4** Pooled regression analysis of the support funds

	<i>Model 1</i>	<i>Model 2</i>	<i>Model 3</i>
RDInnovInd	0.06200		
DevTechInnov		0.00702	
TotalFunds			0.04048**
Size	0.56270***	0.50548***	0.49391***
DKOSGEB	0.10918**	0.15070**	0.08804***
DIndustZones	0.12457**	0.17971***	0.11140***
DOther	0.10130**	0.25713***	0.13343***
DSecMfg	0.09203	0.24588	0.13312**
DSecInfComm	0.07766	0.18771	0.05782
DSecSciTech	0.05376	0.07414	0.03885
Adj. R <sup>2</sup>	0.3684	0.3284	0.2965

Notes: Dependent variable = net sales,  
 Regression coefficients are standardised,  
 \*\*\* (\*\*, \*) indicate 1%, (5%, 10%) level of significance

Table 4 provides the parameter estimates of the regression models considered in this study. The positive and significant impact of *TotalFunds* on net sales indicates support funds for national innovation policies resulting in an increase in the net sales of the small firms supported through these funds. Size is also positively related to the net sales of SMEs. According to model 3, while firms in the manufacturing industry have a significant and positive impact on net sales as compared to firms classified in other industrial sectors, we do not observe this significant and positive impact for firms in the information and communication industry. With respect to location, firms located within the KOSGEB technology development centres, industrial zones and in other locations significantly increase the net sales. Firms located in technology development centres and technoparks do not positively contribute to net sales. About 60% of all firms in our data set are classified in the manufacturing sector. This can be partially explained because a significant portion of firms in our data set is classified in the manufacturing sector and most of these firms are located in industrial zones.

#### 4 Discussions and conclusions

Despite the increased policies and support funds for nurturing innovation activities of small firms all around the world, quantifying the effects of these policies on firm productivity or performance has long been neglected. While developing policies and supporting SMEs is crucial for the survival of small firms, systematic statistical measurement of SME policies is needed to improve the effectiveness of these policies. We measure the effectiveness of support funds provided by one of the largest public agencies in this field in Turkey, the KOSGEB. Yet, comparative studies among different

sources of this kind of support within Turkey as well as cross-country comparative studies must be prepared to analyse the impacts in the long run.

This research contributes to the literature by examining the effects of support funds on firm net sales. 844 SMEs receiving financial support from the KOSGEB were tracked during the years 2009 and 2012. Most of the SMEs receiving these funds are active in the manufacturing, information and communications sectors. According to the regression results, support funds significantly increased the firms' net sales. In addition, the firm size positively contributes to net sales. Our results also reveal manufacturing firms have higher net sales compared to other firms. Moreover, firms located within KOSGEB centres, industrial zones and other regions have higher net sales than firms located in technoparks and technology development centres. This can partially be explained because most of the SMEs supported by the KOSGEB are manufacturing firms located in industrial zones and KOSGEB centres. A significant portion of the firms that are active in information and communication technologies, although small in number, are located in technoparks and technology development centres. While these knowledge-intensive small firms have more potential in nurturing the innovativeness of the economy by developing value added products and services, most of them are so small they cannot compete with their larger counterparts.

Innovation requires high R&D investments that are typically risky and positive outcomes are uncertain in the short-run. Small firms often lack the resources to invest in R&D and innovation. Nevertheless, our analyses indicate support for innovation pays off in terms of higher net sales for manufacturing SMEs. However, this does not necessarily suggest innovation results in lower or non-significant benefits in financial measures for firms specialised in information and communication technologies. Since the data span of this study was limited to a few years (i.e., from 2009 to 2012), the non-significant effects of other industrial sectors other than manufacturing could only be inferred rather than generalised. Future research should collect longitudinal data on a larger number of firms more balanced with respect to different industrial sectors.

This study has key implications for government agencies, practitioners and researchers. The findings of this study shed light on the essential role of innovation policies and supports fostering the innovation activities of Turkish SMEs. From the Turkish Government's perspective, support funds for innovation results in higher financial performance for SMEs benefiting from these funds. The solid empirical evidence will provide insight to future support programmes within the KOSGEB and other private and public sector agencies. There is need for a more careful distribution of these funds relative to the firm's industrial sector with more special devotion towards technology-based firms having higher potential for innovation, firm size and location of the firms. Location can make a significant contribution to value-added in terms of financial and innovation performance as it has been extensively discussed in the literature concerning on- and off-science or technology park firms (Lindelöf and Löfsten, 2002). However, the small number of firms located in such parks in our sample limit was used to fully observe the effects of these locations on firm financial performance. Given this insight, KOSGEB and similar agencies can improve the effectiveness of the support programmes in the long-term and establish new funds and support programmes to further foster the innovativeness of small firms.

The sample for this study was drawn from the KOSGEB, which was limited to a few years (from 2009 to 2012). Given the short time span of our sample, we investigated the contribution of support funds in current net sales. A longer span of time would allow us

to investigate the effect of support funds for innovation on the differences in financial firm performance before and after funding opening a new avenue for future research. The research model could be further tested using samples from other supporting agencies and countries. In this study, the firm's performance was measured using net sales considering the investments in innovation would be reflected in the firm's financial performance. However, there are other important measures of innovation outputs such as patent count and number of new products and services that could be used to test the contribution of support funds in innovation on these measures of innovation outputs. Moreover, there exist other factors such as firm's age, firm's technology and R&D investments and entrepreneurship capital, which could also effect (marginal and joint effects) a firm's innovation performance. Since it is not easy to quantify factors such as entrepreneurship capital, further data needs to be collected through surveys and interviews. Finally, the findings can also be used to compare similar effects in different countries at least from a researcher's point of view.

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