

# The role of innovation policies in SME internationalization: Evidence from Türkiye\*

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## Abstract

This research note investigates the relative innovation performance and international presence of small and medium-sized enterprises (SMEs) in Türkiye. Using administrative data for the period 2006–2020, the empirical analysis shows that government support for research and development (R&D) correlates positively with firms' innovation activities and R&D expenditure. The results also suggest that innovation activities increase the probability of outward foreign direct investment. The results have important policy implications for Türkiye and developing countries in general. The findings highlight the key role of public incentives in targeting innovative activities towards internationalization of SMEs.

**Keywords:** FDI, innovation, innovation policy, panel data, R&D, SMEs

**JEL classification codes:** D25, F21, F23, O31, O32

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## 1. Introduction

Innovation is a key determinant of productivity and long-term growth, and helps enhance the capacity of firms to grow and adapt to market challenges, especially small and medium-sized enterprises (SMEs) (Braunerhjelm and Thulin, 2022; Nunes et al., 2012; Onetti et al., 2012). Innovation activities can play an important role in the internationalization of a firm. Technological innovation is shown to catalyze exports by improving productivity and enhancing product quality (Edeh et al., 2020; Haddoud et al., 2023). It is also associated with greater acquisition of knowledge about foreign markets (Musteen and Datta, 2011). High multimarket overlap in knowledge activities with industry rivals is another factor that pushes firms to internationalize and protect their innovations (Berry, 2020).

The aim of this research note is to empirically examine the role of innovation and innovation policies in the internationalization of SMEs in Türkiye. Türkiye actively supports the innovative activities of SMEs through two main organizations: the Organization for the Development of Small and Medium Enterprises (KOSGEB) and the Scientific and Technological Research Council of Türkiye (TUBITAK). KOSGEB, established in 1990, constitutes the main body for executing SME policies in the country. Since 2004, the Government has adopted four strategic action plans concerning SMEs. A major focus of these plans is to improve the international competitiveness of industrial SMEs to make them more outward-oriented and expand their operations abroad. Despite the proactive policies, SMEs in Türkiye still face major challenges and limitations in their innovation activities. Most manufacturing SMEs (87 per cent) operate in low-tech or medium-low-tech sectors, preventing them from benefiting from improved productivity through intra-industry spillovers such as knowledge and industry-wide cost reductions. Moreover, research and development (R&D) is still relatively costly, hindering the innovative capacity of SMEs. Furthermore, funding challenges limit universities' R&D infrastructure and industry–university cooperation (Ministry of Development, 2018).

This research note uses firm-level data from the Turkish Statistical Institute (TURKSTAT) for the period 2006–2020 to investigate the relative innovation performance and international presence of SMEs. It seeks to answer two main research questions: Are more innovative firms more prone to open their operations to foreign markets? Does government policy support for innovation activities play a role in the internationalization process of SMEs? Our empirical findings suggest that government support for R&D is positively associated with firms' innovation activities and R&D expenditure. The empirical findings herein can support evidence-based policymaking on how domestic policies can shape and sustain the productivity of enterprises by supporting their innovation activities, hence, indirectly helping SMEs to join global value chains by investing abroad.

The rest of the research note is organized as follows. Section 2 provides a brief overview of SMEs in Türkiye and their innovation activities compared with large MNEs. Section 3 outlines the innovation policy in Türkiye. Section 4 presents the research methodology and discusses the empirical findings. The final section concludes and provides some policy recommendations.

## 2. SMEs and innovation in Türkiye

SMEs constitute a major part of the economic activity in Türkiye, with a share of 99.7 per cent of all registered enterprises and 71 per cent of total employment in 2021.<sup>1</sup> They account for 50.6 per cent of total value added and 55.1 per cent of total trade. The significance of SMEs in Türkiye is not only due to their vast share in the economy but also to their “backbone” function in the dynamic but turbulent Turkish economy (Karadag, 2015). As Türkiye experienced severe economic crises in the last decades, SMEs became one of the major elements in the growth and development policies of the country.

In 2021, 36.5 per cent of Turkish SMEs were operating in the wholesale and retail trade, 14.9 per cent in the transportation and storage sectors, and 12.3 per cent in the manufacturing industry. Most SMEs in the manufacturing industry are in medium-low-tech or low-tech economic activities (figure 1). SMEs typically operate in low-tech activities – 55.9 per cent do so, compared with 45.9 per cent in large-scale enterprises – and only 0.7 per cent of SMEs are in the high-tech manufacturing industry. This ratio is four times higher for large enterprises, with a share of 2.8 per cent. The presence of medium-sized enterprises in high- and medium-high-tech sectors is higher than that of micro and small enterprises with shares of 20.4 per cent, 18.2 per cent and 11.8 per cent, respectively. The low share of SMEs in high-tech economic sectors is a limiting factor in their innovative activities.

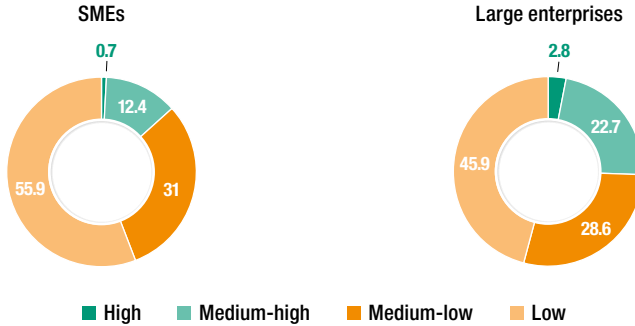
The high cost of R&D and the lack of skilled researchers, particularly at the doctoral (PhD) level, are factors adding to the challenges faced by SMEs (Ministry of Development, 2018). The share of SMEs in R&D expenditure fell to 27.1 per cent in 2021 from 35.3 per cent before the COVID-19 pandemic. Of the 146,735 R&D personnel (including researchers, technicians and other support staff) in the country, SMEs employed 63,938 – 43.6 per cent of all R&D personnel.<sup>2</sup> Similar to R&D expenditure, this number was higher before the pandemic, reaching 47 per cent for three consecutive years from 2017 to 2019.

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<sup>1</sup> All data and statistics in this section are from TURKSTAT (<https://data.tuik.gov.tr>) unless otherwise stated.

<sup>2</sup> Employment numbers are reported in terms of fulltime equivalent (FTE).

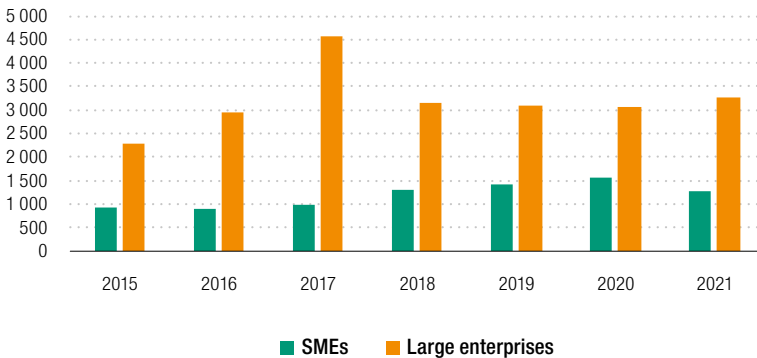
**Figure 1. Share of SMEs and large enterprises in manufacturing, by technology level, 2021 (Percentage)**



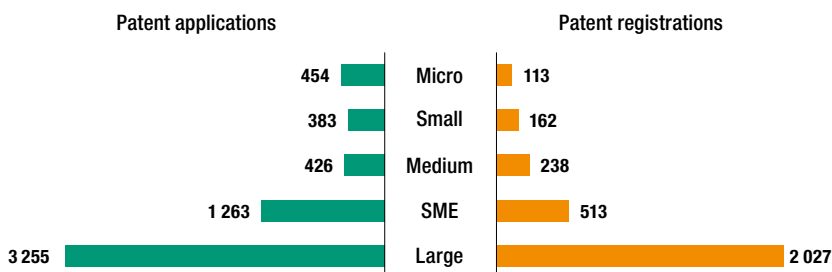
Source: TURKSTAT.

Figure 2 shows that the number of patent applications – a well-established measure of innovation activities – followed an upward trend until 2018 when financial turbulence hit the economy. It continued to increase for SMEs until 2020, and it has remained stable since then for large enterprises. Although the total number of patent applications by SMEs in 2021 was 1,263, 513 patents were registered in the same year (figure 3). In SME scales, micro-sized enterprises ranked first in patent applications with 454 applications but in terms of patent registrations medium-sized enterprises ranked first with 238 registered patents.

**Figure 2. Patent applications, by firm size, 2015–2021 (Number)**



Source: TURKSTAT.

**Figure 3. Patent applications and registrations, by firm size, 2021** (Number)

Source: TURKSTAT.

### 3. Innovation policy for SMEs in Türkiye

Türkiye supports the innovative activities of SMEs through two main organizations: the Organization for the Development of Small and Medium Enterprises (KOSGEB) and the Scientific and Technological Research Council of Türkiye (TUBITAK). KOSGEB constitutes the main body for executing SME policies in the country. It was established in 1990 to provide services and to support SMES in the manufacturing sector. With increasing value production and employment by SMEs in other sectors, the coverage of KOSGEB was expanded in 2009. Today, it offers a wide range of incentives to SMEs including low-interest loans, technical and managerial support, and training programmes. In 2018, its support programmes were updated with a vision to prioritize SMEs that produce innovative, technological and high value added products, that aim to carry these products to international markets and that are export oriented (KOSGEB, 2018).

The major programmes operated by KOSGEB, and by its Enterprise Development Centers (IGEM) and Technology Development Centers (TEKMER), are structured like the ones prevailing in more advanced countries. The laboratories operated by KOSGEB provide SMEs with access to testing and analysis equipment and methodologies that would otherwise not be available to most small firms. These programmes are well designed and effectively managed according to international standards. The technological and managerial assistance provided to SMEs enrolled in the programmes helps these firms to cope successfully with their business problems (OECD, 2020). TUBITAK specifically focuses on scientific and technological research, and supports R&D activities of SMEs. TUBITAK provides grants and support programmes to SMEs. Table 1 shows various types of innovation support programmes provided to SMEs in Türkiye.

SME policies in Türkiye are defined as part of a multi-year action plan. KOSGEB has developed the *KOSGEB Strategic Action Plan 2019–23* to contribute to coordinated delivery of SME policy. The main objectives of the plan include promoting innovation, technology and R&D, fostering entrepreneurship, and strengthening skills, internationalization and productivity of SMEs (KOSGEB, 2018). It also provides specific provisions for monitoring and evaluation. The proactive and up-to-date policy support make Türkiye a particularly relevant case for studying the role of innovation policies in promoting foreign direct investment (FDI) by SMEs.

**Table 1. Innovation support programmes in Türkiye**

KOSGEB incentives	TUBITAK incentives
R&D and innovation support programme	Industrial R&D projects grant programme
Product development and innovation support programme	University-industry collaboration support programme
SMEs technological product investment support programme	SME R&D start-up support programme
Industrial application support programme	International industrial R&D grant programme
Strategic product support programme	Research, technology development, and innovation projects in priority areas grant programme
General SME support programme	Technology Transfer Office support programme
SME development support programme	Venture capital funding programme (Tech-InvesTR)
Foreign market operations support programme	Frontier R&D laboratory support programme
	Capacity-building for R&D grant programme

Source: Authors' elaboration based on KOSGEB (2018) and sectoral plans of Türkiye.

## 4. Empirical analysis

### 4.1. Data

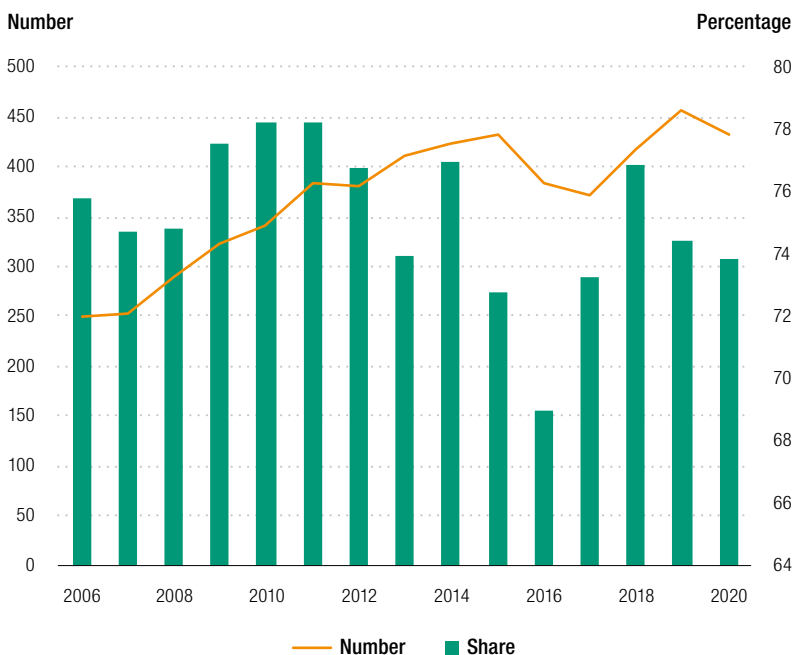
The empirical analysis uses firm-level administrative data from TURKSTAT. The data on SMEs are consolidated by TURKSTAT using annual industry and service statistics, foreign trade statistics, entrepreneurship and business demographics statistics, research and development activities surveys, patent applications and registration data of the Türkiye Patent and Trademark Office. The database covers firms for the period 2006–2020.

Internationalization is measured as outward FDI. Empirical research focusing on internationalization of firms usually measures it as foreign trade; however, the most productive firms are often involved in both FDI and exports. In fact, exports and FDI tend to be complementary (UNCTAD, 2013).

First, in order to draw out sample characteristics, we focused only on firms that invest abroad and present specific features of FDI by SMEs with respect to FDI by large firms. For this purpose, we extracted firms that reported income from foreign subsidiaries for a given year. Using this sample of the over 15 million firms for the given period, only 2,558 were found to have foreign subsidiaries, of which 1,518 were SMEs and 1,070 were large enterprises (see table 2).

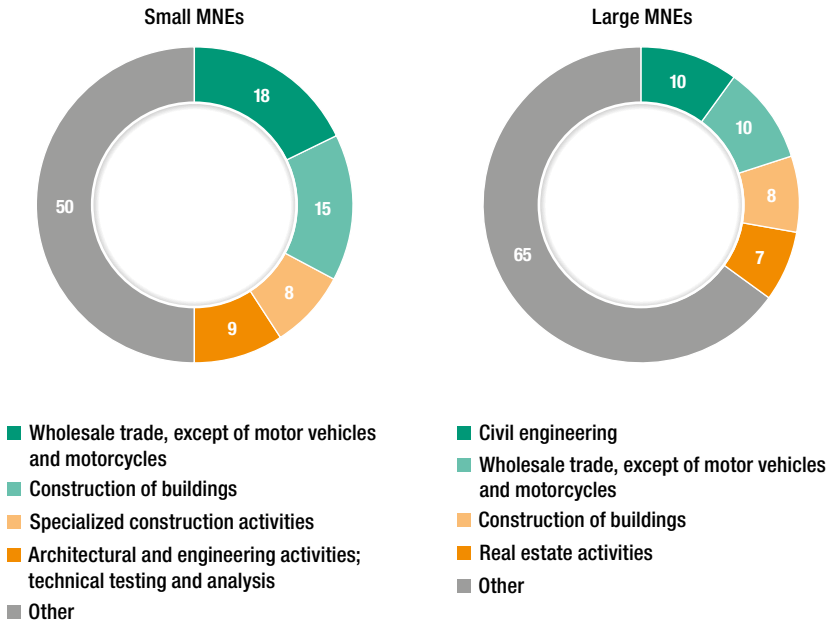
Between 2006 and 2020, SMEs in Türkiye constituted more than half of the firms in the sample that reported revenue from foreign subsidiaries (figure 4). SMEs in Türkiye mainly operate in wholesale trade, construction of buildings and architectural and engineering activities, while large MNEs are more active in real estate and civil engineering in addition to the former two (figure 5).

**Figure 4. SMEs with foreign subsidiaries, 2006–2020**



Source: Authors' calculations based on TURKSTAT data.

**Figure 5. Industrial composition of MNEs in Türkiye (Percentage)**



Source: Authors' calculations based on TURKSTAT data.

Innovation is not easy to quantify. Traditionally the most common indicators to measure business innovation include (i) input measures such as expenditure on R&D, (ii) intermediate output measures such as numbers of patents and (iii) output measures such as growth rates of productivity. This study employs a combination of the first two indicators. R&D expenditure is broadly used as an indicator of innovative activities. In addition, we consider intellectual property rights that encourage innovation by providing innovators with time-limited exclusive legal rights, thus enabling them to generate appropriate returns from their innovative activity (WIPO, 2022). For this, we use applications for patents, trademarks, industrial design, and utility models. Although patents require certain standards of novelty, the other innovation tools do not. A trademark is used to distinguish the goods or services of one enterprise from those of another. Industrial design includes a wide range of activities to develop a new or modified function, form or appearance for goods, services or processes. Utility models provide minor improvements to, and adaptations of, existing products. As a result, they do not qualify for patents but still require some sort of protection as they may have an important role in a national innovation system (OECD and Eurostat, 2018).



Table 2 shows the innovation performance of all enterprises with a foreign subsidiary. The innovation variable shows the total number of firms to which one or more innovation indicators applied: 472 of 2,588 firms have identifiable innovation activities, corresponding to a share of 18 per cent of all firms. For SMEs the share is 12 per cent, and for large MNEs it is 32 per cent. Decomposition of innovation activities across patent, trademark, design and model applications displays a similar picture. Large MNEs dominate in all categories. Trademark filings make up 89 per cent of all applications by SMEs (table 2).

**Table 2. Innovation performance of firms with foreign subsidiaries**

	Whole sample ( <i>N</i> = 2,588)	SMEs ( <i>N</i> = 1,518)	Large MNEs ( <i>N</i> = 1,070)
Innovation	472	181	291
Patent applications	100	6	94
Trademark applications	408	165	243
Design applications	87	8	79
Utility model applications	33	7	26

Source: Authors' calculations based on TURKSTAT data.

Note: The innovation variable shows the total number of firms that applied to one or more innovation indicators. Details of the type of innovation do not add up to the total innovation values because a firm can submit more than one application.

## 4.2. Model specification

The empirical strategy follows a three-step analysis. The first step examines whether there are any significant differences in firm outcomes between SMEs and large MNEs that have foreign subsidiaries. For this purpose, the following equation is estimated:

$$firm\_outcome_{ijt} = \beta_0 + \beta_1 SME_{ijt} + \gamma_{ij} + \varepsilon_{ijt} \quad (1)$$

for firm  $i$  operating in industry  $j$  at time  $t$ .  $SME$  is the variable of interest, which is a binary variable that takes the value 1 if the firm has 250 employees or fewer. Firm outcome is the dependent variable, which takes different values for individual estimations including export intensity, foreign revenue, wage, R&D expenditure and innovation. Export intensity is the share of exports in total sales of the firm. Foreign revenue is measured as the share of revenue from foreign subsidiaries in total sales of the firm. Wage is the average wage at the firm, used in natural logarithm form. R&D expenditure is calculated as the share of R&D expenditure in total sales of the firm. Innovation is a binary variable that takes the value 1 if the firm applies for at least one patent, trademark, design or utility model, and 0 otherwise.

Finally,  $\gamma_{ij}$  is industry-year fixed effects and  $\varepsilon_{ijt}$  is the error term. This model is estimated on a sample of firms with foreign subsidiaries.

The second step investigates the role of government incentives in promoting innovation activities of SMEs. To examine this relationship, the following linear probability model is estimated:

$$innovation_{ijt} = \beta_0 + \beta_1 incentive_{ijt} + \beta_2 \ln size_{ijt} + \beta_3 \ln age_{ijt} + \gamma_{ij} + \varepsilon_{ijt} \quad (2)$$

where the variable *incentive* stands for the support received by the firm for its R&D-related activities either from KOSGEB or TUBITAK. This is a binary variable which takes the value 1 if the firm benefits from any incentives or support programmes from one of the two organizations. Then, two binary variables are introduced to examine the efficiency of different support programmes separately. These variables are named *kosgeb* and *tubitak*, and they take the value 1 if the firm receives support from KOSGEB and TUBITAK, respectively, and 0 otherwise. The variable *size* is the number of employees of the firm, and *age* is the age of the firm, to control for the firm's experience. Both variables are used in natural logarithm form to normalize the distribution. This model is estimated for all SMEs.

The third, and last, stage of the analysis focuses on the internationalization pattern and trends of SMEs within the context of innovation. The role of innovation on internationalization, measured as outward FDI, is analyzed comparing fully domestic firms with firms that invest abroad. The model takes the following form:

$$fdi_{ijt} = \beta_0 + \beta_1 innovation_{ijt-1} + \beta_2 \ln size_{ijt} + \beta_3 \ln age_{ijt} + \gamma_{ij} + \varepsilon_{ijt} \quad (3)$$

where *innovation* is used with a one-year lag. There may, in principle, be a dynamic impact from FDI on innovation as FDI can enhance firms' innovation capacity by promoting firms' learning and access to resources in foreign markets. This reverse causality is disentangled using a lagged independent variable (*innovation<sub>ijt-1</sub>*) in a first difference model (Allison, 2009). This model is estimated for all SMEs using a linear probability model.

All three models are run initially by using industry-year fixed effects. The analysis is repeated by including industry and year fixed effects separately, and results do not change. Standard errors are clustered at the industrial level using the two-digit Nomenclature of Economic Activities (NACE) classification.

### 4.3. Empirical results

The empirical results provide a set of stylized facts observed in the sample that explain the role of innovation in investing abroad. The results of the first model are displayed in table 3. The key message is that SMEs are less innovative but

as internationalized as larger firms. The findings also suggest that SMEs that invest abroad pay lower wages than their large counterparts. In addition, SMEs' participation in innovative activities such as applications for patents, design, trademark and utility models, is lower than that of large firms. Yet, the empirical analysis does not provide evidence in support of a statistically significant difference between SMEs and large firms in terms of their export intensity, foreign revenue share and R&D expenditure share in total sales.

**Table 3: SMEs vs. large firms with foreign subsidiaries**

	Export intensity	Foreign revenue	Wage	R&D expenditures	Innovation
SME	0.004 (0.039)	0.000 (0.021)	-3.811*** (0.135)	-0.001 (0.003)	-0.096*** (0.027)
N	2 038	2 193	2 011	2 036	2 332
Fixed effects	Industry and year	Industry and year	Industry and year	Industry and year	Industry and year
R <sup>2</sup>	0.221	0.222	0.683	0.369	0.325

Source: Authors' estimations.

Note: *t* statistics in parentheses. \* $p < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$ .

Table 4 presents the results of estimating the relationship between government incentives for R&D and firms' innovation performance. Initially, the model is estimated using one common incentive variable to examine the effect of incentives overall regardless of their origin. Then, each model is estimated for *kosgeb* and *tubitak* incentives separately to investigate the efficiency of different support programmes. The results suggest that government support for R&D is positively associated with firms' increase of innovation activities and R&D expenditures, independent of the source of the incentive and of the type of innovation activity. Although both *kosgeb* and *tubitak* variables yield statistically significant coefficients, the magnitude of *tubitak* is greater. This is in line with expectations, as TUBITAK incentives directly target R&D and innovation activities, whereas KOSGEB provides broader incentives, including programmes for general SME support and foreign market operations support.

**Table 4. Effect of government incentives on innovation**

	Patent applications			Innovation			R&D expenditure		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Incentive (lag_1)	0.068*** (0.006)			0.148*** (0.010)			0.062*** (0.014)		
Kosgeb (lag_1)		0.058*** (0.006)			0.142*** (0.011)			0.055*** (0.011)	
Tubitak (lag_1)			0.069*** (0.005)			0.145*** (0.011)			0.066*** (0.016)
Firm size (ln)	0.001*** (0.000)	0.001*** (0.000)	0.001*** (0.000)	0.026*** (0.002)	0.027*** (0.002)	0.025*** (0.002)	0.000 (0.000)	0.000* (0.000)	0.000 (0.000)
Firm age (ln)	-0.000*** (0.000)	-0.000*** (0.000)	-0.000*** (0.000)	-0.010*** (0.000)	-0.010*** (0.001)	-0.010*** (0.001)	-0.000** (0.000)	-0.000** (0.000)	-0.000*** (0.000)
N	5 165 840	5 165 840	6 309 650	5 165 840	5 165 840	6 309 650	5 018 583	5 018 583	6 126 257
Fixed effects	Industry and year	Industry and year	Industry and year	Industry and year	Industry and year	Industry and year	Industry and year	Industry and year	Industry and year
R <sup>2</sup>	0.018	0.010	0.015	0.042	0.041	0.044	0.071	0.054	0.065

Source: Author's estimation.

Note: *t* statistics in parentheses. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

Table 5 presents the findings on the relationship between innovation activities and outward FDI by SMEs, focusing on the aforementioned three measures of innovation. The results suggest that innovation activities increase the probability of outward FDI. The model does not provide evidence for statistically significant results for patent applications and R&D expenditures.

**Table 5: Effect of innovation on outward FDI**

	(1)	(2)	(3)
Innovation (lag_1)	0.015%** (0.0000)		
Patent (lag_1)		0.067% (0.0004)	
R&D expenditures (lag_1)			0.089% (0.0009)
Firm size (ln)	0.017%*** (0.0000)	0.017%*** (0.0000)	0.018%*** (0.0000)
Firm age (ln)	-0.002%** (0.0000)	-0.020%** (0.0000)	-0.002%** (0.0000)
N	6 882 491	6 882 491	6 677 693
Fixed effects	Industry and year	Industry and year	Industry and year
R <sup>2</sup>	0.0009	0.0009	0.0010

Source: Authors' estimations.

Note: Average marginal effects are reported. The dependent variable is whether the firm invests abroad or not. *t* statistics in parentheses.  
\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

The empirical analysis confirms the established theory that only innovative and dynamic SMEs are more likely to invest abroad. Engaging in innovative activities increases SMEs' probability of foreign investment by 0.015 percentage points. The model does not provide significant evidence for the effect of patent applications and R&D expenditures on FDI. The insignificance of the relationship might be explained by the fact that the economic benefits of being granted a patent might be slow to materialize and translate in geographic expansion.

## 5. Conclusion and policy implications

This research note investigates the relative innovation performance and international presence of SMEs, looking at government incentives that promote innovation and hence internationalization in Türkiye. The relationship between innovation and outward FDI is examined through the lens of three incentives for innovation: patent application, innovation activities and R&D expenditures. Using administrative data for a period of 15 years, empirical analysis shows that government support for R&D is positively associated with firms' innovation activities and R&D expenditure. The results also suggest that innovation activities increase the probability of outward FDI.

The results have important implications for policy. They highlight the role of public incentives in promoting innovation and boosting FDI by SMEs. Public funds in the form of research grants, prizes and loans can be crucial in supporting SMEs' R&D operations. Our results also underline the importance of intellectual property rights for promoting innovative activities. Intellectual property rights defined by international agreements must be recognized and implemented by national laws. Policies also must be adopted to ensure countries have a regulatory framework for market competition to provide satisfactory returns to innovators, and complementary infrastructure.

Access to innovation assets, such as technology, data, information and networks, is critical for firms of all sizes but it is more restricted for SMEs. SMEs are also more dependent on external sources of knowledge. Governments should facilitate and ensure the access of SMEs to innovation assets through technological and managerial training, networking events and skills programmes, as well as the necessary complementary infrastructure. Digitalization of SMEs is of great importance as it facilitates access to resources, including finance (e.g. peer-to-peer lending), training and recruitment channels, as well as government services.

Policymakers can further support innovation in SMEs by fostering a sound business environment, helping SMEs to develop and use their internal strategic resources effectively. Strong collaboration between SMEs and university labs is an essential part of a productive innovation ecosystem. Finally, information matters: it is essential that SMEs are well-informed about the incentives and support programmes available to them.

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