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GOVERNMENT FINANCIAL INCENTIVE AND FIRM PERFORMANCE: EVIDENCE FROM TURKEY

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ABSTRACT

Although government incentives to firms are common worldwide, empirical evidence of their impact on firm performance is rare. Against this backdrop, this study examines the causal impact of government financial incentives on firms labor productivity and export performance. We used a sample of Turkish firms obtained from the World Bank Enterprise Survey (WBES). The data were analyzed using Stata software, version 16. The empirical analysis employed the Propensity Score Matching (PSM) approach that controls for counterfactual outcomes. The study's findings indicate that firms receiving government financial incentives are 33% more productive and export five times more than firms that do not. Therefore, it is essential to continue supporting firms to foster their performance, but future incentives should be given more to small and younger firms.

JEL Classification: L53, H54

Keywords: Government support, Turkey, WBES, PSM, Firm performance

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1. INTRODUCTION

Firm performance is said to be determined by both internal and external factors. Internal factors include firm-specific characteristics such as size, age, ownership, and so forth. While external factors comprise the peculiar firm's operational environment, such as the level of market competition and government regulation (Hussen, and Çokgezen, 2019; Hansen and Wernerfelt, 1989). To improve firm performance, most governments around the world provide various incentives, such as tax holidays, reduced corporate income taxes,

investment grants, and R&D funds, to private firms (Nugroho, 2019). For instance, in 2010, the European Union (EU) countries spent around 9.6% of their GDP to support firms (Criscuolo et al., 2012). Similarly, the United States spends about US$50 billion every year on local development policies (Criscuolo et al., 2019). Although these incentives are aimed at fostering firm export performance, create job opportunities, and enhance productivity, among others, there is an increasing concern whether these incentives achieved their aims.

Institutional theory suggests that private enterprises may overcome institutional and other barriers on an uneven playing field through efficient government support. It has been argued that firms with government support will increase research and development (R&D) input and thus improve their performance (Wu, 2017; Hansen, Rand, and Tarp, 2009). In contrast, proponents of rent-seeking viewpoints argued that government subsidies are distributed based on social and/or political connections, and hence distort resource allocation among companies. As a result, government incentives do not necessarily improve firm performance (Vu, and Tran, 2021; Nguyen et al., 2018).

Over the past three decades, there has been a dramatic increase in empirical analysis on the impact of government subsidies on firm performance (Criscuolo et al., 2012). The empirical findings, however, have produced mixed results as to whether subsidies affect firms positively or negatively; the debate is still ongoing. While most empirical studies have indicated the positive impact of government support on firm performance (Criscuolo et al., 2019; Cin, Kim, and Vonortas 2014), others have found a negative relationship between government incentive and firm performance (Guan, and Yam, 2015; Alperovych, Hübner, and Lobet 2015). Other studies have questioned the relevance of government support on firm performance and argued that government incentives are "… like a dessert; it is good to have, but it doesn't help very much if the meal isn't there" (Morisset, and Pirnia, 1999), indicating the limited impact of government support on firm performance.

Different empirical findings may be attributed to the different methodologies, measures of firm performance, and sample observation. A better study would examine the relationship using a larger dataset, employing an empirical methodology that controls for counterfactual outcomes, and a single country as a case study. As Criscuolo et al. (2019) noted, empirical analysis on the effect of government grants based on OLS regression is downward biased; thus, impact evaluation methods, such as Propensity Score Matching

(PSM), provide a better approximation to the true effect of government support. Besides that, studies on the effect of government subsidy mainly focus on developed countries.

This study attempts to fill some of the abovementioned gaps. First, it seeks to examine the causal impact of government incentives in the case of Turkey. Since previous studies have paid relatively little attention to developing and emerging countries, the study adds further insights to the nexus between government incentives and firm performance. Second, this study attempts to address selection bias and identification concerns by employing a PSM approach. The PSM approach matches firms that received government incentives with those that did not, based on various criteria that may predict the probability of a firm being selected for government incentives.

In the early 2000s, the Turkish government embarked on an economic recovery and reform program. Partly because of this, Turkey has shown remarkable economic growth in the last fifteen years, during which per capita GDP has tripled (World_Bank, 2019, 3). Over the years, the Turkish government has been implementing several incentive mechanisms for firms, including financial support, to improve their performance and the economy. Little is yet known, however, as to whether this incentive mechanism has produced tangible effects on firm performance. Furthermore, Turkey envisions to be among one of the top ten richest countries in the world by 2023 (Uddin 2018). If economic theory is any guide, realizing this vision requires enhancing firm productivity. Hence, it is extremely important to explore if financial incentives to firms are a viable policy option that will help the country achieve its goal.

The main questions addressed in this paper are: i) what are the factors determining the probability of receiving government financial incentives? ii) Does government financial incentive improve firm productivity and export performance? To this end, a sample of Turkish firms, retrieved from the World Bank Enterprise Survey (WBES), was used and empirically analyzed by employing the PSM approach that controls for counterfactual outcomes. The empirical result of the study revealed that government financial incentives to firms are effective in Turkey because firms that received them are 33% more productive and export five times more than those that do not. The findings of this study thus suggest that the government should continue supporting firms including, but not limited to, financial incentives to generate higher performance, and higher national economic performance. Since larger and older firms have a higher probability of getting government

financial support at present, future incentive mechanisms should be directed toward small and younger firms.

This study deviates from previous studies in that it employs a PSM approach that accounts for a counterfactual scenario to examine the impact of financial incentives on firm performance. Thus, it adds further insights to the nexus between government financial incentives and firm performance in emerging countries.

The remainder of the present study is organized in the following way: the next section reviews the literature related to the topic. The third section describes the methodology including the data source and the empirical approach of the study. The fourth section discusses the econometric results, and the last section concludes the paper.

2. LITERATURE REVIEW

Previous studies have indicated that firm performance is affected by both internal and external factors. Internal factors include firm-specific characteristics such as size, age, ownership, and so forth. while external factors refer to the unique firm operating environment such as the level of market competition and government regulation (Hussen, and Çokgezen, 2019; Hansen, and Wernerfelt, 1989). Government support for private firms is one of the external factors affecting firm performance. The theoretical and empirical evidence as to whether it affects positively or negatively, however, are mixed. For instance, institutional theory indicated that government subsidies can help private firms overcome market failure, financial problems, and institutional barriers. Thus, firms with government support may show significant performance improvement (Wu, 2017; Hansen et al., 2009). In contrast, others argued that government subsidies are distributed based on social and/or political connections, especially in developing and emerging countries. Hence, this distorts the efficient resource allocation among companies. As a result, firms that receive government incentives do not necessarily improve their performance (Vu and Tran 2021; Nguyen et al., 2018).

Several empirical studies have been conducted in the last three decades on this issue, but there has been little agreement on the effect of government support on firm performance. A strand of literature supports the institutional theory, indicating positive effect of government support on firm performance. For instance, Cin, Kim, and Vonortas (2014) examined the effect of government R&D support on Korean firm productivity using a difference in difference approach and found significant evidence of government support on firm

productivity. Nguyen et al. (2018) analyzed the nexus between government support and firm performance using a sample of Vietnamese firms. The authors indicated that government support promotes firm financial performance. Using 844 Turkish SMEs that received government financial support, Olcay and Bulu (2015) revealed that government support has a significant positive impact on firms' net sales. Xiang and Worthington (2017) also found a similar result for Australian firms.

A recent study by Amendola et al. (2018) revealed the positive impact of government tax incentives on individual firm performance. In the same vein, Criscuolo et al. (2019) indicated that an investment subsidy improves firm performance. According to them, a one-percent increase in investment subsidy increased employment by the same amount. Söderblom et al. (2015) found that although the impact of government subsidy on firm performance is minimal, it can help firms to get qualified employees and other financial resources that directly affect performance. Ahn, Lee, and Mortara (2020) also investigated the link between R&D subsidies and firms' inclination to collaborate with other firms using sample data from 489 Korean manufacturing firms. The authors found that R&D subsidies stimulate firms to increase innovation collaborations. A recent study by Adam and Alarifi (2021) also indicates a significant positive effect of subsidies on firm performance and survival. Using a sample of Chinese enterprises, Jiang et al. (2021) found that government subsidies exert a significant positive impact on innovation performance.

Other strands of literature have suggested that government incentives have only a limited impact on firm performance. Subsidies such as tax exemptions are good to have if other substantial incentives such as regulation and institutional infrastructure support exist (Morisset and Pirnia 1999). Bergström (2000) examined the effect of public capital subsidies on total factor productivity firms using a sample of Swedish firms and found little evidence that subsidies enhanced productivity, although subsidization affected firm growth. In a similar vein, Morris and Stevens (2010) observed that the government subsidy impact on productivity was less conclusive for a sample of firms in New Zealand. Using unbalanced panel data of 2315 firms from China, Fu and Li (2015) found that subsidies tend to have an inverted U-shape effect on firm survival time. Harris and Li (2019) also noted inverted U-shaped gains in TFP level from government subsidies. Liu et al. (2019) found an inverse U-shaped relationship between government subsidies and firm innovation performance. Luo

et al. (2020) indicated that government subsidy effectiveness is subject to the interplay of firm characteristics and legal environment, indicating that subsidies may not necessarily foster higher performance. Vu and Tran (2021) also found no evidence of linkage between government subsidies and firm-level productivity.

Opponents of government support argue that government incentives to firms can distort the market and competition among firms, creating problems such as rent-seeking and low investment efficiency (Claessens, Feijen, and Laeven, 2008). Therefore, incentives have a negative impact on firm performance and the economy as a whole. For instance, firms may spend the company's resources to sustain their relationship with government officials and hire excess employees to obtain and retain government financial incentives (Vu, and Tran, 2021; Bu, and Huang, 2013). In this regard, Alperovych et al. (2015) examined the effect of investor type, either government or private, on the operating efficiency of 515 Belgian portfolio firms and found that a firm with VC backing has low-level productivity and that a government-backed firm has a low-level efficiency. Guan and Yam (2015) investigated the effect of government financial incentives on innovation performance of more than 1000 Chinese manufacturing firms during the mid-1990s. They found that although incentives such as Special Loans and Tax Credits positively related to innovative performance, government direct funding had a significant negative impact on firm innovative performance. Using a panel dataset of Chinese firms, Bu, Zhang, and Wang (2017) found that government subsidy to private firms is negatively related to firm performance. Dai and Li (2020) also indicated that government subsidy has a significant negative relationship with firm performance measured by market power.

In a nutshell, findings of studies on the nexus between government subsidies and firm performance vary depending on the measure of performance, the number of countries taken as a sample, the estimation method employed, and the nature of the dataset (cross-section, time series, and panel). As a consequence, the empirical results of these studies are mixed. Although most of the studies documented the positive effect of government incentives on firm performance, the debate continued specifically for developing and emerging countries. The following Table 1 provides the summary of selected previous empirical studies on the relationship between government subsidies and firm performance.

TABLE 1
Summary of Selected Prior Empirical Papers

Authors	Study sample	Performance measures	Econometric technique	Major findings	Limitations
Cin, Kim, and Vonortas (2014)	2000-2007 / Korean manufacturing firms	Value-added productivity	Difference in Difference (DID)	+ve and significant effect	• Focus on developed countries • Measure of performance
Söderblom et al. (2015)	284 Swedish firms	Annual sales	Ordinary Least Square (OLS)	+ve and significant effect	• Focus on developed countries • Does not account for selection bias
Liu et al. (2019)	China Industrial Enterprise Database	Innovation	Fixed-effect	Inverted U shape	• Selection bias was not accounted
Guo, Guo, and Jiang (2016)	Chinese manufacturing firms from 1998 to 2007	Number of patents, sales from new products, and exports.	PSM and 2SLS	+ve &significant effect	• Measure of performance

TABLE 2 *(continued)*

Authors	Study sample	Performance measures	Econometric technique	Major findings	Limitations
Bu, Zhang, and Wang (2017)	10,130 Chinese firms from 2007 to 2012	Net profit	OLS	-ve and significant effect	• Selection bias wasn't accounted
Nguyen et al. (2018)	2007–2015/Vietnamese manufacturing	Financial performance	GMM	Positive effect	• Measure of performance
Harris and Li (2019)	Chinese firm-level panel data for 1998–2007	Total factor productivity	GMM estimation method	inverted U-shaped	• Measure of performance
Ahn, Lee, and Mortara (2020)	489 manufacturing	Firms' inclination to collaborate	Propensity score matching	+ve and significant effect	• Measure of performance
Luo et al. (2020)	237 high-tech Chinese firms	Firm's sales growth rate	Fuzzy-set Qualitative Comparative Analysis	Mixed result	• Measure of performance • Selection bias

TABLE 3 *(continued)*

Authors	Study sample	Performance measures	Econometric technique	Major findings	Limitations
Dai and Li (2020)	Rice processing industry as a case study	Firms' market power	OLS/ 2SLS/ GMM	Subsidy weakens the market power of firms subsidized	• Focus only on one sector
Vu and Tran (2021)	Firm-level data from Vietnam 2011-2015	Productivity	Instrumental variable fixed effect estimation	Insignificant	• Measure of performance
Adam and Alarifi (2021)	259 SME managers in Saudi Arabia	Innovation performance	PLS-SEM	+ve and significant	• Measure of performance

3. RESEARCH METHOD

This study adopted a quantitative research approach in which secondary and quantitative data were retrieved from WBES and systematically analyzed using Stata version 16, to answer the key research questions of the study.

3.1 SAMPLE AND DATA

Our study relies on secondary data retrieved from the WBES. The WBES conducts a firm-level survey in developing and emerging countries using a harmonized questionnaire every 3 or 4 years. In each country, sample firms are selected based on stratified sampling methodology in which a geographical region within a country, business sector and firm size are chosen. Information regarding firm characteristics, performance, and business environment are collected through face-to-face interviews with the manager/owner. The present study uses a sample of more than 6000 Turkish firms obtained from WBES (survey conducted in 2015) to investigate the causal impact of government financial incentives on firm productivity and export performance.

3.2 EMPIRICAL METHODOLOGY

Propensity Score Matching (PSM) was employed to explore the causal impact of government financial incentives on firm productivity and export performance. In this framework, there are two types of firms: those that get government financial incentives (treated group) and firms that did not get government financial incentives (controlled or counter-factual group); correspondingly, there are two potential outcomes. Suppose that P_i is a binary variable that takes the value 1 if the ith firm gets financial support (treated), 0 otherwise while Y_i is the potential outcomes of the ith firm i.e. firm's performance measured in terms of productivity and export performance. For each observation, the effect of receiving financial incentive (treatment) is given as:

$$(1) \quad ATE_l = E_l(Y_{i1} - Y_{i0}) = E_l(Y_1) - E_l(Y_{i0})$$

Where ATE denotes the Average Treatment Effect. ATE implies the impact of moving all firms from untreated (not receiving financial support) to treated (receiving financial support). Whereas the effect of government support on firms that ultimately received the incentive, which is defined as ATT (Average Treatment effect on the

Treated), is given as:

$$(2) \quad ATT = E(Y_1 - Y_0 | p = 1)$$

Since firms are randomly assigned into treated and nontreated groups in a randomized control trial (RCT), ATE and ATT are the same and simply estimated by comparing the difference in productivity and export performance between the treated and control groups (Imbens 2004). In observational studies, like the present study, firms are not randomly assigned to the treated and control group. Thus, a naive comparison in the productivity and/or export performance of firms between the treated and controlled provides a biased estimate of ATE and ATT. In the present study, for instance, firms that receive government support are intrinsically different from those that did not receive including, but not limited to, innovation, ownership, size, business sector, age, and so forth. These intrinsic differences are most likely correlated with the outcome variable i.e., firm performance, creating selection bias.

Rosenbaum and Rubin (1983) proposed a Propensity Score Matching (PSM) approach to address the selection bias problem. In this approach, treated groups with similar observed characteristics are matched to the nontreated group based on the propensity score, and the differences in outcomes within pairs are computed. Thus, PSM is conducted in two stages. In the first stage, the propensity score of getting financial support from the government is estimated for each firm using a probit/logit estimation method. In this study, we used a logit model to investigate the probability of getting financial support from the government as given in the following equation:

$$(3) \quad p(x) = log\left(\frac{p(y=1}{1-(p=1}\right)_i = \beta' X_i + \varepsilon_i$$

$$(4) \quad p(x) = prob(D = 1|x) = E(D|x)$$

Where D is a binary variable that takes the value 1 if the firm gets financial support, 0 otherwise. In a WBES, firms were asked whether they had received a grant from the government. Affirmative answers to this question by firms were coded as 1 while negative answers were coded as 0. This variable is used as the dependent variable for the logit model. β is a vector of unknown parameters to be estimated while ε_i is the error term. X_i is a vector of independent variables that are deemed to affect the propensity of receiving

government financial incentives. These independent variables include, but are not limited to, size of the firm, ownership (government vs private and foreign vs domestic ownership), being part of a large group, age, and innovation -- both product and process. Table 2 presents the definition of variables used in the present study.

TABLE 4
Definition of Variables

Performance variables	
Productivity	The logarithm of sales per worker
Export	Percentage of the total export from the total sales
Treatment variable	
Grant	A binary variable that takes the value 1 if the firm receives financial assistance from the government, 0 otherwise.
Explanatory variables	
Manufacturing	A binary variable that takes the value 1 if the firm is a manufacturing company, 0 otherwise.
Product innovation	A binary variable that takes the value 1 if the firm introduced a product innovation, 0 otherwise.
Process innovation	A binary variable that takes the value 1 if the firm introduced a process innovation, 0 otherwise.
Age	The difference between Survey year and firm's establishment
Part of a large group	A binary variable that takes the value 1 if the firm is part of a large group of companies, 0 otherwise.
Foreign owned	A binary variable that takes the value 1 if the firm is at least 10% owned by foreigners, 0 otherwise.
Managerial experience	Experience of the manager in the sector (measured in terms of year and transformed into log)
Size of the firm	Number of full-time employees in the company (transformed into log)
Corporation	A binary variable that takes the value 1 if the firm is a corporation, 0 otherwise.

Based on the logit model, the propensity score of each firm is estimated. In the second stage, firms in the treated group whose propensity score is close to that of a treated observation are matched

with untreated observations using various matching algorithms. Thereafter, the ATT of each matched pair is calculated using the following equation:

(5) $$ATT = E(y_1|p(x), D = 1) - E(y_0|p(x), D = 0)$$

Where y implies firm productivity and export performance. This matching procedure is repeated for all firms that receive government support, and averages in differences in productivity and export performance within pairs are computed.

(6) $$ATT = \frac{1}{n_1} \sum_{i \in \{D=1\}} \left[y_{1,i} - \sum_j w(i,j) y_{0,j} \right]$$

Where i represents each firm that received government support and j represents each firm that did not receive, and w is the matching algorithm. Various matching algorithms can be used such as nearest neighbor matching (NNM), radius matching (RM), and kernel matching (KM). NNM matches the outcome of the treated firms with the closest and most similar non-treated firms. RM matches treated and nontreated firms that fall within a specified radius (r). KM matches treated firms with non-treated that have weights inversely proportional to the distance between the two (Cerulli 2015, 83). As a robustness check, all these three matching algorithms were employed in this study.

4. RESULTS & DISCUSSION

4.1 DESCRIPTIVE STATISTICS

Table 3 presents the summary statistics of the variables used in the present study. As shown in the table, sample firms differ in productivity and export performance. While the mean level of productivity is 11.35, the average percentage of export from the firms' total sales is 2.5. The table further indicates that firms vary based on their characteristics such as age, innovation capacity, and ownership. Firms that received government financial incentives account for nearly 4% of the total firms in the sample.

TABLE 5
Summary Statistics for All Variables

Variables	(1) N	(2) Mean	(3) sd	(4) min	(5) max
Productivity	5,786	11.350	1.101	6.809	21.23
Export	5,953	2.486	12.400	0	100
Product innovation	5,950	0.123	0.329	0	1
Process innovation	5,917	0.060	0.238	0	1
Corporation	6,006	0.057	0.231	0	1
Foreign-owned	5,990	0.008	0.088	0	1
Size of the firm	5,989	1.912	1.526	0	9.999
Age of the firm	5,974	2.404	0.803	0	5.075
Managerial experience	5,944	2.813	0.649	0	4.220
Part of a large group	6,006	0.039	0.193	0	1
Manufacturing	6,006	0.499	0.500	0	1
Grant	5,926	0.040	0.195	0	1

In order to exhibit the correlation between the main variables used in this study, the correlation matrix of the variables is presented in the following table. Table 4 indicates that productivity is correlated positively with all of the variables, except firm size. Export performance, on the other hand, is positively correlated will all of the variables used in the study. More importantly, the table indicates the probable positive relationship between government financial incentives and firms' performance measures: productivity and export performance.

TABLE 6
Correlation Matrix for All Variables

	Productivity	Export	Grant	Manufacturing	Part of large group	Managerial experience	Firm Age	Firm Size	Foreign ownership	Corporation	Product innovation	Process innovation
Productivity	1											
Export	0.08***	1										
Grant	0.07***	0.18***	1									
Manufacturing	0.15***	0.10***	0.13***	1								
Part of large group	0.01	0.07***	-0.001	-0.01	1							
Managerial experience	0.06***	0.03*	0.02	0.12***	0.02	1						
Age of the firm	0.05***	0.12***	0.09***	0.07***	0.05***	0.44***	1					
Size of the firm	-0.04*	0.28***	0.26***	0.22***	0.14***	0.08***	0.22***	1				
Foreign ownership	0.03	0.07***	0.03	0.034*	0.08***	0.01	0.03*	0.12***	1			
Corporation	0.08***	0.27***	0.15***	0.10***	0.10***	0.06***	0.20***	0.41***	0.15***	1		
Product innovation	0.07***	0.13***	0.22***	0.12***	0.08***	0.07***	0.08***	0.25***	0.08***	0.17***	1	
Process innovation	0.04**	0.09***	0.18***	0.06***	0.09***	0.03	0.06***	0.21***	0.07***	0.14***	0.43***	1

Notes: $^{*}p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$

Before conducting PSM, we tested for the multivariate vector of means for two groups (incentive receivers and non-receivers) are equal using Hotelling's T-squared generalized means test as reported in the following table. As shown in Table 7, the *F*-statistic is significant at a 1% significance level, so the null hypothesis is rejected. It implies that at least one of the parameters, or a combination of one or more parameters working together, significantly differs. It is an indication that the treated and control group significantly differs in terms of their attributes, suggesting the need to consider this difference to uncover the causal impact of treatment (receiving government financial incentive).

TABLE 7
Hotelling's T-squared Generalized Means Test

	F-statistic	*p*-value
H0: Vectors of means are equal for the two groups	68.3250	0.000

4.2 DETERMINANTS OF RECEIVING FINANCIAL SUPPORT FROM THE GOVERNMENT

As indicated earlier, the first step of the PSM approach is to investigate the probability of getting government incentives and calculating the propensity score for each firm in the sample. This is important because firms that received government financial assistance might have achieved a higher level of productivity and export performance even if they had not received it (see Table 4). Therefore, observable characteristics such as age, ownership, and so forth should be controlled first before comparing the outcome in order to isolate the intrinsic impact of receiving government grants. In the present study, logistic regression was employed to estimate the probability of receiving a government grant and the estimated results are presented in the following Table 8.

TABLE 8
Determinants of Government Financial Incentive

Variables	Dependent Variable: Government Grant
Manufacturing	0.966***
	(0.177)
Part of a large group	-0.596*
	(0.339)
Managerial experience	-0.0527
	(0.126)
Firm Age	0.225**
	(0.108)
Firm Size	0.599***
	(0.0513)
Foreign-owned	-0.199
	(0.545)
Corporation	-0.218
	(0.220)
Product innovation	0.919***
	(0.177)
Process innovation	0.745***
	(0.206)
Constant	-6.174***
	(0.413)
Observations	5,750

Standard errors in parentheses, *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 8 presents the logistic regression result of factors that determine the propensity of receiving government financial incentives. As shown in the table, firm internal characteristics significantly affect the probability of getting government support. More specifically, the result demonstrates that manufacturing firms are more likely to get government financial support compared to service sector firms. The coefficient of firms' age is significant and positive, indicating that the probability of receiving government support increases as the firm becomes older. Firm size also determines probability of getting incentives: larger firms are more likely to get government financial incentives. Consistent with previous literature, innovators--both product and process-- are more likely to get government support compared to their counterparts. Conversely, firms

that are part of a larger group of companies are less likely to receive government assistance. The empirical results further indicate that the experience of firms' managers and foreign ownership seem to be insignificant in government decisions to provide financial assistance. This empirical result thus reveals firms' heterogeneity in terms of their propensity to get government financial incentives. Undoubtedly, this heterogeneity is also correlated with firm productivity and export performance. If not mitigated, it will create selection bias. By employing the PSM approach, this study was able to provide the causal impact of government financial incentives on firm performance as discussed in the following section.

4.3 GOVERNMENT FINANCIAL INCENTIVES IMPACT ON FIRM PERFORMANCE

Rosenbaum and Rubin (1983) indicated that the quality of the matching process should be tested before estimating any treatment impact. Therefore, we tested matching quality in two ways. First, we draw the density distribution of propensity scores before and after matching as shown in Figure 1.

As shown in Figure 1, the density distribution after matching is similar for both the treated and controlled group, implying that the common support condition was satisfied. Additionally, we draw the density plot of the estimated propensity scores for both the control and treated groups as presented in Figure 2.

FIGURE 1
Box Plot

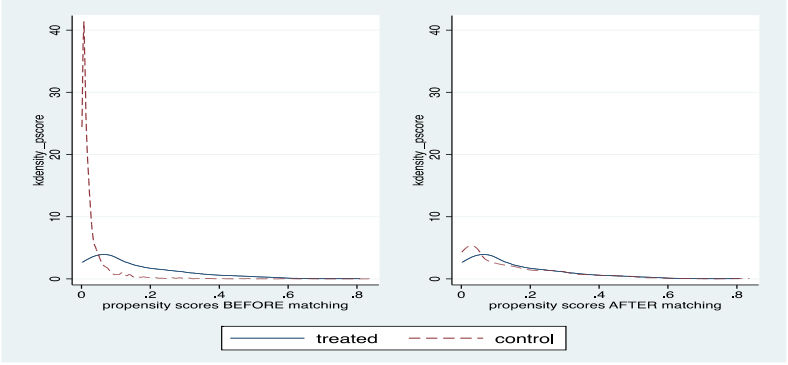
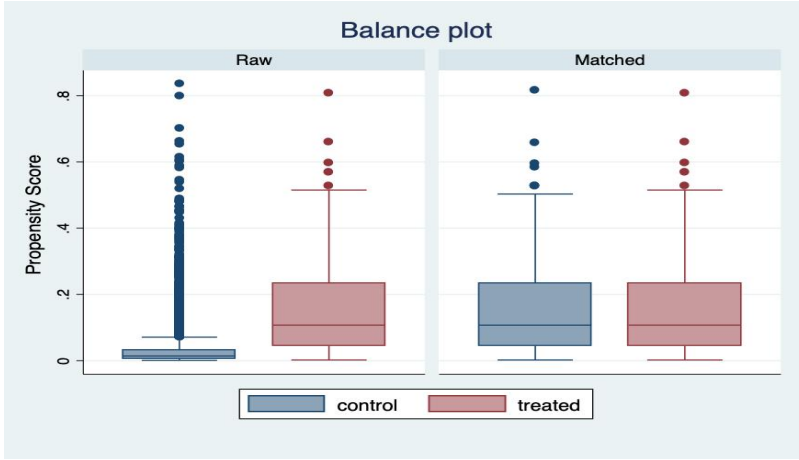


FIGURE 2
Density Plot

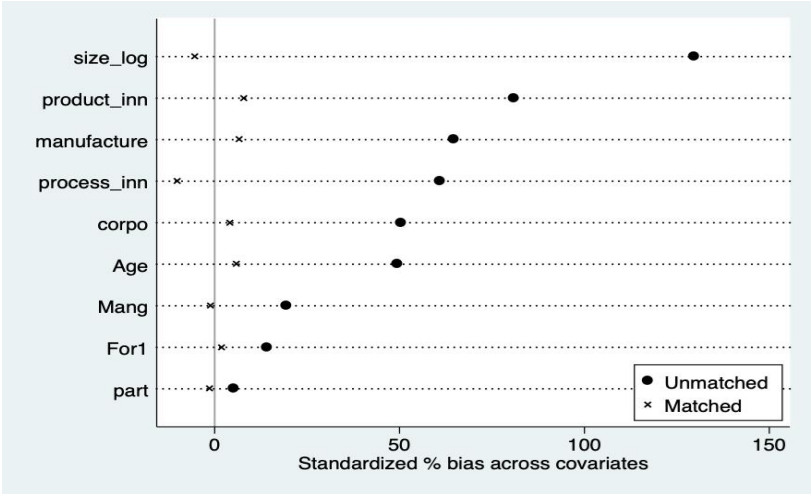


The above density plot further confirms the quality of the matching process used in the current study. Second, we also tested whether the observed characteristics of the control group, such as ownership, innovation performance, size, age, etc are similar to the characteristics of the treated group after matching using a covariate bias test. This test estimates the standardized difference (i. e. bias) of the covariates used in estimating the propensity score. The results are presented in Figure 3.

As shown in Figure 3, the standardized difference before matching was very high, but after matching the magnitude of the standardized bias significantly reduced as low as 1%, implying that implementing the propensity scores matching algorithm results in a substantial bias reduction.

In general, a visual inspection of Figures 1, 2 and 3 indicate that the common support condition was satisfied; thus, it can be said with confidence that the causal impact of government financial support on firm performance can be estimated by calculating ATT. The estimated results of ATT of government financial support on firm productivity and export performance are presented in Table 7, where the first column presents the result of NN matching, the second Kernel and the third Radius matching. The corresponding standard error is presented in parentheses.

FIGURE 3
Covariate Matching



As shown in Table 9, the estimated ATT is positive and significant at conventional significance levels, implying that government financial incentives have a positive and significant causal impact on both firm productivity and export performance. In addition, the three matching algorithms have produced similar coefficients. More specifically, the ATT of firms for the outcome variable productivity is 0.34. It indicates that the average productivity of firms that received government financial incentives is 33% higher than that expected without government financial support. Similarly, the ATT of firms for the outcome variable export performance ranges from 4.9 to 5.59 under the three matching algorithms used in this study. It indicates that export performance of firms that received government support is nearly five times more than that expected without government financial support.

Evidence from this study supports the idea that government incentives, more specifically financial support to firms, enhance firm ability to increase productivity and export performance in Turkey. Results of this study corroborate the findings of a great deal of the previous work in this realm including, but not limited to, findings of Olcay and Bulu (2015) for the case of Turkey and Criscuolo et al. (2019) for the UK. It thus implies that the government should continue providing financial incentives to firms, but more focus should be given to younger and smaller firms. The logistic regression result shows that

large and older firms are more likely to get financial incentives compared to small and younger firms.

TABLE 9
ATT of Receiving Government Grant on Firm Productivity and Export Performance

Outcome (Firm Performance)	Matching Algorithms		
	Nearest Neighbour	Kernel	Radius
Productivity	0.342*** (0.105)	0.336*** (0.084)	0.332*** (0.084)
Export	4.94*** (2.022)	5.64*** (1.687)	5.598*** (1.687)

Note**:** Standard errors are presented in parentheses. The subscript *** represents a significance level at 1%.

5. CONCLUSION

Governments around the world often provide various incentive mechanisms to firms. The Turkish government has been implementing several incentive mechanisms for firms over the years, including financial support, in order to improve firm performance and the economy. However, little is yet known about how these incentives affect firm productivity and export performance: Has government financial support increased firm performance? Is this financial incentive a viable policy option to the country's vision of becoming one of the top ten richest countries in the world by enhancing firm productive and export capacity? The empirical results of previous studies on this matter remain unclear. Even though the great majority of studies have indicated positive impact of government support on firm performance, other studies have questioned the relevance of government support and even suggested a negative relationship between the two.

Acknowledging this gap, this study examined the effect of government financial incentives on firm productivity and export performance. To this end, firm-level data of Turkish firms, obtained from WBES, were used and analyzed using a novel empirical approach that accounts for the counter-factual situation. The empirical

results of this study can be summarized as follows. First, the logistic regression result indicates that firm-specific factors such as age, size, and both product and process innovation significantly and positively affect firm probability to get government financial incentives. Firms that are part of a large firm, however, are less likely to receive government financial assistance compared to their counterparts. Second, after controlling for counterfactual outcomes and employing PSM, government financial incentive in Turkey has been found to successfully raise firm productivity and export performance. More explicitly, firms that received government financial incentives were able to increase their productivity by 33% and their export performance 5 times more than what they could have achieved without government financial support. This finding supports the institutional theory of government support and corroborates the findings of many previous works in this field.

The practical implication of the main findings of this study is that the Turkish government should continue supporting firms including, but not limited to, financial incentives to foster their productivity and national economic performance as a result. The findings of the study further indicate that larger and older firms have a higher probability of getting government financial support at present. Therefore, future incentive mechanisms should be directed toward small and younger firms.

Finally, several significant limitations need to be considered. First, this study was limited by data unavailability. For instance, it would have been better if it examines the topic using the Difference in Difference (DID) approach, which accounts for unobservable but fixed characteristics, in addition to PSM. Longitudinal data, however, is desirable in conducting DID. Therefore, the direction of future research would be to use the DID approach and compare the result with the current study whenever panel data are available. Second, the study used a sample of Turkish firms, so the findings of the study may not be extrapolated to all countries.

REFERENCES

Adam, N.A., and G. Alarifi. “Innovation Practices for Survival of Small and Medium Enterprises (SMEs) in the COVID-19 times: The Role of External Support.” *Journal of Innovation and Entrepreneurship* 10, no. 1 (2021): 1-22.

Ahn, J.M., W. Lee, and L. Mortara. “Do Government R&D Subsidies Stimulate Collaboration Initiatives in Private Firms?”

Technological Forecasting and Social Change 151 (2020): 119840.

Alperovych, Y., G. Hübner, and F. Lobet. "How Does Governmental Versus Private Venture Capital Backing Affect a Firm's Efficiency? Evidence from Belgium." *Journal of Business Venturing* 30, no. 4 (2015): 508-25.

Amendola, A., M. Boccia, G. Mele, and L. Sensini. "Fiscal Incentives and Firm Performance: Evidence from the Dominican Republic." *Policy Research Working Paper 8382*, 2018.

Bergström, F. "Capital Subsidies and the Performance of Firms." *Small Business Economics* 14, no. 3 (2000): 183-93.

Bu, D.l., and J. Huang. "The Enterprise Rent-Seeking and Government Fund Transfer: Based on the Case of BOE." *China Industrial Economics* 6 (2013): 135-47.

Bu, D., C. Zhang, and X. Wang. "Purposes of Government Subsidy and Firm Performance." *China Journal of Accounting Studies* 5, no. 1 (2017): 100-22.

Cerulli, G. "Econometric Evaluation of socio-Economic Programs." *Advanced Studies in Theoretical and Applied Econometrics Series* 49 (2015).

Cin, B.C., Y.J. Kim, and N.S. Vonortas. "The Impact of Government R&D Subsidy on Firm Performance: Evidence from Korean SMEs." *OECD Conference in Entrepreneurship, Innovation and Enterprise Dynamics*, December 8–9, 2014.

Claessens, S., E. Feijen, and L. Laeven. "Political Connections and Preferential Access to Finance: The Role of Campaign Contributions." *Journal of Financial Economics* 88, no. 3 (2008): 554-80.

Criscuolo, C., R. Martin, H.G. Overman, and J.V. Reenen. "Some causal Effects of an Industrial Policy." *American Economic Review* 109, no. 1 (2019): 48-85.

_____, C., R. Martin, H. Overman, and J.V. Reenen. The Causal Effects of an Industrial Policy. National Bureau of Economic Research, 2012.

Dai, J., and X. Li. "How does Subsidy Change a Firm's Market Power? The Case of China's Rice Processing Industry." *Journal of Applied Economics* 23, no. 1 (2020): 372-84.

Fu, L.-p., and Y.-h. Li. "Government Subsidies, Innovation Ability and Enterprise Survival Time." *Studies in Science of Science*, 10, 2015

Guan, J.C., and R.C.M. Yam. "Effects of Government Financial Incentives on Firms' Innovation Performance in China: Evidences from Beijing in the 1990s." *Research Policy* 44, no. 1 (2015): 273-82.

Guo, D., Y. Guo, and K. Jiang. "Government-Subsidized R&D and Firm Innovation: Evidence from China." *Research Policy* 45, no. 6 (2016): 1129-44.

Hansen, G., and B. Wernerfelt. "Determinants of Firm Performance: The Relative Importance of Economic and Organizational Factors." *Strategic Mnagement Journal* 10, no. 5 (1989): 399-411.

Hansen, H., J. Rand, and F. Tarp. "Enterprise Growth and Survival in Vietnam: Does Government Support Matter?" *The Journal of Development Studies* 45, no. 7 (2009): 1048-69.

Harris, R., and S. Li. "Government Assistance and Total Factor Productivity: Firm-Level Evidence from China." *Journal of Productivity Analysis* 52, no. 1 (2019): 1-27.

Hussen, M.S., and M. Çokgezen. "Analysis of Factors Affecting Firm Innovation: An Empirical Investigation for Ethiopian Firms." *Journal of African Business* (2019): 1-24.

Imbens, Guido W. "Nonparametric Estimation of Average Treatment Effects Under Exogeneity: A Review." *Review of Economics and Statistics* 86, no. 1 (2004): 4-29.

Jiang, C., D. Liu, Q. Zhu, and L. Wang. Government Subsidies and Enterprise Innovation: Evidence from China's Photovoltaic Industry." *Discrete Dynamics in Nature and Society* 2021.

Liu, D., T. Chen, X. Liu, and Y. Yu. "Do More Subsidies Promote Greater Innovation? Evidence from the Chinese Electronic Manufacturing Industry." *Economic Modelling* 80 (2019): 441-52.

Luo, X., F. Huang, X. Tang, and J. Li. "Government Subsidies and Firm Performance: Evidence from High-Tech Start-Ups in China." *Emerging Markets Review* (2020): 100756.

Morisset, Jacques, and Neda Pirnia. *How Tax Policy and Incentives Affect Foreign Direct Investment: A Review*. The World Bank, 1999.

Morris, M., and P. Stevens. "Evaluation of a New Zealand Business Support Programme using Firm Performance Micro-Data." *Small Enterprise Research* 17, no. 1 (2010): 30-42.

Nguyen, H.T.T., H.V. Van, F. Bartolacci, and T.Q. Tran. "The Impact of Government Support on Firm Performance in Vietnam:

New Evidence from A Dynamic Approach." *Asian Academy of Management Journal* 23, no. 2 (2018): 101-23.

Nugroho, H. "The Impact of Government Support on the Performance of Indonesia's State-Owned Enterprises." *ADBI Working Paper Series No. 983*, 2019.

Olcay, G.A., and M. Bulu. "Who Should Really Get Government Support: An Analysis of Turkish SME Cases." *International Journal of Knowledge-Based Development* 6, no. 1 (2015): 34-49.

Rosenbaum, P.R., and D.B. Rubin. "The Central Role of the Propensity Score in Observational Studies for Causal Effects." *Biometrika* 70, no. 1 (1983): 41-55.

Söderblom, A., M. Samuelsson, J. Wiklund, and R. Sandberg. "Inside the Black Box of Outcome Additionality: Effects of Early-Stage Government Subsidies on Resource Accumulation and New Venture Performance." *Research Policy* 44, no. 8 (2015): 1501-12.

Uddin, AHM E.. "Economic and Social Make-Over in Turkey: By Erdogan." *International Journal of Economics, Management and Accounting* 26, no. 1 (2018): 135-55.

Vu, Q., and T.Q. Tran. "Government financial Support and Firm Productivity in Vietnam." *Finance Research Letters* 40, (2021): 101667.

World_Bank. *Firm Productivity and Economic Growth in Turkey*. Washington DC: The World Bank, 2019.

Wu, Aihua. "The Signal Effect of Government R&D Subsidies in China: Does Ownership Matter?" *Technological Forecasting and Social Change* 117 (2017): 339-45.

Xiang, D., and A.C. Worthington. "The Impact of Government Financial Assistance on the Performance and Financing of Australian SMEs." *Accounting Research Journal* 30, no. 4 (2017): 447-64.