THE IMPACT OF START-UP GRANTS ON FIRM PERFORMANCE IN ESTONIA

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Abstract

As in economic theory start-up enterprises have been seen as important sources of growth, the government support measures to enterprises have been a common practice around the world for decades. As the governmental support to enterprises is often of a considerable amount of money there is a need to assess its efficiency. In the present article we study the impact of Estonian start-up grants distributed in 2002 and 2003 on various indicators of firm performance with econometric methods, namely propensity score matching. We use the data from the Estonian Business Register in order to study the impact of start-up grants on various economic indicators like the number of employees, turnover, equity, fixed assets and firm survival. The results showed that the start-up grants proved to affect positively the number of employed people and turnover, yet the impact on productivity was negative. One implication of the study is that it is difficult to achieve different goals to the same extent with a single governmental grant.

Keywords: start-up grants, impact evaluation, Estonia

1. Introduction

In the economic theory entrepreneurship is seen as an important source of economic growth and enhancing the development of entrepreneurship is one of the possibilities to sustain stable economic growth. Start-up enterprises which usually grow faster than the incumbent enterprises enrich the economic development by creating new jobs and by stimulating innovation. The government support measures to enterprises have been a common practice around the world for decades. There are many different ways to support enterprises – e.g. loans with below market average interest rate, loan guarantees or simply financial grants given to enterprises. But as the governmental support to enterprises is often of a considerable amount of money there is a need to assess its efficiency. The aim of the impact analysis of support measures can be to obtain information about the performance of different measures

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or projects or to learn about the ways of enhancing the existing support programs (instruments).

In the academic literature there can be found many studies estimating the impact of government grants to enterprises (for literature reviews, see e.g. Masso and Vildo 2006; Klette *et al.* 2000; David *et al.* 2000). Quite many of these are about the R&D grants, for instance, whether the public R&D funding crowds out the private funding or not (see e.g. Czarnitski and Licht 2006). There have been made much less studies on the impact of start-up grants. The few examples that we know are as follows. Del Monte and Scalera (2001) estimated the life duration of the new firms in Italy; their results showed that the subsidies proportional to the size of projects induced a bias towards larger and more risky firms. Almus (2001) found in case of Germany that firms receiving public start-up assistance performed better in terms of employment growth over a six year period. Crepon and Duguet (2003) found from the analysis of French data with propensity score matching techniques that start-up subsidies increased significantly the survival of the firms created by former unemployed people; and the allocation of subsidies acted as a screening process improving the performances of the bank loans; the effect of subsidies was stronger than that of bank loans.

While these studies are on the developed countries, less is known about the effectiveness of start-up grants in case of developing and transition economies (previous studies on governmental grants have analyzed the effectiveness of R&D grants in Central and Eastern European countries, see e.g. Czarnitski and Licht 2006; Burger *et al.* 2006). As summarized by Masso *et al*. (2007), during the transition from a socialist to a market economy, the business sector is expected to be especially dynamic with lots of entries and exits taking place; while in such conditions it might have been for newcomers easier to find a niche in the underdeveloped industries and survive, on the other hand, start-up's were hurt by the underdevelopment of market economy institutions, constraints in capital and labour markets, and the entrepreneurs lacking experience on how to operate a business in market economy.

The goal of the present article is to estimate the impact of Estonian start-up grants with econometric methods. The impact of start-up grants given in 2002 and 2003 are under investigation. We seek to estimate the differences between supported and not supported enterprises in terms of different economic indicators like the number of employees, turnover, equity, fixed assets. Also the impact on the survival of supported and not supported enterprises was studied. The estimation is done in addition to descriptive tables with the use of statistical methods like propensity score matching technique. In case of matching techniques the goal is to form a counterfactual for the treated unit (in this case supported enterprise), that is the expected potential outcome of the supported enterprise in case of not being granted the support, by using the performance of the enterprises not granted a support. Therefore, we seek a 'perfect twin' for each observation of the treatment group, i.e. at least one observation of the potential control group that is as similar as possible to the treated observation with respect to a given distance measure. Thus, our contribution to the literature is that this is one of the first studies on how the policy measures towards start-up firms in late or former transition countries have succeeded.

The rest of the paper is structured as follows. In section 2 we describe the data and the characteristics of the start-up grants' programme used in Estonia during 2002-2003. Section 3 describes our methodological approach to the estimation of the impact of the governmental grants, while section 4 presents firstly the results from the descriptive tables and thereafter from the econometric estimations. The final section concludes.

2. Overview of the data and the Estonian start-ups grants

The entrepreneurial support scheme that is under consideration in this paper is governmental start-up grants that were given out in 2002 and 2003 by Enterprise Estonia. According to a study that was conducted in 2003, start-up grants were the most well-known governmental support measure among entrepreneurs in 2002 and 2003 (Saar Poll 2003).

The main aim of the start-up grants measure was to support the starting and development of small enterprises (Stardiabi ettevõtluse toetamiseks 2001, Stardiabi programmi kord 2002). As the Estonian business activity is lower than the average in Europe, there is a need to increase the business activity and to encourage the potential entrepreneurs (Eesti elanike … 2004).

In 2002, the following costs that were directly connected to an explicit business plan allowed to be financed with the start-up grant: investments (machinery, equipment and other industrial or services industry related fixed assets); purchase and renovation of facilities or their reconciliation with EU requirements; developmental activities (patent research, license purchase etc). In 2003, in addition to these aforementioned restrictions working assets, real estate and facilities purchases were not allowed to be financed with the start-up grant.

The applicants that were eligible for the start-ups grant had to be business associations and self-employed entrepreneurs registered in Estonia and they had to be in the phase of starting their business. In 2002, projects that were aimed at advancing entrepreneurship outside of Tallinn, Tartu and Pärnu were favoured. In 2003, projects that were aimed at advancing entrepreneurship outside of Tallinn were favoured. Enterprises that corresponded to the following criteria were considered to be eligible:

1) Enterprises that had up to 50 employees and less than 10 million kroons of turnover and that had actually operated for maximum of 2 years. In 2003, the eligible enterprise was allowed to have actually operated for maximum of 1 year.
2) The enterprise was not allowed to be a subsidiary of any other legal person.
3) The enterprise was not allowed to have any accrued taxes or the accrued taxed had to be given the dates of payment.

4) The enterprises were not allowed to be under bankruptcy proceedings.

In 2003, there were also a couple of additional requirements – governmental institutions were not allowed to be the owners of the supported business entities and more than 50% of the holding or capital stock had to belong to an Estonian citizen. Eligible sectors were manufacturing, industrial production, services that were supporting manufacturing industry and tourist services. In 2002, the maximum limit of the grant was 50 000 kroons (approximately 3 200 euros). In some exceptional cases, when the business plan was oriented to developing exporting activities or to the substantial growth of the enterprise, the maximum limit was 100 000 kroons (approximately 6 400 euros). Each enterprise was allowed to apply only once. In the case of enterprises from Harjumaa (the region around the capital of Estonia, Tallinn), the self-financing ratio had to be 45%, in enterprises active in other counties, the self-financing ratio had to be 35% of the worth of the project. In 2003, the maximum grant limit was 100 000 kroons but not more than 75% of the costs associated with the project.

Several different criteria were taken into account by Enterprise Estonia while deciding to whom the grant was given. Among other things, projects that aimed at creating new jobs or retaining existent jobs, that were oriented at developing exports, that were aimed at making use of new technology or that were research and development projects and projects that had higher share of self-financing were favoured (Stardiabi ettevõtluse toetamiseks 2001; Stardiabi programmi kord 2002). Taking into account the size of the grant and the average size of the equity capital of supported enterprises, it seems that the grant was of a sufficient size for starting a business. On the other hand, the number of different objectives and their spectrum seems to be too large. Based on different theoretical and empirical articles one might say that in the case of business start-ups, the growth of the enterprise is of a substantial importance. Therefore, the fact that enterprises which aimed at fast growth were supported is anticipated.

So far only two studies have somewhat analyzed the efficiency of Estonian start-up grants. The reason for this is very simple and it is the lack of data. Therefore, the analysis conducted so far has utilized qualitative research methods. Two different institutions have researched the efficiency of start-up grants – National Audit Office of Estonia (NAOE) and Centre for Policy Studies "PRAXIS" on the request of Estonian Economic and Communications Ministry (Riigikontroll 2004b; Riigikontroll 2004a; Kuusk, Jürgenson 2007). NAOE's aim was to estimate the impact of different governmental entrepreneurial support measures to employment in supported regions. Among the analyzed measures were also start-up grants. PRAXIS's aim was to analyze the overall efficiency of start-up grants – they tried to estimate to what extent the start-up grants had fulfilled their objectives.

NAOEs main implications were connected to the overall design of business support measures. They claimed that the objectives specified so far were not clear enough and they emphasized the need to work out a unitary set of desirable outcomes which would contribute to a more aligned government policy package (Riigikontroll 2004a; Riigikontroll 2004b).

The study by PRAXIS concluded that the start-up grant was an important support scheme which was known and used widely among entrepreneurs (Kuusk, Jürgenson 2007). Entrepreneurs that had received the start-up grant claimed that without the grant they would not have carried out the project in the planned volume and it would have taken a lot more time – therefore, the dead-weight component of this measure was estimated to be on a medium level. The critique that was brought out in the study was directed to the time when the grants' effect was over. It was claimed that there weren't any instruments to support entrepreneurs who were not start-ups any more but were in the phase of fast growth. The lack of these kinds of instruments could have jeopardized the results achieved with the start-up grant.

In the present article we use for the estimation of the start-up grants' impact the Estonian Business register data on new start up firms from year 2002 till 2003. The data includes all registered firms without any size limit, and it covers all sectors with the exclusion of banks. In addition to the general data on enterprises like the year of registration, number of employees, ownership, legal form etc., also the items of balance sheets, incomes and costs are available. We excluded from the analysis all start-up enterprises that due to the aforementioned reasons were not eligible for the grant. In the period 2002-2003 there were in our data altogether more than 5 thousand start-up enterprises; according to Statistics Estonia, the overall firm entry rate was in 2002 11.1% and in 2003 12.3%. The data is linked then with the data from the Enterprise Estonia on the supported enterprises (altogether 188 firms). One disadvantage of the data is that we have no information about the person who started the enterprise.

3. Methodological approach

The array of methods that are used to analyze the impact government support measures is very wide. The majority of the methods can be divided into two broad categories – qualitative and quantitative methods. Taking into account the goal of the impact study, different methods can be combined. The present impact analysis is done by using quantitative methods. An overview of the rationale behind the used method is as follows.

When estimating the impact of grants, the main problem is that the knowledge about the value of the efficiency indicator we are interested in is not known – we don't know how the enterprise would have acted without the governments' support. Let us use Y to denote the variable under interest that is used to evaluate the grant's impact (e.g. labour productivity, level of employment, probability of survival etc.). Let $GRT_{it} \in \{0,1\}$ be an indicator (a dummy variable) whether the firm i received a grant or not at time t. Let us also denote $Y^1_{i,t+s}$ the value of the outcome with grant and $Y^0_{i,t+s}$ without grant. The causal effect is then defined as $Y^1_{i,t+s} - Y^0_{i,t+s}$ (the impact of the grant, treatment effect). The problem is that for those treated, the first term is observable but not the second; for those not treated, the situation is vice versa. Thus we can only observe $Y_{i,t+s} = Y_{i,t+s}^0 + GRT_{i,t} \cdot \left(Y_{i,t+s}^1 - Y_{i,t+s}^0\right)$. Without strong assumptions, the treatment effect cannot be estimated at the firm level, however the average treatment effect can be estimated without bias if the selection is due to observables. Average treatment effect of the treated (*ATE₁*) can be written as (Rosenbaum and Rubin 1983):

$$
\begin{aligned}
& ATE_1 = E\left\{Y_{i,t+s}^1 - Y_{i,t+s}^0 \mid GRT_{i,t} = 1\right\} = \\
(1)\quad & = E\left\{Y_{i,t+s}^1 \mid GRT_{i,t} = 1\right\} - E\left\{Y_{i,t+s}^0 \mid GRT_{i,t} = 1\right\} = \\
& = \frac{1}{N^1} \sum_{i=1}^{N^1} \left(Y_{i,t+s}^1 - Y_{i,t+s}^0\right)
\end{aligned}
$$

The term N^1 denotes the number of treated (grant receiving) firms. Since the last term ($E\left\{Y_{i,t+s}^0 \mid GRT_{i,t} = 1\right\}$) is unobservable, the causal inference is dependent on the construction of the counterfactual that is the outcome of the grant recipients in case they would not have received the grant. That is estimated by the value of the outcome of the firms that did not receive grants, i.e. $E\left\{Y_{i,t+s}^0 \mid GRT_{it} = 0\right\}$. The calculation of term as an average over all of the firms not receiving grants will yield biased estimates if the receipt of grants is not random but correlated with observable firm characteristics. Thus, in order to obtain unbiased estimates, the valid counterfactual needs to be constructed.

Many studies have tried to estimate the efficiency of grants by using matching techniques, which is one of the possibilities to construct valid counterfactuals. The matching technique gained popularity with the evaluation of the impact of labour market programmes. In case of matching techniques the goal is to form a counterfactual for the treated unit (in this case supported enterprise), that is the expected potential outcome of the supported enterprise in case of not being granted the support, by using the performance of the enterprises not granted a support. Rosenbaum and Rubin (1983, pp. 50) point out that matching "[…] is a method for selecting units from a large reservoir of potential comparisons to produce a comparison group of modest size in which the distribution of covariates is similar to the distribution in the treated group." Therefore, we seek a 'perfect twin' for each observation of the treatment group, i.e. at least one observation of the potential control group that is as similar as possible to the treated observation with respect to a given distance measure. The success of these approaches depends on several conditions that allow the identification of the potential effect (Heckman, Hotz 1989).

One of the most popular ones among the matching techniques is propensity score matching that uses for matching the probability of receiving the grant (propensity score) conditional on several firm-specific indicators, i.e. the following probit model is used (Caliendo and Kopeining 2005):

$$E\left[GRT_{i,t} \mid X_{i,t}\right] = P\left(GRT_{i,t} = 1 \mid X_{i,t}\right) = F\left(X_{i,t}\right), \quad \forall i = 1\ldots, N^{0}{}' + N^{1} \tag{2}$$

where $X_{i,t}$ is the vector of covariates including possibly firm level variables, regional and industry dummies, lagged values of $GRT_{i,t}$. The choice of variables should capture the factors that are connected to the funding agency's decision making (Girma *et al.* 2005) and the firm's decision to participate in the program (like the return from the participation). Usually the probit model is used to estimate the participation probability, in that case $F\left(X_{i,t}\right) = \Phi\left(X'_{i,t} \cdot \hat{\beta}_{i,t}\right)$, where $\hat{\beta}$ is the vector of parameter estimates of the participation equation and $\Phi(\bullet)$ is the cumulative density function of the standard normal.

To get unbiased estimates with it, it is important to have a presence of common support. It means that all the enterprises that are in the sampling have to have the possibility to be supported or not to be supported. For example, if enterprises in trade sector were not eligible, then there should not be any trade sector enterprises also in the sampling. In the case of propensity score matching, it is important that any of the variable X-s would not define completely the participation or non-participation in the program.

After estimating the probability of receiving the grant it is important to eliminate those observations from the sample which probabilities of receiving the grant lie in a range that don't have observations from both groups. After the probabilities of default are estimated and observations without common support are eliminated from the sample one can start matching.

Let us denote P_{it} the predicted probability of receiving grants (probability of treatment) at time t for firm i that actually receives the grants. A firm j not receiving the grants is then chosen as the match for the firm i according some matching algorithm. In the next step the observation is deleted from the observed group (the group of enterprises that were supported by government). The deletion of the control enterprise depends on whether matching with replacement or without replacement was used. These steps are repeated as long as there are no observations left in the group of enterprises that got the governmental support. The effect of the program is the mean of the supported enterprises $E\left(Y_{1i} - Y_{0i}\right)$ which is compared to the mean that is derived from the non-supported group of enterprises. In the case of the algorithm without replacement, the observation is deleted from the group of enterprises that were not supported. In the case of the algorithm with replacement, the observation is not deleted form the control group and can be used again. With replacement algorithm allows to use the same observation repeatedly and therefore it is possible to find more similar twins (Leping 2004).

One of the most often used matching algorithms is the nearest neighbour matching (the firm to the comparison group is chosen is the one with the propensity score P_{it} closest to the treated firm P_{jt}), caliper matching (that imposes a tolerance level on the maximum propensity score distance $P_{ij} - P_{it}$) etc. (Caliendo and Kopeinig 2005). In our study we use the nearest neighbour matching with either two or five neighbours, as well as the caliper matching. After the matching has carried through for all firms that have received the grant, the ATE_1 can be calculated by taking the average of the treatment effect over all firms treated (given a grant). As to the Hausman (2001), matching leads to more robust results on the treatment or casual effect compared with other methodologies approaches.

4. Econometric results

The tables below present the estimation results of the propensity score matching. The impact of grants on four economic variables was investigated; these were the number of employed, labour productivity, turnover (sales) and fixed assets. Table 1 presents first the estimation results for the probit model for the probability to receive the start-up grant; the probabilities from the model were used for matching. As we can see, the probability to receive the grant was negatively dependent on the size at the time of the start-up; among different economic sectors, firms in manufacturing had a relatively higher and in services relatively lower probability to receive grants; among different regions, firms in North-West of Estonia (the area with the most difficult economic situation in the study period) had the highest probability to receive the grants.

Before calculating the effect of the grant (ATT) we also controlled for the success of matching by looking at the differences of the supported and non-supported firms before and after matching by the use of a standard t-test. In case the matching is successful, the differences in the mean values after matching should not be statistically significant; that was indeed the case (the results are nor reported in order to save space).

Table 1. The probit model for the probability to receive state aid

Variables	Parameters and z-statistics
Number of employees	-0.042 (0.87)
Central Estonia	1.206 (6.28)***
North-Eastern Estonia	1.585 (8.84)***
Western Estonia	1.278 (7.14)***
Southern Estonia	0.986 (5.91)***
Construction	-0.816 (5.55)***
Business Services	-0.262 (2.69)***
Public services	-0.513 (3.51)***
Observations	7263
Log-likelihood	-471.479
Pseudo R-squared	0.167

Note. Absolute value of z statistics in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.

The reference categories are manufacturing and North-Estonia.

Next we move on to the results of propensity score matching. As we can see from Table 2, the estimated impact of grants on job creation varies across the used matching algorithms. Although the numbers are positive for all estimations, only in the 2nd and 3rd years the impact is statistically significant in case of Kernel matching. The size of the impact – among the new firms receiving start-up grants the employment growth rate was up to 25 percentage points higher – thus in addition to being statistically significant these results can also be considered to be economically significant. When using instead of the percentage change the absolute employment change, the impact was positive in the 1st year, but statistically insignificant; in the 2nd year the results were positive and significant in case of nearest neighbour matching with 5 neighbours (NN5) algorithm.

Table 2. Effects of start-up grants on job creation (ATT), propensity score matching results

Matching method	ATT 1-year		ATT 2-years		ATT 3-years	
	Dif.	T-stat.	Dif.	T-stat.	Dif.	T-stat.
Unmatch	0.100	'(1.45)	0.228	'(2.52)**	0.178	'(1.86)*
NN 5	0.020	'(0.20)	0.174	'(1.36)	0.041	'(0.27)
NN 2	0.103	'(1.25)	0.249	'(2.44)**	0.019	'(0.17)
Kernel	0.083	'(1.20)	0.213	'(2.53)**	0.256	'(2.45)**

Note. * significant at 10%; ** significant at % ; *** significant at 1 %. NN – 5: nearest neighbour matching with 5 matches; NN – 2: nearest neighbour matching with 2 matches; ATT - Average Treatment Effect on the Treated (ATT), t-statistics are in parentheses. In case of Kernel matching, the Epanechnikov kernel has been used, the bandwidth has been set at 0.06 (the default value in psmatch2 program).

Secondly we studied the impact on labour productivity (valued added or sales per employee). As can be noted, the results vary over the years – the impact is negative for the 1st year, but becomes positive and statistically significant at the 3rd year. In earlier studies in most cases rather the negative impact on productivity has been revealed (see e.g. Bergström 1998, Lee 1996, Beason and Weinstein 1996). Thus in this case even the result that no statistically significant negative impact can be tested is in a way a positive sign of the grant programme. If the goal of the grant programme is primarily job creation then the missing or negative impact on labour productivity is not unexpected. Because of that it is important to define clearly the goals of the grant programme and how the institution managing the programme estimates its impacts. One possible reason for the insignificant result is the hiring of the new jobs at the beginning of the period because the hiring of new employees is accompanied by the labour turnover or adjustment costs (time spent on the training of new employees, the poor quality production produced by new employees, their initially lower productivity). This result refer also to the contradictions in some of the goals of the grant programme – increasing the number of the employees and increasing productivity (e.g. via the preferred support of R&D activities) are mutually conflicting targets. Probably the training of new employees for their specific tasks undertaken in the enterprise takes time, thus the positive results in productivity could be seen only after the new employees have obtained a sufficient level of competence, thus in the 3rd or 4th year after the support was granted.

Table 3. Effects of start-up grants on productivity (ATT), propensity score matching results

Matching method	ATT 1-year		ATT 2-years		ATT 3-years	
	Dif.	T-stat.	Dif.	T-stat.	Dif.	T-stat.
Unmatch	-1.219	'(1.51)	-0.167	'(0.04)	0.621	'(3.49)***
NN 5	-1.211	'(0.77)	0.389	'(0.96)	0.711	'(2.63)***
NN 2	-0.866	'(0.53)	0.101	'(0.23)	0.622	'(2.39)**
Kernel	-1.233	'(0.79)	0.250	'(0.23)	0.528	'(2.08)**

The results were most robust in case of sales growth rate – for all years and estimation methods significant positive effect could be seen. The supported enterprises increased their sales about 22-28% more than the enterprises not supported in the 1st year, 18-39% in the 2nd year, 33-43% in the 3rd year. We can note that the estimated treatment effects are sometimes greater than the unmatched differences; the reason could be that the supported enterprises have characteristics that otherwise reduce the sales growth (e.g. they could belong to industries where start-ups have usually lower sales growth). In many cases the size of the grant was considerable and equal to the owners' equity. When instead of the percentage sales growth the absolute change of the sales was analyzed, the supported enterprises had somewhat higher sales, but the difference was in most cases statistically insignificant.

Table 4. Effects of start-up grants on turnover (ATT), propensity score matching results

Matching method	ATT 1-year		ATT 2-years		ATT 3-years	
	Dif.	T-stat.	Dif.	T-stat.	Dif.	T-stat.
Unmatche	0.30632	'(3.67)***	0.38856	'(3.87)***	0.381	'(3.53)***
NN 5	0.22529	'(2.15)**	0.31478	'(2.33)**	0.43739	'(2.88)***
NN 2	0.28114	'(3.25)***	0.42425	'(4.09)***	0.37041	'(3.29)***
Kernel	0.28488	'(4.28)***	0.34335	'(4.41)***	0.33896	'(3.95)***

Next, also the impact on the fixed assets was analyzed; the results can be found in Table 5. The impact was statistically significant in year 2, but insignificant in year 1 and 3. The reason for the insignificant result could be that because in most cases the supported enterprises had at the time when they were supported more fixed assets (relative to unsupported enterprises), thus they might have had lower need for the additional investments.

Table 5. Effects of start-up grants on fixed assets (ATT), propensity score matching results

Matching method	ATT 1-year		ATT 2-years		ATT 3-years	
	Dif.	T-stat.	Dif.	T-stat.	Dif.	T-stat.
Unmatche	0.00853	'(0.09)	0.15991	'(1.51)	0.09294	'(0.78)
NN 5	0.01946	'(0.17)	0.39465	'(2.72)***	0.13593	'(0.87)
NN 2	0.08393	'(0.86)	0.22302	(2.00)**	-0.02316	'(0.18)
Kernel	0.00505	'(0.07)	0.18764	'(1.77)*	0.08651	'(0.76)

Finally the impact on the firm survival chances was investigated, by comparing the survival rates of supported economically active enterprises during the years after the grant was given, and the other enterprises after they started their activities. The results in Table 6 show that at the end of the 1st year 87% of natural (unsupported) and 95% of supported enterprises had survived. At the end of the 2nd year the numbers were respectively 75% and 85%, and at the end of the 3rd year 65% and

77%. Also the study undertaken by Praxis reached the similar conclusions – at the 2nd year after the receipt of the grant the firms survival rate was 89% (Kuusk and Jürgenson 2007). Although the positive impact of start-up grant on firm survival may seem to be a positive development, the possible problems may emerge if due to the grant the firms' cost functions seem to be at the moment lower that they actually are; in such case, inefficient enterprise may survive in the market initially until the subsidy ceases to be in operation (Santarelli and Vivarelli 2000). Thereby also the market selection process by which efficient enterprises are sorted out becomes significantly distorted.

Table 6. The survival rates for supported and unsupported enterprises

Interval	Survival rate	Standard deviation	95% confidence intervals	
			Lower	Upper
Unsupported				
1…2	0.87	0.003	0.8641	0.8757
2…3	0.75	0.005	0.7438	0.7614
3…4	0.65	0.006	0.6398	0.6619
Supported				
1…2	0.95	0.02	0.9071	0.9740
2…3	0.85	0.03	0.7827	0.8985
3…4	0.77	0.04	0.6769	0.8440

In addition to the life tables also probit model on firm survival was estimated. The results in Table 7 show that in the 1st year after receiving the grant the firm survival is negatively affected by the initial number of employees (firm size). The firm survival was positively affected by the initial (that of the year, when grant was given) level of sales and fixed assets: the survival chances were higher also in case of enterprises in manufacturing, construction and business services. The parameter for the dummy for grant is in the regression equation positive, but not statistically significant. In the 2nd year after grant the results were somewhat different: the firm survival chances were improved by their location in certain regions (Central Estonia, Southern Estonia, Western Estonia) and the larger firm size in the first year. The dummy for the grant turned out to be statistically insignificant again. Thus we can say that although the grant may improve firm's survival chances, based on our data we are unable to find statistically significant effects. Of course the relatively small number of supported enterprises may make it more difficult to find out statistically significant relations.

Table 7. The probit model for firm survival

Variables	1st year	2nd year
Initial number of employees	-0.092 (-2.65)**	-0.142 (-3.44)***
Initial sales	0.058 (2.56)*	0.093 (3.56)***
Initial fixed assets	0.011 (0.63)	-0.051 (-2.37)*
Manufacturing	-0.448 (-4.77)***	-0.406 (-3.76)***
Construction	-0.296 (-2.98)**	-0.254 (-2.12)*
Business services	-0.373 (-4.20)***	-0.393 (-3.91)***
Central Estonia	0.110 (1.01)	0.066 (0.52)
North-Eastern Estonia	0.137 (1.22)	0.141 (1.04)
Western Estonia	-0.083 (-0.97)	0.054 (0.48)
Southern Estonia	0.112 (1.79)	0.090 (1.19)
Start-up grant	-0.044 (-0.25)	0.637 (2.16)*
Constant	0.991 (3.34)***	1.301 (3.76)***
Number of observations	5506.000	3925.000
Log-likelihood	-1421.865	-975.727
Pseudo R-squared	0.014	0.023

Note. Absolute value of z statistics in parentheses. * significant at 10%; ** The reference categories are manufacturing and North-Estonia.

5. Conclusions

Because the governmental business support measures distribute often a substantial amount of money, there is a clear need to estimate their performance and efficiency. The goal could be either to collect information on the successfulness of the grant programme, improving the performance of the programme or projects, or advising the further developments in government's policies. The present study undertakes the ex post analysis of the success of the Estonian start-up grants distributed in year 2002 and 2003 by the Regional Development Agency of Enterprise Estonia. For that purpose the propensity score matching approach was used in order to construct for supported enterprises a comparison group that would characterize the outcome of supported enterprise in the hypothetical case when it would have not received the grant.

We analyzed the impact on various economic indicators like the number of employees, sales, owner's equity, productivity. The impact on both on percentage change relative the initial level as well as on the absolute numbers was analyzed. According to the probit model the probability to receive the grant was higher for enterprises in North-East Estonia, business services and smaller enterprises. When estimating with propensity score matching the impact on job creation, the impact was positive and statistically significant only in the 2nd year after the provision of the grant; for the other years the impact was positive, but not statistically significant. While in case of productivity no significant effect could be detected (albeit the impact was positive), the impact on sales growth was strongly positive and statistically significant for all years after entry. The reason for lack of impact on the growth rate of fixed assets might have been the initially higher level of the fixed assets, thus the supported enterprises probably did not have additional need for investments into fixed assets. Concerning firm survival, the survival rates of supported enterprises were in each year higher than those of not supported enterprises, e.g. in the 2nd year 77% of supported and 65% of unsupported enterprises had survived. However, after controlling for various other firm characteristics in a probit model, the results did not indicate that the start-up grants had increased the supported firms' survival chances.

In the authors' opinion the following policy implications follow from the above analysis. In the allocation of the business aid one needs to specify very precisely the requested outcome of the grant. If one wants to increase with the same grant both the number of jobs, productivity and R&D expenditures, then the grant might not fulfil any of these goals. The business aid is beneficial if by its development the market situation is taken into account and it offers a financing mean that is not supplied by the private sector due to the market failures. As the present study showed, in case of a well-elaborated financing instrument it is possible to achieve the desired targets and promote the development of entrepreneurship. On the other hand, although this study has demonstrated the possibility to use quantitative approaches for the impact analysis, we would rather suggest the combination of different methods. One possible further development would be to analyze the enterprises investigated in this study over a longer period of time so that short-lived influences on firm performance are eliminated. The future studies should be also based on more detailed databases, e.g. including information on that who are the entrepreneurs behind the start-ups.

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