

UDC 338.246.2

EVALUATION OF PROGRAMS OF FINANCIAL SUPPORT FOR SMALL AND MEDIUM ENTERPRISES IN SPAIN

A.A. Chugunov, PhD in Economics

A.V. Prydius

Odessa National Polytechnic University, Odessa, Ukraine

Чугунов А.А., Придиус А.В. Оцінка програм фінансової підтримки малих та середніх підприємств в Іспанії.

У даній роботі досліджується ефект від участі малих і середніх підприємств у фінансових програмах підтримки. Аналізується зростання активів підприємства, продажів, кількості працівників, продуктивності та ефективності діяльності. Головна мета даної роботи – отримання емпіричних даних, що характеризують вплив двох найбільш важливих фінансових інститутів в Іспанії на малі та середні підприємства через субсидовані кредити від Офіційного Кредитного Інституту (ОКІ) і кредитні гарантії від Взаємних Гарантійних Товариств (ВГТ).

Ключові слова: малі та середні підприємства (МСП), малий та середній бізнес (МСБ), проблема фінансування, інвестиції, регресійний аналіз, метод найменших квадратів (МНК), модель фіксованих ефектів (ФЕ модель), середній ефект впливу (СЕВ).

Чугунов А.А., Придиус А.В. Оценка программ финансовой поддержки малых и средних предприятий в Испании.

В данной работе исследуется эффект от участия малых и средних предприятий в финансовых программах поддержки. Анализируется рост активов предприятия, продаж, количества работников, производительности и эффективности деятельности. Главная цель данной работы – получение эмпирических данных, характеризующих влияния двух наиболее важных финансовых институтов в Испании на малые и средние предприятия через субсидированные кредиты от Официального Кредитного Института (ОКИ) и кредитные гарантии от Взаимных Гарантійных Обществ (ВГО).

Ключевые слова: малые и средние предприятия (МСП), малый и средний бизнес (МСБ), проблема финансирования, инвестиции, регрессионный анализ, метод наименьших квадратов (МНК), модель фиксированных эффектов (ФЭ-модель), средний эффект воздействия (СЭВ).

Chugunov A.A., Prydius A.V. Evaluation of programs of financial support for small and medium enterprises in Spain.

In this research, we evaluate the effect of the participation in the public programs in terms of growth in assets of the firm, sales, number of employees, efficiency and productivity, by comparing granted firms with non-granted firms. The main objective of this study is to provide an empirical evidence regarding the impact of two of the most important Spanish financial policies for SMEs, which are subsidised credit offered by the Official Credit Institute (ICO) and credit guaranteed by a Mutual Guarantee Society (MGS).

Keywords: small and medium enterprises (SMEs), small and medium businesses (SMEs), the problem of financing, investment, regression analysis, method of least squares (OLS), fixed effects model (FE - model), average treatment effect (ATE).

Stimulating the growth of small businesses has been a matter of concern and interest in most developed countries. It is often argued that small and medium enterprises (SMEs) play a major role as an engine of economic growth and they contribute to social wealth through the creation of new businesses and jobs. In Spain, almost 99% of the firms are SMEs, thus they are a key driver for economic growth, innovation, employment and social integration. These SMEs provide 67% of all jobs and generate 68% of the value added in Spain, according to data from the European Commission [1]. One of the most studied aspects of SMEs is the problem of access to financing. The financial institutions limit the loans granted due to the lack of guarantees. Specific public aid instruments have been designed for entrepreneurs that respond to their inability to access bank financing, such as tax reduction and guarantee systems.

The purpose of credit guarantee was to provide financial support to SMEs suffering from insufficient investment from private financial institutions due to market failures and lack of collateral, to increase the competitiveness of SMEs and to increase SMEs' accessibility to private financial sources. The credit guarantee institutions give warranty to private financial institutions such as banks and they remove the risk of lending to SMEs.

Many governments provide subsidised loans and loan guarantees to SMEs. The USA, UK, France, Belgium, the Netherlands, and others have adopted financial assistance programs. However, lots of debates are still going on regarding the efficiency of government support in the SME loan market. The economics literature suggests a set of rationales for governments to offer subsidies to firms. However, some of them argue that government involvement may be distorted by the desire of interest groups or politicians to maximize their own benefits. These suggest a more skeptical view of such programs.

Governments subsidies can increase efficiency of firms by supporting projects that would not be undertaken without the subsidy. Because government subsidies are generally cheaper than other capital, firms will request funds for projects that are privately profitable as well as for projects that benefit society. To increase motivation, public programs should not

fund the best proposals they receive. Instead, they should fund the best proposals among those that are not likely to receive adequate funds from other sources.

In a study Cressy [2], bases on the argument of Lerner [3], suggests a set of criteria in selecting firms to receive government subsidies. The criteria include subsidizing industries which are not currently attractive to private sectors but may have growth potential, avoiding financing firms which have already received other government awards and basing choice more on management flexibility and experience rather than on particular product or service offered by the firm.

Spain has a banking-oriented financial system. Thus, the roll of the banking industry is relevant as there are no alternative sources to finance SME projects, which leads to a significant dependency on bank credit. However, the size, the lack of business experience, the lack of viability of the business plan and the lack of necessary guarantees are major restrictions encountered by entrepreneurs trying to access financing and in the right conditions. This situation justifies the appearance of public aids for financing. Fig. 1 presents the share of government support of SMEs in the total amount of government financing in Spain in the period from 2007 to 2011.

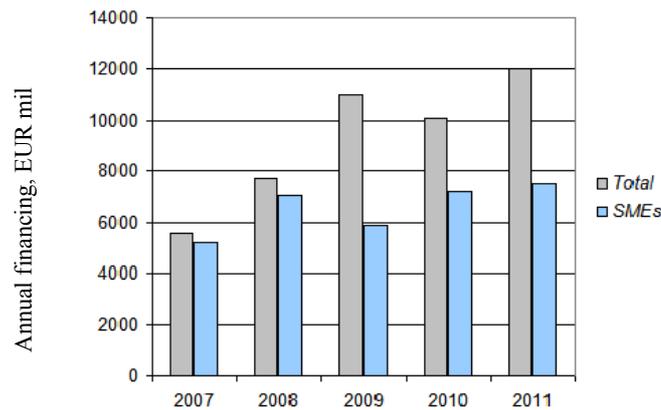


Fig. 1. Trends in SME and entrepreneurship finance in Spain [4]

As we see, more than half of the amount each year is aimed at financing of small and medium enterprises. Hence, the relevance of public programs for SMEs calls attention from both the academic and the institutional perspectives.

Among the most important public policies in Spain are special lines of finance interest rates subsidies by the government through agreements with financial intermediaries (banks) and Mutual

Guarantee Societies. The Official Credit Institute (ICO) is a public company that has a role of specified credit institute and a state financial agency. It provides Spanish companies with a framework of adequate financing to enable them to undertake their productive activity. Fig. 2 presents the trend of ICO financing to SMEs in Spain from 1992 to 2013. As we see, the amount of loans increases significantly comparing with previous periods since 2007.

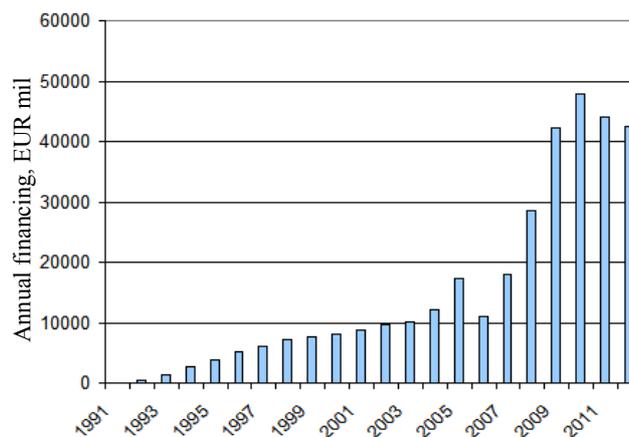


Fig. 2. Loans granted to SMEs in Spain [5]

Mutual Guarantee Societies (MGS) are a special type of limited liability societies. Typically, the guarantees issued by MGSs cover 100% of the bank loan. Spanish system of public support to MGSs is

based on certain limited tax exemptions and mainly on counterguarantees granted by CESGAR (Confederación Española de Sociedades de Garantía Recíproca) [6].

Analysis of recent researches and publications

An evaluation of the impact of public aid programs involves determining whether the program produced the desired effects for its participants and whether those effects are attributable to the program intervention itself. Various authors have sought to analyse the effectiveness of public aid policies for SMEs in different markets.

Lerner in his paper of 1999 studied the effect of the Small Business Innovation Research program (SBIR) in the US on a sample of 894 companies. The comparison group is developed through two matching procedures: one defined by activity and size and the other by location and size. The model of ordinary least squares (OLS) was estimated. Subsequently, he found positive effects in the percentage change of sales and employment levels. While he did not address endogeneity. Roper and Hewitt-Dundas studied 703 Northern Ireland and Republic of Ireland businesses. They considered a participation in different types of programs for SMEs. They used the Heckman selection model. Subsequently, they found a positive effect on job creation. While effect is not significant for growth in assets and sales [7]. Bergström showed in case of Sweden that subsidization is positively correlated with growth of value added and that productivity of the subsidized firms seems to increase the first year after the subsidies were granted. While, in long term financial aid has a negative effect on productivity [8]. Almus found from analysis of German data using parametric selection approach that firms receiving assistance perform better in terms of sales and employment growth over a six year period [9]. Girma et al. examine the impact of enterprise support on firm survival and growth in case of Irish manufacturing enterprises. In particular their study was special that in Ireland the public grants to enterprises have been used in addition to the improvement of domestic firms' performance also for attracting the foreign firms' production units to the country. They used traditional matching techniques in combination with difference-in-difference analysis and showed that especially capital (but also other types of) grants had important impact on firm survival and job creation [10]. The main finding of Ege is that the Small Innovative Research grants in USA stimulate both sales and employment growth. These results are robust across several alternative regression models and different groups of control variables. The most important control variables were the firm's sales in the year of application and the firm's employment in the year of application [11]. Sissoko investigates the role of R&D subsidies on productivity of the French firms. He explores their role on the firm performance measures like employment, capital and R&D expenditures using difference-in-difference techniques. The results suggest that, on average, total factor productivity of the subsidized firms is higher of around 15% towards the end of the 3-years grant period relative to the matched control group. There is also little evidence about a role of R&D subsidies on employment, capital, R&D expenditures and credit

constraints [12]. The recent research of impact of subsidy was done by Criscuolo et al. in Great Britain. They analysed the impact of expenditure on the Regional Selective Assistance program over a 20-year period. They had over 2,3 million observations before and after receiving government support. They found positive program treatment effect on employment, investment and net entry but not on productivity. Their research suggests that government grants to smaller firms in economically disadvantaged areas of Great Britain can increase employment, but that grants to larger firms have no effect [13]. Chandler on the sample of companies that participated in Canada Small Business Financing Program found a positive effect on growth in salaries, employment and sales [14].

Moving on to the existing studies in Spain, Calvo, Garcia and Madrid studied 53 firms that received a subsidy and 53 that didn't in the region of Murcia. They used business matching. Compares averages between comparison and treatment groups. Using logistic regression, they found greater efficiency in the non-subsidised firms and lower risk in the subsidised businesses [15]. Revera and Munoz used data from the Central Balance Sheet Data Office of the Bank of Spain for the period 1992-2002. Using mean differences with t-tests and Mann-Whitney U tests, they obtained positive results for the personal income/expense and revenue/assets indicators. Productive efficiency increases more for larger firms. They did not obtain positive results for other efficiency measures [16]. Garcia-Tabuenca and Crespo-Espert evaluated the Spanish Mutual Guarantee Scheme and ICO SME Lines on firms from 1998 to 2003. Subsequently, companies that received public support are the most efficient ones in economic terms, generating a higher added value per employee and higher financial resources [17]. Romero, Ventas, Garcia and Torres studied the effect of public financial aids for the creation of the companies in the crisis context. They used a sample of companies formed between 2000 and 2002 and have accessed to Mutual Guarantee Societies or Official Credit Institute within the first three years of its activity. They found that the evolution of the profitability of the companies in the sample is effective for the period during which they receive financial support. Subsequently, the profitability of the companies does not experience a positive effect in long term. They conclude that the financial profitability of the companies that have received financial aid (ICO, MGS or both) is below the control group profitability, converging, in a progressive way, into the average values of the period of the study, fact that confirms the improvements obtained during the period of the benefits of the financial aid [18]. Briozzo and Cardone studied effect of MGS and ICO financing on SMEs in Spain. The result shows that during stable periods, these public programs affect the growth of assets, sales and sales to assets ratio. However, during recession, the effects extend to include the growth of employment and sales to number of employees ratio [19].

The empirical evidence generally demonstrates a positive effect on employment creation, whereas there is less support for profit and assets growth in short term. While, there are evidences of negative effect of receiving financial aid on efficiency and productivity in long term.

The aim of the article is to evaluate of programs of financial support for small and medium enterprises in Spain.

The objectives of financial aid programs for SMEs are centered on promoting economic development in this sector. As such, the participation in financial aid programs should improve the observed results in the performance variables. Following the methodology used in previous studies, we attempt to quantify this impact using different variables. The hypothesis of the research:

1) Assets Growth: firms that participate in financial aid programmes should experience greater growth (or fewer declines) in their investments, measured as total assets, than firms in comparison group.

2) Sales Growth: firms that participate in financial aid programmes should experience greater growth (or fewer declines) in their sales than firms in comparison group.

3) Employment Growth: firms that participate in financial aid programmes should experience greater growth (or fewer declines) in the number of employees than firms in comparison group.

4) Growth in Sales to Assets Ratio: firms that participate in financial aid programmes should experience greater growth (or fewer declines) in sales to assets ratio than firms in comparison group in short term and less – in long one.

5) Growth in Labour Productivity: firms that participate in financial aid programmes should experience greater growth (or fewer declines) in labour productivity than firms in comparison group in short term and less – in long term.

The main part

The research conducted an empirical analysis on a sample of companies that have accessed to Mutual Guarantee Companies (MGC's) and others that have accessed to the Spanish Official Credit Institute – Small and Medium Enterprises (SME's) ICO Line.

Official Credit Institute (ICO) – provides specific funding to entrepreneurs in order to facilitate the infrastructure achievement and the principal repayment with more favorable conditions than in the market.

Mutual Guarantee Societies (MGS) – help to limit the financial cost to business financing.

Meanwhile, a representing group of companies who have obtained financial aids was extracted from the Iberian System for Financial Statement Analysis (SABI) database [20]. The database provides quantitative information (financial statements) and qualitative information for Spanish businesses. The Spanish SMEs that participated in financial aid programs were identified for one time period: 2007 (as the starting point of the economic crisis). Only

firms with fewer than 250 employees at the time they received financial aid were included, as they match the European Commission's definition of an SME.

The businesses that participated in these programs were referred to treatment group. Only firms with fewer than 250 employees in 2007 were included to comparison group. The matching methodology was used to identify an appropriate control group that helps to control the problem of selection bias. We used two approaches for it.

Ten businesses similar to each company in the treatment group were selected according to the following parameters, as in the study Briozzo and Cardone of the impact of public programs on SMEs in Spain: activity (NACE classification, 2nd revision, 4 digits); size (total assets measured during the previous year).

The effect of a program can be defined as “what would have happened to those who, in fact, did receive treatment, if they had not received treatment?”. Hence, just comparison between supported firm groups and non-supported firm groups cannot identify the exact additional effect of the support program, since their characteristics before participation in the supporting program were different already, which is also referred as the selection bias.

The most appropriate measure of the effectiveness of government support might be a comparison of the performances of two firms with the same characteristics, assuming that one received support and the other did not. However, it's hard to find appropriate comparison groups, which can represent the non-supported firms in evaluating the program.

We applied the propensity score matching methodology, which allows us to construct a comparison group by matching twin firms based on the propensity score in the population of unsupported firm groups. With this approach, we expect to solve the selection bias problem. Propensity score indicates a conditional probability of applicants to participate in a program when observable characteristics of applicants are given and is defined as:

$$\text{Propensity score} = p(X_i) = P(D_i = 1 | X_i), \quad (1)$$

where D_i – the dummy variable that takes the value 1 if the company participated in the financial aid program, and 0 if it did not;

X_i – the vector combining firm's characteristics measured during the year of program participation.

The concept of the propensity score matching requires fulfillment of the conditional independence assumption. It means that conditioned on the observable characteristics (X) of possible participants, the decision for participation in the program should be independent of the outcome measures. Another required assumption is that the probability to participate in the program for treated group and comparison group should lie in the same domain, which is called the common support assumption. If these assumptions are satisfied we should obtain an unbiased estimation of the effect of a program.

The availability of panel data allows us to consistently estimate treatment effects without assuming ignoring of treatment and without an instrumental variable, provided the treatment varies over time and is uncorrelated with time-varying unobservable that affect the response. In particular, it's reasonable to think in existing of unobservable effects on the performance of companies which may be correlated with other explanatory variables, such as management, effort, intended or non-intended use of the financial aid, etc. This possibility is often called the self-selection problem. Alternatively, public programs might assign firms based on characteristics that we cannot observe.

The literature on panel econometrics clarified how the increasing availability of panel data sets could improve the estimation of econometric models. The key feature of panel data is that we observe the same company in more than one condition. To analyze the impact of the financial support we applied a panel data framework. We use microeconomic data set that has a cross-section dimension (*i*) and a time

dimension (*t*). We will be able to measure time and firm variation in behavior that is unobservable in cross-section data.

In particular case, construction of panel data set gives us: more accurate inference of model parameters; a control on the impact of omitted variables; dynamics in economic behavior; a reduction of the collinearity among explanatory variables; a control on the observable and unobservable heterogeneity.

Table 1 presents the samples' distribution. The cross-section data framework is constructed using two matching procedures: matching on industry and total assets in 2006 and matching on the propensity score. In the first case, we have a sample of 2393 firms (224 firms that did participate in financial aid program and 2169 firms that did not). In the second case, we have a sample of 430 companies (215 firms that did participate in public program and 215 that did not). Both samples of firms include the information for 2007 and 2012 on treated and non-treated companies.

Table 1. Sample distribution

Year	Matched on	SMEs that Do not Participate in Financial Aid Programs (Comparison group)	SMEs that Do Participate in Financial Aid Programs (Treatment group)	Total
2007, 2012	Industry; Total assets (t-1)	2169	224	2393
	Propensity score	215	215	430
Panel data (2005-2012)	Industry; Total assets (t-1)	2169 (17352 obs.)	224 (1792 obs.)	2393 (19144 obs.)
	Propensity score	215 (1720 obs.)	215 (1720 obs.)	430 (3440 obs.)

Note: The control group matched on the propensity score was identified according to the following parameters: Age, Industry, Region, Export, Income, Total Assets, Number of Employees, Equity, EBIT in 2007, as assumed year of receiving a financial aid.

The panel data framework is also constructed using two matching procedures. Both samples of companies include the information on treated and non-treated firms from 2005 to 2012. As such, we have 8 observations for each company. In the case of matching on industry and assets, we have a sample of 19144 observations (1792 observations for 224 companies that did participate in public program, and 17352 observations for 2169 companies that did not participate in public program). In the case of matching on the propensity score, we have a sample of 3440 observations (1720 observations for 215 companies that did participate in financial aid program and 1720 observations for 215 companies that did not).

Differences between the performance of the assisted and non-assisted firms will reflect the characteristics of the companies as well as the effect of assistance. If is an indicator of business performance a basic model which contains these effects can be defined as follows:

$$E(y_i) = \alpha + \beta D_i + X_t' \psi + \varepsilon_i, \tag{2}$$

where y_i – the performance variable of interest measured after program participation;

D_i – the dummy variable that takes the value 1 if the company participated in the financial aid program, and 0 if it did not;

X_i – the vector combining firm's characteristics measured during the year of program participation;

α, β, ψ – the estimated coefficients, where

$$\alpha = E(Y_{0i}), \beta = E(Y_{1i} - Y_{0i});$$

$\varepsilon_i = \varepsilon_{0i} + (\varepsilon_{1i} - \varepsilon_{0i})D_i$ – an error term.

In this model the size, sign and significance of the coefficients on the treatment terms (i.e. β) give an indication of the impact on business performance of receiving grant support. Other studies have shown, however, that such coefficients give an unbiased indication of the effect of grant support only if support is randomly distributed across the population of small and medium enterprises. Whether any element of selection in the award of grants the

coefficients is will reflect the combination of assistance and selection effects. For example, a financial aid agency may wish to target its assistance at firms which had performed well in the past. In this case, if the selection effect was positive (i.e. the agency succeeded targeting faster growing firms), direct estimation of the coefficients on the dummy variables would over-estimate the true assistance effect (Greene [21]).

Rather than direct estimation of equation (1) a preferable approach is therefore to allow explicitly for this type of selection bias. The effect of program participation on the performance variable was analyzed by means of average treatment effects (ATEs). The model for the performance variables was estimated by interacting the treatment effect with each element after subtracting its mean. As such, we estimated the following equation:

$$E(y_i | D_i, X_i) = \alpha + \beta D_i + X_i' \psi + \delta (X_i - \bar{X}) D_i + u_i, \quad (3)$$

where y_i – the performance variable of interest measured after programme participation;

D_i – the dummy variable that takes the value 1 if the company participated in the financial aid program, and 0 if it did not;

X_i – the vector combining firm's characteristics measured during the year of programme participation;

\bar{X}_i – the vector of the sample means for each characteristic;

$\alpha, \beta, \psi, \delta$ – the estimated coefficients;

$u_i = y_i - E(y_i | D_i, X_i)$ – an error term.

Conditional treatment effect is the difference in the means conditional on the observable characteristics of the outcome under treatment and non-treatment. As such, it can be defined by the relation:

$$\begin{aligned} TE(X_i) &= E(y_i | D_i = 1, X_i) - \\ &- E(y_i | D_i = 0, X_i) = \beta + \delta (X_i - \bar{X}) \end{aligned} \quad (4)$$

The ATE under conditional independence is equal to the estimated value of β . As such, it can be defined by the relation:

$$\begin{aligned} ATE &= E(E(y_i | D_i = 1, X_i) - \\ &- E(y_i | D_i = 0, X_i)) = \hat{\beta} \end{aligned}, \quad (5)$$

We used bootstrapped standard errors clustered on regions to correct for the intra-class correlation. An intra-class correlation reflects the correlation of the observations (firms) within a cluster (regions). A bootstrap procedure estimates a model for a specified number of repetitions using samples of the data base. For each repetition, the main analysis is repeated on the sample data, and the estimate is then stored (the model's coefficients in a linear regression). Once all repetitions have been computed, the standard errors can be calculated by taking the standard deviation of the stored model estimates. In bootstrapped standard errors clustered on regions, instead of drawing the observation units (the firms) with replacement, it

draws with replacement within the cluster units (regions).

A list of the variables used is presented at the table 2 along with the operational definitions that have been used. The explanatory variables are financial aid and the corresponding terms of interaction. The remaining variables act as control variables and help to control for the existing heterogeneity among different companies.

The independent variables are measured:

— in cross-section data framework: in the year of program participation (2007), while the performance (dependent) variables are measured in 2012. Dummy variable for participation in the program takes value 1 if company did participate in financial aid program and value 0 if did not.

— in panel data framework: at time period (2005 – 2012), while the performance (dependent) variables are measured at time period (2006 – 2012). Here, we make a strong assumption, regarding the time period of program participation. Dummy variable for participation in the program takes value 0 for 2005 and 2006, and value 1 from 2007 to 2012, as assumed period for participation in financial program if company did participate in financial aid program. If company did not participate in financial aid program, dummy variable for program participation takes value 0 for all studied periods.

We have a list of variables that are fixed for a business (at least over a long period of time), as exporting, industry dummies and region dummies. This may cause the problem of omitted dummy variable estimating the panel data. To solve this problem and to control for the unobserved heterogeneity, we use the Fixed Effects model for estimation the effect of public programs on SMEs. This approach works well when the treatment and control groups are designated based on time-constant variables and when treatment status is not constant across time. The Fixed Effect model assumes that individual heterogeneity is captured by the intercept term. This means every individual gets his own intercept $\alpha_i + \eta_i$ while the slope coefficients are the same.

A more complicated model allows the treatment effect to interact with observable variables and unobserved heterogeneity. As such, we estimate the following equation:

$$\begin{aligned} E(y_{t+1,i} | D_{ti}, X_{ti}) &= \\ &= \alpha_i + \eta_i + \beta D_{ti} + X_{ti}' \psi + \delta (X_{ti} - \bar{X}) D_{ti} + u_{ti}, \end{aligned} \quad (6)$$

where y_{ti} – the performance variable of interest measured after program participation;

D_{ti} – the dummy variable that takes the value 1 if the company participated in the financial aid program, and 0 if it did not;

X_{ti} – the vector combining firm's characteristics measured during the year of programme participation;

\bar{x}_{ti} – the vector of the sample means for each characteristic;
 $\alpha_i, \beta, \psi, \delta, \eta_i$ – the estimated coefficients;
 u_{ti} – an error term. The idiosyncratic error term u_{ti} is assumed uncorrelated with the explanatory variables of all past, current and future time periods of the same firm.

Table 2. Description of the variables

Variable	Definition
<i>Control variables (vector X)</i>	
NL TA	Natural logarithm of Total assets
TA Growth	NLTA year t – NLTA year t-1
NL Sales	Natural logarithm of Sales
Sales Growth	NL Sales year t – NL Sales year t-1
NLS / Emp.	NL Sales / Number of employees
NLS / Emp. Growth	Percentage change of NLS / Emp. ratio
Emp.	Number of employees
TA Turnover	Sales / Total assets
ROA	Income for the year before interests and taxes / Total assets
ROE	Net income / Equity
CRTA	Equity / Total assets
Exporting	Dummy variable that has a value of 1 if the firm carries out export activities.
Age	Years from the date the business was founded to the moment when aid was received.
<i>Industry dummies</i>	
Manufacturing	Dummy variable that has a value of 1 if the firm belongs to the manufacturing sector
Retail	Dummy variable that has a value of 1 if the firm belongs to the retail sector
Construction	Dummy variable that has a value of 1 if the firm belongs to the construction sector
<i>Location dummies</i>	
Catalonia	Dummy variable that has a value of 1 if the firm is located in the region of Catalonia.
Madrid	Dummy variable that has a value of 1 if the firm is located in the region of Madrid.
Basque Country	Dummy variable that has a value of 1 if the firm is located in the region of Basque Country.
<i>Explicative variable</i>	
Aid(D_i)	Dummy variable that has a value of 1 if the firm participated in a financial aid program in year t.
<i>Performance variables (dependent variables y)</i>	
TA Growth	NLTA year t+1 – NLTA year t
Sales Growth	NL Sales year t+1 – NL Sales year t
Emp. Growth	Percentage change in number of employees
Efficiency (TA Turnover Growth)	Percentage change in Sales / Assets ratio
Productivity (NLS / Emp. Growth)	Percentage change in NL Sales / Emp. ratio

Note: In the model, there are terms for the interaction of the control variables with aid. This table includes all the tested variables, including those that are not incorporated into the final model.

The first Fixed Effects (FE) assumption is strict exogeneity of the explanatory variables conditional on α_i : $E(u_{ti} | X_{ti}, \alpha_i) = 0$.

The second Fixed Effects (FE) assumption proves why time-constant variables are not allowed in analysis (unless they are interacted with time-varying variables).

The conditional treatment effect is defined as:

$$TE(X_i) = E(y_i | D_i, X_i = 1) - E(y_i | D_i, X_i = 0) = \beta + \delta(X - \bar{x}) \tag{7}$$

The ATE under conditional independence is equal to the estimated value of β . As such, it can be defined as:

$$ATE = E(E(y_i | D_i, X_i = 1) - E(y_i | D_i, X_i = 0)) = \hat{\beta} \tag{8}$$

In the following methodology, the possible selection bias is controlled in two ways: the determination of the comparison group via matching and the inclusion of the control variables in the equation to study the ATE.

The characteristics of each group of firms (comparison and treatment) are studied as a function of the analysis period. We analysed the sample means for the variables of interest at the next moments of time: two periods prior participating in the program - 2005 and 2006, the year of program participation - 2007 and the years after participating in the program - from 2008 to 2012 (assumed period of receiving financial aid's payments).

For the sample of companies, matched on Industry and Total Assets the year before receiving the financial aid, those firms that received financial aid

experienced more growth in sales and in total assets for the same year as the program (2007). These findings concur with the self-selection bias in that the more growth-oriented firms tend to demand public aid. There are no significant differences in the years prior to program participation, except for Sales to Assets and Sales to Employees ratio, which show that non-granted firms performed better. It's interesting to note that the firms that participated in financial aid programs have smaller Sales to Employees ratio than their peers for all years studied, while the level of Sales is smaller for those that did not participate.

For the sample of companies, matched on the propensity score, those firms that received financial aid experienced more growth in number of employees for the same year as the program (2007). The period prior to program participation, the non-granted group of firms performed better only in Sales to Employees ratio. This tendency was stable during all studied period. In the case of matching on industry and assets, there are more significant differences in favor of the

granted group of firms since 2007. In the case of matching on the propensity score, the number of significant differences is almost stable across the studied period. Thus, the use of matching on the propensity score leads to reduction of differences between control and treated groups.

The estimates for the ATE are made according to the methodology proposed by Wooldridge [22] and as previously described. Firstly, we estimated effect of variables on performance measures in the cross-section data frameworks. As presented at table 3, with respect to the sample of firms matched on industry and total assets, participation in the aid programs is relevant to their efficiency (Sales to Assets ratio) and sales growth.

However, for the sample of firms matched on the propensity score, we did not find a significant effect of program participation.

Hence, there is an evidence to support first and fifth hypotheses (Standard errors in parentheses; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$).

Table 3. The effect of variables on performance measures in the cross-section data frameworks

Matching	Assets Growth	Sales Growth	Emp. Growth	Sales/Assets Gr.	Sales/Emp. Gr.
Industry, Assets	0.0451 (0.059)	0.1336 (0.084)	0.3011 (0.519)	-0.7180* (0.4906)	-0.0695 (0.122)
Propensity score	0.0542 (0.058)	0.2815*** (0.097)	0.4681 (0.798)	-0.0092 (0.237)	-0.0525 (0.117)

As presented in table 4, with respect to the sample of firms matched on industry and total assets, participation in the aid programs is relevant to their efficiency (Sales to Assets ratio) and sales growth. However, for the sample of firms matched on the

propensity score, we did not find a significant effect of program participation. Hence, there is an evidence to support first and fifth hypotheses (Standard errors in parentheses; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$).

Table 4. The effect of variables on performance measures in the panel data frameworks

Matching	Assets Growth	Sales Growth	Emp. Growth	Sales/Assets Gr.	Sales/Emp. Gr.
Industry, Assets	-0.0070 (0.025)	0.0267* (0.015)	0.1534 (0.178)	-1.2721* (0.651)	-0.0645 (0.066)
Propensity score	0.0133 (0.048)	0.0620 (0.039)	0.0865 (0.180)	-0.2223 (0.379)	-0.0254 (0.083)

As in the case of panel data framework we use Fixed Effect model, we should control for the problem of omitted variables. Exporting, region and industry dummies are time-invariant. As such, we create terms of interaction of those dummy variables with dummy variable for program participation and control variables after subtracting its mean.

Conclusions

The investment subsidies are seen by many politicians in Spain as well as in the EU as an efficient instrument to increase growth in firms. As it is unclear how government subsidies influence the growth of firms' performance, we analyzed whether the effects exist when Spanish SMEs participate in financial aid programs (ICO or MGS). To do so, we considered five performance variables: assets, sales and employees growth, efficiency and productivity growth. This analysis contributes to previous studies accounting for heterogeneity across regions,

unobserved heterogeneity across companies and exogenous components of growth. To control for possible effects of selection bias, the control variables are included to estimate the average treatment effect and comparison group is identified using matching methodology.

The main finding of this study is that the effect of financial policy programs is positive on the sales growth and negative on the efficiency. Nevertheless, these effects are not homogeneous among all participating firms, but rather, they depend on the firm's characteristics, its regional location and industrial activity. The observed effects coincide, in general terms, with those reported in previous studies (sales growth [3], [11], [14]; efficiency growth [8], [12], [13], [15], [18]).

This study presents at least two contributions. First, there is an impact of financial policy program during observed period, given the significant effect on

sales and efficiency growth. Second, the existence of particular impacts for the location and activity leads us to consider differences in implementation of SME financial policy programs among regions and industries.

The mutual guarantee systems or the ICO aids should not be used as the only way to solve financial problems. If a company is a bad borrower, it will remain a bad borrower. It is the responsibility of public and financial institutions in charge of distribution of funds to integrate to the public aids some reasonable and quantifiable indicators, in order to measure the degree of exploitation of the investments. An implication of this study, as well as of the results from Bergstrom's study of financial policy in Sweden, is that even if there might be market failure justifications for subsidies, it is not certain that resources will be efficiently allocated. The influence of important pressure groups can lead to subsidization of less efficient firms, which implies that financial aid's policy prevents or delays the structural transformation of the awarded firms.

The results obtained are important premises for decision makers when they have to determine whether a firm should be supported or not. However, the analysis is based on particular results and should not be used as a single decision criterion as to whether a firm should be supported or not. Some results deserve further analysis. First, the significant effects of sales and assets growth show the relevance of selection bias in policy evaluation. Second, the studied period is a crisis period in Spain that may lead to overestimating or underestimating of effect of program participation. Third, in the case of existence an endogeneity of awards reveal that firms with better performance receive subsidies, but subsidies do not lead to increase the performance, in the presence of good instrumental variable, this problem may be solved. Fourth, due to the variety of methods used in the literature on firm growth, it is difficult to determine which econometric method should be used. It should be reasonable to focus on testing the present result using different econometric methods.

Reference:

1. European Commission, European Economic Forecast [*Електронний ресурс*] // Офіційний сайт Європейської Комісії. – Режим доступу: <http://ec.europa.eu>.
2. Cressy R. Funding gaps: A Symposium / R. Cressy // *The Economic Journal*. – 2002. – 11(2).
3. Lerner J. The Government as Venture Capitalist: The Long-Run Impact of the SBIR Program / J. Lerner // *Journal of Business*. – 1999. – P. 285–318.
4. Direccion General del Tesoro y Politica Financiera [*Електронний ресурс*] // Офіційний сайт головного управління казначейства та фінансової політики Іспанії. – Режим доступу: <http://www.tesoro.es>.
5. Instituto de Crédito Oficial [*Електронний ресурс*] // Офіційний сайт Офіційного Кредитного Інституту Іспанії. – Режим доступу: <http://www.ico.es>.
6. Compañía Española de Reafianzamiento [*Електронний ресурс*] // Офіційний сайт гарантійного товариства CERSA. – Режим доступу: <http://www.cersa-minetur.es>.
7. Roper S. Grant Assistance and Small Firm Development in Northern Ireland and the Republic of Ireland [*Електронний ресурс*] / S. Roper, N. Hewitt-Dundas // ERSA conference papers, European Regional Science Association. – Режим доступу: <http://www.erini.ac.uk>.
8. Bergstrom J. Capital Subsidies and the Performance of Firms / J. Bergstrom // *Small Business Economics*. – 2000. – P. 183–193.
9. Almus M. Evaluating the Impact of Public Start-up Assistance: Results from an Econometric Approach, ZEW Discussion Papers 01-23, ZEW - Zentrum Europäische Wirtschaftsforschung [*Електронний ресурс*] / Center for European Economic Research. – Режим доступу: <http://econstor.eu>.
10. Girma S. Government grants, plant survival and employment growth: A micro-econometric analysis [*Електронний ресурс*] / S. Girma, H. Görg, E. Strobl // *IZA Discussion Paper*. – 2003. – 838 p.
11. Ege M. How do grants influence firm performance? An econometric evaluation of the SBIR program at NIH, Rutgers / M. Ege // *The State University of New Jersey*. – 2009.
12. Sissoko A. R&D Subsidies and Firm-Level Productivity: Evidence from France / A. Sissoko // *IRES Discussion Paper*. Université Catholique de Louvain – Belgium. – 2011-2012.
13. Criscuolo C. Causal effects of an industrial policy / [C. Criscuolo, M. Martin, H. Overman, J. Van Reenen] // *NBER Working Paper*, 17842. – 2012.
14. Chandler V. The Economic Impact of the Canada Small Business Financing Program / V. Chandler // *Small Business Economics* 39. – 2012. – P. 253–264.
15. Calvo A. Efectos Económicos y Financieros de la Subvención a la Inversión en la PyME. Un Estudio Empírico / A. Calvo, D. Garcia, A. Madrid // *Revista Española de Financiación y Contabilidad*, 33. – 2004. – P.899–933.

16. Rivera J. M. Evaluación del Impacto Económico y social de los Instrumentos Públicos de Apoyo a la Financiación de la PyME [Електронний ресурс] / J. M. Rivera, M. J. Muñoz // Aproximación a Través de un Análisis Sectorial, VII Conferencia italiano-español en Matemática Financiera. – Режим доступу: <http://mfa2004.uclm.es/papers/riverajuana%20maria.pdf>.
17. García A. Estudio sobre la Incidencia del Sistema Español de Garantías Recíprocas y Reafianzamiento en la Eficiencia de las PyME, 1996-2003 [Електронний ресурс] / A. García, J. Crespo // Instituto Universitario de Análisis Económico y Social (SERVILAB), Universidad de Alcalá. – Режим доступу: <http://www.ipyme.org/ESes>.
18. Crecente R. The public financial aids for the creation of companies: the challenge of companies and financial entities in the crisis context / R. Crecente, T. Garcia, V. Cano, R. Torres // New Challenges of Economic and Business Development. – 2013.
19. Briozzo A. Spanish SMEs subsidised and guaranteed credit during economic crisis: A regional perspective / A. Briozzo, C. Cardone // Regional Studies, DOI: 10.1080/00343404.2014.926318. – 2014.
20. SABI (Sistema de Análisis de Balances Ibéricos) [Електронний ресурс]. – Режим доступу: <http://sabi.bvdep.com>.
21. Greene W. H. Estimation of Sample Selection Models for Count Data / W. H. Greene // New York University, Leonard N. Stern School of Business, Department of Economics. – 1997. – Working Papers, 97-02.
22. Wooldridge J. Econometric Analysis of Cross Section and Panel Data / J. Wooldridge // The MIT Press, London. – 2002.

Надано до редакції 12.04.2015

Чугунов Анатолій Анатолійович / Anatoliy A. Chugunov
tol_tolich@mail.ru

Придіус Анастасія Віталіївна / Anastasiia V. Prydius
anastasiia.prydius@gmail.com

Посилання на статтю / Reference a Journal Article:

Evaluation of programs of financial support for small and medium enterprises in Spain [Електронний ресурс] / A. A. Chugunov, A. V. Prydius // Економіка: реалії часу. Науковий журнал. – 2015. – № 3 (19). – С. 118-127. – Режим доступу до журн.: <http://economics.opu.ua/files/archive/2015/n3.html>