Public Sector Financial Support for SME Innovativeness: Case Study of Selected CEE countries

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Abstract

The impact of innovation on economic development cannot be underestimated. Innovation has been touted as the anchor on which firms can nick a competitive advantage for themselves. Over the years, public sector interest in innovation has been emphasized due to the impact innovation has made on economic development of some nations. Different public sector support systems are available to firms to access for their innovative activities. Small and Medium Scale Enterprises (SME's) play vital role in the economies of most countries. Despite their contribution to development, they are constrained by inadequate funds to engage in R&D for innovation. In the light of this, the research sought to find out whether the innovativeness of SME's from Selected CEE Countries determines the public financial support from the government or the European Union. The logistic regression model was employed using the harmonized European Union Community Innovation Survey 2012-2014 data for the empirical analysis. Our results indicate that SME's that are engaged in innovative activities attract public financial support from national government and/or the European Union. This is because, the public sector financial support from the government and the EU target firms that are already engaged in innovation or show potential to be innovative.

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1 Introduction

Recently, innovation has had enormous impact on economic development of many countries both developed and developing [19], [3]. More so, due to resource scarcity and the aftermath of the financial Crises saw the European Commission in 2010 emphasizing in its communication to the member states the need to spend efficiently resources on innovation activities. However, businesses cannot propel growth alone due to the inadequacy of resources and market imperfections [11], [4] and lack of capital [14]. This is because, both big and small firms need support from external resources to bolster their internal resource geared towards innovative activities firm whose spillover effect in the long run impact positively on the growth and development of the public economy, but they are financially constrained. Different support systems are available to firms to source for their innovative activities especially from the public sector. [10] have suggested avenues through which the public sector supports firms' innovative activities. They include; cooperation arrangements between firms, and other bodies, Loan from the public banks, tax incentives and direct government funding through policies and projects of the government aimed at stimulating innovation. Such subsidies given to firms have both positive and negative ramifications, i.e. they may complement private financial investment in firms' R&D or block such avenues (crowding out effect). Small and Medium Scale Enterprises play vital role in the economies of most CEE countries. Small firms are necessity for employment creation [2], [16], [15], [7]. Bela et al opine that SMEs play important role in the Czech and Slovak republic [2].

Their activities ensure economic growth due to the fact that they promote competition by their radical introduction of new products to the market [18]. Therefore, public sector support is invariably important if SME's are to be able to engage in innovative activities as a tool of innovation policy. Essential amount of literature has dealt with the impact of public funding on

the firm innovative activities [25], [8], [1] and many others have also concentrated on the analysis of the effects of public policy on R&D activities of the firm. Most developing and developed states support SME's innovative activities through subsidies for firms' R&D against the backdrop that they are sources of innovation. In the same light, the EU has conceived SME's to be the backbone of the EU economy [18]

Hesmati & Loof advance an interesting point about how the public sector support firms in their innovative activities [10]. They concur with the assertion of [13] that many of the literature on public financial support assume all firms have the possibility to receive support from the public support programs. Rather, most of these firms attract and receive financial support due to their activeness in innovative activities or owing to their track record and viability of a novel innovative product and or service. In this case, small firms are less privileged than the big firms to access funds from the public sector. Likewise, highly innovative small and medium-scale enterprises are considered to the less or non-innovative ones. Again, some literature on innovation support by the public sector has concluded that effective public sector financial support helps to induce or stimulate innovation activities among firms. However, this research seeks to show that in most cases, public sector support for innovation is competitive and project base [5]. Thus, the most innovative and viable innovative activities of a firm would be supported. It will also outline the kind of financial support firms attract in the selected countries.

The next section delineates a brief review of literature to illuminate the gap in the support of innovation by the public sector. Section three provides the method employed for the empirical analysis and data used. The findings of the research are discussed in section four and lastly, conclusions and recommendations highlighted.

1.1 Theoretical Background

The underlying reasons for public sector financial support for firms' innovative activities is attributable to market failure which stems from underinvestment in innovative activities and financial constraints. Also, the reason that the public sector must ensure improvement in technology [6] for product and service to the general public also stimulates public financial support. Westmore finds in his investigation of the influence of the public policies on private sector innovation of selected OECD countries that social rate of return on innovative support exceeds the private rate of return [25]. Therefore, governments' intervention in innovative activities is paramount for the realization of social benefits on outcomes of innovation. However, Chudnovsky et al opine that subsidies from public sector are given to government selected projects with high social rate of returns [5]. Subsidies and financial support in general provide firms with the ability to grow therefore as many literatures have argued small and medium-size firms have to be supported for two reasons. First, due to financial constraints, survival of many SME's becomes less because firms are unable to internally generate funds. Secondly, SMEs possess the potential to lead in the economic growth of nations because they account for employment, innovation and capital stock.

Moreover, the historical antecedent of the perspective of the then communist regime in the selected CEE countries must be emphasized. Unlike the communism era where new ideas and research were unidirectional i.e. R&D was the task for a group of research institutes who inter alia controlled the various innovative activities of the firm including intellectual property right and patents, the contemporary neoliberal economic systems of the CEE countries as a result of their EU accession has shifted from the lack of in-house research activities among firms [12] to encompass an innovative ecosystem of many stakeholders and enormous research and collaborative agreements due to effective and efficient innovative policies.

The post-accession to EU has in no doubt strengthened the firm level R&D activities ably supported by both national (government) funds and EU funding through the structural funds as well as other special funds. The EU does not only support firm innovative activities but affect innovation policies in the region as well. Kattel et al has described the integration process CEE economies have been through [12]. The economic restructuring and integration into the global economy meant that the CEE countries took the peripheral approach or rather were dipped into the EU economy at the time. That means most big companies at the communist time without

R&D units had either have to up their game or merge with the then Multi-National Companies who had established their outsourced companies here in the CEE region. Current trends which started a decade ago has seen more innovation activities at different levels in the CEE region. SME innovative activities are prevalent leading to the major economic growth in some countries in the region.

As a matter of fact, Steyerberg et al concur that government subsidies and research grants are provided for firms through application process [23]. Moreover, it is the public sector agency that selects such programs to be funded. Enormous research has been done in this field especially assessing the impact of public sector subsidies and financial support and firm performance. But there exist quite a number of methodological issues as Hyytinen & Toivanen re-echoed in their analysis of SMEs in Finland [11]. Amongst them is the issue of reverse causality and selectivity bias with government funding of innovation at the firm-level [10] on one hand and the nature of data set [8]. They emphasize the endogeneity of firms' innovative activities and funds SME's receive from the government. Klette et al also argue that, researchers in most studies ignore the fact that government deliberately select firms to receive R&D subsidies and this mostly leads to significant bias in the econometric estimates and conclusion [13]. Recent papers have however tried to account for this bias by putting certain dummies such as industry and location dummies to control for this bias. However, one possibility to eliminate this bias is by making the public financial support or subsidy dependent on the innovative activities of the firm and their outcomes while accounting for the propose dummies. The current research employs this methodology to show that firms innovative activities determines the public sector financial support for SME's in selected CEE countries.

Firm level innovation can be measured both in terms of the input and outcomes of innovative activities such as intellectual property rights and so on. However, knowledge capital assets have been used recently. As we will show in the subsequent sections, outcomes of the firm innovation are as a result of firm activities such as firms internal and external R&D, purchase of external knowledge and so on and is mostly used as means to attracting financial support from the public sector. In the light of this assumption, we propose two hypotheses as follows;

H1. SME's that are engaged in innovative activities attract public financial support

H2. Innovative SME's attract financial support from the EU and or National government.

The purpose of this paper is to analyze whether the innovativeness of SME's determine the public sector financial support innovative SME's attract in some selected Central and Eastern European Countries.

2 Methodology and Data Source

The Data for the empirical analysis was sourced from the European Union Community Innovation Survey (CIS) conducted for three years from the period 2012-2014. The CIS data has enormous reference across various fields of innovation hence it widely usage by many authors [21], [17], [22] across the innovation field. The CIS gather data on innovation and innovation activities of firms in the EU using a harmonized survey questionnaire. The data from the CIS provides dichotomous variables which makes analysis of the data possible by using binary logistic regression [21], [24]. Logistic regression is employed for the empirical analysis because it is able to predict the probability of an innovative SME attracting public financial support. Additionally, since the dependent variable (Public Financial Support-PFS) is a binary variable or dichotomous in nature, it fits the model used by predicting the relationship between the dependent and the independent variables. The strength in using the logistic regression model stems from the fact that it is able to provide salient information and make inherent relationship predictions that other binomial models fail to account for. The general formula for logistic regression model is given in the form:

$$PFS = \beta_0 + \beta_1 (Intramural\ R\&D)x + \beta_2 (Extramural\ R\&D)x + \beta_3 (Machine\ Acquisition)x + \beta_4 (External\ knowledge\ acquisition)x + \beta_5 (Training\ for\ innovative\ activities)x + \beta_6 (Innovation\ introduction)x + \beta_7 (Patent\ application)x + \beta_8 (Industrial\ design\ right)x + \beta_9 (License/Sell\ patent)x + \varepsilon_x \tag{1}$$

The formula shows that the propensity for SMEs to attract public financial support from Government and EU is dependent on the innovative activities and innovation outcomes of the firm. The dependent variables denoted by PFS represent FUNGMT/FUNEU and ex denotes the residual error margin, β_0 is the intercept and β_1- β_9 denotes the independent variables. We then run the analysis for both dependent variables and the results are presented by tables 1 and 2 below.

Figure 1: shows the analytical concept for the model
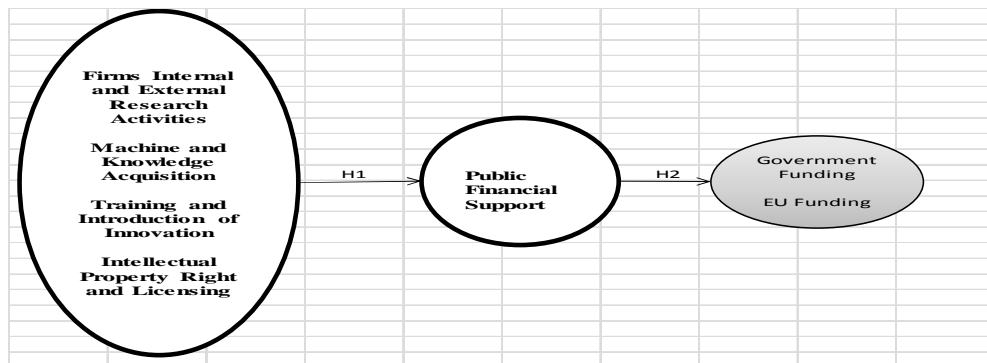
Source: Authors'.

Some CEE countries (Bulgaria, the Czech Republic, Estonia, Croatia, Hungary, Latvia, Lithuania, Romania and Slovakia) were selected for the analysis. These CEE countries were selected because majority of them if not all rely on SMEs as their backbone for economic development. Most of these SMEs are highly innovative and as such have the propensity to expand internationally and ensure competitiveness. Due to this, government and EU (through structural funds) support various activities of these firms to continue in their strides. One key support by these public sectors is financial support. Hence, we seek to analyze which financial support the SME's attract. In the light of this, we propose the conceptual framework as shown in figure 1. The framework illustrates that firm's innovative activities determine public financial support (H_1) and such innovative firms may attract these funds from the public sector or EU funds H_2.

3   Results and Discussion

The empirical results on whether the innovativeness of SME's determine the public sector financial support firms attract in some selected Central and Eastern European countries are presented in the tables 1 and 2. The research considered all SME's that responded to the CIS 2012-2014 innovative questionnaire based on the CIS NACE category regardless of their enterprise group to be able to determine whether innovative SME's funding support come from the EU or the National government.

The effect of government funding of firm's innovativeness has often been said to contain selective bias and reverse causality problem [11]. Most researchers have argued that firm's innovation activities may be endogenous of government funding, i.e. government funds are likely to be given to firms that engage more in research and development for innovation.

From the analysis, we observe that government funding supports innovative SME's in the CEE countries in the firm's internal research and development and Machine acquisition. However, this was not so for firm's external research and development with the exception of Romania and the Slovak Republic which proved to have no effect on attracting government funding. The results complement [9] findings that small and start-up firms have high capital cost. Firm's capital cost involves the purchase of fixed assets such as equipment or machinery which are fundamental for both product and process innovation. Since government sees innovative firms as a source of new ideas and growth, most innovative SME's have the propensity to attract government financial support.

Regarding external knowledge acquisition, innovative SME's in Hungary, Estonia, the Czech Republic, Croatia and Latvia attracted government funding. Only SME's in Estonia attracted government funds for introducing innovation. This evidence can be linked to government policy aimed at supporting innovative capacity building in SME's for engaging in further innovation activities such as the EU Horizon 2020. Also, innovative SME's that applied for patent received funding support from the government except Croatia, Hungary, Lithunia and Slovakia. It has also been shown that only SME's in Bulgaria with industrial design right received support from the government. And lastly, Hungary and the Czech Republic SME's attracted government financial support for licensing or sale of patent.

Table 1: Government Funding for Firms Innovative Activities

	Bulgaria	Czechia	Estonia	Croatia	Hungary	Lithuania	Latvia	Romania	Slovakia
Firm Innovative Activities									
Intramural R&D	2.127 **(0.001)***	2.985 **(0.001)***	1.583 (0.019)**	1.699 (0.030)**	1.672 **(0.001)***	1.773 **(0.001)***	2.364 (0.052)*	4.679 **(0.001)***	3.443 **(0.001)***
Extramural R&D	-0.779 (0.013)**	-0.813 **(0.001)***	-0.182 (0.603)	-1.015 (0.017)**	-0.397 (0.066)*	-0.463 (0.125)	-0.428 (0.495)	0.090 (0.877)	-0.442 (0.329)
Machine Acquisition	3.161 **(0.001)***	1.579 **(0.001)***	1.458 **(0.001)***	4.869 **(0.001)***	3.281 **(0.001)***	2.325 **(0.001)***	1.748 **(0.008)***	1.651 **(0.001)***	2.264 **(0.001)***
Ext. Know Acq.	-0.041 (0.835)	-0.321 (0.097)*	0.795 (0.019)**	-0.639 (0.065)*	0.707 **(0.001)***	0.134 (0.640)	-1.551 (0.096)*	-0.174 (0.673)	-0.253 (0.664)
Training	0.253 (0.116)	0.011 (0.944)	0.804 (0.017)**	0.092 (0.765)	0.210 (0.222)	-0.038 (0.881)	0.762 (0.209)	0.569 (0.419)	0.256 (0.635)
Innovation Intro.	0.098 (0.579)	0.088 (0.566)	-0.313 (0.345)	0.832 **(0.007)***	0.216 (0.236)	0.061 (0.822)	-0.220 (0.729)	1.284 (0.107)	-0.565 (0.336)
Intellectual Property Right									
Patent Applicat.	0.682 **(0.002)***	2.031 **(0.001)***	2.109 **(0.001)***	0.390 (0.524)	0.354 (0.254)	0.166 (0.698)	1.803 (0.010)**	1.932 **(0.001)***	0.843 (0.388)
industrial design right	0.668 (0.041)*	0.500 (0.829)	1.128 (0.368)	0.825 (0.189)	-0.532 (0.352)	-0.630 (0.465)	-15.665 (0.991)	-0.682 (0.482)	-0.886 (0.466)
License or Sell Patent	-0.153 (0.665)	1.316 (0.026)**	-0.575 (0.361)	0.647 (0.475)	1.318 **(0.001)***	0.582 (0.479)	0.517 (0.567)	-14.582 (0.988)	-15.865 (0.990)
N	**13749**	**4193**	**1672**	**1025**	**6195**	**2151**	**1367**	**7143**	**2411**
McFadden R²	**0.287**	**0.329**	**0.326**	**0.431**	**0.407**	**0.208**	**0.277**	**0.521**	**0.355**
Cronbach's α	**0.76**	**0.80**	**0.82**	**0.81**	**0.81**	**0.76**	**0.81**	**0.73**	**0.79**

Source: Authors' own analysis.
Significant values at p<0.5, p<0.01**, p<0.001****

Regarding EU funding for firm's innovative activities, the analysis shows similar trend as the government funding but for Croatia and Estonia, firm's machine acquisition and internal R&D show no effect on firms attracting EU funds. Regarding training for innovative activities and firm's introduction of innovation, the results show the propensity for innovative SME's to attract funds from the EU with the only exception being Bulgaria and Latvia (for introducing innovation) but innovative firms in the Czech Republic and Slovakia show the probability to attract EU funds for introducing innovation and training for innovation activities. Majority of innovative SME's that applied for patent are likely to attract EU funds except for Lithuania and Slovakia. Only Bulgaria and Latvia innovative SME's showed propensity to attract EU funds for industrial design right but for Hungary, sale of patent showed no effect on firm attracting EU funds.

Table 2: EU Funding for Firms Innovative Activities

	Bulgaria	Czechia	Estonia	Croatia	Hungary	Lithuania	Latvia	Romania	Slovakia
Firm Innovative Activities									
Intramural R&D	2.007 **(0.001)*** **	1.275 **(0.001)*** **	1.164 (0.110)	-2.175 (0.348)	1.187 **(0.001)*** ***	3.402 **(0.001)*** **	3.020 (0.001)***	3.859 **(0.001)*** **	1.885 (0.020)**
Extramural R&D	-0.626 (0.047)*	-0.320 (0.067)*	0.449 (0.197)	1.881 (0.103)	0.093 (0.649)	-0.836 **(0.001)*** **	-0.778 (0.037)**	0.103 (0.853)	-0.179 (0.702)
Machine Acquisition	3.432 **(0.001)*** **	2.637 **(0.001)*** **	0.569 (0.126)	17.845 (0.992)	3.001 **(0.001)*** **	1.578 **(0.001)*** **	2.155 **(0.001)*** **	1.940 **(0.001)*** **	3.577 **(0.001)*** **
External Knowledge Acqusition	-0.200 (0.251)	0.082 (0.652)	-0.330 (0.339)	1.042 (0.076)*	0.143 (0.505)	0.105 (0.680)	-1.044 (0.021)**	0.446 (0.282)	0.104 (0.819)
Training	0.707 **(0.001)*** **	0.107 (0.475)	1.027 **(0.003)*** **	1.179 (0.120)	-0.016 (0.920)	-0.200 (0.366)	0.906 **(0.005)*** **	-0.338 (0.670)	-0.095 (0.831)
Innovation Intro.	0.118 (0.446)	0.225 (0.144)	0.899 **(0.006)*** **	-0.447 (0.473)	0.705 **(0.001)*** **	0.444 (0.053)*	0.036 (0.917)	1.825 (0.023)**	-0.432 (0.392)
Intellectual Property Right									
Patent App.	0.387 (0.069)*	1.097 **(0.001)*** **	1.319 **(0.005)*** **	1.999 (0.031)**	0.741 (0.015)**	0.438 (0.267)	1.606 **(0.001)*** **	2.287 **(0.001)*** **	-0.364 (0.758)
industrial design right	1.263 **(0.001)*** **	2.302 (0.301)	0.469 (0.383)	-0.502 (0.716)	-0.374 (0.457)	0.394 (0.609)	1.175 (0.044)*	-1.432 (0.184)	-0.623 (0.584)
License or Sell Patent	0.391 (0.216)	0.157 (0.779)	-0.781 (0.570)	-19.593 (0.999)	1.177 **(0.002)*** **	0.530 (0.493)	0.232 (0.676)	-14.805 (0.987)	-0.713 (0.521)
N	**13749**	**4193**	**1672**	**1025**	**6195**	**2151**	**1361**	**7143**	**2411**
McFadden R^2	**0.373**	**0.283**	**0.289**	**0.386**	**0.415**	**0.276**	**0.406**	**0.473**	**0.355**
Cronbach's α	**0.76**	**0.80**	**0.82**	**0.81**	**0.81**	**0.76**	**0.81**	**0.73**	**0.79**

Source: Authors' own analysis.
Significant values at $p<0.5$, $p<0.01$**, $p<0.001$***

4 Conclusion

Innovation as it has been discussed in the numerous literatures above contributes immensely to the economic growth and prosperity of nations. This assumption by far has been highlighted in all policy documents of the EU to which member states have adopted same. Hence innovation and firm's innovation activities cannot be underestimated. The main goal of this paper is to analyze whether firm's innovativeness determines the public financial support innovative SME's attract in some selected CEE countries. Based on the conceptual framework, we deduced that; innovative SME's that are engaged in innovative activities attract government financial support and or EU funds for their innovative activities. As a result of public innovation policies that support SME's which engage in innovative activities, national and EU funds are likely to be awarded SME innovators.

Our result has demonstrated that based on the innovative activities firms engage in, which are measurable per their innovation outcomes achieved, majority of the SME's in CEE countries attract financial support from the central government and or EU. These findings have therefore confirmed our hypotheses H1 and H2. The results corroborate the finding of Un & Montoro-Sanchez [23] that public funding is influenced by firms' propensity to innovate likewise Heshmati and Loof [10] who found public funds to support SMEs in Sweden. North, Smallbone & Vickers [16] also found in the UK that depending on the intensity of the SME in innovation, the firm gets to participate in public sector support programs in Lee Valley region of London.

In the meantime, the analysis provides mixed results regarding public financial support especially regarding EU funds. This is mainly due to the different levels of the innovation

capacity of the selected countries and their propensity to receive financial support. For instance, [19] describe these innovation groups i.e. (innovative capacity and performance) to be moderate, modest and strong innovators in their analysis of some selected CEE countries. In the current 2018 European Innovation Scoreboard, all the selected CEE countries are categorized into either moderate or modest innovators with Bulgaria and Romania well below the EU average. As such, differences exist among states and their funding policies.

The result also shows the robustness of innovation and SME's innovative activities in the CEE countries after the post-EU accession and the economic recession. State financial support is necessary to drive firms to productive ways and innovation has been the key driver. Firms have to perform and survive whilst creating employment for people thereby contributing to economic growth. In the nutshell, we recommend that much attention be giving to the outcomes of these supported innovative activities of SME's in the selected countries since the result showed rather less effect of public financial support on them. Also, cross regional research be done in order to duly ascertain the most efficient SMEs for comparison sake and to show policy direction of public authorities.

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