Letting Genie out of the Bottle (Towards the formulation of policies to promote innovation activities of private firms)[1]

Anetta Caplanova
Department of Economics, University of Economics in Bratislava
E-mail anetta.caplanova@euba.sk

Rudolf Sivak
Department of Finance, University of Economics in Bratislava
E-mail rudolf.sivak@euba.sk

Abstract

The innovation of firms is considered as a crucial factor of a positive economic development in current complex economic situation in Europe and beyond. In our paper on the basis of the review of existing literature and our own previous empirical analysis based on the use of the World Bank Enterprise Survey data, we review factors impacting on the innovation activities of firms. We look at the innovation activities related to the introduction of a new product or service, the product upgrading, R&D, but also the licensing of the technology from a foreign-owned company. We conclude that factors influencing first three types of innovation activities are different from those impacting on the licensing. In case of the European and Asian transition economies striving to progress from the knowledge adaptors to the knowledge creators it is important to formulate policy measures so as they stimulated those factors, which encourage the creation of new knowledge and innovation (e.g. related to the enhancement of the infrastructure, FDI, efficient governance regimes).

Keywords: *innovation, firms, transition economies, innovation policies*

INTRODUCTION

The global economic crisis, which recently hit some parts of the world with strong intensity, but also the ongoing technological changes impacting on the character of economic processes and the necessity to face the issues of the depletion of non-renewable resources call for the redefinition of existing regulation practices and the change in the use of policy instruments used by national governments and

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international organizations. The innovation activities carried out by firms are considered to be a crucial factor of a positive economic development. They may occur in all economic sectors, even though they are more frequent in some sectors than in the others. Due to their crucial relevance for the current development recently they have been given increasing attention of researchers and also policy makers. The up to date empirical analysis has predominantly paid attention either to selected aspects of innovation such as patents, the expenditures on research and development R&D, or the impact of innovation on productivity, but so far the problem has not been adequately dealt with in its complexity.

There exist differences in the innovation activities across different countries, but also across individual regions within those countries. In the emerging market economies, whose expenditure on R&D are often relatively low, much of the innovation takes up the form of the imitation and adaptation of existing innovations. The innovation activities can be understood as a two-step process, where first there is the emergence and diffusion of new knowledge and then this knowledge is translated into innovation. In the process of the knowledge creation and its diffusion, there are several barriers, which may include e. g. the geographical distance, skills and abilities of employees, but also the availability of financial resources. Currently, large fraction of new knowledge is created in a small number of countries. Less developed countries produce only a small part of knowledge and focus predominantly on its absorption. The identification of factors affecting innovation activities of individual firms is not only a problem, which is of interest to the academic audience, but it is also relevant for policy makers, since it can provide them with important insights about the formulation of policies aiming to promote the innovation activities in the national economy, or its regions and contribute to the promotion of their economic development.

The OECD perceives the innovation as "the introduction of a new significantly improved product or service, process, marketing methods, or new methods of the organization of business practices, workplace, or external relations" (OECD-Eurostat 2005, p. 146). In our paper we look at the state of the art related to the understanding of the innovation activities at micro (firms) level and factors affecting them. We also summarize the results of our previous research carried out using the World Bank Enterprise survey and its contribution to the understanding of this issue. Finally, we conclude the paper with the formulation of generalizations, conclusions and policy lessons relevant for formulating regulatory measures contributing to the stimulation of the innovation activities in companies.

INNOVATION STUDIES IN THE LITERATURE

The processes of how the innovation develops and is diffused in the regions and countries as well as the pace at which the diffusion of innovation takes place have been the object of the attention of several scholars, e.g. Bartelsman & Doms (2000) have shown that the innovation diffusion rate is initially slow, later on it becomes faster. The studies have also shown that cities are the centres for the diffusion of knowledge (Henderson, 2007). Even though after being created the innovation is subsequently spread further, the areas that are more distant from the cities, i.e. rural areas, are at the information disadvantage and the innovations spread to these areas only with the time lag. The main barrier to the diffusion of knowledge is frequently considered to be the lack of appropriate technical skills in companies, individual countries and their regions. This reduces the possibility of absorption and adaptation of knowledge in a given environment.

The studies looking at factors that facilitate the innovation processes and contribute to overcoming the barriers to business and production, or to the diffusion of knowledge, frequently consider the foreign direct investment (FDI) as a factor creating the conditions for the diffusion of knowledge to countries, where it finds its location.

The rationale for the impact of FDI on innovation activities in the country or region has been based on the assumption that foreign firms have better technology than domestic firms, thus, FDI leads to the improved technology levels in the host country. In this context the spill-over effects of foreign firms on domestic firms have been studied. The diffusion of innovation from foreign owned firms can occur in several ways, e.g. if the trained staff leave a foreign firm for a domestic firm or establish their own firms (Kaufmann, 1997), the domestic firms can observe the practice in foreign firms and imitate it, e.g. in relation to new products, technologies, or management (e.g. Ben Hamida & Gugler, 2009), FDI may encourage the growth via the increase of the market competition (Ben Hamida & Gugler, 2009). However, it has been pointed out that foreign companies may have also a negative impact on the activities of domestic firms, e.g. the growth of FDI may lead to the reduced productivity of domestic firms (Aitken & Harrison, 1999). This is steaming from the fact that foreign firms frequently take over the market share of domestic companies that can produce and sell lower amount of production having to face unchanged fixed costs.

In terms of the impact of other factors on innovation activities there are several studies, which contributed to their explanation. Caselli and Coleman (2001) have found that the human capital and the openness of the country's imports of industrial production have a positive impact on domestic innovation activities. The

study carried out by OECD (2010) has shown that the diffusion of knowledge is positively affected by the level of skills of workers and their human capital. The relevance of the governance and existing institutional framework including well-defined property rights for the scope of innovation activities carried out in firms has also been highlighted (Grossman & Helpman, 1991, Sivak, Caplanova & Hudson, 2011).

It is widely believed that also the competition motivates firms to carry out innovation activities. However, some studies have pointed out that the competition in product markets reduces the monopoly rent that motivates companies to carry out innovation activities (e.g. Dixit & Stiglitz, 1977, Aghion and Howitt, 1992). On the opposite, Aghion et al. (2005) have shown that the impact of competition on innovation activities of firms depends on the degree of their effectiveness. It is expected that in case of the firms that operate near their efficiency frontier they will be motivated by the competition to innovate, on the other hand, the competition would deter low efficiency firms from carrying out the innovation activities, since they realize that even if they engage in the innovation they will not be able to catch up with their competitors. In terms of the relevance of the size of the firms as a factor impacting on innovation of individual firms Zemplinerová (2010) in her analysis of the Czech data has shown that the innovation activities of firms may not take place only in large corporations, but also in firms of a smaller size. So far the research of the factors influencing innovation has predominantly focused on the developed countries with some attention being paid also to the transition economies (Carlin, Schaeffer & Seabright, 2004).

INNOVATION ACTIVITIES AS A RESPONSE TO THE EXTERNAL ENVIRONMENT

To contribute to the discussion on the factors impacting on the extent of innovation activities of individual firms we have carried out the empirical analysis using the data from the 2009 World Bank Enterprise Survey. The data contains the information obtained from the sample of more than 11,000 firms with five or more employees from Central and Eastern Europe and Asia. The countries, in which the firms are located, have certain common features, such as that they are oriented primarily on the absorption of knowledge, or that they are at various stages of the transformation process. In our study we have analyzed the factors that are significant for the companies in terms of carrying out any type of the four types of innovation activities, which are identified by the survey (i.e. the introduction of a new product, the innovation of existing products, R&D activities and licensing). Table 1 shows the share of firms that were engaged in specific innovation activities in individual countries.

We can see that there are significant differences between individual countries. Slovenian companies reported the introduction of new products most frequently from

all firms (almost 74% of the companies confirmed this type of innovation activities). On the other end of scale, only 23 percent of Uzbek companies admitted to be involved in this type of innovation. Slovenian companies also most frequently carried out the product upgrade and were at the forefront in terms of R&D activities. With regard to the licensing the situation is different. In this form of innovation activity Slovenian companies have not been very active; on the other hand, in Albanian, Turkish, Russian and Macedonian companies this form of innovation activity has been dominant. Thus, we may conclude that firms in those countries, which have engaged more frequently in the innovation activities related to the introduction of new products, product upgrade and R&D, have the tendency to use licensing less frequently and vice versa.

Table 1: The Engagement in Innovation Activities (share of firms in percentages)

	New products	Product upgrade	R&D	Licensing		New products	Product upgrade	R&D	Licensing
Slovenia	73.9	89.9	40.9	5.4	**Kosovo**	53.7	86.3	24.8	7.0
Lithuania	69.6	89.9	23.9	10.9	**Montenegro**	53.4	60.3	24.1	5.2
Belarus	68.9	89.7	19.4	4.8	**Moldova**	53.2	64.7	27.3	5.0
Russia	68.3	86.0	36.1	15.9	**Slovakia**	52.0	68.7	14.9	10.9
Mongolia	68.0	84.5	22.7	7.7	**Tajikistan**	51.7	78.6	11.9	8.3
Croatia	65.4	76.1	51.6	6.9	**Kirgizstan**	46.0	68.5	14.9	9.8
Estonia	64.1	78.0	35.9	9.2	**Romania**	45.8	50.8	25.0	6.5
Serbia	62.1	74.5	33.0	5.9	**Kazakhstan**	45.0	75.0	11.6	5.3
Czech Republic	62.0	70.8	27.6	6.8	**Turkey**	44.6	58.5	27.2	17.6
Armenia	61.2	75.1	21.9	9.6	**Azerbaijan**	74.2	8.2	8.2	44.2
Latvia	60.5	89.3	18.1	10.0	**Hungary**	42.6	74.2	17.5	5.2
Bosna and Herz.	59.6	80.1	46.3	9.4	**Bulgaria**	42.0	58.0	28.1	3.5
Macedonia	59.6	76.2	41.3	15.6	**Albania**	41.1	69.7	30.3	22.3
Ukraine	56.6	76.5	19.6	12.6	**Georgia**	34.6	72.1	13.4	9.1
Poland	55.8	57.1	20.2	2.4	**Uzbekistan**	23.0	36.9	2.5	6.8

Source: Caplanova, A., Sivak, R. & Hudson, J. (2012).

We have used these data for further analysis using the method of binominal probit to identify the significance of the complex of those variables in individual countries and regions, which influence the innovation activities of individual firms.[2] The results of our analysis pointed to significant spill-over effects of foreign firms on other firms for all forms of innovation activities except for licensing. Being a part of larger group of companies was also shown to be statistically significant and to have

[2] More details on the methodology of the carried out analysis and its results can be obtained from the authors.

positive effects on all forms of innovation activities other than licensing. In particular, those firms that are in the foreign ownership and at the same time they are the part of a group of companies have strong spill-over effects on the innovation activities of other firms.

We have also looked at the significance of relevant regional characteristics for the innovation activities of individual firms. In this context the quality of the regional infrastructure, related e.g. to the electronic communication, impacts significantly on the introduction of new products, R&D activities and licensing activities. The availability of the Internet is a prerequisite for innovation, opens up possibilities for new products, marketing and diffusion of knowledge. The availability of bank credit to firms was also statistically significant having a positive influence on the introduction of new products as well as the upgrade of existing products. It is not a surprising conclusion, since it is reasonable to expect that the investment of firms is usually financed from loan funds. The factors reflecting upon the efficiency of the public administration were also statistically significant. In particular, the problems caused by the need to obtain various permits were shown to have statistically significant negative influence on the introduction of new products, or on the upgrade of existing products. Thus, good governance is an important prerequisite for certain forms of innovation activities of firms.

The characteristics of individual firms are also relevant in terms of their engagement in innovation activities. Our results have shown that small and medium size firms were less prone to innovate. Also, the introduction of new products and R&D activities take place more frequently in companies that are based in towns. The ownership is also a statistically significant feature affecting the innovation activities of companies. The limited liability companies were more frequently involved in all forms of innovation activities except for licensing activities. The abilities and skills of employees (i.e. their human capital) were also statistically significant. The companies, that did not have employees with higher education, were less active in every form of innovation activities. We also looked at the role of a competitive pressure on the innovations. Our results have shown that companies that are under the pressure from foreign competition are more frequently engaged in any of the studied forms of innovation activities. The pressure coming from consumers plays also a positive role in terms of the stimulation of innovation activities of firms. Strong pressure from the domestic competition motivates firms to innovate in terms of introducing a new product, the upgrade of existing products, or R&D, but not in terms of licensing. When looking at individual sectors there have been found statistically significant differences between innovation activities of firms in different industries. In our analysis we considered the processing industry (excluding food, clothing and textile industry) as a reference sector. This sector has been engaged in R&D far more frequently than other

sectors. The transportation, construction, retail and hotel services were identified as being among the least innovatively active industries.

Our study identified positive spill-over effects in different regions from foreign companies for innovation activities of domestic firms, which is consistent with the existing literature. We have also confirmed that the impact of foreign firms on innovation activities is twofold. On the one hand, their presence leads to positive spill-over effects, but at the same time it may also have adverse effects on domestic firms via the competitive pressures and domestic firms being competed out from the market. In terms of the analyzed forms of innovation activities we identified the specificity of licensing activities compared to other forms of innovation. In this context licensing can be considered as a "passive" form of innovation activities, since it is predominantly based on the knowledge transfer. Our study has shown that in terms of the factors influencing this type of innovation activities the licensing is influenced by different factors as other forms of innovation we looked into.

POLICY LESSONS TO SUPPORT INNOVATION PROCESSES OF FIRMS IN TRANSITION ECONOMIES

The study of the determinants of innovation activities has important economic and policy implications. Currently, governments across the world aim at the development of policies and policy measures that would increase the innovation activities at micro and macro levels. The understanding of factors impacting on the extent of innovation activities of individual firms can contribute to the formulation of effective policies to stimulate innovation at micro level.

Our study has shown that the support of foreign direct investment, of the development of infrastructure in terms of the electronic communication, the internet access, the access of firms to bank infrastructure and to sources of external financing, but also the institutional factors such as good governance and reduced bureaucracy belong among factors, which contribute to stimulating firms' innovation activities. Thus, in this context e.g. the reforms of administrative procedures leading to their simplification and the enforcement of intellectual property rights play an important role. The identified impact of competition on innovation as well as the significance of the group of firms as a factor impacting on innovation activities, might change the perceptions on the appropriate regulatory measures of competition policies. The support of the investment into human capital, either in the process of formal education; or in the form of specific training in firms, also creates the potential for the enhanced innovation activities. The conclusion related to the different character of licensing from other forms of innovation activities is also policy relevant, esp. in the context of transition countries, which aim towards the shift from being predominantly in the position of the innovation adaptors to the innovation creators.

Thus, the effort to introduce efficient policy measures, which would stimulate innovation activities, should concentrate on the measures, which impact on those factors, which in a statistically significant way positively influence desired innovation activities. Such policies will contribute to the stimulation of innovation activities in individual countries, or regions. Since there exist significant differences among regions in individual countries in terms of their innovation activities, it is necessary to adapt the policy measures to these differences. The uniform design of policies at national or supranational level cannot be considered an efficient way of their stimulation. The disadvantages of regions further away from urban areas, which are the innovation centres, could be mitigated by the increased support of the development of their infrastructure, foreign direct investment into these regions and also by the support of the training schemes and education systems there. The sectoral aspects of innovation policies should also be taken into account reflecting upon the lower innovation potential of some industries compared to the others.

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