



Determinants of Innovation Activity of Small and Medium-Sized Enterprises in Small Post-Soviet Countries*

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Abstract: *This paper aims to study the determinants of innovation activity of small and medium-sized enterprises in five small post-Soviet countries. Empirical analysis is based on the data from the fifth wave of the Business Environment and Enterprise Performance Survey. Innovation of SMEs is measured with five innovation practices. For each aspect of innovation probit model is applied. Estimation results shows that experience of managers has curvilinear effect on the innovation in SMEs. Moreover, foreign participation, export orientation and competitiveness in sectors are indicated as important condition for innovation by SMEs. Competition forces firms to innovate in order to survive, while openness of the economy provides with exporting opportunities and participation of the foreign capital. Especially the latter factor may significantly reduce costs of innovation through technological transformation from abroad.*

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1. Introduction

Small and medium-sized enterprises (SMEs) by creating new jobs and development of innovative products promote economic growth (Scase, 1997; Skuras et al., 2008; Ionica, 2013). Compared to large firms SMEs may quickly adapt to new socio-economic environment and find out new ways of activity (McIntyre, 2001:11; Rogers, 2004:143, Love & Roper, 2015:29). Recent economic transition of the former Soviet Union (FSU) countries to market economy and making of the entrepreneurship in these challenging environment have made SMEs even more important for these economies (Aidis, 2003; Belkin & Belkina, 2013).

The long-term sustainable economic development requires entrepreneurs to be innovative. SMEs and individual enterprises may demonstrate more dynamic tendency towards introduction of innovation (Love & Roper, 2015). Nevertheless, it may depend on different factors ranging from the characteristics of firms' leaders to the access of financial resources. Among them financial constraints are found as one of the important elements of government support for innovation (Skuras et al., 2008; Landesmann et al., 2016). Although, other studies assert that non-financial support to increase productivity of the labour force is important for innovation too (Szczepanska-Woszczyna, 2014). Moreover, within the context of developing countries qualified labour can be considered as an important challenge for the innovation activities of SMEs (Norek & Arenhardt, 2015).

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Other characteristics of firms which are significant for the innovation propensity of SMEs are size and technological capacity of firms (Sharma, 2014; Bayarçelik et al., 2014). Some of the studies point out importance of the external environmental conditions too. Thus, De Mel et al. (2009) investigating determinants of innovation in micro, small, and medium enterprises in Sri Lanka, demonstrate that firm size has positive impact on the process and organizational innovations, while less on product and marketing innovations. Interestingly, competitive pressure is found as having negative effect on these types of innovation. However, Szczepanska-Woszczyna (2014) found positive influence of the constant pressure coming from the competitors over the innovation of SMEs in case of Poland. Manager characteristics such as gender, experience and entrepreneur skills are also important for the innovation propensity of firms too (Romijn & Albaladejo, 2002; Norek & Costa, 2015; Akulava, 2015).

Not only internal firm level characteristics, but also external cooperation is found to be important for innovation of SMEs. Turriago-Hoyos et al. (2015) in the Colombian example argue that firm size and cooperation with other stakeholders, such as research institutions and foreign industrial groups, have more influence on production innovation. Podmetina (2011) investigating Russian SMEs argues that implementation of innovation through internationalization and cooperation with external partners can provide with opportunities to enter into new markets. Analogically, Ionica (2013) concludes that innovation in SMEs of Romania have been influenced by international strategic partnerships. In a similar vein, studies by Ehrenberger et al. (2015) on Czech Republic, Radas & Božić (2009) on Croatia, Pikkemaat (2008) on Austria, Keizer et al. (2002) on Netherlands confirm the positive influence of external cooperation on innovation of SMEs.

Although there are large number of studies on the innovation and SMEs, empirical evidence on the post-Soviet countries is very limited (for instance, see: Akulava, 2015). Despite some common historical background for the enterprise development among these countries, difference in size of the economies, abundance of the natural resources and government policies have been expressed in diverging economic performance (Iradian, 2007). Moreover, at the aftermath of the comprehensive economic reforms perception of government on the priority of SMEs in economic development varied (Smallbone & Welter, 2001).

This study aims to investigate determinants of innovation of SMEs in small non-oil exporting post-Soviet countries: Armenia, Georgia, Kyrgyzstan, Moldova and Tajikistan. Under the conditions of comparatively smaller economies without large oil resources importance of SMEs for economic stability in these countries has been increasing, while competitiveness and sustainability of these enterprises largely depends on their innovativeness. This article contributes to the existing literature on innovation of SMEs by focusing on post-Soviet economies, which has been neglected by the literature.

We use the data from the 5th wave of the Business Environment and Enterprise Performance Survey (BEEPS) and measure innovation with five innovation practices, which are indicated by the binary response variables. For each innovation activities bivariate regression analysis is applied.

This paper is structured as follows. Next section explores SMEs in the context of post-soviet economies. Section 3 explains methodology and data. Section 4 presents estimation results and section 6 concludes.

2. SMEs in the Context of Post-Soviet Economies

Population in the post-soviet space historically were not encouraged to engage in their own business (Iakovleva & Solesvik, 2014). It was expected that the transition process will promote entrepreneurial activities. However, inefficient allocation of resources inherited from the Soviet period and slow institutional changes have not been conducive to creation of productive SMEs. Underdeveloped infrastructure, corruption and bureaucracy, low intensity of competition, access to finance and lack of knowledge on export oriented activities have been mentioned as main constraints for development of SMEs (McIntyre, 2001; Pasadilla, 2010; Makhmadshoev et al., 2015; United Nations [UN], 2015:35; Sass et al., 2015; Ruziev & Webber, 2017; Gattini & Baiashvili, 2016:19; Vaysman & Podshivalova, 2015).

Most of the government programs designed supporting of SMEs in these economies were launched in the early 2000s and mainly related with simplification of tax regulation, financial and technical assistance, revision of the legal framework and establishment of state organization for development of SME sector (Maslennikov, 2017). Currently, the SME sector receives comprehensive assistance and support not only from national government agencies, but also from international organizations (UN, 2015:35; Commonwealth of Independent States, 2016).

Under the conditions of absence of large industrial production and oil resources SMEs has represented important source for employment in these economies (Delener et al., 2017). Overview of recent trend indicates that SMEs in these economies demonstrate slow, but steadily growing rate. Although, there is no unified official statistics on SMEs for post-soviet countries, analytical reports show that the share of SMEs among total number of registered enterprises reaches almost 95%. Moreover, 78-90% of SMEs are micro-sized enterprises (European Commission [EC], 2016; EU4Business, 2017; National Statistical Committee of the Kyrgyz Republic [NSCKR], 2017; National Bureau of Statistics in the Republic of Moldova [NBSRM], 2018). Contributions by SMEs to the economic performance of these countries are considerable too. Analysis of various analytical reports indicates that in 2015-2016 years share of SMEs in GDP of these five countries range from 20% to 35%, while in employment from 33% to 60% (Gattini & Baiashvili, 2016:16; European Bank for Reconstruction and Development [EBRD], 2017:6; EU4Business, 2017).

Along with this development of SMEs is firmly related with the structure of the economy formed during the transition period. Large inflow of remittances into these economies has led to an increase in consumption and import of goods, which in turn promoted growth of the SMEs in wholesale and retail trade sector. There is relatively less number of SMEs in manufacturing and construction sectors.

Notwithstanding government efforts to create incentives for export-oriented growth of SMEs in these economies, large positive improvements have not been achieved yet. Competitiveness of SMEs in their export oriented growth is mostly determined by their innovativeness and productivity. But low innovation performance among SMEs is noted as the main barrier for such improvements (UN, 2015; National Statistics Office of Georgia [NSOG], 2017).

One of the common characteristics of these small and non-oil exporting post-soviet economies is considerable emigration of the labor force during the transition and large remittances inflow. This tendency may have impact on SMEs evolution in two ways. First, remittances from abroad increase consumption and import of goods, which in turn promote growth of SMEs trade sector. Second, knowledge and technology transferred by migrant workers and diaspora from abroad may improve innovation and entrepreneurship in the home countries (Olimova, 2010; Sass et al., 2015). However, return migration in these economies is associated with low-skilled labor return and do not demonstrate high propensity to entrepreneurship (UN, 2015; Delener et al., 2017).

Despite the insufficient performance of SMEs, some progress is observed during the recent years. Thus, in period of 2012-2016 years according to the SME Policy Index¹ improvements have been observed in Armenia, Georgia and Moldova in such aspects as innovation, access to finance, internationalisation of SMEs, standards and technical regulations, public procurement and green economy (OECD/European Union/EBRD/ETF, 2015). Unfortunately, to our best knowledge there are no other indexes that would allow comparative analysis of SMEs in these five economies. However, several studies evaluate performance of SMEs in case of particular country. For instance, labour productivity of SMEs measured as ratio of output to number of employees in Georgia is indicated as higher than large enterprises (NSOG, 2017). In case of Moldova it is noted that 90% of innovative enterprises in 2015-2016 years were SMEs (NBSRM, 2018).

Thus, economic activity of SMEs is important for small economies without large oil resources that have experienced significant economic restructuring during the post-soviet transition. Innovation of SMEs is important for sustainability of their productivity and competitiveness. However, there is a scarcity of analysis exploring the factors that affect innovation activity of SMEs. This makes study on the determinants of innovation activity of SMEs important.

3. Methodology

3.1. Sample and Data

This study is based on the data of the fifth wave of the Business Environment and Enterprise Performance Survey (BEEPS) for five countries: Armenia, Georgia, Kyrgyzstan, Moldova and Tajikistan.

Total sample consists of 1081 microenterprises, small, and medium-sized enterprises. Following the dataset micro is defined as firms having less than 5 employees, small between 5 and 19, and medium between 20 and 99. Data includes wide range of data on firm activities such as production, expectations, regulatory burden, and different section of the questionnaire is focused on innovation activities.

Innovation activity of enterprises is measured by five aspects: introduction of new products or services (innovation in goods and services); introduction of new methods of production of goods and services (innovation in process); introduction of new or significant improvement in organizational or management practices (innovation in organization); introduction of new marketing methods (marketing innovation; and whether firm did spending on research and development). These are dummy variables, indicating whether firms performed these activities or not.

3.2. Analytical Approach

For the purpose of examining factors affecting innovation activity of SMEs we use binary response probit models, where the dependent discrete variable takes zero or one values, indicating if an event occurred or not (Wooldridge, 2010: 453). In our case, the dependent variables are the innovation measurements, such as: innovation in goods and services, process, organization, marketing and R&D spending. Each innovation categories has binary response character, which means that these dependent variables take value 1 if the firm has introduced innovation in above mentioned categories. Formally, model is given below (Wooldridge, 2009):

$$P(y_i = 1|x_i) = G(\beta_0 + \beta_1x_1 + \dots + \beta_kx_k) = G(\beta_0 + x\beta) \quad (1)$$

$$G(z) = \Phi(z) \equiv \int_{-\infty}^z \phi(v)dv \quad (2)$$

$$\phi(z) = (2\pi)^{-1/2}\exp(-z^2/2) \quad (3)$$

where G is the standard normal cumulative distribution function (cdf) and $\phi(z)$ indicates standard normal density. y_i is the discrete dependent variable, taking values of zero or one, showing the innovativeness of the firm; x_i is the set of explanatory variables.

Covariates used in the analysis follow empirical literature and cover both managerial and firm characteristics, including some aspects of the external environment. Detailed description of variables is given in Table 1. Managerial characteristics are measured by the gender and experience variables. In particular, relationship between experience and innovation may not only be linear, but also may have curvilinear path. At the earlier stages of the managerial experience SMEs may be more active in adapting new approach for production, organizational structure and other aspects of innovation.

Table 1. Description of Variables

Dependent variables:	
Innovation in goods services	During the last three years, has this establishment introduced new or significantly improved products or services? (0-No, 1-Yes)
Innovation in process	During the last three years, has this establishment introduced any new or significantly improved methods for the production or supply of products or services? (0-No, 1-Yes)
Innovation in organization	During the last three years, has this establishment introduced any new or significantly improved organizational or management practices or structures? (0-No, 1-Yes)
Innovation in marketing	During the last three years, has this establishment introduced new or significantly improved marketing methods? (0-No, 1-Yes)
Innovation activity	During the last three years, did this establishment spend on research and development activities, either in-house or contracted with other companies (outsourced)? (0-No, 1-Yes)
Explanatory variables	
<i>CEO characteristics:</i>	
Gender	0 - CEO is male, 1- CEO is female
Experience	The years of experience of CEO (age-education years)
Squared experience	Squared years of experience of CEO
<i>Firm characteristics:</i>	
Years since establishment	Years since establishment of the firm
Squared years since establishment	Squared years since establishment
<i>Firm structure:</i>	
Shares traded	Shareholding company with shares traded in the stock market (0-No, 1-Yes)
Non-traded shares	Shareholding company with non-traded shares or shares traded privately (0-No, 1-Yes)
Other legal status	Sole proprietorship, partnership, limited partnership or other legal status (0-No, 1-Yes)
Foreign participation	Firm has private foreign individuals or companies as owner (0-No, 1-Yes)
<i>Industry type:</i>	
Food manufacturing	Firm is in food manufacturing sector (0-No, 1-Yes)
Construction services	Firm is in construction sector (0-No, 1-Yes)
Retail services	Firm is in retail services sector (0-No, 1-Yes)
Other industry	Firm is in other industry sectors (0-No, 1-Yes)
Location	Firm is located in capital city (0-No, 1-Yes)
Exporter firm	Firm is exporting its products (0-No, 1-Yes)
Training	Firm makes formal training program for permanent employees (0-No, 1-Yes)
Competition	Firm competes with unregistered firms (0-No, 1-Yes)
Credit	Firm currently has a line of credit from a financial institution (0-No, 1-Yes)

Source: 5th Business Environment and Enterprise Performance Survey (BEEPS).

However, with longer managerial experience owners or managers of SMEs may take passive innovative position because of the several reasons: higher personal age and less desire to work on innovative approach or belonging to the “old cohort” of managers that may find difficult adaptation to new conditions through competitive and technological changes. The recent short history of emerging private sector and entrepreneurships in post-soviet economies the latter argument may have higher validity in our analysis. Thus, experience may have non-linear effect over innovation of SMEs. Longer managerial experience may increase innovation activities in enterprises, although within the transition context those managers with pre-transition working experience and, hence, longer experience in general may demonstrate lower performance in innovation activities. In order to take into account this potential non-linear effect, experience years and its square are included in estimation equation. Firm characteristics include years since establishment, dummy variables on ownership structure and foreign participation. Industry type is indicated through four sectors: food manufacturing, construction, retail services and other industry. Other variables indicates reported competition level in the industry, whether firm exports, has provided trainings and has current credit loan.

3.3. Descriptive Statistics

Table 2 presents share of firms indicated each innovation activity by countries in the sample. Among five countries the most innovative SMEs are in Kyrgyzstan and Moldova. In average and relative terms SMEs in Georgia reported lower level of innovation in all five aspects. At the total sample about 20 per cent of SMEs are engaged into innovation activities. However, SMEs show different performance depending on the types of innovation. The least intensive type of innovation is R&D, while other types receive substantially larger consideration of firms. For instance, in Kyrgyzstan more than 30 per cent of SMEs indicated innovation in goods and services, organization and marketing, while Armenia and Georgia innovation in goods and services has comparatively larger share. These varying intensities of innovation activities may be related with their cost and priority for SMEs. Financing R&D activities may be costly given their uncertain results and small size of firms. On the other hand, competitive environment in the industry may pressure SMEs to focus on other issues, such as better promotion of products or improvement of managerial practices of firms.

Table 2. Innovation Activity of Enterprises (in %, by country)

Country	Number of firms	Innovation in goods and services		Innovation in process		Innovation in organization		Innovation in marketing		R&D	
		<i>N</i>	<i>in %</i>	<i>N</i>	<i>in %</i>	<i>N</i>	<i>in %</i>	<i>N</i>	<i>in %</i>	<i>N</i>	<i>in %</i>
Armenia	181	21	11.60	5	2.76	18	9.94	9	4.97	21	11.60
Georgia	249	22	8.84	5	2.01	14	5.62	18	7.23	22	8.84
Kyrgyz Rep.	198	73	36.87	17	8.59	79	39.90	45	22.73	73	36.87
Moldova	163	51	31.29	13	7.98	42	25.77	50	30.67	51	31.29
Tajikistan	290	39	13.45	16	5.52	78	26.90	28	9.66	39	13.45
Total	1081	206	19.06	56	5.18	231	21.37	150	13.88	206	19.06

Source: 5th Business Environment and Enterprise Performance Survey (BEEPS)

Note: *N* denotes the number of firms

Review of the empirical literature shows that innovation activities depends on different firm and managerial characteristics. Table 3 describes the main indicators of SMEs, which are taken into analysis. In general, SMEs are represented by male headed companies, which are more experienced than women CEOs. The firm statistics show that most firms have relatively short history since establishment and accounts for about 11 years, which can be explained by the disintegration of Soviet Union and later development of private sector in these economies.

The distribution of legal statuses of SMEs shows that almost 92 per cent of firms are shareholding companies, which do not trade their shares in the stock market, while only half per cent of shareholding companies trade their shares openly. About 6 per cent of firms have sole proprietorship. About 8 per cent of firms have foreign participation. Large share of SMEs are in sectors of service – almost 66 per cent, while activities of less than 34 per cent are in manufacturing. Services sector has low capital intensity that makes it more attractive for the establishment of SMEs without substantial financial costs. Most of the firms functioning in the service industries, and women headed firms more likely (77 per cent) to be in this sector, and only 23 per cent in the manufacturing industries. Interestingly 57% of women headed firms located in the capital city, indicating that women are more likely to manage firms in the urban areas. 28 per cent of firms conduct training activities to their employees, which can be related with some types of innovation activities of SMEs.

Another interesting feature of SMEs in these countries is that more than 30 per cent of firms report facing competition against unregistered firms. This information indicates the extent to which informal economic activities are spread and may create competition pressure for formal firms.

Table 3. Descriptive Statistics

	Male Sample		Female		Total	
	Obs.	Year	Obs.	Year	Obs.	Year
Experience of the manager (mean)	856	13.88	225	12.34	1081	13.56
Years since establishment (mean)	856	11.04	225	11.30	1081	11.25
Firm structure:						
	Obs.	%	Obs.	%	Obs.	%
- Shareholding company with shares traded in the stock market	3	0.35	1	0.44	4	0.37
- Shareholding company with non-traded shares or shares traded privately	784	91.59	206	91.56	990	91.58
- Sole proprietorship	47	5.49	15	6.67	62	5.74
- Partnership and limited partnership	8	0.93	2	0.89	10	0.93
-Other legal status	14	1.64	1	0.44	15	1.39
Foreign participation	76	8.88	13	5.78	89	8.23
Industry type:						
	Obs.	%	Obs.	%	Obs.	%
- Manufacturing	311	36.33	51	22.67	362	33.49
- Service	545	63.67	174	77.33	719	66.51
Location in capital city	365	42.64	129	57.33	494	45.70
Exporter firm	97	11.33	20	8.89	117	10.82
Training activities	239	27.92	63	28.00	302	27.94
Competition against unregistered firms	285	33.29	71	31.56	356	32.93
Credit or loan from financial institutions	241	28.12	76	33.93	315	29.33

Source: 5th Business Environment and Enterprise Performance Survey (BEEPS)

Note: Male and Female denote to samples by CEO's gender.

4. Estimation Results

Coefficients and marginal effects from estimation of probit model for each innovation component are reported in Tables 4 and Table 5, correspondingly. Most of the explanatory variables have expected sign. Findings show that there is no relationship between gender of CEO and innovativeness of the enterprise.

However, interesting results are indicated in case of the impact of experience of CEOs on innovation. In order to examine the potential curvilinear relationship between experience of managers and innovation, variable measuring the experience in years and their square values is included as distinct variable. Findings show that there is statistically significant and positive relation exists between experience of manager of firm and its innovation indicators. However, squared value of the CEO experience shows statistically significant negative effect on innovation, meaning that CEOs with increase in experience after some values less likely to introduce innovation in firms. Although marginal effect of the negative impact of longer experience is considerably lower.

Curvilinear effect of experience of managers has some support from the establishment history of SMEs too. Analogous to the experience of CEOs, the propensity to invest in innovation increases with increase in years since establishment, than after definite years it reduces. If to consider that SMEs are mostly represented by companies with non-traded shares, then the probability of working the same managers on for the longer time is high. Therefore, curvilinear effect of both experience and establishment history is an expected outcome. Shareholding companies that trade their shares in stock market more likely to introduce new goods, services, implement new production process and introduce a new marketing strategy.

Estimation results show that foreign participation in the firm positively influences innovation in firms, thus these firms more likely to introduce new goods, marketing strategies and organizational management rather than firms that do not have foreign participation in the ownership structure. Interesting results are indicated by the sector of activity. SMEs working in the food manufacturing industries have innovation works in goods and services and process, while firms in construction sector have negative propensity to innovate in

all types of innovation compared to other industries reference group. Retail services sector demonstrate statistically significant negative innovation in process only.

Table 4. Estimation Results for Probit Models (Coefficient Estimates)

	Innovation in				
	Goods services	Process	Organization	Marketing	Activity
CEO characteristics:					
Gender (female=1)	0.0370 (0.1176)	0.1932 (0.1250)	0.1410 (0.1207)	-0.0557 (0.1164)	0.0633 (0.1787)
Experience	0.0268** (0.0132)	0.0453** (0.0165)	0.0483** (0.0164)	0.0439** (0.0141)	0.0493* (0.0268)
Experience ²	-0.0007** (0.0003)	-0.0010** (0.0004)	-0.0012** (0.0004)	-0.0011** (0.0004)	-0.0011* (0.0007)
Firm characteristics:					
Years since establishment	0.0268** (0.0119)	0.0278** (0.0126)	0.0524*** (0.0150)	0.0254* (0.0141)	0.0214 (0.0189)
Years since establishment ²	-0.0003 (0.0002)	-0.0004* (0.0002)	-0.0008** (0.0004)	-0.0005* (0.0004)	-0.0002 (0.0004)
Firm structure (reference group: Other legal status)					
- Shares traded	2.2810** (0.7744)	1.5464** (0.6540)	1.1745 (0.7498)	1.4588** (0.7166)	1.7274** (0.8395)
- Non-traded shares	0.4455** (0.2139)	0.2340 (0.2066)	0.1958 (0.2073)	0.5944** (0.2192)	0.6853 (0.4319)
Foreign participation	0.3166** (0.1608)	0.0324 (0.1835)	0.4802** (0.1651)	0.4503** (0.1589)	0.4645** (0.2009)
Industry type (reference group: other industries)					
- Food manufacturing	0.5248*** (0.1519)	0.5606*** (0.1528)	0.1744 (0.1711)	0.2429 (0.1569)	0.2102 (0.2249)
- Construction services	-0.3437* (0.1855)	-0.3572* (0.1947)	-0.3787* (0.1948)	-0.3446* (0.1782)	-0.5959* (0.3434)
- Retail services	-0.0430 (0.1099)	-0.3786** (0.1264)	0.0495 (0.1135)	0.1381 (0.1064)	-0.1285 (0.1687)
Location	0.2243** (0.0987)	-0.1402 (0.1081)	0.0218 (0.1038)	0.1076 (0.0962)	-0.0816 (0.1499)
Exporter firm	0.3942** (0.1372)	0.1280 (0.1543)	0.2542* (0.1477)	0.3968** (0.1396)	0.4085** (0.1842)
Training	0.6447*** (0.1008)	0.5066*** (0.1097)	0.8661*** (0.1029)	0.7631*** (0.0980)	0.6541*** (0.1465)
Competition	0.2011** (0.0987)	0.2553** (0.1056)	0.1433 (0.1034)	0.1583 (0.0973)	0.2472* (0.1453)
Credit	0.0523 (0.1032)	0.1991* (0.1089)	-0.1986* (0.1118)	-0.0466 (0.1021)	-0.0570 (0.1570)
Constant	-2.204*** (0.2498)	-2.135*** (0.2532)	-2.2754*** (0.2562)	-2.283*** (0.2564)	-3.25*** (0.5041)
Observation	1074	1074	1074	1074	1074
LR chi2	127.99***	101.97***	158.90***	151.37***	68.13***
Log likelihood	-458.1209	-383.2939	-412.4187	-479.5480	-182.952
R ²	0.1226	0.1174	0.1615	0.1363	0.1570

Note: *, ** and *** show statistical significance at the 10, 5 and 1% level, respectively. Standard errors presented in parentheses.

According to these findings innovativeness of SMEs in particular sectors of the economy does not have actively growing tendency. The negative sign of innovation may suggest that SMEs may grow or maintain their current position by growing demand for their products. But low level of competition in these sectors and low exporting capacity of SMEs do not create incentives to search innovation opportunities. These arguments are supported by the exporter and competition variables in the model too. Both of them have positive impact over few innovation types.

Table 5. Estimation results for probit models (marginal effect estimates)

	Innovation in				
	Goods services	Process	Organization	Marketing	R&D
CEO characteristics:					
Gender(female=1)	0.0092	0.0394	0.0317	-0.0144	0.0044
Experience	0.0066**	0.0087***	0.1038***	0.0116***	0.0033*
Squared experience	-0.0001**	-0.0001**	-0.0002***	-0.0003***	-0.00007*
Firm characteristics:					
Years since establishment	0.0069**	0.0056**	0.0120***	0.0074*	0.0015
Squared years since establishment	-0.00008	-0.00007*	-0.0002**	-0.0001*	-0.00001
Firm structure (reference group: Other legal status)					
Shares traded	0.7409***	0.5167**	0.3910	0.5267**	0.4040
Non-traded shares	0.0897***	0.0395	0.0382	0.1219***	0.0275***
Foreign participant	0.0877*	0.0063	0.1264**	0.1381**	0.0448*
Industry type (reference group: other industries)					
Food manufacturing	0.1541***	0.1368***	0.0404	0.0696	0.0165
Construction services	-0.0731**	-0.0571**	-0.0684**	-0.0795**	-0.026***
Retail services	-0.0103	-0.0666***	0.0107	0.0373	-0.0082
Location	0.0556**	-0.0264	0.0047	0.0286	-0.0054
Exporter firm	0.1112**	0.0259	0.0608	0.1189**	0.0370*
Training	0.1794***	0.1104***	0.2250***	0.2288***	0.0590***
Competition	0.0510**	0.0514**	0.0316	0.0428	0.0180
Credit	0.0130	0.0400*	-0.0407*	-0.0121	-0.0037

Note: *,** and *** show statistical significance at the 10, 5 and 1% level, respectively.

Location of firms significantly impacts only on innovation of new products. SMEs located in the capital city may have larger consumer market and lower costs for logistics that may induce them to focus on the attempt to introduce new products and services. Moreover, being located may represent another advantage of accessing current knowledge on technology and innovation opportunities. Training of permanent employees positively correlated with all types of innovation. This result points out the fact that most of the innovation activities are associated with different forms of training activities. However, their magnitude may differ by innovation types. For instance, in our result R&D activities have lower marginal effect of training compared to other innovation elements.

Availability of financial resources is considered as one of the important constraints for innovation of firms. Estimation results show that it has some impact at less statistically significance level over the new production process and organizational management. Nevertheless, these findings do not provide with enough evidence to conclude about significant impact of credits from financial institutions over the innovation of firms. This fact may have two explanations. First, financial system in these countries are not developed and do not supply enough financial resources for innovation activities. Second, SMEs using loans from financial institutions use them for other activities and not necessarily for innovative works.

General assessment of estimation results by types of innovation indicates that among five measured innovation activities R&D remains as affected only by a few variables in the model, while innovation in goods and services are most intensive among SMEs. These findings suggest that R&D activities are limited in SMEs of these economies.

5. Conclusions

This study using the data from the Business Environment and Enterprise Performance Survey (BEEPS) examined factors affecting innovation activities of SMEs in five small post-soviet economies: Armenia, Georgia, Kyrgyzstan, Moldova and Tajikistan. The broad definition of innovation is focused on and measured

by dummy variables in five aspects: introduction of new products or services; introduction of new methods of production of goods and services; introduction of new or significant improvement in organizational or management practices; introduction of new marketing methods; and whether firm did spend on research and development. Because of the binary response character innovation variables, probit model is estimated with explanatory variables on manager and firm characteristics.

Estimation results indicate low intensity of R&D among SMEs, while innovation in goods and services is more widespread. Although influence of most factors is found as in line with previous empirical literature, two findings are of special interest for further studies. First, nonlinearity in the impact of managers' experience on innovative activities exists. This finding may refer to different nature of entrepreneurship of the first generation of entrepreneurs in transition economies formed in 1990s and later generations. Moreover, given the recent short history of emerging private sector in post-soviet economies, managers with longer experience may represent the "old cohort" of entrepreneurs and may be reluctant to innovation. However, our study do not research making entrepreneurship and generational difference of managers in the in post-soviet economies context. Therefore, further studies for understanding this relationship may provide with more detailed insights of this relationship.

Second, innovation propensity of SMEs may have different pattern by sectors of the economy and depend on the participation of foreign capital. Intuitively, it can be explained such that growing sectors of the economy may drive growth of enterprises, but this may not be enough for inducing firms to the innovation. However, in perspectives growing competitive environment, foreign participation and export oriented activities of SMEs may create conditions for their higher propensity to innovate.

These findings suggest that government policy towards increasing competitive environment and openness of economies are fundamental for innovation of firms. Competition forces firms to innovate in order to survive, while openness of the economy provides with exporting opportunities and participation of the foreign capital in ownership structure of firms. Especially the latter factor may significantly reduce costs of innovation through more rapid technological transformation from abroad. Concentration of the most SMEs in capital city shows that more active government support of SMEs in other regions of a country would lead to more balanced intraregional development, which in the long run is conducive to the sustainable economic development.

End Notes

* An earlier version of the paper was presented at the International Conference on Eurasian Economies (July 10-12, 2017, Istanbul).

1. SME Policy Index scores has been developed by the OECD in partnership with the European Commission, the European Bank for Reconstruction and Development (EBRD), and the European Training Foundation (ETF) in 2006 (Source: http://www.oecd-ilibrary.org/development/sme-policy-index-eastern-partner-countries-2016_9789264246249-en).

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