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the case of Ukraine

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Impacting innovation behaviour of foreign and domestic firms: the case of Ukraine

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Abstract

The aim of the paper is to investigate the factors impacting innovation performance of foreign-owned and domestic firms in three regions of Ukraine. Special attention is laid on the inter-firm cooperation between domestic and foreign-owned firms, their absorptive capacity and the role of the local institutional environment in selected regions of Ukraine, namely close to the Western border Lviv region, close to the Eastern border Kharkiv region and the capital region Kyiv. Foreign firms are the subsidiaries of multinational enterprises (MNEs) located in the target regions of Ukraine. An enterprise survey of 305 domestic and 153 foreign firms within two sectors, i.e. machinery and equipment sector and food and beverages sector, was conducted in these regions. The paper empirically analyzes the primary data of the enterprise survey, with the focus on the assessment of the innovative performance of survey firms. The impact of such factors as absorptive capacity of survey firms, the way foreign and domestic firms cooperate and their perception towards local institutional quality on the innovation behaviour of firms is analyzed. The paper introduces a thorough conceptual framework together with a detailed discussion of the empirical results, followed up by some policy implications.

KEY-WORDS: Innovation, absorptive capacity, institutional quality, inter-firm cooperation, enterprise survey

JEL: F21, F23, O31, O43, R12

I. Introduction

Innovation performance of firms within certain regional and national economic systems serves as the means of economic progress and efficient development of entrepreneurship around the world (Cooke, 2001). However, innovative activities are not evenly distributed across the globe. As Asheim and Gertler (2003) state the higher knowledge intensity of an industry leads to the higher clusterization of the latter. With respect to such a Soviet economy as Ukraine which is in its transition from the planned economic system, innovation capabilities of firms are viewed through the realm of inconsistent rather than incremental catch-up process (Kravtsova and Rodosevic, 2012). The authors state, that within the transition process, Eastern European states, which Ukraine is a part of, micro-economic innovations are based primarily on the changing of initial conditions, inherited socialist past and structural reforms. As a consequence the formation of industry clusters might occur due to geographical and cognitive proximity of firms within the same sector. In these industrial clusters there is a constant exchange of common knowledge, technology and other important intangible as well as tangible assets between the firms. Porter (1998) described such clusters as the geographic concentration of specialized firms, suppliers and service providers together with associated institutions.

Inter-firm cooperation between firms in clusters is influenced by the institutional environment, which becomes especially prominent when we are talking about cooperation between foreign and domestic firms in different regions of a certain state. At the same time the degree of effectiveness of such inter-firm collaboration depends on the absorptive capacity of the partners involved, namely whether the firms are able to benefit from the exchange of knowledge, ideas and experience. Thus, in this paper we aim to focus on the role of absorptive capacity, inter-firm cooperation between the subsidiaries of MNCs and domestic firms, located in Ukraine, and institutional environment for the propensity of these firms to innovate with the purpose of further identification of the driving forces of innovation performance of firms within the realm of a transition economy. Moreover, we investigate the innovation performance of firms in different regions and sectors. The empirical analysis of the enterprise survey of 305 domestic and 153 foreign firms, carried out in Ukraine, covers the investigation of innovation performance of foreign and local firms within two sectors, i.e. food and beverages sector and machinery and equipment sector, and three regions, i.e. close to the EU border Lviv region, far from the EU border and close to the Soviet states border Kharkiv region and the capital region Kyiv. Thus, the paper introduces the following research questions:

- 1/ Are there regional, ownership and sectoral differences in the way firms innovate?
- 2/ What determines the innovation behaviour of foreign-owned and domestic firms?
- 3/ How does local institutional quality impact innovative activities of firms?

The paper has the following structure: Part II deals with the theoretical background and conceptual framework; Part III provides the analytical framework with the main hypotheses of the empirical research; Part IV covers data and methods; Part V presents the results of the empirical analysis of the enterprise survey in Ukraine; Part VI follows with the discussion of the results; and Part VII summarizes the paper introducing policy implications.

II. Factors influencing the innovation performance of foreign-owned and domestic firms

2.1 Difference in innovation behaviour of firms by innovation form and sector

In this paper we cover three forms of innovation: product innovation, process innovation, marketing and organizational innovation. These innovation forms are defined in this paper according to the Oslo manual (OECD and Eurostat, 2005). The manual states that product innovations represent a significant change of the characteristics of a product or process or an introduction of an absolutely new good or service. Process innovation represents significant changes in the production or delivery methods. Organizational innovation leads to the implementation of new organizational practices: business methods, workplace organization, and firm's external relations. Marketing innovation involves realization of new marketing methods, such as new product designs, new packaging, new ways of product placement and promotion, pricing of goods and services. We analyse the innovation activities of firms in a regional perspective, since the enterprise survey was carried out in Lviv region, which is an agricultural centre of the country, in Kharkiv region, which is an industrial hub, and Kyiv the capital. Therefore, while food and beverages sector is prominent for agricultural Lviv region, machinery and equipment sector is the case for Kharkiv. Innovation in different sectors bears certain sectoral differences. While machinery and equipment sector is often classified as a high-tech sector, product innovations play a very important role. In contrast, the food and beverages sector is often seen as a low-tech industry according to Fagerberg et al. (2004), in which process and organizational innovations predominate. As a consequence, determining factors for innovation processes might be influenced by these sectoral differences.

In low-tech industries formal R&D capacities, internal education of the employees through the provision of trainings, as well as formal science and technology exchange might play a lesser role than in high-tech industries (Fagerberg et al., 2004). Within low-tech sectors technologies are developed by specialized machinery firms. Thus, food processing firms rarely develop formal innovation capacities by themselves, rather they patent less capital- and technology-intensive innovations. Nevertheless, absorptive capacity still plays an important role for low-tech innovations, as the production technologies have to be used in an efficient manner. Absorptive capacity is defined by Cohen and Levinthal (1990, p. 128) as the "the ability of a firm to recognize the value of new, external information, assimilate it, and apply it to commercial ends". Thus, in order to grasp the absorptive capacity of firms empirically, we look at the following firm characteristics as size of the firm, share of employees with higher education, share of R&D related staff, share of foreign employees with specific tacit knowledge, share of sales spent on R&D and education and development of personnel. Absorptive capacity plays a very important role for different forms of innovation. However, although absorptive capacity is an important factor for successful process as well marketing and organizational innovations, firms in low-tech sectors tend to invest in their human capital development much less than those in high-tech sectors. Thus, in machinery and equipment sector as a high-tech industry, by contrast, the role of product innovation is much more important for economic growth in this sector. Development of new products is of central importance for commercial success in a high-tech industry. Therefore, for firms in such industries human capital and their

absorptive capacities are crucial. Firms in high-tech sectors might especially try to attract more foreign and highly skilled staff into their R&D departments, raising their investments in research-related and training processes.

2.2 Inter-firm cooperation and innovation

Spatial concentration of collaborating firms sharing a common local region-specific institutional environment is a prerequisite of interactive learning processes and further technological and organizational upgrading leading to innovation performance in the long run. In such conditions the regional economic system is set up with shared attitudes, values, norms, routines and expectations, namely certain local business culture, that impacts the practices of firms in the region. Institutionally established local business culture fosters local firms to integrate within certain clusters, which encourages the development of a particular knowledge network (Bathelt et al., 2004). As a result 'communities of practice' are established. These represent concentration of attached business agents interacting on a daily basis based on the same expertise, a common set of technological knowledge and similar experience. Firms' innovation performance requires collaboration between the actors within certain knowledge networks, where the exchange of technology, ideas and experience results in effective knowledge spillovers. Here is where the role of tacit knowledge becomes prominent, since this kind of knowledge is only transferrable through collective interactions, interpersonal information exchange and inter-organizational collaboration (Lu et al., 2008).

In this paper we focus on a specific form of firm's collaboration, which leads to an exchange of knowledge, technology and experience, namely cooperation of foreign and domestic firms within the framework of the host local regional economic system. The role of foreign direct investment (FDI) per se on the economy of the country, where this investment is located, has been acknowledged in the economic literature quite extensively. Special attention has been devoted to the transition economies, since economic progress of emerging markets is supposed to be directly influenced by the inflow of foreign firms, which introduce specific knowledge, technology, highly skilled human capital and resources into the latter. Transition from communist planned system to capitalist economy and the integration of Central and Eastern European countries into the world global arena proceeded through international trade and capital flows, which encouraged growth and innovation, and facilitated the restructuring of firms and sectors (Bevan and Estrin, 2004). Foreign-owned firms are thought to possess higher labour productivity, innovation potential, supplier and customer networks than incumbent firms when entering new markets. As a result FDI flows from developed countries towards emerging economies are expected to become important transmitters of knowledge, technology and other economic resources serving as a prerequisite for substantial economic growth and innovation progress (Frenkel et al., 2004).

Subsidiaries of foreign firms in the host economies are supposed to have an impact on the labour productivity, innovativeness and economic growth of local firms (Garcia et al., 2013). Impact of FDI on innovation of local firms is viewed by the authors from two perspectives. On the one hand, foreign firms cooperating with domestic partners enable knowledge spillovers to take place or they make the domestic firms become more competitive in order to be able to compete with foreign entrants. On the other hand, FDI could also suppress innovation propensity of domestic firms if the increased competition from foreign entrants crowds out local entrepreneurs being not able to withstand such a competition. The findings demonstrate that both perspectives make sense, since FDI may both positively and adversely negatively affect the productivity and innovative potential of local firms. Garcia et al. (2013) state that foreign investments introduce a range of positive externalities, such as:

incentives for domestic firms to improve in order to compete with stronger foreign entrants, increased demand and supply leverage, which leads to the increased scale economies and decreased transaction costs, opportunities for local firms to use knowledge transfer and state-of-the-art technologies for their own benefit. Subsidiaries of foreign firms are the direct transmitters of intangible assets from the parent company to the host economies. The authors state, that local firms may learn from foreign partners in different ways. These might include “by observing and imitating foreign entrants, through formal and informal interactions with those competitors, and through intelligence gathering from third-parties that interact regularly with the foreign entrants” (Garcia et al, 2013, p. 232).

In this paper we analyse the results of the enterprise survey, which covered both foreign and domestic firms within their inter-firm cooperation dynamics. These dynamics are covered in the survey through the customer-supplier relations, which describe inter-firm cooperation and knowledge exchange between foreign and domestic firms. The intensity of inter-firm cooperation might also impact the positive externalities from the cooperation between foreign and domestic firms. Such intensity could be affected by the geographical location of the involved parties. In the capital region, for example, which serves as an industrial and commercial hub of any state, inter-firm cooperation is supposed to be much higher than in the bordering or periphery regions, where even the total number of potential counterparts might be limited due to low potential of a host region.

Technological change, which occurred in the transition period, was followed mainly by the innovation output, which did not correspond to the market demand (Kravtsova and Rodosevic, 2012). R&D departments were occupied by specialised staff, who did not receive target investment and education for the development of the innovation behaviour of a firm. This did not lead to an actual increase in real innovative output of firms. Innovation was organized top-down, and R&D was in the most cases disconnected from the actual manufacturing centres. The result of such strategy of the Soviet economic development was that innovation was planned rather than initiated by real market needs. Thus, in such an industrialized region as Kharkiv, located close to the Soviet states, where heavy industry was the main driver of economic growth, the remains of old system in the form of R&D departments of firms with R&D staff may not lead now to an expected increase of innovation output. In fact, Blalock and Simon (2009) find that firms with stronger production capabilities benefit less from cooperation with foreign entrants than the rest. Absorptive capacity of such firms from the Soviet pasts is lowered simply by the fact that availability of R&D personnel, as well employees with higher education, does not lead to the increase of spending on R&D and provision of accurate training of this personnel adapting the firm’s knowledge base to the realm of the market demand. Such firms with low absorptive capacity are unable to benefit from the positive externalities of inter-firm cooperation. This results in the reduced profitability of firms, which leads to decreased propensity of the latter to innovate, growth of less innovative market segments, lower probability of attraction of highly qualified human capital as an important determinant of innovative performance of a firm.

On the other hand, firms with higher absorptive capacity benefit more from inter-firm collaboration. Larger firms, with more highly educated staff, efficient R&D departments together with sufficient spending on R&D could all increase the absorptive capacity of a firm provided that an enterprise invests money into the development and knowledge management of its R&D employees. In such a way, interdependence between the positive impact of FDI on the innovation output of local firms and

the absorptive capacity of the latter becomes an important issue especially for transition economies. When the technology gap between a local supplier and a foreign subsidiary is too high, the latter might either not be interested to upstream its local partner or will be likely to introduce less sophisticated techniques. This might hinder innovation process in the long run. Firms with better absorptive capacity will be better able to assess the benefits of the new knowledge and technologies foreign firms bring, especially in case that there are foreign employees among the personnel of a domestic firm. Thus, foreign employees become the main transmitters of tacit knowledge to local counterparts. Absorptive capacity of firms also enables firms to assimilate acquired intangible assets from the subsidiaries of MNEs and invest and exploit those in their innovative capacities.

2.3 Institutions and innovation

According to North (1991, p. 97) “institutions are humanly devised constraints that structure political, economic and social interaction”. Therefore, in this paper under institutions we mean formal and informal political and economic regulations and norms, contracts and laws, which impact the way business agents act. In the enterprise survey the firms were asked to indicate their perceptions of the quality of the following formal and informal aspects of institutional environment: enforceability of legislation and regulation policies, physical and intellectual property rights protection, reliability of oral contracts and agreements, central and regional government support. All these aspects of institutional environment introduce certain rules of the game in the society. They serve as constraints and opportunities shaping human interactions, cooperation of firms and organizations. In field of economic and business interactions, institutions represent a set of rules that frame economic, social and political interactions between individuals and social groups, which impacts economic development and progress (Thornton et al, 2011).

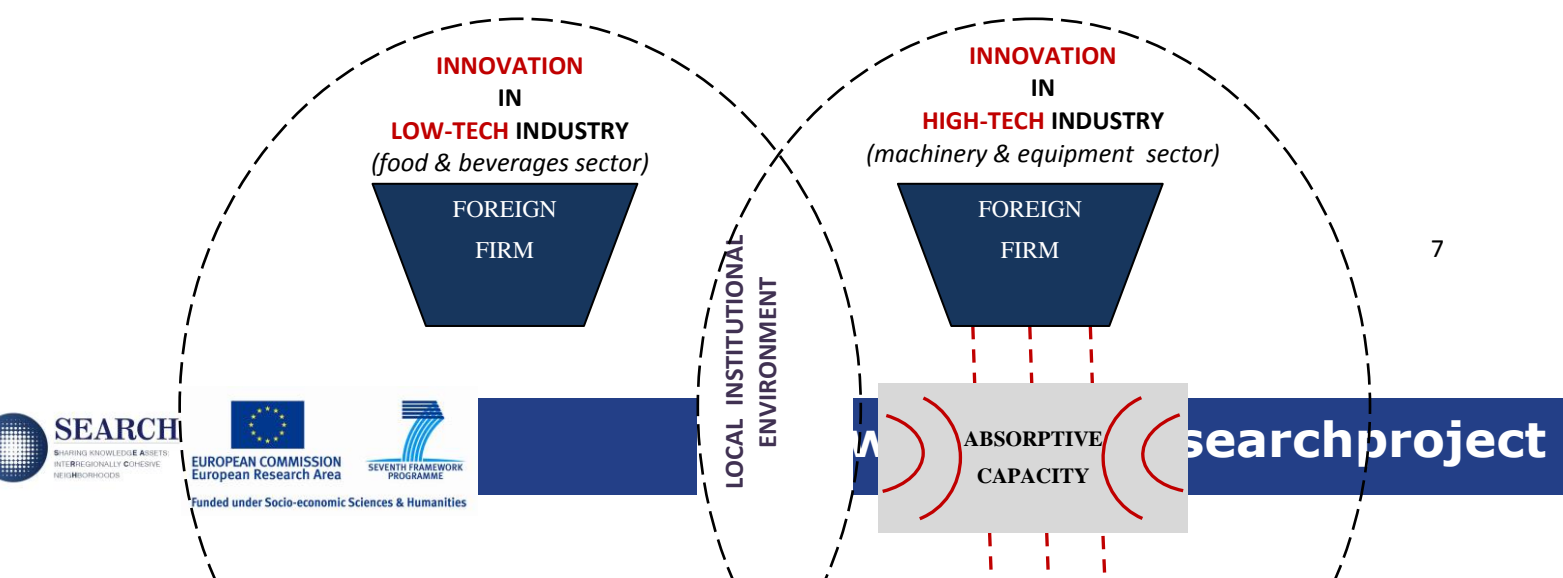
Malmberg and Maskell (2006) state that institutional setup is one of the most important determinants that matter, when firms choose where to develop their competitive advantages with regard to their specific economic activity. One of the possible reasons to that is when innovation abroad becomes a strategic focus of an MNE as the means of the development of its competitive advantage it becomes quite vulnerable to the institutional regulation. Thus, foreign firms get attracted to those locations, where institutional environments enable and facilitate innovation activities. The same reasoning could be applied to domestic firms. Asheim and Gertler (2003) indicate that local institutional environment for domestic firms is very important when they focus on innovation as the means of increasing their competitive status with regard to foreign firms. Innovation in such a case must be based on interactions and knowledge flows between economic entities, such as customers, suppliers and competitors. The authors argue, that the transmission of tacit knowledge requires face-to-face communication and cooperation between partners who already share the same ‘codes’ of communication, rules and norms, fostered by a shared institutional environment. Common institutional environment becomes a one of a kind regional asset, which fosters and promotes the development of local advantage. Maskell and Malmberg (1999, p. 181) claim: “it is the region’s distinct institutional endowment that embeds knowledge and allows for knowledge creation which – through interaction with available physical and human resources – constitutes its capabilities and enhances or abates the competitiveness of the firms in the region”.

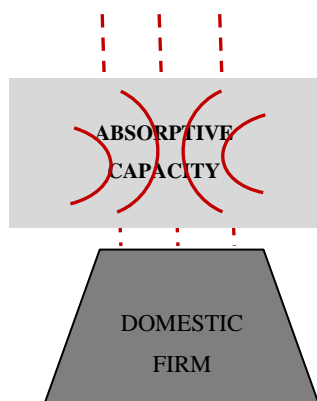
Adaptation to local institutional environment requires from the subsidiaries of MNEs to share the same norms, habits, common practices and rules of a society as domestic firms share. This leads to sharing the same scope of regulation and degrees of freedom at the same time by both types of firms. Waarden (2001) investigated in this respect the direct and indirect impact of formal institutions, such as laws and legislation, on innovation. The concept of the paper was based on the notion that the main problem innovation faces is risk and uncertainty which raise the transaction costs. While laws and legislation aim at reducing such risks and uncertainty, local institutional frameworks differ in their ability to do so. There is a common belief that strict regulation, which is supposed to be a good quality of an institutional environment, hinders innovation, since firms need freedom to innovate (Waarden, 2001). Nevertheless, the results of his research prove that a balance should be sought in order to regulate innovation efficiently. Therefore, institutions should also be developed as flexible mechanisms, able to adapt to and enforce the needed economic activities. Thus, rules, norms, conventions and habits reduce risk and uncertainty to the point when business actors know what to expect from the partners in the game, which is clearly “institutionalized”. In this respect path- and place-dependency of institutions play a very important role especially with regard to such a Soviet economy as Ukraine, where post-socialist legacy leads to “local institutional thickness”. Martin (2000) defines it with the help of four elements: strong presence of institutions such as local authorities, chambers, labor unions, research centers; high level of interaction between these institutions; availability of well-defined structures aimed at minimization of inter-institutional conflict; and collective integration into regional socioeconomic development. For Ukraine as a transition economy with Soviet past such institutional thickness could mean that firms get locked in within the systems of old regime and are neither interested, nor motivated to introduce any change due to benefitting from old, but somewhat functioning business regime. Thus, especially bordering regions, in the case of Kharkiv and Lviv, standing not in the priority list for introduction systematic institutional change in comparison to the capital, might suffer from being locked in within thick institutional frameworks hindering innovation propensity of their firms.

2.4 Conceptual framework

The conceptual framework of the paper is twofold: innovation in low-tech industries, namely in the food and beverages sector, and innovation in high-tech industries, namely machinery and equipment sector. These represent the two circles of the conceptual framework, each comprising firstly, foreign and domestic firms as the partners collaborating within innovation process stating inter-firm cooperation; and secondly, absorptive capacity as an important element of such cooperation. Both circles cross within the field of common local institutional environment, which affects innovation performance of firms in both industries (Figure 1).

Figure 1: Conceptual framework





Source: Provided by author

Innovation output of firms depends on the quality of inter-firm cooperation expressed through red dotted lines connecting the foreign firm quadrant with the domestic firm quadrant in both circles in Figure 1. Such cooperation intends to lead to knowledge and technology spillovers based on the exchange of staff, experience, ideas, blueprints and manuals, product samples and production equipment. The quality of these spillovers might be determined by absorptive capacity of firms. The higher the absorptive capacity, the broader exchange will be reached, which will increase the production capacity of the partners, upgrade their technological and organizational capabilities and enforce better innovation capacity. In this conceptual framework absorptive capacity of firms could be described as a certain “bottle-neck” of innovation. The wider the “bottle-neck”, the more knowledge and technology inflows will enrich the recipient partner. In low-tech industries firms might invest less in the development of their absorptive capacity compared to their counterparts in high-tech industries, where firms tend to develop their human capital and raise their absorptive capacity much more intensively. Therefore, in the low-tech circle absorptive capacity is narrower than in the high-tech circle in Figure 1. However, absorptive capacity is highly important for both low- and high-tech sectors. In low-tech industries, it is prominent for process, marketing and organizational innovation forms, while in high-tech industries it is more important for product innovation.

All these processes, however, do not happen autonomously. Subsidiaries of MNEs cooperate with domestic firms when entering a new regional economic system under certain rules. Their actions are regulated and constrained by laws and norms imposed by certain institutional environment. It impacts directly the way how firms collaborate and indirectly how and if they innovate. These are the local rules of the game that frame regional economic systems enabling them to function properly. Nevertheless, institutional environment has to be flexible enough, so that firms do not get locked-in and become passive in their innovation pursuits. This highly depends on the place-dependency of institutions, which means that the institutional effect on economic operations in different regions of one state may be different due the various quality levels of institutional frameworks at the regional level. This is especially relevant for economies in transition, especially Ukraine as one of the post-Soviet states. The basic elements of a planned economy in the Soviet Union included uneven regional division of states, since there were economically strategic and non-strategic regions. Thus, those regions, which were producing much of heavy industry output, were so-called strategic centers, because this industry was the locomotive of the whole Soviet Union. This

meant in its turn that the government was interested to support strategic assets by the means of provision of financial support for the development of a technological base at these specific strategic locations. This led to the establishment of industrial zones in Ukraine. In the Eastern part of the country close to other Soviet Union member states, the typical socialist heavy industrialization took place. Therefore this region was historically viewed as the source of economic wealth of the whole country. As a result the existing institutional environment at these industrial zones may differ from the institutional environment in other, “less strategic”, parts of the state. Thus, the Western region of Ukraine received much less financial and technological support from the government of the Soviet Union and had much less room for innovation, since it was an agricultural centre and agriculture was not a priority segment in the planned economy. However, these regions were heavily depending on subsidies and money transfer from the central state level.

The same situation concerns the difference in institutional endowments between the capital region and the rest of the state in case of emerging markets. Capital region in a transition economy is the commercial, industrial and social hub of the state (Heidenreich, 2003). Moreover, it serves as a center of education and research. Therefore, the government is interested to support such an urban agglomeration with better infrastructure and attractive innovation potential, contributing in such a way to the development of a higher quality of institutional environment (Fedorov, 2002). Uneven regional development as a specific feature of transition economies with better developed capital regions and lagging behind peripheries is also the outcome of preferential government treatment in a form of better financial support, attractive conditions for foreign capital and better business opportunities (Heidenreich, 2003). Such opportunities in their turn also attract a better pool of qualified human capital, which serves as an important driver of innovation.

III. Analytical framework

In this paper the empirical analysis of the main determinant factors of the innovation performance of firms is centered on the results of the enterprise survey, carried out in three regions of Ukraine within two different sectors. The survey firms among firm-specific questions, covering the absorptive capacity aspects, were asked whether they innovate in different innovation forms, whether they cooperate with each other and what their perceptions towards quality of formal and informal institutions in their local regional economic systems are. The questionnaire of the survey was developed with the aim to answer the research questions we have introduced at the beginning of the paper, on the basis of which the following hypotheses were formulated.

H 1. Firms in the capital region Kyiv are more innovative than firms in the bordering regions.

The reasoning for our first hypothesis is derived from the line of argument that a capital region in any country serves as an economic and commercial hub with high concentration of educational and research centres. The bordering or periphery regions, by contrast, lack attractive market opportunities, institutional environment regulations that pull enterprises to these regions on the first place and create good conditions for their innovation progress in the long run. Therefore, the capital attracts best human capital with a wide range of skills, encourages the emergence of technology-related firms, which leads to a much higher competition than in the bordering regions. Within the realm of a fierce competition innovation becomes one of the instruments for a firm to survive. Moreover, high intensity of cooperation between firms as a prerequisite of their

innovative activities is only possible in the areas, where firstly, the critical mass of firms is available, and secondly, the absorptive capacity of partners is enough to cooperate. Therefore, in the capital region we would expect inert-firm cooperation to play a greater role due to the fact, that firms coming to the capital are interested to develop their capabilities in the most efficient ways and therefore effective partnerships might become an important factor impacting innovativeness of firms in the capital.

With regard to the bordering regions, Kharkiv region, by contrast, is located close to the Soviet states and might still have the communist legacy present due to being an important industrial location for the planned economy in the Soviet times. This led to machinery and equipment sector being the driver of the local economic system in Kharkiv. At the same time firms in Kharkiv might be still locked in the path-dependent economic environment affected by the remains of the communist economy and therefore, their absorptive capacity might be not high enough to innovate effectively and introduce new products. On the other hand, firms in the food and beverages sector, mostly located in Lviv, might also not have high absorptive capacity to innovate. Thus, we assume that firms in the capital region are more innovative than those of the bordering regions.

H 2. Innovative outcome of foreign-owned firms located in Ukraine is higher than that of their domestic counterparts.

Subsidiaries of MNEs play an important role for economic growth and development of the host states and regions. The reason to that lies in the fact that usually foreign firms bring with them certain valuable tacit knowledge other way unavailable in the local market. This is especially the case for such a transition economy as Ukraine, where FDIs serve as one of the main drivers of economic progress. Domestic firms in transition states might get so locked in within the existing economic systems, that there are no interested parties to introduce anything new, or they are at the stage of growing their capabilities in an emerging economy. Therefore, in transition economies domestic business agents are less competitive than the foreign new comers, which allows us to assume that the innovation propensity of foreign-owned firms will be higher than that of domestic enterprises.

H 3. Firms in food and beverages sector are more innovative when it comes to process, marketing and organizational innovations than firms in machinery and equipment sector.

As previously discussed in our conceptual framework, absorptive capacity is an important factor for both low-tech and high-tech industries. However, while in the high-tech industries, like machinery and equipment sector, absorptive capacity is the prominent factor for product innovation to take place, in the low-tech industries, like food and beverages sector, absorptive capacity is more important for process and organizational innovations. Considering the perspective of a post-Soviet economy, we would expect product innovations to be less frequent than process and organization innovations, because the firms are at the stage of transition. They need to invest a lot of financial and physical resources first in order to raise their absorptive capacity and as a result innovative potential. Therefore, innovation behaviour of firms in less technology intensive sectors might be more active than of those involved in highly technological sectors.

H 4. Institutional environment of the capital region encourages local business agents to innovate, whilst institutional framework of the bordering regions affects negatively the propensity of firms to innovate in these regions.

This hypothesis follows our previous discussion that institutional environment is very important for encouraging economic actors to innovate and upgrade their capabilities. High quality institutional environment encourages local business agents to innovate in the capital region due to reliable and supportive institutions that act as the pull factor for firms to such a metropolitan location. In the case of bordering regions within a Soviet transition system institutional change might occur slower, which leads to an emergence of thick institutional frameworks. Such institutional thickness is derived by the presence of post-communist legacy within the regional development of such a transition country as Ukraine. Being locked in within the remains of path-dependent institutions, firms are neither interested, nor able to motivate. Therefore, we assume that while institutional framework of the capital affects positively the innovation performance of local firms, this is exactly the opposite for bordering regions.

IV. Data and methods

The enterprise survey in Ukraine was launched in April, 2012 and finished in July, 2012. Overall 305 domestic SMEs and 153 subsidiaries of MNEs from the food and beverages and machinery and equipment sectors were surveyed in different three regions of Ukraine: the capital region Kyiv, close to the EU border region Lviv (the Western region) and far from the EU border region Kharkiv (the Eastern region). The criteria of selection of the regions were based on the FDI inflows in these regions and geographical position towards the EU border. According to the data of the State Statistical Committee of Ukraine Lviv region is the first in terms of FDI inflows in the Western part of Ukraine, Kharkiv region – in the Eastern part of Ukraine and Kyiv region together with the capital is a national leader in this respect (Table 1).

Table 1. FDI distribution by regions of Ukraine

Regions of Ukraine	FDI increase, reduction per year, \$ million		FDI cumulatively starting from the beginning of investment on October 1, 2011, \$ million	FDI per person cumulatively starting from the beginning of investment, \$	
	2009	2010		2009	2010
Western region					
Volyn region	63,2	11,7	246,6	321,6	332,8
Zakarpattia region	7,3	-1,1	340,1	293,0	291,7
Ivano-Frankivsk region	134,7	-92,5	622,2	460,8	393,9
Lviv region	240,6	75,2	1 363,9	473,2	503,7
Chernivtsi region	1,7	0,5	63,4	68,6	69,1
Capital region					
Kyiv (city)	2 387,9	2 634,1	24 016,8	7 031,9	7 946,2
Kyiv region	178,1	77,5	1 702,8	887,4	935,3
Eastern region					
Donetsk region	107,8	424,7	2 292,2	366,1	464,6
Lugansk region	243,3	-6,3	747,3	275,0	274,7
Sumy region	85,5	114,1	348,3	207,1	307,0
Kharkiv region	472,8	622,7	2 776,7	754,6	985,0

Source: Provided by author, based on the State Statistical Committee of Ukraine

The criteria of selection of the sectors of the survey firms were determined by the strong presence of companies with FDI in these sectors (Table 2). The survey companies were selected randomly from the manufacturing firms. Our focus on manufacturing firms was twofold. Firstly, in order to analyse the embeddedness of MNEs and domestic SMEs into the regional institutional and economic systems of a host transition economy we needed to identify the business processes, which involved exchange of knowledge, such as innovation activities, organizational upgrading and customers-supplier interactions, which are all related to the production processes. Secondly, we were interested in the linkage between institutional quality as the prerequisite of MNEs to invest in Ukraine and their further propensity of technological upgrading within collaboration with domestic SMEs.

Table 2. FDI inflows in the targeted regions in 2010, by sectors, millions of USD

Regions	Food, beverages and tobacco	Pharmaceutical and chemical products	Machinery and equipment	Basic metals and fabricated metal products	Pulp and paper products	Manufacture of textiles and wearing apparel, leather and related products	Wood and wood products, furniture
Kyiv region	481,1	75,2	699,4	67,6	112,8	148,8	23,1
Lviv region	64,3	38,2	107,6	34,5	41,9	35,9	58,3
Kharkiv region	146,5	54,3	286,4	87,9	57,4	28,6	24,5

Source: Provided by author, based on the State Statistical Committee of Ukraine

The sampling frame was based on the firms' directory and accounts of the State Agency of Investment and National Projects Management of Ukraine. Overall 2000 companies (1137 domestic SMEs and 863 subsidiaries of MNEs) from the food and machinery & equipment sector have been contacted by phone. 400 companies were successfully interviewed face-to-face and 58 companies have filled out the questionnaires themselves and were contacted by phone afterwards to ensure the correctness of the given answers. The distribution between surveyed and contacted MNEs and domestic SMEs in the sampled three regions is provided in Table 3. We can clearly observe that there is no significant difference between the regional distribution of response rates, whereas the response rates of domestic SMEs are nearly two times higher than that of MNEs.

Table 3. Response rate in different regions

	Lviv region	Kyiv region	Kharkiv region	TOTAL
Survey subsidiaries of MNEs	50	53	50	153
Contacted foreign firms	280	298	285	863
<i>Response rate</i>	<i>17,9%</i>	<i>17,8%</i>	<i>17,6%</i>	<i>17,7%</i>
Survey domestic SMEs	100	105	100	305
Contacted domestic SMEs	350	402	385	1137
<i>Response rate</i>	<i>28,6%</i>	<i>26,1%</i>	<i>26,0%</i>	<i>26,8%</i>
Total surveyed firms	150	158	150	458
Total contacted firms	630	700	670	2000
Total response rate	23,8%	22,6%	22,4%	22,9%

Source: Provided by author

Two questionnaires were developed: one for the MNEs and one for domestic SMEs, both with closed likert-scale questions. Each questionnaire consisted of 6 thematic blocks. One separate block was devoted specifically to the investigation of innovative performance of the survey firms. The block covered among other innovation-related information the yes/no questions on whether the firms are active in product, process, marketing or organizational innovation. In this paper we label both marketing and organizational innovations as organizational innovation. In the questionnaires we also focused on the supplier-customer relations between the firms. Another block in both questionnaires concerned the assessment of the institutional environment, covering the questions about the quality of aspects like enforceability of legislation and regulation policies, physical and intellectual property rights protection, reliability of oral contracts and agreements, central and regional government support. In order to analyze the perceptions towards institutional quality at a certain location we asked the survey firms to assess on the scale from 5 (very good) to 1 (very bad) the quality of the above elements of institutional environment. We also asked for firm-related information in order to be able to assess the absorptive capacity like the number of employees at the firm, share of employees with higher education, share of employees involved in R&D, share of foreign employees at the firm, share of sales spent on R&D and share of sales spent on trainings of highly skilled staff.

We ran the crosstabs descriptive analysis of the innovation performance of firms, share of sales spent by innovative firms on R&D, number of employees involved in R&D at innovative firms, and share of sales spent by these firms on training activities for highly skilled staff with regard to the differences between three regions (differences between the Capital region Kyiv, the Western close to the EU border region Lviv and the Eastern far from the EU border region Kharkiv) and differences by the type of ownership (Brownfield FDI, Greenfield FDI, domestic SMEs with Soviet context and domestic new private SMEs) (Annex Table 3-10). By Brownfield FDI we mean those subsidiaries of MNEs, which entered the Ukrainian market and acquired an existing production site for future business operations. Greenfield FDI group encompasses those subsidiaries, which built new production sites in Ukraine. Domestic SMEs with Soviet context are the ones which are either the spin-offs of government conglomerates, or were privatized or have state ownership, i.e. those who have any connection to the government and planned economy of the past. Domestic new private firms are basically Ukrainian young start-ups, built by the young generation and therefore having little if none link to the Soviet past.

We ran three binary logit regression models in order to confirm the robustness of our results through identifying that significance and relationship between our outcome variables and controls do not change in different models. The first model is introduced in Table 4.1. The dependent variable is any form of innovation, namely, "1" means that a firm proceeds either product, process or organizational innovation, "0" means that a firm does not innovate at all. This model is run for all the firms from all three survey regions with four control groups: domestic new private firms, Greenfield FDI, Kyiv region and domestic new private firms, Lviv region and Greenfield FDI firms. The second model is introduced in Table 4.2. We run the model for all the firms from all three survey regions. There are three dependent variables in this model: product innovation, process innovation and organizational innovation with the same outcome as described above ("1" means that a firm introduces product/process/organizational innovation, "0" means that a firm does not introduce product/process/organizational innovation). In the second binary logit model there two controls for each dependent variable, namely domestic new private firms and Greenfield FDI firms. The third binary logit model is presented in Table 4.3. Here the

dependent variable is the same as in the first model, but we introduce regional dummies and control variables for domestic new private firms and Greenfield FDI firms in each survey region.

An overview of the independent variables is introduced in Table 1 (Annex) and the correlation matrix in Table 2 (Annex). Thus, among the independent variables we cover regional dummy (for the first binary logit model in Table 4.1), ownership dummy, sector dummy, absorptive capacity parameters, inter-firm cooperation dummy and institutional quality dummy. The regional dummy includes our three survey regions, namely Kyiv region, Kharkiv region and Lviv region. The ownership dummy covers out four groups of firms: domestic SMEs with post-Soviet context, domestic new private SMEs Brownfield FDI and Greenfield FDI firms. The sector dummy represents food and beverages sector and machinery and equipment sector. Among absorptive capacity parameters we analyze the logged number of employees at the firm, share of employees with higher education, share of employees involved in R&D, share of foreign employees at the firm, share of sales spent on R&D and share of sales spent on training activities of highly skilled staff. With regard to the institutional quality dummy, firstly, we have built the composite indicator of institutional quality on the basis of equal weighting with 25% weight devoted to each of the four institutional aspects, provided that physical property rights protection and intellectual property rights protection were treated as one property rights protection indicator and central government support and regional government support were combined into one government support indicator. Thus, we came up with equal weights of enforceability of legislation, property rights protection, reliability of oral contracts and agreements and government support. Since the questions on the above parameters were likert scale from 1 (very bad) to 5 (very good), the composite institutional quality indicator was recoded into “1”, i.e. good and very good quality of the institutional environment (answers 4 and above on the likert scale), and “0” – average, bad and very bad quality of the parameter of institutional environment (answers less than 4 on the likert scale). Concerning inter-firm cooperation dummy, its value equals “1”, if a firm has any foreign/domestic cooperation, and “0”, if a firm has no foreign/domestic cooperation.

V. Results

The first part of the results concerns the descriptive statistics presented in Table 3-10 of the Annex. We can observe that Lviv region leads with more than 80% of firms that introduce any form of innovation activities, namely product innovation, process innovation or organizational innovation (Table 3, Annex). However, such a high percentage of innovative firms in Lviv is linked to the high importance of process innovations, in which there are 77,3% of firms that implement new or introduce significant changes to their processes. Kyiv region, by contrast, stands up with product innovation. In the capital there are around 70% of firms that innovate in terms of product innovations.

In Table 4 (Annex) we can see the difference with regard to innovation schemes of firms by ownership types. Thus, Greenfield FDI firms lead in all forms of innovation with about 90% of firms that introduce any form of innovation and around 80% of firms in each of innovation forms. Brownfield FDI enterprises are the second in terms of being successful innovators with on average around 10% less firms that introduce innovations in comparison to Greenfield FDIs. Domestic firms are the least innovative group. While the share of domestic firms with post-Soviet context that innovate in different innovation forms is on average more than 60%, domestic new private firms perform the worst with only around 40% of domestic new private firms that introduce product innovations.

In Table 5-10 (Annex) we come to descriptive analysis of absorptive capacity aspects of firms that innovate by region and by ownership. We can observe that in Lviv region the share of innovative firms that do not invest in their R&D is the highest, namely around 60%, compared to about 30% of such firms in Kyiv and 40% - in Kharkiv (Table 5, Annex). Kharkiv region leads in terms of the amount of innovative firms that spend on their R&D up to 10% of their sales, while the capital Kyiv is the leader in spending on R&D more than 10% of sales. Poor performance of Lviv with regard to investment in R&D capacity is contradicting considering our results stated above concerning a quite high number of firms that innovate there. Therefore, this only supports our previous logic that innovative behaviour of firms in Lviv shall not be over interpreted. Moreover, this could be explained by the fact that in the Soviet times Lviv was not a target region for industrialization, which resulted in less demand for capital in comparison to industrial hub Kharkiv and the capital Kyiv.

In terms of differences by ownership in Table 6 (Annex) these are not significant. However, we can see that around 50% of domestic firms do not invest in R&D, while around 20% of Greenfield FDI firms invest in R&D more than 10% of their sales. Lack of financial support of innovation potential of domestic firms could serve as one of the most prominent reasons of poor innovation performance of those. With regard to staff involved in R&D processes of a firm Lviv region scores the worst with more than 70% of firms that do not have R&D staff at all, while around 45% of innovative firms in Kharkiv have more than 10% of their employees involved in R&D (Table 7, Annex). This is an interesting result, considering the fact that Lviv region scores quite high with regard to process innovation, while it is lagging behind within its absorptive capacity parameters. The pattern of domestic firms performing much worse than foreign-owned firms is also observed concerning the differences in the shares of staff involved in R&D in innovative firms (Table 8, Annex). Thus, around 60% of domestic firms with Soviet context and 50% of domestic new private firms do not have R&D-related employees among their staff, while around 35% and 33% of Brownfield FDIs and Greenfield FDIs respectively have more than 10% of their employees involved in R&D. Another aspect of absorptive capacity of innovative firms that we assess is education of employees, namely provision of trainings for highly-skilled staff. As we can see from Table 9 (Annex) the shares of innovative firms not investing in trainings for their highly-skilled employees is quite high in all regions of Ukraine, i.e. around 35% in the capital, 50% in Lviv and Kharkiv, although these results are not statistically significant. At the same time while there are around 70% of Brownfield FDI firms and 60% of Greenfield FDI firms that spend up to 10% of their sales on trainings for highly-skilled staff, there are more than 50% of domestic firms that do not invest in training of their employees at all (Table 10, Annex).

The second part of our results concerns the binary logit regression models. In Table 4.1 our first binary logit model with any form of innovation as a dependent variable is introduced. As we can see the regression results coincide with the descriptive statistics outcome discussed above. Thus, firms in Lviv region are more likely to innovate than those located in Kyiv and Kharkiv regions. Domestic SMEs with Soviet context as well as Greenfield FDI firms are more likely to innovate than domestic new private firms. At the same time Brownfield FDI firms are also less likely to innovate when controlling for Lviv region. Firms in food and beverages sector are more innovative than those in machinery and equipment sector. With regard to absorptive capacity parameters of firms, those firms with larger share of employees with higher education and employees involved in R&D as well as those firms that invest in R&D are more likely to innovate.

Table 4.1: Binary logit regression (I)

Dependent variable	I	II	III	VI
	Any form of innovation			
Control Group	Domestic new private firms	Greenfield FDI	Kyiv region & domestic new private firms	Lviv region & Greenfield FDI
Regional dummy				
Kyiv region				-,824**
Kharkiv region			-,465	-1,288***
Lviv region			,824**	
Ownership dummy				
Domestic SMEs with Soviet context	,819***	-,619	,746**	-,620
Domestic new private firms		-1,437**		-1,367**
Brownfield FDI	,516	-,922	,300	-1,066*
Greenfield FDI	1,437**		1,367**	
Sector dummy				
Food & beverages sector	,528*	,528*	,471	,471
Machinery & equipment sector				
Absorptive capacity				
Log of # of employees	,441	,441	,452	,452
% of employees with a higher education degree	,009**	,009**	,005	,005
% of employees involved in R&D	,113***	,113***	,134***	,134***
% of foreign employees	,013	,013	,013	,013
% of sales spent on R&D	,066	,066	,069*	,069*
% of sales spent on trainings of highly skilled staff	-,044	-,044	-,036	-,036
Inter-firm cooperation dummy	,464	,464	,461	,461
Institutional quality dummy	-,506	-,506	-,516	-,516
<i>Model fit</i>				
	<i>Sig.</i>	,000	,000	,000
	<i>-2 Log likelihood</i>	372,106	372,106	356,924
	<i>Cox & Snell R Square</i>	,159	,159	,189
	<i>Nagelkerke R Square</i>	,247	,247	,292
	<i>Correctly classified cases by the model</i>	80,7	80,7	81,4

	<i>N</i>	431	431	431	431
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Source: Provided by author

Note: *Significant at the 0.10 level; **Significant at the 0.05 level; ***Significant at the 0.01 level.

In Table 4.2 our second binary logit model is presented with product, process and organizational forms of innovation as outcome variables. As we can observe domestic new private firms are the least likely to be active in product innovation compared to all other types of firms, in process innovation the score is worse than that of foreign-owned firms and in organizational innovation domestic new private firms perform worse in comparison to Greenfield FDIs. At the same time Greenfield FDIs are more likely to introduce product innovations in comparison to both domestic and Brownfield FDIs, process innovations in comparison to domestic firms and organizational innovations compared to domestic new private firms only. Firms in the food and beverages sector are more likely to perform process and organizational innovation. The larger the firm is, the more active it is likely to be in product and process innovation, considering that the significance level changes from 1% in the case of product innovation to 10% in the case of process innovation. Higher share of employees involved in R&D is likely to impact positively all forms of innovation, but in the case of organizational innovation the significance level is 10% while it is 1% in product and process innovation forms. Investment in R&D has positive relationship towards product and process innovation. Inter-firm cooperation between foreign and domestic firms gets only positively significant for process and organizational innovation.

Table 4.3 introduces the third binary logit regression model with any form of innovation as a dependent variable for three survey regions. In the capital region Kyiv domestic SMEs with Soviet context are more likely to innovate than domestic new private firms. Firms in food and beverages sector are also more innovative than those of machinery and equipment sector. Share of employees involved in R&D positively affects the probability of firms to innovate in Kyiv and Kharkiv. R&D-related investments have positive relationship towards innovation propensity of firms only in Kharkiv. Training of highly-skilled staff lowers the probability of innovation activities by firms in Kharkiv. Inter-firm cooperation between foreign-owned and domestic firms positively impacts innovation performance of firms only in the capital region. At the same time in the bordering regions institutional quality dummy gets significant but with negative relationship.

Table 4.2
Binary logit regression (II)

	I	II	III	IV	V	VI
Dependent variable	Product innovation		Process innovation		Organizational innovation	
Control Group	Domestic new private firms	Greenfield FDI	Domestic new private firms	Greenfield FDI	Domestic new private firms	Greenfield FDI
Ownership dummy						
Domestic SMEs with Soviet context	,877***	-1,252***	,273	-1,276**	,267	-,640
Domestic new private firms		-2,129***		-1,549***		-,907**
Brownfield FDI	,983***	-1,147**	,745*	-,804	,341	-,566
Greenfield FDI	2,129***		1,549***		,907**	
Sector dummy						
Food & beverages sector	,080	,080	,675**	,675**	,745***	,745***
Machinery & equipment sector						
Absorptive capacity						
Log of # of employees	,808***	,808***	,489*	,489*	,310	,310
% of employees with a higher education degree	,003	,003	,002	,002	,002	,002
% of employees involved in R&D	,029***	,029***	,034***	,034***	,017*	,017*
% of foreign employees	-,008	-,008	,013	,013	-,014	-,014
% of sales spent on R&D	,061***	,061***	,067**	,067**	,012	,012
% of sales spent on trainings of highly skilled staff	-,027	-,027	-,048	-,048	,035	,035
Inter-firm cooperation dummy	-,144	-,144	,592*	,592*	,695**	,695**
Institutional quality dummy	-,003	-,003	-,066	-,066	,226	,226
<i>Model fit</i>						
<i>Sig.</i>	,000	,000	,000	,000	,000	,000
<i>-2 Log likelihood</i>	500,994	500,994	466,851	466,851	540,582	540,582
<i>Cox & Snell R Square</i>	,169	,169	,142	,142	,092	,092
<i>Nagelkerke R Square</i>	,228	,228	,200	,200	,124	,124
<i>Correctly classified cases by the model</i>	68,7	68,7	71,2	71,2	65,2	65,2
<i>N</i>	431	431	431	431	431	431

Source: Provided by author

Note: *Significant at the 0.10 level; **Significant at the 0.05 level; ***Significant at the 0.01 level.

Table 4.3
Binary logit regression (III)

	I	II	III	IV	V	VI
Dependent variable	Any form of innovation					
Control Group	Kyiv region		Lviv region		Kharkiv region	
	Domestic new private firms	Greenfield FDI	Domestic new private firms	Greenfield FDI	Domestic new private firms	Greenfield FDI
Ownership dummy						
Domestic SMEs with Soviet context	1,561**	,506	-1,109	-,783	,674	-,953
Domestic new private firms		-1,055		,327		-1,627
Brownfield FDI	,294	-,761	-,779	-,453	,897	-,730
Greenfield FDI	1,055		-,327		1,627	
Sector dummy						
Food & beverages sector	1,301*	1,301*	1,034	1,034	,382	,382
Machinery & equipment sector						
Absorptive capacity						
Log of # of employees	1,013	1,013	,983	,983	-,138	-,138
% of employees with a higher education degree	-,066	-,066	,010	,010	,010	,010
% of employees involved in R&D	,218***	,218***	,007	,007	,166***	,166***
% of foreign employees	,042	,042	,509	,509	,059	,059
% of sales spent on R&D	,028	,028	1,630	1,630	,286**	,286**
% of sales spent on trainings of highly skilled staff	,072	,072	-,442	-,442	-,165**	-,165**
Inter-firm cooperation dummy	1,502*	1,502*	-,087	-,087	,248	,248
Institutional quality dummy	,388	,388	-2,029***	-2,029***	-1,539**	-1,539**
<i>Model fit</i>						
<i>Sig.</i>	,000	,000	,006	,006	,000	,000
<i>-2 Log likelihood</i>	93,624	93,624	71,740	71,740	117,105	117,105
<i>Cox & Snell R Square</i>	,297	,297	,180	,180	,328	,328
<i>Nagelkerke R Square</i>	,465	,465	,352	,352	,470	,470
<i>Correctly classified cases by the model</i>	89,4	89,4	90,6	90,6	80,8	80,8
<i>N</i>	141	141	139	139	,146	,146

Source: Provided by author

Note: *Significant at the 0.10 level; **Significant at the 0.05 level; ***Significant at the 0.01 level.

VI. Discussion

Based on the results presented above, the discussion part of this paper will revolve around the hypotheses stated earlier in the paper.

H 1. Firms in the capital region Kyiv are more innovative than firms in the bordering regions.

We cannot fully accept this hypothesis. Our results show that in any form of innovation this is bordering region Lviv, which leads. On the other hand, we are very careful in arguing that firms in Lviv are overall more innovative than those of the capital due to several reasons. Firms in Lviv are more innovative in process innovation and firms in the capital are more innovative in product innovation. We also find evidence of the fact that food and beverages sector, in which process and organizational innovations predominate, is more innovative than machinery and equipment sector with product innovation form. Since food and beverages sector is a low-tech industry, this could lead to process innovation overcoming product innovation in terms of firms' innovation propensity in low-tech sectors, which in the end could lead to an outcome that Lviv region with process innovation excels the capital with more technology-intensive innovation.

H 2. Innovative outcome of foreign-owned firms located in Ukraine is higher than that of their domestic counterparts.

This hypothesis is accepted. Both descriptive and regression statistical results prove that foreign-owned firms, especially Greenfield FDIs are more innovative than domestic counterparts, with domestic new private firms being the least active in innovative performance. We could explain it with our previous reasoning with regard to the specificity of a transition economy per se. For such an emerging market in transition from the planned communist economy as Ukraine, FDIs play a tremendous role in terms of economic growth and development of the country and its regions. MNEs bring one of the most important assets to the host markets, such as tacit knowledge through their employees and technologies otherwise unavailable within the local economic system. It is supposed that domestic firms are less productive than their foreign counterparts specifically because they lack this certain tacit knowledge. Therefore, our results only prove that FDIs are more innovative than domestic firms and are essential for the local transition economy to grow through the means of knowledge spillovers to domestic business actors.

Especially interesting is the fact that these are Greenfield FDIs that perform the best and domestic new private firms that perform the worst. These could be explained by the reasoning that Greenfield FDIs are usually much more capital- and technology intensive, because these firms need to build their own production capacities at site. Decision to go abroad to do that in the majority of the cases is derived from the necessity to gain certain competitive advantage at the host location. Therefore, subsidiaries of MNEs need to incorporate new technology, process or even product in order to get embedded into the regional economic system at the most efficient manner and be competitive enough to survive. As a result Greenfield FDI firms become much more innovation prone than Brownfield FDI firms, which acquire already existing production sites at the host location. Brownfield FDIs in some cases might be even not interested to innovate if they acquire already good functioning business entity embedded into the local economic system. Within the realm of such a transition economy as Ukraine with present legacy of Soviet past, especially in Kharkiv, it is quite hard to break the old system. Therefore, building something new from scratch might be even more realistic than changing an old paradigm. However, this works quite the opposite for domestic firms. The fact that domestic new private firms score the worst could potentially mean that domestic firms do not have enough capabilities, freedom and financial support to innovate. Whereas domestic firms with Soviet context might still have capacities from the planned economy past with regard to highly qualified R&D staff and innovation propensity of those could therefore be better. Nevertheless, when R&D activities do not

get enough investment, like in the case of domestic firms, the marginal effect of these absorptive capacity aspects for innovation propensity drops drastically.

H 3. Firms in food and beverages sector are more innovative when it comes to process, marketing and organizational innovations than firms in machinery and equipment sector.

This hypothesis is accepted. The results of our regression models show that firms in food and beverages sector are more innovative in process and organizational innovation forms. Within the perspective of a transition economy we are dealing with firms, especially domestic actors, which might be not highly productive due to being locked in within in the legacy of the Soviet past and absorptive capacity of which is also not as high as of firms in more mature and developed markets. This leads to an outcome when within a transition economy process and organizational innovations outstrip product innovation due to certain time, cost and resource constraints. Thus, for machinery and equipment sector to be more innovative than food and beverages sector, firms need to introduce more capital- and technology-intensive innovations. As we can observe from the results the impact of absorptive capacity parameters on the innovative propensity of firms lowers in process and organizational innovations compared to the one in product innovation form. In the bordering regions, especially in Lviv, which scores quite bad in terms of investment in R&D-related activities and number of staff involved in R&D, these parameters show no impact on the firms' innovation propensity. While Kharkiv region, which is a high-tech industry centre, does not score well on these parameters either, there is a positive impact of those aspects on the innovation performance of firms in this region. And this could possibly mean that those firms that do invest in R&D and that do attract R&D-related staff innovate more. So, lower absorptive capacity will hinder firms to innovate and force the low performers out to less technology-intensive sectors, where mostly process and organizational innovation forms are possible.

H 4. Institutional environment of the capital region encourages local business agents to innovate, whilst institutional framework of the bordering regions affects negatively the propensity of firms to innovate in these regions.

This hypothesis is accepted. In the transition economies the capital region is first and for most the hub of opportunities, because it concentrates the best human capital, access to technologies, knowledge and information. To sustain such a trend the governments of the states are interested to support the capital region by the means of creating attractive institutional environment in the latter, which will pull firms to the capital and create good conditions for those to grow and raise in such a way the wealth of the regional and national economic systems. Within such a perspective, bordering regions are left out from the priority lists of improvement and very often their institutional environments are of low quality and provide no support to local business actors. In the case of Ukraine bordering regions used to play their strategic roles within the planned economy of the Soviet Union. While Kharkiv was an industrial hub with heavy industry conglomerates, Lviv was an agricultural hub with a respective infrastructure. Transition from a planned Soviet economy involves change of an old system. But this change could happen slowly or even not happen at all due to several reasons. Firstly, bordering regions do not gain enough attention from the decision makers, i.e. the government stating certain institutional rules of the game, to introduce this change. As a result this only distracts the generators of actual change, namely enterprises. Secondly, an old system always involves certain infrastructure which is already embedded within the regional economic system. So, if it keeps running, there are no interested parties to introduce any change. In such a case it is easier to build something new from scratch than change something that already exists. This in its turn leads to the capital region being top priority for raising the quality of local institutional environment. Thus, while institutions of the capital are undergoing transformations, institutional environment of the bordering region gets only thicker from unsystematic change attempts. This results in a

thick institutional environment of the bordering regions, which limits local firms in their innovation pursuits, because they lack freedom, on the one hand, and actual financial and regulative support, on the other, to innovate.

VII. Summary

In this paper we investigate the factors impacting innovation performance of foreign-owned and domestic firms in three regions of Ukraine as a transition economy from the Soviet past. Based on the results of 305 domestic and 153 foreign firms, carried out in three regions of Ukraine in two different sectors, we focus, firstly, on the regional, ownership and sectoral differences of the innovation performance of firms and secondly, on the role of absorptive capacity, inter-firm cooperation and institutional environment on the propensity of business actors to innovate.

Within our empirical analysis we introduce descriptive statistical results as well as binary logit regression models uncovering the relationship between the factors impacting innovation activities of firms and the output of such activities within three innovation forms: product innovation, process innovation, marketing and organizational innovation as a organizational innovation form. We come up with the following results. Firstly, firms located in the capital are more product-innovators and those located in Lviv are more process-innovators. This leads to overall innovation propensity of firms in Lviv being higher than that of Kyiv. However, we are careful in stating that firms in Lviv are more innovative than those located in the capital due to a lesser technology- and capital-intensity of process innovations per se. Bordering regions still perform quite poor with regard to absorptive capacity parameters, namely R&D investment and involvement of R&D-related staff, in comparison to the capital. Secondly, we found out that foreign-owned firms are excelling domestic counterparts in terms of innovation progress. Greenfield FDIs are the most innovative firms, whereas domestic new private firms perform the worst. This is also supported by the evidence that domestic firms have much lower absorptive capacity in comparison to the subsidiaries of MNEs that bring along new knowledge and technologies. Thirdly, we came up with the result that food and beverages sector is more innovative as a low-tech industry when it comes to process and organizational innovation forms compared to machinery and equipment sector as a high-tech industry. This is an important result especially considering the transition economies perspective of this paper. Innovation in low-tech industries results in active process and organizational innovations. However, firms in these industries tend to invest in their absorptive capacity parameters much less than those of high-tech sectors, which lowers the ability of firms to learn from their business partners and innovate. And the last but not least, we found evidence of importance of a high quality institutional environment for the innovation propensity of firms. Thus, when institutional framework is supportive towards firms, it impacts positively their innovation performance, but when institutional environment gets thick, it becomes a burden for business agents, which cannot introduce innovations as they get locked in.

Our policy implications are threefold. Firstly, there is a need to introduce more support for the bordering regions, so that to diminish uneven regional development of the state with the capital leading at a very high scale in comparison to the periphery. One way to achieve this is to create certain local region-specific institutional environment in the bordering areas which will encourage structural changes within the existing economic system with Soviet legacy. Secondly, the government shall support domestic firms, so that the technological gap between foreign-owned and domestic firms decreases. There is a need to provide financial incentives especially to domestic new private firms, which will enable them to innovate and become competitive enough towards their foreign counterparts. And thirdly, it is important to increase absorptive capacity

of local firms, so that to encourage more product innovations in high-tech sectors, because introduction of new products is essential for the whole manufacturing industry to grow. In order to increase firms' absorptive capacity there is a need firstly, to provide sufficient financial support for innovation activities of the firms, which will allow firms to invest more in R&D as well as training of employees as important absorptive capacity parameters, and secondly, to introduce more research-based education programs at the universities, so that local human capital is skilled enough to enable innovations. Moreover, high quality labor conditions for local personnel should be created, so that employees get motivated to work in tech-related industries as highly competitive and prestigious work environments.

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ANNEX
Table 1
Description of variables

Variables	N	Min	Max	Mean	Std. Deviation
Innovation overall dummy	458	0	1	,79	,411
Product innovation dummy	458	0	1	,61	,488
Process innovation dummy	458	0	1	,69	,464
Organizational/nological innovation dummy	458	0	1	,59	,492
Kharkiv region dummy	458	0	1	,34	,476
Lviv region dummy	458	0	1	,33	,470
Kiev region dummy	458	0	1	,33	,470
Domestic SMEs without FDI with Soviet dummy	454	0	1	,28	,452
Domestic new private firms dummy	454	0	1	,38	,487
Brownfield FDI dummy	454	0	1	,20	,404
Greenfield FDI dummy	454	0	1	,13	,334
Food & beverages sector dummy	455	0	1	,56	,497
Machinery & equipment dummy	455	0	1	,44	,497
Number of employees	455	15	959	98,39	200,579
Share of employees with higher education	450	0	100	68,44	29,837
Share of employees involved in R&D	455	0	75	7,00	12,517
Share of foreign employees among staff	458	0	50	1,66	5,223
Share of sales spent on R&D	458	0	60	4,158	7,8607
Share of sales spent on trainings of highly skilled	458	0	70	1,68	4,604
Institutional quality dummy	451	0	1	,23	,419
Inter-firm cooperation dummy	458	0	1	,53	,500

Source: Provided by author

ANNEX
Table 2
Correlation matrix

	1	2	3	4	5	6	7	8	9	10	11	12
Region (1)	1 458											
Ownership (2)	,009 (,855) 454	1 454										
Sector (3)	-,028 (,555) 455	,320** (,000) 451	1 455									
Log of # of employees (4)	-,131** (,005) 455	-,184** (,000) 451	-,065 (,169) 452	1 455								
% of employees with a higher education degree (5)	,001 (,982) 450	,051 (,278) 446	-,056 (,234) 447	,000 (,997) 447	1 450							
% of employees involved in R&D (6)	,165** (,000) 455	-,134** (,004) 451	-,283** (,000) 452	-,127** (,007) 453	,104* (,028) 447	1 455						
% of foreign employees (7)	-,017 (,718) 458	-,232** (,000) 454	-,163** (,000) 455	-,055 (,243) 455	,004 (,930) 450	,242** (,000) 455	1 458					
% of sales spent on R&D (8)	-,145** (,002) 458	-,063 (,178) 454	-,235** (,000) 455	,183** (,000) 455	,057 (,230) 450	,334** (,000) 455	,119* (,011) 458	1 458				
% of sales spent on trainings of highly skilled staff (9)	-,052 (,269) 458	-,174** (,000) 454	-,100* (,033) 455	,128** (,006) 455	-,090 (,056) 450	,082 (,080) 455	,132** (,005) 458	,372** (,000) 458	1 458			
Institutional quality composite indicator (10)	-,177** (,000) 451	-,241** (,000) 447	-,056 (,236) 448	,178** (,000) 448	-,030 (,523) 443	-,011 (,816) 448	,078 (,097) 451	,073 (,124) 451	,119* (,011) 451	1 451		
% of domestic suppliers out of all suppliers of foreign customers (11)	,116* (,015) 434	-,654** (,000) 430	-,251** (,000) 433	,097* (,044) 432	-,061 (,209) 426	,272** (,000) 431	,196** (,000) 434	,141** (,003) 434	,152** (,001) 434	,143** (,003) 427	1 434	
% of foreign suppliers out of	-,055	-,660**	-,220**	,016	-,063	,229**	,156**	,142**	,199**	,177**	,640**	1

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all suppliers of domestic customers (12)	(,243) 446	(,000) 442	(,000) 445	(,738) 444	(,189) 438	(,000) 443	(,001) 446	(,003) 446	(,000) 446	(,000) 439	(,000) 427	446
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Source: Provided by author

Note: Significance (2-tailed) in the brackets means *significant at the 0.05 level, **significant at the 0.01 level.

**ANNEX
Table 3**

Innovation performance of foreign and domestic firms by region

	Yes	No	Chi-Test
Any kind of innovation activities /n=458/			
Kyiv region	78,5%	21,5%	**
Lviv region	85,3%	14,7%	
Kharkiv region	72,0%	28,0%	
Product innovation /n=458/			
Kyiv region	71,5%	28,5%	***
Lviv region	56,7%	43,3%	
Kharkiv region	54,0%	46,0%	
Process innovation: /n=458/			
Kyiv region	68,4%	31,6%	***
Lviv region	77,3%	22,7%	
Kharkiv region	60,7%	39,3%	
Organizational innovation /n=458/			
Kyiv region	63,3%	36,7%	n.s.
Lviv region	60,7%	39,3%	
Kharkiv region	54,0%	46,0%	

Source: Provided by author

Note: *Significant at the 0.10 level; **Significant at the 0.05 level; ***Significant at the 0.01 level.

ANNEX
Table 4

	Yes	No	Chi-Test
Any kind of innovation activities /n=454/			
Brownfield FDI	83,9%	16,1%	***
Greenfield FDI	91,4%	8,6%	
Domestic SMEs without FDI with Soviet context	79,8%	20,2%	
Domestic new private SMEs	70,1%	29,9%	
Product innovation /n=454/			
Brownfield FDI	67,7%	32,3%	***
Greenfield FDI	86,2%	13,8%	
Domestic SMEs without FDI with Soviet context	65,9%	34,1%	
Domestic new private SMEs	44,3%	55,7%	
Process innovation: /n=454/			
Brownfield FDI	79,6%	20,4%	***
Greenfield FDI	89,7%	10,3%	
Domestic SMEs without FDI with Soviet context	63,6%	36,4%	
Domestic new private SMEs	59,2%	40,8%	
Organizational innovation /n=454/			

Innovation performance of firms *by form of ownership*

Brownfield FDI	65,6%	34,4%	***
Greenfield FDI	79,3%	20,7%	
Domestic SMEs without FDI with Soviet context	56,6%	43,4%	
Domestic new private SMEs	50,6%	49,4%	

Source: Provided by author

Note: *Significant at the 0.10 level; **Significant at the 0.05 level; ***Significant at the 0.01 level.

ANNEX

Table 5

Share of sales spent by firms that innovate on R&D *by region*

/n=313/	No spending on R&D	Spending on R&D up to 10% of sales	Spending on R&D more than 10% of sales	Chi-Test
Kyiv region	31,1%	46,2%	22,7%	***
Lviv region	62,5%	30,2%	7,3%	
Kharkiv region	37,8%	53,1%	9,2%	

Source: Provided by author

Note: *Significant at the 0.10 level; **Significant at the 0.05 level; ***Significant at the 0.01 level.

ANNEX

Table 6

Share of sales spent by firms that innovate on R&D *by form of ownership*

/n=310/	No spending on R&D	Spending on R&D up to 10% of sales	Spending on R&D more than 10% of sales	Chi-Test
Brownfield FDI	35,2%	56,3%	8,5%	n.s.
Greenfield FDI	34,8%	47,8%	17,4%	
Domestic SMEs without FDI with Soviet context	50,0%	35,6%	14,4%	
Domestic new private SMEs	45,6%	38,8%	15,5%	

Source: Provided by author

Note: *Significant at the 0.10 level; **Significant at the 0.05 level; ***Significant at the 0.01 level.

**ANNEX
Table 7**

Share of R&D staff among employees of firms that innovate *by region*

/n=346/	No R&D staff	Share of R&D staff up to 10% of employees	Share of R&D staff more than 10% of employees	Chi-Test
Kyiv region	36,2%	39,7%	24,1%	***
Lviv region	68,0%	19,2%	12,8%	
Kharkiv region	31,4%	23,8%	44,8%	

Source: Provided by author

Note: *Significant at the 0.10 level; **Significant at the 0.05 level; ***Significant at the 0.01 level.

**ANNEX
Table 8**

Share of R&D staff among employees of firms that innovate *by form of ownership*

/n=343/	No R&D staff	Share of R&D staff up to 10% of employees	Share of R&D staff more than 10% of employees	Chi-Test
Brownfield FDI	28,4%	36,5%	35,1%	***
Greenfield FDI	33,3%	33,3%	33,3%	
Domestic SMEs without FDI with Soviet context	60,2%	26,5%	13,3%	
Domestic new private SMEs	50,8%	20,8%	28,3%	

Source: Provided by author

Note: *Significant at the 0.10 level; **Significant at the 0.05 level; ***Significant at the 0.01 level.

ANNEX

Table 9

Share of sales spent by firms that innovate on trainings for highly skilled staff *by region*

/n=231/	No spending on trainings	Spending on trainings up to 10% of sales	Spending on trainings more than 10% of sales	Chi-Test
Kyiv region	35,8%	57,8%	6,4%	n.s.
Lviv region	47,4%	50,0%	2,6%	
Kharkiv region	50,0%	47,6%	2,4%	

Source: Provided by author

Note: *Significant at the 0.10 level; **Significant at the 0.05 level; ***Significant at the 0.01 level.

ANNEX

Table 10

Share of sales spent on trainings for highly skilled staff *by form of ownership*

/n=230/	No spending on trainings	Spending on trainings up to 10% of sales	Spending on trainings more than 10% of sales	Chi-Test
Brownfield FDI	24,1%	72,2%	3,7%	***
Greenfield FDI	30,8%	64,1%	5,1%	
Domestic SMEs without FDI with Soviet context	51,5%	44,1%	4,4%	
Domestic new private SMEs	56,5%	39,1%	4,3%	

Source: Provided by author

Note: *Significant at the 0.10 level; **Significant at the 0.05 level; ***Significant at the 0.01 level.