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Novelty and links in innovative firms' networks:
An analysis of SME in Central and South Eastern Europe

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Abstract:

This paper addresses the question how novelty is influenced by ties to knowledge sources from different spatial levels at the firm level with a special focus on Central and South Eastern Europe. International ties provide access to distant, complementary knowledge. Overcoming knowledge deficits, this could result in a higher degree of novelty of the resulting innovations. This paper aims to contribute to the understanding of microeconomic determinants of novelty by differentiating the effect of international ties on the novelty of product and process innovations on the firm level. We use a multinomial logit model on a sample of recent firm level data of 1299 innovative SME in Central and South Eastern Europe (CSEE) from the 5th round of the EBRD's Business Environment and Enterprise Performance Survey (BEEPS). We find mixed evidence for the hypothesis that firms with international ties are more likely to introduce innovations of high novelty. The type of international ties beneficial to novelty varies between product and process innovations as well as between novelty levels. The results contribute to understanding the distant knowledge bases - novelty nexus by showing that not only ties to distant knowledge sources matter, but also, that the type of these ties differs across innovation categories. Moreover, by analysing the potential of innovation activities in networks for SME in the new and potential EU member states in CSEE, insights can be drawn on how they can overcome size- and location-related challenges in innovation activities and generate novelty and the returns associated therewith.

1 Introduction: Innovation, networks and SME in Central and South Eastern Europe

This paper addresses the question how the degree of novelty of an innovation is influenced by an enterprise's ties to knowledge sources from different spatial levels. To do so, the paper explores the effects of cooperation with actors abroad on novelty of resulting innovations. Innovations are neither radical nor incremental (Amara et al. 2008). They emerge from inter-active processes like knowledge networks or cooperations (f.e. Tödtling et al. 2009) and the resulting innovations differ in their degree of novelty. The idea of combining distant and or complementary knowledge bases for higher novelty can be found in various streams of liter-ature, as for example in the ideas of gatekeepers (f.e. Rychen and Zimmermann 2008) or global pipelines (f.e. Bathelt et al. 2004). Yet, the issue which knowledge sources from which spatial level are most relevant to innovation is still underexplored (f.e. Tödtling and Grillitsch 2014).

By differentiating the effect of international ties on the novelty of innovations on the firm level, this paper aims to contribute to the understanding of microeconomic determinants of novelty. Using data on innovative small and medium enterprises (SME) in Central and South Eastern Europe (CSEE) from the European Bank of Reconstruction and Development (EBRD) and World Bank's Business Environment and Enterprise Performance Survey (BEEPS), the pa-per analyses whether firms with international ties introduce innovations with a higher degree of novelty than firms without such ties. The focus on SME in CSEE is especially interesting to this question, as networking and cooperation have been proposed as ways to overcome both size- and location related challenges for SME in the region. After all, the innovativeness of SME in CSEE is directly linked to their countries potential for the European innovation landscape (see also Piech and Radosevic 2006, xix).

1.1 SME in CSEE – a double challenge

SME in CSEE face two sets of challenges, related to their location and their size. Firstly, with respect to locational challenges, like all firms in CSEE, SME face the overlapping challenges of transition from centrally-planned to market-based systems, (preparing) European Union (EU) accession and globalization (cf Smallbone and Rogut 2005, Welter 1997, Hashi and Krasniqi 2010). The region's innovation productivity is found to be low (cf Krammer 2009, 851; Radose-vic and Auriol 1999). Yet, speaking of an east-west divide in Europe would be overly simplistic (Radosevic 2004). Innovation and research and development (R&D) activities are not new to the transition countries in CSEE. But, as Radosevic (1998) deplores, the state monopoly on R&D was not taken into account during the neoliberal reforms in the 1990s, neglecting tech-nological and industrial restructuring. The R&D system was perceived a tax burden and not a basis for economic recovery (Radosevic and Auriol 1999).

Instead, innovation policies are focused on technological development rather than on diffu-sion and absorptive capacity (cf EBRD 2014, 83; Kravtsova and Radosevic 2012; Lengyel et al. 2013), although this policy focus might not be optimal in the conditions of the region (Lengyel et al. 2013, 2-3). Kravtsova and Radošević (2012) note that the current knowledge generation focus could be enhanced by generating technological capabilities and turning to a diffusion and absorption orientation.

In this setting, enterprises can generate high returns on innovation. Even though the innova-tions in transition countries are often not new to the global markets, process or organizational

innovations that are new to the enterprise can increase productivity considerably. The same is true for increased returns from product innovations and especially so in less innovative sectors (cf EBRD 2014, 31).

SME in transition countries are found to be mainly active in traditional sectors (Aidis 2005, 26f; 2005a), competing internationally by price, not innovativeness (Smallbone & Welter 2001, 259). Findings of SME as hidden unemployment in early transition (Earle and Sakova 2000) or pure necessity (Estrin et al. 2006, 24ff) contrast with findings of SME as important actors in creating employment, innovation and competition (Bartlett 2001, 197). The low level of innovation seems at contrast with the relatively high level of education and technological expertise (Aidis 2005, 26).

Turning to the size related challenges, it first has to be noted, that SMEs' advantages for innovation lay in being flexible, entrepreneurial and closer to the customer. However, due to their size, SME are often assumed to have limited resources, and especially so for innovation. Their access to knowledge, financial and human capital is limited (cf Rogers 2004, 143; Hessels and Parker 2012, 137).

1.2 SME in CSEE – the potential of networks and international cooperation

Accessing knowledge from outside the organizational boundaries is crucial to overcome the size-related limitations. In a similar vein, accessing knowledge from outside the regional boundaries might be crucial to overcome the location-related challenges. Networking is one approach to do so (Bougrain and Haudeville 2002, 739) and SMEs are found to particularly rely on external knowledge networks in innovation (cf Rogers 2004, 143; Radas and Božić 2012, 653; Van de Vrande et al. 2009, 436; Tomlinson and Fai 2013).

Knowledge networks have been identified as crucial element in SME performance also in less competitive regions (Huggins and Johnston 2009). Zeng et al. (2010) point to the increasing role of networks in SME innovation in developing countries. The chaotic conditions of the early transition years increased the role of informal networks of trust (cf Smallbone and Welter 2001, 252) as a means to access resources and business opportunities and to cope with bureaucratic constraints. Combining insights from evolutionary theory and network analysis, Grabher and Stark (1997, 3) argue that the economic unit in post-socialism is networks of firms rather than individual firms.

In other space or time, external relationships were found to enhance innovation performance of SME in for example Australia (Rogers 2004, Gronum et al. 2012), Spain (Nieto and Santamaría 2010) and China (Zeng et al. 2010). While some contributions address the influence of different cooperation partners on the degree of novelty of innovations others explore international linkages and innovation. However, the contributions focus either on novelty or on linkages across different spatial levels, but do not explore how they are intertwined. To bridge this gap, this paper analyses both dimensions in a sample of innovative SME in the new and potential EU member states in CSEE.

Taken together, the potential of innovation in networks for SME in CSEE is high and provides an interesting object of investigation. The following section provides a literature review on theoretical contributions and empirical findings on innovation, novelty and international ties. In the third section the data and methodological approach used for the analysis of the effect

of international ties on novelty are presented. The fourth section discusses the results and the fifth section concludes.

2 Literature review: International ties and novelty

The academic literature on innovation, novelty and networks is extensive. With regard to our analysis of how international links influence the introduction of novelties in innovative firms in CSEE, the following review highlights the role of novelty in the local context, the role of networks for the innovation process and the role of international ties for innovation.

2.1 Innovation and Novelty

As such, innovations are neither radical nor incremental (Amara et al. 2008). They emerge from interactive and evolutionary processes (Pyka 2002, 2007, Fagerberg 2006, Tödtling et al. 2009) and the resulting innovations differ in their degree of novelty. The difference between invention and innovation is an important one to start with. Innovations can be conceptualized in reference to Schumpeter as 'new combinations' that are successfully introduced to the market (Hagedoorn 1996, 885). New combinations refer to the introduction of a new product, new process, new organizational method or other category. In contrast, inventions are not (yet) successfully introduced to the market.

Naturally, innovations do not materialize out of thin air. Central to innovation are the creation and use of knowledge. Invention and innovation are part of a dynamic process involving adaption and transformation (cf Fagerberg 2006, 5-7). Innovations undergo changes in a long process of 'interrelated innovations' (Fagerberg 2006, 6) that transforms their economic significance. The use and combination of existing knowledge and innovations goes beyond technological research and development (R&D), a phenomenon which at its extreme has also been described as innovation without research (Rammer et al. 2010). Significant innovations might also occur in the process of adaption to local contexts (cf Fagerberg 2006, 8f). Even though minor in a narrow technological sense, their economic impact can be of major significance (Fagerberg, Srholec, Verspagen 2010). As outlined in section one, the potential returns on innovation for SME in CSEE are high. This can be true for ground-breaking innovations, as well as to incremental innovations and adaptations to the local context.

In this context, it is worthwhile to investigate the notion of novelty in greater detail. The 'new' in new combinations denotes the novelty. Incremental or evolutionary improvements are distinguished from radical or disruptive innovations. However, as products or processes are neither radical nor incremental, Amara et al. (2008, 451-453) suggest representing the degree of innovation novelty as a continuum. They base novelty on degrees of knowledge deficits like technological uncertainty or technical inexperience. As the need for knowledge creation increases due to knowledge deficits, the novelty of the respective innovation increases. To overcome knowledge deficits, a firm can access resources via its external environment. By giving access to these, an enterprise's international, national and local linkages may facilitate different levels of novelty or radicality of innovations. A possible approach is to distinguish innovations new to the international, national or local market.

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2.2 Innovation as interactive, evolutionary process

When talking about linkages that may facilitate knowledge transfer and creation in innovation processes, we take a process perspective on innovation. Innovation as an interactive process in f.e. knowledge networks or cooperations has been discussed extensively (for an overview see Tödtling et al. 2009, 59, Phelps et al. 2012, Ozman 2009). Innovations are regarded as the result of an interactive process in a wide range of literature, from innovative milieus, over knowledge spill-overs and innovation systems, to innovation networks (Tödtling et al. 2009). The knowledge-based approach considers the uncertainty, heterogeneity and irreversibility associated with innovation, a perspective largely neglected in incentive-based approaches like the transaction cost approach or the production function approach of new industrial economics (Pyka 2002). The process of emergence and diffusion of novelties is characterized by uncertainty and actors with incomplete knowledge bases and capabilities. Consequently, variety or heterogeneity arises, which can be a source of novelty. Finally, the dynamic innovation process takes place in historical time and is irreversible.

Within the knowledge-based approach, innovation networks are seen to be a co-ordination device, making possible the exploitation of complementarities and the exploration of synergies (Pyka 2007). This way, innovation networks offer the possibility for interfirm learning and diffusion of knowledge. Also, they offer the possibility to access complementary assets and knowledge from partners. Furthermore, they offer a possibility to overcome the restrictions of irreversibilities and to build on several knowledge bases. So, innovation networks coordinate learning and diffusion of know-how, provide access to complementary knowledge, and provide an organisational setting to explore opportunities. As outlined in section one, innovation in networks has a big potential for SME in CSEE, both in terms of overcoming size- and location-related challenges an in terms of accessing new knowledge and creating high returns to innovation.

Speaking of accessing new, or complementary knowledge, space is an important dimension to consider. For example, cooperation with partners abroad can be a way for SME in CSEE to access such crucial knowledge and generate high returns to innovation. A spatial dimension of innovation networks can be motivated by the characteristics of knowledge (Bathelt et al. 2004). One line of reasoning builds on a global-local contrast. More codified knowledge can be transferred globally, whereas more tacit knowledge is localized and its transfer dependent on proximity between the actors involved. However, Bathelt et al. (2004) argue, that both tacit and codified knowledge can be exchanged locally (in what they call local buzz) and globally (via what they call global pipelines). They distinguish local learning processes among actors embedded in a community and knowledge attained from outside providers. Especially, over-embeddedness or lock-ins can be overcome by establishing and maintaining such global pipelines. While local buzz generates opportunities and spontaneity, global pipelines are argued to open potentialities associated with knowledge from elsewhere. However, spatial proximity is but one form of proximity, and combined and integrative effects of different forms of proximity all influence knowledge creation in place-based settings and trans-local connections (Bathelt and Cohendet 2014, 880).

2.3 International ties and innovation

The question on which knowledge sources from which spatial level are most relevant to innovation is still underexplored (f.e. Tödtling and Grillitsch 2014). Basically, two contrasting ideas can be found in the literature. The first literature strand is concerned with externalities arising from agglomeration, co-location or proximity and includes research on clusters (f.e. Hinzmann, Cantner, Graf 2017), as well as innovative milieus, regional or national innovation systems and innovation networks (for an overview see Tödtling et al. 2009). The second is centred around the idea of combining distant and or complementary knowledge bases for higher novelty and includes research on global value chains (f.e. Pietrobelli and Rabelotti 2011) or networks (f.e. Glückler and Panitz 2016), global innovation systems (Binz and Truffer 2017), gatekeepers (f.e. Rychen and Zimmermann 2008) or global pipelines (f.e. Bathelt et al. 2004) to name just a few.

Following the second strand, accessing distant, complementary knowledge can enable innovations with a higher degree of novelty. Referring to gatekeepers, temporary co-location and multi-spot configurations, Rychen and Zimmermann (2008) differentiate three stylized "glocal" interfaces at the intersection of the global and the local. The temporary proximity at these interfaces enables firms to access global information and knowledge for further knowledge generation and exchange. Similarly, Bathelt et al. (2004) have coined the expressions of local buzz and global pipelines, the former referring to local learning processes among actors embedded in a community and the latter referring to knowledge attained from outside providers. While local learning processes are associated with opportunities and spontaneity, potentialities arise from global access to different knowledge. In these settings, international ties provide access to distant (complementary) knowledge bases, which can lead to more innovative outcomes (Bathelt and Cohendet 2014, see also Lengyel et al. 2015). Bathelt and Cohendet's state, that instead of mere spatial proximity, combined and integrative effects of different forms of proximity influence knowledge creation in place-based settings and trans-local connections (2014, 880).

Overall, the studies reviewed here highlight the importance of innovation processes in networks for SME in CSEE to overcome size- and location-related challenges and to potentially generate high returns to innovation. Thinking of a more innovative outcome as an outcome with a higher degree of novelty, we expect SME with international ties to be able to overcome the associated knowledge deficits by accessing distant knowledge and therefore introduce innovations with a higher degree of novelty. We therefore hypothesize that enterprises with international ties are more likely to introduce innovations with a higher degree of novelty. Consequently, enterprises that cooperated with international partners, or had other international links, are expected to be more likely to introduce innovations new to the international market.

H1: Enterprises with international ties are more likely to introduce innovations new to the international market (vs. new to the local market).

> a) Direct effect on innovation: innovation was developed in cooperation with foreign clients or suppliers
>
> b) Indirect effect on innovation: innovative enterprise was a direct exporter, had more than 10 % foreign ownership

Similarly, they are expected to be more likely to have introduced innovations new to the national market.

H2: Enterprises with international ties are more likely to introduce innovations new to the national market (vs. new to the local market).

> a) Direct effect on innovation: innovation was developed in cooperation with foreign clients or suppliers

> b) Indirect effect on innovation: innovative enterprise was a direct exporter, had more than 10 % foreign ownership

For both hypothesises, due to the nature of the dataset, direct and indirect effects on innovation will be tested. Here, direct refers to international links with direct regard to innovation activities, while indirect refers to international links which were not directly focused on innovation activities.

2.4 Empirical studies on international ties or novelty

In other regions, external relationships were found to enhance innovation performance of SME in Austria, Germany, Italy, Poland, Hungary and Slovenia (Lasagni 2012), Australia (Rogers 2004, Gronum et al. 2012), Spain (Nieto and Santamaría 2010), the UK (Tomlinson and Fai 2013) and China (Zeng et al. 2010). Several empirical contributions address the influence of different cooperation partners on novelty (f.e. Mention 2001, Tödtling et al. 2009). Another strand of empirical studies explores international linkages and innovation (f.e. Gorodnichenko et al. 2010, Tödtling and Grillitsch 2014). However, in empirical research focused on the influence on innovation novelty of different information sources and link characteristics, little attention is given to the international dimension of these (see f.e. Amara et al. 2008, Barbosa et al. 2013, Freel and Jong 2009, Landry and Amara 2005, Mention 2011, Nieto and Santamaria 2007, Radas and Bozic 2009, Tether 2002, Tödtling et al. 2009). In contrast, empirical research with a focus on international linkages does not distinguish different grades of novelty (see f.e. Aralica et al. 2008, Damijan et al. 2003, Gorodnichenko et al. 2010, Pejic Bach et al. 2015, Tödtling et al. 2006, Tödtling and Grillitsch, 2014). The contributions focus either on novelty or on linkages across different spatial levels, but do not explore how they are intertwined.

In the literature strand focusing on the influence of different information sources and link characteristics on novelty, various innovation partner types are analysed. Mention (2011) finds that firms using information from market sources, internal sources and science collaborations are more likely to introduce new to the market product innovations, whereas firms using information from competitors are less likely to do so. Similarly, Nieto and Santamaria (2007) find that collaboration with suppliers, clients and research organizations positively impact novelty, whereas collaboration with competitors has a negative impact. Tödtling et al. (2009) find more advanced innovations for firms cooperating with universities and research organizations, whereas less advanced innovations rely more on business service links.

The second strand of literature focuses on the influence of globalization and international linkages on innovation. Gorodnichenko et al. (2010) find a positive relationship between foreign competition as well as vertical linkages with foreign firms and innovation. Tödtling and Grillitsch (2014) analyse the influence of knowledge acquired from different spatial levels on

innovation. They find knowledge acquisition in most knowledge-intensive sectors to be territorially bound on the regional and national level as well as some relevance of specialized knowledge from international and global levels. Especially, they found the sourcing of technological knowledge from international clients to be positively associated with all examined types of innovation.

3 Data and methods

To assess both degree of novelty and ties across different spatial levels, the present analysis uses a sample of 1299 innovative SME in the new and potential EU member states in CSEE from the 5th round of the European Bank of Reconstruction and Development and World Bank's Business Environment and Enterprise Performance Survey (BEEPS). The countries included in the analysis are (in alphabetical order) Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Kosovo, Latvia, Lithuania, Macedonia, Montenegro, Poland, Romania, Serbia, Slovakia and Slovenia. In each country, the surveyed firms were selected using stratified random sampling by industry (manufacturing, retail and services sector), establishment size (small 5-19, medium 20-99, large 100+) and region (EBRD 2015, 6). The interviews for the survey were conducted in 2013-14. The survey provides for the first time a specific module on innovation (cf EBRD 2015, 4). Detailed information on how innovation is introduced is available for establishments that reported to have introduced a product or process innovation. As the underlying model implies relationships that may vary per stratum, no weights are used (cf EBRD 2015, 18). Apart from adding the control variables described below, to address heterogeneity between countries, clustered standard errors are used.

The probability of an establishment having introduced an innovation new to the international, national or local market is modelled with a multinomial logit model (MNLM) for product and process innovations respectively. Basically, the MNLM simultaneously fits binary logits for all comparisons among the alternative outcomes (compare Long and Freese 2014, 386-393). This means that for the three novelty levels, a minimal set of two binary logits is fit. Estimates for the remaining coefficients can be computed from this minimal set. The MNLM is superior to fitting a series of binary logits, which would use a different sample each. The MNLM can be written as $ln\Omega_{(m|b)}(x) = \ln\left(\frac{\Pr(y=m|x)}{\Pr(y=b|x)} = x\beta_{m|b}\right)$ for m= 0 to 2, where b is the base outcome. As $ln\Omega_{(b|b)}(x) = \ln 1 = 0$, the log odds of an outcome compared with itself is always 0, and thus the effects of any independent variables must also be 0. One of the major advantages of this approach is that the same regression sample is used throughout instead of having to use a different sample for each comparison (Long and Freese 2014).

The multinomial logit model was estimated using Stata's svy: commands to control for the complex survey design of the BEEPS data. This way, standard errors are computed using the linearized variance estimator, which in the non-survey context is known as robust variance estimator (Stata Corp. 2013, 24). Table 1 shows the variable details.

<p style="text-align:center;">**Table 1:** Variables</p>

Variable Name	Description	Scale
Dependent Variable		
novelty	Product /process new to… the international market (2), national market (1), local market or the establishment (0).	nominal
Independent Variables		
Main way in which main new /significantly improved product /process was introduced:		
internal ideas	Categorical variable (0/1). Takes on the value 1 if developed or adapted by this establishment from its own ideas	nominal
licenced products /services	Categorical variable (0/1). Takes on the value 1 if licensed products or services from another firm.	nominal
cooperation with… domestic suppliers	Categorical variable (0/1). Takes on the value 1 if developed in co-operation with domestic suppliers.	nominal
cooperation with… suppliers from abroad	Categorical variable (0/1). Takes on the value 1 if developed in co-operation with suppliers from abroad.	nominal
cooperation with… domestic client firms	Categorical variable (0/1). Takes on the value 1 if developed in co-operation with domestic client firms.	nominal
cooperation with… client firms from abroad	Categorical variable (0/1). Takes on the value 1 if developed in co-operation with client firms from abroad.	nominal
cooperation with… academic / research institutions	Categorical variable (0/1). Takes on the value 1 if developed in co-operation with academic or research institutions.	nominal
imitation	Categorical variable (0/1). Takes on the value 1 if introduced the establishment's own version of a product or service already supplied (by another firm).	nominal
other	Categorical variable (0/1). Takes on the value 1 if other – spontaneous - reply.	nominal
foreignowned10	Dummy variable (0/1). Takes on the value 1 if the establishment is owned to over 10% by private foreign individuals.	nominal
direxp	Direct exports as % of total annual sales.	cardinal
Control Variables		
EU candidate	Categorical variable (0/1). Takes on the value 1 if the establishment is from an EU candidate country.	nominal
sector	Categorical variable (1/2/3). Takes on the value 1 if the establishment is in the manufacturing and construction sector, 2 if in retail trade, 3 if in other services.	nominal
medium sized	Categorical variable (0/1). Takes on the value 1 if medium sized enterprise (20-99), the value 0 if small (5-19).	nominal
founded after 2008	Dummy variable (0/1). Takes on the value 1 if the establishment is less than five years old (established before 2008).	nominal
main business city	Dummy variable (0/1). Takes on the value 1 if the establishment is located in its country's main business city.	nominal
part of larger firm	Dummy variable (0/1). Takes on the value 1 if the establishment is part of a larger firm.	nominal
ict	Dummy variable (0/1). Takes on the value 1 if the establishment has a website and or uses email to communicate with clients.	nominal
uni	% of full time employees who completed a university degree (0-100).	cardinal
rdspending	Dummy variable (0/1). Takes on the value 1 if the establishment spent on R&D over last 3 years.	nominal

<p style="text-align:right;">Source: Analysis based on the BEEPS 2015 data.</p>

The dependent variable degree of novelty differentiates whether an innovation is new to the international, national or local market (OECD/ Eurostat 2005, 57f as well as Amara et al. 2008, 451-453). We differentiate between product and process innovation (OECD /Eurostat 2005, 45ff; compare also Tödtling and Grillitsch 2014). As compared to classical innovation measures like patents, the advantages of this approach are both of conceptual and methodological nature: In a dynamic process of transformation and adaptation (Fagerberg 2006, 5-8), interlinked innovations change their economic significance and significant innovations might occur when adapting to local contexts. In the contexts similar to the present sample, classical innovation measures and especially patents have been criticized (cf Gorodnichenko et al. 2010, 9; Tödtling and Grillitsch 2014). Innovation output measures like patents or other IPRs (Intellectual Property Rights) focus on invention only, their use varies among countries and enterprises use other measures as well to protect their innovations (cf Gorodnichenko and Schnitzer 2013, 11). Similarly, classical innovation input measures like R&D spending are biased against small enterprises and do not capture imitation and adaptation activities or non-technical innovation. Innovation can be captured more directly at the enterprise level using management officials' perception of their enterprises' innovative in- and output. Naturally, this perception measure is more subjective and might be biased towards more self-confident establishments (cf Lasagni 2012, 331). Yet, this approach does not suffer from the disadvantages of an arbitrary (re)classification of innovations by experts (compare Landry and Amara 2005, 246).

The independent variables are linkages across different spatial levels. The two main groups are local and global ties. International linkages are operationalized as development cooperation with suppliers or clients from abroad, as well as foreign ownership and direct exports. Local linkages include development cooperation with domestic suppliers or clients, as well as research institutions. Dummy variables indicating whether an establishment stated development cooperation with suppliers or client firms from abroad as most important origin of innovation are created using Stata's factor variable notation. Also, dummy variables are used indicating whether more than 10% of an enterprise is owned by a private foreign individual or whether an enterprise is a direct exporter. Similarly, dummy variables for development cooperation with domestic suppliers, clients or research institutes are included.

To control for other factors of influence, a set of general enterprise-level control variables are used: Enterprise age and sector, location in the main business centre and being part of a larger firm. Also, innovation-specific control variables are included: percentage of employees with a university degree, use of information and communication technologies, as well as spending on formal R&D.

4. Results and discussion

4.1 Descriptive Statistics

A tabular comparison of the degree of novelty and the direct and indirect effects on innovation provides an initial overview. For this, table 2 and 3 contrast the novelty levels with the main variables of interest for product and for process innovation.

Firstly, turning to the main way of introduction of product innovations (table 2), it can be seen that the share of product innovations new to the local market is always higher for cooperation with domestic partners than for cooperation with partners from abroad. Also, the share of

product innovations new to the international market is higher if it was developed with a supplier from abroad (17.07) than if it was developed with a domestic supplier (9.86). The same is true for product innovations new to the national market that were developed in cooperation with suppliers from abroad (59.76 compared to 50.70) and for product innovations new to the international market that were developed in cooperation with client firms from abroad (39.13 compared to 11.43). However, the opposite is true for product innovations new to the national market which were developed in cooperation with client firms from abroad (26.09 compared to 48.57).

Also, a short word on the other ways of introduction of product innovations, the shares for licencing and imitation intuitively make sense, in as far as the share of product innovations new to the national market are higher for licencing (56.90) than for imitation (34.48), whereas the share of product innovations new to the local market is higher for imitation (46.55) than for licencing (31.03).

Table 2: Novelty of product innovations

| | new to the … market | | | |
Variable	loc	nat	inat	total
Way in which main new /significantly improved product/service introduced (N=826)				
cooperation with suppliers abroad	23.17	59.76	17.07	100.00
cooperation with domestic suppliers	39.44	50.70	9.86	100.00
cooperation with client firms abroad	34.78	26.09	39.13	100.00
cooperation with domestic client firms	40.00	48.57	11.43	100.00
cooperation with external academic or research institutions	9.09	45.45	45.45	100.00
internal ideas	36.28	42.00	21.72	100.00
licensed products/ services	31.03	56.90	12.07	100.00
imitation	46.55	34.48	18.97	100.00
other	27.27	54.55	18.18	100.00
foreign ownership (N=843)				
foreignowned10=1	12.33	46.58	41.10	100.00
foreignowned10=0	37.14	45.97	16.88	100.00
direct exports (N=837)				
direxp>0 (mean)	19.28	40.16	40.56	100.00
direxp=0	41.67	48.30	10.03	100.00

Source: Analysis based on the BEEPS 2015 data.

Secondly, turning to the indirect effects on product innovation, it can be noted that the share of product innovations new to the international market is higher if the enterprises was foreign-owned (41.10 compared to 16.88). The same is true for product innovations new to the national market (46.58 compared to 45.97). Furthermore, for direct exporters, the share of innovations new to the international market was higher than for non-exporters (40.56 compared to 10.03).

Table 3 replicates the descriptive statistics for process innovation. Firstly, turning to the main way of introduction of process innovations (table 3), it can be seen that the share of process

innovations new to the local market only is always higher for cooperation with domestic partners than for cooperation with partners from abroad. Also, the share of process innovations new to the national market was higher if it was developed in cooperation with a supplier from abroad (72.41) than if its main way of introduction was cooperation with a domestic supplier (54.55). The same is true for the share of process innovations new to the international market with the main way of introduction being cooperation with client firms from abroad (37.50) and domestic client firms (15.79). However, the opposite is true for process innovation new to the international market and cooperation with suppliers and product innovation new to the national market and cooperation with client firms, where the corresponding shares are higher for domestic cooperation.

Again, a short word on the other ways of introduction of process innovations in the table, the shares for licencing and imitation are intuitive in so far as the share of process innovations new to the national market is higher for licencing (62.75) than for imitation (38.10), whereas the share of process innovations new to the local market is higher for imitation (42.86) than for licencing (27.45).

Table 3: Novelty of process innovations

| Variable | New to the … market | | | |
	loc	nat	inat	total
Way in which main new /significantly improved production / delivery method introduced (N=443)				
cooperation with suppliers abroad	20.69	72.41	6.90	100.00
cooperation with domestic suppliers	29.55	54.55	15.91	100.00
cooperation with client firms abroad	25.00	37.50	37.50	100.00
cooperation with domestic client firms	31.58	52.63	15.79	100.00
cooperation with external academic or research institutions	33.33	33.33	33.33	100.00
internal ideas	34.96	43.90	21.14	100.00
licensed products /services	27.45	62.75	9.80	100.00
imitation	42.86	38.10	19.05	100.00
other	100.00	0.00	0.00	100.00
foreign ownership (N=448)				
foreignowned10=1	22.58	48.39	29.03	100.00
foreignowned10=0	34.77	47.96	17.27	100.00
direct exports (N=445)				
direxp>0 (mean)	25.93	40.74	33.33	100.00
direxp=0	37.10	51.29	11.61	100.00

Source: Analysis based on the BEEPS 2015 data.

Secondly, turning to the indirect effects on process innovation, it can be noted that the share of innovations new to the international (29.03) or national market (48.39) is higher if the enterprise was foreign owned as compared to enterprises with less than ten percent foreign ownership (17.27 and 47.96 respectively). Furthermore, for direct exporters, the share of process innovations new to the international market was higher (33.33) than for non-exporters (11.61).

A brief comparison of the cooperation shares with the results of the 2014 Community Innovation Survey (CIS) results (Eurostat 2014) can serve as an intuition for the plausibility of the data: 29% of small and 39% of medium-sized enterprises active in product and /or process innovation in the EU were involved in any type of co-operation. 9.5% of small and 17.7% of medium-sized enterprises active in product and /or process innovation were engaged in any type of innovation co-operation with a partner in EU countries, EFTA or EU candidate countries (except a national partner). Adding up the corresponding shares of BEEPS 2015, 17% (product) and 18% (process) of innovative SME stated co-operation as main way of introduction of their innovation. Cooperation with suppliers or clients abroad adds up to 13% (product) and 11% (process).

The main difference between the CIS and the BEEPS is that the CIS queried whether an enterprise co-operated on any of its innovation activities with other enterprises or organizations, whereas the BEEPS asked for the main way of introduction of the most important innovation. Nevertheless, the results may serve as an intuition on the prevalence of cooperation in innovation activities of SME. Even though the data are not directly comparable, we can assume that the shares of cooperation in innovation activities of SME in CSEE are below the corresponding EU averages. Similarly, the shares of international cooperation in innovation activities of SME in CSEE are, if only slightly, below the corresponding EU averages.

As an interim summary from the descriptive analysis it can be seen that mostly, the share of enterprises that introduced innovations that were new to the local market only, was higher for non-international ties. With some exceptions, the share of innovations new to the national or international market was higher for international ties. To put these intuitions to a more rigorous test, regression analysis was performed for product and process innovation. Summary statistics of the regression samples are in table 4. For the binary variables, the mean indicates the share of enterprises for which the condition was true.

Table 4: Summary Statistics of the Regression Samples

Variable	Product Innovation				Process Innovation			
	Mean	**StD**	**Min**	**Max**	**Mean**	**StD**	**Min**	**Max**
main way of introduction								
licensed products/ services	0.14	0.35	0	1	0.13	0.33	0	1
cooperation with domestic suppliers	0.09	0.28	0	1	0.10	0.31	0	1
cooperation with suppliers from abroad	0.10	0.30	0	1	0.09	0.29	0	1
cooperation with domestic client firms	0.04	0.20	0	1	0.06	0.24	0	1
cooperation with client firms from abroad	0.03	0.17	0	1	0.02	0.13	0	1
cooperation with academic /research institutions	0.01	0.12	0	1	0.01	0.12	0	1
imitation	0.07	0.25	0	1	0.06	0.24	0	1
other	0.01	0.12	0	1	0.01	0.10	0	1
foreignowned10	0.09	0.28	0	1	0.07	0.26	0	1
direxp	8.04	19.39	0	100	8.16	18.92	0	100
EU candidate	0.38	0.49	0	1	0.41	0.49	0	1
sector								
trade	0.38	0.49	0	1	0.36	0.48	0	1
other services	0.12	0.32	0	1	0.12	0.33	0	1
medium sized	0.37	0.48	0	1	0.40	0.49	0	1
founded after 2008	0.06	0.24	0	1	0.06	0.24	0	1
main business city	0.26	0.44	0	1	0.23	0.42	0	1
part of larger firm	0.06	0.24	0	1	0.08	0.27	0	1
uni	21.06	24.85	0	100	20.79	23.18	0	100
ict	0.76	0.43	0	1	0.78	0.41	0	1
rdspending	0.27	0.45	0	1	0.37	0.48	0	1

Source: Analysis based on the BEEPS 2015 data.

4.2 Results for product innovation

The regression results for a product innovation being new to the international market, the national market or the establishment's local market are summarized in table 5. Column (1) shows the comparison of the national market versus the establishment's local market, Column (2) shows the comparison of the international market versus the establishment's local market and Column (3) shows the comparison of the international versus the national market. Column (1) and (2) correspond to the minimal set of binary logits in the MNLM, from which the other results can be calculated. For convenience, these are indicated in column (3). The results for the model Wald F-test suggest that the null hypothesis of all regression coefficients being simultaneously equal to zero can be rejected, as the p value is practically zero.

Table 5: Estimates of adjusted odds ratios for the degree of novelty of product innovation

Product innovation novelty	(1) nat vs loc		(2) inat vs loc		(3) inat vs nat	
main way of introduction: internal ideas [base]						
licensed products /services	1.279		1.232		0.963	
	(0.673)		(0.702)		(0.540)	
cooperation with domestic suppliers	1.132		0.672		0.593	
	(0.545)		(0.443)		(0.393)	
cooperation with suppliers abroad	3.555	**	2.685		0.755	
	(2.181)		(1.896)		(0.462)	
cooperation with domestic client firms	0.948		0.367		0.388	
	(0.561)		(0.346)		(0.388)	
cooperation with client firms abroad	0.502		4.637		9.237	***
	(0.365)		(4.797)		(7.865)	
cooperation with external academic or research institutions	62.092	***	82.737	***	1.332	
	(87.584)		(101.187)		(1.559)	
imitation	0.979		1.399		1.429	
	(0.494)		(1.130)		(1.091)	
other	3.595		5.963		1.659	
	(4.426)		(6.875)		(1.627)	
foreignowned10	2.837		4.225	*	1.489	
	(2.267)		(3.581)		(0.818)	
direxp	1.004		1.045	***	1.040	***
	(0.011)		(0.011)		(0.010)	
EU candidate	2.563	***	1.127		0.440	*
	(0.852)		(0.534)		(0.202)	
sector: manufacturing and construction (base)						
trade	0.652		1.102		1.690	
	(0.227)		(0.472)		(0.717)	
other services	1.153		1.123		0.974	
	(0.572)		(0.590)		(0.480)	
medium sized	1.443		1.156		0.801	
	(0.469)		(0.450)		(0.293)	
founded after 2008	0.073	***	0.129	***	1.780	
	(0.054)		(0.091)		(1.187)	
main business city	4.509	***	3.434	***	0.761	
	(1.648)		(1.497)		(0.306)	
part of larger firm	0.847		3.682		4.347	**
	(0.793)		(3.248)		(2.750)	
uni	0.998		1.010		1.012	*
	(0.006)		(0.007)		(0.007)	
ict	1.208		1.253		1.037	
	(0.486)		(0.490)		(0.456)	
rdspending	1.599		3.971	***	2.483	**
	(0.524)		(1.508)		(0.889)	
constant	0.491	*	0.071	***	0.145	***
	(0.184)		(0.035)		(0.076)	
F-statistic	4.170					
Prob>F	0.000					
N (total)	789					

* p<0.1, ** p<0.05, *** p<0.01, odds ratios, robust standard errors in parentheses.

Source: Analysis based on the BEEPS 2015 data.

To evaluate the fitted model, we perform parameter Wald tests of the overall significance of each of the predictors of interest (cf Heeringa et al. 2010, 268-270). This tests the null hypothesis that all parameters associated with an individual predictor in the model are not significantly different from zero (results see table 6). Inspection of these overall test results shows that cooperation with client firms from abroad and foreign ownership are strongly significant determinants of the degree of novelty. Also, cooperation with domestic client firms significantly determines the degree of novelty. However, the other international and non-international ties do not appear to have a significant effect on novelty. These patterns can be explained looking at the individual logit parameters, as some of the variables significantly affect only certain levels of novelty (table 6).

Table 6: Overall Wald tests for the main variables of interest in the multinomial model for product innovation

Predictor	F-Statistic	P>F
main way of introduction		
licensed products /services	0.12	0.8845
cooperation with domestic suppliers	0.31	0.7328
cooperation with suppliers abroad	2.17	0.1144
cooperation with domestic client firms	0.58	0.5626
cooperation with client firms abroad	3.57	0.0282
cooperation with external academic or research institutions	6.92	0.0010
	0.11	0.8942
imitation	1.20	0.3015
foreignowned10	11.02	0.0000
direxp	1.45	0.2356

Source: Analysis based on the BEEPS 2015 data.

Cooperation with suppliers from abroad increases the odds of an enterprise's product innovation being new to the national as compared to the local market (table 5). Differently said, development in cooperation with suppliers from abroad increases the odds of an innovation being new to the national market compared to the establishment's local market by a factor of 3.55, holding other variables constant. This effect is statistically significant at the 5 percent level. The other results can be interpreted in the same way. However, for brevity the analysis will be focused on statistical significance and direction of effects.

Similarly, cooperation with client firms from abroad increases the odds of an enterprise's innovation being new to the international as compared to the national market. Cooperation with domestic suppliers or client firms has no statistically significant effect on the degree of novelty. However, cooperation with suppliers from abroad has no statistically significant effect on an enterprise's innovation being new to the international market. Similarly, the effect of cooperation with client firms from abroad on an enterprise's innovation being new to the national as compared to the local market is not statistically significant.

This is partial evidence for the direct effect of international ties on novelty. Whereas no statistically significant effect for the corresponding local ties was found, the effect of international ties seems to be very specific and is only statistically significant on certain novelty levels.

Turning to the indirect effects, a similar picture presents itself. A higher share of direct exports increased the odds of its innovation being new to the international market as compared to the national as well as local market. This effect is statistically significant at the 1 percent level. However, the effect on the odds of the enterprise's innovation being new to the national market as compared to the local market is not statistically significant. Foreign ownership increases the odds of an enterprise's innovation being new to the international as compared to the local market. The effect is significant at the 10 percent level only. On the other novelty levels, no statistically significant effect of foreign ownership was found.

These results are partial evidence for the international ties with indirect effects on innovation. Whereas a higher share of direct exports had a statistically significant effect on the level of international market novelty, little effect was found for foreign ownership.

Concerning the impact of the other explanatory variables, it can be briefly stated, that the odds of introduction of an innovation new to the international or national market as compared to the establishment's local market increase if the establishment is located in the main business city of its country, holding other variables constant. Being part of a larger firm increases the odds of an establishment's innovation being new to the international level as compared to the national level. The effect of R&D spending was statistically significant for an enterprise's innovation being new to the international market as compared to both the local and national market. Finally, being a new firm decreased the odds of their innovation being new to the national or international markets as compared to the local one.

4.3 Results for process innovation

The above analysis is repeated for process innovations (table 7). Column (1) shows the comparison of the national market versus the establishment's local market, Column (2) shows the comparison of the international market versus the establishment's local market and Column (3) shows the comparison of the international versus the national market. Again, column (1) and (2) correspond to the minimal set of binary logits in the MNLM, from which the other results can be calculated. For convenience, these are indicated in column (3). The results for the model Wald F-test suggest that the null hypothesis of all regression coefficients being simultaneously equal to zero can be rejected, as the p value is practically zero.

Table 7: Estimates of adjusted odds ratios for the degree of novelty of process innovation

Process innovation novelty	(1) nat vs loc		(2) inat vs loc		(3) inat vs nat	
main way of introduction: internal ideas [base]						
licensed products/ services	5.386	**	0.098	*	0.018	***
	(4.048)		(0.119)		(0.021)	
cooperation with domestic suppliers	9.343	***	5.435	*	0.582	
	(7.694)		(5.173)		(0.507)	
cooperation with suppliers abroad	51.978	***	25.477	***	0.490	
	(55.551)		(28.821)		(0.409)	
cooperation with domestic client firms	1.180		2.302		1.952	
	(1.194)		(2.278)		(2.267)	
cooperation with client firms abroad	0.077	*	0.001	***	0.019	**
	(0.113)		(0.003)		(0.034)	
cooperation with external academic or research institutions	28.705	**	18.863	**	0.657	
	(43.531)		(24.707)		(0.861)	
imitation	0.454		9.560		21.062	***
	(0.465)		(13.222)		(21.637)	
other	25.060	***	0.000	***	0.000	***
	(30.403)		(0.000)		(0.000)	
foreignowned10	1.294		1.763		1.363	
	(1.358)		(1.999)		(1.254)	
direxp	1.018		1.055	**	1.036	**
	(0.015)		(0.022)		(0.016)	
EU candidate	4.099	**	2.035		0.496	
	(2.258)		(1.469)		(0.316)	
sector: manufacturing and construction (base)						
trade	0.828		0.684		0.826	
	(0.491)		(0.482)		(0.570)	
other services	1.937		0.575		0.297	
	(1.431)		(0.531)		(0.239)	
medium sized	2.720	*	1.647		0.606	
	(1.464)		(1.129)		(0.338)	
founded after 2008	2.630		0.012	**	0.005	**
	(2.873)		(0.026)		(0.010)	
main business city	9.381	**	7.116	**	0.759	
	(8.362)		(6.134)		(0.525)	
part of larger firm	1.685		7.797	**	4.628	**
	(1.403)		(7.703)		(3.478)	
uni	0.992		1.005		1.013	
	(0.014)		(0.014)		(0.012)	
ict	1.188		0.753		0.634	
	(0.714)		(0.506)		(0.437)	
rdspending	1.251		2.509		2.005	
	(0.611)		(1.717)		(1.264)	
constant	0.143	***	0.069	***	0.481	
	(0.099)		(0.069)		(0.463)	
F-statistic	13.319					
prob>F	0.000					
N(total)	286					

* $p<0.1$, ** $p<0.05$, *** $p<0.01$, odds ratios, robust standard errors in parentheses.

Source: Analysis based on the BEEPS 2015 data.

To evaluate the fitted model, we again perform parameter Wald tests of the overall significance of each of the predictors of interest. This tests the null hypothesis that all parameters associated with an individual predictor in the model are not significantly different from zero (results see table 8). Inspection of these overall test results shows that cooperation with suppliers from abroad, cooperation with client firms from abroad and foreign ownership are strongly significant determinants of the degree of novelty. Also, licensing of products or services, cooperation with domestic suppliers, cooperation with academic or research institutions and imitation significantly determines the degree of novelty of process innovations. However, the cooperation with domestic client firms or direct exports do not appear to have a significant effect on novelty of process innovation. Again, these patterns can be explained looking at the individual logit parameters, as some of the variables significantly affect only certain levels of novelty (table 7).

Table 8: Overall Wald tests for the main variables of interest in the multinomial model for process innovation

Predictor	F-Statistic	P>F
main way of introduction		
licensed products /services	7.38	0.0006
cooperation with domestic suppliers	3.77	0.0232
cooperation with suppliers abroad	6.88	0.0010
cooperation with domestic client firms	0.36	0.6964
cooperation with client firms abroad	5.45	0.0043
cooperation with external academic or research institutions	3.15	0.0431
imitation	4.52	0.0109
foreignowned10	3.40	0.0333
direxp	0.13	0.8778

Source: Analysis based on the BEEPS 2015 data.

Cooperation with suppliers from abroad increases the odds of an enterprise's process innovation being new to the international as compared to the local market (table 7). Differently said, development in cooperation with suppliers from abroad increases the odds of an innovation being new to the international market as compared to the establishment's local market by a factor of 52, holding all other variables constant. This effect is statistically significant at the 1 percent level. The other results can be interpreted in the same way. However, for brevity the analysis will be focused on statistical significance and direction of effects.

Similarly, cooperation with suppliers from abroad increases the odds of an enterprise's process innovation being new to the national as compared to the local market. However, cooperation with client firms from abroad decreases the odds of an enterprise's innovation being new to national or international market relative to the local one, as well as to the international compared to the local market. Cooperation with domestic suppliers increases the odds of a process innovation being new to the national or international market relative to the local one.

Cooperation with domestic client firms has no statistically significant effect on the degree of novelty.

This is partial evidence for the direct effect of international ties on novelty. Cooperation with suppliers both from abroad and from home had a statistically significant positive effect on novelty levels. However, cooperation with client firms from abroad had a statistically significant negative effect, while no effect was found for domestic client firms.

Turning to the indirect effects, a similar picture presents itself. A higher share of direct exports increased the odds of its process innovation being new to the international market as compared to the national as well as local market. This effect is statistically significant at the 5 percent level. However, the effect on the odds of the enterprise's innovation being new to the national market as compared to the local market is not statistically significant. No statistically significant effect was found for foreign ownership.

As with product innovation, these results are partial evidence for the international ties with indirect effects on process innovation. Whereas a higher share of direct exports had a statistically significant effect on the level of international market novelty, no effect was found for foreign ownership.

Concerning the impact of the other explanatory variables, it can be briefly stated, that the odds of introduction of a process innovation new to the international or national market as compared to the establishment's local market increase if the establishment is located in the main business city of its country, holding other variables constant. Being part of a larger firm increases the odds of an establishment's innovation being new to the international level as compared to both the national and local level. The effect of R&D spending was not statistically significant. Finally, being a new firm decreased the odds of their innovation being new to the national or international markets as compared to the local one.

4.4 Discussion of Results

To analyse how the degree of novelty of an innovation is influenced by the enterprise's ties to knowledge sources from different spatial levels, a sample of innovative SME from CSEE was analysed using a multinomial logit model. Table 7 summarizes the statistically significant effects (at the 5 percent level) and their direction for the international and local direct effects as well as the international indirect effects on the degree of novelty of the SME's innovations.

For product innovation, mixed evidence for the influence of international ties on the degree of novelty was found: On the one hand, no statistically significant effect on novelty of local development cooperation ties with suppliers or client firms were found. On the other hand, ties to suppliers or client firms from abroad were found to have a significantly positively effect on certain higher novelty levels, albeit not all. Taking a closer look at the partner types, a possible explanation might be that cooperation with suppliers from abroad yields access to knowledge that is new on a national but not international level. Cooperation with clients from abroad, however, could have a more exploratory component, enabling product innovation new to the international market.

Table 9: Summary of Results

	product			process		
	nat /loc	inat /loc	inat /nat	nat /loc	inat /loc	inat /nat
cooperation with clients from abroad			+		-	-
cooperation with suppliers from abroad	+			+	+	
foreign ownership						
direct exports		+	+		+	+
cooperation with domestic clients						
cooperation with domestic suppliers				+		
cooperation with academic or research organizations	+	+		+	+	
location in the main business city	+	+		+	+	

Source: Analysis based on the BEEPS 2015 data.

For process innovation as well, the evidence on the influence of international ties on novelty was mixed: On the one hand, the effect of cooperation with suppliers from abroad had a significantly positive effect on novelty both at the international and national market, whereas cooperation with domestic suppliers only had a significantly positive effect on novelty on the national level. On the other hand, the effect of cooperation with clients from abroad had a significantly negative effect on novelty, whereas no effect was found for cooperation with domestic clients. Taking a closer look at the partner types, it seems that cooperation with suppliers is especially beneficial in process innovation, and that cooperation with international suppliers can lead to the introduction of process innovations new to the international market, whereas cooperation with domestic suppliers does so only for the national market. These findings point to the idea that in process innovation, cooperation with suppliers from abroad could have a more exploratory component, enabling process innovations new to the international market.

Furthermore, the category of international linkages might well cover innovation processes at the frontier as well as knowledge transfer or adaptation to local contexts at the same time. Similarly, the category of local linkages might include invention-oriented innovation processes as well as transfer of existing knowledge. Unfortunately, the data at hand does not allow for further distinction within these categories.

For both product and process innovation, cooperation with academic or research organizations had a significantly positive effect on novelty on the international and national as compared to the local market.

Turning to the indirect effects on novelty, being a direct exporter influenced the degree of novelty positively. The effect on product and process innovation is however indirect, as it is not possible with the present data to establish the direction of causality. It is possible, that more innovative enterprises export more, as well. Longitudinal data would be needed to assess this effect further. As the newer rounds of BEEPS become available, this might be possible. With the direct effects, this is not a problem, as the question was asked in retrospective and specific to how a specific innovation was developed.

Also, the effect on novelty of being located in the main business city was significantly positive for both product and process innovation at the international and national as compared to the local level. Intuitively, this is what might be expected, that innovations in the main business city have a higher degree of novelty.

Comparing product and process innovation, cooperation with clients from abroad seems to be most beneficial for novelty on the international market of product innovations, whereas cooperation with suppliers from abroad seems to be so for process innovation. For product innovations being new to the national market, cooperation with international suppliers was beneficial, whereas for process innovation cooperation with both international and non-international suppliers was beneficial. For novelty on the national market, no effect for cooperation with clients was found. The (albeit indirect) effect of direct exports was found for both product and process innovation. Also, the effects of location in the main business city, or cooperation with research organizations correspond to what might be expected.

5. Conclusions

This cross-country and cross-sector analysis extends the current understanding of the influence of international ties on the degree of novelty of SME's product and process innovations. Thereby it contributes to the understanding of microeconomic determinants of novelty by differentiating the effect of international ties on the novelty of innovations on the firm level. Empirical contributions on how enterprise linkages across different spatial levels impact on Small and Medium Enterprises' (SME) innovations and their degree of novelty so far has focused either on novelty of innovation or on the spatial dimension of the ties. Using a multinomial logit model with recent enterprise level data of innovative SME in Central and South Eastern Europe (CSEE), this paper aims to bridge this gap and analyses whether firms with international ties introduce innovations with a higher degree of novelty.

The main results of the analysis of how novelty is influenced by ties to knowledge sources from different spatial levels at the firm level are the following: Cooperation with clients from abroad has a statistically significant positive effect on product innovations being new to the international market, whereas for process innovations, this was cooperation with suppliers from abroad. The corresponding non-international ties had no effect on the respective innovation being new to the international market. As outlined above, these results might be linked to the exploratory component of the respective cooperation activities. Furthermore, for product innovations being new to the national market, cooperation with international suppliers was beneficial, whereas for process innovation cooperation with both international and non-international suppliers was beneficial. For novelty on the national market, no effect for cooperation with clients was found. Similarly, the role of non-international ties differs across product and process innovations as well as across novelty levels. Furthermore, while no effect of foreign ownership was found, being a direct exporter or having cooperation activities with academic or research organizations increases the likelihood of introducing innovations of a higher novelty level.

For theory, these results imply that not only access to distant knowledge sources matters, but also, that the type of these sources differs for different innovation categories. Whereas some

knowledge sources facilitate innovations new to the international level, others facilitate innovations new to the national level. The category of international linkages might well cover innovation processes at the frontier as well as knowledge transfer or adaptation to local contexts at the same time. Similarly, the category of local linkages might include invention-oriented innovation processes as well as transfer of existing knowledge. Further considerations on which international ties facilitate knowledge creation and which facilitate knowledge diffusion is needed to advance understanding the distant knowledge bases - novelty nexus.

A second aim of this paper was to analyse the potential of networks for innovative SME in CSEE in generating novelty. In a setting where the potential returns to innovation are high both for frontier innovation (products or processes new to the international market) and for adaptation to local conditions (products or processes new to the national market), networks can help overcome the size- and location-related challenges SME are faced with. Accordingly, the results have implications for policy makers and managers in SME in the region alike: Policies aiming at facilitating technology and knowledge transfer as well as management strategies in firm networking can be refined according to targeted novelty and existing ties. Besides direct exports and cooperation activities with academic or research organizations, cooperation activities with clients for product innovation as well as cooperation activities with suppliers for process innovations can lead to higher novelty levels of introduced products and processes and thus offer the opportunity to unlock innovation potentials and the returns associated therewith.

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