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Competition from informal firms and product innovation in EU candidate countries: A bounded rationality approach

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ABSTRACT

This study extends the literature that has investigated firms' readiness to confront competition from informal (unregistered) firms by responding through intensified product innovation activities. Drawing on the bounded rationality perspective, we unravel new insights into the relationship between the threat from informal competitors and product innovation by identifying two external contingencies (intellectual property rights protection and regulatory quality) and two internal contingencies (export intensity and top manager's sector experience). In this way, the study acknowledges the immense differences that exist across developing markets, focusing on post-communist societies characterized with a medium level of economic development, limited market size, and weak institutional development. An empirical prototype of this type of context is exemplified in EU candidate countries. Therefore, our model estimates the effect of the threat from informal competitors on product innovation by testing firm-level data from five countries with EU candidate status. Our findings show that direct and positive relationship between the threat from informal competitors and product innovation is strengthened when: 1) intellectual property rights protection is weaker, 2) regulatory quality is higher, 3) the firm is an intesive exporter, and 4) the firm's top managers have less experience.

Compliance with ethical standards

- **Ethical approval:** All procedures performed in this study were in accordance with the ethical standards of the universities, with the 1964 Helsinki declaration and its later amendments.
- Authors declare that they do **not have conflict of interest.**

1. Introduction

The literature investigating the strategic behavior of firms has undergone significant evolution, from a competition-based view (Porter, 1985) to a focus on the internal resources and capabilities of firms (Barney, 1991), acknowledging the importance of context in dictating a firm's strategic behavior. Merging these two perspectives, a growing literature on strategy has identified a number of empirical relationships between dysfunctional and informal competitive practices and the innovative behavior of firms. Unlike formal competition, informal firms, which are "unregistered but derive income from the production of legal goods and services" (Nichter and Goldmark, 2009, p. 1455), exploit various institutional vacuums. However, by competing for the same customers as formally registered firms (hereafter: firms), unregistered firms (hereafter: informal firms) become constituents of the formal marketplace.

While the majority of studies have shown that dysfunctional and informal competitive practices might impede a firm's innovative behavior (e.g., Liu and Atuahene-Gima, 2018; Zhang et al., 2017), others have reported that competition from informal firms may provide a positive stimulus for firms to strengthen their strategic position through innovation (Bruton et al., 2018; Cai et al., 2017). We contend that these inconsistent results may be due to two reasons. The first reason could stem from the fact that previous studies on the relationship between competition from informal firms and a firm's innovative behavior were conducted in contexts that were considered homogeneous but were in fact characterized by a high degree of heterogeneity. For almost two decades, emerging and developing economies have served as a natural experimental setting for research on how an evolving level of economic and institutional development influences business activity (Hoskisson et al., 2000; Meyer, 2004; Wu et al., 2016). Alongside studies on the

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strategic responses of firms to competition from informal firms, which were conducted in large emerging markets such as China (e.g., Bruton et al., 2018; Liu and Atuhaene-Gima, 2018), this line of inquiry has mostly been inspired by the World Bank's Business Environment and Enterprise Performance Survey (BEEPS) (Krammer, 2019; McCann and Bahl, 2017). Although this broad-brush approach has yielded important insights for theory and practice, it directly assumes the homogeneity of emerging and developing countries within such inquiries. However, in reality, large differences in many different aspects can be observed between these countries (Eurostat ONLINE, 2018): for example, in terms of economic development (e.g., Czech Republic vs. Bosnia and Herzegovina), market size (e.g., Russia vs. Montenegro), country trade and openness to investment (Poland vs. Serbia), and institutional development (Estonia vs. Albania). Indeed, scholars have identified Central and Eastern Europe (CEE) countries as a research context that is characterized by an intriguing interplay between institutional development and business activities (Jaklič et al., 2018) and have therefore called for more research in this area. Aiming to respond to these calls we narrow CEE countries down to South-Eastern European (SEE) countries with EU candidate status that remain largely under investigated (e.g., Albania, Bosnia and Herzegovina, Montenegro, Republic of North Macedonia, and Serbia) although they share common characteristics and present a relatively large market of 16 million inhabitants. These countries are marked by a communist legacy, strong historical ties, and all face pressing requirements from the EU to reform their economy, institutions, and society (European Commission, 2018).

Second, to investigate a firm's propensity to innovate in the presence of informal competition, previous studies have utilized various theoretical frameworks ranging from competitive dynamics (Iriyama et al., 2016), institutional theory (Bruton et al., 2018) as well as the attention-based view (McCann and Bahl, 2017). However, we argue that a firm's decision to engage in innovation activities in the presence of competition from informal firms might be driven by rationality. According to the bounded rationality view, prior to making any strategic decision, firms objectively valorize all the pros and cons of a given decision (Simon, 1979) within a complex set of informational cues derived from external and internal environments and a limited capacity to process all the information at hand (Dequech, 2001).

Drawing on the concept of bounded rationality, we identify information cues from the external institutional environment (intellectual property rights (IPR) protection and regulatory quality (RQ)) and a firm's experiential internal environment (generated through export intensity (EI) and top manager's sector experience (TMSE)). Through the bounded rationality argument, we therefore provide theoretical justification and empirical confirmation if identified information cues from the external and internal environments can motivate firms to enhance or rationalize their product innovation (PI) responses in the presence of competitive threats from informal firms.

Our study offers three novel contributions by shedding light on the boundary conditions (external and internal) of the link between informal competition and PI. First, we show that IPR protection and RQ, the external contingencies embodied in a firm's institutional environment (London and Hart, 2004), significantly determine the intensity of a firm's PI in the face of informal competition. Second, we highlight the relevance of the experiential capital of the internal environment of the firm (Mullins et al., 1999), outlined through EI and TMSE, that act as internal boundary conditions shaping the link between competition from informal firms and PI. Finally, by framing internal and external boundary conditions as information cues, our study corroborates the utility of the bounded rationality framework in explaining the intensity of a firm's PI activities in the presence of competition from informal firms in the post-communist societies of the SEE context (Jaklič et al., 2020; Rašković and Vuchkovski, 2020).

2. Theoretical background

Bounded rationality is a specific form of rationality that organizations exercise when the environment in which they operate is above the mental processing abilities of their employees (Decqueh, 2001). This perspective has a natural basis in decision making and in finding an alternative in situations where a firm has several strategic goals to choose from (Simon, 1957; Tushman, 1977). It is activated when the environment is too complex to pursue all alternatives at hand (e.g., to invest in innovation or to reduce prices to fight informal competitors). Consequently, bounded rationality is used by the decision maker who tries to find a satisfactory outcome within a complex internal and external environmental setting (Simon, 1957) characterized by intensive formal and informal competition.

The strategic choices a firm makes are being threatened by the competitive actions of unregistered, informal entities (Darbi et al., 2018; McCann and Bahl, 2017) which raise the complexity of decision making. These informal entities are legally unregistered and thus avoid the business-related regulations, taxes, and laws posed by governments (World Bank Open Data ONLINE; Godfrey, 2011; Xie et al., 2018), but derive revenue from the production and sales of goods and services (Nichter and Goldmark, 2009; McCann and Bahl, 2017). Evidence shows that competition from informal firms is highly prevalent in developing economies (Schneider and Enste, 2002) where informal market players of different sizes are imposing price pressures on firms who adhere to all the rules and principles imposed by the authorities. Therefore, we build on previous research that successfully contextualized bounded rationality to explain a firm's responses to competition from informal firms (Johnson and Hoopes, 2003) as well as a firm's tendency to derive information from the environment to craft more effective strategic decisions (Cristofaro, 2020; Gavetti and Rikvin, 2007). Consequently, we use the bounded rationality framework to explain how firms can optimize their decisions to successfully achieve their organizational goals (Hallen and Pahnke, 2016; Schubert et al., 2018) when competing with informal firms. With an aim of clarifying the relationship between competition from informal firms and a firm's PI activities, we contend that managers are using the bounded rationality approach to interpret information cues coming from internal and external environments (London and Hart, 2004) to decide about PI activities.

Strategy researchers have shown that institutional differences, which correspond to the external environment between countries, should be accounted for when valorizing the impact of a firm's strategic choice on performance (Hoskisson et al., 2000; Meyer, 2004). This is because firms adapt their behavior in relation to the social, political, and regulatory forces emanating from institutions, both formal and informal (North, 1990). Formal institutional pillars are seen as laws and regulations (DeSoto, 2000) while informal pillars are embedded in the social norms with which behavior needs to be aligned. Formal institutions have been found to be more prevalent in shaping innovation responses to competition from informal firms (Krammer, 2019; McCann and Bahl, 2017). Because of their communist legacy and inertia in implementing institutional reforms, SEE economies provide a living lab for investigating the impact of institutional dynamics on a business ecosystem (Jaklič et al., 2018). Therefore, we focus on the role of information cues that represent elements of formal institutions when making a rational decision. In a given case, formal institutions have two subsystems directly affecting businesses: RQ and the rule of law reflected through IPR protection, each with a different set of properties that shape a firm's behavior (Simon, 1996).

Besides the external environment, the extant literature highlights the relevance of the internal environment of a firm through experiential capital (Mullins et al., 1999). More specifically, studies show that the internal environment can significantly determine a firm's propensity to innovate (e.g., Kostopoulos et al., 2002). Information cues used to assess the strength of the internal environment are often seen through intangible resources, such as knowledge and experiential and human capital

(Seligman, 2006; Xu, 2011). Furthermore, studies show that capital generated through EI and TM's experience significantly affects the innovation activity of CEE firms (Maksimov et al., 2017). From the standpoint of bounded rationality, we argue that EI and TMSE may serve as information cues leveraged by managers when deciding on the extent of a response to competition from informal firms through PI.

3. The conceptual model and hypotheses

By drawing on the bounded rationality view, we developed a conceptual model (Fig. 1) that aims to improve the understanding of the role of competition from informal firms in a firm's PI in the context of SEE countries with EU candidate status. Following this approach, we identified information cues that corresponds to external (the formal institutional environment) and internal (experiential capital) environmental characteristics that condition this relationship. In the following section arguments leading to our hypotheses will be justified.

3.1. Threat from informal competition and product innovation

PI is defined as "a good or service that is new or significantly improved. This includes significant improvements in technical specifications, components and materials, software in the product, user friendliness or other functional characteristics" (OECD, 2005). Reliance on PI in developing markets can be seen as one of the main prerequisites for improved performance (Miocevic and Morgan, 2018; Yi et al., 2017). Thus, several studies have explored the innovative behaviors of firms in the presence of informal competitors, yielding mixed findings (e.g., Bruton et al., 2018; Liu and Atuahene-Gima, 2018; McCann and Bahl, 2017). Nevertheless, informal firms still represent a competitive force, and it has been well established that competition leads to faster innovation (Boone and Van Dijk, 1998). In developing and post-communist economies such as EU candidate countries, informal firms directly compete with constituents of the formal economy (European Commission, 2018). Informal firms avoid the costs incurred by various governmental requirements (e.g., value added tax) as well as procedures instilled through various regulatory mechanisms. Thus, by avoiding institutional requirements, informal firms are able to decrease their operational costs (e.g., cost savings from tax evasion) which helps them build a competitive advantage through cost leadership. From the standpoint of bounded rationality, it is expected that the stronger presence of informal competitors will trigger a strategic response from firms in terms of developing and launching new products and services. PI will help firms maintain a competitive edge over informal firms through differentiation (Porter, 1985), since it has been shown that informal firms do not have a strong propensity to innovate (Fu et al., 2018). Consequently, we hypothesize:

H1. Competition from informal firms is positively related to a firm's product innovation.

3.2. Moderating effect of intellectual property rights protection

The formal institutional dimensions play an important role in enhancing the outcomes of innovation activities (Ege and Ege, 2019). By focusing on the competitive activities of informal firms, we posit that firms will form a decision on whether to engage in PI by analyzing specific pillars of the formal institutional environment through an interpretation of information cues underlying these pillars.

Rule of law is the perception of the extent to which agents have confidence in and abide by the rules of society: in particular, the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence (Chang et al., 2015). As the most prevalent rule of law mechanism, IPR protection provides a legal safeguard for firms, thus removing uncertainty and providing an information cue that investments in proprietary assets will be defended/secured. IPR protection has been a continuous concern for many industries whose business models rely on investments in R&D, new product development, branding, and technological know-how.

Although aiming to stimulate the innovation-friendly environment (Candelin-Palmqvist et al., 2012), empirical evidence shows that IPR protection can have opposing effect on firm innovation activities (Chang and Sellak, 2021). For instance, studies show that higher IPR protection standards do not stimulate innovative activities from firms (Brinkerink and Rondi, 2021) or increase their competitiveness (Teixeira and Ferreira, 2019) when dealing with informal competitors in emerging and developing countries (Pathak et al., 2016; Wu et al., 2017). Furthermore, developing country firms tend to increase their investment in

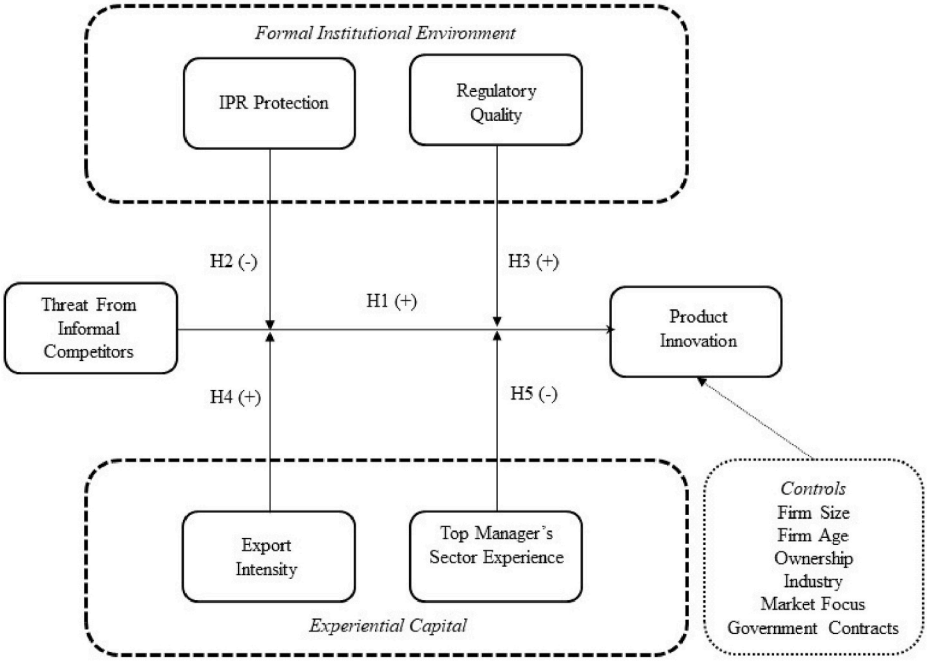

Fig. 1. Conceptual model.

environments with weaker IPR protection since they can acquire knowledge-based assets in informal ways (Yoo and Reimann, 2017). Keupp et al. (2009) suggest that in the environments with weaker IPR protection firms rely less on the system and focus more on their solutions which include increasing the technological complexity of their products.

Consequently, it can be argued that in countries with weaker IPR protection, the innovation activities can become substitutes (Safari, 2016). From the bounded rationality perspective, we contend that in countries with stronger IPR protection, firms will not have an additional stimulus to increase their PI activity when the competitive threat from informal firms' increases. Such firms feel safeguarded and conduct their business as usual and consider that informal competitors are taken into consideration by the legal framework. However, in environments with lower IPR protection, firms will be more encouraged to innovate to battle informal firms. Lower IPR protection standards will thus give a signal to firms that they cannot rely on legal safeguards and must develop strategic responses on their own. Therefore, we hypothesize:

H2. Firms are more/less likely to respond with product innovation to increased competition from informal firms in countries with weaker/stronger IPR protection standards.

3.3. Moderating effect of regulatory quality

The RQ subsystem is part of the formal institutional environment that focuses on policies and governance. RQ captures perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development (Krishnan and Theo, 2012). These policies imply that regulations are enforceable, transparent and non-discriminatory, as well as being designed to encourage the competition, to eliminate unnecessary barriers to trade and investment, to secure market openness, and that they are systematically and periodically reviewed to make sure they meet the objectives (OECD, 2008). Furthermore, the regulatory environment has been found to be of critical importance for innovation and investments in the market (Dutta and Mia, 2010); thus, a high-quality regulatory framework can serve as an information cue that increases a firm's confidence to invest in innovation-related activities. Informal firms avoid market regulations and thus are quicker and have a potential competitive advantage (Qi et al., 2018). Extant studies offer empirical evidence that innovative firms benefit largely from efficient regulatory systems. For instance, Rodríguez-Pose and Zhang (2020) found that RQ can significantly increase firm's innovation propensity. Therefore, RQ is among the most important facilitators of innovative activities (D'Ingiullo and Evangelista, 2020; Kawabata and Junior, 2020; Rodríguez-Pose and Di-Cataldo, 2015).

When considering the impact of RQ, we contend that firms will try to weight their decision to innovate when competing with informal firms. In a situation when the quality of regulations is high, firms will respond more strongly to competitive threats from informal firms through PI. In the presence of higher RQ, the thresholds safeguarding competition and fair business practices are at a high level and at the same time unnecessary burdens are minimized, which ultimately lowers the costs of doing business for firms. To the contrary, in contexts characterized by a low RQ and strong threat from informal competition, firms do not receive enough incentives to innovate. Consequently, firms will try to maintain their present profitability by controlling their costs without making new investments in PI. This is because firms have limited resources, and if the regulatory burden is high this will absorb most of their resources. Hence, we posit that high RQ provides a strong information cue that encourages firms to increase their PI activity when dealing with informal competitors. These arguments lead us to hypothesize the following:

H3. Firms are more/less likely to respond with product innovation to increased competition from informal firms in countries with higher/lower regulatory quality.

3.4. Moderating effect of export intensity

In the following section we will focus on the experiential resources nurtured within a firm's internal environment (Filatotchev et al., 2009) that can condition the effect of competition from informal firms on PI. A firm's innovation capacity and EI are significantly related and mutually enhancing (Golovko and Valentini, 2011). Studies show that a firm's innovation capacity increases through learning-by-exporting and that these effects are stronger for firms in developing economies (Martins and Yang, 2009). This is not surprising since exporters from developing economies can generate more value-added from doing business abroad: 1) from simply interacting with new and novel business environments or by 2) generating valuable technological and management managerial know-how from doing business abroad (Xie and Li, 2018).

According to the tenets of the learning-by-exporting hypothesis (Salomon and Shaver, 2005), higher exporting experience leads to knowledge spillover as companies operating in foreign markets can utilize this knowledge and innovation know-how to develop sound innovative products for both domestic and international markets (Barrios et al., 2003). The experience that firms leverage through exporting acts as an information cue that builds up their confidence for engaging in PI. Hence, we argue that there is an underlying rational motive for firms with higher EI to increase PI efforts as threats from informal competitors' increase. As firms increase their presence in export markets, they gain significant experience and upgrade their know-how (Golovko and Valentini, 2014). This experience is then utilized to upgrade resources and the capabilities required for PI (Tse et al., 2017). Therefore, exporters are likely to see innovating in the presence of competition from informal firms as a more efficient option when compared to firms who do not have exporting experience. Conversely, firms with lower EI will enjoy fewer knowledge spillovers from exporting and would see a higher risk and would thus rationalize their PI capacity when confronting informal competitors. Thus, we hypothesize:

H4. Firms with high/low export intensity are more/less likely to respond with product innovation to increased competition from informal firms.

3.5. Moderating effect of top Manager's sector experience

Another way to leverage the internal environment, more specifically a firm's intangible capital (e.g., Kostopoulos et al., 2002), is to use TMSE. In this study, we posit that top managers who are more experienced in the industry are an asset for firms (Ibrarra, 1993); thus, firms that are managed by experienced top managers will be less susceptible to the turbulences in both broader and industry-level environments (Walsh, 1988; Wieresma and Bantel, 1992). Therefore, it is reasonable to expect that highly experienced top managers will not change their strategic *modus operandi* when threats from informal competitors increase. Hence, we suggest that the greater the experience of top managers in the industry, the weaker the positive effect of competition from informal firms on PI. It can be assumed that top managers who have spent a longer time in business are more familiar with the industry and have a broader spectrum of information on the pressure coming from informal competitors. They are more persistent in their decisions, more conservative, and are not subject to impulsive innovation when informal competitors emerge. Consequently, more experienced top managers know the market situation better and are thus aware of all risks and possibilities when informal competitors challenge their firms.

By contrast, less experienced top managers are inclined to be forward thinkers (Walker, 2002) with a lower degree of risk aversion (Menkhoff et al., 2006). They are ready to turn the challenge of facing informal competition into an opportunity, rendering it a change agent that stimulates innovations by the firm. Top managers with limited experience are also better at navigating the stormy "waters" of markets with informal competitors, as well as gaining access to resources and

pursuing their goals (O'Tole and Tarp, 2014; Ibrarra, 1993). Therefore, we hypothesize:

H5. Firms with less/more experienced top managers are more/less likely to use product innovation to respond to increased competition from informal firms.

4. Method

4.1. Research setting and sample

The data for this study was obtained from BEEPS conducted by the World Bank and the European Bank for Reconstruction and Development (EBRD) on a large number of firms across 30 emerging and developing nations in Eastern Europe and Central Asia. In our study, we limited the focus to EU candidate countries from Southeast Europe, namely: Albania, Bosnia and Herzegovina, the Republic of North Macedonia, Montenegro and Serbia. We believe that the context of EU candidate countries offers a suitable framework for testing the propositions in our model for several reasons. First, there are many pressing issues EU candidate countries need to resolve prior to formal accession, including economic and institutional reforms. According to the indicators within economic and institutional environments (e.g., Doing Business and Economic Freedom rankings) that directly affect businesses, EU candidate countries from Southeast Europe are ranked significantly lower than EU counterparts that are considered emerging markets (e.g., Poland, Croatia, Slovenia, Slovak Republic, Czech Republic, Lithuania, and Estonia). Although the institutional development of EU candidate countries has been generally weak, differences among them exist (European Commission, 2018) allowing us to inspect how the different pace of institutional improvement can shape firms' PI activities when challenging competitors from an informal economy. Second, we believe that the context of EU candidate countries will shed new light on how companies from post-communist societies leverage internal experiential capital when making decisions on when to use innovation to challenge competitors from an informal economy.

The data in the BEEPS surveys are generally provided by the owner (s) or other top managers of business. BEEPS has become very popular among scholars investigating the determinants of innovative behavior by firms (Krammer, 2019; McCann and Bahl, 2017). After limiting the dataset to EU candidate countries, we proceeded with data cleansing to remove missing data. This left a total of 1419 valid observations.

4.2. Measures

The BEEPS survey consists of questions that measure firm-level information on a broad range of issues regarding the business environment and the performance of firms, including business-government relations, firm financing, labor, infrastructure, informal payments, and corruption. The dependent variable PI was measured by asking respondents the question "During the last three years, has this establishment introduced new or significantly improved products or services? Please exclude the simple resale of new goods purchased from others and changes of a solely aesthetic nature." The responses to this question were coded 1 for firms that engaged in the innovation of goods or services and 0 for firms that did not. The independent variable threat from informal competitors was measured by asking respondents to indicate the extent to which they believe informal competitors (unregistered firms) pose a threat to their current operations. The responses to this question ranged from 0-no obstacle to 4-a very severe obstacle. The independent variable RQ was operationalized using "burden of government regulation" scores obtained from the Global Competitiveness Report (GCR), Executive Opinion Survey. The same source was used to measure the IPR protection which was operationalized using "Intellectual Property Protection" scores. We used data from the GCR to match the data from BEEPS.[1] EI was measured by the percentage of total sales coming from a firm's direct and indirect exports. TMSE was measured by asking respondents to indicate the number of years the top manager has been working in that sector.

We also decided to control for additional effects that might influence a firm's decision to engage in PI. We controlled for firm size by using the natural logarithm of the number of employees. We expected that larger firms would be more likely to innovate. Firm age was measured by the natural logarithm of the number of years for which the firm has been formally operating. We expected that the experience accumulated from inception to the present day would increase a firm's propensity to innovate. To measure industry effects, we included an industry-level dummy (0 - non-manufacturing sectors, 1 - manufacturing sectors). The structure of firm ownership was measured by including the proportion of foreign and government stakes in the overall ownership of firms. Firms with a larger proportion of foreign ownership were expected to engage more in innovation activities compared with firms that had a larger proportion of state ownership. Market focus was measured by classifying firms according to their geographical focus (0-national, 1-international). We also controlled whether a firm has won a government contract. This was measured by asking respondents whether their firm had secured or attempted to secure a government contract (0-no, 1-yes).

Like all survey data, we are aware of possible problems with common method variance (CMV). However, the BEEPS survey is structured in a way that minimizes the problems with CMV and, furthermore, we: 1) used different data sources (i.e., the Global Competitiveness Report), 2) tested for interaction effects, and 3) utilized several procedures for testing robustness that also serve to minimize overall CMV (McCann and Bahl, 2017).

5. Results

5.1. Model specification and results

We used binary logistic regression to analyze the properties of the model and test the hypotheses. Because our model contains moderation effects, we mean-centered the independent and control variables and created the responding interaction effects. To test the hypothesized relationships, we estimated three models. In Model 1, we included the control variables. Model 2 comprised direct effects (informal competition, RQ, IPR protection, EI and TMSE) while Model 3 contained the interaction effects described in H2, H3, H4 and H5. The intercorrelation matrix used for the variables is presented in Table 1. The findings of binary logistic regression are presented in Table 2.

The Hosmer-Lemeshow test indicates that the model adequately describes the data ($\chi 2 = 3.018$; $df = 8$; $p > 0.05$), while Nagelkerke R^2, Cox-Snell R^2, and overall Chi-square statistics suggest that the model performs well (see the notes in Table 2). Regarding the control variables, significant effects were found for size ($\beta = 0.18$; $p < 0.05$), industry ($\beta = 0.60$; $p < 0.01$), and government contract ($\beta = 0.82$; $p < 0.01$) whereas no significant relationship with PI was found for the other control variables (age, market focus, percentage of foreign ownership, and government ownership). In terms of the main effects, the findings show that the main effect of the level of threat from informal competitors has a positive and significant relationship with a firm's propensity to engage in PI ($\beta = 0.10$; $p < 0.05$), which supports H1. Furthermore, the TMSE, RQ, and EI all have a significant relationship with PI whereas IPR protection does not.

In relation to the moderation hypotheses, the findings suggest that

[1] High scores on these indicators mean higher levels of regulatory quality and higher levels of IPR protection.

Table 1
Intercorrelation matrix.

#	Constructs	1	2	3	4	5	6	7	8	9	10	11	12
1	Firm size (Ln)	1											
2	Firm age (Ln)	0.16**	1										
3	Industry dummy	−0.13	−0.05*	1									
4	Foreign ownership	0.19**	−0.06*	−0.01	1								
5	Government ownership	0.11**	0.12**	−0.01	0.01	1							
6	Market focus	0.14**	−0.04	−0.23**	0.13**	−0.02	1						
7	Government contract	−0.08**	−0.07**	−0.00	−0.04	−0.01	0.04	1					
8	Threat from informal competitors	−0.12**	0.03	0.00	−0.04	−0.01	−0.10**	−0.04	1				
9	IPR protection	−0.08**	0.02	−0.01	−0.02	−0.04	0.02	−0.01	0.14**	1			
10	Regulatory quality	−0.09**	−0.11**	−0.02	−0.04	−0.03	0.00	−0.01	0.03	0.33**	1		
11	Export intensity	0.20**	−0.01	−0.26**	0.15**	−0.01	0.83**	0.01	−0.11**	0.01	−0.01	1	
12	TM's sector experience	0.04	0.34**	−0.03	−0.06*	0.03	0.06*	−0.09**	0.09**	0.06*	−0.10**	0.05	1

Notes: **- $p < 0.01$, * - $p < 0.05$(2-tailed).

Table 2
Binary logistic regression findings.

Independent variables	Model 1					Model 2					Model 3				
	B	S.E.	Wald	Sig.	Exp (B)	B	S.E.	Wald	Sig.	Exp (B)	B	S.E.	Wald	Sig.	Exp (B)
Control variables															
Firm size (Ln)	0.23	0.09	6.26	0.01	1.25	0.20	0.09	4.50	0.03	1.22	0.18	0.09	3.90	0.05	1.20
Firm age (Ln)	0.17	0.09	4.04	0.04	1.19	0.09	0.09	0.89	0.35	1.09	0.09	0.09	1.00	0.32	1.10
Industry (dummy)	0.60	0.13	21.46	0.00	1.81	0.59	0.13	19.84	0.00	1.80	0.60	0.13	20.75	0.00	1.83
Foreign Ownership	0.00	0.00	0.14	0.71	1.00	0.00	0.00	0.05	0.82	1.00	0.00	0.00	0.04	0.84	1.00
Government Ownership	−0.03	0.02	1.99	0.16	0.97	−0.03	0.02	2.10	0.15	0.97	−0.03	0.02	2.59	0.11	0.97
Market Focus	0.20	0.21	0.92	0.34	1.22	−0.43	0.36	1.41	0.24	0.65	−0.46	0.36	1.62	0.20	0.63
Government Contract	−0.86	0.19	20.11	0.00	0.43	−0.84	0.19	18.76	0.00	0.43	−0.82	0.20	17.57	0.00	0.44
Direct effects															
Constant	−0.49	0.48	1.04	0.31	0.61	0.40	0.60	0.45	0.51	1.49	0.27	0.48	6.43	0.01	0.29
IPR protection (IPR)						−0.28	0.23	1.46	0.23	0.76	−0.16	0.23	0.49	0.48	0.85
Regulatory quality (RQ)						−0.31	0.10	10.20	0.00	0.73	−0.30	0.10	9.20	0.00	0.74
Export intensity (EI)						0.01	0.00	4.89	0.03	1.01	0.01	0.00	7.22	0.01	1.01
Top manager's sector experience (TMSE)						0.02	0.01	4.37	0.04	1.02	0.02	0.01	4.98	0.03	1.02
H1: Threat from informal competitors						0.08	0.05	3.25	0.07	1.09	0.11	0.05	4.94	0.03	1.11
Interaction effects															
H2: Threat from informal competitors * IPR											−0.34	0.17	4.17	0.04	0.71
H3: Threat from informal competitors * RQ											0.25	0.08	11.10	0.00	1.28
H4: Threat from informal competitors * EI											0.01	0.00	5.10	0.02	1.01
H5: Threat from informal competitors * TMSE											−0.01	0.01	3.90	0.05	0.99

Notes: Model 3 - $R^2 = 0.074$ (Cox & Snell), 0.106 (Nagelkerke). Model $\chi^2(18) = 109.771$, $p < 0.01$.

IPR protection has a negative moderating effect ($\beta = -0.34$; $p < 0.05$) on the relationship between a threat from informal competitors and PI, leading to the acceptance of H2. Furthermore, the moderating effect of RQ enhances PI in the presence of a threat from informal competitors ($\beta = 0.25$; $p < 0.01$), thus supporting H3. Further, the findings show that EI has a positive and significant moderating effect ($\beta = 0.01$; $p < 0.05$), while the TMSE has a negative and significant moderating effect on the relationship between the level of threat from informal competitors and PI ($\beta = -0.01$; $p < 0.05$). Thus, both H4 and H5 are supported. A statistical summary of the findings is presented in Table 2.

We continue with the analysis of simple slopes, meaning, the conditional effects of the focal predictor (threat from informal competition) at values of the moderators. We have conducted it in PROCESS v3.5 (Hayes, 2018), using Model 1 (simple moderation) where we tested simple slopes for each moderator, keeping all other elements of the model as the covariates (to get the accurate representation of our overall model). In the Table 3, we outline our results of simple slopes and significance levels of each. Table 3 shows that the strong change in the main effect depends upon the values of the moderator. For the IPR protection moderator, when the moderator value is low main effect of

Table 3
The simple slope test.

Moderator value	Conditional Main Effect	S.E.	Z-value	p-value	LLCI	ULCI
IPR protection						
−0.29	0.20	0.07	2.92	0.003	0.0669	0.3407
0.00	0.10	0.05	2.22	0.027	0.0122	0.1972
0.29	0.01	0.06	0.09	0.932	−0.1228	0.1339
Regulatory quality						
−0.67	−0.06	0.07	−0.94	0.349	−0.1947	0.0687
0.00	0.10	0.05	2.22	0.027	0.0122	0.1972
0.56	0.24	0.07	3.77	0.000	0.1171	0.3703
Export intensity						
−11.00	0.06	0.05	1.17	0.244	−0.0408	0.1607
0.00	0.10	0.05	2.22	0.027	0.0125	0.1975
25.66	0.21	0.07	3.18	0.002	0.0806	0.3388
Top manager's sector experience						
−9.09	0.19	0.07	2.85	0.004	0.0606	0.3280
0.00	0.10	0.05	2.22	0.027	0.0121	0.1971
9.09	0.02	0.06	0.24	0.812	−0.1080	0.1377

Note: Significant conditional main effects are highlighted in grey; LLCI – Lower-level confidence interval; ULCI – Upper-level confidence interval.

the informal competition is strong and significant (Low IPR protection moderator value = −0.29; $\beta_{\text{main effect}} = 0.20$, p = 0.003), while it declines with the increase of the moderator value (Medium IPR protection moderator value = 0.00; $\beta_{\text{main effect}} = 0.11$, p = 0.027), to the point it becomes insignificant at the high moderator value (High IPR protection moderator value = 0.29; $\beta_{\text{main effect}} = 0.01$, p = 0.932). In the case of the RQ moderator, when the moderator value is low main effect of the informal competition is not significant (Low RQ moderator value = −0.67; $\beta_{\text{main effect}} = -0.06$, p = 0.394), while it becomes significant with the increase of the moderator value (Medium RQ moderator value = 0.00; $\beta_{\text{main effect}} = 0.11$, p = 0.027), with the highest effect at the high moderator value (High RQ moderator value = 0.56; $\beta_{\text{main effect}} = 0.24$, p = 0.000).

When it comes to EI, when the moderator value is low main effect of the informal competition is not significant (Low EI moderator value = −11.00; $\beta_{\text{main effect}} = 0.06$, p = 0.224), while it becomes significant with the increase of the moderator value (Medium EI moderator value = 0.00; $\beta_{\text{main effect}} = 0.11$, p = 0.027), with the highest effect at the high moderator value (High EI moderator value = 25.66; $\beta_{\text{main effect}} = 0.21$, p = 0.002). Finally, for the TMSE moderator, when the moderator value is low main effect of the informal competition is strong and significant (Low TMSE moderator value = −9.09; $\beta_{\text{main effect}} = 0.19$, p = 0.004), while it declines with the increase of the moderator value (Medium TMSE moderator value = 0.00; $\beta_{\text{main effect}} = 0.11$, p = 0.027), to the point it becomes insignificant at the high moderator value (High TMSE moderator value = 9.09; $\beta_{\text{main effect}} = 0.02$, p = 0.812).

5.2. Robustness checks

To ensure that our findings were robust we ran additional checks on our model. First, we ran a binary logistic regression model by omitting the control variables, which showed that our results did not change. Second, we ran a STATA regression models with robust standard errors (SEs) and with clustered countries to assess whether there any changes to the model effects, and the focal effects remain stable and consistent.

Third, we utilized different datasets as an alternative measure of RQ and IPR protection. For instance, to measure the level of IPR protection we used the *international property rights index (IPRI)* data provided by the Property Rights Alliance (2020). After substituting the variables in the model, our results remained broadly similar, although the interaction effect between TMSE and the threat from informal competitors was weaker (β = - 0.01; p = 0.05). The same procedure was followed for RQ, where we used the available data in the *Doing Business Index* provided by the World Bank (2012). The *Doing Business Index* measures various aspects of RQ in the country that directly affect business in establishing and maintaining their operations. After substituting the variables in the model, our results remained broadly similar, although the interaction effect between IPR protection and the threat from informal competitors was weaker (β = - 0.04; p = 0.05). We then used an alternative measure for the dependent variable. This involved recoding the PI variable by extending it to account for different types of PI activities, such as radical vs. incremental. To capture the variations between these activities, firms that have engaged in "new to the market" innovation were coded 2 and firms that have engaged in incremental innovations were coded 1. Finally, to additionally account for the nested structure of the data within countries, the hierarchical regression model with interaction effects showed that all paths remained significant, suggesting that the model supports our hypothesis even if the dependent variable is operationalized as continuous.

6. Discussion

This study examined conditioning effects of external (IPR protection and RQ) and internal cues (EI and TMSE) on the relationship between the threat from informal competitors and PI in five EU candidate countries. Like in previous studies, the threat from informal competitors (H1) was found to be positively related to a firm's PI activity.

The informal economy is a serious problem for developing countries due to traditionally underdeveloped and weak institutional environments. In such circumstances, firms are endangered by the emergence of informal firms that, by avoiding the rules of the game (e.g., avoiding taxes), can harness many advantages and thus pose a serious competitive threat. In these circumstances, institutions are having even more important role that can safeguard the marketplace by setting the rules of the game with the goal of reducing non-ethical, corruptive, and informal practices by market actors (Peng, 2002). In terms of bounded rationality, formal institutions provide an information cue to managers when making rational decisions in given circumstances (Dequech, 2001). Although the literature shows that improvements in the institutional environment are beneficial for fostering business activity in developing countries (European Commission, 2018), how firms utilize these signals as part of their strategic behavior against informal competitors was largely in the domain of speculation. Our study helps in going beyond this speculative zone by showing that formal institutions are sending different signals to firms when they make decisions on whether to utilize PI activities as a response to informal competitors.

IPR protection aims to provide a safeguard for firms who innovate as they know that the law enforces strong punishment for firms who engage in business activities that violate the rule of law. In testing the moderating effect of IPR protection (H2), our results show that firms are more ready to engage in PI as a response to increased threats from informal competitors when IPR protection policies are weak. However, it is interesting to note that in countries featuring strong IPR protection mechanisms, firms tend to rationalize their PI response in relation to situations of low and high threats from informal competitors (see Fig. 2a). We provide evidence that strong IPR protection does not necessarily lead to a higher propensity to innovate when informal competitors pose a stronger threat. The findings show that in countries with strong IPR protection laws, a firm's PI is consistent regardless of the threat from informal competitors. In such a context, firms rationalize their investments in PI and rely on a rule of law that safeguards their interests. The stronger inclination towards PI in countries with weaker IPR protection laws might be surprising at first glance. Yet, recent reports suggest that one of the major problems in EU candidate countries is a low level of trust in courts and legal institutions (UNDP, 2018). Therefore, our results could be explained to a certain extent by the proposition that, in contexts where firms face strong competition from informal firms and where IPR protection is weak, firms engage in PI as they see it as the only way to compete with informal competitors (Keupp et al., 2009). A different strategy would be to engage in cost cutting; however, in contexts where IPR protection is weak, firms are aware that they are unlikely to win that war against informal firms.

In testing the moderating effect of RQ (H3), we found that firms operating in countries with higher RQ increase their PI response when the threat from informal competitors intensifies. High quality regulatory framework is a value-added facilitator for PI when a firm faces strong threats from informal competitors. High quality regulatory environments lessen the burden of doing business, which enables firms to lower their operational costs and allocate more resources to PI (D'Ingiullo and Evangelista, 2020; Kawabata and Junior, 2020). However, we also found that firms operating in environments with low RQ tend to rationalize PI when the threat from informal competitors intensifies (see Fig. 2b). In environments characterized by weaker RQ, firms will opt for a rationalization strategy that can also be attributed to rational choice. In situations when there is a greater threat from informal competitors, firms that abide by burdensome regulations (low RQ) will have no incentive to increase their efforts in PI. This is because firms have limited resources, and if the regulatory burden is high this will absorb most of those resources.

According to insights from the moderating effect of EI (H4), highly export-oriented firms have a greater imperative to engage in PI when there is an intensified threat coming from informal competitors. Export-

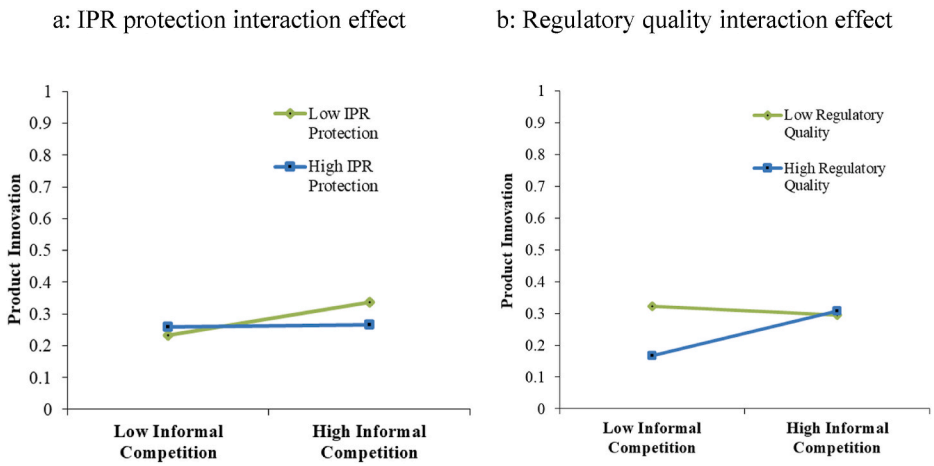

Fig. 2. Illustration of the interaction effect of formal institutions factors.
a: IPR protection interaction effect. b: Regulatory quality interaction effect.

oriented firms generate additional know-how through learning-by-exporting which means that, for them, investing in PI to fight informal competitors is a less risky strategy compared to firms that are less experienced in exporting. In this regard, such findings confirm the utility of the bounded rationality framework. Thus, firms are willing to build on established export processes that generate a steady flow of experiential capital that translates into upgrading a firm's know-how, resources, and capabilities. In such a way, stronger EI helps companies to unleash their PI more readily when confronting informal competitors. These activities may include investing in technology to differentiate themselves and to maintain a competitive advantage in environments featuring strong informal competition. Yet, firms with weak EI seem to have less interest in doing so and they rationalize which is reflected in a lower propensity to engage in PI (see Fig. 3a).

Our study also unfolds the importance of TMSE. In revealing the moderating effects of TMSE (H5), the results demonstrate that firms with highly experienced top managers have a consistent PI response regardless of the intensity of the threat from informal competitors. Interestingly, firms with top managers who have less sector-relevant experience seem to increase their PI activity as a response to the intensified threat from informal competitors (see Fig. 3b). This can again be explained within bounded rationality arguments in that more experienced managers are using their insights from the past as proxies for decision making in the present. Thus, more experienced top managers are biased and, when faced with the high threat of informal competition, they alleviate its effect on their decision to increase their PI efforts. By contrast, top managers with limited/less experience in the sector are challenging the competition (O'Toole and Tarp, 2014; Ibrarra, 1993) and hence allowing the informal competitors to have a more substantial influence on a firm's innovativeness.

7. Conclusions

7.1. Theoretical and managerial implications

This study offers three novel theoretical implications. First, this study disentangles the relevance of the information cues derived from firms' external environments (London and Hart, 2004) that shape their decision to innovate when confronted by informal competitors. In this regard, study contributes by differentiating whether these cues are motivating firms to enhance or rationalize the extent of PI as a response to the threat from informal competitors. Study shows that depending on the status of external cues (weak/strong) in the case of RQ and IPR protection, firms' PI response can significantly differ. Namely, firm's innovation response to strong informal competition is highest in the situation of low IPR protection and high RQ, showing that those institutional aspects signal to firms that it is rational to innovate. Conversely, when the IPR protection is at the high level and regulations are burdensome, firms do not react with innovations as a response to the informal competition.

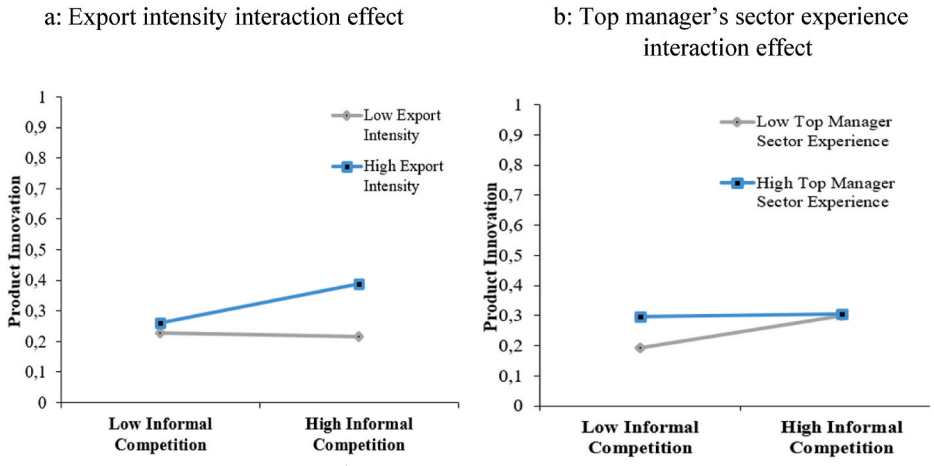

Fig. 3. Illustration of the interaction effect of experiential capital
a: Export intensity interaction effect. b: Top manager's sector experience interaction effect.

Second, this study further stresses the relevance of the firm's internal environment (Mullins et al., 1999). Internal constraints also shape innovation response to the competition from informal firms and are outlined in this study by the EI and TMSE. We show that, in terms of internal contingencies, the response to informal competition with PI is the strongest when EI is high and TMSE is low. It is interesting how two different types of experience, one gained through an additional know-how and the other gained through the individual managerial knowledge of the industry work in completely the opposite way in terms of their conditioning effect. We find bounded rationality relevant for understanding these effects once again, since with greater EI firms can easily and more efficiently transfer their experiences to PI when faced with the threat, while in contrast top managers with high sector experience actually lower their PI response to informal competition, which can be explained by the rational tendency to avoid risky decisions which could be accurately seen and understood as a consequence of greater experience.

Finally, drawing on the concept of bounded rationality, the study contributes to the literature (Krammer, 2019; McCann and Bahl, 2017) by showing that the choice to innovate in the presence of strong informal competitors can be framed as a process of rational decision-making in which firms assess all the costs and benefits of a given decision, albeit within the limitations of their information processing abilities (Simon 1979). In this way, through bounded rationality theory we help in resolving inconsistencies in the previous literature related to the relationship between informal competitive practices and firm's innovative behavior (e.g., Liu and Atuahene-Gima, 2018; Zhang et al., 2017; Bruton et al., 2018; Cai et al., 2017). In this way, the study not only adds to the body of research on the informal economy in general (Godfrey, 2011) and firm behavior in this context (e.g., Bruton et al., 2018; Cai et al., 2017), but also focuses on a context of post-communist societies of the SEE context (Jaklič et al., 2020; Rašković and Vuchkovski, 2020) with the same status, that are largely unexplored.

According to the McKinsey Global Innovation Survey (2020), 84 % of executives believe that the future success of their firms is dependent on innovation. Innovations have immense benefits for firms (e.g., performance growth) and for society at large: for example, the additional value of innovation in developing markets lies in its ability to create prosperity and social equality. This explains why understanding the drivers of innovation is an important topic for managers in developing markets. However, developing markets are highly specific, competitive, and complex contexts that cannot be treated as a single homogenous group, which makes most topics more complex and less straightforward. Due to this heterogeneity, this study identified a homogenous group of developing post-communist markets characterized by a high level of competition from informal firms and a relatively limited market growth and size. As an empirical prototype of such a context, EU candidate countries were selected, and the findings could therefore be of interest to managers whose firms operate in such a context. The findings are also relevant to firms in other developing markets characterized by a high level of competition from informal firms and limited market size.

From a managerial point of view, competition coming from informal firms should not be overlooked. Our findings show that PIs are an effective response that help differentiate from informal firms. The strength of this direct relationship depends on how firms contextualize decisions in relation to different aspects of the institutional environment and internal factors. It is rationalized in the case of stronger IPR, weaker RQ, lower EI, and higher TMSE. Conversely, it is enhanced in the case of weaker IPR, stronger RQ, higher EI, and lower TMSE.

Second, PIs are drivers for the future of a firm and therefore the innovative process should not depend solely on the institutional environment. Managers should determine which internal capabilities could be used as a safeguard for innovative processes. In this study, we found that firms operating in contexts characterized by a high level of competition from informal firms need managers with less experience in the sector as they are less afraid of risk and more ready to innovate. Finally, EI is an important facilitator of innovations in contexts with strong informal competitors. Therefore, managers should create a climate that encourages continuous knowledge flow from employees that are leading export activities to employees in charge of domestic operations.

7.2. Limitations and suggestions for further research

Despite these positive findings, this study has several limitations that need to be addressed. First, we focused on a specific set of external and internal factors, although there are more factors that need to be accounted for that are beyond the scope of this study. For instance, future studies could explore how the social capital developed with business partners can help a firm leverage its innovation capacity. Because firms respond to informal competitors at a different pace, further research could explore the role of agility in response to informal competition. This would entail exploring how quickly firms can deploy innovative products and services when battling informal competitors.

When analyzing the impact of external factors, we exclusively focused on aspects of the formal institutional environment. However, previous research indicates that the informal institutional environment in the form of norms, culture, and attitudes can significantly impact a firm's innovation activities (Tian et al., 2018). Future studies could therefore explore how dominant cultural values steer a firm's PI in the presence of informal competitors. However, when so doing, studies need to account for the fit (misfit) between the national culture and the prevailing unit level culture within the firm (Arslanagic-Kalajdzic et al., 2019). Similar attention could be paid to the role of a firm's ethical climate in comparison to the industrial ethical climate (Kadic-Magaljlic et al., 2019). It may be the case that some industries are more exposed to competition from informal firms than others, and therefore the response of firms will differ in accordance with their ethical climate.

Finally, we acknowledge some limitations relating to the BEEPS data. For example, some basic innovation-related variables that should be included in models that predict PI are missing in the data structure, creating a potential problem with confounding effects. Furthermore, as noted in earlier studies (Krammer et al., 2018), the BEEPS data is susceptible to certain limitations due to the aggregate nature of the variables investigated and an inability to fully capture the latent nature of some constructs (such as TM's sectoral experience). As such, the BEEPS data cannot reveal the more detailed mechanisms that shape PI by firms. Future studies could investigate how other dimensions of export strategy, such as export diversity, may influence a firm's choice whether to engage in innovation in the presence of informal competitors. For instance, a firm can have high EI, but this may be limited to only one export market. Studies suggest that increased export diversity (the number of export markets served) can become a source of economies of scope, allowing firms to quickly generate returns when investing in innovation activities (Bodlaj et al., 2018).

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