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KNOWLEDGE, INNOVATION AND REGIONAL DEVELOPMENT: NEW EVIDENCE

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COOPETITION IN DIFFERENT SETTINGS OF INFORMATION SIMILARITY: WHEN DO THEY LEAD TO INNOVATION RESULTS?

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Motivation

- The phenomenon of **coopetition**, a strategy in which firms simultaneously **cooperate and compete** with each other, has grown in importance over recent years in both management research and business practice (Bengtsson and Kock, 2014; Gast et al., 2015; Hong and Snell, 2015; Ritala et al., 2016)

- Traditionally, **main goals** underlying technological collaboration with competitors:
  - to carry out basic or pre-competitive research (Tether, 2002; Bayona et al., 2003)
  - solving shared problems and establishing standards (Gnyawali and Park, 2001)
  - sharing costs and risks (Tidd, Bessant and Pavitt, 2005)

- This type of collaboration does not seem to be the most suitable mechanism to conclude the innovation process (i.e. reaching product innovations)
  - Exploration goals more relevant than exploitation (Santamaria and Surroca, 2011)

Motivation

- **Paradoxical strategy:**
  coopetition locks firms together in a **love-hate** relationship

  - the **love** delivered by their shared objectives (Bengstsson and Kock, 2000)
  - the **hate** by their potential conflicts of interests and competitive tensions (Gnyawali et al., 2016)

- Despite the difficulties and complexities, however, firms continue to engage in R&D partnerships with competitors… even for reaching specific innovation results!!!

- Alliance between Philips and Sony (1979) to develop, produce and commercialize the compact disc (CD), reaching and international standard

- IBM, Sony and Toshiba (2005): development high-performance microprocessor

- Apple and Canon (2011): LaserWriter and different software

- Ford and Toyota (2013): designing Atlas Ford F-150 Hybrid concept

- Google and Mozilla (Firefox); Apple and Microsoft (licensing mobile operating systems)….

Motivation

- Literature on coopetition has analyzed three big questions (Peng et al., 2017):
  - **WHY?**: motivations and determinants
  - **HOW?**: interaction, dynamics and management of the agreement
  - **WHAT?**: **OUTCOMES**

- **Inconclusive results** in previous literature around coopetition and innovation results (Quintana and Benavides, 2004; Nieto and Santamaría, 2007; Mention, 2011)

  - Lead us to analyze different characteristics of coopetition instead of focusing on the simple observation of whether firms are coopeting or not: a **contingency approach** (Cassiman et al., 2009; Estrada et al., 2016; Ritala, 2012)

- In particular we focus our attention on different degrees of **competitive similarity** between competitors as an explanatory factor in the coopetition-innovation relationship

- **Challenge**: avoid competitive similarity !!!

Research goal

- We analyze the effects of coopetition on innovation –with different degree of novelty- by examining two dimensions
  (i) **information similarity in the innovation process**
  (ii) **geographical location of the partner**

The combination of information similarity with the competitor's geographical location enables us to identify **four settings for coopetition**

i) **Domestic-Low Coopetition**: competitor in the home-country with a low degree of information similarity;
ii) **International-Low Coopetition**: competitor located abroad with a low degree of information similarity;
iii) **Domestic-High Coopetition**: competitor located in the home country with a high degree of information similarity;
iv) **International-High Coopetition**: competitor located abroad with a high degree of information similarity

SETTINGS

Competitor's information similarity

Geographical location	*Low*	*High*
Abroad	International-Low coopetition	International-High coopetition
Home country	Domestic-Low coopetition	Domestic-High coopetition

Our focus

…when at least exists <u>one type</u> of **dissimilarity**: <u>either</u> in terms of information or geographic location of partner

Competitive similarity

We do not present hypothesis regarding the effects of domestic-high coopetition, instead we include it as a control variable.

Hypotheses (I)

Domestic coopetition with low information similarity

- Dissimilarity can support the search for **different solutions** and help avoid the risk of falling into the trap of familiarity. Critical for breakthrough innovations (Ahuja and Lambert, 2001)
- Lower redundancy between partners is helpful in reaching **diversity and novelty of information** (McEvily and Zaheer, 1999)

- Integration of different knowledge is not free of difficulties that, to some extent, can be attenuated by the presence of a **common national context** (Phene et al., 2006)
- Collaborate with local competitors allows a **quickly acquirement of knowledge** and apply it to the markets as well as **sharing cultural and social values** (Ritala and Hurmelinna-Laukannen, 2013)
- Common knowledge base is basic to incremental innovation (Xu, 2015)

Hypothesis 1: In a setting of low information similarity, domestic coopetition is expected to have a positive effect on the likelihood of both new-to-the-market and new-to-the-firm innovations

Hypotheses (II)

International coopetition with low information similarity

- The firm has more to learn given the **low degree of overlapping** between partners' knowledge bases
- International location of partner increasing the likelihood of really new innovations (Phene et al., 2006)
- International coopetition when the information similarity is low provide firms with more opportunities to access to heterogeneous knowledge to innovate

- Incremental innovations need some level of 'common knowledge' to facilitate communication and allow mutual recognition of individual knowledge domains (Xu, 2015). This situation is unlikely to occur in contexts with low information similarity and foreign-based competitors (not an optimal setting to achieve incremental innovations)

Hypothesis 2: In a setting of low information similarity, international coopetition is expected to have a positive effect on the likelihood of new-to-the-market innovations

Hypotheses (III)

International coopetition with high information similarity

- In this context, the geographical origin of the partner is the dimension that provides possibilities to obtain dissimilar knowledge (i.e. different national innovation systems)
- International link-ups provide access to heterogeneous knowledge and information inputs that are often valuable for innovation (Berry, 2014) –in particular for breakthrough innovations

- In a similar manner to what occurs with collaboration with home-country competitors, the existence of 'common knowledge' (in this case, derived from high information similarity) makes it easier to communicate and find improvements to existing products

Hypothesis 3: In a setting of high information similarity, international coopetition is expected to have a positive effect on the likelihood of new-to-the-market and new-to-the-firm innovations

Summary

Geographical location	Competitor's information similarity: *Low*	Competitor's information similarity: *High*
Abroad	Only innovations with high degree of novelty (**H2**)	Innovations with different degree of novelty (**H3**)
Home country	Innovations with different degree of novelty (**H1**)	

Research design

- **Database**
- Technological Innovation Panel (TIP).
- Annual Spanish response to the Community Innovation Survey
- It is compiled by Spain's National Statistics Institute, Science and Technology Foundation, and Foundation for Technical Innovation (yearly basis)
- It includes information on the type of collaborating partner, the importance of the partner's knowledge for the innovation process, and the partner's location (domestic or international).

- **Sample**
  - Unbalanced panel with more than 10,000 firms from different manufacturing and service sectors
  - For the period from 2004 to 2013.

	Variable	Measure	Studies
Dependent	**New-to-market product innovation** **New-to-firm product innovation**	Sales from products new to the market Sales from products new to the firm, but not to the market	Belderbos et al., (2004); Grimpe & Kaiser, (2010); Leiponen & Helfat, (2011); Tether (2002).
Independent	**Domestic low coopetition** **International high coopetition** **International low coopetition** **Domestic high coopetition***	Depending of level of knowledge similarity in the innovation process and geographic location of the competitors in the collaboration (Dichotomous variables)	
Controls	**Other collaboration** **Offshoring R&D** **Innovation effort**	Dichotomous variable Dichotomous variable Firm`s total innovation expenses/total sales	Becheikh, Landry and Amara (2006) Nieto & Rodríguez (2011) Santamaría et al. (2012)
	Size **Startup** **Group** **Geographic Market Scope**	Log (number employees) New firm Belong to a larger firm Local, National, International	Laursen & Salter (2006) Rodríguez & Nieto (2016)
	Year and Sector	Binary indicators	Malerba (2005)

- **Methodology**
  - A random-effects panel Tobit model:
    - Appropriated when values from 0 to 100, which is heavily left-censored – many firms do not introduce products new to the market and consequently have no innovative sales. (Gujarati, 1995; Berchicci, 2013; Grimpe and Kaiser, 2010; Wu and Wu, 2014)
  - Dependent variable is used in its logarithmic form as this reduces the problem of non-normality of the residuals (Berchicci, 2013; Greene, 2003; Laursen and Salter, 2006)

$$\text{Sales from New to the market/ new to the firm}_{it} = a + b_1\,(\text{Domestic high coopetition})_{it-2} + b_2\,(\text{Domestic low coopetition})_{it-2} + b_3\,(\text{International high coopetition})_{it-2} + b_4\,(\text{International low coopetition})_{it-2} + b_5\,(\text{Other collaborations})_{it-2} + b_6\,(\text{Offshoring R\&D})_{it-2} + b_7\,(\text{Innovation effort})_{it-2} + b_8(\text{Size})_{it} + b_9\,(\text{Startup})_{it} + b_{10}\,(\text{Geographic Market Scope})_{it} + b_{11}\,(\text{High-tech})_{it} + b_{12}\,(\text{Medium-tech})_{it} + b_{13}\,(\text{Low-tech})_{it} + b_{14}\,(\text{Kibs}) + b_{15}\,(\text{Other activities}) + b_{16}\,(\text{Year}_t)_{it} + e_i$$

where a is the constant intercept, β is the coefficient vector, and e is the error term.

Results

	Sales of innovative product			
	New to the market		*New to the firm*	
	(1)	(2)	(3)	(4)
International high coopetition $_{t-2}$		0.602***		0.307*
		(3.42)		(1.84)
International low coopetition $_{t-2}$		0.264**		-0.0531
		(2.13)		(-0.45)
Domestic low coopetition $_{t-2}$		0.326***		0.248***
		(3.71)		(3.05)
Domestic high coopetition $_{t-2}$		-0.00187		0.187
		(-0.01)		(1.52)
Other collaboration $_{t-2}$	0.672***	0.644***	0.511***	0.493***
	(18.33)	(17.37)	(15.65)	(14.94)
Offshoring R&D $_{t-2}$	0.287***	0.276***	0.289***	0.285***
	(4.07)	(3.92)	(4.42)	(4.36)
Innovation effort $_{t-2}$	3.503***	3.484***	2.576***	2.560***
	(24.68)	(24.54)	(19.59)	(19.46)
Size	0.109***	0.107***	0.168***	0.167***
	(5.31)	(5.22)	(9.73)	(9.65)
Startup	0.310	0.332	1.937***	1.954***
	(0.61)	(0.65)	(4.48)	(4.52)
Group	0.162***	0.161***	0.134***	0.134***
	(2.92)	(2.91)	(2.80)	(2.81)
Geographic market scope	0.523***	0.522***	0.452***	0.452***
	(20.72)	(20.69)	(20.93)	(20.92)
High-tech	2.164***	2.159***	2.090***	2.086***
	(13.81)	(13.79)	(14.97)	(14.95)
Medium-tech	1.680***	1.678***	2.001***	2.000***
	(15.49)	(15.48)	(21.50)	(21.50)
Low-tech	1.104***	1.105***	1.596***	1.596***
	(9.00)	(9.02)	(15.30)	(15.31)
KIBS	1.225***	1.209***	1.151***	1.142***
	(10.97)	(10.84)	(12.11)	(12.01)
Other sectors	0.331**	0.328**	0.0180	0.0147
	(2.15)	(2.13)	(0.14)	(0.11)
Years	Included	Included	Included	Included
Intercept	-7.157***	-7.149***	-5.864***	-5.860***
	(-47.74)	(-47.72)	(-46.67)	(-46.65)
N	78662	78662	78662	78662
chi2	3306.2***	3341.2***	3702.4***	3720.2***
df_m	19	23	19	23
LL	-68371.0	-68353.0	-86425.4	-86416.5

		Sales of innovative product			
		New to the market		*New to the firm*	
		(1)	(2)	(3)	(4)
International high coopetition$_{t-2}$	***H3:*** ✓	0.602***			0.307*
		(3.42)			(1.84)
International low coopetition$_{t-2}$	***H2:*** ✓	0.264**			-0.0531
		(2.13)			(-0.45)
Domestic low coopetition$_{t-2}$	***H1:*** ✓	0.326***			0.248***
		(3.71)			(3.05)
Domestic high coopetition$_{t-2}$		-0.00187			0.187
		(-0.01)			(1.52)

H1: *In a setting of low information similarity, domestic coopetition is expected to have a positive effect on the likelihood of both new-to-the-market and new-to-the-firm innovations*

H2*: In a setting of low information similarity, international coopetition is expected to have a positive effect on the likelihood of new-to-the-market innovations*

H3*: In a setting of high information similarity, international coopetition is expected to have a positive effect on the likelihood of new-to-the-market and new-to-the-firm innovations*

Conclusions

- This paper delves into the paradox of coopetition to advance our knowledge about the **conditions under which this strategy contributes to innovation performance**

- Starting from the premise that **competitive similarity** between partners is a key factor behind the success or failure of a coopetition relationship
  - we identify four coopetition settings, by using two contextual dimensions:
    - information similarity in the innovation process
    - geographical location of partner-competitors

- The underlying idea is that **some degree of dissimilarity** between partners is required, as heterogeneous knowledge will increase the chances of innovating

Conclusions

We find **strong evidence** that:

- (i) coopetition with international partners –in both low and high information similarity settings– benefits highly novel innovations; less novel innovations, however, require a setting with high information similarity
- (ii) coopetition with home-country partners only benefits innovation performance in a low information similarity setting

- These findings lead us to conclude that **dissimilarity is needed in one of the dimensions** –information or geographical location– to achieve innovation results
- Competitive similarity should be avoided in at least one of the dimensions

Contributions

- With regard to the **technological collaboration** literature, our findings shed new light on the conditions under which coopetition leads to innovation results

- to the intersection between **international business and innovation management** literatures (Phene et al., 2006; Reuer and Lahiri, 2014) by using the international location of the competitor in the collaboration to explain innovation performance

- The use of a wide and diverse database with firms from different sectors over a ten-year period enables us to reach robust conclusions that are highly generalizable to different contexts

- From the **point of view of practitioners**, our paper contributes by helping managers understand the likely results of different technological coopetition settings
- This knowledge will allow them to match their innovation strategies with the most appropriate coopetition setting

Limitations and future research

- Future researchers should pay special attention to the risks (tensions and conflicts) inherent in coopetition

- the availability of more complete information on alliance partners (i.e. dyad information) would enrich the research.
  - For example, information about the network dynamics (e.g., interactions, roles and positions), the importance of the focal firm for the competitor, or the characteristics of the process itself could be included to **advance on the 'how' question** in coopetition

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Thanks for your attention

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