The Conversion Rate of R&D into Technological Innovationin Family-Managed Firms under Vulnerability

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General aims of the study

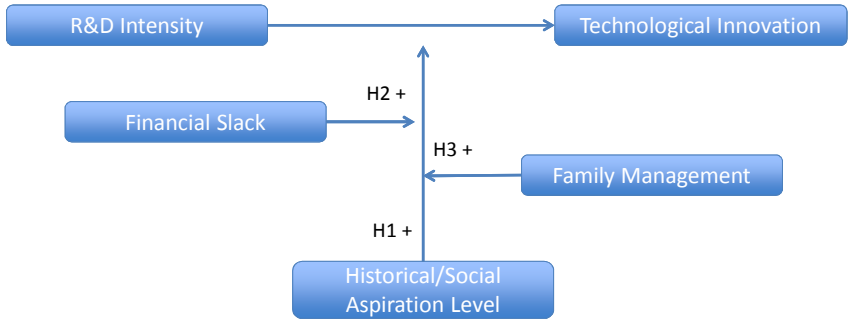
EFFICIENCY TURNING R&D INTO TI

Evaluating whether under vulnerability decision-makers will be able to turn R&D into TI more efficiently

MODERATING ROLE OF SLACK AND FAMILY MANAGEMENT

Investigating whether the presence of slack and family management affects to the conversion rate of R&D into TI under vulnerability

Our proposel model



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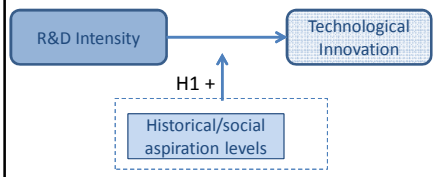
Hypothesis



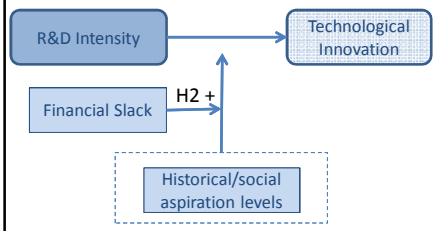
Hypothesis development

- BAM: Loss aversion and problem framing (Wiseman & Gómez-Mejia, 1998). Firstly loss averse and only secondly risk averse.
- Under vulnerability, strategic and tactical changes executed to save the firm from deteriorated financial conditions (Bromiley, 2009).
- Decision-makers exceptionally talented and receptive
- Different coalitions of stakeholders arise (Cyert & March, 1963)

H1. ***Performance below aspiration levels strengthens the positive effect of R&D intensity on the likelihood of obtaining TI.***

Introduction **Hypotheses** Method Findings and Contributions

Hypothesis



Hypothesis development

- Slack can be employed for strategic organizational activities (Parida & Örtqvist, 2015).
- Under vulnerable situations, it gives managers flexible resources (Kotlar, De Massis, et al., 2014) and allows engaging in more efficient orchestration actions (Sirmon, Hitt, Ireland, & Gilbert, 2011)

H2. ***As slack (particularly financial slack) increases, the influence of performance below aspiration levels is more likely to strengthen the positive effect of R&D intensity on the likelihood of obtaining TI.***

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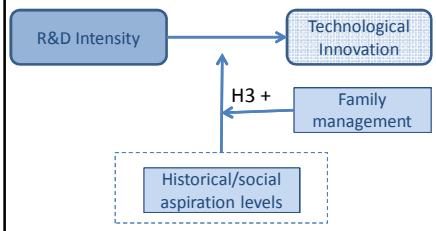
Hypothesis



Hypothesis development

- Vulnerability implies more willingness. It is more likely to achieve a certain critical mass of R&D to obtain higher productivity growth (Kancs & Siliverstovs, 2012)
- Also greater ability to pursue innovation as a result of their tacit knowledge stocks, knowledge combination, their long-term orientation (Patel & Fiet, 2011; Röd, 2016) and parsimony (Carney, 2005)
- The willingness and the ability to innovate go in the same direction because socioemotional and financial endowment may be lost (Chrisman & Patel, 2012; Gómez-Mejia et al., 2010)

H3. ***Family management positively moderates the effect that performance below aspiration levels exerts on the positive relationship between R&D intensity and the likelihood of obtaining TI***

Introduction **Hypotheses** Method Findings and Contributions

Data

- The data used come from the Survey on Business Strategies (ESEE). This survey is built on information from Spanish manufacturing firms.
- Accounting and innovation data was collected for the years 2001-2013. After removing firms with missing data for the analysed variables, the final sample consisted of 3,116 observations

Variables

- *Technological innovation.* Completely new product or make important changes on their products (product innovation) and/or introduction of significant changes in production and/or distribution process (process innovation).
- *R&D intensity.* Total expenditures for R&D divided by total sales
- *Performance below aspiration level* based on own prior performance (*historical aspiration*) is constructed by comparing the level of the firm aspiration level in period t-1 and the aspiration level from the prior period t-2. The second proxy of aspiration level, "*social aspiration*" is built comparing Firm's performance in period t-1 with the performance of a typical firm in the same industry for the same period.
- *Financial Slack.* Firm's current ratio (current assets divided by current liabilities).
- *Family management.* Continuous variable counting the number of family members involves into the top management team of the firm.

*Technological innovation= θ_1 R&D intensity $_{t-1}$ +θ_2 Performance below aspiration level + θ_{31} R&D Intensity$_{t-1}$*Performance below aspiration level +Controls +ε*

Variables	5	6
Main effect		
R&D intensity $_{t-1}$ (β_1)	0.159*** (0.040)	0.156*** (0.039)
Moderator		
Performance below aspiration level (Historical aspirations) $_{t-1}$ (β_{21a})	1.138* (0.648)	-
Performance below aspiration level (Social aspirations) $_{t-1}$ (β_{21b})	-	1.152* (0.642)
Interaction effect		
R&D intensity $_{t-1}$* Performance below aspiration level (Historical aspirations) $_{t-1}$ (β_{31a})	1.749** (0.739)	-
R&D intensity $_{t-1}$* Performance below aspiration level (Social aspirations) $_{t-1}$ (β_{31b})	-	1.744** (0.738)
Controls		
Firm size	0.531*** (0.163)	0.529*** (0.163)
Subsidies	1.393*** (0.176)	1.396*** (0.176)
Technological opportunity	1.017*** (0.253)	1.023*** (0.253)
Firm age	0.232*** (0.074)	0.231*** (0.074)
Performance over aspiration level (Historical aspirations) $_{t-1}$	0.086 (0.366)	
Performance over aspiration level (Social aspirations) $_{t-1}$		0.139 (0.329)
Territorial specificities dummies	Yes	Yes
Number of observation	3116	3116
Log likelihood	-754.831	-754.774
Model χ^2	295.63***	295.55
Pseudo R^2	0.120	0.120
Wald test: Total effects (β_1+ β_{31}	1.908**	
(β_1+ β_{31}		1.900**

*Technological innovation= θ_1 R&D intensity $_{t-1}$ + θ_{21} Performance below aspiration level + θ_{23} Unabsorbed Slack $_{t-1}$ + θ_{31} R&D Intensity$_{t-1}$ * Performance below aspiration level + θ_{34} R&D Intensity$_{t-1}$* Unabsorbed Slack $_{t-1}$ + θ_{35} Performance below aspiration level y$_{t-1}$ * Unabsorbed Slack $_{t-1}$ + θ_{42} R&D Intensity$_{t-1}$ *Performance below aspiration level* Unabsorbed Slack $_{t-1}$ + Controls + ε*

Variables	2	4
Main effect		
R&D intensity $_{t-1}$ (β_1)	-0.102* (0.055)	-0.100** (0.055)
Moderator		
Performance below aspiration level (Historical aspirations) $_{t-1}$ (β_{21a})	2.326*** (0.796)	-
Performance below aspiration level (Social aspirations) $_{t-1}$ (β_{21b}))	-	2.345*** (0.781)
Unabsorbed slack $_{t-1}$ (β_{22})	0.114*** (0.038)	0.101*** (0.038)
Interaction effect		
R&D intensity $_{t-1}$* Performance below aspiration level (Historical aspirations) $_{t-1}$ (β_{31a})	3.021*** (0.919)	-
R&D intensity $_{t-1}$* Performance below aspiration level (Social aspirations) $_{t-1}$ (β_{31b})	-	3.011*** (0.916)
R&D intensity $_{t-1}$* Unabsorbed Slack $_{t-1}$ (β_{34})	0.153*** (0.038)	0.151*** (0.037)
Performance below aspiration level (Historical aspirations) $_{t-1}$* Unabsorbed Slack $_{t-1}$ (β_{35a})	1.628*** (0.568)	-
Performance below aspiration level (Social aspirations) $_{t-1}$* Unabsorbed Slack $_{t-1}$ (β_{35b})	-	1.622*** (0.567)
R&D intensity $_{t-1}$* Performance below aspiration level (Historical aspirations) $_{t-1}$* Unabsorbed Slack $_{t-1}$ (β_{42a})	1.662*** (0.627)	
R&D intensity $_{t-1}$* Performance below aspiration level (Social aspirations) $_{t-1}$* Unabsorbed Slack $_{t-1}$ (β_{42b})		1.653*** (0.624)
Control Variables…		

*Technological innovation= θ_1 R&D intensity $_{t-1}$ + θ_{21} Performance below aspiration level + θ_{22} Family management $_{t-1}$ + θ_{31} R&D Intensity$_{t-1}$ * Performance below aspiration level + θ_{32} R&D Intensity$_{t-1}$ * Family management $_{t-1}$ + θ_{33} Performance below aspiration level y_{t-1} * Family management $_{t-1}$ + θ_{41} R&D Intensity$_{t-1}$ * Performance below aspiration level * Family management $_{t-1}$ + Controls + ε*

Variables	2	4	
Main effect			
R&D intensity $_{t-1}$ (β_1)	0.132*** (0.040)	0.129*** (0.038)	
Moderator			
Performance below aspiration level (Historical aspirations) $_{t-1}$ (β_{21a})	0.893 (0.689)	-	
Performance below aspiration level (Social aspirations) $_{t-1}$ (β_{21b})	-	0.847 (0.656)	
Family management $_{t-1}$ (β_{22})	0.182** (0.077)	0.212*** (0.070)	
Interaction effect			
R&D intensity $_{t-1}$* Performance below aspiration level (Historical aspirations) $_{t-1}$ (β_{31a})	1.978** (0.797)	-	
R&D intensity $_{t-1}$* Performance below aspiration level (Social aspirations) $_{t-1}$ (β_{31b})	-	1.972*** (0.751)	
R&D intensity $_{t-1}$*Family management $_{t-1}$ (β_{33})	0.169** (0.074)	0.235*** (0.082)	
Performance below aspiration level (Historical aspirations) $_{t-1}$* Family management $_{t-1}$(β_{33a})	0.241 (1.267)		
Performance below aspiration level (Social aspirations) $_{t-1}$ * Family management $_{t-1}$ (β_{33b})	-	0.473 (0.501)	
R&D intensity $_{t-1}$* Performance below aspiration level (Historical aspirations) $_{t-1}$ * Family management $_{t-1}$ (β_{41a})	-0.583 (1.524)	-	⟸
R&D intensity $_{t-1}$* Performance below aspiration level (Social aspirations) $_{t-1}$ * Family management $_{t-1}$ (β_{41b})	-	-1.582** (0.706)	⟸
Control Variables…			

- Referent and historical target-performance gaps matter when analysing firms' conversion rate: risky decisions (Chrisman and Patel, 2012; Gómez-Mejía et al., 2007) and different strategic actions (Holmes et al. 2011).
- When managers detect deviations of performance outcomes below the aspiration level, they become more likely to obtain better conversion rates (giving the best, change firm strategic and tactic behaviour, exceptionally talented and receptive,…).

- Slack helps firms to improve the conversion rate of R&D into TI also under vulnerability.
- Managers utilize slack to enlarge exploitation of current advantages and to explore new opportunities and new occasions for business from internal sources (Kotlar et al., 2014).
- Unabsorbed slack offers managers potentially utilizable resources that help them to achieve their goals, particularly relevant when firms are under their aspiration performance levels

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- Vulnerability means for F-MFs a higher willingness to reach a critical mass of R&D, and a greater ability to orchestrate unique resources, able to generate better conversion rates. However, the decisions affecting the process of the conversion are not immediately effective (Hall & Oriani, 2006).
- Consistent with economic considerations, family managers try to improve conversion rate to overcome declining performance, but when the preservation of the firm's discretion and socioemotional wealth is endangered, they opt for adopting a technological strategy which accepts below target performance.

Introduction Hypotheses Method **Findings and Contributions**

- Family managers consider a loss of competitive advantage relative to industry as the most important reference when actions regarding the process of achievement of TI from R&D investments have to be carried out.
- Utilizing a continuous measure of the level of family management allow us to explore heterogeneity across family firms in their efficiency of converting R&D expenses into TI in a context of losses
- Finally, this paper answers the call of Duran, et al. (2015) for additional research on the conversion rate of innovation input into output, by studying this relationship taking into consideration vulnerable situations (Gómez-Mejia et al., 2015).

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Thanks for your attention!

Castilla.-La Mancha

Almería

Málaga

Sample Characteristics

Year	Firms in the population	Matched sample
2001	3462	314
2002	3462	262
2003	3462	232
2004	3462	254
2005	4050	242
2006	4357	232
2007	4475	272
2008	4629	226
2009	4851	216
2010	5040	214
2011	5040	210
2012	5304	220
2013	5304	222

Matched sample

One firm with TI outputs (157 firms in 2001) with another matched control firm without innovation outputs (157 firms in 2001) in the same year and similar size and industry

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Sample composition by industry

Industry	N	%
1. Meat industry	130	4.17%
2. Foodstuffs and snuff	364	11.68%
3. Drinks	98	3.15%
4. Textiles and clothing	209	6.71%
5. Leather and footwear	57	1.83%
6. Timber industry	64	2.05%
7. Paper Industry	165	5.30%
8. Graphics	99	3.18%
9. Chemical and pharmaceutical products	304	9.76%
10. Rubber and plastic	222	7.12%
11. Non-metallic mineral products	82	2.63%
12. Ferrous and nonferrous metals	129	4.14%
13. Metal products	427	13.70%
14. Agricultural and industrial machinery	184	5.91%
15. Computer, electronic and optical products	52	1.67%
16. Electrical machinery and material	122	3.92%
17. Motor vehicles	220	7.06%
18. Other transport equipment	83	2.66%
19. Furniture industry	83	2.66%
20. Other manufacturing	22	0.71%
TOTAL	**3,116**	**100.00%**

Descriptive statistics

Continuous variables

Variables	Innovator Firms					Non-Innovator Firm					
	Mean	Median	25%	75%	Std.Dev.	Mean	Median	25%	75%	Std. Dev.	T-Tests
R&D intensity$_{t-1}$	1.234	0.294	0.001	1.220	3.572	0.568	0.001	0.001	0.195	2.411	-6.090***
Performance below aspiration level (Historical aspirations)$_{t-1}$	0.037	0.000	0.000	0.036	0.092	0.035	0.000	0.000	0.033	0.091	-0.660
Performance below aspiration level (Social aspirations)$_{t-1}$	0.047	0.009	0.000	0.067	0.096	0.047	0.011	0.000	0.072	0.082	-0.107
Family management$_{t-1}$	0.672	0.000	0.000	1.000	0.972	0.598	0.000	0.000	1.000	0.951	-2.271**
Unabsorbed slack$_{t-1}$	2.453	2.056	1.422	2.959	1.768	2.501	1.983	1.382	3.066	1.884	0.729
Firm size	16.578	1.629	15.091	17.923	1.937	16.403	16.482	14.844	17.889	2.036	-2.572**
Firm age	3.300	3.367	2.890	3.784	0.765	3.190	3.296	2.708	3.761	0.792	-4.113***
Performance over aspiration level (Historical aspirations)$_{t-1}$	0.046	0.000	0.000	0.042	0.126	0.046	0.000	0.000	0.045	0.123	0.055
Performance over aspiration level (Social aspirations)$_{t-1}$	0.098	0.067	0.031	0.121	0.138	0.096	0.064	0.031	0.119	0.140	-0.293

***; **; *; and † Significant at the 0.001, 0.01, 0.05 and 0.10 levels, respectively

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28th June - 1st July 2017

Descriptive statistics

Categorical variables

Categorical variables

	Innovator firms		Non-innovator firms	
	N	%	N	%
Subsidies	305	19.58%	100	6.42%
Non subsidies	1253	80.42%	1458	93.58%
Technological opportunity industry	346	22.21%	345	22.14%
Non- Technological opportunity industry	1212	77.79%	1213	77.86%
Geographical localization				
Nothwest	258	15.01%	273	15.88%
Northeastern	182	10.59%	166	9.66%
Madrid	217	12.62%	264	15.36%
Center	219	12.74%	235	13.67%
East	710	41.30%	597	34.73%
South	116	6.75%	146	8.49%
Canarias	17	0.99%	38	2.21%

Variables	1	2	3	4	5	6	7	8	9	10	11	12
1. Technological innovation	1											
2. R&D intensity$_{t-1}$	0.109***	1										
3. Performance below aspiration level (Historical aspirations)$_{t-1}$	0.011	-0.023	1									
4. Performance below aspiration level (Social aspirations)$_{t-1}$	0.002	0.003	0.385***	1								
5. Family management$_{t-1}$	0.039**	-0.054**	0.028	-0.030	1							
6. Unabsorbed slack$_{t-1}$	-0.013	-0.015	-0.014	-0.038**	0.116***	1						
7. Firm size	0.044**	0.119***	-0.048**	-0.045**	-0.329***	-0.084***	1					
8. Subsidies	0.185***	0.214***	-0.022	-0.008	-0.058***	-0.051***	0.261***	1				
9. Technological opportunity	0.001	0.184***	0.011	0.005	-0.147***	-0.059***	0.159***	0.099***	1			
10. Firm age	0.071***	0.082***	0.041**	0.016	0.024	0.066***	0.318***	0.099***	0.03	1		
11. Performance over aspiration level (Historical aspirations)$_{t-1}$	-0.001	-0.034*	0.258***	0.461***	0.039**	-0.073***	-0.091***	-0.014	0.014	-0.006	1	
12. Performance over aspiration level (Social aspirations)$_{t-1}$	0.005	0.009	0.027	0.104***	-0.025	-0.067***	-0.076***	-0.018	0.021	0.001	0.494***	1
13. Territorial specificities dummies	0.015	-0.088***	**-0.023**	-0.047**	0.072***	0.063***	-0.029*	-0.041**	-0.121***	0.079***	-0.023	-0.074***

***; **; *; and † Significant at the 0.001, 0.01, 0.05 and 0.10 levels, respectively

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28th June - 1st July 2017

Multicollinearity analysis	Historical aspirations			Social aspiration		
	R2	VIF	Condition Index	R2	VIF	Condition Index
R&D intensity$_{t-1}$	0.086	1.09	1.000	0.085	1.09	1.000
Performance below aspiration level (Historical aspirations)$_{t-1}$	0.083	1.09	2.179			
Performance below aspiration level (Social aspirations)$_{t-1}$				0.025	1.03	2.268
Family management$_{t-1}$	0.145	1.17	2.367	0.149	1.17	2.695
Unabsorbed slack$_{t-1}$	0.038	1.04	2.762	0.036	1.04	2.856
Firm size	0.259	1.35	2.865	0.259	1.35	2.948
Subsidies	0.100	1.11	3.052	0.100	1.11	3.158
Technological opportunity	0.077	1.08	3.300	0.075	1.08	3.413
Firm age	0.113	1.13	4.415	0.116	1.13	4.556
Performance over aspiration level (Historical aspirations)$_{t-1}$	0.089	1.10	6.607			
Performance over aspiration level (Social aspirations)$_{t-1}$				0.033	1.03	6.841
Territorial specificities dummies	0.034	1.03	14.703	0.037	1.04	15.067

Conditional logistic regression. The effects of aspiration levels on the relationship between R&D intensity and the likelihood of innovation output achievement.

Variables	1	2	3	4	5	6
Main effect						
R&D intensity$_{t-1}$ (β_1)	-	0.085** (0.035)	0.121*** (0.040)	0.121*** (0.040)	0.159*** (0.040)	0.156*** (0.039)
Moderator						
Performance below aspiration level (Historical aspirations)$_{t-1}$ (β_{21a})	-	-	0.259 (0.417)	-	1.138* (0.648)	-
Performance below aspiration level (Social aspirations)$_{t-1}$ (β_{21b})	-	-	-	-0.028 (0.473)	-	1.152* (0.642)
Interaction effect						
R&D intensity$_{t-1}$* Performance below aspiration level (Historical aspirations)$_{t-1}$ (β_{31a})	-	-	-	-	1.749** (0.739)	-
R&D intensity$_{t-1}$* Performance below aspiration level (Social aspirations)$_{t-1}$ (β_{31b})	-	-	-	-	-	1.744** (0.738)
Controls						
Firm size	0.912*** (0.103)	0.867*** (0.136)	0.419*** (0.145)	0.418*** (0.146)	0.531*** (0.163)	0.529*** (0.163)
Subsidies	1.417*** (0.147)	1.354*** (0.167)	1.330*** (0.166)	1.329*** (0.166)	1.393*** (0.176)	1.396*** (0.176)
Technological opportunity	0.582*** (0.195)	0.821*** (0.226)	1.097*** (0.236)	1.103*** (0.235)	1.017*** (0.253)	1.023*** (0.253)
Firm age	0.160*** (0.058)	0.184*** (0.061)	0.203*** (0.066)	0.204*** (0.066)	0.232*** (0.074)	0.231*** (0.074)
Performance over aspiration level (Historical aspirations)$_{t-1}$			-0.010 (0.336)		0.086 (0.366)	
Performance over aspiration level (Social aspirations)$_{t-1}$				0.103 (0.289)		0.139 (0.329)
Territorial specificities dummies	yes	Yes	Yes	Yes	Yes	Yes
Number of observation	3116	3116	3116	3116	3116	3116
Log likelihood	-1013.718	-917.463	-842.573	-842.724	-754.831	-754.774
Model χ^2	354.05***	361.78***	273.26***	273.18***	295.63***	295.55
Pseudo R^2	0.123	0.120	0.106	0.106	0.120	0.120
Wald test: Total effects						
(β_1+ β_{31})					1.908**	
(β_1+ β_{31})						1.900**

***; **; *; and † Significant at the 0.001, 0.01, 0.05 and 0.10 levels, respectively

Conditional logistic regression. The effects of financial slacks on the moderating role of *historical and social aspiration* levels on the relationship between R&D intensity and the likelihood of innovation output achievement *(Unabsorbed slack).*

Variables	1	2	3	4
Main effect				
R&D intensity$_{t-1}$ (β_1)	0.121*** (0.040)	-0.102* (0.055)	0.119*** (0.040)	-0.100** (0.055)
Moderator				
Performance below aspiration level (Historical aspirations)$_{t-1}$ (β_{21a})	0.257 (0.419)	2.326*** (0.796)		-
Performance below aspiration level (Social aspirations)$_{t-1}$ (β_{21b}))		-	-0.037 (0.466)	2.345*** (0.781)
Unabsorbed slack$_{t-1}$ (β_{22})	-0.013 (0.022)	0.114*** (0.038)	0.079' (0.047)	0.101*** (0.038)
Interaction effect				
R&D intensity$_{t-1}$* Performance below aspiration level (Historical aspirations)$_{t-1}$ (β_{31a})		3.021*** (0.919)		-
R&D intensity$_{t-1}$* Performance below aspiration level (Social aspirations)$_{t-1}$ (β_{31b})		-		3.011*** (0.916)
R&D intensity$_{t-1}$* Unabsorbed Slack$_{t-1}$ (β_{34})		0.153*** (0.038)		0.151*** (0.037)
Performance below aspiration level (Historical aspirations)$_{t-1}$* Unabsorbed Slack$_{t-1}$ (β_{35a})		1.628*** (0.568)		-
Performance below aspiration level (Social aspirations)$_{t-1}$* Unabsorbed Slack$_{t-1}$ (β_{35b})		-		1.622*** (0.567)
R&D intensity$_{t-1}$* Performance below aspiration level (Historical aspirations)$_{t-1}$* Unabsorbed Slack$_{t-1}$ (β_{42a})		1.662*** (0.627)		
R&D intensity$_{t-1}$* Performance below aspiration level (Social aspirations)$_{t-1}$* Unabsorbed Slack$_{t-1}$ (β_{42b})				1.653*** (0.624)
Controls				
Firm size	0.418*** (0.146)	0.574*** (0.158)	0.433*** (0.146)	0.572*** (0.158)
Subsidies	1.329*** (0.166)	1.308*** (0.175)	1.324*** (0.166)	1.311*** (0.176)
Technological opportunity	1.096*** (0.236)	1.114*** (0.246)	1.089*** (0.236)	1.121*** (0.246)
Firm age	0.207*** (0.067)	0.232*** (0.075)	0.205*** (0.066)	0.231*** (0.075)
Performance over aspiration level (Historical aspirations)$_{t-1}$	-0.038 (0.338)	0.108 (0.353)		
Performance over aspiration level (Social aspirations)$_{t-1}$			0.099 (0.289)	0.149 (0.329)
Territorial specificities dummies	Yes	Yes	Yes	Yes
Number of observation	3116	3116	3116	3116
Log likelihood	-842.422	-738.344	-841.107	-738.292
Model χ^2	273.60***	297.13***	279.14***	297.51***
Pseudo R^2	0.106	0.139	0.108	0.140
Wald test: Total effects				
(β_1+ β_{31a})		2.919***		
(β_1+ β_{31b})		-		2.911***
(β_1+ β_{34})		0.051*		0.051
(β_1+ β_{31a}+ β_{34}+β_{42a})		4.734***		
(β_1+ β_{31b}+ β_{34}+β_{42b})				4.766***

***; **; *; and † Significant at the 0.001, 0.01, 0.05 and 0.10 levels, respectively

Conditional logistic regression. The effects of the level of family management on the moderating role of aspiration levels on the relationship between R&D intensity and the likelihood of innovation output achievement

Variables	1	2	3	4
Main effect				
R&D intensity$_{t-1}$ (β_1)	0.122*** (0.042)	0.132*** (0.040)	0.121*** (0.041)	0.129*** (0.038)
Moderator				
Performance below aspiration level (Historical aspirations)$_{t-1}$ (β_{21a})	0.240 (0.413)	0.893 (0.689)	-	-
Performance below aspiration level (Social aspirations)$_{t-1}$ (β_{21b})	-	-	0.273 (0.399)	0.847 (0.656)
Family management$_{t-1}$ (β_{22})	0.102** (0.049)	0.182** (0.077)	0.103** (0.051)	0.212*** (0.070)
Interaction effect				
R&D intensity$_{t-1}$* Performance below aspiration level (Historical aspirations)$_{t-1}$ (β_{31a})	-	1.978** (0.797)	-	-
R&D intensity$_{t-1}$* Performance below aspiration level (Social aspirations)$_{t-1}$ (β_{31b})	-	-	-	1.972*** (0.751)
R&D intensity$_{t-1}$*Family management$_{t-1}$ (β_{32})	-	0.169** (0.074)	-	0.235*** (0.082)
Performance below aspiration level (Historical aspirations)$_{t-1}$ * Family management$_{t-1}$(β_{33a})	-	0.241 (1.267)		
Performance below aspiration level (Social aspirations)$_{t-1}$ * Family management$_{t-1}$ (β_{33b})	-	-		0.473 (0.501)
R&D intensity$_{t-1}$* Performance below aspiration level (Historical aspirations)$_{t-1}$ * Family management$_{t-1}$ (β_{41a})	-	-0.583 (1.524)	-	-
R&D intensity$_{t-1}$* Performance below aspiration level (Social aspirations)$_{t-1}$ * Family management$_{t-1}$ (β_{41b})	-	-	-	-1.582** (0.706)
Controls				
Firm size	0.567*** (0.164)	0.539*** (0.159)	0.565*** (0.164)	0.539*** (0.162)
Subsidies	1.378*** (0.177)	1.356*** (0.176)	1.382*** (0.178)	1.368*** (0.177)
Technological opportunity	1.035*** (0.255)	1.009*** (0.249)	1.042*** (0.255)	1.015*** (0.252)
Firm age	0.217*** (0.073)	0.228*** (0.074)	0.216*** (0.073)	0.224*** (0.074)
Performance over aspiration level (Historical aspirations)$_{t-1}$	0.121 (0.342)	-0.583 (1.524)		
Performance over aspiration level (Social aspirations)$_{t-1}$			0.204 (0.321)	0.189 (0.333)
Territorial specificities dummies	Yes	Yes	Yes	Yes
Number of observation	3116	3116	3116	3116
Log likelihood	-759.748	-745.151	-759.624	-741.588
Model χ^2	297.24***	292.68***	297.15***	292.60***
Pseudo R^2	0.115	0.132	0.115	0.136
Wald test: Total effects				
(β_1+ β_{31a})		2.110**		
(β_1+ β_{31b})				2.101**
(β_1+ β_{32})		0.301***		0.364***
(β_{21b}+ β_{33b})				0.602*
(β_1+β_{31a}+β_{32}+β_{41a})		-0.451		

***; **; * and ^ significant at the 0.001, 0.01, 0.05 and 0.10 levels, respectively