Family Management and Firm Performance: The Interaction Effect of Technological Innovation Efficiency

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Abstract Understanding the relationship between family management and firm performance has emerged as one of the most prominent issues for both scholars and professionals in the family firm research field. This chapter aims to shed light on this theme by analyzing how family members in top management teams (TMT) impact on firm performance. Moreover, this chapter adds the effect of an interaction factor that has become essential for the improvement of firms' competitiveness: technological innovation efficiency. By conducting a panel data analysis on 1154 observations of private manufacturing firms over the period 2010–2015, the findings reveal a negative impact of family members in TMT on firm performance. The empirical analysis also reveals that technological innovation efficiency weakens the negative effect of family presence in TMT on firm performance.

Keywords Family management · Firm performance · Technological innovation efficiency · Upper echelon · Socioemotional wealth

1 Introduction

Firm performance is essential to guarantee firm success and survival (Diéguez-Soto et al. 2015; Martínez-Romero 2018). However, and notwithstanding the importance of family firms worldwide (Family Firm Institute 2018; La Porta et al. 1999; Zellweger 2017), the existing research regarding the influence of family firms' characteristics on firm performance is far from offering conclusive results (Basco 2013; De Massis et al. 2015; López-Delgado and Diéguez-Soto 2015).

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Recent studies have focused on how family involvement in management impacts on firm performance (Diéguez-Soto et al. 2019; Sciascia et al. 2014). Family managers, and individual family members in top management teams (hereafter TMT), as the dominant coalition in family firms (Chrisman et al. 2012; Chua et al. 1999), are in charge of strategic decision-making, having a determining influence on performance outcomes.

The impact of family TMT members on performance outcomes could be justified in the light of both the upper echelon (Hambrick and Mason 1984) and the socioemotional wealth (Gómez-Mejia et al. 2007) theories. On the one hand, the upper echelon theory states that TMT members' behavior and characteristics are important, influential factors of performance outcomes (Certo et al. 2006; Kor 2006). On the other hand, it is widely accepted that family TMT members take strategic decisions considering not only financial objectives but also noneconomic goals (Astrachan and Jaskiewicz 2008; Martínez-Romero and Rojo-Ramírez 2017; Zellweger and Astrachan 2008), influencing their firms' performance.

Despite the existing studies analyzing the direct impact of family management on performance outcomes (Sciascia and Mazzola 2008; Sciascia et al. 2014), there is scarce previous literature using the number of family TMT members to measure family management. Moreover, there is also a lack of prior research analyzing specific factors that moderate the relationship between family TMT members and firm performance in private firms. Therefore, in an attempt to deepen in such relationships, this chapter introduces a continuous variable to measure family management and a moderating factor which may well be helpful to explain the current findings. Specifically, the effect of technological innovation efficiency (hereafter TI efficiency) was included as an additional element that may influence the impact of family TMT members on firm performance. We contend that family firm research should essentially consider another factor, namely, TI efficiency, which may encourage family managers to start changes in the way the strategic inovation process is developed, with the final goal of enhancing performance outcomes.

Thereby, this chapter addresses a twofold research question. First, how do family TMT members influence performance in the context of private firms? Second, does TI efficiency moderate the expected relationship between family TMT members and firm performance? To answer these questions, an empirical analysis is developed utilizing a longitudinal dataset comprising 1154 observations of Spanish manufacturing firms over the period 2010–2015. Spain is a fascinating context for analyzing the effect of family TMT members on firm performance, because the family presence in the TMT of Spanish firms is around 70%, meanwhile in 51.6% of Spanish family firms, all TMT members belong to the family (IEF & Red de Cátedras de Empresa Familiar 2015, 2018).

This chapter offers relevant contributions to the literature. First, we answer the call for further research on the family management-performance relationship in the context of private firms (Sciascia et al. 2014; Zattoni et al. 2015). Specifically, we investigate the influence of family TMT members on performance outcomes (Ling and Kellermanns 2010). At this respect, we go beyond previous research which has mainly used a binary measure of family involvement in management (e.g., Diéguez-

Soto et al. 2018; Rojo-Ramírez and Martínez-Romero 2018) and employ a continuous variable to report the family presence in TMT, counting the number of family members in top management positions. This is of utmost interest because it allows disclosing heterogeneity among family firms. Second, we surpass the conceptual frame that analyzes the direct effect of family involvement in management on firm performance, and we introduce TI efficiency as a moderator of the abovementioned relationship. In such a way, we investigate how family presence in TMT interacts with TI efficiency in influencing firm performance. Notwithstanding prior research has examined different factors (Diéguez-Soto et al. 2019; Kellermanns et al. 2012) that may influence the family presence in TMT on firm performance, to the best of the authors' knowledge, no research has analyzed when and under what conditions TI efficiency influences such relationship.

The chapter is structured as follows. Section 2 introduces the theoretical foundations and hypotheses development. Data and methodology are depicted in Sect. 3, meanwhile, Sect. 4 exhibits empirical results. Finally, the discussion of our findings, the limitations, and future research and the conclusions are exposed.

2 Theoretical Foundations

2.1 Family Presence in Top Management Team and Firm Performance

There is no doubt that family firms present peculiar features conditioning their performance outcomes (Arosa et al. 2010; Arrondo-García et al. 2016), due to the intermeshing of the family and the business (Berrone et al. 2010, 2012; Zellweger 2017). As family involvement in the firm increases, so does the overlap between the family and the business (Le Breton-Miller et al. 2011).

Specifically, family presence in management is an important conditioning of firm performance (Diéguez-Soto et al. 2019), since it is an expression of the family's ability to influence the firm's outcomes (De Massis et al. 2014).

Nevertheless, despite the great deal of attention that the relationship between family involvement (in management) and firm performance has received, results are far from being conclusive (Basco 2013; De Massis et al. 2015; Sciascia et al. 2014). Most of the existing research has focused on large (e.g., Dyer 2006; Kammerlander et al. 2015) and public (e.g., Diéguez-Soto et al. 2019) companies. However, prior studies do not assure that results found for public firms could hold for private businesses (Martínez-Romero et al. 2020; Miller et al. 2007). Among those studies analyzing the family management-firm performance relationship in private firms, the existing results reveal both a positive influence (e.g., Gallucci et al. 2015) and a negative influence (e.g., Sciascia and Mazzola 2008) of family managers on firms' outcomes.

In any case, what is clear is that family members present in the firm management, and, namely, in the TMT, belong to the dominant coalition of the firm and thus exert significant influence on organizational outcomes (Hambrick and Mason 1984). Family managers have been demonstrated to be the most important decision-makers within the context of family firms (Vandekerkhof et al. 2015). In this vein, the upper echelon theory states that TMT members' experiences, attitudes, and beliefs drive strategic decision-making (Cyert and March 1963; Hambrick and Mason 1984). Namely, the beliefs, values, and goals of TMT members will influence the implementation of strategies and, consequently, the firms' outcomes.

Moreover, in a family firm context, family's presence in the TMT leads to peculiar performance outcomes due to the overlapping of economic and noneconomic goals, which rises as a primary driver in guiding family firms' strategic choices (Gómez-Mejia et al. 2007). Specifically, family managers normally overweigh emotional considerations over purely financial objectives (Vandekerkhof et al. 2015; Zellweger et al. 2011). Thus, decision-making within family-managed firms is highly influenced by noneconomic objectives, captured by SEW, which may conduct family managers toward the fulfillment of affective needs, rather than acting under effectiveness principles (Martínez-Romero and Rojo-Ramírez 2017).

Accordingly, gains or losses in SEW become the pivotal frame of reference that family firms use to make strategic decisions (Berrone et al. 2012; Gómez-Mejia et al. 2007; Martínez-Romero and Rojo-Ramírez 2016), and family managers would avoid strategic choices that are perceived as threats to their SEW. For example, family managers are reluctant to allow new members from outside the family to take control over strategic decisions as this involves losing control of their firms (Gómez-Mejia et al. 2007, 2010). Therefore, even though collaboration networks and relationships with external stakeholders might well be associated with improved performance (De Massis et al. 2013b; Sorenson 1999), family managers perceive these strategies as a loss of control over their firms and as a cession of discretionary power over outsiders. These concerns may hinder collaborative relationships with external partners (De Massis et al. 2013a; Manzaneque et al. 2020), limiting the possibilities of obtaining performance outcomes.

Moreover, family managers' desire to maintain their SEW might lead to a lack of professionalism in the firm, since firm managers may be selected based on nepotism or altruism rather than on meritocracy principles (Llach and Nordqvist 2010; Poutziouris 2001). Problems related to self-control and altruism result in higher agency costs (Schulze et al. 2001) while also increasing the difficulty of monitoring the firm performance (Dyer 2006). That is, whether nepotism is the accepted norm, incompetent family members might be placed in key management positions, thus jeopardizing firm performance (Manzaneque et al. 2018).

Therefore, family managers in order to maintain the control of their firms and, namely, to preserve their SEW may act under nonpurely financial ideals (Martínez-Romero et al. 2020; Martínez-Romero and Rojo-Ramírez 2017), prioritizing family over economic goals (Chrisman et al. 2012; Martínez-Romero et al. 2020; Rojo-Ramírez and Martínez-Romero 2018). Furthermore, as the number of family

members in management increases, noneconomic goals acquire greater relevance over economic objectives. Thus, our first hypothesis is:

Hypothesis 1 A higher presence of family members in the firm TMT exerts a negative influence on firm performance.

2.2 *The Moderating Influence of Technological Innovation Efficiency*

We have previously hypothesized that firms with a higher family presence in TMT are likely to diminish their performance outcomes. Herein, we argue that this relationship might be moderated by TI efficiency.

Prior research reveals that TI efficiency is a fundamental factor in the obtaining of superior incomes (Wang 2007) and the improvement of firms' competitiveness (Gao and Chou 2015). TI efficiency is defined as the relative capability of a firm to achieve TI outputs given a certain quantity of TI inputs (Cruz-Cázares et al. 2013; Manzaneque et al. 2020). Furthermore, Cruz-Cázares et al. (2013) showed that in a complex and long-term innovation process, the efficiency with which innovation inputs are converted into innovation outputs is the key to increase firm performance.

Family management is often related to a long-term perspective due to the overlap between the family and the business. In this vein, authors agree that innovation is a necessary condition for family firms' continuity (Kellermanns et al. 2012; Martínez-Alonso et al. 2018). Accordingly, by refining the management of innovation resources and capabilities, family-managed firms may be able to increase the probability of sustainability and survival in the long term (Revilla et al. 2016; Yu et al. 2011). Moreover, although family involvement in TMT is seen as a specific governance structure (Diéguez-Soto et al. 2018) that enables the possession of unique characteristics such as long-standing relationships (Patel and Fiet 2011), social capital (Arregle et al. 2007), or tacit knowledge (Llach and Nordqvist 2010), it does not appear to be a sufficient condition for the achievement of competitive advantages and the enhancement of firm performance (Dyer 2006; Wagner et al. 2015). At this respect, a higher efficiency in the conversion of innovation inputs into innovation outputs (Duran et al. 2016) may help family-managed firms to reinforce their unique systemic conditions, contributing to the development of idiosyncratic resources and dynamic capabilities (Sirmon et al. 2007; Teece et al. 1997). Specifically, these characteristics may be fully developed by being the best at orchestrating resources (Chirico et al. 2011), because the simple possession of innovation resources is not enough to achieve superior firm performance (Sirmon and Hitt 2003).

Hence, more efficient management of innovation resources would enable family managers to attract external stakeholders, including other family-managed firms (Miller and Le Breton-Miller 2005). Greater TI efficiency derived from the consolidation of these relationships (Diéguez-Soto et al. 2018) allows family managers to

further develop their social capital (Schulze and Gedajlovic 2010). These external groups are usually aware of the innovative potential of family-managed firms, and therefore, they are eager to establish long-standing and prosperous relationships with them (Miller and Le Breton-Miller 2005). Accordingly, the establishment of these relationships could lead to the development of open innovation projects (Feranita et al. 2017) and more precisely R&D collaborations (Grimpe and Kaiser 2010), which might increase TI efficiency and, thus, can help family-managed firms to improve their firm performance (Carney 2005).

Moreover, these external partners are aware of the family firms' desire to preserve their SEW in the long term (Martínez-Romero et al. 2020), as well as their concern to protect and maintain the family firm reputation and identity (Deephouse and Jaskiewicz 2013), given the closeness these firms show to the environment in which they operate (Berrone et al. 2010). As a consequence, whether family managers do not perceive a threat over their SEW and their firm control and, more importantly, whether their noneconomic goals are not surpassed by economic ones, they would be willing to accept the establishment of such collaborative innovation ties (Feranita et al. 2017). These innovation networks will increase the R&D critical mass augmenting the possibilities of obtaining innovation outcomes and, thus, TI efficiency (Galende Del Canto and Suárez González 1999; Kancs and Siliverstovs 2016). Therefore, increased TI efficiency will enable family managers to take full advantage of this privileged knowledge derived from the relationships with selected stakeholders and, then, enhance firm performance (Matzler et al. 2015).

It is known that better communication and tacit knowledge may increase TI efficiency in family-managed firms. Some family-managed firms could create a virtuous circle in such a way that TI efficiency may enhance the business-oriented, friendly, sincere, and close relationships inside the firm (Gómez-Mejia et al. 2007). In this vein, TI efficiency may permit a more fluid communication among family-managed firms' members (Diéguez-Soto et al. 2018), an improved decision-making quality (Vandekerkhof et al. 2018), and also the transmission of valuable ideas across different departments (Bammens et al. 2015). This strong feeling of mutual trust between family managers, due to the increased TI efficiency, positively contributes to wider dissemination of tacit knowledge throughout the firm (Nieto et al. 2015). The possession of this unique and non-transferable knowledge (Duran et al. 2016) will enable family managers to reinforce the commitment and identification with their firms (Chrisman et al. 2012; Pazzaglia et al. 2013) and, consequently, improve their performance outcomes. That is, TI efficiency will reinforce the abovementioned family-managed firms' distinctive characteristics, unlocking their performance potential.

Based on the previous discussion, we state that TI efficiency may weaken the negative influence of family TMT members on firm performance since it contributes to align economic and noneconomic goals improving firms' outcomes. Therefore, our second hypothesis is:

Hypothesis 2 Technological innovation efficiency weakens the negative influence of family presence in TMT on firm performance.

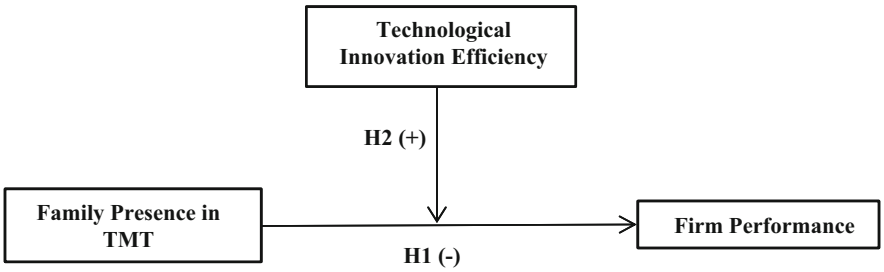

Fig. 1 Theoretical model and hypotheses

The theoretical model and the proposed hypotheses are presented in Fig. 1.

3 Research Method

3.1 Sample and Data Sources

In order to check our hypotheses, we employed the Survey on Business Strategies (ESEE). Specifically, we analyzed the 2010–2015 period. The ESEE is administrated by the State Partnership of Manufacturing Equity (SEPI) foundation on behalf of the Spanish Ministry of Industry and consists of manufacturing firms. The survey is designed following both exhaustive and random sampling criteria, guaranteeing the representativeness of the population and the validity of the contents. Notably, the data include the whole population of Spanish manufacturing businesses with 200 or more employees and a stratified random sample of 5% of the population of firms with at least 10 but fewer than 200 employees. The survey, which has been conducted year by year since 1990, encompasses unbalanced data covering 1800 firms on average per year. After removing businesses with incomplete data for the analyzed variables, we adopted a matched-pair research design (see among others Allouche et al. 2008) through which each firm that achieves TI efficiency was matched with another one without TI efficiency. This approach is based on two potential factors, firm size (ln of total assets) and industry (three-digit SIC code). The matching was conducted for each year (see Table 1 for the distribution of pairs by year). The final sample comprises 1154 observations of private manufacturing firms (577 with TI efficiency and 577 without TI efficiency). Table 1 provides a more detailed view of the sample.

Table 1 Sample characteristics

Number of firms per year		
Year	Firms in the population	Matched sample
2010	5040	200
2011	5040	190
2012	5304	198
2013	5304	202
2014	5566	192
2015	5566	172
Sample composition by size	*N*	*%*
Large-sized firms	601	52.10
Medium-sized firms	374	32.40
Small-sized firms	179	15.50
Total	1154	100.00
Sample composition by industry		
Industry	*N*	*%*
Meat industry	40	3.47
Foodstuffs and snuff	174	15.09
Drinks	16	1.40
Textiles and clothing	64	5.55
Leather and footwear	12	1.04
Timber industry	12	1.04
Paper industry	4	0.35
Chemical and pharmaceutical products	228	19.76
Rubber and plastic	42	3.64
Nonmetallic mineral products	48	4.16
Ferrous and nonferrous metals	18	1.56
Metal products	34	2.90
Agricultural and industrial machinery	172	14.90
Computer, electronic, and optical products	48	4.16
Electrical machinery and material	88	7.63
Motor vehicles	84	7.28
Other transport equipment	34	2.95
Furniture industry	36	3.12
Total	1154	100.00

3.2 Variables

Dependent Variable In this chapter, *firm performance* is measured by the return on assets ratio (earnings before interest and tax to total assets), which is commonly used in the family business field (e.g., Anderson and Reeb 2003) and particularly when studying innovation in family businesses (e.g., Diéguez-Soto et al. 2019).

Independent Variable *Family presence in management* is the independent variable. In line with the study of Kotlar et al. (2014), we contemplate both family ownership and family involvement in TMT as factors that affect decision-making in family businesses. Accordingly, we define family presence in management as a continuous variable counting the number of family members in the firm's TMT (Kotlar et al. 2013; Manzaneque et al. 2020).

Moderating Variable We employ *TI efficiency* as a moderating variable. Following Cruz-Cázares et al. (2013), who consider that an optimal measure of TI efficiency should include both innovation input and innovation output, we use R&D expenses as innovation input (Qiao and Fung 2016) and the number of product innovations as innovation output (Cruz-Cázares et al. 2013). Therefore, TI efficiency is measured by the ratio of the number of product innovations over R&D expenses.

Control Variables In order to rule out possible alternative explanations to that formally hypothesized, we include several control variables that might affect firm performance. Because firm capabilities are formed through experience acquired over time (Cruz-Cázares et al. 2013), we control by *firm age*, measured as the number of years between the firm's foundation and the observation year (Martínez-Romero and Rojo-Ramírez 2017). Since large firms have advantages in comparison with small firms in terms of financial and economic resources or internal knowledge (Cohen and Klepper 1996), which are expected to increase both TI efficiency and firm performance, we controlled for *firm size* measured as the log of total assets (Kotlar et al. 2013). Moreover, because firms with more significant financial resources can achieve greater firm performance, *leverage* is measured as debt to total assets ratio (Block 2012). We also measure the *geographical localization* by adding a group of dummy variables to control for the territorial specificities or context conditions (Camagni and Capello 2013). These control variables also allow us to capture the effect of geographical opportunities to improve firm performance and to develop innovation (Diéguez-Soto et al. 2019). Specifically, we include dummy variables representative of seven Spanish territorial subdivisions (NUTS1, Nomenclature des Unités Territoriales Statistiques).[1] Finally, 18 dummy variables referring to specific sub-industries were included in all models.

3.3 Methods

Given that our primary goal is to analyze both the influence of family TMT members on firm performance and the moderating effect of TI efficiency in the

[1]Regions in the European Union-NUTS 2013/EU-28. Eurostat: http://ec.europa.eu/eurostat/web/nuts/overview [Accessed 10th of October of 2018]. The subdivisions are (1) Northwest, (2) Northeastern, (3) Madrid, (4) Center, (5) East, (6) South, and (7) Canarias.

abovementioned relationship, we estimate different models based on the following equation:

$$\begin{aligned}\text{Firm Performance} = {} & \beta_0 + \beta_1 \text{Family management} \\ & + \beta_2 \text{Technological innovation efficiency} \\ & + \beta_3 \text{Family management} \\ & * \text{Technological innovation efficiency} + \beta_4 \text{Firm age} \\ & + \beta_5 \text{Firm size} + \beta_6 \text{Leverage} + \beta_7 \text{Territorial subdivisions} \\ & + \beta_8 \text{Sub} - \text{industries} + \varepsilon\end{aligned}$$

We use a panel data methodology, which allows us to control for individual heterogeneity or unobservable individual effects. Commonly, it is required to distinguish fixed effect from random effect in panel data, typically using Hausman test. However, in our case fixed effect estimation is not appropriate given the time-invariant nature of the industry affiliation and territorial subdivisions dummies (Diéguez-Soto and López-Delgado 2019; González et al. 2013). Consequently, to test our hypotheses, we use robust and two-stage least squares regression with random effects controlling for heteroscedasticity.

4 Results

Means, other descriptive statistics for continuous variables, and frequencies for categorical variables are reported in Panel A, Table 2.

The correlation matrix is presented in Panel B, Table 2. Multicollinearity should not be a concern in our study as we found only moderate levels of correlation between our variables. Besides, we analyzed the variance inflation factors (VIF) and observed that all values were lower than 1.13, which is below the suggested warning level proposed in prior research (Hair et al. 1999). Thus, there is enough evidence to rule out multicollinearity in the data.

Table 3 shows the regressions results. Model 1 is the baseline model and includes only control variables. Model 2 is a variant of model 1 in which we add the variable family presence in TMT. The coefficient of family presence in management is negative and significant in explaining the firm performance ($\beta = -0.004$; $p < 0.1$), supporting our first hypothesis.

The variable TI efficiency is then introduced in Model 3. The results show that the coefficient of TI efficiency is nonsignificant. However, the direct effect of the moderator is not substantial for testing the moderating hypothesis (Baron and Kenny 1986); on the contrary, whether the moderator is uncorrelated with the dependent variable, the interpretation of the interaction term is more straightforward (Michiels et al. 2014). Further, what we want to examine is when and to what extent TI efficiency through long-standing relationships, tacit knowledge, and social capital leads family-managed firms to the improvement of their performance outcomes. TI

Table 2 Descriptive statistics and correlation matrix

Panel A. Descriptive statistics					
Continuous variables					
	Mean	Median	25%	75%	Std. Dev.
ROA	0.094	0.078	0.034	0.137	0.112
Firm age	3.485	3.583	3.135	3.891	0.633
Firm size	17.689	17.615	16.612	18.660	1.638
Leverage	0.497	0.492	0.339	0.664	0.214
Family management	0.605	0.000	0.000	1.000	1.026
Technological innovation efficiency	3.22e−05	1.97e−08	0.000	4.80e−06	3.95e−04
Categorical variables					
Geographical localization	*N*	%			
Northwest	136	11.80			
Northeastern	188	16.29			
Madrid	71	6.18			
Center	175	15.17			
East	480	41.57			
South	91	7.87			
Canarias	13	1.12			
Panel B. Correlation matrix					
	1	2	3	4	5
1. ROA					
2. Firm age	−0.042				
3. Firm size	−0.035	0.102***			
4. Leverage	−0.108***	−0.076***	0.209***		
5. Family management	−0.043*	−0.076***	−0.241***	−0.055**	
6. Technological innovation efficiency	−0.060*	0.003	−0.079**	−0.018	−0.012

N (observations) = 1154; ***Significant at 1%. **Significant at 5%. *Significant at 10%

efficiency is thus expected to indirectly affect the relationship between family presence in TMT and firm performance.

Hence, to capture this potential moderating impact of TI efficiency on the family presence in TMT-firm performance relationship, Model 4 includes the interaction effect of Family management*TI efficiency, which is positive and statistically significant ($\beta = 84.989$; $p < 0.1$). Therefore, our results provide support for our second hypothesis.

Figure 2 shows a plot of this interaction effect with a positive slope for family presence in TMT and firm performance when TI efficiency is high and a negative slope for family presence in TMT and firm performance when TI efficiency is low. These results further confirm H2.

Table 3 Random effects regressions

Dependent variable	Firm performance (ROA)			
	Model 1	Model 2	Model 3	Model 4
Main effect				
Family management (β1)		−0.004* (0.003)	−0.004 (0.004)	−0.005 (0.004)
Moderator				
Technological innovation efficiency (β2)			−8.888 (2.227)	−11.543 (1.494)
Interaction effect				
Family management × technological innovation efficiency (β3)				84.989* (47.310)
Controls				
Firm age (β4)	−0.007 (0.010)	−0.007 (0.010)	−0.006 (0.010)	−0.013 (0.011)
Firm size (β5)	−0.007* (0.004)	−0.008* (0.004)	−0.007 (0.004)	−0.004 (0.004)
Leverage (β6)	−0.096*** (0.029)	−0.096*** (0.029)	−0.070*** (0.025)	−0.074*** (0.025)
Territorial subdivisions	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes
Constant	0.323*** (0.104)	0.336*** (0.106)	0.321*** (0.105)	0.299*** (0.099)
Number of observations	1154	1154	1154	1154
Hausman test				
Wald's X^2	69.99*** (29)	71.64*** (30)	67.78*** (29)	196.88*** (34)
R^2				
Within	0.0269	0.0263	0.0066	0.0306
Between	0.1412	0.1459	0.1472	0.1528
Overall	0.0762	0.0787	0.1000	0.1071

Notes: (1) Standard errors are in parentheses
***Significant at 1%. *Significant at 10%

4.1 Robustness Test

To strengthen the obtained findings, we developed an additional robustness control on the interaction effect of TI efficiency, using an alternative measure of this moderating variable. Thus, in this case, TI efficiency is calculated by the ratio of the number of product innovations over R&D intensity. R&D intensity has been commonly utilized in prior literature (e.g., Manzaneque et al. 2018) as an innovation input in the measurement of TI efficiency.

Table 4 shows that the robustness test results are very similar to those obtained in previous analyses (Table 3), thus reinforcing our empirical findings. Model 6 reveals

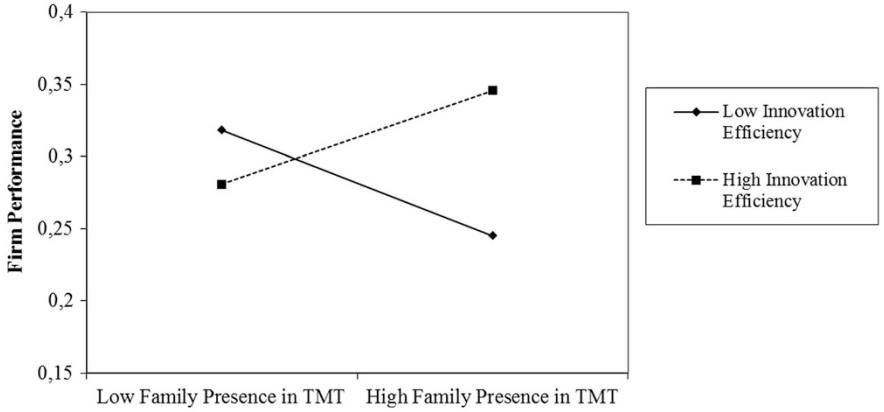

Fig. 2 Interaction effect of TI efficiency on the relationship between family presence in TMT and firm performance

Table 4 Robustness test

Dependent variable	Firm performance (ROA)	
	Model 5	Model 6
Main effect		
Family management (β1)	−0.004 (0.004)	−0.006 (0.004)
Moderator		
Technological innovation efficiency (β2)	−4.18e−07 (2.59e−07)	−5.42e−07 (1.94e−07)
Interaction effect		
Family management × technological innovation efficiency (β3)		7.68e−06* (4.32e−06)
Controls		
Firm age (β4)	−0.006 (0.010)	−0.011 (0.011)
Firm size (β5)	−0.006 (0.004)	−0.007* (0.004)
Leverage (β6)	−0.070*** (0.025)	−0.070*** (0.024)
Territorial subdivisions	Yes	Yes
Industry dummies	Yes	Yes
Constant	0.319*** (0.105)	0.340*** (0.107)
Number of observations	1154	1154
Hausman test		
Wald's X^2	58.36*** (29)	88.35*** (34)
R^2		
Within	0.0064	0.0323
Between	0.1449	0.1519
Overall	0.0981	0.1106

Note. (1) Standard errors are in parentheses
***Significant at 1%. *Significant at 10%

that the interaction effect of Family management*TI efficiency exerts a positive and significant impact ($\beta = 7.68e{-}06$; $p < 0.1$) on firm performance.

In short, this check enables us to guarantee the consistency of our results.

5 Discussion

Investigating how family presence in TMT influences firm performance has become an important topic in management research (e.g., Block et al. 2011; Manzaneque et al. 2020). Prior literature has shown that family-managed firms often prioritize noneconomic goals over economic ones (Gómez-Mejia et al. 2007, 2010), creating a unique context that affects decision-making and strategy implementation and, ultimately, the achieved performance (Martínez-Romero et al. 2020; Rojo-Ramírez and Martínez-Romero 2018). However, as previously stated, the existing results regarding the effect of family presence in TMT on firm performance are far from being conclusive (Vandekerkhof et al. 2018). At this respect, it is important to highlight that we found a lack of prior studies investigating firms' factors that may have an indirect impact on the family involvement-performance relationship. This is why we introduce a moderating factor, i.e., TI efficiency, which might well be helpful to explain the controversial results.

In line with recent studies (Martínez-Romero et al. 2020; Sciascia and Mazzola 2008), our empirical findings show that family involvement in management, and specifically family presence in the TMT, exerts a negative influence on firm performance. These results can be explained in the light of both the upper echelon and the SEW theories, since family managers would avoid taking strategic decisions that imply a loss of control over their firms (Gómez-Mejia et al. 2007, 2010), knowing that these decisions might involve improved performance outcomes. Furthermore, our findings reveal a positive moderating effect of TI efficiency on the family management-performance relationship. That is, firms with higher family presence in TMT and with enhanced TI efficiency, by promoting long-standing and prosperous relationships with selected stakeholders (Patel and Fiet 2011), social capital (Arregle et al. 2007), and tacit knowledge (Llach and Nordqvist 2010), weaken the negative relationship between family presence in TMT and firm performance.

This chapter contributes to previous literature in several manners. First, we analyzed the family presence in TMT-firm performance relationship in the context of private firms, which up to now has not received enough attention (Martínez-Romero et al. 2020; Sharma and Carney 2012), despite the mixing findings (Sciascia et al. 2014). In line with recent studies (Diéguez-Soto et al. 2019), our findings reveal that family managers, as the dominant coalition in family firms (Hambrick and Mason 1984; Vandekerkhof et al. 2015), negatively influence performance outcomes. Furthermore, we go a step further than previous research that used a binary measure of family management (e.g., Diéguez-Soto et al. 2018; Rojo-Ramírez and Martínez-Romero 2018), by using a continuous variable of family presence in TMT, disclosing heterogeneity across family firms concerning firm performance.

Second, with the purpose of shedding some light on the family management-performance relationship, this chapter introduces the moderating effect of TI efficiency. Thus, our study provides relevant insights regarding the interactive effect of TI efficiency and family presence in TMT with regard to performance outcomes. In such a way, our findings highlight that when TI efficiency is high, firms with a significant family presence in TMT can obtain higher performance outcomes, whereas when TI efficiency is low, firms with a significant family presence in TMT decrease their performance results. That is, Fig. 2 evinces that the moderating effect of TI efficiency on the family management-performance relationship is contingent upon the number of family managers on the TMT. Thus, our results seem to suggest that when there is a higher presence of family members in the TMT and a greater TI efficiency, family managers do not perceive any threat to their emotional endowment, because they dominate the strategic decision-making. In these situations, family managers enter in a virtuous circle and will be willing to establish collaborative innovation ties that increase TI efficiency (Feranita et al. 2017) and thus, firm performance, since these innovative collaborations are not contemplated as a loss of their firm control.

Our findings also have important practical implications, particularly for those family-managed firms that are disposed to enhance their firm's outcomes. In this sense, family managers should be aware of the importance of attaining higher TI efficiency in order to reach a proper balance between their economic and noneconomic goals. In this vein, family-managed firms may hire key external managers to learn from them the necessary skills and knowledge to improve efficiency in the resource management and implement an innovative culture that persists in the long term (Diéguez-Soto et al. 2016). Furthermore, external managers can avoid certain common practices in family firms such as overcompensation (Anderson and Reeb 2004) or prevent an unqualified family member from becoming CEO (Shleifer and Vishny 1986), which could be detrimental to the implementation and development of innovative projects and, thus, to TI efficiency and firm performance.

Notwithstanding the relevance of the obtained results, this chapter presents certain limitations that, in turn, open new lines for future research. Although we have focused on the family members' presence in the TMT, we have not contemplated the heterogeneity between these members. At this respect, future studies should analyze whether the interaction effect of TI efficiency on firm performance is the same when in a family firm, TMT members of various generations with different goals and values coexist (Chrisman et al. 2012). What is more, we measured TI efficiency using number of products as innovation output instead of using process innovation, which has been considered essential to decrease costs and to improve production efficiency by reducing the required level of input (Chang et al. 2015; Ramos et al. 2011). Thus, further research should consider the use of both product and process innovations as outputs to calculate TI efficiency in order to see its possible consequences on firm performance.

6 Conclusion

Overall, this chapter examines fundamental relationships in the family firm field, relating family presence in TMT to firm performance and highlighting the key role of TI efficiency. Thus, this manuscript reveals that TI efficiency weakens the negative relationship between the family presence in TMT and firm performance. Notwithstanding our study extends the theoretical and empirical contributions of prior literature (Diéguez-Soto et al. 2019; Sciascia and Mazzola 2008; Sciascia et al. 2014), more research is required to better understand the management implications in family firms performance and, more importantly, to identify what new factors may indirectly contribute to enhancing the family presence in TMT-firm performance relationship.

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