Profitability Goals, Control Goals, and the R&D Investment Decisions of Family and Nonfamily Firms*

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Introduction

Research and development (R&D) investments have the potential of yielding technological innovations capable of transforming organizations and industries, and can be used by companies to create and sustain competitive advantages (e.g., Artz, Norman, Hatfield, and Cardinal, 2010; Morbey, 1988). R&D investments can lead to high-impact, new product development programs, generate flows of new technological competencies into the firm, allow keeping abreast of the latest technical developments, and enhance the likelihood of developing products and services that are new to the market (Deeds and Decarolis, 1999; Song and Parry, 1997). However, R&D investments also entail considerable costs and require challenging organizational

stability and legitimacy (Burgelman, 1991; Greve, 2003a). Hence, innovation management scholars have long been interested in gaining an understanding of how managers deal with the opposition between potential benefits and concomitant risks in their R&D investment decisions (Bolton, 1993; Dougherty and Hardy, 1996; Fleming and Bromiley, 2000; Howell and Higgins, 1990).

The behavioral theory of the firm (Cyert and March, 1963), a dominant paradigm in this literature, views R&D investments as a form of problemistic search behavior and suggests that variations in R&D investments follow a process of performance evaluation (Cyert and March, 1963; Greve, 2003b). Because the relation between R&D investments and performance is uncertain, managers have to make decisions about R&D investments without clear economic guidance. Thus, they form reference points (Fiegenbaum, Hart, and Schendel, 1996) that reflect their personal goals, and make decisions to increase or decrease R&D investments based on whether firm performance is below or above such reference points (Cyert and March, 1963). In other words, the reference points are used by boundedly rational decision-makers to determine

the limit between success and failure in continuous measures of performance (Fiegenbaum et al., 1996; March and Simon, 1958). R&D investments are hereafter seen as a form of problemistic search in that they are "stimulated by a problem [and] directed toward finding a solution to that problem" (Cyert and March, 1963, p. 121). Among the different goals that managers might pursue, firm profitability has received the largest attention among scholars (Audia, Locke, and Smith, 2000; Bromiley, 1991; Greve, 2003a, 2003b; Lant, 1992; Miller and Chen, 2004) and, accordingly, the behavioral theory of the firm suggests that R&D investments will increase when profitability relative to the aspiration level decreases (Greve, 2003a).

Yet, the emphasis on profitability goals in prior research provides only limited insights about the decision-making processes of a considerable number of firms, namely family firms, where a family exerts strong

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influence over strategic actions by the means of its substantial ownership stake and active involvement in management (Chua, Chrisman, and Sharma, 1999; Sirmon, Arregle, Hitt, and Webb, 2008). Family involvement in ownership and management is associated with a vision for how the firm should benefit the family, potentially across generations, which entails the pursuance of noneconomic family-centered goals such as maintaining control and discretionary power in the hands of family members (Berrone, Cruz, and Gomez-Mejia, 2012; Chrisman, Chua, Pearson, and Barnett, 2012; Kotlar and De Massis, 2013). Besides the potential consequences of R&D investments for firm profitability, investing in R&D also requires diluting family ownership and ceding some power and control to nonfamily personnel (e.g., Chrisman and Patel, 2012; Gómez-Mejía, Makri, and Larraza-Kintana, 2010), and this is seen as inconsistent with the noneconomic goals of family members (Block, 2012; Chrisman and Patel, 2012; Gómez-Mejia et al., 2013; Munari, Oriani, and Sobrero, 2010). For example, Allen and Panian (1982) noted that "families may be willing to sacrifice some degree of corporate profitability in order to retain some degree of direct family control over the corporation" (p. 546). For these reasons, family business scholars agree that family firms tend to be conservative and tend to avoid strategic decisions that may increase performance variability, such as increasing R&D investments, and that R&D investment decisions entail unique trade-offs for family firms (Gómez-Mejia et al., 2013; König, Kammerlander, and Enders, 2013). Although R&D investment decisions in family firms involve considerations of both economic and noneconomic goals, how these two classes of goals interact in determining variations in R&D investments of family firms remains little understood, and despite growing research attention at the intersection of innovation management and family business research (Block, 2012; De Massis, Frattini, and Lichtenthaler, 2013; De Massis, Frattini, Pizzurno, and Cassia, 2014; Greve, 2003a; Kotlar, De Massis, Fang, and Frattini, 2013; Kotlar, De Massis, Frattini, Bianchi, and Fang, 2013; Munari et al., 2010), no empirical study has been conducted so far to examine how profitability and control goals are jointly considered in R&D investment decisions of family firms.

In this paper, we draw on the resource dependency perspective (Kotter, 1979; Pfeffer and Salancik, 1978) to identify the concentration of major firm suppliers as a dimension along which family managers evaluate their goals for control over the organization. Managers of nonfamily firms, who are assumed to be primarily driven by firm profitability, may consider the concentration of

suppliers only as an indirect antecedent of profitability (Porter, 1980). Conversely, we propose that family managers see the concentration of firm suppliers and their ensuing higher bargaining power as a direct threat to their control goals, and thus form reference points for control by focusing on increasing (or at least maintaining) their current decision control over time. Accordingly, we propose that family firms will respond more vigorously to a growing concentration of suppliers by the means of increasing R&D investments. Furthermore, we examine how the pursuance of control goals is contingent upon the accomplishment of profitability goals in family firms, outlining two alternative logics—*sequential attention* and *mutual activation*—that offer plausible explanations of how reference points for profitability and for control goals jointly enter the decision-making process about R&D investment variations in family firms. These hypotheses are examined empirically by the means of a panel data analysis of 431 Spanish manufacturing firms observed over the period 2000–2006. By doing so, this paper advances our understanding of the trade-offs entailed by R&D investment decisions in family firms (e.g., Chrisman and Patel, 2012; Gómez-Mejia et al., 2013; König et al., 2013; Kotlar, De Massis, Fang, et al., 2013) and illuminates both the direct and joint influence of economic and noneconomic goals on decision-making processes in family firms, thus offering important theoretical and practical implications for innovation management in family firms.

The remainder of the paper is organized as follows. The second section provides the theoretical background of the study and presents the hypotheses. The third section describes the methodology, while the fourth reports the results. Discussion of the findings and their implications, avenues for future research, and conclusions follow.

Theoretical Background and Hypotheses Development

Multiple Goals and R&D Investment Decisions

The behavioral theory of the firm suggests that firms pursue multiple objectives that derive from internal negotiation, while the comparison of goal variables attained through targets or points of reference determines decisions on key organizational actions (Cyert and March, 1963; Fiegenbaum et al., 1996; Kahneman and Tversky, 1979). Goals are therefore seen as targets along a measurable dimension that becomes the point of reference. When the actual outcome falls below a specific reference point, decision-makers initiate a problemistic search for actions that are expected to reestablish the status quo and support the accomplishment of outcomes above the aspiration level in the future (Cyert and March, 1963). A cumulative body of research in this area demonstrates that failure to meet an aspiration level motivates managers to accept the risks inherent in changing their organization (e.g., Audia and Greve, 2006; Greve, 1998; Greve, 2003b; Kim, Haleblian, and Finkelstein, 2011) including the development of new products and services through increasing R&D investments (Bolton, 1993; Greve, 2003a).

Although managers are acknowledged to pursue a wide range of goals (e.g., profitability, sales, status), profitability goals are generally thought to be their primary point of reference and have thus historically received the most attention in the literature (Greve, 2008). Firm profitability is a primary driver of top managers' compensation and their value in the job market (Berle and Means, 1965) as well as a key factor in the career development of subordinate managers and workers (Mezias, Chen, and Murphy, 2002). For these reasons, firm managers are generally expected to pay utmost attention to profitability reference points. While this view may well capture the logics underlying decision-making in organizations characterized by dispersed ownership and separation between ownership and management (cf. Wiseman and Gómez-Mejia, 1998), it does not take into account, however, the distinct organizational setting of family firms and the different goal profiles of their managers.

Owing to their ownership stake, managerial involvement, and close identification with the business (Chua et al., 1999), family members benefit from several noneconomic utilities such as maintaining family control and influence, sharing identification among family members within the firm, building social ties with stakeholders, sustaining the emotional attachments of family members to the firm, and renewing family bonds through dynastic succession (Berrone et al., 2012; Chrisman et al., 2012; Kotlar and De Massis, 2013). On the one hand, despite that managers belonging to an owning family may be less concerned about compensation and career development (Gómez-Mejía, Larraza-Kintana, and Makri, 2003; Gómez-Mejía, Nunez-Nickel, and Gutierrez, 2001), profitability goals still play a significant role in family firm decision-making because economic success is a prerequisite to achieving noneconomic goals, and therefore the risk of business failure that accompanies profitability below the reference point may be seen as a serious threat as well (Chrisman and Patel, 2012; Gómez-Mejía et al., 2010). As such,

decision-making in family firms involves consideration of both economic and noneconomic goals.

In prior research, many studies have shown that family managers frame strategic decisions differently depending on whether the family firm's profitability is below or above the aspiration level of profitability. For example, empirical evidence shows that family firms are generally reluctant to increase R&D investments (e.g., Block, 2012; Chrisman and Patel, 2012; Kotlar, De Massis, Fang, et al., 2013), but when performance falls below the profitability target, otherwise risk-averse family firms are likely to embrace high strategic risk in the form of increasing R&D investments (Chrisman and Patel, 2012; Gómez-Mejia et al., 2013; Kotlar, De Massis, Fang, et al., 2013; Patel and Chrisman, 2014), engaging in technology acquisitions (Kotlar, De Massis, Frattini, et al., 2013) and diversifying their business (Gómez-Mejía et al., 2010). On the other hand, the role of family-centered noneconomic goals in family firms' decision-making has not been examined directly so far, despite the fact that these goals are acknowledged to be of primary importance to family managers (Chrisman et al., 2012; Kotlar and De Massis, 2013). Theoretically, managerial decision-making becomes more complex when several goals—and therefore potentially more goal conflicts—coexist within an organization (Fiegenbaum et al., 1996; Greve, 2008), and extending the investigation of organizational theory guided by goals that go beyond profitability appears both necessary and useful. In particular, given the potential differences in goals between managers of family and nonfamily firms, examining whether goals other than profitability exist and how different managers choose among multiple goals represents an important avenue for future research (Fiegenbaum et al., 1996; Greve, 2008).

The family business literature particularly acknowledges that family managers are primarily concerned about their ability to maintain control and exercise managerial discretion (e.g., Berrone et al., 2012; Carney, 2005; Gómez-Mejía, Haynes, Núñez-Nickel, Jacobson, and Moyano-Fuentes, 2007; Kotlar and De Massis, 2013), such that they are likely to choose reference points associated with the increase or decrease of their control over the organization. In this paper, we extend this argument and specifically focus on how suppliers could affect managerial control. Supplier bargaining power could be an important reference point for family managers in terms of their idiosyncratic goals, and their actions aimed at achieving and maintaining a certain level of discretionary control are highly consequential. Accordingly, in the following sections, we examine how information on supplier bargaining power enters decision-making in family firms and drive variations in R&D investments. We also consider how profitability aspirations affect the importance of supplier bargaining power in the family firm decision-making process.

Control Goals and R&D Investment Decisions in Family Firms

Supplier-based reference points are grounded in the belief that the bargaining power of the firm's vertical parties affects managers' control over decision-making. Management research has long emphasized that in making strategic decisions, managers also consider the external actors along the firm's value chain (Baird and Thomas, 1985; Fiegenbaum et al., 1996). Supplier bargaining power is often perceived as an indicator of the costs involved in replacing a supplier (Porter, 1980). This dimension is indirectly related to firm profitability because an increase in supplier bargaining power may result in lower ability to appropriate value by the firm, and may eventually cause lower margins. Family managers may, however, see an increase in supplier bargaining power as a more direct threat to their goals to maintain control and exercise managerial discretion because an increase in supplier bargaining power implies that the firm will have to comply with greater demands from its vertical parties, will have lower possibility of negotiating quantities and prices, and will hardly exit from the relationship (Kotter, 1979). Thus, similarly to managers in the insurance industry who form unique goals according to firm size that reflect their compensation and value on the job market (e.g., Greve, 2008), family managers may configure a reference point that captures positive or negative variations in supplier bargaining power, and thus react to increasing bargaining power with strategic decisions that could guarantee greater independence in the future from the aforementioned external constraints (Oliver, 1991). In this regard, an increase in R&D investments is a typical strategic decision that can help reduce supplier bargaining power (Baird and Thomas, 1985). Indeed, increasing R&D investments can result in technological knowledge that enhances the threat of vertical integration exerted by the focal firm on its suppliers (Porter, 1980). Moreover, these investments enable a higher standardization of product components, which reduces the switching costs associated with changing suppliers (Porter, 1980). Higher R&D investments can improve production processes, lowering the consumption of raw materials and components, and consequently the focal firm's dependency on its suppliers (Tidd and Bessant, 2009).

While managers are generally reluctant to depend on factors outside their control (Pfeffer, 1972), concerns about supplier bargaining power are likely to be perceived more strongly by family managers in their pursuit of control over decision-making. This is because an increase in supplier bargaining power implies that critical resources to firm operations are harder to obtain at optimal conditions and/or from alternative sources (Kotter, 1979; Pfeffer, 1972). The increasing resource dependency on suppliers is likely to limit managerial actions and reduce the ability of family managers to pursue their personal and particularistic decision-making goals (Carney, 2005) up to the point of leaving managers with very little control over strategic choices (Jawahar and McLaughlin, 2001; Pfeffer and Salancik, 1978). This threat thus directly jeopardizes the family's ability to exert decision-making control (Chrisman and Patel, 2012; Gómez-Mejía et al., 2007, 2010). As a consequence, family managers are likely to react to increasing supplier bargaining power by adopting strategic and operational choices that provide greater autonomy to act outside the limits established by powerful suppliers. For these reasons, increasing R&D investments seems particularly suitable to pursuing this objective. Accordingly, we here argue that, although the desire of family managers to maintain decision-making control leads family firms to increase R&D investments, the same control goals make reference points for supplier bargaining power peculiarly salient to R&D investment decisions in family firms.

> H1: Supplier bargaining power moderates the negative relationship between family firms and R&D investment variations such that the negative tendency of family firms toward increasing R&D investments becomes weaker given an increase in supplier bargaining power.

Joint Effect of Performance and Control Goals

Organizations respond to gaps in performance aspirations by enacting a broad range of strategic changes including increasing R&D investments (Greve, 1998, 2003a). In particular, prior research has shown that variations in R&D investments follow a process of comparison between the focal firm and industrial competitors (Fiegenbaum et al., 1996), and a primary aspiration of this reference point derives from industrial benchmarks generated by the average performance of competitors (Porter, 1980). Indeed, industry averages serve as an aspiration level of profitability for many firms (Frecka and Lee, 1983), which are expected to respond to negative gaps in profitability aspirations by undertaking projects

with the potential to recover the firm's competitive advantage, such as increasing R&D investments (Greve, 2003a).

As discussed above, profitability goals also rank high on the agenda of family firms (Chrisman and Patel, 2012) largely because the achievement of financial targets is a prerequisite to the viability of the firm, and thus a key variable for family managers interested in creating and/or preserving their control over the business (Gómez-Mejía et al., 2010). Nevertheless, control goals lead family managers to establish a reference point for supplier bargaining power and increase R&D investments when this power increases. Because both profitability and supplier bargaining power are strongly related to the owning family in terms of their noneconomic goals, and the achievements of both goals need the support of firm resources, it is rather naïve to assume that effects of these two goals on decision-making are independent of each other. Rather, it is interesting to explore how the interaction of multiple goals, such as profitability and supplier power, could affect strategic decision-making of family firms. We will now consider these interactions.

Previous studies have addressed the question of how multiple goals concur in decision-making in different ways. Some have investigated the effects of multiple goals side by side as in the case when accounting and stock market measures of profitability are used to predict risk taking (Miller and Chen, 2004). This approach treats goals as alternative measures of the same construct, which is appropriate for closely related goals but not in terms of qualitatively different goals such as control and profitability. An alternative approach is to include multiple goals in a single model, assuming that the effects of multiple goals are independent of each other and thus additive. This logic has shown that two goals can independently influence a single outcome such as when goals for market share and network status both affect network tie initiation (Baum, Rowley, Shipilov, and Chuang, 2005). This is a parsimonious approach to modeling different goals and is favored under the assumption that goals are perceived by managers as unrelated to each other. Nevertheless, there are reasons to assume joint goals' effects. In particular, family business literature has shown that, compared with nonfamily managers, family managers have a broader set of goals that may either be conflicting or compatible (Kotlar and De Massis, 2013). Furthermore, this literature also indicates that the variance in family firm R&D investments changes according to whether profitability is below or above the reference point, which suggests that the effect of family control goals could be contingent on accomplishing performance

aspirations and thus be activated only under certain performance configurations (Chrisman and Patel, 2012). However, a theoretical framework that allows understanding under which conditions control goals are salient to family manager decision-making is still lacking, and no study has directly explored, either theoretically or empirically, the joint effect of profitability and control goals in family firms.

In this respect, there are two alternative explanations for this joint effect. The first is a *sequential attention logic* stating that due to limited attention, decision-makers attend to one goal at a time and move on to the next goal when the first has achieved performance above the reference point (Cyert and March, 1963). According to Cyert and March (1963), the hierarchy of decision-making goals will depend on the preferences of the dominant coalition, which may vary across firms. In this regard, some goals will receive more attention than others, and the saliency of a higher hierarchy reference point will reduce the relevance of lower hierarchy reference points. It is reasonable to assume that goals that are closely associated with the survival of the firm, such as profitability, will have high hierarchical priority in family businesses for several reasons. Indeed, achieving profitability goals will fundamentally affect the family members' ability to satisfy their individual needs, as well as protecting their identity and emotional relationships. Furthermore, firm profitability could be an important prerequisite of successful family business succession. On the other hand, compared with profitability goals, control goals could be treated as secondary since family decision-makers may be willing to give up management control to achieve long-term business prosperity and increase the possibility of passing a healthy business to later generations. Overall, this theoretic tenet suggests that in family businesses, goals for control gain more attention when profitability targets are met. In other words, profitability goals will reduce the importance of control goals, with the latter perceived as less important by family decision-makers and hence reducing the causal connection between control goals and firm decision-making. This is especially true in family firms given that the achievement of both goals requires investing resources, while family decision-makers are shown to be parsimonious in resource investments (Carney, 2005).

Another explanation for the sequential logic is the psychological adaptation theory (Helson, 1964), which suggests that although profitability goals and control goals have independent effects on decision-makings, their combination should reduce rather than increase the cumulative effects of each type of single goal. According to Helson's (1964) theory, when people are exposed to a set of stimuli, they develop an adaptation level to those stimuli such that any future exposure to similar stimuli produces an indifferent (or minimal) response. According to this theory, family decision-makers may perceive dual goal achievements (and accordingly achievement–aspiration gaps) as two stimuli affecting their decision-making. While each single goal still has a relevant effect on decision-making, the combination of the two goals reduces the effects of both because the stimuli are similar to those involved in the adaptation level of one. This argument is particularly relevant for family businesses since profitability and supplier bargaining power are both strongly related to the family's noneconomic goals.

Overall, the sequential logic suggests that an increase in supplier bargaining power will generally lead family managers to increase R&D investments, but because profitability goals have greater saliency, the relation between supplier bargaining power and variations in R&D investments will become weaker, and possibly close to zero, when profitability is below the reference point. Thus, the sequential attention logic suggests the following hypothesis:

> *H2a (sequential attention logic): For family firms, a negative profitability–aspiration gap will negatively moderate the positive effect of a change in supplier bargaining power on R&D investment variation, such that the effect will be weaker.*

> *H2b (sequential attention logic): For family firms, a positive profitability–aspiration gap will positively moderate the positive effect of a change in supplier bargaining power on R&D investment variation, such that the effect will be stronger.*

Sequential attention is not the only explanation that has been proposed and in the case of profitability and control goals, the *mutual activation logic* could also be a plausible alternative hypothesis. Goals can be causally linked in such a way that the fulfillment of one goal helps an actor to fulfill the next (Greve, 2008; March and Simon, 1958). As said, an organization facing increasing supplier bargaining power may also suffer from poor profitability. This is because powerful suppliers can dictate prices and impose inefficient production processes, especially when exiting is unfeasible (Kotter, 1979). In this regard, increasing R&D investments can reduce external dependency by improving production processes in such a way that allows incorporating alternative inputs. Furthermore, increasing R&D investments may provide new organizational areas that are outside of supplier influence and where family managers can exer-

cise unconstrained control. Thus, it is also reasonable to expect family managers to follow the activation logic, assuming that achieving control goals helps achieve profitability goals, especially when performance is below the reference point. Family managers may thus perceive that if a firm has high performance, it is sufficiently independent of the influence of suppliers. However, if performance is low, increasing R&D investments may be seen as a solution. This formulation implies that, contrary to H2a and H2b, the relationship between supplier bargaining power and R&D investment variation is stronger (weaker) when performance is below (above) the reference point:

> H3a (mutual activation logic): For family firms, a negative profitability–aspiration gap will positively moderate the positive effect of a change in supplier bargaining power on R&D investment variation, such that the effect will be stronger.

> H3b (mutual activation logic): For family firms, a positive profitability–aspiration gap will negatively moderate the positive effect of a change in supplier bargaining power on R&D investment variation, such that the effect will be weaker.

It should be noted that we are implicitly assuming that these relationships will not hold in nonfamily firms. In particular, we assume that nonfamily managers are less likely to form reference points for supplier bargaining power or, if they do so, such reference points will have lower saliency in their decision-making. The strategic management literature indicates that higher supplier bargaining power could reduce the firm's ability to capture the value of products sold, and consequently negatively affect the firm's profitability, at least in the long run (e.g., Porter, 1980). But, even if managers of nonfamily firms may see this dimension as an indirect antecedent of firm profitability, they can more simply evaluate their profitability goals based on direct measures of profitability. All managers will conceivably prefer to be less dependent on factors outside of their control (Pfeffer, 1972), but managers of nonfamily firms are also more likely to give primary emphasis to direct measures of firms' profitability, because this dimension is directly related to their and their subordinates' careers and value in the job market (Berle and Means, 1965; Mezias et al., 2002). That is to say, nonfamily managers will be less concerned about control goals. These assumptions suggest that changes in supplier bargaining power will not directly relate to R&D investment variation in nonfamily firms, and that, to the extent to which managers of nonfamily firms do consider this dimension as an indirect antecedent of firm profit-

ability, we will find some interactive effects of profitability and control goals in nonfamily firms, such that (1) when profitability is below the reference point, increasing supplier bargaining may reinforce the tendency toward increasing R&D investments, and (2) when profitability is above the reference point, increasing supplier bargaining power may weaken the negative tendency toward increasing R&D investments. These contentions are explored in our empirical analysis and discussed in the discussion section.

Methodology

Sample

To test our hypotheses, we obtained data on Spanish manufacturing firms from the Encuesta Sobre Estrategias Empresariales database (Survey on Business Strategies, ESEE) produced by the Sociedad Estatal de Participaciones Industriales (SEPI) Foundation on behalf of the Spanish Ministry of Industry. The database provides a wide range of information on Spanish manufacturing firms with 10 or more employees, including information on R&D investments. The survey has been undertaken annually since 1990 and is an unbalanced panel. For our purposes, we have focused our analyses on the period 2000–2006. One of the most relevant characteristics of the ESEE is its representativeness, which was ensured by combining exhaustiveness and random sampling criteria. The data cover the entire population of Spanish manufacturing firms with 200 or more employees, and include a stratified random sample of 5% of the population of firms with at least 10, but fewer than 200, employees. Efforts have been made to minimize the deterioration of the sample across periods because of either a reduction of the firms' collaboration with the survey, or their dropping from the sample itself. In the first case, firms are reminded of the important social contribution of their participation in the survey; in the second, new firms are incorporated in the panel in order to avoid reductions in population coverage across industries and size segments. The overall response rate varied across years, ranging between 80.8% and 94.8%. Given the very high response rate and the efforts to minimize the deterioration of the sample over time, the nonresponse bias does not represent a major problem. Furthermore, the quality of this survey data is also ensured by the data collection procedure, which involves multiple organizational members of each firm filling the different sections of the survey based on their direct responsibilities and access to information (on average, the survey was filled by approximately 2.5

individuals in each firm), as well as a subsequent validation of the contents. This is made in close collaboration between the Fundación SEPI, the company that carries out the fieldwork, and the companies that provide the information.[1] The reliance on multiple respondents, the validation process described above, and the objective nature of the information collected through the survey should reduce common-method bias. This database has been used widely in prior research in management and other fields, including family business (e.g., Greenwood, Díaz, Li, and Lorente, 2010; Kotlar, De Massis, Fang, et al., 2013; Kotlar, De Massis, Frattini, et al., 2013; Salomon and Jin, 2008; Salomon and Shaver, 2005).

As we are interested in variations in R&D investments, a focus on manufacturing industries was considered appropriate because the typically high degree of obsolescence of manufacturing firm products due to their relatively short life cycle suggests that R&D investments are likely to be commonly used to search for sustainable competitive advantages. In addition, although families operate in a broad array of firms, family firms appear to be a very common organizational form among private firms and in manufacturing industries (Astrachan and Shanker, 2003). Moreover, the unbalanced nature of this data set implies that firms can enter and exit the survey in the same way as companies appear and disappear in the economy. For this reason, this sample is considered appropriate to observe sufficient degrees of performance and business risk. Restricting the sample of companies to observations in the same time period would affect the randomness of the sample with a much lower likelihood of including firms facing a negative profitability–aspiration gap. The full sample included 4475 firm year observations. After excluding observations with missing data, we obtained 995 time-series cross-sectional observations, consisting of 431 companies operating in twenty different manufacturing industries over the period 2000–2006.

Variables

Change in R&D investments. This variable captures the extent to which a firm changes its level of R&D investments across periods. We operationalize this variable by subtracting the ratio of R&D expenditure to sales at time t_{-1} to the ratio at t_0. In order to exclude industry-specific effects on R&D investments, we adjusted this variable to industry average by year.

Family firm. The definition of family firms has been long an object of scholarly debate, and researchers have adopted varied approaches for operationalizing it (for a review, see De Massis, Sharma, Chua, and Chrisman, 2012). In contrast to traditional approaches that rely only on family ownership, family business scholars have increasingly recognized the importance for a family to have both a substantial ownership stake and managerial presence in a firm in order to affect its strategic actions (Chua et al., 1999). Family vision and goals are indeed found to be highly correlated with the extent of family involvement in the firm (Chrisman and Patel, 2012; Chrisman et al., 2012). Accordingly, we consider both family ownership and family involvement in top management to build a binary measure of *family firm* operationalized as 1 if there is a family with majority ownership in the firm and at least one member of that family is actively involved in top management, and 0 otherwise. This measure is used to test H1 and to differentiate family firms from nonfamily firms in testing H2a to H3b. Overall, approximately 30% of the usable sample (298 of 995) is classified as belonging to the family firm population, which is consistent with other studies adopting the same definitional approach (for example, 32.6% in Anderson and Reeb, 2004, and 40% in Sirmon et al., 2008).

Change in supplier bargaining power. The bargaining power of suppliers relative to a firm may be defined along two dimensions: the importance of the purchase and the criticality of the products purchased (Caniëls and Gelderman, 2007; Nellore and Söderquist, 2000; Porter, 1980). For each year, the ESEE database reports the percentage of purchases a firm makes from its three largest suppliers. Scores close to 0 indicate that a firm has a large number of suppliers, whereas scores close to 100 mean that a firm has less than four suppliers overall. Based on this information, we build the variable *change in supplier bargaining power* as the ratio difference between the scores at time t_{-1} and t_{-2}, with positive values indicating a concentration of the firm's major suppliers and thus increasing supplier bargaining power. Unfortunately, the ESEE database does not include more detailed information about the criticality of such goods, so we are unable to combine these two dimensions to build an accurate measure of supplier bargaining power. Thus, we only focus on the importance of major suppliers in this study, which is still considered as an important dimension along which managers can evaluate their goals for control because (1) this figure is easily available to managers, and (2) regardless of the criticality of the goods provided,

managers of a firm that depends on a smaller number of suppliers for a substantial proportion of goods bought can be conceivably expected to lower control over quantities, prices, and other strategic choices than in firms with less concentrated suppliers (Harrigan, 1983; Jawahar and McLaughlin, 2001; Kotter, 1979; Lustgarten, 1975; Pfeffer, 1972; Pfeffer and Salancik, 1978). The change in supplier bargaining power variable so defined is thus used to test H1 in this study. A positive coefficient of the interaction between family firm and supplier bargaining power indicates support of H1, meaning that an increase in supplier power motivates family firms to invest more in R&D activities.

Profitability–aspiration gaps. Following prior research (e.g., Chen, 2008; Chrisman and Patel, 2012; Greve, 2003a, 2008; Kotlar, De Massis, Fang, et al., 2013; Kotlar, De Massis, Frattini, et al., 2013) we construct continuous variables to measure positive and negative gaps between aspirations and profitability (Greene, 1993, pp. 235–238). This reflects the assumption that as positive or negative discrepancies between firm performance and competitor performance widen, decision-makers are more likely to perceive positive or negative gaps between current profitability performance and aspirations (Fiegenbaum et al., 1996). The positive profitability–aspiration gap is calculated as the absolute difference between the focal firm's performance (i.e., return on assets ratio [ROA]) in each period and the average performance of other firms in the relevant two-digit Nomenclature statistique des activités économiques (NACE) industry if positive, and zero (0) otherwise. The negative profitability–aspiration gap is calculated in the same way. Using two measures makes it easier to interpret the effect of positive or negative deviations in performance in relation to aspirations. This is especially important in testing the sequential (H2a & H2b) and mutual activation logics (H3a & H3b). If the sequential logic better predicts decision-making in family firms, we would expect to see a negative estimated coefficient for the interaction between a negative profitability–aspiration gap and supplier bargaining power (H2a), and a positive estimated coefficient for the interaction between a positive profitability–aspiration gap and supplier bargaining power (H2b). Instead, if the mutual activation logic better captures decision-making in family firms, we would expect to see a positive estimated coefficient for the interaction between a negative profitability–aspiration gap and supplier bargaining power (H3a), and a negative estimated coefficient for the interaction between a positive profitability–aspiration gap and supplier bargaining power (H3b).

Control variables. In view of the findings in strategic risk and R&D investment literature, we include several one year lagged control variables to exclude alternative explanations. First, we control for environmental factors (competitor, buyer, and market dynamics) that may affect family and nonfamily business R&D investment decisions. *Change in competitor market power* indicates the change in market power of a focal firm's key competitors. For each year, the ESEE database reports the market share of the four major competitors in each of the firm's main markets, and we calculate the ratio difference between the scores at time t_{-1} and t_{-2}. Similar to supplier bargaining power, *change in buyer bargaining power* is calculated as the ratio difference between the percentage of sales earned from the four major customers at time t_{-1} and t_{-2}. We also include the *change in market dynamism* variable to control for shifts in a firm's focal market that may affect its attitude toward risk (Shinkle, 2012). In particular, for each year, the ESEE database reports whether a firm's focal market has (1) expanded, (2) remained stable, or (3) has contracted. Based on this information, we build the variable as the difference in market dynamism between period t_{-1} and t_{-2}.

Second, we include unabsorbed *resources available* to the focal firm at time t_{-1}, calculated as the ratio of quick assets (cash and marketable securities) to sales, which indicates uncommitted and high discretion resource availability. We also include *organizational age* (i.e., years from foundation) and *firm size* (i.e., logarithm of sales at time t_{-1}) as controls for organizational inertia (Kelly and Amburgey, 1991). Third, we include the ROA at time t_{-1} to control for overall firm efficiency (Chrisman and Patel, 2012). Fourth, we add the *debt intensity* at time t_{-1} calculated as the debt/sales ratio, with the aim of capturing threats to firm survival resulting from financial activities (Gómez-Mejía et al., 2010). Fifth, we control for the amount of resources absorbed by the organization, which indicate the complexity of the firm's administrative system and could thus constrain R&D investments decisions (e.g., Greve, 2003a), by including the *absorbed resources* variable, calculated as the ratio of sales and general expenditure divided by sales at time t_{-1} (George, 2005). Sixth, we include the variables *previous R&D investments*, which is the ratio of R&D expenses to sales at time t_{-2} to control for the size dependence of the rate of change in R&D investments, following Gibrat's law of proportionate change (e.g., Klette and Griliches, 2000); *product diversification*, measured as the number of sectors in which a firm has diversified its activities; and *financial support for R&D*, calculated as the total amount of financial resources expressed in thousands of euros

that a firm received from public institutions intended for R&D activities. Seventh, we include the *international operations* variable, measured as the ratio of purchases made from foreign countries divided by sales at time t_{-1}, to control for possible economies of scope associated with R&D investments (Baysinger and Hoskisson, 1989). Finally, in order to exclude overall economic fluctuations in Spain from 2000 to 2006, we also include *average industry firm performance* (i.e., ROA) for each year.

Endogeneity. To control for the possible endogeneity of R&D investments due to unobservable organizational or environmental characteristics that are not captured in the control variables, we implement the Heckman (1979) two-stage technique (see, for example, Gómez-Mejía et al., 2007). Using Heckman's two-stage procedure, we first estimate a probit model for each period, in which the endogenous variable is family (=1) versus nonfamily firm (=0), and estimate the inverse Mills ratio. We then estimate the change in R&D investments model using the inverse Mills ratio from the first stage as a control variable. Incorporating this correction term into the second-stage model yields unbiased estimates of the predictors of change in R&D investments (Greene, 1993). In the first-stage model, we use three variables that could affect the likelihood of family control, but are not correlated to change in R&D investments. The first variable is the number of family members working as employees in the firm, since having family members as employees increases the benefits a family may derive from owning a company. The second variable is the firm's legal form because families are more likely to control private limited companies. The ESEE database reports six possible legal forms: public limited company (=1), private limited company (=2), limited labor company (=3), public limited labor company (=4), partnership (=5), and other (=6). Finally, we include the share of foreign equity because families and foreign investors are likely to have divergent interests (Kim, Kim, and Lee, 2008) and family control is thus less likely when foreign investors own a significant share of the firm's equity. There is no theoretical basis to link either of these variables directly to change in R&D investments. The other variables listed above were also included in the first-stage model.

Data Analysis

The descriptive statistics and correlations for the variables are reported in Table 1. The average firm age is 31 years, and the average firm has revenues for 17 million euros and 392 employees. In order to test for H1, both family and nonfamily firms are included in the sample (Model 1). To test for the sequential and mutual activation logics, we separate family from nonfamily firms and focus on family firm observations only (Model 2). We also replicate the tests for nonfamily firms (Model 3). As the assumption for normal distribution could not be met in the ordinary least squares regression model, longitudinal regression analyses were conducted. We calculated the variance inflation factors after each regression to see whether the results were subject to multicollinearity. The values were below 5, indicating that the estimations were free of any significant multicollinearity bias. The Wu–Hausman test suggests that fixed effect generalized least squares panel regression is more appropriate than random effect regression for all models of interest. As such, we used fixed effect panel regression as our primary analysis tool. The Huber–White sandwich estimator for cross-sectional correction of covariance was used to control for heteroskedasticity and serial correlation. As correcting for self-selection of family control is important in theory (Chrisman and Patel, 2012), we included the inverse Mills ratio from this model into the second-stage models (see Table 2). The Mills ratio's nonsignificance in the second stage indicates that potential endogeneity of family control did not adversely affect our estimated results on changes in R&D investments. The hypothesized results are similar with and without the inclusion of the inverse Mills ratio.

Results

Model 1 presents the regression results of the different responses of family versus nonfamily firms to a change in supplier bargaining power. Consistent with prevailing understanding, the family firm variable has a marginally significant negative coefficient (B = −.302, $p < .10$), meaning that generally family firms are reluctant to increase R&D investments. The standardized coefficient of the family firm variable (β = −.100) is the third biggest among all significant coefficients, supporting the basic assumptions that family firms are more reluctant to increase R&D investments across periods. The estimated coefficient of change in supplier bargaining power is nonsignificant, indicating that a change in supplier bargaining power does not generally affect R&D investment decisions.

H1 predicts that supplier bargaining power moderates the negative relationship between the family business variable and R&D investment variation, such that the original negative relationship becomes positive given a high increase in supplier bargaining power. As shown in

Table 1. Descriptive Statistics and Correlations

	Mean	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1. Change in R&D investments	.02	1.39	1.00																		
2. Family firm	.30	.46	-.06	1.00																	
3. Negative profitability–aspiration gap	39.10	70.38	.00	.02	1.00																
4. Positive profitability–aspiration gap	2.15	10.26	-.02	.09	-.02	1.00															
5. Change in supplier bargaining power	.14	2.59	-.01	-.02	-.01	-.01	1.00														
6. Change in competitor market power	-.02	.33	-.04	-.04	.01	.02	.01	1.00													
7. Change in customer bargaining power	.17	2.89	.00	-.02	.00	.02	.01	.03	1.00												
8. Change in market dynamics	.13	.49	.04	.02	.02	.07	.01	-.01	.06	1.00											
9. Resource availability	.04	.21	.00	.07	.12	.01	-.01	.02	.00	.00	1.00										
10. Firm age	31.14	21.78	-.04	-.13	-.06	-.04	-.02	.04	-.01	-.02	.00	1.00									
11. Firm size	16.66	1.95	.07	-.43	-.02	-.12	.09	.06	.05	.05	-.04	.34	1.00								
12. ROA	2.68	14.03	-.01	.07	-.03	.76	.00	.02	.02	.04	-.02	-.02	-.05	1.00							
13. Debt ratio	3.16	27.11	-.01	-.01	.00	-.01	.00	.01	.00	.05	.03	-.06	.02	-.01	1.00						
14. Absorbed slack	.76	.16	-.05	.02	.06	-.07	.02	.03	.03	-.01	.05	-.07	-.11	-.18	.03	1.00					
15. Previous R&D activity	.46	1.73	.08	-.06	.00	-.04	-.01	-.04	-.02	.01	.12	.10	.14	-.03	.00	-.05	1.00				
16. Product diversification	.23	.57	.00	.03	.01	.01	.03	-.04	-.01	-.02	.05	-.08	.02	.03	-.02	.03	-.03	1.00			
17. Financial aid for R&D	5.51	43.49	.10	-.08	-.01	-.02	-.01	-.04	-.01	.01	.17	.02	.12	-.02	.00	-.01	.38	.07	1.00		
18. Import intensity	.05	.09	-.01	-.15	-.01	-.06	.01	.03	.01	-.03	.10	.14	.28	-.05	.00	.08	.25	-.01	.13	1.00	
19. Yearly average industry performance	2.69	1.40	.00	-.06	-.13	.08	.05	.02	.02	-.01	-.17	-.08	-.06	.09	.03	-.04	-.25	.07	-.11	-.42	1.00

Correlations $\geq$ |.05| are significant at $p < .001$.
SD, standard deviation; R&D, research and development; ROA, return on assets ratio.

Table 2. Fixed Effect Regression Analysis

	Change in R&D Investments					
	Model 1 (FF & NFF)		Model 2 (FF)		Model 3 (NFF)	
Variables	B	β	B	β	B	β
Family firm (FF)	−.302†	−.1†				
Change in supplier bargaining power (SBP)	−.012	−.023	.117*	.047*	−.142	−.292
FF × SBP (H1)	.151*	.026*				
Negative profitability–aspiration gap (NP)			.0004***	.025***	.037***	.97***
Positive profitability–aspiration gap (PP)			−.015***	−.189***	−.040**	−.22**
NP × SBP (H2a & H3a)			−.0002**	−.014**	−.012	−.474
PP × SBP (H2b & H3b)			.012	.054	−.042†	−.058†
Change in competitor market power	−.204***	−.048***	−.132*	−.041*	−.289	−.062
Change in customer bargaining power	.001	.002	−.017	−.014	.003†	.008†
Change of market dynamics	.179**	.064**	.045	.02	.193*	.064*
Resource availability	−.435**	−.065**	−.094	−.022	−1.065***	−.127***
Firm age	.001	.018	−.006***	−.101***	.002	.034
Firm size	.395***	.553***	.179	.236	.275***	.345***
Return on assets ratio	.001	.015	.019***	.257***	.041***	.369***
Debt ratio	.000	.001	.0003**	.002**	.000	.084
Absorbed slack	.622	.073	.668†	.074†	.863	.102
Previous R&D activity (R&D intensity t_{-2})	−.285*	−.354*	.004	.005	−.304	−.367
Product diversification	.116	.048	−.361†	−.202†	.092	.034
Financial aid for R&D	.002***	.063***	.012	.036	.002**	.075**
Import intensity	−.001	.000	1.413***	.080***	−1.731*	−.011*
Yearly average performance	−.017	−.018	.013*	.017*	−.049	−.045
Miller's inverse ratio	−.032	−.046	−.016	−.017	−.006	−.008
Sample size	995		298		697	
Within R^2	.087		.296		.113	
F-Statistics	2.88***		26.40***		2.72***	
Wu–Hausman χ^2	703.54***		705.59***		425.18***	

† $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$.
NNF, nonfamily firm.

Model 1, the interaction coefficient between family business and change in supplier bargaining power is positive and significant (B = .151, $p < .05$) and the standardized coefficient is .026. In combination with the negative coefficient of the family business variable, this means that given a one standard deviation increase in supplier bargaining power, family firms become aggressive and increase their R&D investments by approximately 2.6%. Hence, H1 is supported. To facilitate understanding the complex interactions, we visually present the results in Figure 1, setting high and low conditions (plus and minus one standard deviation from the mean, respectively) for the moderating variable (Cohen, 2003).

H2 (H2a and H2b) and H3 (H3a and H3b) concern the sequential and mutual activation logics in family business decision-making. If the sequential logic explains decision-making with multiple reference points, then the interaction between a negative profitability–aspiration gap and a change in supplier bargaining power should be negative, while the interaction between a positive profitability–aspiration gap and a change in supplier bargaining power should be positive. If the mutual activation logic explains decision-making with multiple reference points, then the interaction between a negative
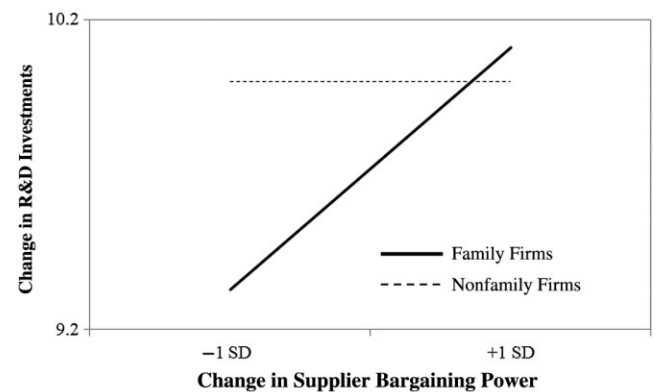
Figure 1. Effects of Supplier Bargaining Power on R&D Investment Decisions.
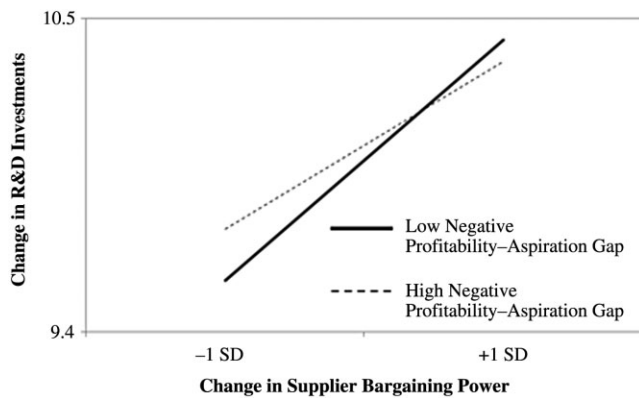R&D, research and development; SD, standard deviation

profitability–aspiration gap and a change in supplier bargaining power should be positive, while the interaction between a positive profitability–aspiration gap and a change in supplier bargaining power should be negative.

Model 2 reports the regression results only for family firm observations. Consistent with previous studies (Chrisman and Patel, 2012; Patel and Chrisman, 2014), negative and positive profitability–aspiration gaps are found to respectively have positive and negative coefficients. H2a is supported because the interaction coefficient between supplier bargaining power and a negative profitability–aspiration gap is negative and significant (B = −.0002, p < .001). Hence, given a high negative profitability–aspiration gap, the slope between supplier bargaining power and R&D investment variation becomes less steep compared with a low negative profitability–aspiration gap (Figure 2). H2b is not supported (B = .012, p > .10), although the direction of the coefficient is consistent with the sequential logic. H3a and H3b are not supported in the family firm observations.

Model 3 reports the regression results for nonfamily firm observations. The comparison of Model 3 with Model 2 provides additional support to our theoretical assumptions, and in particular for H1: managers of family firms respond to growing supplier bargaining power by increasing R&D investments (B = .117, p < .05), whereas managers of nonfamily firms are not sensitive to such variations (B = −.142, p > 0.l0). In addition, the unstandardized coefficients for negative and positive performance–aspiration gap are larger in nonfamily firms than in family firms, suggesting that, in general, profitability goals are less salient to managers of family firms. This is consistent with the view that R&D investment decisions in family firms involve consideration of other goals than profitability and, thus, additional trade-offs

Figure 2. Joint Effects of Supplier Bargaining Power and Profitability on R&D Investment Decisions in Family Firms.
R&D, research and development; SD, standard deviation

(e.g., Chrisman and Patel, 2012; Gómez-Mejia et al., 2013; König et al., 2013; Kotlar, De Massis, Fang, et al., 2013). Also, the interaction between supplier bargaining power and a positive profitability–aspiration gap is negative, but only marginally significant (B = −.042, p < .10). Overall, these results suggest that the sequential logic better explains decision-making with multiple reference points in family firms, whereas control goals appear to be less relevant to managers of nonfamily firms.

Discussion

The idea that managers have multiple goals and use multiple reference points to make strategic decisions in R&D and technological innovation has long been part of the organizational theory debate (Cyert and March, 1963; Fiegenbaum et al., 1996). In addition, research at the intersection of the family business and innovation management fields of study has shown that family firms generally minimize R&D investments because they are seen as conflicting with the family-centered goals distinctly pursued by managers who belong to the owning family (Block, 2012; Kotlar, De Massis, Fang, et al., 2013; Kotlar, De Massis, Frattini, et al., 2013; Munari et al., 2010). However, in spite of theory suggesting that profitability and family-centered goals coexist in family firms, researchers interested in the anatomy of R&D investment decisions in family firms have thus far emphasized profitability, thereby overlooking other organizational goals that cause additional heterogeneity in family firm R&D decisions (Chrisman and Patel, 2012). The finding that reference points on supplier bargaining power influence R&D investment decisions in family firms is important because it empirically supports the validity of the theoretical call for research on organizational goals beyond profitability (Greve, 2008), and offers insights into how goals for control of family managers produce heterogeneity in the R&D investment decisions of family firms (Chrisman and Patel, 2012).

Research Implications

The examination of multiple goals in family firms opens up new avenues for research on innovation in family firms. Sequential attention to goals, a key element of the behavioral theory of the firm (Cyert and March, 1963), leads to the prediction that the relevance of reference points for control in family firm decision-making differs depending on whether targets for profitability goals are met or not. Therefore, the empirical evidence reported in this study on the existence of a moderating effect of

profitability goals on family firm responses to a change in supplier bargaining power reference points is particularly important: for family firms with profitability below their reference point, the relation between change in supplier bargaining power and R&D investments becomes weaker. This study appears to be the first to empirically demonstrate, using quantitative methods, the sequential attention of decision-makers in family firms to control and profitability goals. To test the sequential attention hypothesis, we used the method initially proposed by Greve (2008), interacting the variable indicating a discrepancy with the reference point for supplier bargaining power with a censored variable capturing whether the profitability reference point variable was fulfilled. As noted by Greve (2008), this method is easily replicable and is thus useful for future research on sequential attention to organizational goals in family firms.

While our result of family firms supports the sequential attention hypothesis, it should be noted that the regression analysis result of nonfamily firms provides marginally significant results that support the mutual activation logic hypothesis. Although this paper intends to bring in two conflicting theories to explore the presence of multiple reference points in family business, it is equally important to discuss why mutual activation logic does not fit family business. In this study, activation logic assumes that managers believe that reducing external dependency may have positive effects on firm performance. This argument is partially supported for managers of nonfamily firms, which offers some support to our view that suppliers' bargaining power is primarily seen by managers of nonfamily firms as an indirect antecedent of profitability. Thus, when profitability is above the reference point, managers of nonfamily firms do not consider the bargaining power of suppliers as a relevant dimension for their decision-making, but when profitability falls below the reference point, they start to consider it and respond to it with increased R&D investments. As expected, however, family managers follow a different logic (sequential attention hypothesis), such that they start considering the dimension of supplier bargaining power only when profitability goals are achieved. This finding supports the theoretical perspective proposed in this paper; in particular, that family managers pursue control goals in addition to profitability goals, and that the degree of concentration of the firm's major suppliers is used by family managers as a reference dimension for evaluating changes in their control over decision-making. Also, this finding advances interesting questions for future empirical examinations: first, the evidence that managers of family and nonfamily firms use different

reference points and even interpret differently the same reference dimension (i.e., managers of nonfamily firms see supplier bargaining power as an antecedent of firm profitability, while managers of family firms see it as a determinant of their control over decision-making) might reflect different configurations in knowledge between these two classes of managers: for example, nonfamily managers may better benefit from industry-specific, explicit knowledge, whereas family managers may possess more firm-specific and learning-by-doing knowledge (Anderson and Reeb, 2004). Second, the family business literature commonly assumes that family managers make strategic decisions primarily driven by family-centered noneconomic goals (e.g., Chrisman and Patel, 2012; Gómez-Mejía et al., 2007), but our evidence suggests that when variations in R&D investments are concerned, profitability goals have the priority in family managers' evaluation processes. Future research is needed to extend these suspicions by, for example, examining the antecedents and the anatomy of evaluation processes of family and nonfamily managers using qualitative research methods, and examining the impact of profitability and control goals on other strategic behaviors, such as internationalization, new product introductions, and mergers and acquisitions, present different trade-offs for managers in family and nonfamily firms. Also, future research can further extend our study by taking into account the time frame of performance evaluation and decision-making processes. While our findings indicate that profitability and control goals follow a sequential logic in decisions concerning R&D investments, such goals may have mutually reinforcing effects when more short-oriented strategic behaviors are concerned. Therefore, future research that examines how control and profitability goals jointly affect firm behavior in family firms could compare long-term strategic decisions such as R&D and internationalization with more short-term-oriented strategies such as marketing investments or downsizing decisions.

Supplier bargaining power is just one of the many possible reference points that could be used by family managers in relation to their unique goals, but has particular significance in the case of R&D investments because the actions taken by managers to attain and maintain a certain level of control over decision-making in their firms are extremely consequential to innovation strategy in family firms (Chrisman and Patel, 2012; Kotlar, De Massis, Frattini, et al., 2013). Indeed, decisions on technological innovation in family firms such as establishing whether a firm should increase or decrease its R&D investments over time, acquire a technology, or

enter into a joint venture, have previously been studied from other perspectives (Gómez-Mejía et al., 2010; Kotlar, De Massis, Frattini, et al., 2013; Sirmon et al., 2008; Swinth and Vinton, 1993). It is time to revisit research on these outcomes with supplier bargaining power reference points or others based on external dependency dimensions as a predictor variable. Based on the findings reported here, one would expect all these strategic actions to be pursued to a lower extent in family firms than in nonfamily firms and become more extensive when a family firm faces increasing external dependency in the form of supplier bargaining power.

The theoretical implications of these findings are important. The explanation of R&D investments as a response to discrepancies between reference points and realized outcomes is parsimonious to the point of appearing simplistic: family managers seek to develop new technological knowledge through increasing R&D investments when they believe that their control over decision-making is too limited. This explanation is valuable because it makes use of well-known facts on individual decision-making and organizational behavior to develop new and novel predictions. Organizational pursuit of goals and socially constructed reference points are microlevel theories of individual decision-making that have received ample empirical support (Kahneman and Tversky, 1979; Lant, 1992). When combined with the idea that external dependency has implications for the sought-after ability of family managers to freely exert their control within their firms, which is potentially relevant but difficult to judge, a premise emerges that family managers use available information to form heuristic judgments on their desired level of discretion through historical comparison. This premise yields clear and specific predictions when coupled with knowledge on the sources of external dependency in organizations (Kotter, 1979; Pfeffer and Salancik, 1978) and the theory on how managers act on reference point judgments. Here, the theory lends insight into how family managers form and act on unique reference points in relation to supplier bargaining power.

This study also has interesting implications for practice. In particular, the findings challenge the idea that family-centered noneconomic goals such as control goals are always a dominant force in family firms and shows that when profitability targets are not met, decision-makers in family firms may be inclined to downplay the importance of maintaining control and make strategic decisions such as increasing the level of R&D investments despite the fact that this entails ceding power to professional managers and sometimes even diluting the

family ownership stake (Chrisman and Patel, 2012). This suggests that during periods of crisis when performance is well below the target points, family firm decision-makers may be able to set aside the pursuance of family-centered goals and undertake strategic, long-term, and risky decisions, such as increasing R&D investments, which could be critical for the future competitiveness of the organization once the crisis is over. This could represent a competitive advantage for family firms compared with their nonfamily counterparts, which typically engage in risk-averse behavior, especially in the area of technological innovation (Chesbrough, 2003). However, even family firms that perform well find reasons to invest in R&D as a result of family manager aspirations to maintain control over their organizations. These goals are activated in situations where the family firm is subject to higher external dependency, such as when supplier bargaining power increases. Professional managers in family firms should take advantage of this dynamic, e.g., submitting long-term, strategic projects to the top management team when the organization's performance falls below target; counter-intuitively, the chances of projects being approved increase under these circumstances rather than when firm performance is especially good. Furthermore, family managers should carefully evaluate the consequences of R&D investments for their family-centered goals as well as for the firm's profitability goals when designing their family firm's innovation strategy.

Limitations and Future Research Directions

Despite its contributions, our study has some limitations, some of which also represent opportunities for future research. First, some caution must be exercised on the generalizability of our findings. We used a sample of private Spanish manufacturing firms to test our hypotheses, which allowed us to focus on an ideal setting where a firm's ability to successfully bring new products and services to the market is especially important for competitive advantage and careful R&D investment decisions are fundamental to achieving this goal (Danneels and Kleinschmidt, 2001; McNally, Cavusgil, and Calantone, 2010). Research using other sampling frames is needed to extend the validity of our findings to publicly traded firms, in other industrial sectors, and outside of Spain. Second, this study relies on secondary data sources and, similar to other recent studies (Anderson and Reeb, 2004; Chrisman and Patel, 2012; Gómez-Mejía et al., 2010; Kotlar, De Massis, Fang, et al., 2013; Kotlar, De Massis, Frattini, et al., 2013; Sirmon et al., 2008), we proxied the importance of family-centered goals to decision-making

with family ownership and involvement in top management. Based on prior research, we assumed that family-centered goals go hand in hand with family involvement (Chrisman et al., 2012). However, we have also shown that despite similar configurations of family involvement, family firms may differ in the importance they attach to family-centered goals. Thus, research is needed to further refine our definition of family firms and further extend our understanding of the link among family involvement, family influence, and family goals (Chrisman et al., 2012; De Massis, Kotlar, Chua, and Chrisman, 2014; Sirmon et al., 2008). Recent research has also shown that the importance of family-centered goals changes over time and this can influence family firm entrepreneurial behavior (De Massis, Chirico, Kotlar, and Naldi, 2014). Future work introducing a temporal dimension into the debate on R&D investment decisions and examining how firm age could help explain the R&D investment behavior of family firms is another interesting area for future research. Finally, constrained by the availability of data, we evaluated the change in suppler bargaining power by only relying on one dimension—the importance of major suppliers (e.g., Harrigan, 1983; Lustgarten, 1975)—but we did not evaluated the criticality of the goods provided by such suppliers (e.g., Porter, 1980). A refinement of this measure could plausibly provide more robust and significant results.

This study also has strong implications for future research aimed at understanding the anatomy of the technological innovation process in family firms. Recent research indicates that the characteristics of family governance entail idiosyncratic behaviors in the area of technological innovation and strongly differ from those found in nonfamily firms (De Massis et al., 2013). These behavioral patterns are often inconsistent with the predictions of established innovation theories, which have been developed in large part without either theoretically or empirically acknowledging the singularity of family firms. The present paper suggests a very promising way to overcome this limitation of established innovation theories, which entails focusing on the particularistic goals and reference points against which decisions in family firms are taken. In addition to decisions concerning R&D investments, the reference point theory applied in this paper could be used to extend our understanding of previously examined differences between family and nonfamily firms as to, for example, the acquisition of technology from outside firm boundaries (Classen, Van Gils, Bammens, and Carree, 2012) and technology adoption (König et al., 2013), or other areas that have been not yet examined in depth such as the choice between radical or incremental innovations and decisions to out-license proprietary technologies to third parties.

Conclusions

This paper offers a new perspective based on the behavioral theory of the firm and prior family business research to explain differences between family and nonfamily firms in making R&D investment decisions. The results show that in addition to reference points for profitability emphasized in prior research, other reference points are relevant to family firm R&D investment decisions that reflect the family-centered goals of family managers for unconstrained control over their organizations. In view of these goals, family managers form reference points for supplier bargaining power and use these to make judgments on the degree of external obstruction to their freedom and managerial discretion. In addition, this study shows that the relevance of profitability goals and family-centered goals for control in family firm decision-making follows a sequential logic, such that family firms react to increasing supplier bargaining power more strongly when their profitability reference points have been reached. In sum, this study brings new perspectives to research on technological innovation in family firms and extends prior knowledge on the distinctive organizational processes engendered by family involvement in a business organization. This study also informs future research on the need to understand the behavioral processes that produce differences in innovation decisions between family and nonfamily firms and heterogeneity among family firms.

References

Allen, M. P., and S. K. Panian. 1982. Power, performance, and succession in the large corporation. *Administrative Science Quarterly* 27 (4): 538–47.

Anderson, R. C., and D. M. Reeb. 2004. Board composition: Balancing family influence in S&P 500 firms. *Administrative Science Quarterly* 49 (2): 209–37.

Artz, K. W., P. M. Norman, D. E. Hatfield, and L. B. Cardinal. 2010. A longitudinal study of the impact of R&D, patents, and product innovation on firm performance. *Journal of Product Innovation Management* 27 (5): 725–40.

Astrachan, J. H., and M. C. Shanker. 2003. Family businesses' contribution to the US economy: A closer look. *Family Business Review* 16 (3): 211–19.

Audia, P. G., and H. R. Greve. 2006. Less likely to fail: Low performance, firm size, and factory expansion in the shipbuilding industry. *Management Science* 52 (1): 83–94.

Audia, P. G., E. A. Locke, and K. G. Smith. 2000. The paradox of success: An archival and a laboratory study of strategic persistence following radical environmental change. *The Academy of Management Journal* 43 (5): 837–53.

Baird, I. S., and H. Thomas. 1985. Toward a contingency model of strategic risk taking. *The Academy of Management Review* 10 (2): 230–43.

Baum, J. A. C., T. J. Rowley, A. V. Shipilov, and Y. T. Chuang. 2005. Dancing with strangers: Aspiration performance and the search for underwriting syndicate partners. *Administrative Science Quarterly* 50 (4): 536–75.

Baysinger, B., and R. E. Hoskisson. 1989. Diversification strategy and R&D intensity in multiproduct firms. *The Academy of Management Journal* 32 (2): 310–32.

Berle, A. A., and G. C. Means. 1965. *The modern corporation and private property*. New York: MacMillan.

Berrone, P., C. Cruz, and L. R. Gomez-Mejia. 2012. Socioemotional wealth in family firms: Theoretical dimensions, assessment approaches, and agenda for future research. *Family Business Review* 25 (3): 258–79.

Block, J. H. 2012. R&D investments in family and founder firms: An agency perspective. *Journal of Business Venturing* 27 (2): 248–65.

Bolton, M. K. 1993. Organizational innovation and substandard performance: When is necessity the mother of innovation? *Organization Science* 4 (1): 57–75.

Bromiley, P. 1991. Testing a causal model of corporate risk taking and performance. *The Academy of Management Journal* 34 (1): 37–59.

Burgelman, R. A. 1991. Intraorganizational ecology of strategy making and organizational adaptation: Theory and field research. *Organization Science* 2 (3): 239–62.

Caniëls, M. C., and C. J. Gelderman. 2007. Power and interdependence in buyer supplier relationships: A purchasing portfolio approach. *Industrial Marketing Management* 36 (2): 219–29.

Carney, M. 2005. Corporate governance and competitive advantage in family-controlled firms. *Entrepreneurship Theory and Practice* 29 (3): 249–65.

Chen, W. R. 2008. Determinants of firms' backward-and forward-looking R&D search behavior. *Organization Science* 19 (4): 609–22.

Chesbrough, H. W. 2003. *Open innovation: The new imperative for creating and profiting from technology*. Boston: Harvard Business Press.

Chrisman, J. J., J. H. Chua, A. W. Pearson, and T. Barnett. 2012. Family involvement, family influence, and family centered noneconomic goals in small firms. *Entrepreneurship Theory and Practice* 36 (2): 267–93.

Chrisman, J. J., and P. J. Patel. 2012. Variations in R&D investments of family and non-family firms: Behavioral agency and myopic loss aversion perspectives. *The Academy of Management Journal* 55 (4): 976–97.

Chua, J. H., J. J. Chrisman, and P. Sharma. 1999. Defining the family business by behavior. *Entrepreneurship Theory and Practice* 23 (4): 19–39.

Classen, N., A. Van Gils, Y. Bammens, and M. Carree. 2012. Accessing resources from innovation partners: The search breadth of family SMEs. *Journal of Small Business Management* 50 (2): 191–215.

Cohen, J. 2003. *Applied multiple regression/correlation analysis for the behavioral science*. Mahwah, NJ: Lawrence Erlbaum.

Cyert, R. M., and J. G. March. 1963. *A behavioral theory of the firm*. Englewood Cliffs, NJ: Prentice-Hall.

Danneels, E., and E. J. Kleinschmidt. 2001. Product innovativeness from the firm's perspective: Its dimensions and their relation with project selection and performance. *Journal of Product Innovation Management* 18 (6): 357–73.

De Massis, A., F. Chirico, J. Kotlar, and L. Naldi. 2014. The temporal evolution of proactiveness in family firms: The horizontal S-curve hypothesis. *Family Business Review* 27 (1): 35–50. doi:10.1177/0894486513506114.

De Massis, A., F. Frattini, and U. Lichtenthaler. 2013. Research on technological innovation in family firms: Present debates and future directions. *Family Business Review* 26 (1): 10–31.

De Massis, A., F. Frattini, E. Pizzurno, and L. Cassia. 2014. Product innovation in family versus non-family firms: An exploratory analysis. *Journal of Small Business Management*, doi:10.1111/jsbm.12068.

De Massis, A., J. Kotlar, J. H. Chua, and J. J. Chrisman. 2014. Ability and willingness as sufficiency conditions for family-oriented particularistic behavior: Implications for theory and empirical studies. *Journal of Small Business Management* 52 (2): 344–64. doi:10.1111/jsbm.12102.

Deeds, D. L., and D. M. Decarolis. 1999. The impact of stocks and flows of organizational knowledge on firm performance: An empirical investigation of the biotechnology industry. *Strategic Management Journal* 20 (10): 953–68.

Dougherty, D., and C. Hardy. 1996. Sustained product innovation in large, mature organizations: Overcoming innovation-to-organization problems. *The Academy of Management Journal* 39 (5): 1120–53.

Fiegenbaum, A., S. Hart, and D. Schendel. 1996. Strategic reference point theory. *Strategic Management Journal* 17 (3): 219–35.

Fleming, L., and P. Bromiley. 2000. *A variable risk propensity model of technological risk taking*. Boston: Harvard Business School.

Frecka, T. J., and C. F. Lee. 1983. Generalized financial ratio adjustment processes and their implications. *Journal of Accounting Research* 21 (1): 308–16.

George, G. 2005. Slack resources and the performance of privately held firms. *The Academy of Management Journal* 48 (4): 661–76.

Gómez-Mejia, L. R., J. T. Campbell, G. Martin, R. E. Hoskisson, M. Makri, and D. G. Sirmon. 2013. Socioemotional wealth as a mixed gamble: Revisiting family firm R&D investments with the behavioral agency model. *Entrepreneurship Theory and Practice*, doi:10.1111/etap.12083.

Gómez-Mejía, L. R., K. T. Haynes, M. Núñez-Nickel, K. J. L. Jacobson, and J. Moyano-Fuentes. 2007. Socioemotional wealth and business risks in family-controlled firms: Evidence from Spanish olive oil mills. *Administrative Science Quarterly* 52 (1): 106–37.

Gómez-Mejía, L. R., M. Larraza-Kintana, and M. Makri. 2003. The determinants of executive compensation in family-controlled public corporations. *The Academy of Management Journal* 46 (2): 226–37.

Gómez-Mejía, L. R., M. Makri, and M. Larraza-Kintana. 2010. Diversification decisions in family-controlled firms. *Journal of Management Studies* 47 (2): 223–52.

Gómez-Mejía, L. R., M. Nunez-Nickel, and I. Gutierrez. 2001. The role of family ties in agency contracts. *The Academy of Management Journal* 44 (1): 81–95.

Greene, W. H. 1993. *Econometric analysis*. New York: Macmillan.

Greenwood, R., A. M. Díaz, S. X. Li, and J. C. Lorente. 2010. The multiplicity of institutional logics and the heterogeneity of organizational responses. *Organization Science* 21 (2): 521–39.

Greve, H. R. 1998. Performance, aspirations, and risky organizational change. *Administrative Science Quarterly* 43 (1): 58–86.

Greve, H. R. 2003a. A behavioral theory of R&D expenditures and innovations: Evidence from shipbuilding. *The Academy of Management Journal* 46 (6): 685–702.

Greve, H. R. 2003b. *Organizational learning from performance feedback*. Cambridge: Cambridge University Press.

Greve, H. R. 2008. A behavioral theory of firm growth: Sequential attention to size and performance goals. *The Academy of Management Journal* 51 (3): 476–94.

Harrigan, K. R. 1983. *Strategies for vertical integration*. Lexington, MA: D. C. Heath Co.

Heckman, J. J. 1979. Sample selection bias as a specification error. *Econometrica: Journal of the Econometric Society* 47: 153–61.

Helson, H. 1964. *Adaptation level theory: An experimental and systematic approach to behavior*. New York: Harper & Row.

Howell, J. M., and C. A. Higgins. 1990. Champions of technological innovation. *Administrative Science Quarterly* 35 (2): 317–41.

Jawahar, I., and G. L. McLaughlin. 2001. Toward a descriptive stakeholder theory: An organizational life cycle approach. *The Academy of Management Review* 26 (3): 397–414.

Kahneman, D., and A. Tversky. 1979. Prospect theory: An analysis of decision under risk. *Econometrica: Journal of the Econometric Society* 47 (2): 263–91.

Kelly, D., and T. L. Amburgey. 1991. Organizational inertia and momentum: A dynamic model of strategic change. *The Academy of Management Journal* 34 (3): 591–612.

Kim, J. J., J. J. Haleblian, and S. Finkelstein. 2011. When firms are desperate to grow via acquisition: The effect of growth patterns and acquisition experience on acquisition premiums. *Administrative Science Quarterly* 56 (1): 26–60.

Kim, H., H. Kim, and P. M. Lee. 2008. Ownership structure and the relationship between financial slack and R&D investments: Evidence from Korean firms. *Organization Science* 19 (3): 404–18.

Klette, T. J., and Z. Griliches. 2000. Empirical patterns of firm growth and R&D investment: A quality ladder model interpretation. *The Economic Journal* 110 (463): 363–87.

König, A., N. Kammerlander, and A. Enders. 2013. The family innovator's dilemma: How family influence affects the adoption of discontinuous technologies by incumbent firms. *The Academy of Management Review* 38 (3): 418–41.

Kotlar, J., and A. De Massis. 2013. Goal setting in family firms: Goal diversity, social interactions, and collective commitment to family-centered goals. *Entrepreneurship Theory and Practice* 37 (6): 1263–88.

Kotlar, J., A. De Massis, H. C. Fang, and F. Frattini. 2013. Strategic reference points in family firms. *Small Business Economics* 30 (6): 1073–88. doi:10.1007/s11187-014-9556-6.

Kotlar, J., A. De Massis, F. Frattini, M. Bianchi, and H. Fang. 2013. Technology acquisition in family and non-family firms: A longitudinal analysis of spanish manufacturing firms. *Journal of Product Innovation Management* 30 (6): 1073–88.

Kotter, J. P. 1979. Managing external dependence. *The Academy of Management Review* 4 (1): 87–92.

Lant, T. K. 1992. Aspiration level adaptation: An empirical exploration. *Management Science* 38 (5): 623–44.

Lustgarten, S. H. 1975. The impact of buyer concentration in manufacturing industries. *The Review of Economics and Statistics* 57 (2): 125–32.

March, J. G., and H. A. Simon. 1958. *Organizations*. New York: John Wiley.

McNally, R. C., E. Cavusgil, and R. J. Calantone. 2010. Product innovativeness dimensions and their relationships with product advantage, product financial performance, and project protocol. *Journal of Product Innovation Management* 27 (7): 991–1006.

Mezias, S. J., Y.-R. Chen, and P. R. Murphy. 2002. Aspiration-level adaptation in an American financial services organization: A field study. *Management Science* 48 (10): 1285–300.

Miller, K. D., and W. R. Chen. 2004. Variable organizational risk preferences: Tests of the March-Shapira model. *The Academy of Management Journal* 47 (1): 105–15.

Morbey, G. K. 1988. R&D: Its relationship to company performance. *Journal of Product Innovation Management* 5 (3): 191–200.

Munari, F., R. Oriani, and M. Sobrero. 2010. The effects of owner identity and external governance systems on R&D investments: A study of western European firms. *Research Policy* 39 (8): 1093–104.

Nellore, R., and K. Söderquist. 2000. Portfolio approaches to procurement: Analysing the missing link to specifications. *Long Range Planning* 33 (2): 245–67.

Oliver, C. 1991. Strategic responses to institutional processes. *The Academy of Management Review* 16 (1): 145–79.

Patel, P. C., and J. J. Chrisman. 2014. Risk abatement as a strategy for R&D investments in family firms. *Strategic Management Journal* 35 (4): 617–27.

Pfeffer, J. 1972. Interorganizational influence and managerial attitudes. *The Academy of Management Journal* 15 (3): 317–30.

Pfeffer, J., and G. Salancik. 1978. *The external control of organizations: A resource dependence perspective*. New York: Harper & Row.

Porter, M. E. 1980. *Competitive strategy*. New York: Free Press.

Salomon, R., and B. Jin. 2008. Does knowledge spill to leaders or laggards? Exploring industry heterogeneity in learning by exporting. *Journal of International Business Studies* 39 (1): 132–50.

Salomon, R., and J. M. Shaver. 2005. Export and domestic sales: Their interrelationship and determinants. *Strategic Management Journal* 26 (9): 855–71.

Shinkle, G. A. 2012. Organizational aspirations, reference points, and goals. *Journal of Management* 38 (1): 415–55.

Sirmon, D. G., J. L. Arregle, M. A. Hitt, and J. W. Webb. 2008. The role of family influence in firms' strategic responses to threat of imitation. *Entrepreneurship Theory and Practice* 32 (6): 979–98.

Song, X. M., and M. E. Parry. 1997. A cross-national comparative study of new product development processes: Japan and the United States. *The Journal of Marketing* 61 (2): 1–18.

Swinth, R. L., and K. L. Vinton. 1993. Do family-owned businesses have a strategic advantage in international joint ventures? *Family Business Review* 6 (1): 19–30.

Tidd, J., and J. R. Bessant. 2009. *Managing innovation: Integrating technological, market and organizational change*. Chichester, UK: John Wiley & Sons Inc.

Wiseman, R. M., and L. R. Gómez-Mejia. 1998. A behavioral agency model of managerial risk taking. *The Academy of Management Review* 23 (1): 133–53.