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The role of family firm specific resources in innovation: an integrative literature review and framework

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Abstract

Family firms are the prevalent form of entrepreneurial organizations worldwide. While even long-lasting and successful family firms are said to invest less in innovation, their innovation output varies according to their heterogeneity often matching or even exceeding the output of other incumbent firms. These contradictory results have confused entrepreneurship and innovation researchers alike. Based on an integrative literature review we develop a conceptual framework to explain the role of family firm specific resources for innovation. Our analysis of 48 peer-reviewed empirical articles drawn from a body of 466 published empirical papers shows how our integrative perspective helps to solve these existing contradictions. We argue that higher investments into these family firm specific resources trigger a virtuous circle in family firm innovation.

Keywords Entrepreneurial firms · Family firm · Innovation · Family firm resources · Conceptual framework

JEL Classification L10 · L26 · O30

1 Introduction

Research interest in family firm innovation has flourished in the last decade (Hu and Hughes 2020; Calabrò et al. 2019; Filser et al. 2016; Padilla-Meléndez 2015; De Massis et al. 2013; Duran et al. 2016), highlighting idiosyncratic traits and

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generating promising avenues of inquiry to analyze this phenomenon deeper (Chrisman et al. 2015a, b; De Massis et al. 2013; Kraiczy and Hack 2016; Duran et al. 2016). Innovation is essential for family firms to remain competitive and to ensure survival in an increasingly dynamic environment (Johnson et al. 2008). There are however strong theoretical reasons to believe that family firms may encounter greater difficulties in responding to innovation (König et al. 2013). As traditional or even conservative organizations unwilling to break away from proven ways of doing business in addition to their resource dependence, inertia and rigidity, family firms are further constrained by generational transition, emotional ties, and the pursuit of nonfinancial goals (Kotlar and De Massis 2013; Kotlar et al. 2018), which together impact how family firms manage innovation (König et al. 2013; De Massis et al. 2016a, b). Nevertheless, some family firms are amongst the most innovative firms in the world (De Massis et al. 2013, 2017, 2018; Urbinati et al. 2017), and their long-term orientation acts as a stimulus to innovation (Diaz-Moriana et al. 2018). Scholars argue that family firms are associated with lower innovation inputs (e.g., R&D investments), than their nonfamily counterparts (De Massis et al. 2013; Calabrò et al. 2019), at the same time other studies show that family firms are associated with relatively high innovation outputs (e.g., new patents or products), and high levels of innovation (De Massis et al. 2013; Urbinati et al. 2017) at the same time. Consequently, there is a dilemma as studies find family firms to be at the same time better and worse equipped to handle this innovative pressure in comparison with non-family firms. The heterogeneity of family firms' ability to convert limited innovation inputs into outputs, is still poorly understood (Chrisman et al. 2013; De Massis et al. 2015). So far, several literature reviews (De Massis et al. 2013; Duran et al. 2016; Calabrò et al. 2019; Hu and Hughes 2020) have addressed innovation in family firms. De Massis et al. (2013) show what is available and develop differentiated questions and future directions in this regard. Based on a meta-analysis Duran et al. (2016) analyze that family firms invest significantly less in innovation than non-family firms do, their innovation output, *ceteris paribus*, is higher. Calabrò et al. (2019) provide a state of the art of the family firm innovation literature. They highlight the need for more contextualized understanding of innovation in family firms. Hu and Hughes (2020) categorize the existing studies into four prevelant theoretical approaches and derive key research questions for the field. All of these syntheses of the field are unable to answer the questions raised above. They lack a conceptual framework that can explain the peculiarities of innovation behaviour in family firms due to the specifics of family firms. In this paper, we use the established model of family specific resources as a base for developing a conceptual framework to better explain family firm innovation.

Family firms cultivate unique resource bundles (Habbershon and Williams 1999; Dyer 2003; Zahra et al. 2004; Zellweger 2007), which can be a source of innovation (Zahra et al. 2004; Eddleston et al. 2008; Spriggs et al. 2013; Carnes and Ireland 2013; Bammens et al. 2015). According to Sirmon and Hitt (2003) family firms are associated with unique human capital (i.e. knowledge, skills and capabilities), which is generally considered as their most important resource. Moreover, they are associated with unique social capital, which is essential to gain access to other forms of intellectual, human or financial capital (Sirmon and Hitt 2003, Sanchez-Ruiz et al.

2019, Dawson 2012, Danes et al. 2009). Human capital includes the knowledge, skills and abilities in the family firm (Carney 2005, Danes et al. 2008, 2009; Dawson 2012; Sirmon and Hitt 2003). Human capital of a family firm is complicated by the overlap of business and family, as family members often work in the firm. They simultaneously participate in both businesses and family relationships in their professional lives. The duality of these relationships increases their complexity and creates an unique context for human capital compared to nonfamily firms. Moreover, family firms are characterized by long-lasting employment contracts and employee retention. These long-term employees acquire highly firm specific human capital and tacit knowledge that builds up over the years and contributes to family firm innovation in a unique way. (Danes et al. 2008; Rondi et al. 2021; Sirmon and Hitt 2003). Social capital is best described as the bundle of resources that can be acquired or utilized through networks with external stakeholders. These resources embedded in social relationships are crucial for family firms' innovation (Sanchez-Famoso et al. 2019; Sanchez-Ruiz et al. 2019). Social capital in family firms is enhanced by strong ties, more often than not built up over generations, that exist among family members and stakeholders providing a system of connections for mutual advice and communication, which are elements necessary to work towards innovation. In addition, family firms are further characterized by their unique financial capital, which may limit their sources of external financial capital due to their avoidance of sharing equity with non-family members. Recently, survivability capital is unique to family firms and refers to the bundle of personal resources that family members are willing to loan, contribute, or share in order to support their family's business (Sirmon and Hitt 2003). By examining these peculiarities of family firms, we also offer deeper insights into the largely unopened black box of family firm heterogeneity on the basis of their unique resources bundles (Chua et al. 2012). This very heterogeneity can further be considered as a critical factor for a better understanding of innovation in the family business context (Urbinati et al. 2017). However, there is still a research gap in the existing literature being unable to explain the question of how resources are bundled. We use the approach of an integrative literature review to create new insights about this topic by critically reviewing the published empirical literature on family firm innovation (Torraco 2005; Snyder 2019). To this end, we look in detail at what the individual family specific resources mean for innovation management and examine in particular the connection and interfaces between individual resources. By analyzing the results of the specific resources on innovation based on our integrative perspective, we make a theoretical contribution by following the trend of current research to go beyond the literature review to a theory-building goal (Hoon and Baluch 2020; Post et al. 2020). We provide a conceptual framework as a basis for a more nuanced understanding of the core mechanisms underlying application responses and the established and proposed relationships between variables.

The remainder of the article is structured as follows. The next section introduces the state of the art of family firm innovation research along major topics within this research stream. Next, we describe the idea of family firm specific resources as a theoretical base for our analysis of the literature. We provide a three-circle model as a basis for opening the black box and investigating the interdependencies of the resources in detail to examine what importance specific resources do

have for innovation in family firms. The methodology section gives detailed insights into the search and selection strategy of our integrative review of the literature. The fifth section of the paper analyzes the current literature based on the previously established model of family firm specific resources and resource bundles. Here, we formulate differentiated propositions that not only capture the current knowledge but can also be used to guide future research in the field. In the final section we then conclude and discuss our findings from the analysis and give advice for a future research agenda.

2 Major topics in family firm innovation research

The first major topic in the literature on family firm innovation deals with the determinants or drivers of innovation, also referred to as innovation inputs, such as investments in R&D and thus R&D intensity (De Massis et al. 2013; Urbinati et al. 2017). R&D expenditures are necessary for innovation (Block 2012; Cucculelli and Bettinelli 2015) as they serve as a key factor to gain and sustain a competitive advantage and increase firm performance (Kotlar et al. 2014). Several studies observe a negative relationship between family involvement in a firm and its level of R&D investments, due to conservatism and risk aversion (Chen and Hsu 2009; Anderson et al. 2010; Nieto et al. 2015; Broekaert et al. 2016), the limited risk propensity of controlling shareholders (Munari et al. 2010), the various identities of family owners (Block et al. 2011), inner family conflicts (Block 2012), family firms' limited resources (Muñoz-Bullón and Sanchez-Bueno 2011; Nieto et al. 2015) and loss aversion with regard to their non-financial goals (Gómez-Mejía et al. 2007, 2014). However, scholars observe that R&D investments in family firms tend to increase, when their firm performance falls below aspiration levels and consequently family as well as economic goals increasingly overlap (Block et al. 2013; Chrisman and Patel 2012; Patel and Chrisman 2014; Sciascia et al. 2015). The literature also finds a negative relationship between family governance and R&D intensity, due to an overlap between family wealth and firm equity (Sciascia et al. 2015), family influence through ownership, management and governance, which leads to resource scarcity (Matzler et al. 2015) as well as family control (Schmid et al. 2014). A contrasting finding, however, argues that family firms have a particularly high innovation output—higher quality of innovation in terms of number of patents and citations—as their ability to capitalize on their innovations is particularly high (Matzler et al. 2015).

Technological innovation (De Massis et al. 2013) is another valuable outcome of value creating innovation activities. On the one hand, family firms are considered as particularly capable of technological innovation due to their flexible structures and decision-making processes (Craig and Dibrell 2006). On the other hand, they are less likely to turn to external sources of innovation and technological collaboration than their non-family counterparts (Nieto et al. 2015). Recent studies on German Mittelstand firms—many of which are family firms—confirm that these are particularly innovative due to specific characteristics (De Massis et al. 2018; Heider et al. 2021).

In addition to the various sources and types of innovation, there is further differentiation with respect to the level of innovation (i.e. incremental, progressive or radical) and its magnitude (i.e. exploitative or explorative) (Sharma and Salvato 2011). Family firms are particularly well-equipped for exploiting opportunities in domains close to their current operations through the pursuit of incremental and/or progressive innovation, due to their long-term orientation as well as their unique human and social capital (Patel and Fiet 2011; Sharma and Salvato 2011; Hiebl 2015). More recent findings confirm that family firms are more likely to achieve incremental than radical innovations (Nieto et al. 2015) and perform particularly well in the domain of exploitative innovations (Bammens et al. 2015). The exploration of new opportunities (e.g. new markets and products) is typically followed by radical innovations and becomes essential in dynamic business environments (Bergfeld and Weber 2011), but also when existing markets or product lines saturate (Sharma and Salvato 2011). In order to ensure long-term survival and performance advantages, however, family firms need to engage in both, the pursuit of exploration and exploitation (Sharma and Salvato 2011), an ability referred to as organizational ambidexterity (March 1991; Tushman and O'Reilly 1996; O'Reilly and Tushman 2004). Salvato and Melin (2008) investigate the antecedents of long-term innovation in family firms on the basis of their financial outcomes and strategic sustainability and investigate their abilities to dynamically recombine sources of competitive advantage. They find that family firms systematically create value over generations through their ability to renew and reshape their social interactions within and outside the controlling family. Also, they show that organizational ambidexterity is important for family firms to create financial value and competitive sustainability over generations, by performing continuous improvement of their original competencies and innovation through exploitation, punctuated by more or less radical strategic innovations through exploration (Salvato and Melin 2008). In a similar vein, Bergfeld and Weber (2011) show that successful family firms do not only follow a clear long-term strategy of constantly addressing new opportunities (e.g. new market and technologies), but are also considered as ambidextrous organizations. They seek for both, incremental innovation in daily operations and radical innovation and/or corporate renewal in order to assure their "future-proofness". The former is mostly executed by external managers, while the responsibility for the latter lies in the family (Bergfeld and Weber 2011).

In summary, family firms are associated with a tendency to low innovation inputs (e.g. R&D expenditures), but high innovation outputs (e.g. new patents or products) (Duran et al. 2016). Especially, in contrast to non-family firms, firms with family involvement innovate more efficiently than do non-family firms (Lodh et al. 2014; Matzler et al. 2015). Family firms require consistency between their innovation decisions and approaches as well as their family firm specific characteristics in order to take full advantage of their innovation potential (De Massis et al. 2015). However, if the innovation process is not institutionalized within the family and the business by means of family and corporate

governance, their special ability—on the basis of their unique family assets—can atrophy and stifle innovation performance over time (Bennedsen and Foss 2015).

3 Theoretical framework: family firm specific resources

The resource based view (RBV) assumes that differences in firm performance, the creation of competitive advantages and entrepreneurial outcomes, such as innovation are largely attributable to resources and capabilities (Penrose 1959; Wernerfelt 1984; Barney 1991). Due to the continuous involvement of the family in the business, family firms develop unique resource bundles (Habbershon and Williams 1999; Dyer 2003; Zahra et al. 2004; Zellweger 2007), which can be a source of competitive advantage (Cabrera-Suárez et al. 2001) and innovation (Zahra et al. 2004; Eddleston et al. 2008; Spriggs et al. 2013; Carnes and Ireland 2013; Bammens et al. 2015). On the downside, like all incumbent firms (Christensen 2013), family firms vary in their ability to respond to disruptive threats by their capabilities to allocate and commit resources (König et al. 2013; Weimann et al. 2020), because of family firms' dependence on their specific resource bundles producing lock-ins, inflexibility (Zahra et al. 2004), and rigidity (Roessl et al. 2010).

According to Simon and Hitt (2003) (Sirmon et al. 2007, 2011), the special nature of family businesses beyond their governance structure can be described by the existence of the following specific resources: human capital, social capital, patient financial capital, and survivability capital.

In more detail, family firms are associated with unique *human capital* (i.e. knowledge, skills and capabilities), which is generally considered as their most important resource (Sirmon and Hitt 2003). A major characteristic of their human capital is the typical long-term orientation of family firms (Dyer 2003; Zellweger 2007). Due to their long-term orientation and more specifically their long employee, management and leadership tenures (Patel and Fiet 2011; Bammens et al. 2015; Röd 2016), family firms are further associated with unique intellectual human capital, which refers to their explicit and deep firm specific tacit knowledge (Sirmon and Hitt 2003; Rothaermel and Hess 2007). Scholars find that family firms devote a substantial amount of their human capital to innovation (Llach and Nordqvist 2010) and in line with their long-term orientation, it does not only affect their innovativeness, but especially their ability to respond to disruptive threats and thus their rate of disruptive innovation. (De Massis et al. 2013). Consequently, family firms may have an increased ability to pursue innovation, as such cannot only take particularly long to produce tangible returns (Chesbrough 2007; Foss and Saebi 2017; Teece and Linden 2017), but is highly dependent on the top management, its long-term commitment and is mostly performed under a top-down approach so that necessary resources are provided quickly and without bureaucracy (Chesbrough 2010; Bucherer et al. 2012) (Fig. 1).

Social capital summarizes the resources resulting from the relationships between organizational members and with external stakeholders (Adler and Kwon

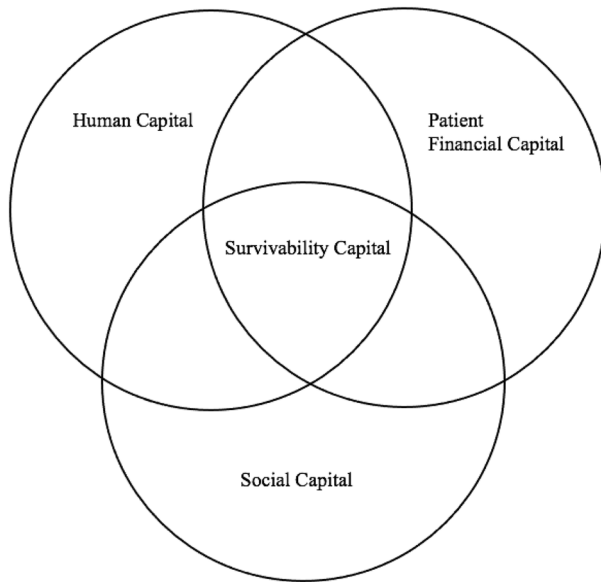


Fig. 1 Theoretical framework: family firm specific resources

2002; Hoffmann et al. 2006; Llach and Nordqvist 2010). Family firms are associated with unique social capital, which is essential to gain access to other forms of intellectual, human or financial capital (Sirmon and Hitt 2003). Family firms typically have a superior ability to nurture and develop prosperous, long-standing relationships with their stakeholders and also to establish more cooperation, both formally and informally, which can further increase their innovativeness (Miller et al. 2015). Cooperation is considered as an important innovation input (Llach and Nordqvist 2010) affecting the tendency to rely more on the contribution of external sources of knowledge during the innovation process (De Massis et al. 2013), which becomes particularly important for innovation, which largely builds on collaborations with external partners (Eppler et al. 2011; Zott et al. 2011).

Family firms are further characterized by their unique *patient financial capital*, which may—in the first place—limit their sources of external financial capital due to their avoidance of sharing equity with non-family members (Sirmon and Hitt 2003). But, due to their unique patient capital, family firms are also exempted from the pressure for short-term paybacks in the management of innovation (Dunn 1996; De Massis et al. 2013), which non-family firms are usually imposed on by external investors and capital markets (Gómez-Mejía et al. 2001; De Massis et al. 2013). This is particularly beneficial for the management innovation projects, which usually take a long time—sometimes even years or decades—until they produce tangible returns given their risks and lags in revenue generation (Foss and Saebi 2017; Teece and Linden 2017; Chesbrough 2010). *Survivability capital* is unique to family firms and according to Sirmon and Hitt (2003) describes to the bundling and overlapping of the individual family-specific resources.

Ultimately, resource based theory allows for a deeper analysis of the heterogeneity of family firms since their unique resources and capabilities commonly reside to varying degrees in family firms and thus largely account for their great heterogeneity (Habbershon and Williams 1999; Sirmon and Hitt 2003). In dynamic business environments and especially in times of disruptive change, however, resources alone are no longer sufficient to explain innovation success (Eisenhardt and Martin 2000; Ray et al. 2004). Therefore, it is all the more important to identify and bundle one's internal resources so that bundling them becomes a competitive advantage. We assume that the competitive advantage is created by bundling the individual family specific resources. Obviously, the bundling of resources can strengthen each other, which then leads to more innovation. However, the effect of the resource bundles can also deteriorate, which leads to less innovation.

4 Methodology

The aim of this integrative literature review is to develop a conceptual model (Tor-raco 2005; Booth et al. 2012, p. 40; Snyder 2019) of how family firm specific resources and resource bundles are able to explain the heterogeneity in family firm innovation. Accordingly, the selection of studies integrated in this review is based on a number of *a priori* considerations. First of all, our enquiry is restricted to peer-reviewed academic journals in English language which empirically investigate family firm specific resources—or proxies for these resources. The rationale behind these rather restricted inclusion criteria is the attempt to derive an evidence-based model rather than produce a canonical and all encompassing overview of possible influencing factors (Webster and Watson 2002; Tranfield et al. 2003).

To identify the relevant studies, we first conducted a systematic search by using the leading scientific research database EBSCO Business Source Complete. In more detail, we conducted a title and abstract search by using the key terms “family business” or “family firm” and combined them (AND) with the term “innovat*” to capture variations of the words innovation(s), innovating, innovativeness, etc. This search was restricted to peer-reviewed articles only. In parallel, we conducted a title search combining the search phrases “family firm” AND innovation” as well as “family business” AND innovation” on Google Scholar utilizing the Publish or Perish software package (Harzing 2007). This search was not *a priori* restricted to peer-reviewed articles which enabled us to cast a wider net and make sure that also very recently accepted papers are included within the search. As a third step, we conducted a comparable search pattern as in the first step utilizing the JSTOR repository. This last search was more of a robustness check and—as we expected—yielded no additional results. All three research steps led to 926 data records.

The raw data were cleaned in a three-step procedure. First, all non-English articles (Chinese, Czech, French, German, Greek, Polish, Portuguese, Russian, Spanish, Turkish) were removed. Second, by filtering the data for blanks in the Journal Name field of the database and then manually looking up the Publisher or publication context, 177 records of non peer-reviewed articles were identified. The overwhelming majority of these stem from the Google Scholar search results, as it is not possible

to filter for peer reviewed journals only. Nevertheless, a few of these records came from the other searches and had obviously slipped past the search filters of said databases. In a last step, we removed the remaining duplicates in the database. The order of this three-step process is necessary as it is possible that a pre-print version as well as a published version of an article is listed in the search results. Only by manually checking the publication context beforehand one can ensure that the published version is kept when duplicates are removed through an automated procedure (we used the duplicate removal feature in MS Excel). The data cleaning process left us with 466 unique peer reviewed articles based on our search terms above.

The most demanding task of the paper selection process was to decide which papers are within the scope or beyond the scope of our investigation. In a first step, all paper titles and abstracts were read regarding their relevance for the topic at hand. In this first step, 342 articles were excluded. Common reasons for exclusion were: (a) the lack of empirical primary data in the articles (e.g. editorials, point-counterpoints, commentaries, and opinion pieces), (b) papers that dealt with related fields but did not define or operationalize family firms (e.g. SMEs, New Technology Based Firms, Start-Ups, etc.), (c) papers that contained the word “family” in title or abstract without referring to family firms (e.g. in female entrepreneurship literature the word “family” is used quite often, similarly “product families” are often referenced in marketing), (d) articles that dealt with other family firm topics (mainly internationalization, sustainability, CSR, family business groups, and succession) that refer to innovation within the abstract. This left us with 120 articles.

The remaining 120 articles were completely read and judged based on the questions whether the conceptually *and* empirically addressed our research interest as a main topic within a generalizable logic (Bakker 2010; David and Han 2004). Of these, 28 papers were excluded as they only addressed corporate governance research variables without referring to any kind of resource base of the firm, 23 were excluded as they conceptually referred to family firm specific resources but did not include any (even coarse) proxies in their empirical part. 17 additional papers turned out to be literature reviews or purely conceptual, these papers were not included in the analysis but have been used and referenced in the previous sections of this paper. Additional five papers only used innovation as a moderator, while three more papers looked at very specific innovation contexts (e.g. green or eco-innovations) that are not driven by the general innovation literature. These papers were excluded as these specific context did not allow to draw relevant conclusions for the research at hand. All in all, we were able to include 48 peer reviewed papers in this review. An overview of our search, cleaning, and exclusion, and inclusion procedure is displayed in Table 1. These 48 papers were coded with regard to the family firm specific resources or resource bundles they addressed and are analyzed in the next section of the paper (see Table 2).

Table 1 Search strategies for published and peer-reviewed papers

Source	Search terms	Search fields	Filters	Results
<i>Search strategies for published and peer-reviewed papers</i>				
Business source premier	"family firm" AND innovat*	Title and abstract	Peer-reviewed Articles	320
Business source premier	"family business" AND innovat*	Title and abstract	Peer-reviewed Articles	322
Google Scholar	"family firm" AND innovation	Title	n.a	86
Google Scholar	"family business" AND innovation	Title	n.a	176
JSTOR	"family firm" AND innovat*	Abstract	Articles	8
JSTOR	"family business" AND innovat*	Abstract	Articles	15
			Gross search results	927
<i>Data cleaning</i>				
	Manual removal of non-peer reviewed Articles from Google Scholar searches			– 177
			Removal of duplicates	– 240
			Unique peer reviewed Articles	509
<i>Exclusion of papers beyond scope</i>				
	Papers deemed irrelevant after reading the title and abstract			386
	<i>Papers deemed irrelevant after reading of the complete article as they...</i>			
	... did only conceptualize and operationalize corporate governance constructs			– 28
	... used resources as part of overall argumentation but did not investigate resources			– 23
	... did not empirically investigate primary data			– 17
	... used innovation only as moderator of other performance outcomes			– 5
	... investigated highly specific types of innovation beyond general innovation logic			– 3
			Papers included in this review	48

Table 2 Papers included in the analysis

Author and year	Sample and method	Aim of study	Family-specific resources
<i>Human capital</i> Arzubiaga et al. (2018)	n = 230	Entrepreneurial orientation and innovation in family SMEs	More human capital in TMT leads to higher exploratory innovation Higher family influence has negative impact on exploratory innovation External involvement has positive effect on exploratory innovation
Bergfeld and Weber (2011)	n = 654	Owning families' influence on the innovativeness	Professionalisation of innovation management through additional external human capital leads to more innovation Collaborating with managers and advisors that were not family members was dedicated to acquiring additional managerial and technical knowledge which helped the owning families to multiply the effect of their decisions and intentions within their firms and in intercompany collaborations
Calabrò et al. (2021)	n = 478	Relationship between human capital (employees' experience, knowledge and technical skills, managerial talent) and innovativeness (propensity to innovate)	Positive relationship between human capital and family firm innovativeness Family board ratio positively moderates the relationship between human capital and innovativeness The moderation effect is weaker when multiple family generations are actively involved in the firm

Table 2 (continued)

Author and year	Sample and method	Aim of study	Family-specific resources
Chen and Hsu (2009)	n = 369 data set of TSE- and OTC-listed electronic Taiwanese firms	Examines relationship among family ownership, board independence, and R&D investment	<p>High family ownership increase R&D investment when the CEO-chair roles are separated</p> <p>Negative relationship between family ownership and R&D investment, suggesting that because of their conservatism or their efficient use of R&D investment</p> <p>Firms with high family ownership use less R&D in relation to firms with low family ownership</p>
Chirico and Salvato (2016)	n = 592 Swiss family firms; ffs registered with the Chamber of Commerce of one canton in the Swiss Confederation	Examine how product development is determined by the controlling family's capability of knowledge internationalization, which denotes family members' collective ability to recognize, assimilate, and exploit each other's knowledge for product development	<p>Quality of human capital is essential, but equal emphasis should be placed on how the knowledge endowment of individual family members is internalized across the family through social and affective mechanisms</p> <p>Family social capital influence a family firm's ability to internalize its members' knowledge for PD</p> <p>Effects depends on which generation controls the firm</p> <p>Later generations enhance the positive effect of social capital, reduce the influence of affective commitment</p>

Table 2 (continued)

Author and year	Sample and method	Aim of study	Family-specific resources
De Massis et al. (2016b)	n = 6 family SMEs multiple cases; to develop explanatory theory about phenomena that have not been well-explored from consistent patterns of data using replication logic	Investigate the design decisions that fit family and business logics to create high-performing NPD programs	Cross-functional teams of dedicated human resources which have functional interaction on a full-time basis during the course of a project enable closer collaboration among diverse team members and superior external communication NPD programs in family SMEs that design NPD teams by relying on the existing departments of the firm and contribute to NPD projects by devoting part of the time of their human resources outperform those that design NPD teams by relying on dedicated cross-functional teams
Diéguez-Soto et al. (2016)	n = 583 Spanish family firms	Effect of professional management on innovation in family-owned firms	Professionalism provides owner-managers with resources, ideas, labels, and visions with which to build and develop the business over time Professionalism is positively associated with expected innovation in family firms Professionalism is positively associated with persistence of innovation in family firms Family firms with less professional management remain disadvantaged when it comes to new product development

Table 2 (continued)

Author and year	Sample and method	Aim of study	Family-specific resources
Hauck and Prügl (2015)	n = 81; Quantitative data collected from the owner-managers of entirely family-owned (100%) and -managed hotels and guesthouses located in a ski resort in Austria; cross-sectional quantitative survey design	How socioemotional factors are related to the owner-manager's perception of the intra-family leadership succession as an opportunity for innovation activities in family firms	Successors are identifiers of new entrepreneurial opportunities and drivers of innovation Act as source of new information, knowledge and resources
Hillebrand et al. (2020)	n = 746	Influence of the generation in control and the (non-family) management diversity on family firm innovation	Family generation and TMT diversity increase product innovation Family firms in third or later generations outperform first-generation ones (i.e. generational development) and family firms with a mixed TMT (i.e. with non-family members in the top management team) outperform purely family-managed family firms TMT diversity increase R&D inputs and exploration, not exploitation
Kammerlander and Ganter (2015)	n = 7 longitudinal case studies in the German consumer goods industry	How the attention of family CEOs to discontinuous technological shifts, the interpretation and decision-making processes associated with these changes, and ultimately organizations' responses are affected by CEOs' non-economic goals	Family CEO's noneconomic goals (power and control, transgenerational value, maintenance of family reputation, continuance of personal ties, personal affect) determine whether discontinuous technologies are considered as relevant enough to react CEOs from different FFs might pursue different noneconomic goals, which help to explain the variance in FFs' adaptations to discontinuous technological change

Table 2 (continued)

Author and year	Sample and method	Aim of study	Family-specific resources
Matzler et al. (2015)	CDAX listed firms in Germany n = 134 for the innovation input estimation; n = 136 for the innovation output of PATSTAT database	How family ownership, management, and governance impact innovation input and output	<p>Results capture the extent of family participation on supervisory and management boards</p> <p>Deployment of idiosyncratic resources unique to family firms require a strong involvement of families in management and governance. The more family members are involved in management and governance, the greater the likelihood that they can deploy these family-specific resources</p> <p>Only active involvement of the family creates an intersection between the firm and the family. Only via these system interactions can family-specific resource advantages and capabilities come to light</p> <p>Familial TMTs are therefore more efficient in exploiting their given R&D investments because they are more likely to engage in a process of social capital building that is unique to family firms</p>

Table 2 (continued)

Author and year	Sample and method	Aim of study	Family-specific resources
Sanchez-Famoso et al. (2014)	n = 172	Effects of internal social capital on organisational innovation	<p>Internal networking relationships between family members (family social capital) and between non-family members (non-family social capital) in family firms facilitates innovation</p> <p>The better the family members among each other and also among non-family members (communities of practices), the higher the level of innovation</p> <p>Informality and relationship orientation is a special form of human capital</p> <p>It is sufficient if networking takes place between non-family members, the human capital of employees then substitutes the family</p> <p>Professionalisation and relationship orientation increases innovation</p>
Serrano-Bedia et al. (2016)	n = 110	Relationship between sources of knowledge and innovation performance in family firms	<p>Human capital increases innovation</p> <p>Social capital = acquired knowledge increases innovation</p> <p>Cooperation agreements and alliances increase innovation</p> <p>Lack of TMT diversity is a sign of low human capital, which leads to a reduction of innovation</p>

Table 2 (continued)

Author and year	Sample and method	Aim of study	Family-specific resources
<i>Social capital</i>			
Broekaert et al. (2016)	n = 2604	Relationship between family ownership and R&D and organizational flexibility	Family firms engage less in R&D, but are more flexible in the way they organize and that this organizational flexibility enables less in R&D, but are more flexible in the way they organize Organizational flexibility enables them to successfully develop new products and even outperform non-family owned businesses when it comes to process innovation
Classen et al. (2012)	n = 355	Differences in the diversity of cooperation partners used for innovation-related activities between family and non-family SMEs	Family SMEs have a lower search breadth than their non-family counterparts Family SMEs use a less diversified set of partners to acquire innovation-related resources than non-firs External social capital benefits may apply primarily to nonintrusive ties not threatening the family's SEW and network configurations not exceeding the controlling family's limited cognitive and absorptive capacity

Table 2 (continued)

Author and year	Sample and method	Aim of study	Family-specific resources
Gómez-Mejía et al. (2007)	n = 1237	SEW and risks in family-controlled firms	Higher social capital has positive impact on a family's commitment to the firm in terms of the moral obligation to exercise strong influence, recognition of the costs associated with leaving the firm, and emotional bonds Social capital should be stronger in the founding-family-controlled and managed firms (stage one) and that it should be relatively lower as the firm moves into later stages, ownership and management by non-founding extended family (stage two) and ownership by extended family members who are not involved in the firm's management (stage three)
Gómez-Mejía et al. (2014)	n = 610 database: Corporate Library, COMPUSTAT, Thompson Financial, and the U.S. Patent and Trademark office	How the R&D decision differs for family firms due to the influence of SEW factors upon the family's R&D mixed gamble in a hightechnology context	SEW losses mitigated by gains from enhanced social capital due to R&D investment SEW gains from enhanced social capital due to R&D investment
Kraiczy et al. (2015)	n = 114 family SMEs	How organizational context interacts with CEO risk-taking propensity to affect NPD innovativeness	CEO risk-taking propensity has a positive effect on NPD innovation Effect of CEO risk-taking propensity on NPD innovativeness is stronger in family firms at earlier generational stages

Table 2 (continued)

Author and year	Sample and method	Aim of study	Family-specific resources
Pittino et al. (2013)	n = 508	How family firms manage their access to technology	<p>Family firms, compared with non-family firms, rely more on exploration-oriented alliances</p> <p>Technology sourcing strategy tends to shift towards exploitation goals as organisational knowledge codification and formalisation take place</p> <p>Family firms remain in small familiar networks due to their risk aversion</p> <p>Prefer long-term relationships and invest in depth rather than breadth</p> <p>Make less technology sourcing</p> <p>Use their social capital significantly more for exploitation, while at the same time doing less exploration</p> <p>Family firms are quite good at exploitation and if they do something to overcome their human capital deficit, they do exploration</p>
Pucci et al. (2021)	n = 145 from one life sciences cluster	Moderating effect of family involvement on firm relationships and innovation performance	Family involvement positively moderates the effect of firm relationships on R&D performance

Table 2 (continued)

Author and year	Sample and method	Aim of study	Family-specific resources
Salvato and Melin (2008)	n = 4 cases	Relationship between social capital and value creation in each individual FCB	<p>The greater the closure of ties within the controlling family and trustworthiness among family members, the greater the amount of family-generated human capital available for strategic resource recombination</p> <p>Social capital enhances value creation in any type of firm, in FCBs these advantages are absorbed in family members' social links and in the family network's configuration</p> <p>Family business managers should invest in both external and internal social capital</p> <p>Investments in building the external social capital of individuals, units, or the family firm as a whole should be balanced by investments in internal social capital within the firm and, more importantly, within the family</p>

Table 2 (continued)

Author and year	Sample and method	Aim of study	Family-specific resources
Sanchez-Famoso et al. (2019)	n = 172	Effect of family control and generational involvement on innovation	Family and nonfamily SC has positive effect on innovation Fit advances the knowledge on the consequences of an interplay between social groups in an organization, suggesting that the presence of a strong dominant coalition creates the conditions for a positive reciprocal influence between social communities within an organizational setting Complementarity between different forms of internal SC in the creation of innovation External SC may be investigated as a complementary or substitutive resource of the internal network
<i>Patient financial capital</i>			
Anderson et al. (2010)	n = 2000 largest, publicly-traded U.S. firms 2003–2007	Relation between equity ownership structure and corporate investment policy by focusing on the effect, if any, of family shareholders on firms' investment decisions	Family firms devote fewer financial resources to R&D investments than nonfamily firms Controlling shareholders commit fewer financial resources to long-term investments than non-family firms

Table 2 (continued)

Author and year	Sample and method	Aim of study	Family-specific resources
Block (2012)	n = 154	Whether family firms exhibit high or low levels of R&D spending and R&D productivity and how they, as a group, compare with lone founder or other firms	Lone founder-owned firms invest more resources in R&D relative to other firms family-owned firms invest less resources in R&D relative to lone founder-owned firms Family-owned firms invest less resources in R&D relative not only to the group of lone founder-owned firms but also to the group of other firms Knowledge and organizational culture are enablers or inhibitors of resource-recombination processes through which entrepreneurial performance is facilitated and transgenerational value is created to be partially reinvested in knowledge
Chirico and Nordqvist (2010)	n = 4 multiple case studies, semi-structured interviews	How transgenerational value creation is generated across generations	Family firms record a significantly lower R&D intensity than non-family firms Because of ownership and control in the hands of family members, with ensuing reluctance to recruit nonfamily professional managers Family members' difficulty in mobilizing the necessary external financial resources for carrying out R&D investments
Muñoz-Bullón and Sanchez-Bueno (2011)	n = 736	Impact of family involvement in ownership and control of firms' R&D intensity	

Table 2 (continued)

Author and year	Sample and method	Aim of study	Family-specific resources
Rondi et al. (2019)	Interviews with 2 family business consulting firms	How can family firms unlock their innovation potential?	Long-term orientation of family owners lead to a greater incentive to invest more resources in innovation, yet the findings indicate that due to risk aversion and potentially higher agency costs that lead to inner family conflicts, they invest less in R&D At the individual level, CEO risk-taking propensity—the willingness of a CEO to commit significant resources to exploit opportunities or engage in behaviors with uncertain outcomes
<i>Financial capital and human capital</i> Bammens et al. (2015)	n = 893	Role of employees' innovative work involvement as an internal informal source of innovation	Exploitative innovations are more in line with families' socioemotional concerns, as they involve lower risks and are less dependent on additional financial and human resources from outside the family
Block et al. (2011)	n = 116	Influence of owners and owner-managers of public companies on innovation	Close associations between family owners and members turn the former into family nurturers thus dividing loyalties between the family and business Constrains financial and knowledge resources and risk taking, which reduces the scope and quality of innovation

Table 2 (continued)

Author and year	Sample and method	Aim of study	Family-specific resources
Block et al. (2013)	n = 248	Effects on the economic and technological importance of innovations produced in family and founder firms	<p>Patient capital of family owners might promote a tolerance of below average firm returns, and hence an indifference toward an insufficient of ineffective innovation policy</p> <p>Innovation constraints regarding financial and talent resources can be significant in family-managed firms</p>
Chrisman and Patel (2012)	n = 964	R&D investments and innovation performance	<p>Human capital investments, which can further increase the risk aversion of family firms owing to managerial capacity constraints that limit their ability to manage the R&D process and increase the hazards associated with making such investments</p> <p>To overcome such constraints, family firms would need to supplement their TMTs with nonfamily managers who possess technical backgrounds and experience</p>

Table 2 (continued)

Author and year	Sample and method	Aim of study	Family-specific resources
Classen et al. (2014)	n = 2087 family SMEs	Differences between family and non-family firms in innovation investment, product and process innovation outcomes, and labor productivity	Family SMEs invest less financial capital in investments For the same financial input, family SMEs are better at exploitation than non-family SMEs For a given innovation output (in exploitation and exploration), family SMEs have lower labour productivity, i.e. they are less measurably productivity Gap shows that for the same investment, more output is produced by the additional human capital slack
Munari et al. (2010)	n = 1000 publicly-traded firms, 163 from France, 239 from Germany, 69 from Italy, 31 from Norway, 62 from Sweden and 436 from the United Kingdom	Effects of ownership and control on R&D investments by considering the influence of different types of ownership and of institutional corporate governance systems	Higher shareholding by families is negatively associated with R&D investment managers can leverage their capabilities and focus on profitable business opportunities even if lacking personal resources or collateral to be used to secure debt financing
<i>Financial capital and social capital</i>			
Munari et al. (2010)	15,174 observations (1998–2007); n = 6319 percent family firms; n = 8854 percent nonfamily firms	Innovation behavior in family firms	Family firms are less inclined to turn to external sources (contracting mechanisms and collaboration agreements) than are nonfamily firms

Table 2 (continued)

Author and year	Sample and method	Aim of study	Family-specific resources
Patel and Chrisman (2014)	n = 847	Why family firms are able to invest less in R&D and still remain competitive	<p>Why family firms might make different R&D investments than nonfamily firms—to protect socioemotional wealth and the undiversified financial holdings of the family—as well as how those investments differ</p> <p>Family firms make exploitative R&D investments that reduce the variability of sales when performance meets or exceeds aspirations and make exploratory R&D investments that increase variability in sales when performance is below aspirations</p>
Sciascia et al. (2015)	n = 240 family SMEs	Family ownership and R&D intensity	<p>Family ownership is likely to foster R&D intensity because of the long-term orientation of family owners that increases the family firm's propensity to be at the risk of investing in R&D activities</p> <p>When overlap between family wealth and firm equity is high, family ownership reduces R&D intensity because family owners derive the majority of both their financial and socioemotional benefits from the firm and could potentially lose everything if engaging and committing excessive resources to risky projects where the outcome is uncertain, such as in R&D projects</p>

Table 2 (continued)

Author and year	Sample and method	Aim of study	Family-specific resources
<i>Human capital and social capital</i>			
Bendig et al. (2020)	n = 744 firm-year observations for 124 manufacturing firms	Effect of family involvement on technological and market innovations and the moderating role of board members' social capital	Family involvement is negatively related to the number of inventions Family involvement is positively related to the market relevance of innovations Board members' human and social capital increases technological innovations
Brinkerink (2018)	n = 346	How do family and non family firms learn	Family firms are better at exploitation because they use smaller, tighter and more established networks Family firms are worse at exploration, because they have social capital but do not use it for the usual reasons
Cassia et al. (2011)	n = 4 multiple case studies	Specificities of small family firms in conducting NPD activities and how the family variable impact on the NPD process	FFs face financial and human resource constraints, but their LTO allows them to dedicate resources to innovation

Table 2 (continued)

Author and year	Sample and method	Aim of study	Family-specific resources
Casprini et al. (2017)	Single case study	How family firms execute open innovation strategies by managing internal and external knowledge flows	<p>Active use of social capital (small network with trustworthy partners) increases innovation</p> <p>Problems to use the network on a wide scale</p> <p>Family internally uses the employees who do it for them and this increases innovation</p> <p>Develop stable and long-term relationships with employees and outside partners by devoting continuous attention to capitalizing on existing relationships and building trust in social interactions, both within and beyond the firm</p> <p>While the imprinting capability derives from the non-economic goals that drive and inspire family firm behavior, fraternization results from the distinctive traits of the family's and the family firm's social capital</p>

Table 2 (continued)

Author and year	Sample and method	Aim of study	Family-specific resources
Kraiczy et al. (2014)	n = 63 family firm TMT	Relationship between TMT innovation orientation and new product portfolio performance	<p>Those TMTs with a high ratio of family members may suffer from lack of knowledge and social capital of family-external TMT members, which may lead to poor decisions in regard to innovations</p> <p>Higher number of family members reduces non-family members' discretion and freedom to act and diminishes the attractiveness of the family firm as a place to work, thus limiting human capital</p>

Table 2 (continued)

Author and year	Sample and method	Aim of study	Family-specific resources
Llach and Nordqvist (2010)	n = 151	Differences in innovative behavior between family and non-family firms	<p>Differences between family and non-family firms with regard to the role of human, social and marketing capital for innovation</p> <p>With regard to human capital, family firms have both a higher percentage of qualified employees and a higher percentage of employees devoted to R&D tasks</p> <p>Family firms focus more on qualified employees who can meet the specific requirements of customers than spending a high budget in basic research</p> <p>Family firms tend to devote more human capital to innovation</p> <p>Family firms have more linkages to other firms which can support innovation that non-family firms have</p> <p>Family firms, with high technical employees and high level of cooperation, produce new products or launch new services according the request of the costumers</p>
Weimann et al. (2021)	N = 181	Influence of the social capital of the dominant family coalition on innovation, strategic, renewal, and corporate venturing	The higher the family's social capital, the higher the innovativeness of the family firm

Table 2 (continued)

Author and year	Sample and method	Aim of study	Family-specific resources
<i>Survivability</i>			
Cassia et al. (2012)	n = 10 multiple case studies	Relationship between the presence of the family variable within a business enterprise and the managerial factors affecting success of NPD	<p>Long-term view resulted in less pressure for short term paybacks and more attention to ensure the longevity of the business</p> <p>Family firms are considered to be less progressive in terms of human resource issues such as employee involvement</p> <p>Family firms tend to pay higher wages than non-family firms and care significantly more about the satisfaction of their employees</p> <p>Family firms are closed family related systems</p>

Table 2 (continued)

Author and year	Sample and method	Aim of study	Family-specific resources
Covin et al. (2016)	n = 1671	Aims to identify combinations of behavioral proclivities and financial resources that drive radical innovation in FFs and NFFs	<p>Different paths that lead to exploration innovation: Through high human capital (proactiveness and responsiveness) Even better when human capital is combined with social capital (proactiveness and networking) Best when financial, social and human capital come together (financial resources, networking, proactiveness and risk-taking)</p> <p>No path to the problem that increasing the financial resource input does not increase exploratory innovation, i.e. financial capital alone does not have an effect on exploratory innovation</p> <p>Financial capital cannot substitute social capital and/or human capital</p>
De Massis et al. (2015)	n = 10 multiple case studies	How and why the anatomy of the product innovation process differs between family and nonfamily firms	<p>Family firms' human capital can be a source of competitive advantages and helps developing social capital between the family and stakeholders</p> <p>Management of financial resources in FFs is unique due to the long-term interaction between the family and the business</p>
Diaz-Moriana et al. (2020)	42 interviews	Why multigenerational firms innovate	<p>LTO positively influences NPD</p> <p>3 innovation patterns on why and how multigenerational family firms innovate: conserving, persisting, legacy-building based on LTO</p>

5 Analysis

The analysis of the 48 papers shows the influence of family firm specific resources on innovation. First, the influences of human capital, social capital and patient financial capital on innovation are analyzed. This is followed by an analysis of the interfaces of the individual family specific resources. The results of this analysis is conceptualized in our integrative model of how the interaction of family specific resources influences innovation.

5.1 Influences of human capital on innovation

Family businesses innovate differently because of their specific characteristics and the interpretation here is that family human capital should be considered as a central element in the innovation process in family firms. Chirico and Salvato (2016) describe the family social capital within the organization as special. According to this, family human capital manifests itself in proven cognitive schemata and interactions that result in their ability to implement implicit knowledge particularly well. Family members have the ability to transform knowledge, by combining existing with new knowledge, and to exploit gathered knowledge, by refining and extending existing competencies or creating new ones by using new and transformed knowledge. Family businesses that make use of their specialized human capital are better than those that do not (De Massis et al. 2016b), because those firms with conventional new product development designs are unable to muster adequate levels of human or financial resources and face conflicts between innovation activities and organizational routines.

Proposition 1a *Innovation processes must be organized around family human capital.*

Several studies show that professionalisation of innovation management through additional human capital leads to more innovation. In this context, Bergfeld and Weber (2011) argue that collaboration with managers and advisors that were not family members was dedicated to acquiring additional managerial and technological knowledge which helped the owning families to multiply the effect of their decisions and intentions within their firms and in intercompany collaborations. In consequence, family firms with less professional management remain disadvantaged when it comes to new product development (Diéguez-Soto et al. 2016). A lack of TMT diversity is a sign of low human capital, which leads to a reduction of innovation (Serrano-Bedia et al. 2016). Informality and relationship orientation is a special form of human capital and it is sufficient if networking takes place between non-family members, the human capital of employees then substitutes the family. Diéguez-Soto et al. (2016) agree with findings with those of studies that state family TMTs restrain the positive relationship between R&D investment and innovation performance as they are more efficient in exploiting given technological innovation outputs rather than increasing firm performance

through exploration. The family firms' superior tacit knowledge is beneficial for harvesting advantageous human capital and allows leveraging unique resources more effectively. Family businesses involve more members due to their role width (overstaffing), thus achieving diversity and an adequate resource level. Conversion of technological innovation into performance is thus more efficient. Other studies show that more human capital in TMTs leads to higher exploratory innovation and a higher family influence has a negative impact on exploratory innovation (Arzubiaga et al. 2018). Family firms in third or later generations outperform first-generation ones and family firms with a mixed TMT (non-family members in the TMT) outperform purely family-managed family firms (Hillebrand et al. 2020). The results of this study show that TMT diversity increase R&D inputs and exploration, not exploitation.

Proposition 1b *Involvement of external managers in the TMT of family firms has a positive effect on exploratory innovation.*

Matzler et al. (2015) show that only active involvement of the family creates an intersection between the firm and the family. Via these system interactions family-specific resource advantages come to light. Familial TMTs are therefore more efficient in exploiting their given R&D investments because they are more likely to engage in a process of social capital building. They suggest that family members are risk averse and reluctant to invest in innovation, but at the same time do so more efficiently. Because of risk aversion, they do less. This is because R&D investments are always associated with uncertainty and family businesses tend to invest in security. Similar to the results of De Massis et al. (2016b), the literature here shows that family firms, due to their special characteristics such as forms of communication, quick decisions, and more efficient innovation management, leads to more exploitative innovation output. Calabrò et al. (2021) find not only a positive influence of human capital on family firm innovativeness, but are also able to show that family involvement in the board leverages this innovativeness.

Proposition 1c *Family involvement in the TMT of the family firm leads to higher innovation efficiency.*

Adaptability and family members' closeness to the firm are positively associated with perceiving the succession phase as an opportunity for innovation. Adaptability here is regarded as family-specific human capital. Successors are drivers of innovation and can act as a source of new information, knowledge and resources (Hauck and Prügl 2015). However, intergenerational authority and the history of family bonds are negatively related with the perception of the succession phase as suitable for innovation. The more adaptable the successors behave, the more likely the company is to exhibit higher innovation activity. If, on the other hand, there is a high path dependency, the firm is less innovative due to its rigidity. Here, a positive attitude towards the ability to deal with all succession-related issues and conflicts is recommended. In this context, Kammerlander and

Ganter (2015) find that CEO's noneconomic goals determine whether discontinuous technologies are considered enough to react. Enduring ties, emotions and affect are a form of family-specific human capital, which leads to less innovation. In contrast, power, control, transgenerational value and family reputation lead to more innovation (Kammerlander and Ganter 2015).

Proposition 1d *Higher family adaptability increases innovation output in family firms.*

Proposition 1e *Stronger family ties reduce innovation in family firms.*

5.2 Influences of social capital on innovation

Because of the strong social capital resources family firms' innovation management is more flexible and less formalized than in non-family firms (De Massis et al. 2015). Long-term and close intra-family cooperation can lead to more in-depth discussion about the firm and the processes. As a result, knowledge can be shared and integrated in more efficiently between family members, increasing the family firms' ability to adapt its internal structures and external relations (Chirico and Salvato 2008). Therefore, family firms benefit from extensive and strong internal and external social capital resources. Although social capital enhances innovation in any type of the firm, these advantages are absorbed in family members' social links and in the family network's configuration. Investments in building the external social capital should be balanced by investment in internal social capital within the firm (Salvato and Melin 2008). While some studies find that family businesses use fewer cooperation partners than they could (Classen et al. 2012) other studies show the importance of family involvement to leverage firm relationships to innovation performance (Pucci et al. 2021). Family firms remain in small familiar networks due to their risk aversion, prefer long-term relationships, and invest in depth rather than breadth. Family firms have stronger networks than non-family firms, but they use them only selectively through partners who do not potentially harm them. While smaller firms suffer from limited resources, they benefit from more interaction and closer relationships between family members and employees, which can be translated in higher innovativeness. Hence, they use their social capital significantly more for exploitation, while at the same time doing less exploration (Pittino et al. 2013).

Proposition 2a *Strong network embeddedness of family firms leads to exploitative innovation.*

External social capital may be investigated as a complementary or substitute resource of the internal network (Sanchez-Famoso et al. 2019). Gómez-Mejía et al. (2014) find that successful R&D investment can enhance the family owners' standing and reputation due to outperforming peers. Family owners will be prescient with regard to potential socioemotional gains, such as those deriving from economic success that may come from enhanced reputation or wider exposure of the family

name. Because reputation is important to family firms, they invest more in R&D. Long-term orientation of family owners would suggest they have a higher incentive to invest more resources in innovation, but Rondi et al. (2019) find that due to SEW loss aversion and potentially higher agency costs that lead to inner family conflicts, they invest less in R&D. Moreover, compliance with institutional investors' wishes through greater R&D spending enhances and protects SEW, because cooperation along these lines is likely to build social capital with institutions.

Proposition 2b *Family firms invest in innovation to protect their SEW through social capital.*

5.3 Influences of patient financial capital on innovation

Anderson et al. (2010) find that family firms invest less financial resources into R&D than non-family firms because they try to keep resources together. Family firms record a significantly lower R&D intensity than non-family firms (Muñoz-Bullón and Sanchez-Bueno 2011). Ownership and control is in the hands of family members because they do not want to lose their control over the family firm. This makes it difficult for family owners to mobilize necessary external financial resources for carrying out R&D investments. Moreover, this need for control leads to a reluctance to recruit nonfamily professional managers, which prevents the influx of new human capital. On the other hand, the accumulation of specialized knowledge leads to a more efficient innovation management. As a result, they are often market leaders in niche markets, where they face less competition and less market uncertainties (Johann et al. 2021). This market position accommodates their risk aversion, but also limits their innovative capacity. Chirico and Nordqvist (2010) show that less risk averse family firms invest financially to compensate for their deficit in human capital. The higher the entrepreneurial orientation is, the more they use financial resources to compensate for the deficit in human capital. They use financial resources to acquire new knowledge or implement existing ones through training, executive courses, employing external non-family members. There is a trade-off between human and financial capital when it comes to innovation in family firms: both forms of capital can act as a substitute for the other form of capital. Family firms with high lock-ins into specialized family human capital can use financial capital to become more innovative while risk averse and resource constrained family firms can mobilize their human capital towards the same end.

Proposition 3 *Family firms can compensate a lack of financial capital by investing into human capital to increase innovation and vice versa.*

5.4 Influences of financial capital and human capital on innovation

By pursuing socio-emotional factors, family firms tend to make exploitative innovations. Bammens et al. (2015) assume that exploitative innovations involve lower risks and are less dependent on additional financial and human resources from outside the family. This effect is reinforced by the fact that no human capital is built up. The adoption of caring, relational approaches to solicit innovative ideas and suggestions from employees may increase exploitative innovation outputs. Block et al. (2011) argue in a similar way; they find that the focus on family preservation changes the preference of the family owner and prevents financial investments. Family owners and managers spend less on innovation input and also obtain less output and quality. The reason is that close associations between family owners and members turn the former into family nurturers thus dividing loyalties between the family and business. This constrains financial and knowledge resources and risk taking, which reduces the scope and quality of innovation. Block et al. (2013) argue that human capital leads to more exploitative innovation. Family-managed firms receive fewer patent citations in comparison with other firms. This result can be explained by the lower returns on innovation of a family business. As they have capital tied up in the long-term (patient capital), they do not feel the pressure to innovate. Chrisman and Patel (2012) show that human capital investments, which can further increase the risk aversion of family firms owing to managerial capacity constraints that limit their ability to manage the R&D process and increase the hazards associated with making such investments. To overcome such constraints, family firms would need to supplement their TMTs with non-family managers who possess technical knowledge. Managers can leverage their capabilities and focus on profitable business opportunities even if lacking personal resources or collateral to be used to secure debt financing. Given the same financial input, family firms are better at exploitation than non-family firms. For a given innovation output (exploitation and exploration), Classen et al. (2014) show that family firms have lower labour productivity, i. e. they are less productive. For the same investment, more innovation output is produced by the additional human capital.

Proposition 4 *Given the same financial investment into innovation, family firms benefit more by additional investments into human capital than non-family firms.*

5.5 Influences of financial capital and social capital on innovation

Innovation activities are costly and risky and therefore an unattractive option for conservative family firms, which have limited financial resources. While family firms are limited in financial resources and opportunities to finance innovation activities, they can create social capital easily (Nieto et al. 2015). Pucci et al. (2020) show that family firms are especially more able to utilize their social capital to amplify their innovation outcomes. Although, they can easily generate social capital, they often do not use it, because they fear losing control and are

anxious to protect their specific knowledge. Risk aversion and loss of control therefore lead to underinvestment into innovation. Bendig et al. (2020) investigate the role of family involvement in boards of directors for technological and market innovation. They show that the negative effect of family involvement on innovation can be alleviated by the board's social capital.

Proposition 5 *Family firms that actively use their social capital to mitigate limited financial resources have higher innovation outcomes.*

5.6 Influences of human capital and social capital on innovation

Family firms face financial and human resource constraints, but their long-term orientation allows them to dedicate resources to innovation (Cassia et al. 2011). The analysis of this interface again confirms the argument that family firms are better at exploitation because they use smaller, tighter and more established networks, whereas family firms are worse at exploration, because they have social capital but do not use it as we have seen before (Brinkerink 2018). With regard to human capital, Llach and Nordqvist (2010) show that family firms have a higher percentage of qualified employees devoted to R&D tasks. These results suggest that family firms focus more on qualified employees who can meet the specific requirements of customers than spending a high budget in basic research. Therefore, family firms tend to devote more human capital to innovation and those with a high number of technical employees have more linkages to other firms and a higher level of cooperation. While Bendig et al. (2020) show that family firms produce less technological innovations with more market relevance, they also find a positive moderating effect of the human and social capital of board members on technological innovation. This high social capital enables board members to acquire new external knowledge and their human capital legitimizes the appropriation within the firm. Similar positive effects can be found when considering the family owners internal human and external social capital (Weimann et al. 2021).

In summary, the analysis shows that the active use of employee social capital increases innovation. Casprini et al. (2017) show that family firms have problems to scale up their network beyond a few trusted partners. As family firms develop stable and long-term relationships with employees and outside partners by devoting continuous attention to capitalizing on existing relationships and building trust in social interactions, they are able to use employees social capital to bridge the void between themselves and a wider network.

Proposition 6 *Family firms that capitalize on their employees' social capital have higher innovation outcomes.*

5.7 The role of family firm specific resources in innovation

Family firms' human capital can be a source of competitive advantages and helps developing social capital between the family and stakeholders. The management of financial resources in family firms' is unique due to the long-term interaction between the family and the business (De Massis et al. 2015). The long-term view results in less pressure for short-term paybacks and more attention to ensure the longevity of the business. Family firms are considered to be less progressive in terms of human resources issues such as employee involvement. Cassia et al. (2012) argue that family firms face financial and human resource constraints, but their long-term orientation allows them to dedicate resources to innovation. Covin et al. (2016) show different paths that lead to explorative innovation. The easiest path to achieve explorative innovation is through human capital (proactiveness and responsiveness). Therefore, this is also the starting point of our conceptual model. When human capital is combined with social capital (proactiveness and networking) it is even better. The best path is when financial capital, social capital and human capital come together (financial resources, networking, proactiveness and risk-taking). We understand this path as resource bundling. Overall it can be observed that there is no path over the problem that increasing the financial resource does not increase exploratory innovation, which means that financial capital alone does not have an effect on exploratory innovation. From this result we can conclude that financial capital cannot substitute the social capital and the human capital (Fig. 2).

Moreover, the analysis of family-specific resources provides results and approaches to solve the explain the heterogeneity in family firms. We can identify a virtuous circle which leads to rotative overinvestment into exploitative innovations. On the one side restricted human capital leads to underinvestment of financial capital in exploratory or radical innovation. On the other side the patient financial capital lowers the pressure on human capital investments into exploratory innovations.

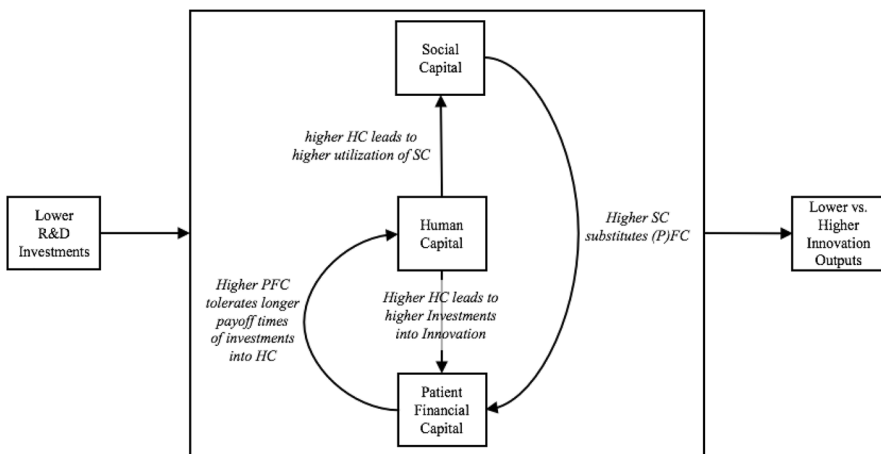


Fig. 2 The interplay of family firm specific resources

Therefore, a key finding is that investment in human capital can help to explain the heterogeneity because human capital activates social capital and substitutes the deficits in financial capital. Higher human capital enhances social capital utilization and social capital integrates financial capital restrictions. The major challenge is to increase growth, profit and sustainability by achieving the proper balance between the family firms' resources and its innovation capacity. Moreover, family firms consider innovation and creativity as less important and are less oriented toward innovation and growth and more resistant to change than non-family firms. The conflicting relationship between family firms and innovation arises from the interplay of their long-term orientation and conservatism (i.e. tradition, avoidance of risk to destroy family wealth).

6 Avenues for future research

Making theoretical contributions with review articles requires combining integrative and generative approaches, which can move a review's contribution beyond a summary of prior research directions towards a fundamental theoretical contribution (Post et al. 2020). Accordingly, the integrative aspect involves the analysis and synthesis of existing research on innovation in family businesses. The generative aspect refers to the development of new ideas and theories based on the analysis of previous studies (Torraco 2016; Gatrell and Breslin 2017).

On the basis of our integrative literature review and the detailed analysis of relevant studies on family firm innovation, we conclude that—despite the huge interest in the field—the relationship between family firms and innovation remains poorly understood (De Massis et al. 2013; Duran et al. 2016; Calabrò et al. 2019). With respect to the former, that is the impact of family involvement on innovation inputs, we find that the existing research merely examines whether or not family firms are more or less innovative than their non-family counterparts. However, the findings from these studies produce mixed results without explaining the family firm innovation heterogeneity. With respect to the latter, that is the impact of family involvement on innovation outputs, we find that most of the studies apply a rather simplified partial view of innovation only on single types of innovation: e.g. technological product and/or process innovation (Classen et al. 2012; De Massis et al. 2013).

The analyzed studies emphasized the relationship between the family firm specific resources and innovation but overlooked the heterogeneity of family firms. In the previous research are already some literature reviews and one meta-analysis about innovation in family firms (Calabrò et al. 2019; Filser et al. 2016; Padilla-Meléndez 2015; De Massis et al. 2013; Duran et al. 2016). All of them follow the narrative that family firms seem to be able to yield higher innovation outputs from lesser innovation inputs under resource constraints. None of the recent studies state how family firms are able to generate higher outputs with fewer resources. Therefore, the aim of this paper was to look at the so called black box to examine how family firms achieve this what kind of innovation performance. So far, it is known that family businesses have specific resources, but not in what way these resources are bundled and have an impact on innovation. That is, family firms appear to rely

on unique resources bundles as the underlying condition for innovation, but the composition and confirmation of the bundles remain unknown. In this context, we show that the configuration and bundling of family firm specific resources is the missing link in explaining this gap. By developing our model we are able to explain how the interplay of family firm specific resources can leverage innovation processes. An unresolved problem, however, is about what resource stocks and bundles should consist of and whether specific resource histories and trajectories create lock-ins that further hinder family firm innovation. This requires a shift in theoretical assumptions set around the ownership of resources and towards the composition of the resources held or accessible by the family firm.

In order to address these very important research gaps and opportunities, future research should increasingly take into account the heterogeneity of family firms so as to create a better understanding of their idiosyncratic resources and how they influence innovation. The great variability among family firms, for example, in terms of size, generation or degree of family involvement in ownership, management and/or governance largely affect their propensity toward innovation. Innovation outputs, whether these are new products, services or business models, are very likely to differ on the basis of firm size.

Our analysis has shown that higher human capital leads to higher innovation in family firms. We find that there is already a great deal of research on governance to increase human capital. However, there is little research on how to increase human capital. From TMT board research we know that diversity in family firms leads to higher innovation, for example through female managers, successors or external TMT members. A possible approach for future research is the paper by Arzubiaga et al. (2018), which deals with skills and roles. Further starting points for a future research agenda can be found in the area of HR practices in family firms. Rondi et al. (2021) examine how long-term orientated family firms' can simultaneously innovate and manage its human resources, ensuring mutual gains for the firm and its employees. Future research could explore the role that different groups and individuals, either family or non-family members, play in shaping mutual gains. We acknowledge that the family firm literature has dedicated much attention to examining the different treatments that owning-families adopt toward family and non-family employees, leading to phenomena such as nepotism, bifurcation bias (Rondi et al. 2021).

Overall, research on social capital in family firms shows that family businesses have smaller, closer networks based on trusting relationships. Many studies show that family businesses have social capital, but do not use it widely because they are afraid of losing control. A future research question here could be how family businesses manage to overcome this and how they seek the breadth rather than the depth of the network. This is followed by the question of how family businesses can pursue open innovation approaches. Heider et al. (2021) point out that dynamic capabilities as an approach lead to a search to the outside (sensing). There are indications from Dynamic Capabilities Research that an external search can help. One question here could be how networks can be activated in the future. For example, network analyses could be conducted to see how the underlying network is structured. There

is already research about the role of family members in entrepreneurial networks (Anderson et al. 2005).

In the area of financial capital, the results are well researched (e.g. on R&D investments) and the findings are relatively clear. Overall, family firms invest less for the reasons already known. On the one hand we find a negative effect in patient financial capital, due to family investors' acceptance of below market returns on their investments. This lowers the innovative pressure within the company. On the other hand, a positive effect of patient financial capital is a higher tolerance of long-term payoff periods leading to a long-term investment strategy. The actual positive or negative effect of patient financial capital is possibly moderated by the investors' attitude toward the firm. For example a tight-knit, highly identified, and small family group might tolerate lower returns than a larger and more diverse owner-groups expecting higher returns. Future research could investigate how family structure and attitude influences the effect of patient financial capital on innovation. How does social proximity or distance affect the capital market orientation and hence the innovation output of a family firm?

Considering the interplay of human and social capital questions arise how family businesses acquire the relevant human capital to leverage social network resources. One question could be in how far a successor can renew and establish new social networks beyond the existing ones in a company through his or her education and job experience (e.g. experiences within the Start-up eco-system). At the same time, research on top management teams and boards of directors has shown the beneficial effects of using their networks strategically. The question if and how family firms can utilize board networks to leverage social capital for innovation has not been answered yet.

As we have argued higher human capital leads to higher financial capital investments into innovation. The question remains, whether this increase of human capital only changes the quantity of financial capital investments or whether it changes the quality of investments at the same time. It is possible that a higher absorptive capacity and/or reduced risk aversion will change the portfolio of innovation investments at the same time. Future research could start with the question whether a change in the level of investment also changes the type of innovation projects. Moreover, the studies show that higher social capital can substitute for patient financial capital. Substitution works through spillovers, accessing resources and knowledge from outside without paying the full price. However, spillovers only work under certain conditions, through social, technological, and/or regional agglomeration effect, such as dense urban areas. Future research could look at the conditions under which social capital generates spillovers. Here, research on regional economics provides some indications of how spillovers work and under what conditions family firms can reap their benefits (e.g. regional clusters).

Concerning practical implications the level and importance of human capital is the primary driver of exploratory innovation. In this framework, the question arises of how to achieve higher human capital. This can be achieved, for example, through structured talent management, the recruitment of appropriate employees and early succession planning. Furthermore, human resource development should pursue the general goal of increasing the diversity and quality of human capital. The investment

in human capital activates social capital. The higher and diverse human capital leads on the one hand to broader networks with more stakeholders through personal contacts, which in turn leads to a higher knowledge flow and at the same time increases the absorptive capacity because the existing stakeholders increase responsiveness and sensitivity. This can be achieved by participating in activities outside the firm, such as university collaborations, in order to build and use the relevant networks. Higher existing human capital and higher activation from the environment of the firm enables better investment decisions to be made. Those who would invest more financial capital but are unable to do so due to resource constraints can compensate for their financial resource scarcity by engaging more in social networks.

Given that family firms represent the predominant type of organization worldwide, the research on family firms is still relatively young, but their importance across most economies has already been acknowledged. Scholars have also shown that innovation constitutes a major determinant for their long-term success over generations, but technological innovation alone will no longer be sufficient to remain competitive. This is why we observe a huge interest in innovation from scholars and practitioners. As we have shown, there are strong theoretical reasons to believe that innovation in family firms differs from that found in non-family firms and even between family firms due to their heterogeneity.

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Declarations

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