Family and non-family sources of knowledge diversity in family firms: The role of causation logics

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Abstract:

This article will critically analyse the sources and the role of knowledge diversity in informing causation logics in family firms. Family firms rely on knowledge resources from both intra-family and extra-family sources, which may require different approaches to effectively manage. We argue that as family firms acquire greater knowledge diversity, family-centred effectuation processes become limited and they will increasingly rely on formal causation logics to coordinate these resources. However, we expect this relationship to differ when knowledge diversity is sourced from either family or non-family sources. Empirical analyses of 242 small- and medium-sized family firms indicate that knowledge diversity positively affects a firm's reliance on causation logics, regardless of the source of that diversity. This suggests that the affinity of family firms to leverage effectuation logics may not be characteristic of family firms in general, but instead may be an artefact of firm reliance on knowledge capital concentrated in family owners.

Article:

Introduction

The capacity to leverage family knowledge resources to enhance competitive and innovation outcomes is an important characteristic of family firm strategy (Chrisman et al., 2012). The family network structure facilitates knowledge generation and flow in ways that are difficult to replicate in non-family settings (Arregle et al., 2007; Chirico and Salvato, 2008). Family social capital and the pursuit of non-economic goals may also shape the interpretation of competitive opportunities and the evaluation of outcomes (Chrisman et al., 2014). These strategic idiosyncrasies are well illustrated in the study of knowledge management in family firms and may inform the logic systems underlying firm behaviour, particularly their reliance on effectuation and causation logics (Chandler et al., 2011).

Both effectuation – grounded in a logic of control – and causation–grounded in a logic of prediction – influence the operational patterns of problem solving and opportunity recognition in organisations (Sarasvathy, 2001). Tactics indicative of effectuation logics focus on enhancing firm outcomes through emergent strategies with alternatives selected on the basis of available means, affordable loss, acceptable risk and controllable aspects of an unpredictable future (Sarasvathy, 2001). By contrast, causation logics are geared more towards more traditional competitive strategies; tactics include linear strategic planning, clear objectives, and predictable outcomes (Chandler et al., 2011; Sarasvathy, 2001). While effectuation and causation logics are independent constructs and can emerge simultaneously in both new and established ventures (Smolka et al., 2016), extant research emphasises an alignment between family ownership and effectuation logics (Goel and Jones, 2016; Jaskiewicz et al., 2015). However, these findings are grounded in an understanding that family firms are adept at efficiently leveraging knowledge resources possessed by family members. Hence, it is unclear how effectively family firms can rely on effectuation logics when knowledge is acquired from non-family sources (Tabor et al., 2018).

The literature regarding these two types of logic tentatively suggests that family firms are simultaneously prone to apply effectuation logics (Chandler et al., 2011) and also to rely on non-family managers for diverse knowledge (Tabor et al., 2018); this may create conflicting implications. This potential for theoretical friction emphasises the importance of the boundary conditions of effectuation logics as family firms grow and their knowledge sources become more diverse. This article is motivated by these mixed findings and is guided by the following research question: *How does the source of knowledge diversity, as either family or non-family, indicate reliance on causation logics in family firms?*

We ground our arguments in social capital theory, particularly by extending findings from the domain of family structural capital (Cabrera-Suárez et al., 2015), to explore how family firm knowledge diversity informs the utility of causation logics, and if the source of knowledge influences this relationship. This article contributes to our understanding of knowledge management and knowledge diversity in family firms. Specifically, we provide evidence that the benefit from effectuation logics may not be the main characteristic of family firms, but may be an artefact of firms relying on concentrated knowledge resources, such as tacit founder knowledge.

Furthermore, we emphasise the importance of knowledge diversity in family firms and recognise that family knowledge capital, not simply family ownership, is the key to understanding the role of effectuation and causation logics in family firm strategy. In so doing, we present knowledge diversity as a primary consideration for understanding the strategic heterogeneity of family firms. This article contributes to our understanding of knowledge management and diversity in informing the application of effectuation and causation logics in family firms. We also provide insights into the potential limitations of relying on processes grounded in the idiosyncratic structural capital of the owning family, since a firm's knowledge base is expanded to include more non-family sources.

The article is organised as follows: We first review the literature of effectuation, causation, and structural social capital in family firms. Then we develop a series of hypotheses aimed at

clarifying the role of knowledge diversity in informing causation logics in family firms. Next, we describe our methodology and present our empirical findings. We conclude by discussing the contributions and implications of our findings for future research and practice.

Theoretical overview

Causation and effectuation logics provide a framework for understanding the cognitive processes underlying firm behaviour and strategy (Sarasvathy, 2001). Seminal applications of this framework have been used to illustrate heterogeneous processes that entrepreneurs employ as they evaluate market opportunities and approach challenges related to value and venture creation (Chandler et al., 2011). More contemporary applications have extended the scope of this research to illustrate the behavioural and strategic heterogeneity of established firms. This trend has enhanced our understanding of the variety of firm resources and capabilities that influence effectuation and causation approaches to problem solving, notably knowledge management (Carnabuci and Operti, 2013), which is particularly relevant for family firms (Chirico and Salvato, 2008).

Extant work considering knowledge management in family firms recognises the distinct applicability of effectuation logics in these populations by studying the rift between the linear rational processes of causation models and the relational and social logics underlying governance decisions in family firms (Sarasvathy et al., 2015; Sharma and Salvato, 2011). This tendency is illustrated in various domains that span theoretical perspectives and scope, including studies of succession (Dalpiaz et al., 2014), diversified portfolio governance (Steier et al., 2015), opportunity recognition (Randerson et al., 2015), and entrepreneurial orientation (Sciascia et al., 2013). Clearly, effectuation logics, which are predicated on socially informed cooperative logics of coordination, are conceptually aligned with many of the unique strategic characteristics of family firms.

By contrast, causation logics are associated with a linear planned strategy approach where objectives are initially defined and outcomes are viewed as predictable through proper calculation and empirical analysis (Chandler et al., 2011; Sarasvathy, 2001). Decision makers who utilise causation logics compare alternative approaches against currently available resources and make selections predicated on maximising returns. Causation and effectuation based processes are independent, but do not exist in isolation, and mixed logics are likely to abound in any single organisation (Smolka et al., 2016). However, the distinctive social capital that informs family firm strategic planning suggests not only a predilection towards effectuation-based logics, but that those logics are more illustrative of idiosyncratic family firm behaviours that inform our understanding of their distinctiveness.

Building on this foundation, we concur with research that emergent, non-predictive strategies based on underlying effectuation logics are aligned with the relatively low information asymmetries, relational capital, and social control logics that characterise most family systems (Hayton et al., 2011). Family groups may be particularly able to instil effectuation logics into the firm, as illustrated by a tendency to leverage from the cohesion of their family network to facilitate firm management; this results in positive outcomes regarding family firm performance, innovation, and resilience (Chrisman et al., 2011; Memili et al., 2015; Sharma and Salvato,

2011). However, a primary antecedent underlying this effectiveness may be the social capital present within the family network and the presence of convergent goals and motivations among family actors. These goals and motivations may be threatened when strategies expand to incorporate more diverse knowledge sources.

Social capital is generally analysed along three dimensions: cognitive, relational, and structural (Nahapiet and Ghoshal, 1998). The *cognitive* dimension refers to resources that provide participating actors with shared representations, interpretations, and systems of meaning. These shared meanings, values, and norms are conducive to actors eschewing the pursuit of immediate self-interested outcomes in order to pursue mutually beneficial collective action and long-term collaboration. The *relational* dimension refers to relationships that develop within a network through social interactions, and the extent to which trust, obligation and reciprocity exist between actors. The *structural* dimension refers to social capital that is derived from the structural configuration of the network and concerns the structure for creating opportunities for socialisation to generate collective benefits. Overall, social capital is a particularly insightful perspective when studying family firms and has informed a number of the idiosyncratic behaviours that are characteristic of family governance (Carr et al., 2011).

When family-centred social capital informs decision making, it may promote firm strategies that prioritise affective outcomes for the family group over the performance outcomes of the firm (Berrone et al., 2012). As such, family firms provide a unique organisational context for studying effectuation logics owing to the co-existence and trade-offs between economic firm-centred goals and non-economic family-centred goals (Chrisman et al., 2012; Gómez-Mejía et al. 2007). This commitment to family-centred non-economic goals may lead to family firms being unwilling to threaten family control by empowering highly knowledgeable, non-family managers. Thus, family firms often direct their efforts towards opportunities that can be pursued with primarily intra-family knowledge resources (Chrisman et al., 2014). Together, this provides strong evidence that the particularistic pursuit and attainment of family-centred non-economic goals provides affective returns for the family group (Berrone et al., 2012; Gómez-Mejía et al., 2007). While all three dimensions of social capital are useful for studying and understanding the dynamics of the family network in informing family firm strategy, the structural dimension is particularly insightful for illustrating how family firms leverage the knowledge capital present in the family network to pursue firm outcomes (Pearson et al., 2008).

Family structural capital is a network dimension that refers to the social capital present within the family group structure that can be exploited in pursuit of firm objectives (Cabrera-Suárez et al., 2015). With regard to knowledge resources, family structural capital can be enhanced through the professional development, education, and embeddedness of family members who are already engaged in the firm (De Massis et al., 2015), or through the introduction of extended, often cross-generational, family members into the firm (Jaskiewicz et al., 2015). As the name suggests, family structural capital is grounded in the structural dimension of social capital and is derived through the internal network of ties within a family. It facilitates the establishment of patterns of interaction, involvement, and cohesion among family members (Carr et al., 2011; Pearson et al., 2008). Cabrera-Suárez et al. (2015) refine this conceptualisation and specifically consider the dimensions of open communication, intergenerational attention, and emotional cohesion. Together, these dimensions of family structural capital reflect the shared

representations, interpretations, and systems of meaning which reduce the barriers to knowledge exchange (Cabrera-Suárez et al., 2015). This suggests that family structural capital reflects the orientation of family firms in relying on transgenerational knowledge creation and resources when pursuing firm opportunities, and can improve the efficacy through which effectuation logics are applied within family firms (Hayton et al., 2011).

The effectiveness of family structural capital as a primary source of novel knowledge as family firms grow, age and professionalise is a matter of ongoing debate. For instance, when performance levels are satisfactory, an owning family's affective loss aversion can lead to the pursuit of risk adverse strategies in order to protect and preserve affective interests. When firm performance is less than satisfactory, preference reversal may occur and family firms can become risk-seeking (Berrone et al., 2012; Gomez-Mejia et al., 2010), particularly with regard to innovative behaviours such as R&D investment (Chrisman and Patel, 2012), the success of which may require knowledge capital from outside the family. It is important to assess the impact of knowledge diversity in supporting a long-term transgenerational strategy (Patel and Fiet, 2011), but it is unclear to what extent the characteristic effectuation logics of family firms retain their strategic relevance once firms come to rely upon more diverse sources of knowledge capital. We recognise the importance of family structural capital in informing the dynamics of a family group, but it is also important to develop arguments about the use of causation logics in family firms and how these sources of knowledge diversity can inform these logics.

Family and non-family sources of knowledge diversity

Knowledge diversity refers to the concentration of knowledge resources among firm stakeholders (Carnabuci and Operti, 2013). This plays a specific role in family firms since it represents the degree to which competitive knowledge resources are concentrated within family sources (Patel and Fiet, 2011). Generally, family firms with low knowledge diversity pursue strategies that rely on knowledge capital concentrated within a network of family owners. While lower levels of knowledge diversity may restrict possible growth opportunities, the firm may be better positioned to entrench in niche market segments and explore avenues of innovation that rely on existing knowledge capital (Carnabuci and Operti, 2013). Conversely, family firms with high degree of knowledge diversity rely on knowledge from a greater variety of sources, but this creates a potentially double-edged sword. On the one hand, these firms may be able to leverage an expanded set of skills and expertise to facilitate rapid responses to market opportunities; on the other hand, they may also face efficiency and agility issues when coordinating knowledge resources across stakeholders external to the family network (Carnabuci and Operti, 2013). In an attempt to clarify the confounding role of knowledge diversity in family firms, we identify two sources of knowledge diversity particularly relevant to family firms: family structural capital and non-family managers. Enhancing family structural capital involves the introduction of new knowledge resources from within the family. Most commonly, this refers to the professional training and development of family managers and the introduction of family members from multiple generations into the firm (Chirico and Salvato, 2008; Sciascia et al., 2013). We argue that enhancing family structural capital provides an important avenue for knowledge diversity in family firms and supports the pursuit of opportunities requiring knowledge capital and expertise that are possessed outside of the founding generation.

Hypothesis 1a: Family structural capital is positively related to knowledge diversity in family firms.

The introduction of non-family managers into the firm can provide a direct source of knowledge diversity and novel knowledge resources for the firm. Research indicates that non-family managers in family firms can help avoid inertia in strategic decision making; this increases the likelihood of long-term survival and growth by providing access to valuable knowledge capital (Cabrera-Suárez et al., 2015). Furthermore, largely owing to the different sizes of applicant pools, many family firms may actually employ a greater proportion of non-family employees than family members in order to pursue opportunities that would otherwise be onerous when relying solely on family managers (Chrisman et al., 2014). It is important to recognise that while there may be barriers facing family firms that seek to take advantage of knowledge capital held by non-family managers (Chrisman et al., 2014), the use of non-family managers does not necessarily reduce reliance on family-centred approaches to problem solving (Chirico and Salvato, 2008). Regardless, reliance upon non-family managers is expected to be a primary source of knowledge diversity in family firms.

Hypothesis 1b: Reliance on non-family managers is positively related to knowledge diversity in family firms.

The introduction of non-family managers increases the firm's reliance on non-family knowledge in firm decision making. This also promotes the development of processes that are predicated on a wider range of capabilities and knowledge resources that are not available within the family network. However, this can also limit the effectiveness of many managerial practices that rely on the effectuation-based processes characteristic of many family networks. We therefore, extend our arguments to explore how the sources of knowledge diversity in family firms enhance the structural capital of the family network and increase the reliance on non-family managers, and thereby incentivise the use of causation logics in family firms.

Sources of family firm knowledge diversity and causation logics

Family structural capital is enhanced through the expansion and professionalisation of the family network. When viewed as an antecedent of knowledge diversity, enhancing family structural capital allows for the introduction of new knowledge into the firm without relying on extra-family sources. While relying on familial sources of knowledge diversity may provide some additional protection against knowledge expropriation and information asymmetries when compared to non-family sources (Chrisman et al., 2014), the family network may not possess sufficient depth to achieve firm goals (Sciascia et al., 2013). Furthermore, family firm reliance on effectuation logics is reinforced by the shared network ties of family members which promote complementary systems of interpretation and responses (Chandler et al., 2011). Thus, while enhanced family structural capital is a route to knowledge diversity, we expect new knowledge to emerge as complementary to existing norms and logics and to be managed accordingly.

We posit that effectuation approaches that underlie family firm knowledge management are not threatened by enhanced family structural capital. Specifically, we expect that as family structural capital is enhanced through the professionalisation and expansion of the family network and the

resulting introduction of new diverse knowledge into the firm, it will continue to rely on established family-oriented logics to adapt and leverage this new knowledge. Further, family firms may be particularly disinclined to adopt causation logics in general since doing so may represent a departure from their familial approach to firm governance, and such a change may be difficult to reverse in the future. Enhancing family structural capital may be an important aspect of the growth and development of family firms, as well as a necessary vehicle for their evolution and strategic renewal. However, we expect that these enhancements will be processed through a familial lens that inhibits the emergence of causation logics.

> *Hypothesis 2: Family structural capital is negatively related to causation logics in family firms.*

Employing and empowering non-family managers presents additional issues for family firms which must accommodate the information asymmetries and social rifts that may emerge as non-family decision makers are empowered. Family firms must reconcile the fact that non-family managers are not privy to the social cohesion and shared affective goals that are accepted by those within the family network, and that enhance the utility of effectuation logics (Chrisman et al., 2014). Thus, non-family managers may perceive both that there is a lower utility for the effectuation logics characteristic of family firms, and an over-reliance on informal controls that result from the cohesion of the family group. In such cases, we expect that family firms will be motivated to adopt a more formal approach in knowledge management.

Since the knowledge resources of non-family managers exist outside family control, they are less likely to be effectively managed using informal practices associated with effectuation logics. As non-family managers become more empowered within a family firm, we expect the introduction of more formal knowledge management practices to leverage and monitor non-family managers more effectively than a reliance on effectuation logics would provide. Thus, we expect that as the role of non-family managers increases in family firms, so too does the presence of diverse knowledge resources not available within the family network. We expect that will lead to an increased reliance on causation logics to more effectively manage these new knowledge resources. Put simply, the objectivity and diverse knowledge resources of non-family managers, paired with their relative focus on expected financial returns rather than familial non-economic motivations, should result in more planned and calculative approaches to corporate strategy.

> *Hypothesis 3a: The proportion of non-family managers is positively related to causation logics in family firms.*

As family firms rely more on diverse knowledge not present within the family network, they are likely to reduce their emphasis on effectuation logics and increase their reliance on causation logics. However, we do not expect causation logics to emerge if the introduction of non-family managers does not enhance the firm's knowledge diversity. Put another way, introducing non-family managers with knowledge resources that are compatible with the existing knowledge capital of family firms would not result in the same pressure to adopt and incorporate causation logics. Nevertheless, as reliance on non-family managers increases alongside knowledge diversity, we expect that the shortcomings of the effectuation processes will become more apparent. In such cases, we argue that the incorporation of non-family managers into upper

echelons of decision making requires the presence of shared objectives that are driven by uniform and directed causation logics. Thus,

> *Hypothesis 3b: Knowledge diversity mediates the relationship between the proportion of non-family managers and causation logics in family firms.*

Methods

Data

Data were collected using a survey instrument with previously validated scales from family-owned Turkish small- and medium-sized enterprises (SMEs). The Turkish context is suitable for this study for two reasons. First, the prevalence and importance of family firms in Turkey make them a prime context in which to study the strategy and performance implications of family firms (Altindag et al., 2011; Tatoglu et al., 2008), especially given our focus on the adoption of causation logics in family firms. Second, Turkey is a growing economy with a highly dynamic institutional context and intensive market competition (Altindag et al., 2011). Hence, the importance of knowledge management and causation logics is critical, especially for family firms that often struggle to attract external experts and/or leverage internal family-centred knowledge.

Data were collected from a sample of 350 family firms obtained from the Turkish Family Firms Association (TFFA; www.taider.org.tr) through collaboration with a major Turkish university. We collected data via a mail survey, an approach common when soliciting information from private firms and frequently used in family business research (Eddleston et al., 2007). Membership in the TFFA is restricted to firms that self-classify as a family business and are primarily governed by a dominant owning family. However, to ensure the relevance of our sample, we only included firms that reported having at least two family members in management positions (Eddleston et al., 2007). Valid responses from 242 firms were received resulting in a final response rate of 694%. The questionnaires were completed by the principal managers of the firms. Before conducting the primary analysis, t-tests compared early and late respondents to the survey for the variables of interest. Results indicate non-response bias does not significantly impact our analyses or findings (Kanuk and Berenson, 1975).

Primary variables

Measurement of key constructs, factor loadings, and composite reliabilities are reported in Table 1. Unless noted otherwise, all items here are measured using a 5-point scale where 1 means 'strongly disagree' and 5 means 'strongly agree', All constructs are measured by using scale means. *Knowledge diversity* is measured using a 5-item questionnaire ($\alpha = 0.828$) developed by Tiwana and Mclean (2005) and adapted from De Massis et al. (2014). This instrument highlights various aspects of knowledge, including expertise, background and experiences, education, and the extent to which knowledge held by different individuals is complementary. Illustrative statements include 'members of this team vary widely in their areas of expertise' and 'members of this team have a variety of different backgrounds and experiences'.

Table 1. Construct items, factor loadings, and reliability.

	Factor loadings	Composite reliability
Knowledge diversity (α = 0.828)		
1. Members of this team vary widely in their areas of expertise	0.78	*0.88*
2. Members of this team have a variety of different backgrounds and experiences	0.76	
3. Members of this team have skills and abilities that complement each other's	0.67	
4. Members of this team have studied in different educational institutions	0.79	
5. Members of this team have been educated in different specialisations	0.85	
Family Structural Social Capital (α = 0.860)	0.79	
1. In this family we openly express our opinions	0.74	*0.92*
2. In this family we regularly talk about things that concern us	0.83	
3. In this family we take time to listen to each other	0.84	
4. In this family we bring issues out in the open, good or bad	0.70	
5. In this family the older generation takes a close interest in the activities of the younger generation	0.70	
6. In this family the older generation is very responsive to the needs of the younger generation	0.69	
7. In this family the young adults are left to their own devices	0.52	
8. In this family the older generation is highly supportive to the goals of the younger generation	0.72	
9. In this family the emotional bond between us all is very strong	0.63	
10. In this family members make each other feel secure	0.72	
Causation (α = 0.708)		
1. We analysed long run opportunities and selected what we thought would provide the best returns	0.47	*0.86*
2. We developed a strategy to best take advantage of resources and capabilities	0.46	
3. We researched and selected target markets and did meaningful competitive analysis	0.80	
4. We designed and planned business activities	0.77	
5. We organised and implemented control processes to make sure we met objectives	0.78	
6. We had a clear and consistent vision for what we wanted to do.	0.78	
7. We designed and planned production and marketing efforts	0.63	
8. The ultimate product/service that I used to launch this business was quite similar to my original conception	0.50	
9. Our decision making has been largely driven by expected returns	0.44	
Effectuation (α = 0.722)		
1. The ultimate product/service that I used to launch this business was quite different from my original conception	0.48	*0.82*
2. It was impossible to see from the beginning where we wanted to end	0.62	
3. We have allowed the business to evolve as opportunities have emerged	0.75	
4. We evaluated the set of resources and means we had at our disposal and thought about different options	0.68	
5. We experimented with different products and/or business models	0.73	
6. We started out very flexibly and tried to take advantage of unexpected opportunities as they arose	0.66	
7. Our decision making has been largely driven by how much we could afford to lose	0.43	
8. We used a substantial number of agreements with customers, suppliers and other organisations and people to reduce the amount of uncertainty	0.43	

Causation logic is measured via a 9-item questionnaire (α = 0.708) adapted from Chandler et al. (2011). These items reflect the fact that causation logic is characterised by clearly defined ends and carefully planned means (Sarasvathy, 2001). Illustrative statements include 'we organised and implemented control logics to make sure we met objectives' and 'we designed and planned business strategies'.

Family structural capital is measured using a 10-item questionnaire (α = 0.860) adapted from Cabrera-Suárez et al. (2015). It assesses the structural networking among family members, as well as the exchange of physical and non-physical resources through networking among family members (Arregle et al., 2007; Cabrera-Suárez et al., 2015; Pearson et al., 2008). Items include the exchanges of knowledge resources (items 1-4), inter-personal support, especially the support from senior family members towards junior members (items 5-8), and emotional support among family members (items 9-10). Illustrative statements include 'in this family we openly express our opinions', 'in this family the emotional bond between us all is very strong', and 'in this family the older generation is highly supportive of the goals of the younger generation'.

Non-family management is measured by the number of non-family managers serving in the family business. As detailed below, for primary, secondary, and robustness tests we use either the number of non-family managers or the percentage of non-family managers on the Top Management Team (TMTWe also use the percentage of non-family managers in a robustness test. Construct measurements are summarised in Table 1.

Control variables

Since our arguments are grounded in social capital theory and rely on the understanding of the family structure of our respondents, we control for a number of demographic indicators which may introduce variance in our collected data. Specifically, we control for respondent gender, education, and age. *Gende*r is measured using a binary variable with 1 for male and 0 for female, *education* is measured on a 5-point scale where 1 means less than high school and 5 means post-graduate, and *age* is measured on a 7-point ordinal scale. We also control for firm factors that may influence the presence of causation logics beyond the outside sources of knowledge diversity that are recognised in family business research. We control for the *number of family owners* (measured as a count variable); the presence of *succession intentions* (measured as a binary variable in which 1 records the presence of such an intention and 0 otherwise), and the number of *family generations* simultaneously involved in business. Finally, we control for *firm age* (number of years since founding), *firm size* (number of employees), *firm debt* (on a 6-point scale where 1 means no debt and 6 means debt exceeds 200% of equity), and the firm's *industrial affiliation* (1 for service industries and 0 for production industries).

Controlling for endogeneity

Since our arguments are predicated on the presence of knowledge diversity impacting operating logics, we recognise the potential for recursive effects in our model. Specifically, we recognise the potential reverse causality risks in our model that our cross-sectional data may not be sensitive to. To address this endogeneity issue, we use two approaches. First, we run a Durbin–Wu–Hausman test (Chrisman et al., 2012; Hausman, 1978). The insignificant statistic (F-

statistic = 0.08, *p* = 0.78 > 0.10) indicates that the issue of endogeneity is not substantially present in our sample, and ordinary least squares (OLS) results should be unbiased and can thus be directly reported (Davidson and Mackinnon, 1983). Second, we implement Heckman's (1979) two-stage technique (ala Gómez-Mejía et al., 2007). We first estimate a probit model where the endogenous variable is the owner's self-identification as a family business (a binary variable where 1 = being self-identified as a family business and 0 otherwise) and estimate the inverse Mills ratio. We then incorporate the inverse Mills ratio as one additional control in the second stage to test all of our hypotheses (Greene, 2003). The same technique has been used in the family business literature to address endogeneity concerns (Gómez-Mejía et al., 2007; Kotlar et al., 2014). The rationale behind this approach is that some family-centred factors (i.e. instrumental variables) might affect whether family owners/managers self-identify the business as a family business, which will fundamentally affect the family's knowledge management practice in business.

In the first stage, we use three items that reflect various aspects of family-centred non-economic goals (Chrisman et al., 2012). The three items are as follows: (1) *family harmony* ('family harmony is an important goal in making my business decisions'), (2) *family status* ('the social status of my family is an important factor in making my business decisions'), and (3) *family involvement* ('my business is closely related to my family, including parents, spouse, sibling, cousin and other relatives who are or have been involved in business'). All three variables are measured using 5-point Likert-type scales. We also use a different set of instrumental variables as one robustness test.

Pre-tests

Descriptive data for all variables are reported in Table 2. Consistent with our hypotheses, non-family management is positively and significantly correlated with both knowledge diversity and causation logics. In addition, knowledge diversity is also positively and significantly correlated with causation logics. Interestingly, and inconsistent with our hypotheses, family structural capital is also positively correlated with causation logics; we explore this unanticipated finding below. Variance inflation factor (VIF) coefficients suggest multicollinearity does not appear to be an issue.

While our model is focused on predicting the presence of causation logics in family firms, we conducted pre-tests on our major assumptions to ensure that our sample is aligned with extant family business research. First, we tested the assumption that effectuation logics are prominent in our family business sample. We adopted the measurement of effectuation[1] (α = 0.722) from Chandler et al. (2011, also see Table 1). In our sample, effectuation logics are generally present in family firms (mean = 3.27) with relatively low variance (SD = 0.57), affirming the finding that effectuation logics are common among family firms in general. Furthermore, when we analyse the family firms in our sample across various dimensions of family involvement (ala Chrisman et al., 2012), our findings suggest that effectuation logics are significantly present

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[1] Since data were collected from a single instrument, we also tested for the possibility of the common method bias using Harman's single-factor test. The first unrotated factor captured only 15.2% of the variance, whereas the top three factors captured 41.1% of the variance. We conclude that no single factor emerged that captures most of the variance, and the common method bias does not significantly affect our findings.

in family firms, regardless of succession intentions, number of family owners, and generations of control.

Furthermore, the independence of effectuation and causation measures is supported by both correlation analyses ($\rho = -.003^{ns}$) as well as factor analysis, which indicates no significant cross-loadings between items. Interestingly, while previous research has shown that causation and effectuation logics are often correlated with one another (Chandler et al., 2011), this relationship becomes more complicated when we focus on family firms (Hayton et al., 2011). This is likely the result of multiple co-existing positive and negative corollary relationships linking these constructs. We further explore this unexpected outcome in a series of post hoc tests, which are reported after our main findings.

Finally, when we replicate our analyses using effectuation logics as the dependent variable (DV) we find that the resilience of effectuation logics in family firms is noteworthy. In these tests, effectuation logics are again strongly present across all family firms ($B = 28.09$, p-value < 0.001) and only firm age ($B = -2.55$, p-value < 0.01) significantly diminishes their presence, with knowledge diversity approaching significance ($B = -0.15$, p-value < 0.1). Taken together, these pre-tests affirm extant notions that effectuation logics are generally dominant in family firms overall and illustrate their potential limitations in managing diverse knowledge resources. Hence, our primary analyses do not suggest that causation logics supersede or supplant effectuation logics, but instead illustrate the factors that lead to the emergence of causation logics alongside with the effectuation logics characteristic of family governance.

Regression results

Primary regression results are reported in Table 3. The first stage model uses the Probit regression model to calculate the inverse Mill's ratio which will be added into other regression models. We found that family harmony ($B = 0.755$, p-value < 0.001), family status ($B = -0.572$, p-value < 0.01), and family involvement ($B = 0.565$, p-value < 0.001) are all significantly related to family business identity, suggesting robustness of our family firm sample as a function of both ownership and influence. In addition, the McFadden R-square is 0.215, showing a reasonable level of model fit.

We use the OLS approach to test our hypotheses. White's correction of covariance is added in all models. Model 1 tests H1 and H2. Structural family capital ($B = 0.267$, p-value < 0.01) and non-family management ($B = 0.040$, p-value < 0.001) are both positively related to knowledge diversity in family business thus, providing support for Hypotheses 1a and 1b. Family structural capital is positively related to causation logics ($B = 0.313$, p-value < 0.001) and therefore, does not support Hypothesis 2. Non-family management is positively related to causation logics ($B = 0.019$, p-value < 0.001), which supports Hypothesis 3a (Model 2), and knowledge diversity is positively related to causation logics ($B = 0.175$, p-value < 0.001), which supports Hypothesis 3b (Model 3).

Table 2. Descriptive and correlation tables.

	Mean	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1. Causation	3.98	0.67	1.00																		
2. Effectuation	3.27	0.57	–0.00	1.00																	
3. Knowledge diversity	3.64	0.74	0.28	–0.05	1.00																
4. Family structural capital	3.87	0.55	0.30	0.13	0.22	1.00															
5. Non-family management	1.63	4.70	0.20	0.14	0.30	0.19	1.00														
6. Gender	0.83	0.38	0.07	0.02	–0.04	0.15	0.03	1.00													
7. Education	3.09	1.17	0.07	–0.08	0.04	–0.15	0.01	–0.17	1.00												
8. Age	2.55	1.19	–0.04	–0.03	–0.03	0.11	–0.06	0.17	–0.40	1.00											
9. # of family owners	2.93	1.40	–0.04	0.08	0.09	–0.01	0.18	0.06	–0.01	0.06	1.00										
10. Succession intention	0.88	0.33	0.09	–0.13	0.07	0.19	0.03	0.13	–0.13	0.10	0.15	1.00									
11. # of generation	1.94	0.63	–0.10	–0.04	0.01	0.10	0.00	–0.02	0.10	–0.08	0.28	0.15	1.00								
12. Firm age	20.38	13.27	–0.26	0.01	–0.03	–0.07	–0.03	0.03	–0.01	0.08	0.18	0.06	0.30	1.00							
13. Firm size	93.13	517.14	–0.09	–0.01	0.01	–0.03	0.07	–0.11	0.15	0.01	0.17	0.04	0.15	0.27	1.00						
14. Firm debt	2.43	0.97	–0.25	–0.09	–0.08	–0.05	–0.20	–0.03	–0.06	–0.01	0.00	–0.13	0.11	0.14	0.06	1.00					
15. Industry	0.40	0.49	0.07	0.00	0.09	–0.07	–0.01	–0.22	0.12	–0.06	0.01	–0.10	–0.18	–0.33	0.04	–0.07	1.00				
16. Family business identity	0.89	0.31	–0.04	–0.03	–0.19	0.18	–0.18	0.09	–0.13	0.04	0.12	0.19	0.12	0.18	0.03	0.09	–0.15	1.00			
17. Family harmony	3.93	0.75	0.09	0.07	0.21	0.45	0.17	0.00	–0.08	–0.03	0.03	0.08	0.03	–0.09	–0.08	–0.08	0.10	0.23	1.00		
18. Family status	3.74	0.87	0.08	0.09	0.22	0.36	0.18	0.09	–0.18	0.05	0.08	0.09	0.03	0.04	0.05	–0.02	–0.09	0.22	0.57	1.00	
19. Family involvement	3.54	0.96	0.08	0.10	0.15	0.28	0.16	0.03	–0.14	–0.04	0.13	0.04	0.08	–0.02	–0.10	0.02	0.01	0.24	0.40	0.54	1.00

Correlations $\geqslant |.11|$ are significant at $p < .010$.

Table 3. OLS regression analysis results.

Variable	Family business identity (yes=1; no=0)	Knowledge diversity	Causation		
	First-stage regression	Model 1	Model 2	Model 3	Model 4 (binary 0/1)
Constant	–0.651	2.175***	2.972***	2.582***	–7.254***
Gender	0.344	–0.127	0.066	0.088	0.014
Owner education	–0.236****	0.026	0.073	0.068	0.321****
Owner age	–0.212	–0.002	–0.001	–0.001	0.201
# of family owners	0.265*	0.027	–0.015	–0.019	–0.385*
Succession intention	0.842**	0.122	0.074	0.057	–0.929****
# of generation	–0.146	–0.016	–0.069	–0.065	0.245
Firm age	0.022	0.003	–0.010**	–0.010**	–0.044*
Firm size	0.001	–0.000	–0.000	–0.000	–0.002*
Firm debt	0.172	–0.003	–0.125**	–0.125**	–0.411*
Industry	–0.548*	0.146	0.025	–0.002	0.272
Knowledge diversity				0.175**	0.906***
Structural family capital	–0.154	0.267**	0.313***	0.269***	1.085**
Non-family management	–0.099***	0.040***	0.019***	0.011	0.095
Family harmony	0.755***				
Family status	–0.572**				
Family involvement	0.565***				
Inverse Mill's ratio		–0.007	0.042	0.043	0.956
N	242	242	242	242	242
McFadden R^2	0.315				0.176
Adjusted R^2		0.094	0.175	0.205	
Log likelihood (absolute)	56.755				131.817
F-statistic		2.949***	4.932***	5.445***	

OLS: ordinary least squares. ****Significant at 0.10 level; ***significant at 0.001 level; **significant at 0.01 level; *significant at 0.05 level.

Since family structural capital was positively related to causation logics (in violation of Hypothesis 2), we included an additional test for the non-hypothesised mediating effects of knowledge diversity. In this final model, while knowledge diversity fully mediates the link between non-family management and causation logic (in support of Hypothesis 3b), its effect upon family structural capital and causation is only partial. This suggests that there are additional effects of structural family capital not captured by the mediation of knowledge diversity. Our hypothesised conceptual model and simplified results are illustrated in Figure 1.
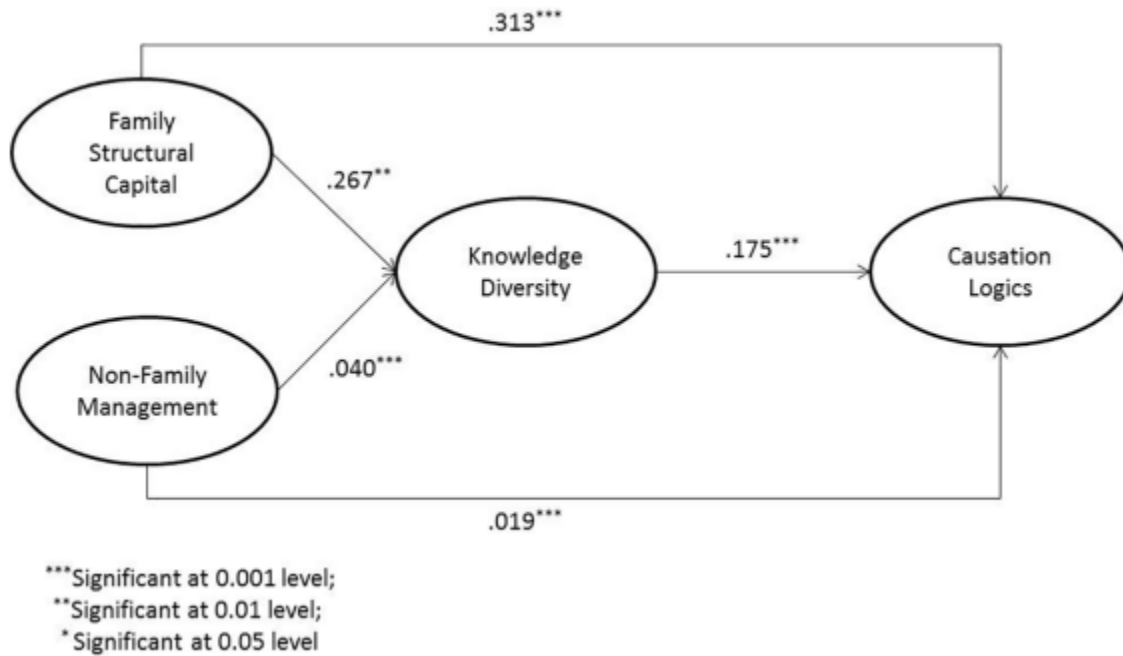

***Significant at 0.001 level;
**Significant at 0.01 level;
*Significant at 0.05 level

Figure 1. Conceptual model with empirical results.

We also use the Sobel-Goodman Test (Sobel, 1982) to verify the reliability of the mediation effects (Table 4). We observe that the mediation effect of knowledge diversity exists for non-family management ($z = 2.801$, $p < 0.01$) and family structural capital ($z = 2.549$, $p < 0.05$). Such a result is also supported by Bootstrap Estimates. We conclude that the mediation effects are supported.

Table 4. Sobel-Goodman test and bootstrapped.

	Sobel-Goodman test (knowledge diversity as the mediator)				
	Z (indirect effect)		p-value		
Non-family management	2.801		0.005		Mediation supported
Family structural capital	2.549		0.011		Mediation supported
	Bootstrapped Estimate (1000 times, knowledge diversity as the mediator)				
	Effect (indirect effect)	*SE*	Confidence interval		p-value	
Non-family management	.010	.004	.003	.018	0.006	Mediation supported
Family structural capital	.063	.026	.012	.114	0.015	Mediation supported

Robustness tests

In order to ensure the robustness of our findings, we conducted a number of post hoc tests. These tests are aimed at providing insights into the following relationships and questions to ensure the robustness of our primary analyses[2]: (1) Should causation and effectuation logics be conceptualised as dichotomous? (2) What is the relationship between causation and effectuation in our sample and can we assume their independence? (3) Are our results biased by the founder effect (Miller et al., 2007)? (4) Are our results resilient with different measures of non-family management? (5) Are our findings robust when we apply a different set of instrumental variables? and (6) Does relying on self-identified family firms impact our findings? The results of these tests are detailed below and generally yield consistent results supporting the primary tests. In the primary test, we measure causation logics as a continuous variable based on established scales. However, the literature often conceptualises causation and effectuation logics as dichotomous, which creates a partial incongruity between measurement and analysis in this case. With this in mind, we measure causation as a binary variable by considering cases with values above the mean (Table 2; $\mu = 3.98$). Then we use Logit Regression to replicate Model 3. The result (Table 5) shows no significant change from our primary result.

Table 5. OLS regression analysis results first generation only.

Variable	Knowledge diversity	Causation	
	Model 1	Model 2	Model 3
Constant	4.496***	2.910***	2.177*
Gender	–0.763****	0.034	0.153
Owner education	–0.019	0.119	0.120
Owner age	0.015	–0.079	–0.081
# of family owners	0.007	0.034	0.032
Succession intention	–0.062	0.278	0.299
# of generation	–0.340*	–0.160	–0.106
Firm age	0.014	–0.001	–0.003
Firm size	0.0001	–0.002***	–0.002***
Firm debt	–0.210	–0.096	–0.062
Industry	–0.025	0.039	0.041
Knowledge diversity			0.159****
Structural family capital	0.193	0.312**	0.287**
Non-family management	0.032**	0.014	0.008
Inverse Mill's ratio	–0.104	0.002	0.017
N	100	100	100
Adjusted R^2	0.145	0.203	0.216
F-statistic	2.297***	2.902***	2.917***

[a] Calculated by first stage model in Table 2.
**** Significant at 0.10 level; ***Significant at 0.001 level; **Significant at 0.01 level; * Significant at 0.05 level.

In addition, as discussed in the pre-tests above, the low non-significant correlation between effectuation and causation is unexpected. While it is aligned with extant research that specifically consider this relationship in family business contexts (Hayton et al., 2011), it requires further investigation. In order to better understand the relationship between these constructs in our sample, we conducted a series of post hoc validity tests. To begin, we ran a simple regression in which causation serves as the DV and effectuation serves as the independent variable (IV).

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[2] Results of the following robustness tests are available upon request.

The R^2 is 0.001 and the estimated coefficient is 0.044 ($p = 0.535$) with relatively large standard error (0.070) compared to the magnitude of the estimated coefficient. This indicates that the relationship between causation and effectuation might be associated with high variation, and cannot be simply summarised as a linear relationship. Furthermore, if causation and effectuation are indeed mutually exclusive, then their sum should have relatively low variation, because the increase in one is accompanied by a decrease in the other. However, if the relationship is complex, in some cases causation might crowd in effectuation, in other cases causation might crowd out effectuation, then the sum should have relatively high variation. We calculate the sum of causation and effectuation. The mean of the sum is 7.252 with SD of 0.88. This variable's SD is greater than the SD of causation (0.65) and the SD of effectuation (0.58), suggesting that the relationship between these constructs is non-linear.

We also test whether our results might be influenced by founder effect (Miller et al., 2007), wherein our findings may be reflective of transgenerational family firms, but not necessarily founder-led firms, or vice versa. We test this by restricting our analyses to only those respondents belonging to a first-generation firm (Table 4). Compared to the primary results, the positive relationship between family structural capital and knowledge diversity becomes non-significant. In addition, the positive relationship between non-family management and causation logics also becomes non-significant. Combined, it appears that when we restrict our analysis solely to founder-led family firms, knowledge diversity no longer mediates the relationship between family structural capital and causation logics; this is likely to result from the firm primarily relying on knowledge resources of the founder(s). In addition, the relationship between non-family management, knowledge diversity, and causation logics becomes stronger. While consistent with our hypotheses, this finding emphasises the disruptive nature of knowledge diversity in transgenerational family firms.

We adjusted our measure of non-family management to the ratio of all managers, including both family and non-family managers, instead of the simple number of managers, as used in our primary analyses. Although remaining positive, the coefficient of non-family management is significant only at the 0.10 level. Furthermore, to control for potential endogeneity concerns, we tested our effects against an alternate set of instrumental variables that have been recognised as related to our explanatory variables. The two chosen instrumental variables are social responsibility (responsible behaviour towards society without a legal imperative; 5-point scale where 5 means mostly agree), and family support (family members often assist other family members with their work; 5-point scale, where 5 means mostly agree). Regression results are largely consistent with our primary results.

Finally, we ran our analyses using only observations that self-identify as entirely family-owned firms. This limits our sample to 216 firms. Such a restriction further ensures that our sample contains only those who strongly perceive the business as the extension of the family, but may exclude those with relatively low family business identity. Again, the regression results are consistent with our primary results.

Discussion

The findings increase our understanding of the antecedents of causation logics in family firms. Specifically, we find that while knowledge diversity fully mediates the link between non-family management and causation logics, its impact on the relationship between family structural social capital and causation is only partial. More broadly, we find that both family structural social capital and non-family management are important antecedents to knowledge diversity in family firms. Extending these arguments, we find that knowledge diversity limits the influence of effectuation logics in family firms and leads to a preference for causation logics, regardless of the source of the knowledge diversity.

Contrary to our expectations, we find a direct positive link between family structural social capital and causation logics. This finding suggests that even when knowledge is acquired from within the family it supports the presence of more formal causation logics. This is an interesting finding which serves to question the nature and role of family knowledge resources in family firms. Research often applies the notion of family embeddedness uniformly across diverse family groups. However, recent research has questioned this approach by emphasising the intra-familial heterogeneity of various family systems (Bird and Zellweger, 2017). In alignment with this, our unexpected finding may illustrate an important boundary condition when assuming the presence of effectuation logics in family firms. Specifically, our findings suggest that the underlying case for the prominence of effectuation logics in family firms may not purely be the social capital of the family system, including cohesion, familiarity and trust of the family network; instead, it may be tied to the familiarity, expertise and capabilities directly diffused through the firm's founders. Our findings suggest that when diverse knowledge is misaligned with the established knowledge pool of the founder group, and even when introduced from trusted family sources, it tends to be managed in more formal ways suggestive of causation logics.

Effectuation logics may very well be common among close-knit, founder-led family management teams with significant relational embeddedness. However, as that family group expands via enhanced family structural capital, the boundary conditions of effectuation logics may become attenuated, even if decision makers are all family members. This finding responds to recent calls for understanding the limitations in assuming generalised effectuation logics when studying family firms, and emphasises the importance of studying causation and effectuation logics as independent, not antithetical, constructs (Dalpiaz et al., 2014; Steier et al., 2015). Our finding that knowledge diversity, regardless of family or non-family sources, results in an increased reliance on causation logics suggests that the dominant familial strategies espoused in family business scholarship may be a phenomenon restricted to a relatively narrow subset of family firms. Specifically, those utilising concentrated knowledge resources are likely to be tied to tacit founder knowledge. The implications are clear: there are risks in assuming the dominance of familial logics solely from the family ties of firm owners. It also implies that family business research should attach more significance to family heterogeneity measures and family diversity in studies of family firm strategy.

Contributions of the research

Our research makes several contributions to the literature. First, drawing from both primary and post hoc analyses, we suggest that while effectuation logics are characteristic of family firms,

they do not appear inhibited, or otherwise hindered, by the presence of causation logics that may be equally instrumental to reaching firm outcomes.

Second, while family firms may benefit from leveraging their alignment with effectuation logics, this does not diminish the significant role that causation logics play in their ongoing development and innovation as they coordinate diverse knowledge resources. Our study illustrates the importance of understanding the sources of knowledge diversity and the necessity of adaptive logics for firms seeking to competitively benefit from their knowledge diversity.

Third, our findings contribute to the understanding of knowledge capital and management in family firms by suggesting that knowledge diversity itself increases the utility of causation logics, even if those knowledge resources are retained within the extended family group. This suggests that the extent to which family firms differ in strategically leveraging diverse knowledge resources, either intra-familial or extra-familial, (De Massis et al., 2014) may be limited in cases of more established family firms governed by multiple generations of family members.

Fourth, we provide empirical evidence that family structural social capital has a significant impact on the knowledge resources and strategic logics used in family firms. We contribute to current applications of social capital theory in family firms by introducing family structural social capital as an antecedent to knowledge diversity and to the use of causation logics in family firms. This occurs as the result of two effects. The first relates to family structural social capital enriching knowledge diversity of the firm, which ultimately indicates the importance of causation logics. The second refers to family structural social capital being able to nurture causation logics that can improve firm competitiveness. The impact of family structural capital on knowledge diversity and causation logics accentuate the importance of family-related resources and capabilities. These may be critical components in achieving innovativeness without the need for acquiring external knowledge resources from non-family sources. Investigating this relationship is not only relevant for the ongoing debate on family firm innovativeness, but also on the transgenerational sustainability of family firms.

Implications for future research

Future research should focus on studying the avenues that are available to family firms as they retain the utility of effectuation processes even when knowledge diversity increases. The capacity for family firms to rely on effectuation logics is notable in the literature and an oft cited source of enhanced strategic capabilities relative to non-family owned competitors. Our findings suggest that there are significant barriers to this approach since family firms leverage knowledge from increasingly diverse sources. Hence, prioritising routes to retain the capacity of effectuation logics in family firms may present a significant opportunity for family firms seeking to coordinate a growth orientation without sacrificing the distinctiveness of family governance.

Practical implications

In addition to the implications for the ongoing study of family business strategy, our findings also have practical implications for understanding the management of family firms. They show

the importance of family structural social capital and knowledge diversity that are obtained from both family and non-family sources, which can aid the formalisation of causation logics. In some family firms, the founder has great discretion and freedom to apply effectuation logics because the firm mainly relies upon that individual's knowledge capital. Conversely, when knowledge is obtained from family structural capital, this increases the competencies employed and the firm may be able to predict future market conditions, control uncertainties, and aim competitive strategies through causation logics. This presents an important framing of the role of family founders and the complexity involved in replicating founder influence, even in firms that retain complete family control. Drawing on findings in our post hoc robustness tests, we find that when restricting our sample to only founder-led firms, the extent of knowledge diversity – regardless of source – fall significantly. These findings suggest limitations in knowledge-seeking capabilities and barriers to knowledge diversity in founder-led firms. This may have a number of implications for understanding the resilience of innovative strategies of family firms. These may not be purely informed by competitive and performance outcomes, but may be contingent on the relational embeddedness and knowledge diversity of firm owners.

Limitations

While we endeavour to ensure the validity of our arguments and robustness of our analysis, we recognise some limitations. First, since our data were collected from firms in Turkey, it is important to recognise the organisational context of our study. Research has highlighted the importance of context in studies (Johns, 2006), and it is possible that the country setting can influence the strength of the observed relationships and thus their generalisability. Although country differences are assumed to exist, it has been argued that due to increased globalisation, operational logics of established firms are becoming similar across countries (Carney, 2005). Family firms, in particular tend to possess similar operating behaviour and strategic idiosyncrasies across geographic contexts (Carr, 2005). Thus, we do not believe that the geographical context significantly affects the generalisability of our findings; however, we encourage future studies that replicate and extend our model in other countries, as well as utilise a multi-country design.

Second, our data is cross-sectional and common method bias could be a concern (Podsakoff and Organ, 1986). However, our robustness analyses diminish these concerns and provide evidence that common method variance does not bias our results. Third, the data are self-reported and therefore may have a subjective bias. While we encourage future research to utilise more objective data, these objective measures may not be available for private firms. Prior research also has shown that self-reported and actual measures are highly correlated (Dess and Beard, 1984). Fourth, our study utilised principal managers of firms as respondents; in SMEs, these individuals are usually, but not necessarily, the owner. Our focus on the principal managers of firms as key respondents seems representative for the respective organisations (Eddleston et al., 2007). However, since principal managers are likely to belong to the owning family, future research that pairs responses from both family and non-family managers is likely to generate greater insight into knowledge diversity and causation logics in family firms.

Fifth, the low and non-significant correlations linking causation and effectuation logics in our sample runs counter to previous studies (Chandler et al., 2011). While we applied a series of post

hoc validity and robustness tests to ensure the integrity of our findings, this relationship is still surprising and requires further consideration. It is likely in our context that there co-exists multiple positive and negative corollary relationships linking these constructs, leading to the non-significant correlation in our findings. It is possible that the context of our study (family-owned SMEs) might result in 'crowd-in' effects in our sample. While other studies exploring effectuation and causation processes in family business contexts have similarly found inconsistent correlations (Hayton et al., 2011), it is clear that the nature of this relationship is non-obvious and requires further research.

Conclusion

This article contributes to the understanding of both knowledge diversity and operating logics in family firms. Our analysis suggests that while effectuation logics dominate across family firms in general, only those firms with relatively uniform knowledge pools are likely to be successful relying solely on effectuation logics. This represents a significant boundary condition underlying extant research on knowledge management and family firms. Hence, knowledge diversity must be a primary consideration underlying family firm operations. As knowledge diversity increases, regardless of sources being intra-family or not, causation logics are increasingly important, and potentially necessary, to effectively manage expansive and diverse knowledge pools. We argue that these firms tend to favour a more instrumental view of their family structure, leveraging effectuation capabilities across familial logics, but necessitating more directed causation logics when knowledge and capabilities held outside of founding owners are required. This may have particular implications for family firms during times of succession or equity dilution, which would benefit from understanding the extent to which key operating logics and organisational knowledge are concentrated within the family group.

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