Variance in Family Members' Assessments: The Importance of Dispersion Modeling in Family Firm Research

Daniel T. Holt[1], Kristen Madison[1], and Franz W. Kellermanns[2,3]

Abstract

The extent to which assessments are shared across family members and generations has been questioned, suggesting that the variability in the family members' perceptions may convey important family-level information. With this in mind, we theoretically and methodologically introduce dispersion modeling which is designed to use this variance as an important explanatory variable, presenting a framework that can guide scholars in its application. Using field data to apply the framework, we illustrate how this modeling approach helps us understand the dynamic interactions within family firms, and then we offer future research ideas that are best suited to dispersion composition modeling.

Often, family business research relies on the firm's leader as a key informant and considers him or her to be a reliable, unbiased source of information regarding the firm and the family's perceptions and assessments (e.g., Eddleston, Kellermanns, & Zellweger, 2012). Researchers have questioned this practice, arguing that the unbiased assessment of many family-level issues within a family firm environment cannot be done with a single informant (Chrisman, Sharma, & Taggar, 2007). Recent family firm research has instead started using multiple informants (e.g., Eddleston et al., 2012; Eddleston & Kellermanns, 2007) and a shared composition model approach (Chan, 1998), in which family-level measures are created by averaging individual members' assessments. To build these shared composition models, computations of within-group agreement (e.g., r_{wg}; James, Demaree, & Wolf, 1984) are used to determine whether the creation of aggregate scores from individual-level data is justifiable (Cole, Bedeian, Hirschfeld, & Vogel, 2011), and when this is done, unexplained variance is regarded as noise or measurement error (Kozlowski & Klein, 2000).

This approach of justifying aggregation through a test of interrater agreement and then testing the hypothesized

relationships between the higher level constructs is a common practice (Cole, Bedeian, Hirschfeld, et al., 2011). In family firms, however, the extent to which assessments are shared across family members and generations has been questioned (e.g., Chandler, 2015). Kotlar and De Massis (2013), for instance, qualitatively demonstrated that individual family members do not necessarily perceive constructs, such as goals, in a relatively uniform manner. In doing so, they implicitly suggested that unpacking the unexplained variance among family members' assessments may convey relevant family-level information rather than simply reflecting error variance. Put differently, family business scholars might gain meaningful insights by distinguishing between the

[1]Mississippi State University, Mississippi State, MS, USA
[2]University of North Carolina at Charlotte, Charlotte, NC, USA
[3]WHU–Otto Beisheim School of Management, Vallendar, Germany

Corresponding Author:
Daniel T. Holt, Department of Management & Information Systems, Mississippi State University, P.O. Box 9581, Mississippi State, MS 39762, USA.
Email: daniel.holt@msstate.edu

shared assessments (i.e., the mean level or magnitude of the family members' assessments) and the differences in family members' assessments (i.e., the variance among the family members' assessments). Thus, just as the magnitude of the family's assessments has been linked to meaningful outcomes (e.g., Cabrera-Suarez, Deniz-Deniz, & Martin-Santana, 2015; Eddleston et al., 2012), similar assessments (i.e., little variance) among family members would likely result in meaningful outcomes whereas dissimilar assessments (i.e., considerable variance) would likely lead to frustrations and conflicts among family members that would need to be managed successfully if each family member's and the firm's objectives are to be simultaneously achieved.

Exploring this possibility in other areas, leadership researchers consider what are termed *dispersion composition models*, rather than shared composition models (e.g., Cole, Bedeian, & Bruch, 2011; Feinberg, Ostroff, & Burke, 2005). Using a dispersion composition model, within-group variance (or, in the case of the family firm, the extent to which there is similar or dissimilar assessments among family members) is treated as a meaningful, higher level construct rather than a statistical prerequisite for aggregation (Chan, 1998; James et al., 1984; Kozlowski & Klein, 2000). Within the leadership domain, the extent to which individuals agree about the quality of their managers' leadership behavior has been termed *leadership consensus* (Cole, Bedeian, & Bruch, 2011), while the general management literature often refers to strategic consensus (Kellermanns, Walter, Lechner, & Floyd, 2005). Consensus would be high when the individuals' perceptions of a leader's behavior are homogenous. Conversely, dissimilarity (or low consensus) would be high when individuals' perceptions of a leader's behavior are heterogeneous. In either instance, the degree of (dis)similarity is, by definition, a group-level measure of the amount of variability in the members' perceptions of the quality of their managers' leadership behavior and conveys important information about the group and leadership. Feinberg et al. (2005), for instance, concluded that in environments where there was a consensus among individuals regarding their leaders' behaviors, interpersonal rivalries were less likely and performance improved. Conversely, in situations where individual followers failed to achieve a consensus, leaders were perceived to have idiosyncratic follower relationships and their actions produced friction and tension, having counterproductive effects.

In line with this reasoning and the findings from family business scholars (e.g., Cramton, 1993; Kotlar & De Massis, 2013), we suggest that the variability in the family members' perceptions conveys important family-level information that should be considered in family business research (e.g., Evert, Martin, McCleod, & Payne, 2016; Labaki, Michael-Tsabari, & Zachary, 2013). As such, the purpose of our research is threefold. First, we theoretically and methodologically introduce dispersion composition models to family firm research, presenting a sequential framework that can guide family business scholars in the application of dispersion composition models. Second, we illustrate the framework with an example that incorporates field data to show how the variance in family members' perceptions about family-level phenomena may be an important explanatory variable to understand the dynamic interactions within family firms (Chrisman, Sharma, Steier, & Chua, 2013; Kotlar & De Massis, 2013). Third, we suggest future research ideas using key constructs including family goals, family harmony, succession attitudes, and family climate that would be ideally suited for dispersion composition modeling. By fulfilling these objectives, we present a straightforward resource such that the relevant theoretical, measurement, design, and analytical considerations are addressed as family business scholars begin to examine within-family variation through the application of dispersion composition modeling.

Family-Level Assessments and Composition Models

Many constructs measured by family business researchers are intended to represent the collective assessments of family members, having theoretical foundations in the affect, behavior, and characteristics of individual family members, which through social interactions and exchanges have emergent properties at a higher level, the family. Berrone, Cruz, and Gómez-Mejía (2012), for example, introduced the construct of the family's identification with the firm which captures the collective meaning and belonging the family has toward the firm and would be expected to differ insofar as the individual family members' sense of meaning and belonging differs.

Accordingly, much of the family business scholarship focuses on understanding the family's shared perceptions or assessments. The understanding we have of the family's shared perceptions or assessments is often gained

through a single, key informant (i.e., family firm leader; e.g., Wu, 2008; Zellweger, Kellermanns, Chrisman, & Chua, 2012) or through aggregation, using shared composition constructs (e.g., Cabrera-Suarez et al., 2015). Often, key informants have been chosen to communicate their thoughts about key family firm issues such as identification of family members with the firm (Berrone et al., 2012). Relying on key informants has been justified because they are influential and are considered knowledgeable about the family and the firm (e.g., Wu, 2008; Zellweger et al., 2012). Indeed, Seidler (1974, p. 817) argues that key informants are appropriate when researchers are generalizing about "observed (actual) or expected (prescribed)" facets of their organizations.

Nonetheless, key informants' responses should not be interpreted as a meaningful representation of the entire family when family members' personal feelings, opinions, and behaviors of the group are being examined (Kumar, Stern, & Anderson, 1993; Seidler, 1974). In these situations, relying on a single, key informant has significant drawbacks, with the informant's responses affected by potential bias and random error (Chrisman et al., 2007; Cramton, 1993; Kumar et al., 1993). Bias, for instance, can result from differences related to the informant's organizational role. When the views of founders, for instance, are used to gauge the family's assessments, researchers must acknowledge that the founder's thoughts may systematically vary from those of second-generation family members because of his or her differing organizational role and perceptions regarding the family and the family firm (e.g., Cramton, 1993). Other idiosyncratic sources of error have also been linked to systematic biases in key informants' reports. Key informants have been found to suffer from memory failure, inaccurate recall, and memory distortion, all of which can result from hindsight bias, attributional bias, or attempts to manage others' impressions (Golden, 1992; Kumar et al., 1993; Nutt, 1986; Salancik & Meindl, 1984).

Based on the shortcomings of key informants, several researchers within and beyond the family business literature have advocated querying multiple informants to increase the reliability and validity of higher level constructs (e.g., Chrisman et al., 2007; Golden, 1992; Seidler, 1974). In such situations, Chan (1998) proposed a typology of basic composition models to specify the functional relationship between phenomena at different levels of analysis. The level of agreement or homogeneity across individual group members' perceptions is a central consideration in Chan's *shared composition* (either in the form of direct consensus or referent-shift consensus models) and *dispersion composition* models.

Shared composition models are based on variables that originate in individuals and develop through group members' social interactions (Klein & Kozlowski, 2000; Morgeson & Hofmann, 1999), representing the dominant approach to explain group-level phenomena in family firms and other areas of study (e.g., Eddleston et al., 2012; Klein & Kozlowski, 2000). Methodologically, shared composition models take two general forms, namely, direct consensus or referent-shift consensus models. In both, group-level scores are operationalized by averaging the individual members' perceptions (Chan, 1998). For direct consensus models, researchers would ask family members to share their individual perceptions with regard to a construct such as individual identification with the family firm (e.g., "I have a strong sense of belonging to the family business;" adapted from Berrone et al., 2012) where the family-level variable is represented by the average of the individual members' assessments.

Referent-shift consensus models, in contrast, ask individuals to respond to survey items in reference to a higher level unit (Chan, 1998). Researchers interested in identification with the family firm might ask individual family members, as Berrone et al. (2012) propose, whether the family members collectively identify with the firm (e.g., "Family members have a strong sense of belonging to the family business;" Berrone et al., 2012). That is, rather than asking family members about their individual assessments, referent-consensus models incorporate a different referent (i.e., the family as a whole), which creates a theoretically distinct, higher level form (e.g., family identification) of a lower level construct (e.g., individual identification). These subtle shifts in item wording have led to meaningful empirical differences where the use of a group referent in items (i.e., "we") vis-à-vis the use of an individual referent (i.e., "I") resulted in greater within-group agreement and more between-group variability (Klein, Conn, Smith, & Sorra, 2001).

In both cases, testing whether the data fit the proposed level of analysis involves determining whether there is sufficient consensus among the individual-level measures to justify aggregation of individual responses to create a group-level construct. For this purpose, agreement indices are computed and compared with

threshold values. In this regard, researchers using shared composition constructs must take a dichotomous perspective. That is, they hold that a construct cannot be said to exist at a unit level without high within-unit agreement. Specifically, Klein et al. (2001) noted that "in the absence of substantial within-unit agreement, a unit-level construct is untenable, moot" (p. 4). Following this approach, Eddleston et al. (2012) examined the interactions between a family firm's stewardship culture, corporate entrepreneurship, and family-to-firm unity—all group-level phenomena. In doing so, they relied on a shared composition model, as their data permitted, to measure each of the constructs at the family level (Chan, 1998). Consistent with this method, family-level measures were created by averaging individual members' assessments of the firm's stewardship culture, corporate entrepreneurship, and family-to-firm unity, demonstrating that a stewardship culture differentiates entrepreneurial family firms from others.

When testing the relationships among shared composition constructs, whether relying on direct consensus or referent-shift consensus models, family firm research tends to focus on the absolute level (arithmetic mean) of the family's collective values, beliefs, and attitudes (e.g., Cabrera-Suarez et al., 2015; Eddleston et al., 2012). While providing important insights, this approach has shortcomings. First, as noted, when using shared composition constructs, researchers must take a dichotomous perspective, meaning that a family-level construct cannot exist without high, within-family agreement. Second, the focus on the agreement among individual members neglects the possibility that meaningful differences in outcomes might result when the variance in the family members' perceptions is considered (Kotlar & De Massis, 2013). Hence, our extant methods have neglected the possibility that the effectiveness of the family firm may depend, at least in part, on the extent to which there is agreement among family members.

Dispersion Composition Modeling Process

Dispersion composition models, in contrast, conceptualize within-group variance as a focal construct of theoretical importance rather than a statistical prerequisite for aggregation (Chan, 1998). Examining dispersion composition models in family firms is grounded in a number of theoretical perspectives, such as Arregle, Hitt, Sirmon, and Very's (2007) model of family social capital and the theories of parental altruism (Lubatkin, Durand, & Ling, 2007). Taken together, these paradigms indicate that family members are socialized to act in similar ways and come to share similar interpretations with others in the family. These models, however, acknowledge that there are individual differences in beliefs, values, and attitudes. Arregle et al. (2007), for instance, suggest that children receive their primary socialization from their family during childhood, gaining an understanding of values, behavioral norms, and cognitive schemes which can result in family social capital. At the same time, however, the family socialization process does not necessarily result in unified assessments among all family members but, instead, a diverse set of assessments likely emerge through the repeated interactions family members have with one another over time (Lubatkin et al., 2007). Hence, the individual differences that exist within the family are likely to influence the family's collective assessments and might be systematically altered with family stability and strong socialization processes.

While there is a rich literature that reviews multilevel analysis (e.g., Cole, Bedeian, Hirschfeld, et al., 2011; Klein & Kozlowski, 2000; McKenny, Payne, Zachary, & Short, 2014), our goal is to distill the extant recommendations and the vast array of resources into a concise and straightforward guide that can aid family business scholars. With this in mind, Table 1 presents a framework to guide family business researchers as they consider dispersion composition modeling. Four basic considerations are highlighted: (a) theoretical considerations, (b) design and measurement considerations, (c) analytical considerations, and (d) reporting considerations.

Theoretical Considerations

Mathieu and Chen (2011) argue that researchers should "devote far more attention to the identification of focal units of analysis" (p. 624) because unit designation "becomes the hinge variable for the estimation of within-group agreement or variance, as well as the focal point for estimating interrater reliability and between-group variance" (p. 622). For family business scholars, this presents an interesting challenge. On one hand, specifying the focal unit of analysis may be straightforward because the family is often the focal unit. On the other hand, neither social scientists nor family business scholars have clearly defined who exactly makes up that focal group (Michael-Tsabari, Labaki, & Zachary, 2014).

Table 1. Framework to Guide Researchers in the Application of Dispersion Composition Modeling.

Dispersion modeling steps	Description	Key citations for reference
1. Theoretical considerations	Present an appropriate theory as to whether the study variables capture a shared characteristic or characteristics that arise within individuals who are embedded within the family where assessments are likely to vary, making dispersion modeling appropriate.	Chan (1998); Klein and Kozlowski (2000); Morgeson and Hofmann (1999)
2. Design and measurement considerations	Sample at least two family members nested within at least 50 family firms.	Chan (1998); Chen, Mathieu, and Bliese (2003); Klein and Kozlowski (2000); Maas and Hox (2005)
	Align the measurement instrument's frame of reference to ensure that the level of analysis is properly represented in the items, using a referent-shift framing whereby the reference used by family members is "shifted" from themselves to the family.	
3. Analytical considerations	Determine how the dispersion will be calculated, considering the standard deviation as a first-choice measure of dispersion (see the appendix for a step-by-step guide in conducting the analysis).	Lindell and Brandt (2000); Roberson, Sturman, and Simons (2007); Harrison and Klein (2007)
4. Reporting considerations	Provide transparent and articulate descriptions of measures and analytics, balancing the need to be succinct with sufficient explanations of this innovative approach.	Evert, Martin, McCleod, and Payne (2016); Crook, Shook, Morris, and Madden (2010)

Family business scholars, therefore, must specify which family members represent the focal unit.

After the focal unit of analysis is specified, theoretical attention should be given to whether (dis)similar perceptions within the family might influence the study constructs. Constructs (or mental configurations of a concept that require the development of observable indicators; Pearson, Holt, & Carr, 2014) that are suitable for dispersion composition modeling, like those that reflect other shared properties, capture the pattern of a collective's perceptions and assessments. Unlike other shared properties, however, these variables would not be assumed to converge with any individual's perceptions easily differing from others' perceptions. Perceptions of family harmony would be one such example where each family member may have dramatically different perceptions. In these cases, dispersion composition models would be appropriate.

We argue that the dispersion of family members' ratings is important for several reasons. As noted, the use of the mean overlooks potential discord among family members which may significantly influence outcomes. A measure of satisfaction with the family's succession process between a family business owner and his or her potential successor (Sharma, Chrisman, & Chua, 2003),

for example, with a mean rating of 3.0 when response options range from 1 to 5 could indicate (a) perfect consensus (e.g., with both responses at the midpoint of the response scale) or (b) polarized perceptions (e.g., with responses at the highest and lowest response categories). Yet the extant method of aggregation which can only be done when it has been verified that individuals' perceptions are similar enough to justify aggregation would reject the case of polarized perceptions. Thus, the true distribution of the family members' responses are overlooked and key families are excluded from a sample that limits the examination of relationships using only a shared composition approach (e.g., Harrison & Klein, 2007; James et al., 1984).

Design and Measurement Considerations

Several design and measurement issues must be dealt with as dispersion modeling studies are designed. Foremost, sampling becomes a labor-intensive challenge as it is not enough to sample many members within a single family firm or a single family member from many family firms. That is, multiple family members who are nested within multiple family firms must be sampled. Family firms vary considerably on the

number of family members involved in the ownership and management of the business. And, it would be reasonable to expect these numbers to be relatively small. With this in mind, there is no hard rule on what would represent a reasonable number of family members within a single family firm that should be queried. There are, however, accepted guidelines regarding what represents a reasonable number of firms. Simulation work has indicated that there are ideal numbers of family firms that should be considered with statistical estimates becoming unacceptably biased when fewer than 50 groups are analyzed but considerable confidence in the results grows as the number of groups approaches and exceeds 100 (Maas & Hox, 2005).

As the level of analysis, modeling method, and sample size are considered, the referent used by individuals within a scale that measures a particular construct should be considered as well. Chen, Mathieu, and Bliese (2003) argued that referent-shift models are the most appropriate method to measure and explore constructs that require shared perceptions such as goals and values. As noted, many family-level phenomena emerge from individual family member's cognitions, affect, and behaviors, through social interactions and exchanges (McKenny et al., 2014; Yu, Lumpkin, Sorenson, & Brigham, 2012). For this reason, many of these constructs represent the collective perceptions family members have regarding their entire family. It would be appropriate, therefore, to measure these using a referent-shift composition model whereby the reference used by family members is "shifted" from themselves to the family. Assessing an individuals' personal experiences along with experiences with the family in a single measure, as done by Venter, Boshoff, and Maas (2005) as they assessed satisfaction with the succession process,[1] may not adequately measure the shared nature of families, potentially missing the emergent aspects of the family-level construct and, in some cases, may in fact measure an entirely different construct (Lindell & Brandt, 2000).

Analytical Considerations

The primary analytical consideration is determining the appropriate index to represent the family's dispersion. A number of indices are available to researchers as they consider the dispersion of family members' perceptions (e.g., r_{wg}, coefficient of variation, standard deviation). Lindell and Brandt (2000) suggested that an estimate of interrater agreement like the r_{wg} or the $r_{wg(j)}$ indices of

interrater reliability which are indicators of higher level variables (James et al., 1984; LeBreton, James, & Lindell, 2005) could also serve as dispersion indices. Others have relied on diversity indexes such as the coefficient of variation, which corrects for the correlated nature of measures of central tendency and measures of variability, to indicate dispersion (e.g., Bedeian & Mossholder, 2000). Finally, standard deviation or an average deviation index has been used as a representation of a measure of group-level dispersion (Lindell & Brandt, 2000).

Using simulation data, Roberson, Sturman, and Simons (2007) considered how several different dispersion indices (e.g., r_{wg}, coefficient of variation, and standard deviation) influenced findings. Despite some similarities, there were notable differences. In particular, r_{wg} did not detect subtle relationships like interactions as well as the standard deviation. In addition, the coefficient of variation performed poorly as a measure of dispersion. In sum, they concluded that the standard deviation is one of the most effective indices for assessing within-group dispersion. Furthermore, Sin and Newman (2005), through a similar simulation, demonstrated that a measure of dispersion based on standard deviation was best when it was calculated based on the variance associated with group members' construct score rather than the mean of the variation for each item associated with a construct. Collectively, this suggests that the standard deviation—which should be calculated based on the variance associated with group members' construct score—would be an exemplary practice when computing dispersion among family members' perceptions (e.g., Cole, Bedeian, Hirschfeld, et al., 2011; Harrison & Klein, 2007; LeBreton & Senter, 2008; Roberson et al., 2007; Sin & Newman, 2005). Indeed, Kellermanns et al. (2005) suggests the use of standard deviation scores when similarity of view is the focus of research.

Furthermore, multicollinearity or the correlation between potential study variables warrants special attention as dispersion models are applied. Specifically, it has been shown that a mean-based aggregate score and variance-based aggregate score of the same group-level construct are not statistically independent (Lindell & Brandt, 2000). The inherent multicollinearity within the mean-based and variance-based aggregate scores can lead to biases in standard errors of estimated mean scores if they were used in the same model. Accordingly, researchers interested in linear relationships, as tested

through ordinary least squares regression models, should examine the interdependence between the mean-based and variance-based aggregate scores (Lindell & Brandt, 2000) and consider whether it is appropriate to include them in the same model.

Reporting Considerations

In a review of the methods used by family business scholars, Evert et al. (2016) lamented that "language ambiguity was a problematic issue with the reporting of statistical techniques" (p. 14), making it difficult to understand the exact analyses and procedures researchers used in conducting studies. Thus, basic reporting recommendations like the presentation of a covariance matrix should be followed.[2] Given that multilevel analysis and dispersion modeling, in particular, is relatively new to the family business research (Evert et al., 2016; McKenny et al., 2014), researchers must balance the goal of being clear, theoretically persuasive, and succinct with the need to educate editors, reviewers, and readers to the methods. That is, variation, as a meaningful construct that should be considered by family business researchers, is an idea that will likely warrant some discussion.

In summary, we provided arguments suggesting that the variance in family members' assessments conveys important information that has thus far been neglected. We then introduced dispersion composition modeling as an approach to test the extent to which this variance may help understand the nuances of the family firm. We provided a resource guide of theoretical, measurement and design, analytical, and reporting considerations to aid family business scholars in pursuing this approach. In the next section, we follow our own guidelines and offer an illustration to show how and why dispersion composition modeling should be used to provide new insights into family firm dynamics.

Illustrative Example

Chrisman et al. (2013) note that we lack "an understanding of how members of the family firm's dominant coalition negotiate among themselves and with other stakeholders to establish a consensus on the goals that will guide organizational decision making" (p. 1250). With this in mind, we offer an illustrative example that demonstrates how insights can be drawn when dispersion composition models are used. The research question guiding this empirical illustration is, "What is the relationship between perceived decision quality and family firm performance?" We will address this question by analyzing a single respondent model, a shared composition model, and a dispersion composition model. Results illustrate that single, shared, and dispersed assessments have different effects on performance, and that the approach used affects the insights and inferences that may be made about the relationships and the family firm.

Theoretical Considerations

Perceived decision quality refers to the extent to which decisions contribute to the achievement of organizational goals (Mustakallio, Autio, & Zahra, 2002). Theoretically and practically, it would be important to conceptualize perceived decision quality in terms of its variability because agreement about decision quality, as a family-level construct, implies homogeneity with regard to family members' shared assessments as it relates to the firm's vision (Mustakallio et al., 2002). From a social capital perspective, agreement, or little variation, would likely indicate a well-functioning family, characterized by a positive social environment, lesser opportunism, and the free sharing of information. In contrast, a lack of agreement implies negative performance outcomes as family members lack shared priorities and the ability to implement decisions as well as having the need to expend time and energy to manage conflict (e.g., Kellermanns, Walter, Floyd, Lechner, & Shaw, 2011). Thus, by examining the variation in perceptions of family members who are involved with the operations and management of the firm, we gain the understanding Chrisman et al. (2013) have called for, offering more direct insights into the family members' internal interactions that can only be inferred from other methods. Moreover, we respond to Evert et al.'s (2016) call for novel ways to examine strategic decision-making processes in family firms while applying the innovative multilevel techniques such as dispersion modeling that they also call for.

Design and Measurement Considerations

Sample. Data were collected as part of a larger study of U.S. family firms. The sample included 103 dyads, each of which had responses from the family firm's leader and another family member working in the firm.[3] The sample included firms across a variety of industries (i.e., retail,

services, manufacturing, construction, agriculture), and on average, these firms were in business for 35 years and employed 4 family members and 59 nonfamily members.

Measures. Perceived decision quality, measured with a three-item scale (Mustakallio et al., 2002), assessed the perception that strategic decisions (a) help the company achieve its objectives, (b) are consistent with the family firm's vision, and (c) contribute to the overall effectiveness of the company. Responses were made on a 7-point scale, with higher scores representing a higher level of agreement with the item. We captured the perceived decision quality from the leader and a family member working in the family firm. The scale reliability for the leader and family member responses were $\alpha = .93$ and $\alpha = .96$, respectively. As recommended for shared and dispersion composition modeling, the items were framed using a higher level referent, meaning leaders and family members responded to each item in reference to the family firm rather than capturing their individual-level perceptions of decision quality (Chen et al., 2003). We created two additional measures of decision quality, namely, shared decision quality (calculated with the mean of leader and family member decision quality), and the variance in decision quality (calculated with the standard deviation of leader and family member decision quality).

Firm performance was measured with an eight-item scale that captured the leader's assessment of overall firm performance and performance relative to competitors ($\alpha = .93$; e.g., Eddleston & Kellermanns, 2007). Responses were made on a 7-point scale, with higher scores representing higher levels of performance. The family firm leader's assessment was captured for several reasons. First, leaders are considered the most suitable and knowledgeable informants about their own firms' performance (Kumar et al., 1993). Second, perhaps as importantly, subjective assessments have been shown to be reasonable measures of firm performance and correlate highly with objective measures (Ling & Kellermanns, 2010). In sum, performance of the family firm was captured from the leader because of his or her unique perspective (Seidler, 1974) and the fact that these reports resemble objective data (Dess & Robinson, 1984; Richard, Devinney, Yip, & Johnson, 2009), making it ill-suited for shared or composition modeling.

In addition, we controlled for variation in performance that can be attributed to the firm's age, industry, and size. Age was measured by the number of years the

family firm has been in business, industry was measured by a dummy variable (1 = *retail or services*, 0 = *all other industries*), and size was measured by the number of employees.

Analytical Considerations

We analyzed the relationship between decision quality and family firm performance using ordinary least squares hierarchical regression. In Model 1, the control variables were regressed on family firm performance. Model 2 tested the single respondent model which was based on data collected from each firm's leader. Model 3 tested the shared composition model, using data collected from the leader as well as a family member. Prior to testing this regression model, we conducted preliminary tests of the data to ensure that aggregation was appropriate (see the appendix for a step-by step guide in conducting the analysis). To do this, we first calculated r_{wg}, or the level of within-group interrater agreement (Chan, 1998; James et al., 1984) between the leader and family members' responses. Aggregation from the individual level to the firm level is justified when the variability within the group is smaller than the variability expected by chance, represented by an r_{wg} of greater than .70 (Klein & Kozlowski, 2000). Decision quality had an acceptable r_{wg} of .87. Finally, Model 4 tested the dispersion composition model, using data collected from the leader and a family member. Although dispersion can be calculated in many ways, as we have noted, we followed Roberson et al. (2007) and others who have recommended the standard deviation as one of the most effective measures of within-group dispersion (Cole, Bedeian, Hirschfeld, et al., 2011; Harrison & Klein, 2007).

Reporting Considerations

Descriptive statistics and bivariate correlations between the variables in our study are provided in Table 2. While reporting these relationships is necessary to adhere to accepted reporting practices (Crook, Shook, Morris, & Madden, 2010), these results offer two critical insights into our understanding of dispersion modeling. First, despite the high r_{wg} (.87), the leaders' perceptions of decision quality ($M = 5.62$; $SD = 1.23$) were significantly lower ($p < .05$) than the family members' perceptions of decision quality ($M = 6.26$; $SD = 0.93$). This suggests that aggregating the individual-level responses into a group score using the mean only may overlook some

Table 2. Descriptive Statistics and Bivariate Correlations.

		Mean	Standard deviation	1	2	3	4	5	6
1	Firm age	35.21	30.18						
2	Industry	0.54	0.50	−.04					
3	Firm size	62.62	167.08	.25*	.10				
4	Leader's perceived decision quality	5.62	1.23	−.14	.08	.16			
5	Family member's perceived decision quality	6.26	0.93	−.10	.07	.00	.32***		
6	Shared decision quality	5.94	0.88	−.15	.09	.11	.87***	.75***	
7	Variance in decision quality	0.72	0.72	.02	−.10	−.11	−.80***	−.08	−.60***

Note. n = 103 leaders and 103 family members.
*p < .05. **p < .01. ***p < .001.

Table 3. Decision Quality Regressed on Firm Performance.

	Control model	Single respondent model	Shared composition model	Dispersion composition model
	Model 1	Model 2	Model 3	Model 4
Controls				
Age	−.22*	−.12	−.13	−.20*
Industry	.03	.00	.00	.00
Size	.16	.06	.09	.12
Main effect				
Decision quality		.49***		
Shared decision quality			.48***	
Variance in decision quality				−.35***
Adjusted R^2	.029	.248	.242	.142
ΔAdjusted R^2	—	.219	.213	.113

Note. Standardized beta coefficients are presented. The dependent variable is firm performance. The single respondent model is based on data collected from each firm's leader; the shared composition model is based on the data collected from the leader as well as a family member with decision quality represented as the mean of their responses; the dispersion composition model is based on data collected from the leader as well as a family member with decision quality represented as the standard deviation of their responses. n = 103 leaders and 103 family members.
*p < .05. **p < .01. ***p < .001.

meaningful information, potentially oversimplifying our understanding of how perceptions of decision quality influence performance. Second, on examining the relationship between the shared assessments of perceived decision quality and dispersion of those assessments ($r = −.60; p < .001$), we concluded that these correlated variables should not be included in the same model.

The results of our illustrative example are presented in Table 3. As shown, the absolute level of decision quality (arithmetic mean), as measured by the leader and the family member, was positively associated with firm performance. Specifically, Model 2 shows that the leader's

perceived decision quality was significantly related to performance (standardized $\beta = .49, p < .001$). Similarly, as a family member's perception was considered, developing a shared composition model (Model 3), decision quality was significantly associated with performance (standardized $\beta = .48, p < .001$). The consistency of these findings was expected given the leader's assessments were incorporated into the shared composition model and the magnitude of r_{wg}; moreover, these aligned with previous findings regarding decision quality (e.g., Eddleston et al., 2012). When the variation between the leader and family member's perceived decision quality

was tested in Model 4 (i.e., dispersion composition model), results show a significant negative relationship between varied assessments and firm performance (standardized $\beta = -.35$, $p < .001$). This demonstrates that the firm was more likely to report higher levels of performance when decision quality perceptions were similar than when perceptions were dissimilar. It also appeared that the groups with similar decision quality perceptions tended to be in significantly younger firms, indicated by firm age being significant in Model 4 (standardized $\beta = -.20$, $p < .05$). These findings support the ideas that, consensus is important for performance (Kellermanns et al., 2011) and that as the firm ages, a set of more diverse attitudes are likely involved in the firm's ownership and management (Lubatkin et al., 2007).

As the results of the illustrative example demonstrate, the answer to our research question, "What is the relationship between perceived decision quality and firm performance?" depends on the theoretical and methodological approach. When relying on a single-informant or a shared composition model, the data indicate that perceived decision quality would be a significant and positive predictor of firm performance. When the variation in perceived decision quality is taken into consideration, however, it is shown to be a significant and negative predictor of firm performance, helping us understand the implications of the differences that were observed when the individual means were examined (see Table 3). In other words, decision quality is an important predictor of family firm performance; however, the more family members disagree about the decision quality, the worse firm performance becomes. Taken together, these results demonstrate that (a) decision quality and (b) (dis)similar assessments of decision quality are both valid but different predictors of firm performance. Understanding the distinction between these constructs allows us to answer different types of research questions and reveals new insights into the dynamics within family firms.

Future Research

Habbershon and Astrachan (1997) argued that the convergence or divergence in individual perceptions within the family are important and by understanding these it would be possible to better understand the collective cognitions or shared beliefs of the family. We suggest that we can begin to gain this understanding by examining dispersion composition models where the dispersion across family member's assessments evolves in one of two possible trajectories, toward similarity or dissimilarity. Similarity, or consensus, indicates that the family may have shifted from a state of greater dispersion to less dispersion while dissimilarity indicates that the family has greater dispersion. Looking at family firm issues through this lens introduces several interesting research avenues.

Table 4 includes several constructs that have been examined in family business research where the application of dispersion modeling might improve our understanding of family firms. This table is not intended to be an all-inclusive list, but rather provides examples of ideal constructs and research ideas that would be applicable to this type of approach. We highlight theoretical (e.g., phenomena) and methodological considerations (e.g., constructs, sample items, referent) when presenting opportunities for future research. Specifically, studies measuring family goals, commitment and attachment, family cohesion and harmony, transgenerational succession perceptions, family culture and climate, and family conflict might provide a deeper understanding of the family firm with the application of dispersion modeling techniques.

Researchers can begin, for instance, to explore the extent to which the shifting consensus (or dispersion) of family assessments are a function of compositional elements (e.g., multigenerational involvement), structural elements (e.g., role differentiation as family members act as owners, managers, or both), and interactional processes (e.g., family communication). In essence, researchers can begin to explore how the dispersion along key elements like goals, harmony, and culture come about and the implications that arise when they do. Mischel (1973), for instance, distinguishes between strong and weak contexts, arguing that these can be powerful to the extent that they: (a) lead individuals within the group to interpret and perceive the particular context in the same way, (b) induce uniform norms that guide accepted responses through incentives that reward those responses, and (c) instill the skills necessary for its satisfactory construction and execution. The dispersion along variables like harmony and climate would be indicators of the level of consensus, thus serving as an indicator of the strength of the family context. When consensus is high with regard to harmony, for instance, family members' perceptions of harmony are homogenous, giving indications of a context that is universally perceived. Conversely, heterogeneity (or low consensus) would be

Table 4. Examples of Family Business Constructs and Research Ideas Suited for Dispersion Modeling.

Theoretical construct	Measured variable (number of items)	Source	Data source (description if provided)	Example item (referent is underlined)	Research ideas
Family goals	Shared vision (3)	Mustakallio, Autio, and Zahra (2002)	Key informant (Board chairman or CEO)	Family members are committed to jointly agreed-on goals of the firm.	• Understand how the dispersion within differing family subgroups' perceptions of goals influence financial and nonfinancial outcomes.
	Attitude toward family control (3)	Romano, Tanewski, and Smyrnios (2001)	Key informant (Family business owner)	Your family might be open to discussion about having nonfamily shareholders if the conditions were acceptable.	• Identify and explore the significant events that fracture or coalesce the family's assessments around particular goals. • Identify conditions where too much agreement among the family with regard to goals may be problematic.
Commitment and attachment	Emotional ownership (8)	Bjornberg and Nicholson (2012)	Key informant (Next generation family member)	I feel as if I belong to the family business.	• Determine the process used to help the younger generations' commitment and norms of the family and firm converge with the older generations' commitment.
	Culture of commitment	Zahra, Hayton, Neubaum, Dibrell, and Craig (2008)	Key informant (Family business leaders)	We feel loyal to the family business.	• Test the implications of the dispersion of differing types of commitment (affective, normative, and continuance) on generational subgroups.
	Perceived sense of belonging (3)	Ensley, Pearson, and Sardeshmukh (2007)	Key informant (CEO or top management team [TMT] member)	I feel a sense of belonging to the family.	
Family cohesion and harmony	Social interaction (3)	Mustakallio et al. (2002)	Key informant (Board chairman or CEO)	Family members maintain close social interactions.	• Assess how and when the dispersion of family cohesion and harmony influences priorities with regard to financial and nonfinancial outcomes.
	Perceived feelings of morale (3)	Ensley et al. (2007)	Key informant (CEO or TMT member)	I am enthusiastic about the family.	• Test whether the dispersion of family cohesion and harmony assessments influences priorities with regard to financial and nonfinancial outcomes.

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Table 4. (continued)

Theoretical construct	Measured variable (number of items)	Source	Data source (description if provided)	Example item (referent is underlined)	Research ideas
	Family cohesion (12)	Lansberg and Astrachan (1994)	Key informant (Owner-manager or successor)	Family members like to spend their free time with each other.	• Determine the extent to which dispersion of family's cohesion and harmony assessments shapes entrepreneurial learning and innovation.
	Family cohesion (5)	Smyrnios et al. (2003)	Key informant (Family business owners)	To what extent does your family spend special time together?	
	Family-member exchange (3)	Kellermanns and Eddleston (2007)	Three family members per firm	Family members usually let each other know when their actions affect another family members' work	
	Cognitive cohesion (8)	Bjornberg and Nicholson (2007)	Key informant (Individual asked to think about "your family")	In this family, we have similar views to things.	
	Emotional cohesion (8)	Bjornberg and Nicholson (2007)	Key informant (Individual asked to think about "your family")	In this family, we are usually happy to be with each other.	
	Adaptability (8)	Bjornberg and Nicholson (2007)	Key informant (Individual asked to think about "your family")	In this family, when we face difficulties, we work together.	
Transgenerational succession process	Satisfaction with succession process (12)	Sharma, Chrisman, and Chua (2003)	Key informant (Successors and incumbents)	I was satisfied with the manner in which the succession process was managed.	• Identify the mechanisms that can trigger shared emotional bonds and commitment to transgenerational succession (i.e., little dispersion) across generations.
	Satisfaction with succession process (4)[a]	Venter, Boshoff, and Maas (2005)	Key informant (Owner-manager or successor)	All family members involved in the family business are satisfied with the succession process.	• Explore how the consensus around transgenerational succession (i.e., little dispersion) influences the grooming and training of successors.

Table 4. (continued)

Theoretical construct	Measured variable (number of items)	Source	Data source (description if provided)	Example item (referent is underlined)	Research ideas
	Commitment to succession (3)	Lansberg and Astrachan (1994)	Key informant (Owner-manager or successor)	I am satisfied with the succession process. The owner-manager wants his or her children to enter the business.	• Determine whether the dispersion of transgenerational succession assessments constrain family firms from developing succession plans.
	Commitment to succession (2)	Mahto, Davis, Pearce, and Robinson (2010)	Key informant (TMT members)	How strongly does the senior generation want the business to stay in the family?	
Family culture and climate	Altruism (5)	Davis, Allen, and Hayes (2010) and Eddleston and Kellermanns (2007)	Key informant (Owner-manager or successor)	Employees often help other employees with their work when they are absent.	• Assess the implications of a strong (i.e., little dispersion) and weak family climate (i.e., considerable dispersion) on performance efforts.
	Stewardship (3 items)	Davis et al. (2010)	Key informant (Owner-manager or successor)	I believe my organization's leaders have initiatives that are credible and attractive.	• Identify ways in which the family fosters a strong stewardship or altruistic culture (i.e., little dispersion).
	Stewardship culture (4)	Zahra et al. (2008)	Key informant (Family business leaders)	To what extent does your business encourage collectivist rather than an individualistic culture?	• Explore how the strength of the family's culture (as measured through its dispersion) influences nonfamily employees.
	Stewardship motivation (5)	Zahra et al. (2008)	Key informant (Family business leaders)	To what extent does your business satisfy your personal needs?	
	Participative strategy process (5)	Eddleston and Kellermanns (2007)	Mixed sample of key informants and multiple family members	Decision making in our family is participative.	
	Individual vs. Group cultural orientation (4)	Zahra, Hayton, and Salvato (2004)	Key informant (CEO)	This company values consensus in making key decisions.	

(continued)

Table 4. (continued)

Theoretical construct	Measured variable (number of items)	Source	Data source (description if provided)	Example item (referent is underlined)	Research ideas
	External vs. Internal cultural orientation (5)	Zahra et al. (2004)	Key informant (CEO)	<u>This company values working with key</u> customers and learning from them.	• Test the conditions under which differing perceptions of the conflict environment enable positive and negative family outcomes.
Conflict	Task conflict (3)	Ensley (2006)	Key informant (TMT members)	How frequently are there conflicts among <u>family members?</u>	• Determine how the (dis)similarity of the perceptions of the conflict environment influence other processes, like strategic decision making, positively or negatively.
	Process conflict	Kellermanns and Eddleston (2007)	Mixed sample of key informants and multiple family members	<u>We often have</u> disagreements about who should do what in our family firm.	• Examine how the (dis)similarity of the perceptions of the conflict environment influence governance systems.
Firm-level knowledge	Knowledge-based resources (11)	Wiklund and Shepherd (2003)	Key informant (CEO)	Compared with other companies in your industry, does <u>your company</u> have a weak or strong position in terms of staff with expertise regarding development of products and services?	• Determine how the (dis)similarity of firm-level knowledge affects firm-level processes such as recruiting and selection or succession.
Environmental hostility	Environmental hostility (3)	Covin and Slevin (1989)	Key informant (senior most manager)	How would you characterize the <u>external environment within which your firm operates? Ranging</u> from 1 = *very safe, little threat to the survival and well-being of my firm*, to 7 = *very risky, a false step can cause my firm's undoing*.	• Determine how the (dis)similarity of the perceptions of the industry can affect strategic decision making and firm performance outcomes.

[a]This scale included items where family members were asked to use two referents, namely, themselves and the family as a whole.

an indicator of a weaker context where family members' perceptions may be independent of any contextual or family influences. Either could have significant implications on the family and the firm with regard to succession planning, strategic decision making, and nonfamily members.

With regard to family goals, dispersion composition modeling is particularly salient to future empirical examinations of socioemotional wealth preservation and the pursuit of noneconomic goals. Through a detailed qualitative study, Kotlar and De Massis (2013) found that goals varied within and across family firms as the overlap between the family, ownership, and business systems varied. Moreover, these differences become more salient as transgenerational transitions approach. Dispersion modeling can build on this work by providing a method to further identify and explore the significant events that fracture or coalesce the family's assessments around particular goals (see Table 4).

As we have noted, studies relying on key informants or shared composition models may offer a somewhat limited perspective to our understanding of family firms. Because of the methodological constraints, researchers have only relied on groups with high within-group agreement (or alternatively, minimal dispersion) because agreement is a prerequisite for family level data to exist when shared composition models (i.e., using an absolute mean to represent the family) are applied. Consequently, the family-level phenomena studied to date largely generalize to insights provided by key informants or those from high-agreement groups. That is, groups in which there is a sufficient level of agreement to justify aggregation (e.g., Cabrera-Suarez et al., 2015). Whereas most would view high agreement on family-level constructs as a favorable finding (which was demonstrated with our illustrative example), there may be situations in which too much agreement within the family may be detrimental. Indeed, others have argued, in specific situations, discord among teams may contribute to team effectiveness (e.g., DeRue, Hollenbeck, Ilgen, & Feltz, 2010). In family firms, these situations might be understood with the application of dispersion composition modeling.

We agree with the assessment of McKenny et al. (2014) who suggested that it would be fruitful to consider subgroups within families and family firms. Gooty and Yammarino (2011) have explained the important theoretical implications of subgroups, suggesting that

individuals are nested not only within groups or teams but also within dyads and these dyads warrant considerable attention. The dyadic subgroup may be particularly salient in family firms as we hope to further advance our understanding of succession and the unique influences of the family's matriarch and patriarch. Undoubtedly, there are mutual influences between the incumbent and successor during the succession process but questions still remain regarding how and when the relationships among this key dyad provides value to the succession process and dispersion modeling may help us understand some of those conditions (Daspit, Holt, Chrisman, & Long, 2016).

It would also be meaningful to move beyond our exploration of shared and varied assessments among family members by exploring the family–nonfamily relationships within family firms at strategic and operational levels. At a strategic level, it may be important to examine the owning group or the top management team where either group may or may not be entirely made up of family members. It might also be interesting to understand how the distance between strategic groups' assessments influences the family firm. Although criticized methodologically (Edwards, 2002), the consensus literature has suggested the use of Euclidian distance scores to capture consensus between the CEO and other top management team members (Kellermanns et al., 2005). Dispersion modeling could be a valuable tool to address similar questions when researchers are interested in general agreement rather than differences relative to a specific referent (e.g., Ensley & Pearson, 2005; Kellermanns et al., 2005). This would help further our understanding of strategic-level issues, namely, how and when assessments made by top management team members differ from that of the (family) CEO.

At an operational level, several have suggested that family firm research often neglects considerations of the nonfamily employee (e.g., Barnett & Kellermanns, 2006). Studies that do, however, show that there are differences between family and nonfamily employees that could affect behavior and performance. For example, Davis, Allen, and Hayes (2010) find that the family employees' perceptions of stewardship are significantly higher than the nonfamily employees' perceptions. Additionally, they argue that stewardship is positively associated with individual-level commitment to values and trust in leadership and with firm-level competitive advantage (Davis et al., 2010). In a study exploring

differences in behavior between family and nonfamily employees, Madison and Kellermanns (2013) found that spiritual leadership is positively related to family employees' organizational citizenship behaviors but does not have a significant impact on nonfamily employees' behaviors. Taken together, these studies demonstrate that there are differences in both perception and behavior of family and nonfamily employees. Future research would benefit from understanding the extent to which this variance affects both individual- and firm-level outcomes.

Regardless of the specific issues being explored, scholars would be encouraged to reach as many members within any subgroup as possible as variations in group sizes can influence results (Biemann & Kearney, 2010). While our study may be somewhat limited in that we only sampled two family members, several points should be highlighted. First, dyads, as Gooty and Yammarino (2011) have explained, warrant considerable attention especially in family firms. Second, a significant proportion of family members involved in the business were involved by sampling just two family members (i.e., on average, four family members were involved in the family firms in our sample). Moreover, small samples are likely the norm for family business scholars as our sample is consistent with others who have applied shared composition modeling techniques (e.g., Cabrera-Suarez et al., 2015; Eddleston, Otondo, & Kellermanns, 2008). Still, and perhaps most important, by moving from one to two respondents, as we did, significant insights were gained.

Finally, our article has largely focused on continuous variables that can be used to examine family-level issues. Yet it would be remiss not to discuss dispersion modeling at the firm-level and dispersion modeling of categorical variables. While a detailed and comprehensive discussion of both would be beyond the scope of this article, they warrant mention as scholars consider novel family business studies. For the examination of dispersion of firm- or industry-level variables across time using continuous variables, the analysis works as described. The long-term orientation of family firms, for instance, has been well documented (Lumpkin & Brigham, 2011); however, the performance consequences of persistent strategic decisions that may come with a long-term orientation have not been explored. This persistence could be operationalized by the variation in strategic investments over time where little

variation would represent strategic persistence and great variation would represent strategic shifts.

If the variables are not continuous but categorical (e.g., gender), the aggregation method described would not make sense. Instead, Blau's (1977) index for assessing agreement (or more precisely similarity) would be more appropriate (for a detailed discussion, see Harrison & Klein, 2007). Blau's index is calculated as follows:

$$B = 1 - \sum_{i=0}^{k} p_i^2$$

Specifically, k is the number of categories and p_i is the proportion of the ith category. Values of approximately .5 would indicate that the distribution among the categories is about equal (e.g., a similar number of men or women). If an understanding of general agreement (i.e., similarity in rater agreements) is sought, Cohen's kappa could be used in lieu of the standard deviation as a measure of dispersion (for details, see Cohen, 1960). The coefficient of variation would be recommended when an understanding of diversity is important (e.g., age diversity) where lower values indicate more similarity among the responses, whereas a score of 1 indicates the highest diversity (Harrison & Klein, 2007).

Conclusion

Because the family is a critical coalition in guiding the family firm, much of the family business scholarship has rightfully focused on understanding the family's shared assessments through a single, key informant (i.e., family firm leader) or through aggregation with shared composition constructs (e.g., Eddleston et al., 2008). By doing this, family firm research has tended to focus on the absolute level (arithmetic mean) of the family's collective values, beliefs, and attitudes. While providing important insights, we argue that such a focus has neglected the possibility that the effectiveness of the family firm may depend, at least in part, on the extent to which there is perceptual agreement among family members (Kotlar & De Massis, 2013). And, our results reinforce this notion, finding that as the family's dissimilarity in perceptions regarding decision quality grows, the performance of the firm suffers. Accordingly, we hope that our introduction of dispersion composition modeling to family firm scholars provides the resources and means necessary to move the vibrant field of family business research forward.

Appendix

Tutorial for Dispersion and Shared Composition Modeling

The analysis presented in our illustration are easily conducted using most statistical software packages. For our analysis, we relied on SPSS and have included the syntax that was necessary to restructure the data and compute the key values for testing the dispersion and shared composition models (see Table 3, Models 3 and 4). While our purpose is to outline dispersion modeling, we have also included computations for shared composition modeling because it was part of our analysis and it may help others who are conducting research with individuals nested within groups. The syntax is provided so that family business scholars can simply cut and paste to run their analyses.

Data Preparation and Restructuring. Our data were structured such that each individual completing a questionnaire represented a case where individuals were grouped according to a variable termed *firm* which differentiated between firms. For example, the sample data below show four firms with two individuals (i.e., CEO was represented by a 1 and the other family member was represented by 0) from each firm completing five questionnaire items (using a 7-point Likert-type scale). This is an illustration only and does not represent the actual responses or analyses we reported in the article.

Firm	CEO	q1	q2	q3	q4	q5
1	1	7	6	6	5	5
1	0	7	7	7	—	—
2	1	7	7	7	7	6
2	0	6	6	6	—	—
3	1	7	6	7	4	4
3	0	6	5	5	—	—
4	1	4	4	5	4	4
4	0	6	5	5	—	—

Note. CEO was 1 if the participant was the CEO; 0 otherwise. Participants completed questionnaire items using a 7-point scale.

To prepare and restructure the data:

Step	Description	Notes	SPSS syntax
1	Reverse code negatively phrased items	Assuming q1 was negatively phrased, q1 is recomputed as the same variable by subtracting the observed value from 8 which is 1 greater than the available response options (i.e., 7).	COMPUTE q1=8-q1. EXECUTE.
2	Compute study variables	Assuming decision quality variable is represented by q1 – q3 and performance was represented by responses to q4 – q5, variables are created based on the mean value of the items associated with each variable. These variables will each appear as a new column after the syntax is executed.	COMPUTE dq=MEAN(q1,q2,q3). COMPUTE perf=MEAN(q4,q5). EXECUTE.
3	Restructure the data	The data are shifted such that each case represents a family firm	SORT CASES BY FIRM. CASESTOVARS /ID = Firm /Groupby = VARIABLE. Execute.

After executing the syntax listed, the data will be restructured across firms as shown below. Put differently, the CEO's responses are represented by variable q1.1, q2.1, q3.1, and so on. The other family member's responses are represented by variable q1.2, q2.2, q3.2, and so on. Given that the additional family member did not provide performance data, this variable was only computed for the CEO responses.

Firm	q4	q5	perf	CEO.1	CEO.2	q1.1	q1.2	q2.1	q2.2	q3.1	q3.2	dq.1	dq.2
1	5	5	5.00	1	0	7	7	6	7	6	7	6.33	7.00
2	7	6	6.50	1	0	7	6	7	6	7	6	7.00	6.00
3	4	4	4.00	1	0	7	6	6	5	7	5	6.67	5.33
4	4	4	4.00	1	0	4	6	4	5	5	5	4.33	5.33

Reliability Estimate (Coefficient Alpha). To compute alpha coefficients, we recommend researchers execute the following steps:

Step	Description	Notes	SPSS syntax
4	Compute the reliability estimate for each study variable.	For illustration, the decision quality variable is represented by q1 – q3.	Reliability for CEO's decision quality assessments: RELIABILITY /VARIABLES=q1.1 q2.1 q3.1 /SCALE('ALL VARIABLES') ALL /MODEL=ALPHA.
		When the syntax is run, the results will be displayed in the SPSS output window. Typically, an alpha value that exceeds .7 is considered acceptable.	Reliability for family member's decision quality assessments: RELIABILITY /VARIABLES=q1.2 q2.2 q3.2 /SCALE('ALL VARIABLES') ALL /MODEL=ALPHA.

Dispersion Composition Statistic (Standard Deviation). To compute the dispersion variable, we recommend researchers execute the following steps:

Step	Description	Notes	SPSS syntax
5	Compute the standard deviation for the appropriate study variables.	For illustration, the decision quality variable is represented by the standard deviation of dq.1 and dq.2.	Observed variance computations for decision quality assessments: COMPUTE sd.dq=SD(dq.1,dq.2). EXECUTE.

After executing the syntax listed, the data include one additional variable. For simplicity, the original questionnaire responses are not shown, presenting the computed variables for each family firm. Put differently, the CEO's perceptions of decision quality are represented by variable dq.1; the other family member's responses are represented by variable dq.2; and the dispersion variable is represented by sd.dq. With these data, researchers can test regression models as done traditionally. In our analysis, we used sd.dq as the independent variable in Model 4 (see Table 3)

Firm	dq.1	dq.2	sd.dq
1	6.33	7.00	.47
2	7.00	6.00	.71
3	6.67	5.33	.94
4	4.33	5.33	.71

Shared Composition Statistic (r_{wg}). Prior to aggregating the data in a shared composition model, researchers must test the data to ensure that aggregation is appropriate. To do this the r_{wg} statistic is computed, using a formula that includes the observed variance and the expected variance. To compute the shared composition modeling variables, we recommend researchers execute the following steps:

Step	Description	Notes	SPSS syntax
6	Compute observed variance for perceived decision quality and the expected variance.	The computation of the r_{wg} requires the computation of the observed variance for and the expected variance based on the number of response options used on the questionnaire. The following equation can be used to compute the expected variance: $$expected\ variance = \frac{\left(A^2 - 1\right)}{12}$$ A represents the number of response options used in the questionnaire. In our study, we relied on a 7-point response scale which yielded an expected variation of 4.[a]	Observed variance computations for decision quality assessments: COMPUTE var. dq=VAR(dq.1,dq.2). EXECUTE.
7	Compute the r_{wg} statistic for each study variable across each firm.	The following equation can be used to compute r_{wg}.[b] $$r_{wg} = 1 - \left(\frac{observed\ variance}{expected\ variance}\right)$$	r_{wg} computations for decision quality assessments: COMPUTE rwg.dq = 1-(var. dq/4). EXECUTE.

[a]The equation for expected variance is taken from the formula presented by Biemann et al. (2012). [b]The equation for r_{wg} is taken from the formula presented by LeBreton and Senter (2008).

After executing the syntax listed, the data include two additional variables. The var.dq represents the variance in the decision quality that is observed between the CEO and other family member. The rwg.dq variable is an indicator of agreement between the CEO and other family member. Aggregation of the individual responses of the CEO and other family member are justified when the rwg.dq > .7.

Firm	dq.1	dq.2	sd.dq	var.dq	rwg.dq
1	6.33	7.00	.47	.22	.94
2	7.00	6.00	.71	.50	.88
3	6.67	5.33	.94	.89	.78
4	4.33	5.33	.71	.50	.88

Assuming that the reliability estimates and the values justifying aggregation meet acceptable standards (i.e., r_{wg} > .7) the shared composition variable for decision quality is computed as the mean of the individual responses. To compute this variable, we recommend researchers execute the following step:

Step	Description	Notes	SPSS syntax
8	Compute the group-level variables.	For illustration, the group-level decision quality variable is represented by the mean of the CEO's response and the other family member's response. The dispersion variable requires no additional computations as this variable is represented by the standard deviation that was computed previously (i.e., sd.dq).	Family-level perceived decision quality: COMPUTE fam.dq=MEAN(dq.1,dq.2). EXECUTE.

After executing the syntax listed, an additional variable will appear which represents the mean of the family's perceived decision quality. With these data, researchers can test regression models as done traditionally. In our analysis, the average r_{wg} across firms was .87, justifying the aggregation where the fam.dq variable was used as the independent variable in Model 3 (see Table 3).

Firm	dq.1	dq.2	sd.dq	var.dq	rwg.dq	fam.dq
1	6.33	7.00	.47	.22	.94	6.67
2	7.00	6.00	.71	.50	.88	6.50
3	6.67	5.33	.94	.89	.78	6.00
4	4.33	5.33	.71	.50	.88	4.83

Notes

1. Venter et al. (2005) asked individuals to report personal perceptions along with family-level perceptions in a single measure that included items such as (a) All family members involved in the family business are satisfied with the succession process and (b) I am satisfied with the succession process.
2. While one would expect correlation matrices to be ubiquitous, a recent review found that nearly 30% of the family firm agency theory research failed to report a covariation matrix (Madison, Li, & Holt, 2016).
3. Researchers might expect, in many cases, the number of individuals making up the family in a family firm to be small as the firms are often small. Two family members per firm is consistent with previous family business research that has applied shared composition models. Eddleston et al. (2008) relied on 2.3 family members per firm while Cabrera-Suarez et al. (2015) relied on 2.16 family members per firm.

References

Arregle, J. L., Hitt, M. A., Sirmon, D. G., & Very, P. (2007). The development of organizational social capital: Attributes of family firms. *Journal of Management Studies*, *44*, 73-95.

Barnett, T., & Kellermanns, F. W. (2006). Are we family? Nonfamily employees' perceptions of justice in the family firm. *Entrepreneurship: Theory and Practice*, *30*, 837-854.

Bedeian, A. G., & Mossholder, K. W. (2000). On the use of the coefficient of variation as a measure of diversity. *Organizational Research Methods*, *3*, 285-297.

Berrone, P., Cruz, C., & Gómez-Mejía, L. R. (2012). Socioemotional wealth in family firms: Theoretical dimensions, assessment approaches, and agenda for future research. *Family Business Review*, *25*, 258-279.

Biemann, T., & Kearney, E. (2010). Size does matter: How varying group sizes in a sample affect the most common measures of group diversity. *Organizational Research Methods*, *13*, 582-599.

Biemann, T., Cole, M. S., & Voelpel, S. (2012). Within-group agreement: On the use (and misuse) of r WG and r WG (J) in leadership research and some best practice guidelines. *The Leadership Quarterly*, *23*, 66-80.

Bjornberg, A., & Nicholson, N. (2007). The family climate scales—Development of a new measure for use in family business research. *Family Business Review*, 20, 229-246.

Bjornberg, A., & Nicholson, N. (2012). Emotional ownership: The next generation's relationship with the family firm. *Family Business Review*, 25, 374-390.

Blau, P. M. (1977). *Inequality and heterogeneity*. New York, NY: Free Press.

Cabrera-Suarez, M. K., Deniz-Deniz, M. C., & Martin-Santana, J. D. (2015). Family social capital, trust within the TMT, and establishment of corporate goals related to nonfamily stakeholders. *Family Business Review*, 28, 145-162.

Chan, D. (1998). Functional relations among constructs in the same content domain at different levels of analysis: A typology of composition models. *Journal of Applied Psychology*, 83, 234-246.

Chandler, G. N. (2015). Control structures used in family business to manage wealth: Operationalization of antecedent and outcome variables. *Entrepreneurship: Theory and Practices*, 39, 1305-1312.

Chen, G., Mathieu, J. E., & Bliese, P. D. (2003). A framework for conducting multi-level construct validation. In F. J. Yammarino & F. Dansereau (Eds.), *Multi-level issues in organizational behavior and processes* (pp. 273-303). Oxford, England: Elsevier/JAI.

Chrisman, J. J., Sharma, P., Steier, L. P., & Chua, J. H. (2013). The influence of family goals, governance, and resources on firm outcomes. *Entrepreneurship: Theory and Practice*, 37, 1249-1261.

Chrisman, J. J., Sharma, P., & Taggar, S. (2007). Family influences on firms: An introduction. *Journal of Business Research*, 60, 1005-1011.

Cohen, J. (1960). A coefficient of agreement for nominal scales. *Educational and Psychological Measurement*, 20, 37-46.

Cole, M. S., Bedeian, A. G., & Bruch, H. (2011). Linking leader behavior and leadership consensus to team performance: Integrating direct consensus and dispersion models of group composition. *Leadership Quarterly*, 22, 383-398.

Cole, M. S., Bedeian, A. G., Hirschfeld, R. R., & Vogel, B. (2011). Dispersion-composition models in multilevel research: A data-analytic framework. *Organizational Research Methods*, 14, 718-734.

Covin, J. G., & Slevin, D. P. (1989). Strategic management of small firms in hostile and benign environments. *Strategic Management Journal*, 10, 75-87.

Cramton, C. D. (1993). Is rugged individualism the whole story? Public and private accounts of a firm's founding. *Family Business Review*, 6, 233-261.

Crook, T. R., Shook, C. L., Morris, M. L., & Madden, T. M. (2010). Are we there yet? An assessment of research design and construct measurement practices in entrepreneurship research. *Organizational Research Methods*, 13, 192-206.

Daspit, J. J., Holt, D. T., Chrisman, J. J., & Long, R. G. (2016). Examining family firm succession from a social exchange perspective: A multi-phase, multi-stakeholder review. *Family Business Review*, 29, 1-21.

Davis, J. H., Allen, M. R., & Hayes, H. D. (2010). Is blood thicker than water? A study of stewardship perceptions in family business. *Entrepreneurship: Theory and Practice*, 34, 1093-1115.

DeRue, D. S., Hollenbeck, J., Ilgen, D., & Feltz, D. (2010). Efficacy dispersion in teams: Moving beyond agreement and aggregation. *Personnel Psychology*, 63, 1-40.

Dess, G. G., & Robinson, R. B., Jr. (1984). Measuring organizational performance in the absence of objective measures: The case of the privately-held firm and conglomerate business unit. *Strategic Management Journal*, 5, 265-273.

Eddleston, K. A., & Kellermanns, F. W. (2007). Destructive and productive family relationships: A stewardship theory perspective. *Journal of Business Venturing*, 22, 545-565.

Eddleston, K. A., Kellermanns, F. W., & Zellweger, T. M. (2012). Exploring the entrepreneurial behavior of family firms: Does the stewardship perspective explain differences? *Entrepreneurship: Theory and Practice*, 36, 347-367.

Eddleston, K. A., Otondo, R. F., & Kellermanns, F. W. (2008). Conflict, participative decision making, and generational ownership dispersion: A multilevel analysis. *Journal of Small Business Management*, 46, 456-484.

Edwards, J. R. (2002). *Alternatives to difference scores: Polynomial regression analysis and response surface methodology*. San Francisco, CA: Jossey-Bass.

Ensley, M. (2006). Family businesses can outcompete: As long as they are willing to question the chosen path. *Entrepreneurship: Theory and Practice*, 30, 747-754.

Ensley, M. D., & Pearson, A. W. (2005). A comparison of the behavioral processes of top management teams in family and non-family firms: Cohesion, conflict, potency, and consensus. *Entrepreneurship: Theory and Practice*, 29, 267-284.

Ensley, M. D., Pearson, A. W., & Sardeshmukh, S. R. (2007). The negative consequences of pay dispersion in family and non-family top management teams: An exploratory analysis of new venture, high-growth firms. *Journal of Business Research*, 60, 1039-1047.

Evert, R. E., Martin, J. A., McCleod, M. S., & Payne, G. T. (2016). Empirics in family business research: Progress, challenges, and the path ahead. *Family Business Review*, 29, 1-27.

Feinberg, B. J., Ostroff, C., & Burke, W. W. (2005). The role of within-group agreement in understanding transformational

leadership. *Journal of Occupational and Organizational Psychology*, *78*, 471-488.

Golden, B. R. (1992). The past is the past—or is it? The use of retrospective accounts as indicators of past strategy. *Academy of Management Journal*, *35*, 848-860.

Gooty, J., & Yammarino, F. J. (2011). Dyads in organizational research: Conceptual issues and multilevel analyses. *Organizational Research Methods*, *14*, 456-483.

Habbershon, T. G., & Astrachan, J. H. (1997). Research note perceptions are reality: How family meetings lead to collective action. *Family Business Review*, *10*, 37-52.

Harrison, D. A., & Klein, K. J. (2007). What's the difference? Diversity constructs as separation, variety, and disparity in organizations. *Academy of Management Review*, *32*, 1199-1228.

James, L. R., Demaree, R. G., & Wolf, G. (1984). Estimating within-group interrater reliability with and without response bias. *Journal of Applied Psychology*, *69*, 85-98.

Kellermanns, F. W., & Eddleston, K. A. (2007). A family perspective on when conflict benefits family firm performance. *Journal of Business Research*, *60*, 1048-1057.

Kellermanns, F. W., Walter, J., Floyd, S. W., Lechner, C., & Shaw, J. (2011). To agree or not to agree? A meta-analytical review of the relationship between strategic consensus and organizational performance. *Journal of Business Research*, *64*, 126-133.

Kellermanns, F. W., Walter, J., Lechner, C., & Floyd, S. W. (2005). The lack of consensus about strategic consensus: Advancing theory and research. *Journal of Management*, *31*, 719-737.

Klein, K. J., Conn, A. B., Smith, D. B., & Sorra, J. S. (2001). Is everyone in agreement? An exploration of within-group agreement in employee perceptions of the work environment. *Journal of Applied Psychology*, *86*, 3-16.

Klein, K. J., & Kozlowski, S. W. (2000). From micro to macro: Critical steps in conceptualizing and conducing multilevel research, *Organizational Research Methods*, *3*, 211-236.

Kotlar, J., & De Massis, A. (2013). Goal setting in family firms: Goal diversity, social interactions, and collective commitment to family centered goals. *Entrepreneurship: Theory and Practice*, *37*, 1263-1288.

Kozlowski, S. W. J., & Klein, K. J. (2000). A multilevel approach to theory and research in organizations: Contextual, temporal, and emergent processes. In K. J. Klein & S. W. J. Kozlowski (Eds.), *Multilevel theory, research, and methods in organizations: Foundations, extensions, and new directions* (pp. 3-90). San Francisco, CA: Jossey-Bass.

Kumar, N., Stern, L. W., & Anderson, J. C. (1993). Conducting interorganizational research using key informants. *Academy of Management Journal*, *36*, 1633-1651.

Labaki, R., Michael-Tsabari, N., & Zachary, R. K. (2013). Emotional dimensions within the family business: Towards a conceptualization. In K. X. Smyrnios, P. K. Poutziouris, & S. Goel (Eds.), *Handbook of research in family business* (2nd ed., pp. 734-664). Cheltenham, England: Edward Elgar.

Lansberg, I., & Astrachan, J. H. (1994). Influence of family relationships on succession planning and training: The importance of mediating factors. *Family Business Review*, *7*, 39-59.

LeBreton, J. M., James, L. R., & Lindell, M. K. (2005). Recent issues regarding r_{wg}, r^*_{wg}, and $r^*_{wg(j)}$. *Organizational Research Methods*, *8*, 128-138.

LeBreton, J. M., & Senter, J. L. (2008). Answers to 20 questions about interrater reliability and interrater agreement. *Organizational Research Methods*, *11*, 815-852.

Lindell, M. K., & Brandt, C. J. (2000). Climate quality and climate consensus as mediators of the relationship between organizational antecedents and outcomes. *Journal of Applied Psychology*, *85*, 331-348.

Ling, Y., & Kellermanns, F. W. (2010). The effects of family firm specific sources of TMT diversity: The moderating role of information exchange frequency. *Journal of Management Studies*, *47*, 322-344.

Lubatkin, M. H., Durand, R., & Ling, Y. (2007). The missing lens in family firm governance theory: A self-other typology of parental altruism. *Journal of Business Research*, *60*, 1022-1029.

Lumpkin, G. T., & Brigham, K. H. (2011). Long-term orientation and intertemporal choice in family firms. *Entrepreneurship: Theory and Practice*, *35*, 1149-1169.

Maas, C. J., & Hox, J. J. (2005). Sufficient sample sizes for multilevel modeling. *Methodology*, *1*, 86-92.

Madison, K., & Kellermanns, F. W. (2013). Is the spiritual bond bound by blood? An exploratory study of spiritual leadership in family firms. *Journal of Management, Spirituality & Religion*, *10*, 159-182.

Madison, K., Li, Z., & Holt, D. T. (2016). Agency theory in family firm research: Accomplishments and opportunities. In F. W. Kellermanns & F. Hoy (Eds.), *The routledge companion to family business*. New York, NY: Routledge.

Mahto, R. V., Davis, P. S., Pearce, J. A., II, & Robinson, R. B., Jr. (2010). Satisfaction with firm performance in family businesses. *Entrepreneurship: Theory and Practice*, *34*, 985-1001.

Mathieu, J. E., & Chen, G. (2011). The etiology of the multilevel paradigm in management research. *Journal of Management*, *37*, 610-641.

McKenny, A. F., Payne, G. T., Zachary, M. A., & Short, J. C. (2014). Multilevel analysis in family business studies. In P. Sharma, L. Melin, & M. Nordqvist (Eds.), *Sage handbook of family business* (pp. 594-608). Thousand Oaks, CA: Sage.

Michael-Tsabari, N., Labaki, R., & Zachary, R. K. (2014). Toward the cluster model: The family firm's entrepreneurial behavior over generations. *Family Business Review*, *27*, 161-185.

Mischel, W. (1973). Toward a cognitive social learning reconceptualization of personality. *Psychological Review*, *80*, 252-283.

Morgeson, F. P., & Hofmann, D. A. (1999). The structure and function of collective constructs: Implications for multilevel research and theory development. *Academy of Management Review*, *24*, 249-265.

Mustakallio, M., Autio, E., & Zahra, S. A. (2002). Relational and contractual governance in family firms: Effects on strategic decision making. *Family Business Review*, *15*, 205-222.

Nutt, P. G. (1986). The tactics of implementation. *Academy of Management Journal*, *29*, 230-261.

Pearson, A. W., Holt, D. T., & Carr, J. C. (2014). Multilevel scales in family business studies. In P. Sharma, L. Melin, & M. Nordqvist (Eds.), *Sage handbook of family business* (pp. 551-572). Thousand Oaks, CA: Sage.

Richard, P. J., Devinney, T. M., Yip, G. S., & Johnson, G. (2009). Measuring organizational performance: Towards a methodological best practice. *Journal of Management*, *35*, 718-804.

Roberson, Q. M., Sturman, M. C., & Simons, T. L. (2007). Does the measure of dispersion matter in multilevel research? A comparison of the relative performance of dispersion indexes. *Organizational Research Methods*, *9*, 564-588.

Romano, C. A., Tanewski, G. A., & Smyrnios, K. X. (2001). Capital structure decision making: A model for family business. *Journal of Business Venturing*, *16*, 285-310.

Salancik, G., & Meindl, J. R. (1984). Corporate attributions as strategic illusions of management control. *Administrative Science Quarterly*, *29*, 238-254.

Seidler, J. (1974). On using informants: A technique for collecting quantitative data and controlling for measurement error in organizational analysis. *American Sociological Review*, *39*, 816-831.

Sharma, P., Chrisman, J. J., & Chua, J. H. (2003). Predictors of satisfaction with the succession process in family firms. *Journal of Business Venturing*, *18*, 667-687.

Sin, H. P., & Newman, D. A. (2005). Variance of means versus mean of variances: A contrarian view on operationalizing group dispersion. *Best Paper Proceedings of the Academy of Management Annual Meeting, 2005*(Meeting abstract supplement), B1-B6. doi:10.5465/AMBPP.2005.18783408

Smyrnios, K. X., Romano, C. A., Tanewski, G. A., Karofsky, P. I., Millen, R., & Yilmaz, M. R. (2003). Work-family conflict: A study of American and Australian family businesses. *Family Business Review*, *16*, 35-51.

Venter, E., Boshoff, C., & Maas, G. (2005). The influence of successor-related factors on the succession process in small and medium-sized family businesses. *Family Business Review*, *18*, 283-303.

Wiklund, J., & Shepherd, D. (2003). Knowledge-based resources, entrepreneurial orientation, and the performance of small and medium-sized businesses. *Strategic Management Journal*, *24*, 1307-1314.

Wu, W. (2008). Dimensions of social capital and firm competitiveness improvement: The mediating role of information sharing. *Journal of Management Studies*, *45*, 122-146.

Yu, A., Lumpkin, G. T., Sorenson, R. L., & Brigham, K. H. (2012). The landscape of family business outcomes: A summary and numerical taxonomy of dependent variables. *Family Business Review*, *25*, 33-57.

Zahra, S. A., Hayton, J. C., Neubaum, D. O., Dibrell, C., & Craig, J. (2008). Culture of family commitment and strategic flexibility: The moderating effect of stewardship. *Entrepreneurship: Theory and Practice*, *32*, 1035-1054.

Zahra, S. A., Hayton, J. C., & Salvato, C. (2004). Entrepreneurship in family and non-family firms: A resource based analysis of the effect of organizational culture. *Entrepreneurship: Theory and Practice*, *28*, 363-381.

Zellweger, T. M., Kellermanns, F. W., Chrisman, J. J., & Chua, J. H. (2012). Family control and family firm valuation by family CEOs: The importance of intentions for transgenerational control. *Organization Science*, *23*, 851-868.

Author Biographies

Daniel T. Holt is an associate professor of management in the College of Business at Mississippi State University. He received his PhD in management from Auburn University. Prior to joining the faculty at Mississippi State University, he served in the U.S. Air Force, serving as an engineer in Central America, Asia, and Middle East. His research interests cover a wide spectrum of management areas to include family business, entrepreneurship, measurement methods, and organizational behavior issues.

Kristen Madison is an assistant professor of management in the College of Business at Mississippi State University. She received her PhD in organizations and strategy from the University of Tennessee. She has a BS in management and an MS in human resources, both from Auburn University. Her research interest is family business, with a focus on topics that intersect strategic management and human resources, such as governance, leadership, and competitive advantage.

Franz W. Kellermanns is the Addison H. & Gertrude C. Reese Endowed chair in International Business and professor of management in the Belk College of Business at the University of North Carolina–Charlotte. He holds a joint appointment with the Center for Family Business at the WHU–Otto Beisheim School of Management (Germany). He received his PhD from the University of Connecticut. He is an editor of *Entrepreneurship: Theory and Practice*.