Resolving Crises and Conflicts in Family Firms in the German Mittelstand: Three Essays

DISSERTATION

zur Erlangung des Grades eines Doktors rer. pol.

der Fakultät III – Wirtschaftswissenschaften, Wirtschaftsinformatik und Wirtschaftsrecht der Universität Siegen

vorgelegt von

Tobias R. Bürgel, M.Sc.

Erstgutachter/in: Univ.-Prof. Dr. Martin R.W. Hiebl

Zweitgutachter/in: Univ.-Prof. Dr. Arndt Werner

Datum der Disputation: 7. Juni 2024

Dekan der Fakultät III: Univ.-Prof. Dr. Marc Hassenzahl

Acknowledgments

This dissertation was completed during my tenure as a research and teaching assistant at the University of Siegen, working at the Chair of Management Accounting and Control, and as a recipient of a doctoral fellowship from the EQUA Foundation. Both professional engagement and fellowship have been instrumental in enabling and fostering my academic growth, spanning over a period of six years dedicated to writing this dissertation. I sincerely thank the University of Siegen and the EQUA Foundation. Completing this doctoral journey has been a profound and transformative experience, and I am humbled to express my heartfelt gratitude to all who have contributed to its realization.

First and foremost, I wish to extend my sincere appreciation to Professor Dr. Martin Hiebl, my esteemed doctoral advisor, whose invaluable guidance, and unwavering support have been pivotal throughout my research and writing journey. Professor Dr. Martin Hiebl's mentorship extended to facilitating my participation in various international conferences and doctoral seminars. This factor significantly boosted the development of the papers included in this dissertation. Your mentorship has enriched my scholarly pursuits and inspired me to aspire greater heights in my academic and professional endeavors.

I sincerely appreciate Professor Dr. Arndt Werner for undertaking the second evaluation of this dissertation and Professor Dr. Andreas Dutzi for graciously serving as a member of my dissertation committee.

Furthermore, I offer a special acknowledgment to the EQUA Foundation, in particular, the foundation board (Dr. Ulrich Wacker, Vicky Schlagböhmer, Georg Wacker) and Dr. Rena Haftlmeier-Seiffert for affording me this invaluable opportunity. I extend my gratitude to my colleagues at the EQUA Foundation, whose valuable advice and support during the annual colloquia have been indispensable throughout the years.

I am furthermore grateful for the support of my colleagues and friends, especially to David Pielsticker and Sina Feldermann for their encouragement and camaraderie. I express my profound appreciation to my former colleague David Pielsticker for the collaboration and shared journey throughout this endeavor, who played a crucial role in the data collection and analysis process. Working alongside you, David, has been an enriching experience.

My gratitude extends to my friends and family, whose unwavering encouragement and understanding have sustained me through the challenges of this journey, and for their unwavering support and patience during the long hours of research and writing.

Last but not least, I wish to express my deepest appreciation to my parents, Jutta and Rüdiger, my brother Niklas, and my grandparents, Kurt and Heidemarie, whose unwavering support has been a constant source of strength. Their steadfast encouragement and backing have made my education, from the first day of school and all the way to the completion of this dissertation, possible. Your values and guidance have been the cornerstone of my academic pursuits, and I dedicate this accomplishment to your unwavering faith in me. With deep reverence and appreciation, I dedicate this dissertation to my parents and grandparents, whose foundation has shaped my academic journey.

In conclusion, I am deeply indebted to all those who have played a significant role in my academic pursuits and the realization of this dissertation. Your support, guidance, and encouragement have been invaluable, and I am profoundly grateful for the opportunity to undertake this scholarly endeavor. Each of you has played an integral role in shaping my academic journey, and I am eternally grateful.

Siegen, October 2023

Tobias R. Bürgel

Zusammenfassung auf Deutsch

Mittelständische Unternehmen sind zentrale Treiber des wirtschaftlichen Wohlstands und der globalen Wettbewerbsfähigkeit Deutschlands. Sie zeichnen sich durch Innovationskraft, regionale Präsenz, Exportorientierung und Traditionsbewusstsein aus. Häufig familiengeführt, beeinflussen familiäre Werte und langfristige Ziele die Unternehmensentscheidungen maßgeblich. Familienunternehmen kombinieren familiäre Bindungen und geschäftliche Aktivitäten, was sowohl Vorteile als auch Herausforderungen mit sich bringt. Sie streben nach finanzieller Stabilität, Nachfolgeplanung und Nachhaltigkeit, sind oft risikoscheu und binden mehrere Generationen in die Unternehmensführung ein. Diese Generational Ownership Dispersion kann zu komplexen Entscheidungsdynamiken und Konflikten führen, die die Unternehmensleistung beeinflussen. Neben internen Konflikten stehen Familienunternehmen auch vor externen Herausforderungen wie finanziellen Krisen, geopolitischen Spannungen und der digitalen Transformation. Die COVID-19-Pandemie hat die Bedeutung der Resilienz von Unternehmen verdeutlicht, und Digitalisierungsprozesse werden zunehmend wichtiger, wobei viele Familienunternehmen noch am Anfang dieser Entwicklung stehen.

Die Dissertation untersucht, wie Familienunternehmen im deutschen Mittelstand Krisen und Konflikte effektiv bewältigen können, insbesondere im Kontext der zunehmenden Digitalisierung. Paper 1 analysiert die Resilienz von Familien- und Nichtfamilienunternehmen vor der COVID-19-Pandemie. Paper 2 untersucht, wie Konfliktmanagementstrategien digitalisierungsbedingte Konflikte in Familienunternehmen mildern und deren digitale Positionierung verbessern können, sowie den Einfluss der Anzahl der Familiengenerationen. Paper 3 konzentriert sich auf die Eigentumsstruktur und deren Einfluss auf die organisatorische Ambidextrie.

Zusammenfassend zeigen die Ergebnisse, dass die Effekte je nach eingesetzten Konfliktlösungsstrategien variieren und betonen die Bedeutung einer geeigneten Konfliktbewältigung für

die langfristige Innovationsfähigkeit. Die Ergebnisse unterstreichen das komplexe Zusammenspiel der Digitalisierungseffekte auf Familienunternehmen und betonen die Rolle der Eigentumsdynamik und der strategischen Konfliktmanagements. Kontextuelle Feinheiten, wie der Unterschied zwischen Familien- und Nichtfamilieneigentum, die Verteilung des Eigentums über Generationen hinweg und Konfliktlösungsstrategien, beeinflussen das Ausmaß dieser Effekte. Die Forschung hebt das komplexe Zusammenspiel der Digitalisierungseffekte auf Familienunternehmen hervor und zeigt, dass geeignete Konfliktlösungsstrategien, insbesondere Vermeidung und Zusammenarbeit, die Resilienz und organisatorische Ambidextrie in vollständig familiengeführten Unternehmen verbessern können.

Abstract in English

Medium-sized enterprises are central drivers of Germany's economic prosperity and global competitiveness. They are characterized by their innovative strength, regional presence, export orientation, and adherence to tradition. Often family-owned, familial values and long-term goals significantly influence business decisions. Family businesses combine familial ties and business activities, which brings both advantages and challenges. They strive for financial stability, succession planning, and sustainability, are often risk-averse, and involve multiple generations in business management. This generational ownership dispersion can lead to complex decision-making dynamics and conflicts that impact business performance. In addition to internal conflicts, family businesses also face external challenges such as financial crises, geopolitical tensions, and digital transformation. The COVID-19 pandemic has highlighted the importance of business resilience, and digitalization processes are becoming increasingly important, with many family businesses still in the early stages of this development.

This dissertation examines how family businesses in the German Mittelstand can effectively manage crises and conflicts, particularly in the context of increasing digitalization. Paper 1 analyzes the resilience of family and non-family businesses before the COVID-19 pandemic. Paper 2 investigates how conflict management strategies can mitigate digitalization-related conflicts in family businesses and improve their digital positioning, as well as the influence of the number of family generations. Paper 3 focuses on ownership structure and its impact on organizational ambidexterity.

In summary, the results show that the effects vary depending on the conflict resolution strategies used, highlighting the importance of appropriate conflict management for long-term innovation capacity. The findings emphasize the complex interplay of digitalization effects on family businesses and the role of ownership dynamics and strategic conflict management. Contextual nuances, such as the difference between family and non-family ownership, the distribution of

ownership across generations, and conflict resolution strategies, influence the extent of these effects. The research underscores the complex interplay of digitalization effects on family businesses and shows that appropriate conflict resolution strategies, particularly avoidance and collaboration, can improve resilience and organizational ambidexterity in fully family-owned businesses.

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List of Abbreviations

AVE	average variance extracted
CEO	Chief Executive Officer
cf.	confer
CFA	confirmatory factor analyses
CR	composite reliability
Ed(s).	editor(s)
e.g.	exempli gratia
et al.	et alii
i.e.	id est
Min.	minimum
Max.	maximum
N	numbers
p.	page
pp.	pages
PCA	principal component analyses
SD	standard deviation
SME	small and medium-sized enterprise
SEW	Socioemotional Wealth
VIF	variance inflation factor(s)

A. Introduction

A.1 Motivation of the Research Topic and Research Model

Mittelstand firms, sometimes also referred to as small and medium-sized enterprises (SMEs), hold a crucial and indispensable role in the German economy, as substantiated by academic research (Ayyagari et alii (*et al.)*, 2007; Beck & Demirguc-Kunt, 2006; De Massis *et al.*, 2018). These firms command recognition for their pivotal contributions to Germany's prosperity and global economic influence (Ayyagari *et al.*, 2007; Pahnke & Welter, 2019; Simon, 1996). As defined by De Massis *et al.* (2018), Mittelstand firms, within this dissertation, encompass entities with a workforce of up to 3,000 employees (Becker *et al.*, 2008). Empirical research (exempli gratia (e.g.), De Massis *et al.*, 2018; Heider *et al.*, 2022) highlights Mittelstand firms' prowess in entrepreneurship and innovation, coupled with a robust regional presence, export orientation, and a reverence for tradition. These firms are renowned for their commitment to quality and long-term strategies. However, they grapple with limitations in capabilities and resources, particularly in the financial realm, due to their smaller scale (Audretsch & Elston, 1997; De Massis *et al.*, 2018; Beck & Demirguc-Kunt, 2006; Knight, 2000; Pissarides, 1999).

Mittelstand firms often embody a family ownership structure, categorizing them as family firms. These family firms involve family members in ownership, governance, and management roles (Chua *et al.*, 1999; Steiger *et al.*, 2015), distinctly shaping their decisions with familial considerations and values (Newbert & Craig, 2017). Family ownership signifies the percentage of family shareholders within the business, which may not always equate to complete control. Thus, family firms can collaborate with non-family investors (e.g., Klein, 2000). This dissertation defines a family firm as a business with a high family influence (Sharma, 2004). The measurement of family firms follows a self-assessment approach, whereby participants determine whether their business aligns with the criteria of a family firm or not.

Family firms embody the intricate fusion of family ties and business pursuits, encompassing roles within the family as employees or managers and ownership holders (Harvey & Evans, 1994; Qui & Freel, 2020). This fusion yields both advantages, such as solid bonds and complications. For instance, family firms are notably risk-averse, committed to safeguarding overall well-being encompassing financial stability, intergenerational succession, reputation, and sustainability (González *et al.*, 2013; Hiebl, 2013, 2015; Hoessler & Carbon, 2022; Stubner *et al.*, 2012). Anchored in this commitment, they shun actions that could jeopardize vitality (Basly & Saunier, 2018), driven by emotions, values, and continuity, guiding choices beyond immediate economics. Furthermore, family firms evolve through the engagement of multiple generations in ownership, a phenomenon termed generational ownership dispersion (Alvarado-Alvarez *et al.*, 2020; Kellermanns *et al.*, 2012). Generational ownership dispersion is a defining trait of many family firms, involving multiple family generations holding ownership stakes (Gersick *et al.*, 1997). This phenomenon influences decision-making dynamics, leading to potential conflicts and reduced firm performance (Kellermanns & Eddleston, 2007). It underscores the complex interplay between generations within these family firms (Gersick *et al.*, 1997; Magrelli *et al.*, 2022).

Like their non-family counterparts, family firms grapple with challenges encompassing external and internal dimensions. These challenges contain financial crises, global geopolitical tensions, and shifts in environmental paradigms (Hillmann, 2021; Hillmann & Guenther, 2021; Linnenluecke, 2017; Williams et al., 2017). Recent examples of such challenges include the COVID-19 pandemic and the ongoing digital transformation of society in general and the business sphere. The impact of COVID-19 has been far-reaching, affecting individuals and businesses and prompting an investigation into the factors that render family firms more resilient in such crises (Kraus et al., 2020). The repercussions of COVID-19, triggered by respiratory syn-

drome coronavirus 2 (SARS-CoV-2), have reverberated across a vast multitude, impacting individuals, and exerting profound short- and long-term implications on the overall economy and individual enterprises (Donthu & Gustafsson, 2020; García-Carbonell *et al.*, 2021; Mitze & Makkonen, 2022).

Digitalization, encompassing the application of digital technologies within broader contexts, profoundly affects firms' activities and business models (Legner *et al.*, 2017). Despite being recognized as potential global leaders in specific niches, many family firms still have significant room for improvement in their level of digitalization (e.g., Calabrò, 2019). Empirical studies have identified three progressive phases of digital transformation: process digitalization, product/service digitalization, and business model digitalization (Soluk & Kammerlander, 2021). The initial phase, process digitalization, involves adapting IT systems to supply chain requirements, emphasizing business partners' social ties and needs. Product/service digitalization focuses on creating digital offerings, while business model digitalization centers on continuous renewal. However, many companies, regardless of type, are still in the initial stages of digitalization, mainly focusing on process improvements (de Groote *et al.*, 2023; Plomp et al., 2012; Soluk & Kammerlander, 2021). Therefore, this observation highlights the need for further development in this area (Batt *et al.*, 2020; Löhde *et al.*, 2020). Family firms exhibit a unique dual nature, characterized by stability and a long-term orientation, fostering innovation. While some family firms excel as global innovators (De Massis et al., 2013; Diaz-Moriana et al., 2018), others focus on niche products, potentially hindering their willingness to invest in new ideas, such as digital transformation (Calabrò *et al.*, 2019; De Massis *et al.*, 2013; Duran *et al.*, 2016; Heider *et al.*, 2022). This dual perspective can lead to self-isolation, limiting access to external knowledge and resulting in a preference for incremental over exploratory innovation, thus impacting their overall organizational ambidexterity.

Family firms encounter internal challenges primarily related to disputes and conflicts (Davis & Harveston, 2001). Conflict theory is instrumental in understanding these dynamics, as conflicts often emerge from differing viewpoints on strategy, succession, responsibilities, generational interests, and ownership distribution, intensified by emotional ties and history (Caputo *et al.*, 2018; Claßen & Schulte, 2017; Frank *et al.*, 2011). Decision-making is a crucial trigger, influenced by individual goals and values. These conflicts encompass cognitive, process, and relationship aspects (e.g., Kellermanns & Eddleston, 2007; Sorenson, 1999; Sorenson *et al.*, 2008; 2009). While cognitive and process conflicts positively impact innovation and performance, relationship conflicts harm decision-making and performance goals. Complex family relationships contribute to conflicts driven by norms, decision-making influence, unequal treatment, and generational differences. Family firms' conflicts have the dual potential to hinder or catalyze innovation and change processes (Anwar *et al.*, 2022; Cucculelli *et al.*, 2022; Kraiczy *et al.*, 2015; Pucci *et al.*, 2020). Such conflicts can detrimentally affect family firms during transformations (Shepherd & Haynie, 2009; Wong & Chau, 2019), potentially leading to operational decline or failure (De Massis et al., 2008; Dunn, 1995; Dyer, 1986; Lansberg & Astrachan, 1994). However, moderate conflict levels, without escalation, can benefit business and family outcomes, according to conflict theory.

Former literature presents diverse mechanisms to address these challenges. This dissertation will delve deeper into two mechanisms: organizational resilience and suitable conflict management and resolution strategies. Organizational resilience is multifaceted due to its foundation in various disciplines, leading to a lack of a standardized definition (Linnenluecke, 2017; Williams *et al.*, 2017). Organizational resilience is seen as an ability to withstand disruptions and maintain functionality (Hillmann & Guenther, 2021). Much research has focused on how firms respond to external shocks, such as natural disasters and financial crises, emphasizing the need

for context-specific definitions (Hillmann, 2021; Hillmann & Guenther, 2021). However, pandemic crises, although often unexpected, fit the crisis definition and trigger a focus on organizational stability (Hillmann & Guenther, 2021). This perspective, however, has received limited attention in existing literature (Hillmann & Guenther, 2021; Linnenluecke, 2017; Williams *et al.*, 2017).

Extensive research affirms that conflicts arising from personal or content-related differences can be effectively managed in family firms using various conflict resolution strategies (Caputo *et al.*, 2018; Chrisman *et al.*, 2004; Sorenson, 1999; Sorenson *et al.*, 2008, 2009). These strategies provide valuable insights into mechanisms for successful conflict resolution, enabling individuals and organizations to navigate conflicts and promote understanding and cooperation. Sorenson (1999) proposes strategies such as avoidance, compromise, and collaboration, each offering distinct approaches to resolving disputes. While avoidance aims to leave conflicts unresolved, temporarily or permanently, compromise refers to finding a solution that may not fully satisfy everyone involved; collaboration involves all parties in the decision-making process to reach a mutually beneficial solution.

The increasing pertinence of conflict management and resolution strategies within family firms is underscored by the evolving innovation landscape, primarily characterized by explorative forays like digitalization and digital transformation, alongside the pursuit of organizational ambidexterity. Nonetheless, the extant literature remains deficient in delivering a comprehensive analysis of family firm behavior vis-à-vis these intricate dynamics, particularly when scrutinized through conflict theory. Therefore, this dissertation endeavors to explore the subsequent overarching research query:

Dissertation Research Question. *How can family firms in the German Mittelstand resolve crises and conflicts effectively during explorative innovation, id est (i.e.), increasing digitalization and digital transformation?*

This dissertation is divided into three papers, each contributing to finding preliminary answers to the dissertation research question. Paper 1 (Section B) explores the disparity in pre-crisis digitalization resilience between family and non-family businesses. For Paper 1, the outbreak of COVID-19 serves as the specific event triggering a crisis. Paper 2 (Section C) investigates the potential of conflict management strategies to mitigate digitalization-induced conflicts within family businesses, thereby facilitating an enhanced digital positioning. Moreover, Paper 2 delves into the influence exerted by the number of family generations on strategy choice within this context and its logical branches for digitalization. Subsequently, Paper 3 (Section D) focuses on the ownership structure nuances within family firms, revealing its impact on the adept management of organizational ambidexterity. Paper 3 further shows that these effects depend on distinct conflict resolution strategies.

Table A-1 provides detailed information on Papers 1 to 3, such as the title, authors, methodology and sample, scientific contributions, presentations, and submission status to research journals. The ensuing section will reintroduce the trio of papers with a heightened level of granularity, further explaining their contributions to this dissertation. This will be accomplished by deriving their respective research questions.

Paper Number	Title	Authors	Methodology and Sample	Contributions	Status
Paper 1	Digitalization and Entrepreneurial Firms' Resilience to Pandemic Crisis: Evidence from COVID-19 and the German Mittelstand	Bürgel, Tobias R., Hiebl, Martin R. W., Pielsticker, David I.	Quantitative: Surveying the Chief Executive Officers (CEOs) of German Mittelstand firms in 2020. Receiving 156 partially or fully completed questionnaires resulted in a final sample of 115 cases with complete information on all the variables of interest in this study.	a) This paper contributes empirical substantiation demonstrating that heightened levels of globalization in entrepreneurial firms and the non-family entrepreneurial context have engendered augmented resilience in the face of crises within a short-term temporal horizon. This phenomenon is notably pronounced when these entities have proactively undergone substantial digitalization of their business models before the onset of the crisis. These findings particularly engender a nuanced perspective on the prevailing Parasite Stress Theory of Values, which conventionally underscores the attenuation of interpersonal interactions but overlooks the potential of digital technologies to serve as an alternative avenue for such interactions. The discerned implications of this study posit that the susceptibility of globalized and non-family entrepreneurial enterprises to crisis-induced perturbations can be curtailed through the strategic adoption of heightened digitalization efforts. b) The present findings make a noteworthy scholarly contribution to organizational resilience. They affirm the nuanced nature of organizational resilience, as Linnenluecke (2017) expounded by demonstrating the situational specificity of digitalization's role in fostering resilience during pandemic crises. This variability is particularly discernible in the case of non-family firms and those enterprises exhibiting heightened susceptibility to globalizing influences.	Published in *Technological Forecasting & Social Change* (VHB-JOURQUAL3: B).
Paper 2	Conflict Management Strategies and the Digitalization of Family Firms: The Moderating Role of Generational Ownership Dispersion	Bürgel, Tobias R., Hiebl, Martin R. W.	Quantitative: Surveying the CEOs of German Mittelstand firms in 2020. Receiving 156 partially or fully completed questionnaires resulted in a final sample of 85 cases with complete information on all the variables of interest in this study.	a) This paper is a pioneering effort to present empirical substantiation distinctly centered on conflicts arising from the digitalization endeavors within family firms. The findings reveal that many family firms experience conflicts during digitalization. b) The present contribution of this paper lies in showcasing the potential of conflict management strategies, with particular emphasis on compromise and collaboration, in mitigating these conflicts and providing valuable support for the digitalization endeavors of family firms. c) Notably, these findings contribute to conflict theory, showing the efficacy of collaboration hinges on the dispersion of ownership across multiple family generations, thus underscoring the salience of generational ownership dispersion. This new insight adds a layer of complexity to the existing literature, shedding light on the remarkable heterogeneity that characterizes family firms and the imperative of tailoring conflict management strategies to their specific contextual nuances. In essence,	Presented at the IFERA Annual Conference 2022 and ACIEK Conference 2022; Published in IEEE *Transaction on Engineering Management* (VHB-JOURQUAL3: B).

			Additional qualitative Interviews with 13 representatives of German family firms from 2021 to 2022.	these findings underscore the varying effectiveness of distinct conflict management strategies during the digitalization process of family firms, further enriching the discourse in alignment with prior research (e.g., Chua & Chrisman, 2012; Dibrell & Memili, 2019).	
Paper 3	Family Ownership, Conflict Resolution Strategies, and Organizational Ambidexterity	Bürgel, Tobias R., Hiebl, Martin R. W.	Quantitative: Surveying the CEOs of German Mittelstand firms in 2020. Receiving 156 partially or fully completed questionnaires resulted in a final sample of 91 cases with complete information on all the variables of interest in this study.	a) This paper contributes to the literature about organizational ambidexterity within family firms by debunking the presumed direct impact of family influence (e.g., Allison *et al.*, 2014; Arzubiaga *et al.*, 2018; Gedajlovic *et al.*, 2012; Kammerlander *et al.*, 2015; 2020; Hiebl). Notably, this contribution challenges the conventional assumption of a direct family influence effect, emphasizing the indispensability of contextual nuances. b) Furthermore, the findings extend the purview of conflict literature pertinent to family firms, underscoring the transformative potential of compromise and collaboration strategies in engendering a substantial elevation in organizational ambidexterity. c) The paper extends the theoretical domain by demonstrating that specific conflict resolution strategies, namely avoidance and collaboration, exercise a discernible impact on the augmentation of organizational ambidexterity. Intriguingly, this effect manifests exclusively within family firms under complete family ownership, while it remains notably absent within family firms encompassing non-family investors. This intricate interplay between ownership structure and conflict resolution strategies further enriches the discourse surrounding organizational ambidexterity within the family firm context.	Submitted to *International Journal of Entrepreneurial Venturing* (VHB-JOURQUAL3: B).

Table A-1. Overview of the paper included in this dissertation

A.2 Associated Research Papers and Research Questions

A.2.1 Paper 1: Digitalization and Entrepreneurial Firms' Resilience to Pandemic Crisis: Evidence from COVID-19 and the German Mittelstand

Paper 1 (see Table A-1), titled "Digitalization and Entrepreneurial Firms' Resilience to Pandemic Crisis: Evidence from COVID-19 and the German Mittelstand", examines the relationship between increased levels of digitalization and Mittelstand firms' organizational resilience, in this case, especially within the context of the COVID-19 pandemic crisis. The 20th and early 21st centuries have witnessed numerous crises resulting from diseases like the Spanish flu, AIDS, SARS, Avian flu, and coronavirus (COVID-19) (Kraus *et al.*, 2020). Those diseases have profoundly affected individuals, economies, and businesses, prompting a need to investigate resilience against such crises (Donthu & Gustafsson, 2020; García-Carbonell *et al.*, 2021; Mitze & Makkonen, 2022). Research on organizational resilience has grown considerably (Duchek, 2020; Hillmann, 2021; Hillmann & Guenther, 2021; Linnenluecke, 2017; Williams *et al.*, 2017), yet gaps remain. Existing studies are context-dependent, often focusing on specific contexts or events such as economic crises, disasters, or terrorist attacks (Linnenluecke, 2017; Williams *et al.*, 2017), but have not addressed the specific context of pandemic or healthcare crises (Hillmann & Guenther, 2021; Linnenluecke, 2017; Williams *et al.*, 2017). Studies on resilience to COVID-19 have suggested digitalization as a resilience driver (Beninger & Francis, 2022; Fath *et al.*, 2021), but qualitative data or conceptual approaches limit these.

Paper 1 aims to fill this gap using the Parasite Stress Theory of Values (Thornhill & Fincher, 2014). This theory suggests that individuals activate their psychological immune system to fight diseases. Prior research has explored the psychological immune system's impact on behavior (Bennett & Nikolaev, 2020; Faulkner *et al.*, 2004; Navarrete & Fessler, 2006; Nørfelt *et al.*, 2020; Park *et al.*, 2007). Paper 1 builds on this by investigating the impact of the psychological immune system, particularly in the context of pandemic crises. Bennett and Nikolaev (2021)

emphasized a strategic approach to mitigate infectious disease transmission, involving the reduction of interpersonal interactions, termed "social distancing" during the COVID-19 pandemic (Ferguson *et al.*, 2020). In this dynamic, digitalization emerges as a transformative factor (Eller *et al.*, 2020), potentially mitigating the adverse effects of social distancing on firms. Consequently, firms with robust pre-pandemic digitalization infrastructure may demonstrate heightened resilience in navigating the crisis.

In exploring the impact of digitalization across firms, Paper 1 examines whether the link between digitalization and crisis resilience, which varies among firms (Eller *et al.*, 2020), is moderated by the family firm status. Additional variables such as globalization, firm size, industry, strategy, and past performance are potential moderators. Family firms prioritize long-term stability and often exhibit higher risk aversion (De Massis *et al.*, 2015; Hiebl, 2013), leading to increased equity or debt levels (González *et al.*, 2013) that could enhance crisis resilience. In contrast, non-family firms generally show lower crisis resilience (Amann & Jaussaud, 2012), making them more vulnerable. Consequently, elevated digitalization is likely more impactful for crisis resilience in non-family firms. The study addresses the evolving relationship between digitalization and organizational resilience, specifically during pandemic crises, incorporating various contextual factors that may influence this relationship. Overall, the following two research questions are addressed in Paper 1:

Research Question 1. Do higher levels of digitalization increase entrepreneurial firms' resilience to pandemic crises?[1]

[1] The research questions (Research Question 1 to Research Question 6) are outlined in the individual Papers. Unlike Papers 1 to 3, the provided research queries have been adjusted, if required, to harmonize with the relevant scientific context.

Research Question 2. How do Mittelstand firms' characteristics (firms' level of globalization, family firm status, firm size, industry affiliation, strategy, past performance, transformational leadership style, and embedding in subnational regions) impact the digitalization–crisis resilience relationship?

A.2.2 Paper 2: Conflict Management Strategies and the Digitalization of Family Firms: The Moderating Role of Generational Ownership Dispersion

Paper 2 (see Table A-1), called "Conflict Management Strategies and the Digitalization of Family Firms: The Moderating Role of Generational Ownership Dispersion," investigates the impact of applied conflict management strategies, namely avoidance, compromise, and collaboration, on the level of digitalization in family firms, influenced by the number of family ownership generations. The successful adoption of a digital business strategy is crucial for contemporary family businesses, enhancing professionalization and performance while also promoting long-term survival (Chittoor & Das, 2007; de Groote *et al.*, 2023; Llopis-Albert *et al.*, 2021; Nambisan *et al.*, 2017). Digitalization encompasses integrating digital technologies into various aspects of individual, organizational, and societal contexts (Legner *et al.*, 2017). This contains diverse innovations, such as artificial intelligence, big data, blockchain, and the Internet of Things (Nambisan, 2017; Omrani *et al.*, 2022; Schallmo *et al.*, 2017; 2022), potentially bolstering overall company performance (Singhal *et al.*, 2020).

Family firms are characterized by family members' involvement in ownership, governance, and management (Chua *et al.*, 1999; Steiger *et al.*, 2015). Therefore, most decisions in family firms are influenced by family considerations, traditions, and values (Newbert & Craig, 2017). It has been found that family interests considerably shape the implementation of digital technologies or a digital business model transformation (Chung *et al.*, 2023; Daspit *et al.*, 2021; Davis, 1983). Therefore, family considerations can significantly impact business transformation processes, including innovation processes (Anwar *et al.*, 2022; Batt *et al.*, 2020; Cucculelli *et al.*, 2022;

Kraiczy *et al.*, 2015; Löhde *et al.*, 2020; Pucci *et al.*, 2020). For instance, Soluk and Kammerlander (2021) observed conflicts arising from digital transformation in family firms (Chakma *et al.*, 2021; Guffler *et al.*, 2023), and Weyrauch *et al.* (2021) highlighted conflict's crucial, often overlooked role in innovation within contexts like digital transformation.

Conflict theory provides valuable insights into understanding family business dynamics, particularly the complex interplay of roles, responsibilities, and generational interests (Caputo *et al.*, 2018; Claßen & Schulte, 2017; Frank *et al.*, 2011). Conflicts within family firms have the dual capacity to impede or facilitate innovation and change processes (Anwar *et al.*, 2022; Cucculelli *et al.*, 2022; Kraiczy *et al.*, 2015; Pucci *et al.*, 2020), especially during transformative phases (Shepherd & Haynie, 2009; Wong & Chau, 2019), where they might overshadow business priorities (De Massis *et al.*, 2008; Dunn, 1995; Dyer, 1986; Lansberg & Astrachan, 1994), potentially leading to operational setbacks, reduced profitability, or even business failure. However, effective conflict management strategies, including avoidance, compromise, and collaboration, can assist family firms in navigating the complexities of digital transformations (Sorenson *et al.*, 1999). The avoidance strategy involves leaving conflicts unresolved, while compromise seeks a middle ground that may not satisfy all parties. Collaboration entails engaging all stakeholders in decision-making to achieve mutually beneficial outcomes. Building on this foundation, the integration of generational ownership dispersion, proposed by Alvarado-Alvarez *et al.* (2020), emerges as a potential moderating factor. Generational ownership dispersion refers to the distribution of ownership rights across multiple family generations (Gersick *et al.*, 1997; Kellermanns *et al.*, 2012). Research indicates that firms with a single ownership generation experience fewer detrimental conflicts, attributed to more personal interaction that curtails relationship conflicts (Davis & Harveston, 2001; Wang & Zhang, 2022). In contrast, family firms with multiple ownership generations may face increased conflict potential, partic-

ularly during digital transformation. Younger generations, often more tech-savvy and experienced outside the family firm, may advocate for technology adaptation, while older generations may resist change, clinging to established practices (Chakma *et al.*, 2021; de Groote *et al.*, 2021). As such, digitalization can fuel intergenerational conflicts, making effective conflict management strategies crucial. The interplay of generational ownership dispersion thus shapes the effectiveness of conflict management strategies in digitalization (Alvarado-Alvarez *et al.*, 2020). In light of these considerations, Paper 2 explores the interplay between digitalization and conflict management strategies within family firms, particularly those spanning multiple generations. Overall, the following research question is addressed in Paper 2:

Research Question 3. How do different conflict management strategies influence the digitalization of family firms, and to what extent does generational ownership dispersion moderate this relationship?

A.2.3 Paper 3: Family Ownership, Conflict Resolution Strategies and Organizational Ambidexterity

Paper 3 (see Table A-1), entitled "Family Ownership, Conflict Resolution Strategies, and Organizational Ambidexterity," analyzes the effect of family ownership on family firms' level of organizational ambidexterity, influenced by applied conflict resolution strategies: avoidance, compromise, and collaboration. Organizational ambidexterity involves the concurrent pursuit of explorative and exploitative endeavors within firms, demanding a careful balance between stability and adaptation (Goel & Jones, 2016; Sharma & Salvato, 2011). Exploratory activities encompass innovations, opportunities, and capabilities aimed at novel products, services, or markets, whereas exploitative activities ensure the efficiency and quality of existing strengths and competencies (Junni *et al.*, 2013; O'Reilly & Tushman, 2004). In the rapidly evolving business landscape, attaining ambidexterity is utmost for upholding competitiveness, enduring suc-

cess, and seamless continuity (Lubatkin *et al.*, 2006). Nevertheless, family enterprises, renowned for their unique synthesis of tradition and innovation, grapple with distinct challenges in achieving ambidexterity, underscoring the necessity for meticulously exploring this intricate phenomenon (Kammerlander *et al.*, 2020; Martin *et al.*, 2019).

Family firms are distinguished from other business forms' pronounced influence of ownership on company management and decision-making, shaping the activities that either facilitate or impede organizational ambidexterity (Lubatkin *et al.*, 2006). The pivotal role of family ownership involvement takes center stage, signifying the extent of shares owned by family shareholders in the enterprise. Family enterprises, characterized by a proclivity for risk aversion, often prioritize the preservation of the firm's continuity, thus limiting the diversification of their portfolio holdings (González *et al.*, 2013; Hiebl, 2013; Hoessler & Carbon, 2022; Stubner *et al.*, 2012). Consequently, they avoid actions that could jeopardize their survival (Basly & Saunier, 2018; Hiebl, 2013). This predisposition leads to a preference for incremental and exploitative innovations, resulting in a relatively modest level of organizational ambidexterity (Anderson *et al.*, 2012; Cucculelli & Marchionne, 2012; De Massis *et al.*, 2015; Hoessler & Carbon, 2022). In contrast, family firms that incorporate non-family investors may embrace a broader strategic horizon, fostering daring exploratory endeavors that extend beyond the confines of familial shareholder interests (Amit *et al.*, 1990; Chan *et al.*, 1990).

The complexities arising from conflicts within family firms amplify the pursuit of ambidexterity, stemming from divergent aspirations, capacities, and dynamics within the familial realm (Kammerlander *et al.*, 2020; Martin *et al.*, 2019). These conflicts arise due to disparities in strategic viewpoints and the imperative of upholding family unity and heritage (Eddleston & Kellermanns, 2007; Guffler *et al.*, 2023; Ingram *et al.*, 2016). As a result, the interplay between organizational ambidexterity and conflict resolution strategies—namely avoidance, compromise, and collaboration (Sorenson, 1999)—is intricately interwoven, with the latter potentially

alleviating tensions and catalyzing the achievement of ambidexterity (Stubner *et al.*, 2012). Proficient conflict resolution strategies could shift family firms from risk aversion, enabling them to refocus on prospects, i.e., exploratory activities, thereby influencing the nuanced interaction between family ownership and organizational ambidexterity. While existing research has primarily analyzed the link between family ownership and organizational ambidexterity, the pivotal role of conflict resolution strategies remains a relatively unexplored terrain, warranting investigation to elucidate this dynamic. Overall, the following three research questions are addressed in Paper 3:

Research Question 4. Does the ownership structure of a family firm influence the level of organizational ambidexterity?

Research Question 5. Do applied conflict resolution strategies in family firms influence organizational ambidexterity?

Research Question 6. How do conflict resolution strategies impact the ownership–organizational ambidexterity relationship?

A.3 Methodology and Structure

To address these six introduced empirical research questions of the dissertation outlined in Section A.2, an online survey was first conducted targeting German Mittelstand firms. All three included studies of this dissertation employed a quantitative approach (see Papers 1 to 3 in Sections B-D). In addition, the second study incorporates a qualitative approach to enhance the comprehension of the quantitative interaction terms and the content of the findings (see Paper 2 in Section C).

A.3.1 Sampling and Data of the Quantitative Studies

The quantitative analyses (Papers 1 to 3) were conducted based on a survey project focused on digitalization, globalization, and stakeholder relations within the German Mittelstand (see Appendix Dissertation A for the survey questionnaire). Consistent with the classification by De Massis *et al.* (2018) and Becker *et al.* (2008), the study included firms with a maximum of 3,000 employees, excluding microenterprises, by setting a minimum threshold of 10 employees. This decision was driven by the research's specific scope and objectives (see in detail Papers 1 to 3).

The survey occurred during the summer of 2020, coinciding with the COVID-19 crisis. To construct the sample, Bureau van Dijk's Amadeus database was utilized, resulting in data collection through an online questionnaire distributed to the CEOs of 1,118 German firms. It is essential to acknowledge that this sample represents a subset of firms in the three regions under study, limited to those with accessible email addresses for their CEOs or top managers, who were invited to participate. The survey's authors manually searched for the email addresses of top managers, including CEOs and other top management team members, to encourage their involvement. The dataset contains essential information, including each firm's number of employees, industry affiliation, and contact details.

Considering the declining response rates in business and management research, particularly among CEOs (Cycyota & Harrison, 2006; Mellahi & Harris, 2016; Pielsticker & Hiebl, 2020), a proactive approach was adopted to enhance participation in the survey. To increase the likelihood of responses, firms located in the same federal state or a federal state close to the survey authors' university (i.e., those situated in Hesse, North Rhine-Westphalia, or Rhineland Palatinate) were contacted, leveraging prior evidence suggesting that geographical proximity between survey recipients and authors positively influences response rates (Bartholomew & Smith, 2006).

To increase the response rate, participants were offered meaningful rewards (Edwards *et al.*, 2002), including the choice to receive a detailed research report and/or donate 10 EUR to a charity of their choice. Participants were allowed to select one or both incentives based on their preferences. This thoughtful approach bolsters the response rate and fosters active engagement with the survey.

A total of 156 fully or partially completed questionnaires were received, resulting in a response rate of 13.95%, comparable to the response rates of similar recent studies in family business research (e.g., Pielsticker & Hiebl, 2020; Kammerlander *et al.*, 2020; Schulze *et al.*, 2003). Different samples were used for the studies on Papers 1 to 3 due to the variables used in these individual studies. Hence, the sample of study 1 contains 133 German Mittelstand firms; in study 2, 85 family businesses were included in the analysis, and for study 3, data from 91 family businesses were used.

In the context of declining response rates (Chidlow et al., 2015; Pielsticker & Hiebl, 2020), surveys targeting individual top managers present a pragmatic approach to attain sufficiently large sample sizes (Montabon et al., 2018) and capitalize on in-depth knowledge of their respective firms (Avlonitis & Gounaris, 1997). Despite the widespread use of this single-respondent approach in management research (e.g., Avlonitis & Gounaris, 1997; Ogbonna & Harris, 2000), it has faced criticism due to its susceptibility to common method bias. To mitigate this concern, several pre-survey design measures and conducted post-data collection analyses in line with prior research recommendations were proactively adopted for all three Papers within this dissertation (e.g., Podsakoff et al., 2003). First, to obtain responses and mitigate social desirability bias, the participants were assured strict confidentiality, fostering a comfortable and secure environment (Podsakoff et al., 2003). Second, a lag between the independent and dependent variables was implemented within the questionnaire to prevent participants from con-

structing their mental models, which could influence the outcomes, so-called item context effects (Podsakoff et al., 2003). Third, to reduce context-induced mood, i.e., how the wording of questions from the research literature can influence respondents' perspectives and answers, a comprehensive questionnaire pretest was conducted, incorporating feedback from practitioners and researchers equally (confer (cf.) Hunt et al., 1982). Fourth, to address common method bias, a marker variable unrelated to other study variables was integrated into the questionnaire (Williams et al., 2010). This approach, recommended by Lindell and Whitney (2001), involved computing correlations with all other variables (Calic & Ghasemaghaei, 2021; Lindell & Whitney, 2001), ensuring unbiased results (Bagozzi et al., 1991). Finally, Harman's one-factor test using exploratory factor analysis was performed (Podsakoff & Organ, 1986; Harman, 1976). Therefore, all variables for each study were included in a single factor, indicating that this factor did not account for a significant portion of the variance among the variables, i.e., more than 50 % (Podsakoff et al., 2003; Podsakoff & Organ, 1986). The results of these tests (see Papers 1 to 3) indicated that the dissertation's data was unlikely to suffer from common method bias.

Considering the percentage of non-respondents in this study, which is relatively, but not unusually high (cf. Pielsticker & Hiebl, 2020), the potential presence of non-response bias was assessed by examining differences between early and late respondents (Frohlich, 2002; van Loon, 2003). Non-response bias occurs when the usable sample is skewed due to a high percentage of non-respondents (Frohlich, 2002; Van Loon, 2003). A common approach of comparing early and late respondents was adopted to evaluate this bias. Since late respondents are more like non-respondents than early respondents, they were used as a proxy for non-respondents (e.g., Oppenheim, 1966; Van der Stede et al., 2005). The analysis revealed no significant difference between early (lower quantile) and late respondents (upper quantile), indicating an absence of non-response bias in the samples of each study, and hence, in this dissertation (Armstrong & Overton, 1977).

A.3.2 Sampling and Data of the Qualitative Study

To augment the quantitative findings, explicitly focusing on the interaction terms of the second study (see section C), 13 additional semi-structured interviews were conducted with German family firms, ensuring representation from various perspectives, including owners, top managers, family members, and non-family managers (Rabionet, 2011). As emphasized by Frank *et al.* (2011), the utilization of interviews aimed to delve deeper beyond what can be solely obtained through empirical-quantitative methods. The selection of family firms for the interviews involved six participants from the prior quantitative study, with an additional seven family firms included. Bureau van Dijk's Amadeus database was conducted to identify these seven further participants, employing specific firm size, industry, and geographical region criteria. Moreover, family firms were proactively approached through personal contacts to foster meaningful engagement. Consequently, the interview study embraced family firms of diverse ages, sizes, and industries, enriching the comprehensive understanding of the research context.

The semi-structured interviews were conducted during the midst of 2021 and early 2022, coinciding with the COVID-19 pandemic, necessitating the adoption of online video communication software for interview sessions. Before the interviews, the participants received an interview guide (see Appendix Dissertation B). Subsequently, with proper consent, the interviews were audio and video recorded and later transcribed. For analysis, specialized software tools were employed to analyze the transcribed interview data, thoroughly generating additional insights. While initially inclined towards a strict deductive approach in the qualitative survey, following the guidance of Mayring and Frenzl (2019), the findings revealed the need for a more nuanced approach, incorporating deduction and induction elements. As a result, the analysis of the interviews can be characterized as abductive, encompassing a synergistic blend of deductive and inductive methods, allowing for a richer and more holistic exploration of the data.

The rest of this dissertation is organized as follows: after this introduction, in Section A, Sections B, C, and D present Papers 1 to 3. Finally, Section E follows with an overall discussion and conclusion.

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B. Digitalization and Entrepreneurial Firms' Resilience to Pandemic Crisis: Evidence from COVID-19 and the German Mittelstand

Authors: Tobias R. Bürgel, Martin R. W. Hiebl, David I. Pielsticker

Paper's status: This paper has been published in Technological Forecasting & Social Change.

We, the authors of the paper, hereby declare that this paper's first author, Tobias R. Bürgel, and third author, David I. Pielsticker, were each equally responsible for collecting and analyzing most of the data, developing the multiple regression models, and writing most of the paper.

Tobias R. Bürgel	Martin R. W. Hiebl	David I. Pielsticker

B.1 Introduction

The 20th century and early 21st century have seen an increasing number of crises due to diseases such as Spanish flu, AIDS, SARS, Avian flu, and – most recently – the coronavirus disease 2019 (COVID-19), caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) (Kraus *et al.*, 2020). These diseases have impacted thousands or even millions of individuals, and have had serious short- and long-term consequences for the economy as a whole and for individual businesses (Donthu & Gustafsson, 2020; García-Carbonell *et al.*, 2021; Mitze & Makkonen, 2022). Since it cannot be ruled out that additional pandemic crises will further affect businesses, it seems relevant to investigate what makes businesses more resilient against such crises.

While research on organizational resilience has grown significantly in recent years (Duchek, 2020; Hillmann, 2021; Hillmann & Guenther, 2021; Linnenluecke, 2017; Williams *et al.*, 2017), this literature still features some important gaps. For instance, Linnenluecke (2017, page (p.) 15) concludes that existing resilience research is highly context-dependent. That is, such research has typically focused on organizations' resilience in specific cultural and sector contexts or in response to exogenous events such as economic crises, disasters and terrorist attacks (Linnenluecke, 2017; Williams *et al.*, 2017). In addition, Linnenluecke (2017) mentions that "a prominent approach for assessing resilience has been case-based research". Thus, while insights from the existing literature can be relevant to the specific types of accidents and disasters or similar events, they may not generalize to other kinds of external shocks (Linnenluecke, 2017) such as pandemic crises. Interestingly, in the review papers on organizational resilience by Hillmann & Guenther (2021), Linnenluecke (2017) and Williams *et al.* (2017), the context of pandemic crises, or healthcare crises more generally, is not mentioned. Hence, we lack a thorough understanding of what makes firms resilient to pandemic crises, which have increased in frequency over the past century (Kraus *et al.*, 2020). Recently, studies have analyzed resilience to

pandemic crises in the case of COVID-19, some of which point to digitalization before the crisis as a driver of such resilience (e.g., Beninger & Francis, 2022; Fath *et al.*, 2021). However, these works also rely on qualitative data (Fath *et al.*, 2021) or remain at the conceptual level (Beninger & Francis, 2022). Thus, what a-priori factors make larger populations of firms resilient to pandemic crises remains an open question.

A theory to address this gap and which we draw on in this study is the Parasite Stress Theory of Values (e.g., Thornhill & Fincher, 2014). Generally, this theory assumes that the physiological and psychological immune systems can be mobilized to fight infectious diseases. Earlier research on business and human behavior (e.g., Bennett & Nikolaev, 2020; Faulkner *et al.*, 2004; Navarrete & Fessler, 2006; Nørfelt *et al.*, 2020; Park *et al.*, 2007) has mainly added to our understanding of the psychological immune system and our paper follows this tradition. For instance, by drawing on the psychological immune system of the Parasite Stress Theory of Values and focusing on the effects of the Spanish flu, Bennett and Nikolaev (2020) recently found that countries with high historical exposure to pandemic diseases show lower innovativeness today. The Parasite Stress Theory of Values suggests that this observation is due to the phenomenon that in regions with a high disease prevalence, people tend to activate the psychological immune system and thus minimize the risk of contracting diseases by avoiding interactions with other people. In turn, this avoidance of social contact results in less "mutually beneficial economic and social interactions, thus hindering the division of labor, specialization, and gains from trade possible in broader markets" (Bennett & Nikolaev, 2020, p. 2) and in turns limits innovativeness. Adding to this line of thought by investigating the effects of Spanish flu, Rao and Greve (2018) found that pandemic crises lead to less organization building. Likewise, Nørfelt *et al.* (2020) argue that an openness to foreigners has historically created opportunities for social exchange and gains in technology, shelter and food resources – all of which are endangered in times of pandemic crises when the psychological immune system is activated.

While these dynamics have been at play in historical pandemic crises such as the Spanish flu in the early 20th century, recent business trends may now provide a different environment for entrepreneurs. In particular, digitalization – the "manifold sociotechnical phenomena and processes of adopting and using" digital technologies "in broader individual, organizational, and societal contexts" (Legner *et al.*, 2017, p. 301) – may be seen as a game changer (cf. Dąbrowska *et al.*, 2022; Eller *et al.*, 2020). As indicated by Bennett and Nikolaev (2020), one strategy for curtailing the spread of contagious diseases is avoiding interactions among people. This strategy has been adopted in the COVID-19 crisis under the label of "social distancing": according to Ferguson *et al.* (2020), isolation at home, voluntary quarantine, social distancing by at-risk groups, general social distancing, and lockdown including of governmental and entrepreneurial facilities are the five most important non-pharmaceutical interventions to fight the spread of the SARS-CoV-2 virus.

While these social distancing measures hampered business activity during the Spanish flu pandemic (Bennett & Nikolaev, 2020), higher levels of digitalization may have reduced this harmful effect of social distancing on individual businesses during the COVID-19 crisis. Put differently, we could expect that entrepreneurial firms that had a higher level of digitalization before the COVID-19 crisis show a higher level of resilience to the crisis. As not all firms may benefit from digitalization in the same way (e.g., Dąbrowska *et al.*, 2022; Eller *et al.*, 2020) and organizational resilience is generally found to be context-bound (Hillmann & Guenther, 2021; Linnenluecke, 2017; Williams *et al.*, 2017), we additionally examine whether this general digitalization–crisis resilience relationship is moderated by the respective firms' level of globalization, family firm status, firm size, industry affiliation, strategy, and past performance (see Figure B-1 for a summary of these expectations). To recap, in this paper, we want to answer the following two research questions that have so far remained unanswered:

1. *Do higher levels of digitalization increase entrepreneurial firms' resilience to pandemic crises?*
2. *How do context characteristics (firms' level of globalization, family firm status, firm size, industry affiliation, strategy, past performance, transformational leadership style, and embedding in subnational regions) impact the digitalization–crisis resilience relationship?*

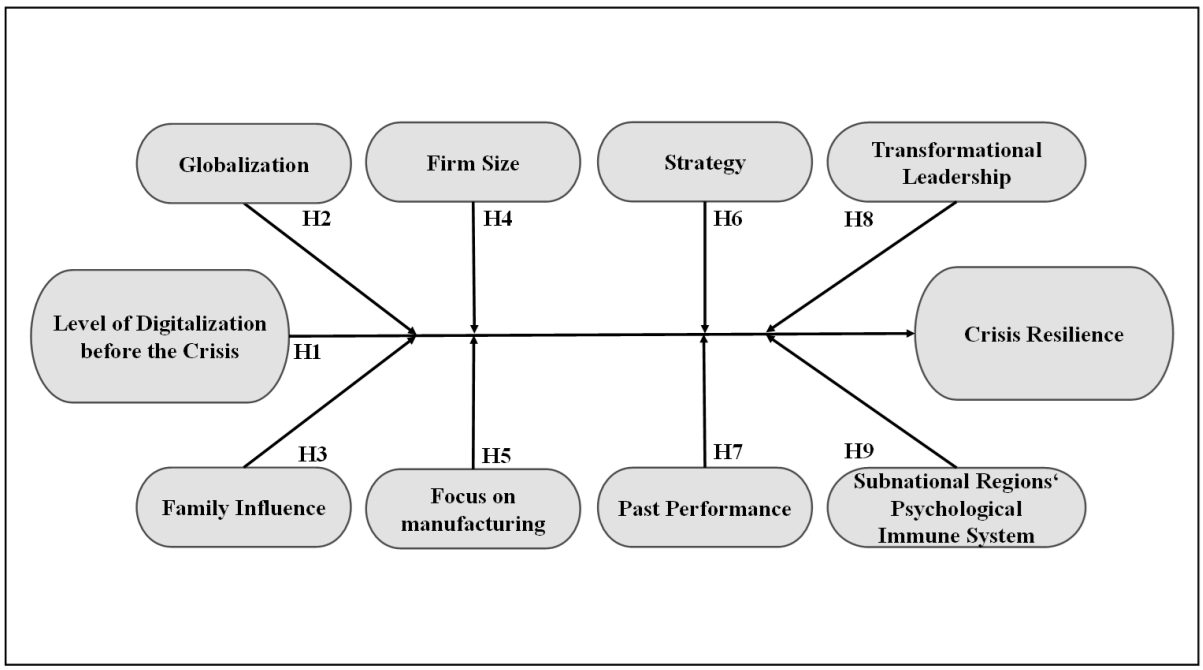

Figure B-1. Research Model

By addressing these questions, we contribute to the organizational resilience literature (Duchek, 2020; Hillmann, 2021; Hillmann & Guenther, 2021; Linnenluecke, 2017; Williams *et al.*, 2017) by being among the first to identify the conditions under which digitalization can make firms resilient to pandemic crises. Moreover, our study adds to the development of the Parasite Stress Theory of Values (Bennett & Nikolaev, 2020; Thornhill & Fincher, 2014) by introducing the notion that measures that can maintain business contacts despite social distancing in times of pandemic crisis (e.g., digital technologies) can help mitigate the detrimental economic impact of such crises, at least in certain contexts (e.g., high levels of globalization and non-family ownership).

The remainder of this paper is organized as follows. The next section positions our research in the existing literature and develops seven hypotheses. Section B.3 then describes our methods, the main characteristics of the sampled firms and respondents, and the procedures used to ensure valid data. Section B.4 presents our results. Section B.5 concludes with a discussion of our findings, their implications, and their main limitations.

B.2 Literature Review, Theory, and Hypotheses

B.2.1 Organizational Resilience

The organizational resilience literature is rooted in several disciplines (e.g., psychology, ecology, management, organizational studies), which may help explain why no uniform conceptualization or definition of resilience has emerged (Linnenluecke, 2017; Williams *et al.*, 2017). However, some common threads within the resilience literature can be identified. For instance, much of the research on organizational resilience has focused on how well firms can respond to external threats or even shocks such as natural disasters, terrorist attacks, and financial crises (Hillmann, 2021; Hillmann & Guenther, 2021; Linnenluecke, 2017; Williams *et al.*, 2017). In this literature stream, there is some agreement that such resilience needs to be defined in light of the specific context being analyzed (Hillmann & Guenther, 2021; Parker & Ameen, 2018; Shin & Park, 2021; Linkov *et al.*, 2014).

The context we examine, namely, a pandemic crisis or, more broadly, a healthcare crisis, has so far been overlooked in the organizational resilience literature, as reflected in three recent and well-cited reviews of the topic (Hillmann & Guenther, 2021; Linnenluecke, 2017; Williams *et al.*, 2017). Nevertheless, pandemic crises can be regarded as "inconceivable, unscheduled, and unexpected" (Williams *et al.*, 2017, p. 735) and thus fit the definition of Williams *et al.* (2017) as a crisis triggered by a specific event. In our empirical setting, this event is the outbreak and worldwide spread of COVID-19. As argued by Hillmann and Guenther (2021, p. 24), in such an event-triggered crisis, organizational resilience is mainly geared toward stability and can be

defined as an organization's ability to "endure or bear the impacts of change or a disruptive event" and to "keep the organization functioning". Given our research objectives in Section B.1, we concentrate on one capability at the organizational level (i.e., digitalization) that was put in place before the event-triggered crisis. That is, for the purpose of our study, we view digitalization before the COVID-19 pandemic as a preparation capability that later became "necessary in times of crisis", even though the respective organizations may have been prepared "without knowing, if, when, or where" this preparation capability would become relevant in the context of the event-triggered crisis studied in this paper (Duchek, 2020, p. 226; see also Giones *et al.*, 2020).

With this focus on digitalization before the crisis as a preparation capability, we aim to complement earlier research that has examined entrepreneurial firms' responses to the pandemic crisis caused by COVID-19 (e.g., Bartik *et al.*, 2020; Dejardin *et al.*, 2022; Emami *et al.*, 2021; Giotopoulos *et al.*, 2022; Hadjielias *et al.*, 2022; Hammerschmidt *et al.*, 2021; Kraus *et al.*, 2020; Khurana *et al.*, 2022; Kusa *et al.*, 2022; Schwaiger *et al.*, 2022; Soluk, 2022; Soluk *et al.*, 2021; Wendt *et al.*, 2021; Xie *et al.*, 2022), and thus into coping and adaption forms of organizational resilience (Duchek, 2020). In general, these earlier findings highlighted the significant variance among entrepreneurial firms' responses to the COVID-19 pandemic crisis (e.g., Hadjielias *et al.*, 2022; Sharma *et al.*, 2022), including their reliance on digital technologies (Giotopoulos *et al.*, 2022; Khurana *et al.*, 2022; Soluk, 2022; Soluk *et al.*, 2021; Wendt *et al.*, 2021). At the same time, these studies highlighted several factors that could have influenced how such firms responded (for a review, see Sharma *et al.*, 2022), including their status as family firms (e.g., Hadjielias *et al.*, 2022; Kraus *et al.*, 2020; Soluk *et al.*, 2021), industry affiliation (Bartik *et al.*, 2020; Giotopoulos *et al.*, 2022), organizational size (Bartik *et al.*, 2020; Kraus *et al.*, 2020; Wendt *et al.*, 2021), involvement in global commerce and supply chains (Wendt *et al.*, 2021), the commandment of dynamic capabilities (Dejardin *et al.*, 2022) and

resource allocation skills (Soluk, 2022), the individual entrepreneurial orientation and management style of the firm owners (Emami *et al.*, 2021; Khurana *et al.*, 2022; Kusa *et al.*, 2022), financial resources built on their past financial performance (Bartik *et al.*, 2020), their regional embedding (Hammerschmidt *et al.*, 2021; Wendt *et al.*, 2021), an innovation-friendly culture (Giotopoulos *et al.*, 2022) and inclusion in business networks (Khurana *et al.*, 2022; Xie *et al.*, 2022). While these factors need not function in the same way for preparation forms of organizational resilience as for coping and adaption forms (Duchek, 2020), we build on such prior work and examine these contextual characteristics as potential moderators of the general digitalization–resilience relationship.

Like other event-triggered crises, pandemic crises can come with enormous economic and social costs such as lower productivity, firm closures, and unemployment (Bertschek *et al.*, 2019; Frick, 2019; Landini *et al.*, 2020; Rapaccini *et al.*, 2020; Hammerschmidt *et al.*, 2021). These effects are not only short-term, but may instead have long-term consequences. As indicated above and motivated by the Parasite Stress Theory of Values, Bennett and Nikolaev (2020) showed that countries with high personal and economic exposure to the Spanish flu in the early 20th century are less innovative today. Given this theory's focus on developing resilience against infectious diseases (Thornhill & Fincher, 2014), it fits our pandemic crisis-context well and we detail the theory's main tenets next.

B.2.2 Parasite Stress Theory of Values

According to the Parasite Stress Theory of Values, two main strategies can be deployed to overcome times of infectious diseases and thus develop resilience: (1) adapting the physiological immune system and (2) adapting the psychological (e.g., behavioral) immune system (Schaller, 2011). In this paper, as in other business-related research on this theory (e.g., Bennett and Nikolaev, 2020; Mortensen *et al.*, 2010), we draw on the second strategy – adapting the

psychological immune system, which can be described as "a complex suite of cognitive, affective, and behavioral mechanisms that ultimately help prevent pathogen transmission in the face of recurrent infectious disease threats" (Ackerman *et al.*, 2018, p. 2).

The theory predicts that if the parasite stress increases, social groups will adopt their psychological immune system and will become more resilient toward infectious diseases (Thornhill & Fincher, 2014). For instance, the psychological immune system can lead to higher conformity to cultural norms and more social conservatism (Ackerman *et al.*, 2018; Fincher and Thornhill, 2008; Faulkner *et al.*, 2004). Also, the psychological immune system can be reflected in stereotyping, such as aversion toward outgroup members, especially those associated with the pandemic disease, and lead to phenomena such as xenophobia, neophobia, philopatry, and ethnocentrism (Nørfelt *et al.*, 2020; Thornhill & Fincher, 2014). A series of experimental studies has generally confirmed this mechanism of the psychological immune system as predicted by the Parasite Stress Theory of Values (e.g., Faulkner *et al.*, 2004; Navarrete & Fessler, 2006; Park *et al.*, 2007).

At the same time, the theory starts from the assumption that the institutions and values vary between social groups, which is why Thornhill and Fincher (2014) expect to see differences in the psychological immune system between social groups such as continents and countries. In particular, as part of this psychological immune system, the theory suggests that in regions with a high disease prevalence, people tend to minimize the risk of contracting by avoiding interactions with other people. Consequently, people in a closed group, who are confronted with the risk of infection by a disease, tend to be less open to new experiences as well as to economic and social interactions with people in other groups; hence, they are more introverted (Mortensen *et al.*, 2010). Such behavior has been documented not only for Spanish flu (Bennett & Nikolaev, 2020; Rao & Greve, 2018), but also for other infectious diseases such as the plague in medieval Europe (e.g., Linkov *et al.*, 2014; Perciaccante *et al.*, 2021). While not explicitly referring to

the Parasite Stress Theory of Values, Linkov *et al.* (2014) present a case study of how the medieval state of Venice tried to keep the plague off the main islands by stopping incoming ships already at the outer islands and separating their passengers from Venice's main population until the health of the passengers had been evaluated. While such measures were meant to save the people in a closed social group (e.g., the citizens of medieval Venice) from infection, lowered levels of interactions with other social groups may also jeopardize several of the benefits of cross-cultural interaction such as sharing knowledge, technology or warfare strategies (Nørfelt *et al.*, 2020).

In line with the latter notion, Bennett and Nikolaev (2020) have investigated the long-term effects of the Spanish flu and found that lower degrees of interaction have historically hindered the division of labor and trade more generally, which in turn may have resulted in lower innovativeness. By contrast, in regions less severely hit by the Spanish flu, Bennett and Nikolaev (2020) found higher levels of innovativeness today. The Parasite Stress Theory of Values suggests that this finding can be explained by the fact that people in less-hit regions can continue to be more open to interact with other people and engage in economic collaboration. Such less hit regions can thus continue to benefit from learning from other and foreign people (Nørfelt *et al.*, 2020). Rao and Greve (2018) add to the detrimental effect on collaborative business activity found by Bennett and Nikolaev (2020) by showing that this effect is more pronounced for disasters that can be attributed to human behavior such as pandemic crises than natural disasters (e.g., caused by weather shocks). Rao and Greve (2018) theorize that this stronger detrimental economic effect of human-made crises such as pandemics is due to the less pronounced feeling of shared fate and need for cooperation than in situations of natural disasters.

Existing research has mostly applied the Parasite Stress Theory of Values at the continent or country level. That is, psychological immune system differences and their effects have been found for comparisons between continents and countries (e.g., Bennett & Nikolaev, 2020;

Thornhill & Fincher, 2014). For this reason, Bennett and Nikolaev (2020) called for further studies of the applicability of the theory not only between countries, but also within countries and thus between subnational regions. Below, we take such reasoning into account, but aim to drill down even further to social groups. As indicated above, we theorize that we may not only see differences between continents, countries and subnational regions when it comes to social groups' psychological immune system. By contrast, we adopt the notion that individual organizations such as entrepreneurial firms can also be viewed as social groups characterized by their idiosyncratic institutions and values (e.g., Logue *et al.*, 2015; Lounsbury, 2007, 2008). With the following hypotheses, we thus aim to test the applicability of the Parasite Stress Theory of Values for organization-level studies for the specific case of digitalization.

B.2.3 Digitalization and Resilience against Pandemic Crises

As just discussed, for the Spanish flu, the predictions of the Parasite Stress Theory of Values, especially those of the adaptions of the psychological immune system, seem to hold – at least for between-country comparisons. Existing work on this theory assumes that physical distancing automatically leads to fewer interactions and detrimental long-term economic effects (e.g., Bennett & Nikolaev, 2020; Thornhill & Fincher, 2014). However, recent economic and technological trends may have created an environment that has spawned different psychological dynamics than those in the early 20th century when the Spanish flu crisis occurred. In particular, the growing digitalization of and interactions among businesses may now provide a vehicle to maintain contacts despite measures of physical social distancing (Mäntymäki *et al.*, 2022), including business contacts with key external stakeholders such as suppliers and customers (Qader *et al.*, 2022). Hence, in our contemporary COVID-19 setting and different to the situation during the Spanish flu, the psychological immune system of many individuals and entrepreneurs seems to understand that staying in contact via digital technologies is safe if personal contact and thus the risk of infection are minimized. In this way, as shown by Mäntymäki *et al.*

(2022), higher levels of digitalization can be an effective way to deal with psychological life stressors. For instance, entrepreneurs can stay in contact with their stakeholders despite social distancing measures and thus avoid the additional stressor of fearing business failure.

At the same time, when a pandemic crisis unfolds, digital alternatives to personal communication and business transactions may not immediately be available. That is, like with other kinds of infrastructures, digital infrastructures also need time to build, test, and implement (Bullini Orlandi *et al.*, 2021; Giotopoulos *et al.*, 2022; Urbinati *et al.*, 2020). Consequently, we expect that businesses that had already built digital infrastructures to a higher degree before a pandemic crisis are better equipped to cope with that crisis. In short, such firms should be more resilient (Linnenluecke, 2017). Hence, we view digitalization before the crises as a preparation capability (Duchek, 2020; Giones *et al.*, 2020) to develop resilience to pandemic crises and expect that firms with higher levels of digitalization before a pandemic crisis should be more resilient in the face of such a crisis (Pedersen *et al.*, 2020; Rapaccini *et al.*, 2020; Belhadi *et al.*, 2021). Consequently, we hypothesize:

***Hypothesis 1**. (H1).* *Entrepreneurial firms that had become more digitalized before a pandemic crisis are more resilient to the effects of that crisis.*

B.2.4 Moderating Effects

As indicated above and addressed in our second research question, the existing literature on organizational resilience (Hillmann, 2021; Hillmann & Guenther, 2021; Linnenluecke, 2017; Williams *et al.*, 2017) has highlighted that preparedness to crisis events and thus the development of organizational resilience seems highly context-dependent. Thus, we now turn to the important aspects of context that can be assumed to impact the general digitalization–resilience relationship proposed in H1.

Among these context factors is globalization. In particular, we expect the relationship between digitalization and resilience to pandemic crises to be more pronounced for globalized firms. Globalization can be understood as the increasing interdependence of and connectivity between national economies including suppliers, governments, and consumers in various countries (Devezas, 2020; Knight, 2000). Entrepreneurial firms that are strongly affected by globalization usually have a supplier and customer base spread across several countries or even continents (e.g., Belhadi *et al.*, 2021; Ekinci *et al.*, 2022; Hiebl & Pielsticker, 2022; Laanti *et al.*, 2007). If social distancing measures are introduced in response to a pandemic crisis, then personal contacts between entrepreneurs and their international partners would be hit hard due to travel restrictions and outright travel bans (Brem *et al.*, 2021; Nummela *et al.*, 2020). That is, close personal contacts between global parties may be more difficult to maintain without the extensive use of digital technologies. Consequently, for entrepreneurial firms with a global orientation, higher levels of digitalization before a pandemic crisis seem to be particularly relevant to provide higher resilience to the crisis. By contrast, less globalized entrepreneurial firms, which are mainly active at the local or regional level, may find it easier to maintain personal contacts without increased levels of digitalization. Their business contacts may be predominantly found in the same region or country and thus less affected by travel bans and closed borders. Hence, we hypothesize:

***Hypothesis 2**. (H2).* *The relationship described in H1 is more pronounced if the respective firm is more affected by globalization.*

Also, the relationship between digitalization and resilience to pandemic crises as proposed in H1 can be expected to be more pronounced for non-family firms than for family firms. According to the literature, in the large group of entrepreneurial firms, family firms comprise an important subgroup that differs from non-family entrepreneurial firms in several ways (e.g., Zahra *et al.*, 2004). For instance, family businesses are characterized by a built-in focus on resilience

against crises, which helps them to survive crises and quickly regain their performance afterwards (Amann & Jaussaud, 2012; Calabrò *et al.*, 2021).

A prime reason for such resilience can be found in family businesses' usual long-term orientation (Clauß *et al.*, 2022; Le Breton-Miller and Miller, 2022; de Groote *et al.*, 2023). That is, many family firms tend to strive for long-term business stability and, therefore, show higher levels of risk aversion (De Massis *et al.*, 2015; Hiebl, 2013; Soluk, 2022; Soluk *et al.*, 2021). For instance, such risk aversion is reflected in the finding that family firms are often reluctant to leave traditionally stable and attractive markets and are slow to react to disruptive technological change (de Groote *et al.*, 2023). For instance, Ceipek *et al.* (2021) recently found that family firms are less open than non-family firms to exploratory innovation related to the Internet of Things. In addition, family firms' typical risk aversion is reflected in their lower levels of debt and higher levels of equity (e.g., González *et al.*, 2013). While these different forms of risk aversion may hamper family business development in times of strong economic growth, they may also prevent family firms from severe economic downsides in times of crisis (Calabrò *et al.*, 2021; Le Breton-Miller and Miller, 2022). A potential mechanism behind this relationship was recently highlighted by Leppäaho and Ritala (2022). Based on a single case study of a Finnish family business, these authors highlighted that family businesses may accumulate slack resources during economically calm periods, which they then use in times of crisis not only to ensure their survival, but also to potentially mobilize renewal and innovation endeavors when other firms such as non-family firms cannot afford to do so. Interestingly, Leppäaho and Ritala (2022, p. 6) referred to this behavior of retaining earnings and creating slack resources as providing "psychological and emotional safety" to the family business and controlling family. Relatedly, Calabrò *et al.* (2021, p. 5) referred to the psychological phenomenon that a controlling family's "conviction in its capability to find solutions and resources to cope with challenges as a group can be considered as a cornerstone of resilience", highlighting another psychological

source of the higher built-in resilience of family firms. That is, family businesses' long-term orientation, retained earnings during good or calm economic times and the controlling family's cohesion may enable them to ride out economically rough times such as those during a pandemic with less psychological stress.

However, if we assume that due to the just described behavior, family firms and their managers on average experience less stress during pandemic crises than their non-family counterparts, we can infer that the psychological benefits of higher levels of digitalization before a pandemic crisis are less valuable to family firms than to non-family firms. That is, non-family firms do not usually feature an equally strong and built-in long-term orientation and crisis resilience as that of family firms (Amann & Jaussaud, 2012). Therefore, they may not command the same level of slack resources and psychological resilience and generally be more vulnerable to crises. It can thus be expected that higher levels of digitalization are more important for non-family firms to develop resilience against pandemic crises. That is, the above-described notion that higher levels of digitalization before the crisis may work against entrepreneurial firms' psychological stressors should be more pronounced for non-family firms, as, on average, they cannot be expected to have an equally strong psychological safety net as family firms. Hence, we hypothesize:

***Hypothesis 3**. (H3). The relationship described in H1 is more pronounced for non-family businesses than for family businesses.*

Besides, the relationship between digitalization and resilience to pandemic crises can be expected to be more pronounced for smaller entrepreneurial firms than for their larger counterparts. Compared with smaller firms, larger ones usually enjoy more and better access to resources (Spithoven *et al.*, 2013) such as access to finance (Bartik *et al.*, 2020; Cowling *et al.*, 2015; Wendt *et al.*, 2021). Due to this higher level of resources, larger entrepreneurial firms

usually have a more stable basis when entering crises, which makes them more likely to be resilient to such crises. In contrast, for smaller entrepreneurial firms, crises such as pandemics can be expected to threaten their existence, as they usually do not have the resources to weather extended periods with fewer sales, lower earnings, and associated liquidity problems (Eggers, 2020). Consequently, we expect that for smaller firms, higher levels of digitalization before the crises are even more important to develop resilience against a pandemic crisis than for larger firms. Hence, we hypothesize:

***Hypothesis 4**. (H4). The relationship described in H1 is more pronounced for smaller entrepreneurial firms than for larger entrepreneurial firms.*

In addition, for firms that are mainly active in the manufacturing industry, it can be expected that the relationship between digitalization and resilience to pandemic crises is less pronounced. For other industries such as retail, lockdowns during the COVID-19 pandemic have made in-person retail business difficult or non-existent in many countries worldwide (Pantano *et al.*, 2020). That is, for such non-manufacturing industries, higher levels of digitalization before a crisis – such as e-commerce in the case of retail firms – can be expected to be a more important driver of the resilience against pandemic crises as compared with manufacturing firms. In contrast, for manufacturing firms, even higher levels of digitalization might not significantly affect their resilience against pandemic crises. First, several parts of the manufacturing industry such as producers of medical ventilators, N95 masks, and hand sanitizers experienced increased demand during the COVID-19 pandemic (Brem *et al.*, 2021) – irrespective of these businesses' level of digitalization. Second, due to social-distancing measures during pandemic crises and the current inability to apply remote work to shopfloor levels, other manufacturing firms tend to be either shut down completely or have their operations upheld thanks to protective measures (Cai and Luo, 2020). On both options, the level of digitalization can be expected to have little impact on their resilience against pandemic crises. Hence:

***Hypothesis 5**. (H5). The relationship described in H1 is less pronounced if the respective firm is primarily focused on manufacturing activities.*

Also, it can be expected that the relationship between digitalization and resilience to pandemic crises is more pronounced for prospector firms and less pronounced for defender firms. The latter firms primarily occupy niches in markets where relatively stable ranges of products or services are offered. Such defender firms are usually not at the forefront of market developments related to new products or services and tend to ignore changes that have no immediate impact on current activity areas (Miles & Snow, 1978). In contrast, prospector firms usually make changes to products or services frequently, are generally more open to radical innovation, and are thus more used to translating such innovation into their operations than defender firms (e.g., Laforet, 2008). Given their higher familiarity in dealing with innovation such as digitalization, we expect that prospector firms are able to "make more out of higher levels of digitalization" in terms of developing resilience to pandemic crises in the short term. Hence:

***Hypothesis 6**. (H6). The relationship described in H1 is more pronounced for prospector firms and less pronounced for defender firms.*

As discussed above, it needs significant resources to not only build digital infrastructures, but also put them in place. Not least, such resources could be available due to superior past performance, which is why past performance can be expected to moderate the relationship proposed in H1, too. That is, we expect the relationship between digitalization and resilience to pandemic crises to be more pronounced for firms with high levels of past performance. Such high-performing firms are likely to have retained some of their high recent earnings and thus created reserve funds that can be drawn upon in times of pandemic crisis. While we have theorized above that high levels of digitalization are per se a driver of such resilience (see H1), we assume that the impact of this driver can even be enhanced by quick and bold measures to draw on and

extend digitalization endeavors already started before the crisis (Rapaccini *et al.*, 2020). Such measures are likely to require the short-term availability of financial resources. Such resources are more likely to be found in firms with recent outperformance and sufficient reserve funds than in firms which show recent underperformance (Pal *et al.*, 2014). That is, we expect high-performing firms to be able to use their reserve funds to develop more quickly and effectively high levels of digitalization before a crisis into crises resilience than low-performing firms. Hence, we assume:

***Hypothesis** 7. (H7).* *The relationship described in H1 is more pronounced for firms with high levels of past performance than for firms with low levels of past performance.*

Similar to the abundant resources created by past performance, apt leadership personnel can be expected to be crucial when trying to transfer higher levels of digitalization into resilience to a pandemic crisis. For many firms, a pandemic crisis represents a state of upheaval and transformation, which is why we examine transformational leadership (e.g., Bass, 1999; Bass & Riggio, 2006), which we expect to moderate the relationship proposed in H1. That is, we expect the relationship between digitalization and resilience to pandemic crises to be more pronounced for firms with high levels of transformational leadership. Prior research has found that building and introducing digital infrastructures is an important first step, but that making the most of these infrastructures is an equally important second step that relies heavily on apt managerial skills (Dong *et al.*, 2009; Jafari-Sadeghi *et al.*, 2023; Zangiacomi *et al.*, 2020). During business transformations, it may be necessary to deal with continuously changing environments, especially during times of pandemic crises (Kusa *et al.*, 2022; Li *et al.*, 2022). To make the most of technological innovation such as new digital infrastructures, managers with a transformational leadership style may thus be specifically valuable (Birasnav, 2013; Zoltners *et al.*, 2021). Managers who have such a transformational leadership style serve as a transformation role model to an

organization's employees by having a charismatic personality and motivating and inspiring employees to give their best to make the transformation a success (Bass, 1999; Bass & Riggio, 2006; Farrukh *et al.*, 2022; Gerards *et al.*, 2021; Hiebl & Pielsticker, 2022). We thus suspect that if firms feature managers with such a transformational leadership style, such firms can better translate their high levels of digitalization before the crisis into higher levels of resilience to pandemic crises. Therefore:

***Hypothesis 8**. (H8).* *The relationship described in H1 is more pronounced for firms featuring high levels of transformational leadership than for firms featuring low levels of transformational leadership.*

Finally, as suggested by Bennett and Nikolaev (2020), we anticipate that entrepreneurial firms' embedding in different subnational regions moderates the relationship proposed in H1. Just like for continents and countries (Thornhill & Fincher, 2014), the values and institutions of subnational regions may vary, as might their psychological immune system when facing an infectious disease (Bennett & Nikolaev, 2020). In particular, it can be expected that some subnational regions put in place more rigid measures than others. For instance, more rigid regions may be characterized by more rigidly restrictive opening hours as well as more social distancing and exit prohibition measures during pandemic crises (Behnke, 2021). By contrast, in subnational regions with a less rigid psychological immune system, organizations have more room for maneuver. We thus assume that in such regions with less rigid restrictions, the level of digitalization before the crisis has a stronger effect on organizational resilience than in regions in which firms have less discretion. Hence, we assume:

***Hypothesis 9**. (H9).* *The relationship described in H1 is more pronounced for firms located in subnational regions with less rigid psychological immune system reactions than for firms located in subnational regions with more rigid psychological immune system reactions.*

B.3 Methods

B.3.1 Sampling, Data, and Tests for Potential Biases

B.3.1.1 Sampling Procedures

To test our hypotheses, we conducted an online survey targeting German Mittelstand firms since they have been depicted as usually showing high levels of entrepreneurship (De Massis *et al.*, 2018; Heider *et al.*, 2022; Logue *et al.*, 2015). Such high levels of entrepreneurship are often due to the need for German Mittelstand firms to innovate despite their scarce financial and human resources (De Massis *et al.*, 2018; Weigel *et al.*, 2022). This high level of innovation efficiency is usually found to be rooted in German Mittelstand firms' pronounced entrepreneurial mindset (Heider *et al.*, 2022), which makes them a useful sample to study entrepreneurial firms. In line with De Massis *et al.* (2018), we follow the German Mittelstand definition of Becker *et al.* (2008) and define Mittelstand firms as those with a maximum of 3000 employees.

Most of the survey questions were based on established constructs from the English-language literature. We translated these questions into German – the language of our questionnaire. Our questionnaire was then retranslated into English by a fellow researcher who was not involved in the rest of the research process. This retranslated version allowed us to check potential translation errors by comparing the original English-language survey items with those in the retranslated version (cf. Brislin, 1970; Maneesriwongul & Dixon, 2004). In addition, we invited 10 pretesters (five academics, five practitioners) to provide feedback on the comprehensibility and flow of the questionnaire (cf. Hunt *et al.*, 1982). Based on our language comparisons and the pretest feedback, we slightly amended the german-language questionnaire.

From the Amadeus database, we extracted a sample of 1118 Mittelstand firms, which had a maximum of 3000 employees and were situated in the same federal state or a federal state close to our university (i.e., those situated in Hesse, North Rhine-Westphalia, or Rhineland Palatinate) since past research has shown that geographic proximity between survey authors and addressees results in higher response rates (Bartholomew & Smith, 2006). This data set exclusively comprised non-listed firms that were not part of the financial services industry. The Amadeus data included the firms' industry affiliation, their numbers of employees, and the contact information of each firm. We then manually searched for the firms' top managers' e-mail addresses. We specifically targeted CEOs and other members of the top management team, since these top managers usually have an excellent and wide-ranging overview of their firms' activities (Zahra, 1991).

The survey invitations that clearly indicated the university sponsorship of our survey (cf.'Mellahi & Harris, 2016) were sent out to these top managers by e-mail in early July 2020 and reminders were sent through the middle of August 2020. The timeframe of the survey was in the midst of the COVID-19 crisis, which enabled us to capture the perceived impact of the crisis on the surveyed firms at that time without involving potential issues of recall bias, which could have materialized if we conducted our survey several months or years later. To facilitate responses, we assured participants of their anonymity (cf. Mellahi & Harris, 2016). In addition, since past research has found that incentives usually lead to higher response rates (Singer & Ye, 2013), we offered our survey addressees two kinds of incentives upon the completion of the survey: (1) an executive research report and (2) a donation of EUR 10 to a charity of their choice. Survey respondents could choose between receiving none, one, or both incentives.

In total, 156 complete or partially complete questionnaires were obtained. This resulted in a response rate of 13.95 %. In general, response rates in management and entrepreneurship research have been declining in recent decades (e.g., Chidlow *et al.*, 2015; Pielsticker & Hiebl,

2020), especially those targeting top executives (Cycyota & Harrison, 2006). However, our achieved response rate seems satisfactory, as it is in line with those of comparable recent and well-published survey studies (e.g., Rodil *et al.*, 2016; Förster, 2015; Popa *et al.*, 2017; Xie *et al.*, 2022). Of the 156 cases, 23 had to be removed due to missing information on the variables of interest in this study. We thus used the remaining 133 cases with full information on the measures discussed below.

B.3.1.2 Potential Biases

In times of decreasing response rates (Chidlow *et al.*, 2015; Pielsticker & Hiebl, 2020), surveys addressing individual top managers offer a pragmatic approach to realizing sufficiently large sample sizes (Montabon *et al.*, 2018) and drawing on respondents' knowledge about their firms. At the same time, the results of such surveys may be susceptible to common method bias (Podsakoff *et al.*, 2003; Montabon *et al.*, 2018). Although we include archival data on the varying levels of COVID-19-related restrictions in the subnational regions we cover, most of the data we analyze below were generated by a single respondent in each firm. Consequently, and in line with prior research (e.g., Podsakoff *et al.*, 2003), we took several established measures to avoid common method bias from arising. First, as indicated above, we ensured our respondents full anonymity. Second, we implemented a lag between the independent and dependent variables in the flow of our questionnaire to avoid respondents building their own mental models, which may bias our results. Third, we drew on pretested questions from the research literature and conducted extensive pretests. This way, we wanted to ensure that our questions were, for instance, simple, concise, specific, and did not feature complicated syntax (Podsakoff *et al.*, 2003). Fourth, we integrated a marker variable in our questionnaire. As suggested by Lindell and Whitney (2001), we used a highly reliable multi-item construct that is theoretically unrelated to our variables – *Executive Job Demands* (see below for measurement). We computed correlations between this variable and all other variables in our study (see Table B-4) (Calic &

Ghasemaghaei, 2021; Lindell & Whitney, 2001). These correlations provide no signals of a common method bias as the maximum significant correlation value was rather low (i.e., -0.268; see Cohen, 1988 on correlation effect sizes). Finally, we conducted a Harman's one-factor test. The basic assumption of this test is that common method variance is present when a single factor explains much of the covariance between the variables (Podsakoff *et al.*, 2003; Podsakoff and Organ, 1986). Our exploratory factor analysis on all the survey-generated variables included in this study shows that no single factor explains most of the covariance between these variables (the largest factor accounts for only 16.77 % of the covariance). Therefore, our survey data seem unlikely to suffer from common method variance.

Another bias potentially affecting survey studies is non-response bias (Van Loon, 2003), which arises if the percentage of non-respondents is high (Frohlich, 2002). A common type of non-response analysis is a comparison of late and early respondents since non-respondents are viewed as similar to late respondents (e.g., Van der Stede *et al.*, 2005). In line with the approach suggested by Armstrong and Overton (1977), Table B-1 compares the mean values between early (25^{th} quantile) and late respondents (75^{th} quantile) for all the variables involved in our study. To use the correct tests for analyzing the differences between early and late respondents, we tested all the variables in our sample using a Kolmogorov–Smirnov test and Shapiro–Wilk test, finding that none of the variables were normally distributed, excluding *Past Performance*. Consequently, we used the non-parametric Mann–Whitney *U* test to check for significant differences between early and late respondents for non-normally distributed variables except the dichotomyous variables *Industry*, *Family Business*, *Firm Size*, and *Strategy*. For these latter variables, we used the chi-square test to check for significant differences, and we used the *t*-test for the normally distributed variable *Past Performance*. We found no significant difference between early and late respondents and thus no signals of non-response bias.

Variable	Early Respondents	Late Respondents	p-value
	Mean	Mean	
Crisis Resilience	3.73	4.12	.332
Family Business	0.58	0.61	.802
Firm Size 250-499	0.21	0.18	.757
Manufacturing	0.52	0.64	.319
Strategy	0.30	0.42	.306
Past Performance	4.65	4.54	.654
Level of Digitalization before the Crisis	43.88	35.39	.135
Globalization	3.82	3.84	.995
Transformational Leadership	5.83	5.83	1.000
Subnational Region North Rhine-Westphalia	0.67	0.76	.415
Subnational Region Hesse	0.12	0.21	.322

Table B-1. Comparison of the variables involved in this study for late respondents and early respondents

B.3.2 Measures

B.3.2.1 Independent Variable

As suggested by prior literature (Bergkvist & Rossiter, 2007; Niemand *et al.*, 2021), the *Level of Digitalization before the Crisis* was measured by a single item indicating the firm's level of digitalization. In line with Niemand *et al.* (2021), respondents were asked to indicate the digitalization of their firm's business model before the COVID-19 crisis from 0 % to 100 %.

B.3.2.2 Dependent Variable

Crisis Resilience was measured using a reverse-coded scale adapted from Becker *et al.* (2016). Becker *et al.* (2016) established a construct to measure the impact of the global financial crisis in 2008. We slightly adapted the questions for our specific empirical setting and the COVID-19 crisis. Respondents were asked to indicate the extent to which their firm was impacted by the COVID-19 crisis along six dimensions on a seven-point Likert scale (from "not at all" to "very strongly"). We acknowledge that the various instruments used to measure organizational resilience in survey studies lack agreement on a generally accepted survey construct (for reviews, see Duchek, 2020; Linnenluecke, 2017). We opted for the scale developed by Becker *et al.* (2016) since this scale, too, was designed to measure the impact of a crisis at the organiza-

tional level (and not the individual level such as the frequently applied PsyCap measure introduced by Luthans *et al.*, 2007). In addition, the Becker *et al.* (2016) scale had already been applied in a similar fashion in our country of data collection (Germany), which lowered potential biases due to cultural differences in interpreting and answering our questionnaire.

B.3.2.3 Moderator Variables

Globalization. Based on the scale presented by Knight (2000), we asked respondents to indicate their agreement on six dimensions (see Table B-2) of the globalization of their firm on a seven-point Likert scale (from "completely disagree" to "completely agree").

Family business. Family business research has not agreed on a generally accepted definition of family firms, but many empirical studies rely on survey respondents' self-assessment of their firms as family or non-family firms (Steiger *et al.*, 2015). We followed this approach and coded this variable as "1" (yes) if the respondent considered his or her firm as a family firm and "0" if otherwise.

Firm Size. We operationalized *Firm Size* based on the number of employees (e.g., Speckbacher & Wentges, 2012; Tocher & Rutherford, 2009) and created two size classes: *Firm Size 250–499* is coded as "1" if the firm has more than 249 and fewer than 500 employees, and coded as "0" if otherwise.

Manufacturing. This dichotomous variable is coded as "1" if the firm primarily belongs to the manufacturing industry in the respondents' view, and "0" if otherwise.

Strategy. We operationalized this variable using two of Miles and Snow's (1978) strategic archetypes: prospectors and defenders. After reading a short description of two types of firms, one reflecting a prospector strategy and the other a defender strategy, respondents had to rate which of the two descriptions fits their firms best. The resulting *Strategy* variable was coded "1" for prospectors and "0" for defenders.

Past performance. We measure *Past Performance* based on the subjective performance measurement suggested by Eddleston and Kellermanns (2007) consisting of eight items. For all items, our survey respondents were asked to indicate on a seven-point Likert scale whether they performed better or worse than their competitors in the three years before our survey.

Transformational Leadership. We measured the *Transformational Leadership* style as suggested by Rowold and Poethke (2017). Their measurement includes 24 items along the following six dimensions: vision, team spirit, innovation, focus on individuality, performance development and setting an example to somebody. We used a seven-point Likert scale from "completely disagree" to "completely agree" and asked our participants the extent to which they agree with the 24 items regarding their behavior toward their employees in the labor context. In line with the literature, we operationalized *Transformational Leadership* as a second-order construct[2] and a metrically scaled variable (e.g., MacKenzie *et al.*, 2005; Tyssen *et al.*, 2014).

Subnational Regions. To measure *Subnational Regions*, we used the restrictiveness index developed by Behnke (2021). This index measures the restrictiveness of the measures introduced by the 16 federal states (*Bundesländer*) in Germany in response to the COVID-19 pandemic during our period of data collection (i.e., mid-2020, "KW 33" as per Behnke, 2021). In Germany, federal states have autonomy and a high degree of discretion, and therefore they respond to pandemic crises differently (Büthe *et al.*, 2020; Karaulova & Kroll, 2021). The degree of restrictions in response to the COVID-19 pandemic thus greatly differed across federal states (Büthe *et al.*, 2020), which allowed us to distinguish the influence of more or less rigid subnational regions. According to Behnke (2021), the federal state of North Rhine-Westphalia featured much more rigid restrictions in mid-2020 than the federal state of Hesse, which scored

[2] After having conducted confirmatory factors analyses to create the first-order constructs, we also calculated the significance of the formative weights (path coefficients) and VIFs to address potential multicollinearity problems (Hair *et al.*, 2019). In line with the literature (e.g., Braumann *et al.*, 2020; van Riel *et al.*, 2017), we used the repeated indicator approach. No VIF value was above three; hence, the results indicated no multicollinearity problems and all the formative weights were significant (Hair *et al.*, 2019).

very low on the scale presented by Behnke (2021). We thus viewed North Rhine-Westphalia as a subnational region with a more rigid psychological immune system and Hesse as a subnational region with a less rigid psychological immune system. To incorporate these subnational regions into our analyses, we created two dummy variables. For firms that have their headquarters in North Rhine-Westphalia, we coded *Subnational Region North Rhine-Westphalia* "1" and "0" otherwise. Likewise, we coded *Subnational Region Hesse* "1" if the firm is located in Hesse and "0" otherwise. The federal state of Rhineland Palatinate thus served as the reference group; firms located in this federal state were coded "0" for both dummy variables.

B.3.2.4 Marker Variable

The multi-item construct *Executive Job Demands* is based on the job demands measurement suggested by Janssen (2000). For all eight items by Janssen (2000), we asked our survey participants to indicate on a seven-point Likert scale how often the statements applied to their current organizational role (from "never" to "always").

B.3.3 Reliability and Validity of Multi-item Constructs

For the multi-item constructs used in our study, we conducted confirmatory factor analyses (CFA) to establish construct validity (see Table B-2). As proposed by the literature, we suppressed factor loadings smaller than 0.40 (Field, 2018; Hair *et al.*, 2011, 2019) and conducted empirical tests to establish content and construct validity (Nunnally, 1978). According to Hair *et al.* (2019), composite reliability (CR) values should be at least 0.7 and average variance extracted (AVE) values should be at least 0.5 for all multi-item constructs. For two of our multi-item constructs (i.e., *Crisis Resilience*, *Executive Job Demands*), some individual items showed loadings below 0.4 or that had a detrimental effect on reaching the suggested AVE threshold. In line with methodological advice (Fornell & Larcker, 1981; Hair *et al.*, 2017, 2019) and similar survey-based studies (e.g., Mariani *et al.*, 2021; Naatu *et al.*, 2022; Popa *et al.*, 2017), we removed such items from further analysis to ensure that all the items show loadings of at least

0.4 and that the above CR and AVE thresholds are reached. To construct *Crisis Resilience*, we therefore removed the initial items four and six; to construct *Executive Job Demands*, we excluded the original items five, seven and eight.[3] For the remaining two multi-item constructs in our study (i.e., *Globalization*, *Past Performance*), the CFA results indicated sufficient reliability and that all the measured items loaded onto a single factor and could thus be retained. After having confirmed that all the multi-item constructs had convergent and discriminant validity, we averaged the responses across the remaining items of the respective constructs to arrive at the final scores for our variables (see Table B-2).

Crisis Resilience		
Composite reliability = .88	AVE = .66	Factor loadings (CFA)
To what extent is your firm impacted by the current COVID-19-crisis?		**.712**
Was there a decline in orders?		**.872**
Was there a decline in your turnover?		**.995**
Has the availability of capital decreased?		**.608**

Globalization		
Composite reliability = .90	AVE = .59	Factor loadings (CFA)
Many of our most important competitors' headquarters are abroad.		**.648**
Most of our main competitors have distribution channels in Asia and Europe.		**.756**
Cross-border flow of goods and capital normally happens in our industry without problems.		**.628**
Within the last ten years, trade with foreign countries has increased enormously.		**.929**
Within the last ten years, competition with overseas firms has increased enormously.		**.784**
Within the last ten years, we came to the conclusion in our firm that international sales are an important source for additional revenue.		**.825**

[3] To assess whether the removal of individual items due to low factor loadings or low AVE values for the full constructs affected our results, we also calculated all the regression models without dropping any items when constructing the dependent variable *Crisis Resilience* (albeit, of course, with lower resulting AVE values). The significant findings shown in our regression analyses remained the same (untabulated). We also performed the same exercise for the marker variable *Executive Job Demands*. Again, the inclusion of all the items did not materially change our results for this marker variable.

Past Performance

Composite reliability = .90 AVE = .54	Factor loadings (CFA)
How would you rate your firm's current performance as compared to your competitors?	
Sales growth	**.475**
Growth in market share	**.461**
Growth in number of employees	**.432**
Increase in profitability	**.822**
Return on equity	**.959**
Return on assets	**.958**
Profit margin on sales	**.861**
Ability to fund growth from profits	**.680**

Transformational Leadership

	Factor loadings (CFA)
Innovation (Formative weight (path coefficient) = .156***; Variance Inflation Factors (VIF) = 1.340) *(CR = .77; AVE = .53)*	
I communicate the meaning and background of upcoming tasks and goals.	**.704**
I show new ways of understanding tasks and goals.	**.746**
I encourage my employees to question their own approaches and ways of thinking.	**.722**
Team spirit (Formative weight (path coefficient) = .261***; VIF = 2.089) *CR = .82; AVE = .54)*	
I ensure that team members work well together.	**.820**
I ensure that employees see themselves as team members rather than individuals.	**.825**
I appeal to the sense of community or togetherness.	**.605**
I manage to get employees to work together to achieve goals and tasks.	**.653**
Performance development (Formative weight (path coefficient) = .218***; VIF = 1.394 *(CR = .86; AVE = .60)*	
I demand justified best performance from employees.	**.808**
I explain why top performance is required.	**.879**
I communicate transparently and comprehensibly that high performance is important.	**.784**
I communicate my confidence in the ability of the respective employee when defining performance goals.	**.610**
Individuality focus (Formative weight (path coefficient) = .220***; VIF = 1.564) *(CR = .81; AVE = .54)*	**.704**

I know how my employees are doing personally.	**.921**
I know my employees' individual interests and personal goals.	**.857**
I support my employees in their professional performance and development.	**.586**
I express my appreciation to my employees.	**.461**
Vision (Formative weight (path coefficient) = .249***; VIF = 1.953)	
(CR = .82; AVE = .54)	
I inspire through a vision of the future.	**.786**
I communicate a clear and attractive vision of the future for my team.	**.978**
I enthusiastically communicate my vision of long-term opportunities, tasks and goals.	**.592**
I make my employees understand the meaning and value of their work.	**.490**
To set an example of something to somebody (in the way one lives) (Formative weight (path coefficient) = .250***; VIF = 1.772)	
(CR = .82; AVE = .54)	
I exemplify what is important to me.	**.785**
I am aware of my role as a role model.	**.758**
I am a credible role model as a leader.	**.673**
I am myself a good example of how members of my organization (or firm) should behave.	**.716**
Executive Job Demands (marker variable)	
Composite reliability = .84 AVE = .52	Factor loadings (CFA)
To what extent do the following statements apply to your current position in your firm?	
I have to work fast	**.683**
I have too much work to do	**.733**
I have to work extra to finish a task	**.835**
I work under time pressure	**.826**
I have to deal with backlog at work	**.612**

Note. AVE = average variance extracted; CR = composite reliability; CFA = confirmatory factor analysis; VIF = average variance extracted.

Table B-2. Construct validity of Crisis Resilience, Globalization, Past Performance, and Executive Job Demands (marker variable)

B.4 Results

B.4.1 Descriptive Results and Correlations

Table B-3 contains the descriptive statistics of our variables (e.g., N, Mean, Median, Standard Deviation (SD)) and Table B-4 presents the correlation matrix. Due to the various scale levels of our variables, we used different measures of associations (e.g., Pearson, Phi; see the notes in

Table B-4). There are several significant associations between the variables. However, there is no indication of multicollinearity issues since all the correlations are below the threshold of 0.7 (Dormann *et al.*, 2013).

Variables	N	Mean	Min	Max	Median	SD
Crisis Resilience	133	4.00	1.00	7.00	4.00	1.64
Family Business	133	.68	.00	1.00	1.00	.47
Firm Size 250-499	133	.26	.00	1.00	.00	.44
Manufacturing	133	.61	.00	1.00	1.00	.49
Strategy	133	.44	.00	1.00	.00	.50
Past Performance	133	4.53	1.63	7.00	4.50	1.03
Level of Digitalization before the Crisis	133	38.05	.00	90.00	39.00	21.62
Globalization	133	3.77	1.00	6.83	4.17	1.80
Transformational Leadership	133	5.82	2.88	6.91	5.89	0.53
Subnational Region North Rhine-Westphalia	133	.68	.00	1.00	1.00	.47
Subnational Region Hesse	133	.20	.00	1.00	.00	.40

Note. N = total number of cases; Min. = minimum; Max. = maximum; SD = standard deviation.

Table B-3. Descriptives

	Variables	N	1	2	3	4	5	6	7	8	9	10	11	12
1	Crisis Resilience	133	1											
2	Family Business	133	.026	1										
3	Firm Size 250-499	133	-.128	**-.221**	1									
4	Manufacturing	133	**-.251**	**.369**	-.060	1								
5	Strategy	133	.054	**.197**	.136	.033	1							
6	Past Performance	133	**.260**	**.194**	-.120	.104	**.308**	1						
7	Level of Digitalization before the Crisis	133	.011	.058	-.097	-.080	-.030	.115	1					
8	Globalization	133	**-.340**	**.159**	.082	**.607**	.094	.117	.052	1				
9	Transformational Leadership	133	-.056	-.057	-.009	.031	.075	**.177**	**.222**	**.160**	1			
10	Subnational Region North Rhine-Westphalia	133	-.115	.038	.110	.072	-.062	-.069	-.003	.101	-.060	1		
11	Subnational Region Hesse	133	.057	-.051	-.124	-.017	.076	.019	**-.144**	-.063	-.029	**-.730**	1	
12	Executive Job Demands (marker variable)	133	-.105	-.004	.135	**.153**	-.135	**-.268**	-.024	.141	-.077	.028	.000	1

Note. N = total number of cases; correlations significant at $p \leq .10$ are indicated in bold; *Point-biserial* correlation coefficients are used for correlations between metric and dichotomous variables; *Pearson* correlation coefficients are used for correlations between metric variables; *Phi* values are used between dichotomous variables (for further information see Field, 2018).

Table B-4. Correlation matrix

B.4.2 Multiple Regression Analyses

We used a hierarchical regression analysis to test our hypotheses (see Table B-5). Model 1 includes the main effects suggested in H1 and Model 2 adds the interaction terms as proposed in H2 through H7. Before creating the interaction terms, we mean-centered the involved variables (Cronbach, 1987; Field, 2018) and calculated their cross products. For all the models, we display the variance inflation factors (VIFs) to further assess potential multicollinearity issues. There are several guidelines for VIFs; however, as a general rule of thumb, they should not exceed 10 (e. g., Dormann *et al.*, 2013; Hair *et al.*, 2011). Our VIFs in Table B-5 are all well below this threshold: the maximum VIF value was 2.939. Consequently, from the VIFs and the above correlation matrix, we have no indications of multicollinearity issues that may threaten the validity of our results.

Dependent Variable	*Crisis Resilience*							
	Main effects only (Model 1)				**Interaction effects added (Model 2)**			
Independent Variables	Stand. Beta	t value	p value	VIF	Stand. Beta	t value	p value	VIF
Constant		2.726	.007***			2.340	.021**	
Level of Digitalization before the Crisis	-.020	-.237	.813	1.148	-.019	-.226	.822	1.200
Globalization	-.285	-2.727	.007***	1.724	-.263	-2.447	.016**	1.884
Family Business	.045	.485	.628	1.341	.067	.719	.474	1.434
Firm Size 250-499	-.064	-.741	.460	1.170	-.050	-.577	.565	1.250
Manufacturing	-.124	-1.129	.261	1.886	-.142	-1.265	.208	2.042
Strategy	-.005	-.062	.950	1.221	-.083	-.912	.364	1.360
Past Performance	.299	3.424	.001***	1.202	.273	2.996	.003***	1.353
Subnational Region North Rhine-Westphalia	-.086	-.718	.474	2.249	-.035	-.270	.788	2.695
Subnational Region Hesse	-.041	-.343	.732	2.301	.041	.316	.752	2.693
Transformational Leadership	-.058	-.691	.491	1.130	-.033	-.378	.706	1.219
Level of Digitalization before the Crisis * Globalization					.249	1.952	.053*	2.648
Level of Digitalization before the Crisis * Family Business					-.202	-2.222	.028**	1.348
Level of Digitalization before the Crisis * Firm Size 250-499					-.020	-.222	.825	1.342
Level of Digitalization before the Crisis * Manufacturing					-.106	-.876	.383	2.403
Level of Digitalization before the Crisis * Strategy					-.025	-.262	.794	1.523
Level of Digitalization before the Crisis * Past Performance					.011	.105	.916	1.678
Level of Digitalization before the Crisis * Transformational Leadership					.015	.170	.865	1.308
Level of Digitalization before the Crisis * Subnational Region North Rhine-Westphalia					-.156	-1.162	.248	2.939
Level of Digitalization before the Crisis * Subnational Region Hesse					-.028	-.230	.818	2.468
R^2			.226				.308	
Adjusted R^2			.162				.191	
F			3.553***				2.643***	
N			133				133	

Note. VIF = variance inflation factor; R^2 = coefficient of determination; adjusted R^2 = adjusted coefficient of determination; F = F ratio; N = total number of cases; Stand. B = standardized regression coefficient β.
** p < .10; ** p < .05; *** p < .01*

Table B-5. Hierarchical regression analysis

All the models show sufficient predictive validity as measured by R^2. Our full model (Model 2) features a higher R^2 (0.308) than Model 1, which supports our hierarchical regression setup. The F statistics indicate that both models are significant at $p < .01$. In addition, the two models should hold sufficient statistical power, as the 19 independent variables in Model 2 would require a minimum number of 95 (19 * 5) observations as of Hair *et al.* (2019) or 115 (20 + 19 * 5) as of Khamis and Kepler (2010). Our number of observations (133) is well above these thresholds.

Model 1 tests the direct effect proposed in H1. Besides *Past Performance* (b = 0.299, p < .01) and *Globalization* (b = -0.285, p < .01), no further significant direct effect on *Crisis Resilience* can be found. In particular, Model 1 shows no direct positive effect of the *Level of Digitalization before the Crisis* on *Crisis Resilience*, which is why H1 cannot be confirmed.

The significant predictors *past Performance* (b = 0.273, p < .01) and *Globalization* (b = -0.263, $p < .05$) are also confirmed by Model 2. In addition, two interaction effects turn out to be significant. First, the interaction between the *Level of Digitalization before the Crisis* and *Globalization* (b = 0.249, $p < .10$), and second, the interaction between the *Level of Digitalization before the Crisis* and *Family Business* (b = -0.202, p < .05) are associated with *Crisis Resilience*, which supports H2 and H3.

Figures B-2 and B-3 plot the variables involved in our significant interaction effects. For plotting these effects, we categorizing the respective variables into two groups using a median split each. Figure B-2 indicates that firms barely affected by globalization that show a low level of digitalization feature the highest level of *Crisis Resilience* (i.e., 4.66). By contrast, and in line with H2, firms highly affected by globalization with a more digitalized business model emerge from our analyses as more resilient to pandemic crises than their less digitalized counterparts (see the solid slope in Figure B-2). In summary, as the solid slope is steeper than the dotted

slope in Figure B-2, it seems as if the hypothesized relationship between the *Level of Digitalization before the Crisis* and *Crisis Resilience* holds better for firms highly affected by globalization.

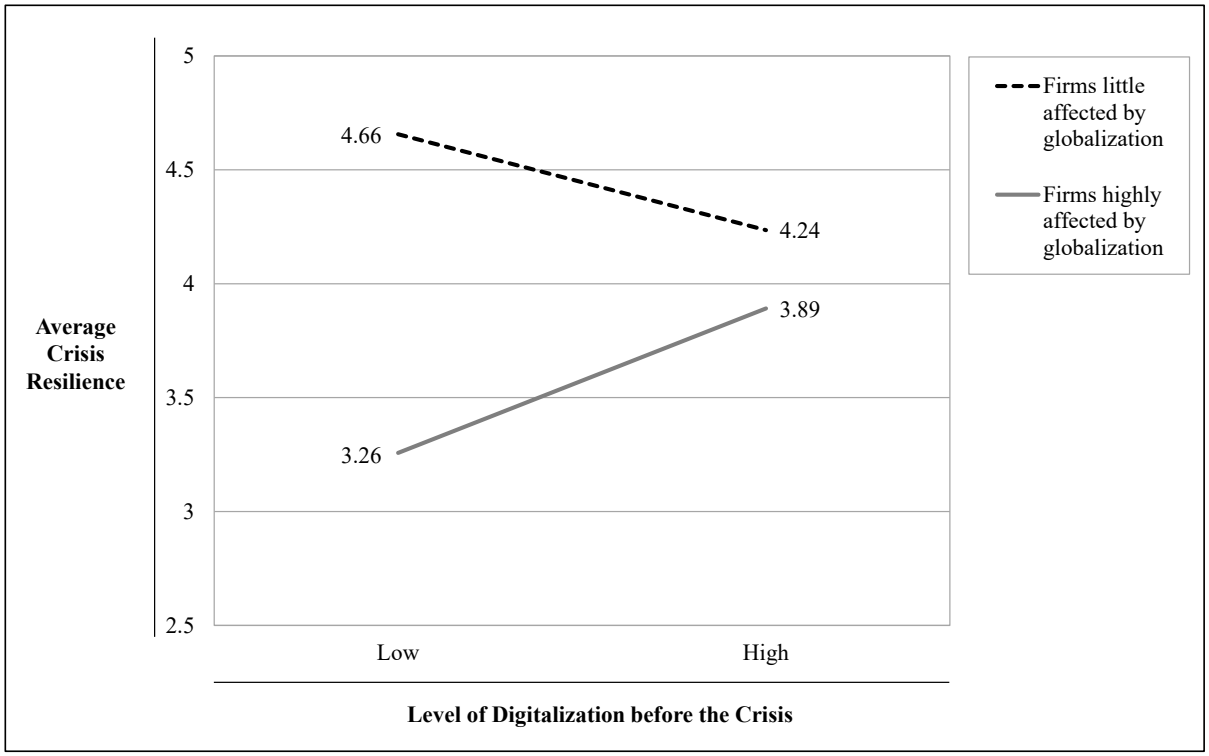

Figure B-2: Interaction between Level of Digitalization before the Crisis and Globalization

Figure B-3 indicates that non-family businesses with a little digitalized business model show the lowest level of *Crisis Resilience* (i.e., 3.63). By contrast, and in line with H3, non-family businesses with a more digitalized business model emerge from our analyses as more resilient to pandemic crises than their less digitalized counterparts and family businesses (see Figure B-3). Therefore, it seems as if the hypothesized relationship between the *Level of Digitalization before the Crisis* and *Crisis Resilience* holds better for non-family businesses.

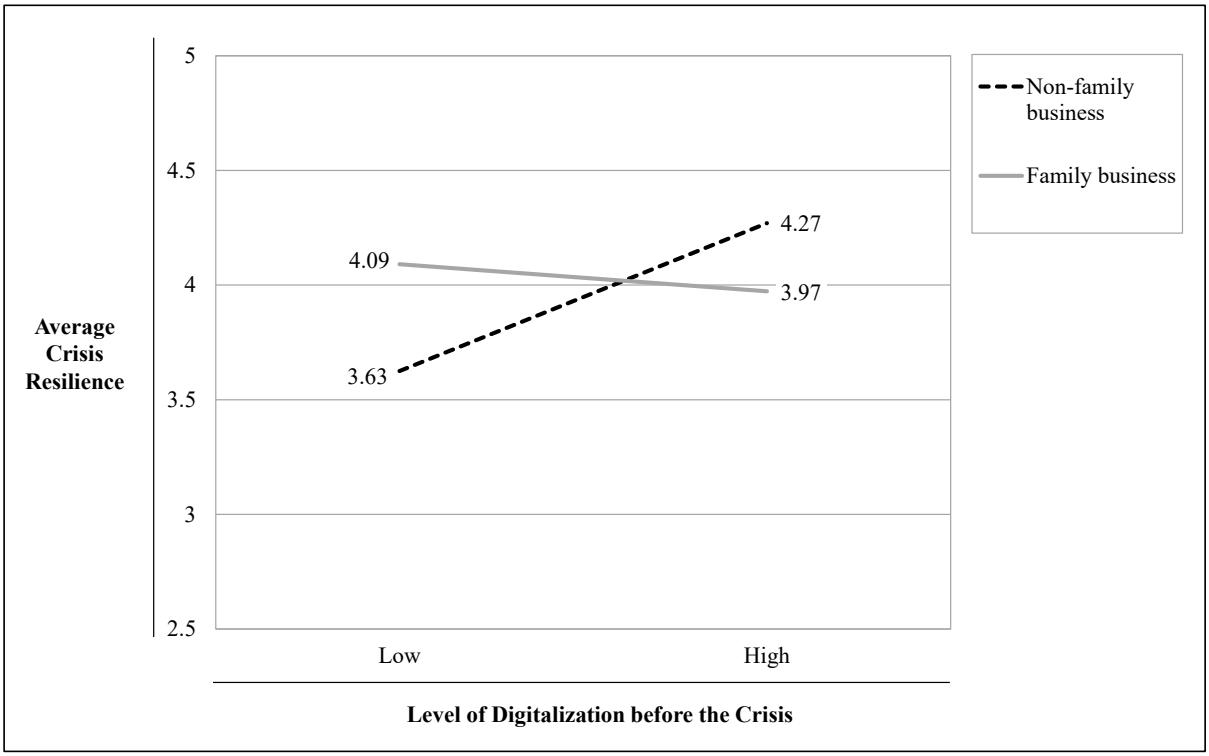

Figure B-3. Interaction between Level of Digitalization before the Crisis and Family Business

B.4.3 Robustness Check

As a robustness check of our results, we tested an alternative measurement of the level of digitalization – that is, the level of digitalization *during* the crisis. We did so as our data indicated that during the COVID-19 crisis, the average level of digitalization increased from 38.05 % before the crisis to 47.20 % during the crisis. Consequently, it could be argued that higher levels of digitalization during the crisis would affect *Crisis Resilience*, perhaps even more so than those levels before the crisis. We thus computed another battery of regression models, where the *Level of Digitalization During the Crisis* acts as the independent variable and as part of our interaction terms. Just as the variable *Level of Digitalization Before the Crisis*, the variable *Level of Digitalization During the Crisis* was constructed by asking the respondents to indicate the digitalization of their firm's business model at the moment of answering our survey and thus during the COVID-19 crisis from 0 % to 100 % (cf. Niemand *et al.*, 2021). The results of this exercise are reported in Table B-6 and confirm the significant moderator *Family Business*. However, the interaction term between *Digitalization During the Crisis* and *Globalization* is

not significantly related to *Crisis Resilience* in the final model in Table B-6. Only our results on *Family Business* can thus be considered robust against potential differences between the levels of digitalization before and during the crisis, which reinforces our focus on *Digitalization Before the Crisis* as an even more important source of resilience than *Digitalization During the Crisis*.

Dependent Variable	*Crisis Resilience*							
	Main effects only (Model 3)				**Interaction effects added (Model 4)**			
Independent Variables	Stand. Beta	t value	p value	VIF	Stand. Beta	t value	p value	VIF
Constant		2.731	.007***			2.401	.018**	
Level of Digitalization during the Crisis	.010	.122	.903	1.142	.002	.025	.980	1.249
Globalization	-.290	-2.768	.007***	1.724	-.254	-2.344	.021**	1.885
Family Business	.042	.460	.646	1.334	.061	.639	.524	1.458
Firm Size 250-499	-.060	-.694	.489	1.190	-.040	-.449	.654	1.276
Manufacturing	-.118	-1.085	.280	1.858	-.140	-1.239	.218	2.071
Strategy	-.004	-.044	.965	1.216	-.084	-.906	.367	1.368
Past Performance	.296	3.382	.001***	1.210	.262	2.885	.005***	1.331
Subnational Region North Rhine-Westphalia	-.081	-.686	.494	2.219	-.060	-.477	.634	2.589
Subnational Region Hesse	-.034	-.281	.780	2.276	.004	.035	.972	2.584
Transformational Leadership	-.064	-.757	.450	1.118	-.035	-.401	.689	1.227
Level of Digitalization during the Crisis * Globalization					.169	1.388	.168	2.402
Level of Digitalization during the Crisis * Family Business					-.200	-2.284	.024**	1.241
Level of Digitalization during the Crisis * Firm Size 250-499					.016	.178	.859	1.362
Level of Digitalization during the Crisis * Manufacturing					-.018	-.149	.882	2.345
Level of Digitalization during the Crisis * Strategy					-.019	-.205	.838	1.407
Level of Digitalization during the Crisis * Past Performance					.027	.294	.770	1.333
Level of Digitalization before the Crisis * Transformational Leadership					.026	.289	.773	1.257
Level of Digitalization before the Crisis * Subnational Region North					-.145	-1.070	.287	2.948
Level of Digitalization before the Crisis * Subnational Region Hesse					-.030	-.226	.821	2.757
R^2		.225				.299		
Adjusted R^2		.162				.181		
F		3.547***				2.533***		
N		133				133		

Note. VIF = variance inflation factor; R^2 = coefficient of determination; adjusted R^2 = adjusted coefficient of determination; F = F ratio; N = total number of cases; Stand. B = standardized regression coefficient β.
** p < .10; ** p < .05; *** p < .01*

Table B-6. Hierarchical regression analysis (robustness check)

B.5 Discussion, Implications and Limitations

B.5.1 Summary of Hypotheses Tests

Our main results do not imply a universal impact of digitalization on crisis resilience as proposed in H1, but rather an effect contingent on the extent to which entrepreneurial firms are affected by globalization (as proposed in H2) and family influence (see H3). That is, our data lends support to hypotheses H2 and H3, but hypotheses H4, H5, H6, H7, H8 and H9 on additional moderating effects could not be supported. At the same time, our main findings can be considered to control for the potential influence of these non-significant moderator variables and thus incorporate the potential effect of firm size, industry affiliation, strategy, past performance, leadership style and regional embedding.

Overall, these findings imply that higher levels of digitalization do not serve all types of firms equally well as a preparation capability to develop resilience to pandemic crises. In Sections B.5.2 and B.5.3, we thus first focus on the two hypotheses and moderating effects that could be confirmed by our main results. We then turn to the theoretical implications of our results in Section B.5.4, where we incorporate our significant and non-significant hypotheses tests and explain what they mean for the development of the Parasite Stress Theory of Values and literature on organizational resilience. In Section B.5.5, we discuss the practical implications of our study, while Section B.5.6 concludes the paper by describing its most important limitations and resulting avenues for further research.

B.5.2 The Moderating Effect of Globalization

As shown in Figure B-2, the positive impact of digitalization on crisis resilience can only be found for entrepreneurial firms highly affected by globalization. This finding indicates that in pandemic crises, globalized firms are specifically reliant on digital technologies to continue their relationships with stakeholders worldwide. In turn, globalized entrepreneurial firms that have only a relatively low level of digitalization before a pandemic crisis emerge from our study

as those most affected by the COVID-19 pandemic and thus show the lowest resilience to this crisis.

In turn, for entrepreneurial firms less affected by globalization, Figure B-2 suggests that higher levels of digitalization before the crisis do not increase their crisis resilience. This goes directly against our first hypothesis. A potential explanation of this finding is that entrepreneurial firms hardly affected by globalization are mostly active locally or regionally. Historically, such firms, at least German Mittelstand firms, have been highly embedded in their local communities (De Massis *et al.*, 2018; Pahnke & Welter, 2019). However, as suggested by recent evidence on remote work (Soroui, 2021), a growing reliance on digital technologies may lead to disembedding dynamics. In our case, this could mean that Mittelstand firms, which were once locally embedded but now increasingly rely on digital technologies, may have lost some of this embeddedness due to their lower levels of personal contact and interaction (cf. Soroui, 2021). In times of crisis, the loss of local embeddedness may then come with lower levels of reciprocal support between locally or regionally active firms with higher levels of embeddedness, and this could explain the lower levels of crisis resilience for more digitalized entrepreneurial firms that are not globalized.

B.5.3 The Moderating Effect of Family Business

As shown in Figure B-3, the positive impact of digitalization on crisis resilience can be found for both family and non-family entrepreneurial firms. Figure B-3 also shows that the positive effect is particularly evident for non-family businesses (see the solid lines' steeper slope), which confirms our H3. This finding indicates that non-family firms are more reliant on digitalization to create resilience against pandemic crises than family firms. In turn, non-family entrepreneurial firms with a more digitalized business model emerge from our analyses as more resilient to pandemic crises than their similarly digitalized family entrepreneurial counterparts.

As indicated in Section B.2, we suppose that this finding is due to family firms having a higher level of built-in crisis resilience (Amann & Jaussaud, 2012; Calabrò *et al.*, 2021) and psychological safety net (Leppäaho & Ritala, 2022) due to their usual long-term orientation (Clauß *et al.*, 2022; De Massis *et al.*, 2015), their risk aversion (Hiebl, 2013) and slack resources built up during economically calm times (Leppäaho & Ritala, 2022). As shown by our findings, particularly those from our simple slope analysis, family firms may gain less from digitalization than their non-family counterparts, indicating that they may feature a higher level of built-in crisis resilience—irrespective of their level of digitalization before the crisis. Viewed through the lens of the Parasite Stress Theory of Values, we can conclude that the psychological immune system of family firms seems to differ from those of non-family firms. In particular, it may be that family firms are less reliant on technological drivers of resilience such as their level of digitalization because they are typically more prone than non-family firms to create an emotional and psychological safety net during good economic times than can be accessed during times of crises (Leppäaho & Ritala, 2022). In addition, family firms may benefit from the controlling family's commitment to the firm and strong willingness to find resources and solutions to cope with crises (Calabrò *et al.*, 2021). All these psychological features of family firms and controlling families seem to make them less reliant on other tools that may relieve psychological stress during pandemic crises such as higher levels of digitalization (Mäntymäki *et al.*, 2022). By contrast, non-family firms, which may lack the above-noted psychological features, seem to be more reliant on higher levels of digitalization before the crisis to reach higher levels of resilience.

These results add to the growing literature on the digitalization of family firms (Batt *et al.*, 2020; Löhde *et al.*, 2020; Škare & Soriano, 2021; Soluk, 2022; Soluk & Kammerlander, 2021; Soluk *et al.*, 2021). In particular, our findings on preparation capabilities complement earlier work that examined the other forms of organizational resilience adopted by family firms in

response to the COVID-19 pandemic crisis (e. g., Calabrò *et al.*, 2021; Giotopoulos *et al.*, 2022; Hadjielias *et al.*, 2022; Le Breton-Miller & Miller, 2022; Schwaiger *et al.*, 2022; Soluk, 2022; Soluk *et al.*, 2021). Most directly related to our research, Soluk *et al.* (2021) focused on family firms' coping and adaptation capabilities as part of organizational resilience (cf. Duchek, 2020). They found that the creation of adaptive capacity and adoption of digital technologies to deal with the exogenous shock caused by COVID-19 depend on several antecedents including resource constraints, the fear of losing the socioemotional wealth associated with the controlling family's status as business owners and the presence of non-family managers. Combining our findings with those of Soluk *et al.* (2021) indicates that family firms' long-term orientation and the associated built-in organizational resilience tend to make them less reliant on digitalization to be *prepared* for the impact of such crises (as found in our study); however, in terms of their *adaptive* capacity, family firms differ widely due to their idiosyncratic resource sets and other antecedents (Soluk *et al.*, 2021; see also Hadjielias *et al.*, 2022; Schwaiger *et al.*, 2022).

B.5.4 Theoretical Implications and Contributions

As summarized in Table B-7, our study adds to the literature on the effects of pandemic crises on entrepreneurship. Two prominent recent additions to this literature (Bennett & Nikolaev, 2020; Rao & Greve, 2018) focus on the short- and long-term effects of Spanish flu and find the detrimental effects of this pandemic on entrepreneurial activities such as innovation (Bennett & Nikolaev, 2020) and organization building (Rao & Greve, 2018). Both studies explain this relationship using the Parasite Stress Theory of Values that suggests that "social distancing" leads to less collaboration, interaction, and, as a consequence, entrepreneurial activity.

Theme	Implications and contributions of the present study	Selected references to which the present study contributes
Parasite Stress Theory of Values	• In case of pandemic crises, the Parasite Stress Theory of Values has so far assumed a negative impact of the psychological immune system and social distancing on entrepreneurial activities such as innovation. • Our study qualifies the theory by showing that this impact of the psychological immune system is less pronounced if entrepreneurial firms exhibit preparation resilience – such as higher levels of digitalization before the pandemic crisis – that enables social contact despite parasite stress. • While the Parasite Stress Theory of Values has previously been applied at the country or continent level, our study shows that the theory can also be applied at the subnational and organizational levels. • According to our results, specific characteristics such as family involvement and globalization impact an organization's development of the psychological immune system in the event of a pandemic crisis.	Bennett & Nikolaev (2020), Rao & Greve (2018), Thornhill & Fincher (2014)
Organizational resilience	• Previous studies on the COVID-19 crisis have mainly analyzed coping and adaption forms of organizational resilience. • Our study extends this literature by analyzing preparation resilience in a healthcare crisis in terms of higher levels of digitalization before the crisis. • Our study provides evidence of the context-dependency of organizational resilience by showing that higher levels of digitalization before a pandemic crisis do not universally contribute to the development of preparation resilience in all types of organizations.	Calabró *et al.* (2021), Duchek (2020), Hadjielias *et al.* (2022), Hillmann (2021), Hillmann & Guenther (2021), Khurana *et al.* (2022), Leppäaho & Ritala (2022), Linnenluecke (2017), Schwaiger *et al.* (2022), Soluk *et al.* (2021), Williams *et al.* (2017)

Table B-7. Summary of theoretical implications and contributions

At the time of last submitting this manuscript (October 2022), the COVID-19 crisis has not been fully resolved and we cannot yet foresee the long-term effects of this pandemic. However, our data suggest that in the short run, more globalized entrepreneurial firms and non-family entrepreneurial firms have been more resilient to the crisis in case they had the necessary preparation capabilities analyzed in this paper: higher degrees of digitalization in their business model before the crisis. That is, our findings qualify the Parasite Stress Theory of Values, which has thus far focused on the reduction of personal contact but overlooked digital technologies that may provide an alternative to such contact. The reduction of personal contact can also be seen in the COVID-19 crisis (e. g., Lewnard & Lo, 2020). According to our findings, more intensive reliance on modern digital technologies seems to reduce the detrimental impact of social distancing for more globalized entrepreneurial firms and for non-family entrepreneurial firms. That is, despite social distancing measures introduced during a pandemic, higher levels of digitalization seem to help such firms in retaining cross-cultural interaction including its benefits such as transfers of technology and knowledge and keeping up intercultural trade (Nørfelt *et al.*, 2020). As severe economic downturns are observed in most countries worldwide as a consequence of the outbreak of the COVID-19 pandemic (e.g., Fernandes, 2020; Mitze & Makkonen, 2022), our findings imply that the extent to which globalized and non-family entrepreneurial firms are affected by such crises can be reduced by higher levels of digitalization. However, they do not imply that digitalization protects globalized and non-family entrepreneurial firms from pandemic crises perfectly. Hence, theoretically, our findings imply that the relationship between contagious diseases and entrepreneurship suggested by the Parasite Stress Theory of Values is moderated by the use of digital technologies or, more broadly, ways that support humans in maintaining interaction despite the reduction of personal contact.

While earlier research on the Parasite Stress Theory of Values focused on its application at the country or continent level (e.g., Bennett & Nikolaev, 2020; Thornhill & Fincher, 2014), we

responded to the call by Bennett and Nikolaev (2020) to examine its applicability at the subnational level, too. Despite finding no differences between subnational regions with a more or less rigid psychological immune system, we further extended the application of this theory to individual organizations. Similar to countries and subnational regions, organizations also have idiosyncratic values and traditions (Logue *et al.*, 2015; Lounsbury, 2007, 2008). However, their characteristics, although important, have thus far been overlooked sources of the variance in organizations' psychological immune systems. Although only two of the eight tested organizational characteristics turned out to significantly affect the digitalization–resilience relationship, our two significant moderation results generally confirm the idea that some organization-level characteristics drive the variance in organizations' development of their psychological immune system against pandemic crises. In particular, our results indicate that non-family firms and more globalized firms benefitted more from their digitalization before the crises in developing preparation resilience to the pandemic crises caused by COVID-19. In particular, it is the above-noted psychological specifics of family firms (Calabrò *et al.*, 2021; Leppäaho & Ritala, 2022) that point to their psychological immune system working differently than the ones in non-family firms.

To summarize, as of our best knowledge, our paper is the first to highlight the applicability of the Parasite Stress Theory of Values to individual organizations. At the same time, to corroborate our results, we call for further research to test the predictions of Thornhill and Fincher (2014) at the organizational level, while controlling for the potential differences among subnational regions, countries and continents.

Besides these theoretical contributions to the Parasite Stress Theory of Values, our findings contribute to the literature on organizational resilience (Duchek, 2020; Hillmann, 2021; Hillmann & Guenther, 2021; Linnenluecke, 2017; Williams *et al.*, 2017). This literature highlights that organizational resilience is context-dependent, but has so far mostly overlooked what

makes firms resilient in healthcare crises such as a pandemic. Considering that such pandemic crises have increased in frequency in the last century (Kraus *et al.*, 2020), our study is among the first to deliver evidence on developing preparation resilience to this important type of crisis and thus moves beyond existing qualitative evidence (Fath *et al.*, 2021) and conceptual pieces (Beninger & Francis, 2022) on preparation resilience in light of the COVID-19 crisis. We thus extend empirical research that has focused on coping and adaption resilience in response to COVID-19 (Bartik *et al.*, 2020; Dejardin *et al.*, 2022; Emami *et al.*, 2021; Giotopoulos *et al.*, 2022; Hadjielias *et al.*, 2022; Hammerschmidt *et al.*, 2021; Kraus *et al.*, 2020; Khurana *et al.*, 2022; Kusa *et al.*, 2022; Schwaiger *et al.*, 2022; Soluk *et al.*, 2021; Wendt *et al.*, 2021; Xie *et al.*, 2022) by adding the notion that digitalization can be considered to be a preparation form of organizational resilience (Duchek, 2020), but does not equip all types of organizations equally well to withstand the impact of pandemic crises. That is, different to some of these recently published papers (e.g., Giotopoulos *et al.*, 2022; Schwaiger *et al.*, 2022; Wendt *et al.*, 2021), we did not find that organizational size, strategy, industry affiliation, or past performance materially affect the resilience emanating from the preparation capability of digitalization. A potential reason for such differing findings may lie in that earlier studies focused on coping and adaption forms of resilience. Hence, while, for instance, larger firms and those with better past performance have not benefitted from the preparation capability of digitalization according to our results, they may be better equipped to cope with and adapt to pandemic crises due to their higher average resource bases (Schwaiger *et al.*, 2022; Wendt *et al.*, 2021).

More generally, our findings thus confirm the context dependency of organizational resilience (Linnenluecke, 2017) by showing that digitalization does not universally contribute to developing preparation resilience to pandemic crises, but particularly so in non-family firms and firms more affected by globalization.

Overarching implication	More detailed practical implications
A higher level of digitalization before a pandemic crisis serves as a source of resilience against the crisis	• Entrepreneurial firms that have a more digitalized business model before a pandemic crisis are less affected by the impact of this crisis, but the effectiveness of this source of resilience depends on some firm characteristics. • Our study shows that family firms benefit less from digitalization than non-family firms in terms of their resilience to pandemic crises. We attribute this result to the long-term orientation and built-in resilience of family businesses. • Globally active entrepreneurial firms benefit more from digitalization before a pandemic crisis than less globally active entrepreneurial firms.

Table B-8. Summary of practical implications

B.5.5 Practical Implications

As summarized in Table B-8, our findings imply that the value of digitalization as a protector against pandemic crises depends on the extent to which entrepreneurial firms are affected by globalization and the level of family influence they experience. Their resilience to pandemic crises seems to rise if they are globally active or controlled by non-family shareholders and invest in the digitalization of their business. In turn, for entrepreneurial firms that are not globally active, our results suggest that higher levels of digitalization are associated with less resilience to pandemic crises. As discussed above, this dynamic may be because of the lowering of local embeddedness due to digitalization and thus less reciprocal support from the local community. Furthermore, for family entrepreneurial firms, our results suggest that higher levels of digitalization are associated with an increased crisis resilience, but lower in contrast with their non-family counterparts. As discussed above, this dynamic may be because of the family firms' long-term orientation and built-in crisis resilience, which makes digitalization less important for them. However, we can only theorize about these dynamics, and a closer examination is warranted. While these practical implications focus on increasing the resilience of entrepreneurial firms to pandemic crises, we do not rule out that higher levels of digitalization may still help fight the ongoing COVID-19 crisis (cf. Hadjielias *et al.*, 2022; Sharma *et al.*, 2022; Soluk *et al.*, 2021; Wendt *et al.*, 2021; Xie *et al.*, 2022). However, as we specifically measured the level of digitalization before the crisis, we cannot provide evidence for this assumption.

B.5.6 Limitations

Our findings are not free from limitations. First, our study used empirical data from a specific geographical region – Germany. In particular, we draw on data on Mittelstand firms, which have been shown to feature different dynamics than other entrepreneurial firms (e. g., those situated in Australia or the Silicon Valley; Logue *et al.*, 2015; Pahnke & Welter, 2019). We do not think that this affects the generalizability of our findings to other countries with heavily

globalized economies, as the findings on firms highly affected by globalization appear to be the strongest in our analyses. Nevertheless, this limitation must be kept in mind, and the corroboration of our results using data from other regions of the world is needed. Second, the data collection period represents a possible limitation. The data on the various constructs were collected during a global pandemic crisis. According to Podsakoff *et al.* (2003), respondents' answers depend strongly on their mood states, especially on relatively recent mood-forming events as well as on the way they see themselves and the world around them. Answering a survey at the time of a pandemic crisis may have resulted in different responses than in "normal" times. However, the focus of our survey necessitated this timing, and this limitation could not have been prevented; nevertheless, it must be kept in mind. Third, respondents' answers are, in most cases, subjectively measured. That is, these answers depend strongly on their perception and, therefore, could deviate from firms' objective situation (Podsakoff *et al.*, 2003). At the same time, we aimed to address top managers, who usually have a good overview of their firms, which helps mitigate this limitation. Fourth, while we have analyzed several potential moderators of the relationship between the level of digitalization before the COVID-19 crisis and the resilience of entrepreneurial firms in that crisis, there may be other factors that increase or decrease the impact of digitalization on such preparation resilience. Consequently, future research is needed to test other potential moderating factors, including actor-level factors such as managerial and employee skills (cf. Jafari-Sadeghi *et al.*, 2023; Soluk, 2022), organizational-level factors such as an innovation-friendly culture (cf. Giotopoulos *et al.*, 2022), and industry- and economy-level factors such as regulation and funding for research, development, and innovation (cf. Mitze & Makkonen, 2022; Sharma *et al.*, 2022). Relatedly, we cannot rule out that the driver of our significant findings on the moderating impact of family firm status on the digitalization–resilience relationship may be driven by family firms' underlying risk aversion. Therefore, risk aversion and the associated resilience-enhancing practices such as risk management

may drive our findings, especially since we did not measure risk aversion or similar constructs due to the typical space limitations of questionnaire surveys (e.g., Deutskens *et al.*, 2004). However, family firms typically show low adoption rates of risk management practices (e.g., Glowka *et al.*, 2021; Henschel & Durst, 2016; Hiebl *et al.*, 2019; Mitter *et al.*, 2022a,b), suggesting that our results are not exclusively driven by risk aversion and risk management practices. Nevertheless, to rule out this alternative reasoning, we call for future research to delve into the dynamics among family firms, risk aversion, risk management practices and their organizational resilience to event-triggered crises.

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C. Conflict Management Strategies and the Digitalization of Family Firms: The Moderating Role of Generational Ownership Dispersion

Authors: Tobias R. Bürgel, Martin R. W. Hiebl

Paper's status: A former version of this paper has been presented at the IFERA Annual Conference 2022 and ACIEK Conference 2022. The final version of this Paper has been published in IEEE Transactions on Engineering Management.

We, the authors of the paper, hereby declare that this paper's first author, Tobias R. Bürgel, was responsible for collecting and analyzing most of the data, developing the multiple regression models, and writing most of the paper.

Tobias R. Bürgel Martin R. W. Hiebl

C.1 Introduction

For many contemporary family businesses, a digital business strategy can be critical in the current business environment and may improve their professionalization. Successfully digitalizing the family business can have positive effects on family firms' performance and increase the likelihood of their long-term survival (Chittoor and Das, 2007; de Groote *et al.*, 2023; Llopis-Albert, 2021; Nambisan *et al.*, 2017). In general terms, digitalization describes the "manifold sociotechnical phenomena and processes of adopting and using digital technologies in broader individual, organizational, and societal contexts" (Legner *et al.*, 2017, p. 301). This definition applies to hardware- and software-related innovation (Heider *et al.*, 2022). Over recent decades, digitalization has become an indispensable part of everyday business life. Artificial intelligence, Big Data, blockchain, cloud computing, robotic process automation, three-dimensional printing, 5G technology, the Internet of Things, and many more opportunities are subsegments of the ongoing digital transformation (Nambisan, 2017; Omrani *et al.*, 2022; Schallmo *et al.*, 2017; 2022). These innovations could also enhance the company's overall performance (Singhal *et al.*, 2020). At the same time, the overarching digital transformation of individual businesses can be categorized into three incremental stages, namely process digitalization, product/service digitalization, and business model digitalization (Soluk & Kammerlander, 2021).

While existing evidence suggests that most family firms are still in the first stage of process digitalization (Soluk & Kammerlander, 2021), software-based technologies have become increasingly affordable (Strauss *et al.*, 2014). Thus, even small companies, many of which are family businesses, have become increasingly professional through digitalization (Batt *et al.*, 2020). Still, family firms tend to show idiosyncrasies regarding their digital transformation (Batt *et al.*, 2020; Löhde *et al.*, 2020). Family firms are businesses where family members are usually involved in the firm's ownership, governance, and management (Chua *et al.*, 1999; Steiger *et al.*, 2015). Therefore, most decisions rendered in family firms are influenced by family

considerations, traditions, and values (Newbert & Craig, 2017). In line with this notion, former research has highlighted that such family considerations considerably impact business transformation processes, including innovation processes (Anwar *et al.*, 2022; Cucculelli *et al.*, 2022; Kraiczy *et al.*, 2015; Pucci *et al.*, 2020). Similarly, it has been found that the implementation of digital technologies or a digital business model transformation is considerably shaped by family interests (Chung *et al.*, 2023; Daspit *et al.*, 2021; Davis, 1983). While such digital transformation can be expected to bring about new opportunities for family firms, it may also entail substantial risks for family firms (e.g., Anwar *et al.*, 2022; Batt *et al.*, 2020; Bürgel *et al.*, 2023; de Groote *et al.*, 2023; Löhde *et al.*, 2020; Manesh *et al.*, 2020; Rozak *et al.*, 2021; Soluk *et al.*, 2021; Soluk & Kammerlander, 2021). For instance, Soluk & Kammerlander (2021) found that family firms undergoing a digital transformation often face challenges due to conflicts arising due to the digital transformation (Chakma *et al.*, 2021; Guffler *et al.*, 2023). Relatedly, Weyrauch *et al.* (2021) highlight the critical but often overlooked role of conflict and conflict resolution in realizing important innovation endeavors in an organizational context such as digital transformation.

Due to the close ties among family members, conflict theory is a widely recognized theoretical lens in family business research (e.g., Caputo *et al.*, 2018; Claßen & Schulte, 2017; Frank *et al.*, 2011; Kellermanns & Eddleston, 2007; Tagiuri & Davis, 1992; Wang & Zhang, 2022; Xi *et al.*, 2015), which we also adopt in this article. The relationships between family members (e.g., parents, children, or distant relatives) are often complicated (Davis & Harveston, 2001). The roots for conflicts lie in the unique and complex interplay of family members' roles. These roles may include membership in the private owner family, being an employee or manager in the family business and holding ownership rights in the business (Harvey & Evans, 1994; Qui & Freel, 2020). Such complex role sets imply that family members are usually concerned about both family and business outcomes (e.g., Kubíček, & Machek, 2020; Sorenson, 1999). At the

same time, these multiple interests may interfere with each other and lead to conflicts, especially when several family generations are involved in the business (Miler *et al.*, 2013). Conflict theory thus suggests that the potential for conflicts in family firms often stems from norms, personal influence on decision-making, different treatment of family members, sibling rivalry, unequal distribution of power, and differing views, values and goals among the family generations involved in the business (De Clercq & Belausteguigoitia, 2015; Kubíček, & Machek, 2020; Magrelli *et al.*, 2022). Family firms can substantially suffer from such internal conflict, especially during transformation processes (e.g., Shepherd & Haynie, 2009; Wong & Chau, 2019), as they may overshadow business concerns (De Massis *et al.*, 2008; Dunn, 1995; Dyer, 1986; Lansberg & Astrachan, 1994), and lead to lower operational performance, reduced profitability, and even the risk of business failure. However, conflict theory also suggests that a moderate level of conflict in family firms, where there are disagreements or tensions between parties but the conflict has not escalated, can be beneficial to achieving both business and family outcomes (Kellermanns & Eddleston, 2004).

Equipped with these earlier insights into family business conflicts, in this article, we examine whether conflict management strategies can help overcome the conflicts related to digitalization within family firms, especially in those with multiple ownership generations. This article considers three established conflict management strategies by Sorenson (1999) (avoidance, collaboration, and compromise) that we apply to the new field of family businesses' digital transformation. While avoidance aims to leave conflicts unresolved, either temporarily or permanently; compromise refers to finding a solution that may not fully satisfy everyone involved; collaboration involves all parties in the decision-making process to reach a mutually beneficial solution. In addition, following Alvarado-Alvarez *et al.* (2020), we integrate generational ownership dispersion as a potential moderating factor in the relationship between conflict management strategies and digitalization. Generational ownership dispersion occurs when the ownership

rights in the family business are dispersed among several family generations (Gersick *et al.*, 1997; Kellermanns *et al.*, 2012). Family business research has shown that firms with only one ownership generation have less potential for harmful conflicts. This low conflict potential is theorized to stem from the scope of personal contact, which prevents the emergence of relationship conflicts (Davis & Harveston, 2001; Wang & Zhang, 2022). In contrast, conflicts may be more likely to arise in family firms with two or more ownership generations, especially regarding the digital transformation. This is because the younger, tech-savvy generation, who often have experience and knowledge acquired outside the family firm, may have differing abilities and willingness to push for the adaptation of new technologies to align the business for the future (De Clercq & Belausteguigoitia, 2015; Heider *et al.*, 2022). Meanwhile, the older generation may be more defensive and stick to the status quo, preferring to continue doing business as usual and resisting change (e.g., Chakma *et al.*, 2021; de Groote *et al.*, 2021). Therefore, the digitalization of family businesses may lead to conflicts between generations, and conflict management strategies could be particularly valuable. To summarize, we, therefore, address the following research question:

> *How do different conflict management strategies influence the digitalization of family firms and to what extent is this relationship moderated by generational ownership dispersion?*

To address this research question, we rely on a mixed-methods approach. First, we include survey data from 85 German family firms with a maximum of 3,000 employees. We find support for the notion that the effect of conflict management strategies on digitalization is contingent on generational ownership dispersion. To further analyze these quantitative results, we conducted 13 in-depth interviews with family firm actors, six with family firms that had already participated in the quantitative studies, and seven with additional family firms.

Our findings contribute to the literature in three primary ways. First, we contribute to the literature on conflict theory applied to family firms (e.g., Dunn, 1995; Kellermanns & Eddleston, 2004; 2007). This article is among the first to deliver empirical evidence focusing on conflicts about the digitalization of family firms. Our survey reveals that many family firms experience process conflicts during the digitalization process. Second, we add to the literature by demonstrating that conflict management strategies, particularly compromise, and collaboration, may help alleviate such conflicts and support family business digitalization. At the same time, third, our findings show that the effectiveness collaboration is contingent on the number of family generations holding ownership rights (i.e., generational ownership dispersion). Moreover, this finding adds to the literature by highlighting the large heterogeneity among family firms and the importance of tailoring conflict management strategies to the specific context. That is, some conflict management strategies seem more effective than others during family business digitalization (e.g., Chua & Chrisman, 2012; Dibrell & Memili, 2019).

The rest of the article is organized as follows. Section C.2 positions our research in the existing literature and develops the hypotheses. Section C.3 describes our mixed-methods research setup. Section C.4 presents the results of our analysis. Finally, Section C.5 concludes this article.

C.2 Literature Review and Hypotheses

C.2.1 Digitalization and Family Firms

Digitalization has become a ubiquitous part of everyday private and business life; indeed, it can be expected to become an even more ubiquitous part in the future, further changing how companies and employees work (Degryse, 2016). Although research on the digital transformation of family firms is still in its infancy (Batt *et al.*, 2020; Bürgel *et al.*, 2023; Löhde *et al.*, 2020), empirical studies have found that it can be divided into three incremental steps (Soluk & Kam-

merlander, 2021): process digitalization, product/service digitalization, and business model digitalization. As the first step of digital transformation, process digitalization describes the adaption of family firms' IT standards to the requirements of their business partners along the supply chain. Therefore, process digitalization is concerned with existing social ties and the ability to meet the requirements of suppliers and customers. Such process digitalization is, for instance, reflected in implementing or modifying firms' enterprise resource planning systems. By contrast, product and service digitalization describes family firms' capacity and resources to create technological opportunities (e.g., digital products and services). Business model digitalization represents the last step of digital transformation through continuous renewal. In this regard, Plomp *et al.* (2012) assumed that companies, regardless of their form, are still relatively at the beginning of their digitalization efforts and limit this mainly to processes.

In the short run, these steps are expected to help ensure family firms' business professionalization; in the long run, digitalization is crucial for survival (Chittoor & Das, 2007). These steps suggested by Soluk & Kammerlander (2021) indicate that digitalization is more than a technical process; it can be a game-changer for business models and, therefore, a new way for how family firms can operate. The more flexible, less formalized, very entrepreneurial, and superior decision-making characteristics of family firms can give them an advantage over non-family firms (Craig & Moores, 2006), allowing them to digitalize their businesses quickly (Batt *et al.*, 2020; de Groote *et al.*, 2023). However, only a minority of family firms have reached the last stage of digitalization, namely, the digitalization of their business model (Soluk & Kammerlander, 2021). Family businesses must therefore always manage to find a middle way between incremental innovation (exploitation), i.e., the optimization of existing technologies, and such new and more radical innovations (exploration), e.g., digital transformation (Junni *et al.*, 2013). The crucial question is how family firms are affected by digital transformation and the advantages and challenges they face.

In line with this notion, previous articles have shown that although family firms are outstanding at facing incremental innovations, they may be less equipped for radical technological innovations such as digitalization and digital transformation (e.g., Calabrò, 2019). Indeed, family firms seem to be more risk-averse to exploratory technological innovations (Ardito & Capolupo, 2023; Ceipek *et al.*, 2021; Filser *et al.*, 2016). Moreover, former research indicates that family businesses and their decision-makers do not always follow strict economic goals in their decision-making, but also pursue non-economic goals (Gomez-Mejia *et al.*, 2011; 2018), even if a strategic decision does not have obvious economic benefits (Berrone *et al.*, 2010; 2012; Leitterstorf & Rau, 2014). This phenomenon can be traced back to considerations around Socio-emotional Wealth (SEW), which is defined as the "affective endowment of family owners" (Gomez-Mejia *et al.*, 2011, p. 654), and describes the way in which family owners are driven by various sets of motives. These motives could be influenced, for example, by family bonds, identification of the family members with the firm, and emotional attachment (Berrone *et al.*, 2010; 2012).

SEW considerations can also be a cause for conflicts in family firms, particularly when it comes to decision-making and governance. Family members may prioritize their emotional attachment to the firm over strategic priorities and investments (Berrone *et al.*, 2010). The resulting divergence in family members' views about the usefulness and risks of digitalization may cause conflicts. Hence, family members may be hesitant to adopt explorative innovations such as new digital technologies because they are perceived as a threat to the family's traditions, values, and identity (Firfiray & Gomez-Mejia, 2021). Digitalization may also require a significant investment of time and resources, which can create conflicts between preserving SEW and pursuing financial growth.

C.2.2 Conflict Theory and Conflict Types in Family Firms

This article focuses on process digitalization since most family firms have not completed the first steps in implementing a focused digitalization roadmap (Batt *et al.*, 2020; Pricewaterhouse-Coopers, 2021). As indicated above, for most family firms, process digitalization may be the first and primary challenge when it comes to digitalization (Soluk & Kammerlander, 2021). However, even such process digitalization can lead to and enhance the conflict potential in family firms. Conflict theory is a framework that is particularly relevant for understanding conflicts in family business. Conflicts in family firms may normally arise in combination with decision making (Frank *et al.*, 2011), since most decisions are influenced by differences in individual goals, interests, and values (Chung *et al.*, 2023). In general, the conflict potential in family firms is due to the close ties and relationships among family members, leading to a complex interplay among family business, family ownership, and family business ownership (Caputo *et al.*, 2018; Claßen & Schulte, 2017; Frank *et al.*, 2011; Kellermanns & Eddleston, 2007; Magrelli *et al.*, 2022; Qiu & Freel, 2020; Sharma *et al.*, 2022). This is reflected in the various and often overlapping roles in family businesses (Davis & Harveston, 2001) as indicated above. Family firms usually take longer than non-family firms to adopt technological innovations because the older generations in charge are more resistant to new technological innovations than younger family generations and thus try to avoid or delay technological change (König *et al.*, 2013). This can be caused by a lack of technical knowledge and a desire to maintain the status quo and may challenge the strategic alignment of the family firm's digitalization effort (Ardito & Capolupo, 2023). Therefore, different types of conflicts can occur (Filser *et al.*, 2016).

In this article, we mobilize conflict theory to view digitalization as an essential cause for conflicts currently effecting many family firms worldwide. Conflict theory suggests that conflicts

can start on a small scale as disagreements, but if not addressed, can develop into serious disputes over time (Davis & Harveston, 2001). This can manifest itself in competing goals, personal hostility, disrespect, aggressive behavior, loss of constructiveness and hatred. However, following conflict theory, a moderate extent of conflicts in family firms is beneficial to achieve both family and business outcomes (e.g., Kellermanns & Eddleston, 2004; 2007). This is because moderate conflicts in family businesses allow space for new ideas to be exchanged, which do not need to be addressed if the potential for conflict is low or cannot be addressed if the potential for conflict is high or paralyzes. Moderate conflicts therefore do not paralyze work but move it forward. Hence, when a conflict is well managed, for instance with the help of conflict management strategies, differing perspectives can lead to better solutions than when there are concurring, non-conflicting perspectives (Davis & Harveston, 2001).

Conflict theory states that conflicts can be separated into cognitive, process, and relationship types. Cognitive conflicts focus on strategies, goals, and open discussion, whereas mental disputes focus on the capabilities and talents of family members. Past research has found that cognitive and process conflicts positively relate to problem-solving, creativity, and family firm performance (Kellermanns & Eddleston, 2007; Jehn, 1995; 1997). In contrast, relationship conflicts (i.e., tension and anger between group members) are negatively related to family decision-making and harm the achievement of performance goals (Eddleston & Kellermanns, 2007; Kellermanns & Eddleston, 2004; Wang & Zhang, 2022). Given this background and our above definition of digitalization, we view digitalization and digital transformation as drivers of potential cognitive and process conflicts.

C.2.3 Conflict Management Strategies and the Digitalization of Family Firms

As Omrani *et al.* (2022) suggested, a business's internal environment is an essential predictor of digital adoption. For family firms, conflicts among family business owners and associated conflict management strategies are an integral part of the internal environment. Without such

strategies, conflicts can loom over everything and possibly reach high and uncontrollable levels. Conflicts in family firms can have their roots within the controlling family, the family members who are owners, and the family business. However, regardless of the origin of these conflicts, these conflicts can significantly impair operational and strategic decision-making and, in the worst case, even curtail a family firm's ability to act and succeed.

Family firms are thus regularly advised to apply conflict management strategies to reduce the destructive conflict potential to a moderate level (Frank *et al.*, 2011). One possible solution for solving conflicts is the so-called dual-concern model, which categorizes concern into two dimensions that go along with the five underlying conflict management strategies: concern for others and concern for self. Each dimension has two expressions for its application, namely, low and high. Collaboration, compromise, and avoidance are the three possible solutions to an integrative approach along these dimensions and their expressions. This means these three conflict management strategies lie on the opposite extremes of these two dimensions and describe the extent to which each individual is involved in finding the family firm's best solution. Family firms can apply these strategies to address extended family members' problem-solving and find appropriate answers (e.g., Saunders *et al.*, 2003; Sorenson, 1999; Walton & McKersie, 1965). We next discuss these three conflict management strategies in more detail and develop hypotheses on how they are expected to affect the digitalization of family firms. We rely on the three integrative conflict management strategies described below.

Avoidance is one strategy in the contingency either/or approach (Putnam *et al.*, 2016; Qiu & Freel, 2020). This approach includes settings within which family members can choose between self-interest and accommodating others' interests. Furthermore, it is characterized by failing to achieve the desired business and family outcomes. Through the absence of direct communication about existing conflicts, avoidance manifests in a lack of reaction to conflicts (Kellermanns

& Eddleston, 2006). Therefore, frustration, negative feelings, and increased relationship tensions can occur. Such a denial of conflicts (Sorenson, 1999) and the withdrawal of family members from the family and/or business (e.g., through retirement, childbirth, and divorce) can be possible reasons for using this conflict management strategy (Alderson, 2015; Galbraith, 2003). Hence, an avoidance strategy may be a practical solution for low-intensity conflicts and those between family and non-family members. Still, it may be unsuitable for disputes between family members. In the case of high-intensity conflicts, this strategy can lead to unsolved issues, limited productivity, and rising rivalry within the family. Therefore, avoidance can result in a more destructive conflict potential and reduced organizational performance (McCarthy, 1996; Perlow & Repenning, 2009). In this context, avoidance leads to unsolved questions and problems related to digitalization.

A lack of consensus or discussion is likely to leave important questions regarding digitalization open. The result could be a failure to develop and implement a comprehensive digitalization strategy that could contribute to raising the family firms' digitalization level (Plomp *et al.*, 2012). If questions regarding digitalization still trigger tensions and conflicts despite an avoidance strategy, such conflicts may only be approached very cautiously, and attempts will be made to avoid the conflict and related disputes. As a result, family firms resorting to such avoidance strategies can be expected to not address important digitalization steps and are likely to experience a lower level of digitalization. Hence:

Hypothesis 1a *(H1a). The level of avoidance is negatively related to the extent of family business digitalization.*

Compromise belongs to the both/and approach (Putnam *et al.*, 2016; Qiu & Freel, 2020). It means accepting the persistence and interdependency of contradictory forces in family firms (e.g., the conflicts between family generations and between family and non-family members).

This strategy is characterized by finding a middle course to broker an acceptable solution to achieve both business and family outcomes (Smith & Lewis, 2011). Finding a compromise between business and family outcomes can lead to solutions that focus on "keeping the peace" within the family and family firm. Although no one feels completely satisfied with the found solution, no one feels completely dissatisfied either. This conflict management strategy is thus depicted by a mentality of "giving in" to prevent harmful feelings and tensions from arising in relationships. Due to a more participatory decision making, a compromise strategy may help minimize or reduce conflicts to a moderate level (Kellermanns & Eddleston, 2006; Schulze, 2003). If applied successfully, the family firm can achieve the desired business and family goals, but not to the highest possible extent due to the latent conflicts between those goals (Rahim, 1983). Therefore, this strategy can support the outcomes of the family firm since a moderate level of process, cognitive conflicts, and a lower level of relationship conflicts raise firm performance (Eddleston & Kellermanns, 2007; Kellermanns & Eddleston, 2004; McKee *et al.*, 2014). By including several important family business actors, the digitalization of family firms may also have a broader and thus firmer foundation, which is assumed to be beneficial to digitalization processes (Plomp *et al.*, 2012). Overall, we can thus expect a compromising conflict management strategy to be beneficial to the extent of family firm digitalization. Hence:

Hypothesis 1b *(H1b). The level of compromise is positively related to the extent of family business digitalization.*

Collaboration is also part of the both/and approach (Putnam *et al.*, 2016; Qiu & Freel, 2020) and is characterized by achieving the desired business and family outcomes through highly participative decision-making. Collaboration reveals itself through open communication about potential conflicts. This results in mutual support, mutual trust, high effort, creativity, and, therefore, cohesive and positive relationships (Seymour, 1993). Achieving this jointly agreed, acceptable solution for each party involved in the overarching goal means no sacrifices need to

be made (Alderson, 2015). Applied to the digitalization of family businesses, this may imply that a joint digitalization strategy could be developed, which is theorized to be an important driver of actual digitalization (Plomp *et al.*, 2012). In addition, this conflict management strategy is also characterized by organizational learning and continuous improvement. Thus, the likelihood of reaching business goals such as digitalization can increase (Dyer, 1986; Eddleston *et al.*, 2008; Sorenson, 1999).

Nevertheless, this strategy is impractical for solving short-term conflicts and decision-making. Furthermore, it might be unsuitable for family firms with a low level of trust. Similar to compromise, while a collaboration strategy may help to reduce or eliminate task and relationship conflicts due to participatory decision making (Kellermanns & Eddleston, 2006; Schulze, 2003), negative family or business outcomes remain possible, meaning a certain level of conflicts can still arise. Given the abovementioned benefits of a compromise strategy, on balance, the family business conflicts literature suggests that collaboration strategies are often helpful in solving family business challenges such as digitalization (Qiu & Freel, 2020). Hence:

Hypothesis 1c *(H1c). The level of collaboration is positively related to the extent of family business digitalization.*

C.2.4 The Moderating Role of Generational Ownership Dispersion

In addition, we assume that generational ownership dispersion moderates the relationships proposed in *H1a, H1b,* and *H1c*. At a conceptual level, generational ownership dispersion occurs when at least two family generations hold ownership stakes in the family firm (e.g., Kellermanns *et al.*, 2012). It heavily influences the decision-making processes in family firms due to the rivalry and conflicts within and between multiple generations (Gersick *et al.*, 1997; Magrelli *et al.*, 2022). Therefore, various generations take part in the decision-making process and the likelihood of potential conflicts increases, which could derive from a lower output, such as

reduced firm performance (Kellermanns & Eddleston, 2007). In line with this notion, Davis and Haverston (2001) were able to establish that conflicts in family firms are generally related to the number of generations. These authors also emphasized that the so-called generational shadow favors conflicts. This effect can be characterized by the changing dynamics among family members when each new generation enters the firm, resulting in complex interactions. Davis and Haverston (2001) therefore suggest that in order to reduce the potential for conflict, the influence of the older generation should be reduced, or appropriate tools should be used to reach consensual decisions.

These dynamics seem to be particularly pertinent when a new generation becomes part of the ownership structure. The degree of ownership involvement varies by family firm. The decisions made in the firm could be driven by altruism and a strong incentive to maximize the family's and the firm's welfare (Schulze, 2003). In family firms with one ownership generation, the generation in charge might be more open to external advice from, for example, family members without an ownership stake and non-family managers, especially when there could be a substantial impact on the strategic future of the firm and, thus, later generations. Therefore, in strategic decision-making, the older generation may be open to the insights and knowledge of the younger generation, even if they are not in partial charge. The opinions of later generations could help avoid potential conflict before the earlier generation cedes control (Qiu & Freel, 2020). Hence, conflict could be maintained low, and conflict management strategies could better impact ownership behaviors. High generational ownership dispersion (i.e., two or more family generations with an ownership stake) is associated with agency problems and an increased risk of different types of conflicts (Arteaga & Menéndez-Requejo, 2017; Eddleston *et al.*, 2008; Qiu & Freel, 2020), primarily across generations owing to their different points of view (Berrone *et al.*, 2012; Davis & Harveston, 1999). In these situations, each family generation and their members may want to force their decisions on the others (De Massis *et al.*, 2013). These

conflicts may lead to short-term decision-making, increasing the likelihood of formulating harmful strategies and hampering business outcomes and technological innovations (De Massis *et al.*, 2013; Kellermanns *et al.*, 2012; Schulze, 2003; Shleifer & Vishny, 1986).

In such an environment, the younger generation can be expected to foster digital transformation because they are usually more tech-savvy. In contrast, older generations can sometimes be defensive, stick to the status quo, and show a high unwillingness and resistance to (digital) change (de Groote *et al.*, 2023; Soluk & Kammerlander, 2021; Hiebl, 2015). Norms, personal influence on decision-making, the different treatment of family members, interpersonal conflicts, sibling rivalry, a lack of trust and commitment between family and non-family managers, and different views on the strategic direction of the family firm can overshadow business concerns and diminish more radical innovations as well as its success (De Massis *et al.*, 2008; Dunn, 1995; Dyer, 1986; Kubíček & Machek, 2020; Lansberg & Astrachan, 1994). Thus, in line with conflict theory, family firms with two or more ownership generations usually show a higher potential for conflicts, leading to self-interest, reducing performance (Kellermanns & Eddleston, 2007; Kubíček & Machek, 2020), and hampering innovation (Calabrò *et al.*, 2021). Large parts of the literature suggest family business conflicts between older and younger family owner generations (e.g., Alderson, 2015). By contrast, in family firms with only one ownership generation, conflicts are often less harmful and can even improve the firm's outcomes.

Consequently, we can expect that conflict management strategies such as avoidance, compromise, and collaboration are especially relevant and helpful in family firms where two or more family generations hold ownership rights. Hence, we expect the relationship between conflict management strategies and digitalization to be more pronounced for firms with two or more family ownership generations than those with only one family ownership generation, as in the latter firms, the conflict levels around digitalization can be expected to be lower anyway (e.g., de Groote *et al.*, 2021). Based on the above considerations, we hypothesize:

Hypothesis 2a *(H2a). The relationship described in H1a (avoidance) is more pronounced if two or more family generations are involved in the ownership.*

Hypothesis 2b *(H2b). The relationship described in H1b (compromise) is more pronounced if two or more family generations are involved in the ownership.*

Hypothesis 2c *(H2c). The relationship described in H1c (collaborate) is more pronounced if two or more family generations are involved in the ownership.*

A visual summary of our hypotheses can be found in Figure C-1.

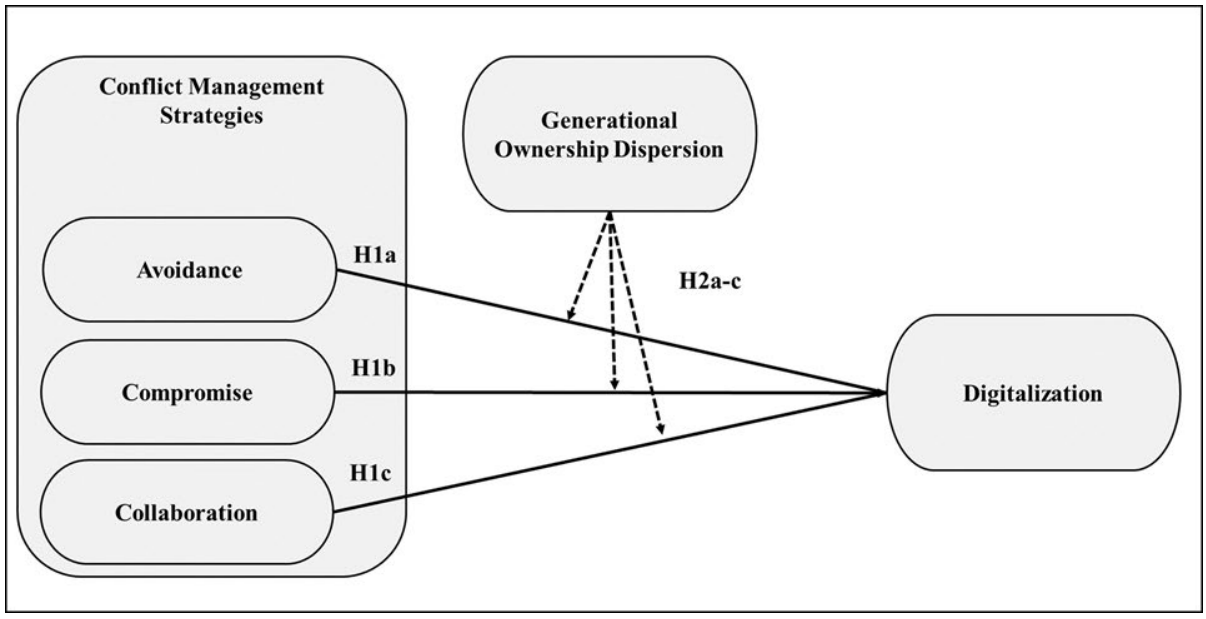

Figure C-1. Research model

C.3 Methods

C.3.1 Sampling and Data

To address our central research question, we employ a mixed-methods research design, consisting of a survey and in-depth interviews with family business actors to get a closer under-

standing of the dynamics of conflicts, conflict management strategies and digitalization processes in family firms. Our survey targeted German Mittelstand firms as family firms are widespread in the German Mittelstand. The typical German family firm is often viewed as being part of the Mittelstand and, therefore, not very large and not publicly listed (Berghoff, 2006; Pahnke and Welter, 2019). At the same time, family firms in the German Mittelstand especially face challenges when it comes to digital transformation (de Groote *et al.*, 2023; Pahnke *et al.*, 2022; Weigel *et al.*, 2022). Following de Massis *et al.* (2018) and Becker *et al.* (2016), our target population of Mittelstand firms contains only firms with 3,000 employees or less. We obtained the survey addresses from the Amadeus database. Listed firms and firms from the financial services industry were excluded due to their unique characteristics when it comes to digitalization (Manser *et al.*, 2021; Meng *et al.*, 2022).

In the survey, we targeted the top management team, specifically CEOs, since it can be assumed that they are the most knowledgeable respondents about their business (Zahra *et al.*, 2004). CEOs often hold a unique position in family businesses as they are usually responsible for maintaining close ties with the controlling family while simultaneously driving business performance. Therefore, CEOs have an excellent and comprehensive overview of their firms' activities and the nature of the collaboration in the top management team (Zahra *et al.*, 2004). In family firms, we can distinguish between CEOs belonging to the controlling family (i.e., family CEOs) and CEOs not belonging to the family (i.e., non-family CEOs). However, regardless of family status, CEOs usually have close ties with the controlling family and an excellent understanding of what is driving them as well as potential conflicts (Hiebl and Li, 2020). We thus deem both family and non-family CEOs to be well-suited informants for the survey part of this article. Research has also shown that a company's executives have a decisive influence on digitalization (Li *et al.*, 2020) and are thus deemed an excellent group of respondents for issues around digital transformation, including conflicts.

To increase the likelihood of response, we manually identified the personal e-mail addresses of top managers, especially CEOs of Mittelstand firms that are located near our university. We particularly identified firms situated close to our university since past research has shown that geographic proximity between survey authors and potential respondents results in higher response rates (Bartholomew & Smith, 2006). This process resulted in a target population of 1,118 firms. We sent out an initial mailing in early July 2020 and later sent multiple follow-up reminders through the middle of August 2020, as recommended by Dillman *et al.* (2014). In all our mailings, we indicated the university sponsorship of our survey to obtain full transparency (cf. Mellahi & Harris, 2016). Furthermore, we offered our survey addressees two incentives upon completing the survey (Singer & Ye, 2013). Survey respondents could choose between receiving none, one, or both incentives: (1) an executive research report and (2) a donation of EUR 10 to a charity of their choice.

We received 156 complete or partially complete questionnaires, resulting in an overall response rate of 13.95%. This response rate is comparable to similar recent survey studies drawing primarily on small and medium-sized firms (e.g., Casprini *et al.*, 2022; Ling *et al.*, 2022; Sastre *et al.*, 2022). This initial set of responses included family and non-family firms since there was no viable option to identify family firms upfront. Therefore, we needed to determine the family firms among our responses. To do so, we relied on the self-assessment approach, which is a usual way to define family firms in family business research (e.g., Arteaga & Menéndez-Requejo, 2017; Steiger *et al.*, 2015; Schulze, 2003). Specifically, we asked the respondents whether they considered their firm a family firm or not, and excluded those firms that did not view their firm as a family firm. The final sample contained only those firms that identified themselves as family firms. Hence, 71 of the 156 respondents had to be removed due to their missing family firm status and/or incomplete answers on the variables of interest considered in this article. We only used the 85 family business cases with complete information on the

measures relevant to this article. Although this number of observations is low (and lower than we desired), it is in line with comparable survey-based family firm studies published recently owing to a complex and sensitive subject area (e.g., Bernhard & Labaki, 2020). Furthermore, family firm studies often suffer from low sample sizes and response rates, as such firms tend to be reserved, especially when sensitive data are involved to keep the secrets of the family private (Chrisman *et al.*, 2004; Wilson *et al.*, 2014). In addition, considering that the response rate in family business research has generally decreased over recent decades (e.g., Chidlow, 2015; Pielsticker & Hiebl, 2020), especially those targeting top executives (Cycyota & Harrison, 2006), our achieved number of observations seems sufficient for conducting our statistical analyses (cf. Speklé & Widener, 2018).

Note that this article started with the assumption that family firms, indeed, would experience conflicts around digitalization and that conflict management strategies may help alleviate such conflicts. To ascertain that such conflicts indeed are present in our sampled firms, we first examined two types of family firm conflicts: general process conflicts and specific process conflicts about digitalization. The process conflict variable was measured using the multi-item scale presented by Kellermanns and Eddleston (2006). The direct comparison of these two types of conflicts in Table C-1 shows that, in particular, process conflicts about digitalization are more pronounced among our sampled firms than general process conflicts. These descriptive findings underpin that conflicts around digitalization are very present in many contemporary family firms, including those in our sample. Note, however, that the two conflict variables presented in Table C-1 are not further used in our below analyses due to the cross-sectional nature of our sample. These descriptive findings nevertheless show that conflicts around digitalization are a relevant phenomenon that is present in many family firms we surveyed.

Variable	Mean	Min	Max	Median	SD	Low (%)	Medium (%)	High (%)
General process conflicts	1.79	1.00	5.67	1.33	1.01	81.2	17.6	1.2
Specific process conflicts about digitalization	2.07	1.00	5.00	1.75	1.09	69.4	30.6	0

Note. Min. = minimum; Max. = maximum; SD = standard deviation.

Table C-1. Comparison of general process conflicts and specific process conflicts about digitalization

C.3.1.1 Non-Response Bias

Non-response bias occurs when the percentage of non-respondents is high, and thus the usable sample is biased (Frohlich, 2002; Van Loon, 2003). To analyze the likelihood of non-response bias in this article, we used the common approach of testing for differences between early and late respondents. Since late respondents are considered more similar to non-respondents than early respondents, we used late respondents as a proxy for non-respondents (e.g., Oppenheim, 1966; Van der Stede *et al.*, 2005). Table C-2 shows the mean values of all the variables included in this article and compares the subsamples between early respondents (25^{th} quantile) and late respondents (75^{th} quantile) (Armstrong & Overton, 1977). We first used a Kolmogorov–Smirnov test and a Shapiro–Wilk test to analyze whether the constructs in this article follow a normal distribution. We found that none of the variables, except *Past Performance*, were normally distributed. Hence, we used a t-test for *Past Performance*. For all the other variables except *Generational Ownership Dispersion*, *Industry*, *Firm Size*, and *Strategy*, we used the non-parametric Mann–Whitney U-test. For the dichotomous variables, we used the non-parametric chi-square test. We found no significant difference between early and late respondents, suggesting our sample did not suffer from non-response bias.

Variable	Early Respondents	Late Respondents	p-value
	Mean	Mean	
Digitalization	2.28	2.12	.222
Avoidance	3.59	3.55	1.000
Compromise	4.25	4.61	.509
Collaboration	5.15	5.47	.420
Generational Ownership Dispersion	.59	.73	.340
Firm Size > 499	.50	.45	.763
Manufacturing	.68	.77	.498
Strategy	.36	.45	.540
Past Performance	4.70	4.65	.851

Table C-2. Comparison of the variables for late and early respondents

C.3.1.2 Common Method Bias

We obtained the independent and dependent variables from the same source; therefore, this article design could suffer from potential common method bias. To mitigate common method bias, we took several procedures. First, we separated the measurements of the independent and dependent variables in the flow of our questionnaire to avoid participants drawing their own conclusions about the hypotheses, which can evoke social desirability bias (e.g., Podsakoff *et al.*, 2003; Lindell & Whitney, 2001; Hult *et al.*, 2006). Second, we ensured the respondents' anonymity. Third, we used the feedback from an extensive pretest on the variables involved in this article (Podsakoff *et al.*, 2003). Fourth, we integrated a marker variable (Craighead *et al.*, 2011; Hult *et al.*, 2006; Malhotra *et al.*, 2006; Richardson *et al.*, 2009; Speklé & Widener, 2018; Williams *et al.*, 2010;) theoretically unrelated to at least one of our variables (i.e., *Donation*, a dummy variable) into our questionnaire. As indicated above, we asked survey respondents whether they wanted to receive an executive research report and/or a donation of EUR 10 to a charity of their choice (or neither of these choices). Based on this information, we developed

the dichotomous variable *Donation*, coded one if a donation was desired and zero otherwise.[4] We then computed the correlations between this variable and all the other variables in this article (see Table C-6) (Calic & Ghasemaghaei, 2021; Craighead *et al.*, 2011). The maximum significant correlation value was relatively low (i.e., -.180; see Cohen (1988) for the correlation effect size). Hence, these correlations did not indicate common method bias (Bagozzi *et al.*, 1991). Fifth, we used Harman's one-factor test, based on an exploratory factor analysis, to identify potential common method variance (Harman, 1976; Hult *et al.*, 2006; Lindell & Whitney, 2001; Podsakoff & Organ, 1986). We computed all our study variables as a single variable, showing that no single factor explains most of the covariance between the variables (the most crucial factor accounts for only 13.51% of the covariance). The results of these procedures indicated that the relationships in our survey regression are unlikely to be affected by common method bias.

C.3.2 Measures

Since the constructs in this article relied on established scales from the English-language literature, we translated all the questions in our survey into German. We back-translated them into English to check whether the German translation precisely conveyed the meaning of the original questions (cf. Brislin, 1970; Maneesriwongul & Dixon, 2004). The back-translation was conducted by a fellow researcher not further involved in this research project. In addition, we used extensive and helpful feedback from a pretest of our questionnaire involving five academics and five practitioners to ensure the comprehensibility and flow of the questionnaire (cf. Hunt *et al.*, 1982). The variables were collected using a structured survey, including only closed-ended questions.

[4] Donation as a single-item measure is not a perfect marker variable, as noted by Lindell and Whitney (2001) and Williams *et al.* (2010). However, this marker variable did not lengthen our questionnaire compared with additionally including a multi-item measure. Furthermore, our procedure was in line with that of Calic and Ghasemaghaei (2021).

To establish the construct validity of the multi-item constructs of our survey, we conducted a principal component analysis (PCA). Following Field (2018) and Hair *et al.* (2011), we suppressed factor loadings (i.e., PCA loadings) below .30. To interpret the factor groupings, we used varimax rotation to maximize the dispersion of the loads within the factors so that a smaller number of variables loaded onto each factor (Field, 2018). After removing cross-loadings, we ensured several items belonged to one factor (Sarstedt *et al.*, 2014). We performed several empirical tests to establish the content and construct validity of our measures (Nunnally, 1978). To test unidimensionality, we conducted Bartlett's test of item correlation (Bartlett's test = .00) and Kaiser–Meyer–Olkin statistics (KMO > .5). For the multi-item constructs in this article, we also calculated Cronbach's alpha, composite reliability (CR), and average variance extracted (AVE) values (Hair *et al.*, 2010). Not all the constructs reached the recommended threshold (.70) for Cronbach's alpha values suggested by Nunnally (1978). However, similar situations have been noted in the family firm literature (cf. Sorenson, 1999). The CR statistics were all above the threshold of .70. The AVE values exceeded the threshold of .50, indicating the adequate reliability and validity of the constructs (Fornell & Larcker, 1981).

C.3.2.1 Dependent Variable

Digitalization was measured using a reverse-coded scale adapted from Plomp *et al.* (2012). Plomp *et al.* (2012) built a so-called digitization maturity construct that measures the extent to which companies have digitalized their supply chains. We adapted this approach by focusing solely on the technological maturity dimensions. This measurement initially included nine statements for both the supply and the demand dimensions, such as "ordering goods or services online" versus "receiving online orders" and "managing the capacity or inventories of suppliers" versus "managing the capacity or inventories of customers" (for the complete list of items, see Table C-3). We asked respondents to indicate the extent to which their firms used specific

IT systems/applications to manage these process characteristics and offered four answer categories (Plomp *et al.*, 2012): (1) no; (2) yes, for only one of our suppliers/customers; (3) yes, for some of our suppliers/customers; and (4) yes, for most of our suppliers/customers. The nine-item "digitalization customer" construct was validated using a PCA with varimax rotation. The nine items loaded onto three factors and indicated satisfactory reliability (see Table C-3). The KMO measure verified the sampling adequacy of the analysis (KMO = .65, which is "mediocre" according to Kaiser & Rice, 1974), and all the KMO values for the individual items were above .51 compared with an acceptable limit of .50 (Kaiser & Rice, 1974). The three factors jointly explained 62.21% of the variance and had eigenvalues over Kaiser's criterion of 1. The nine-item "digitalization supplier" construct was also based on a PCA with varimax rotation (see Table C-3). To ensure the reliability and validity of the analysis, we eliminated two items because of their cross-loadings. The KMO measure verified the sampling adequacy of the analysis (KMO = .73, which indicates "middling" according to Kaiser & Rice, 1974), and all the KMO values for the individual items were above .59 (Kaiser & Rice, 1974). The seven items showed satisfactory reliability and loaded onto two factors (see Table C-3). These two factors had eigenvalues over Kaiser's criterion of 1 and jointly explained 58.92% of the variance. For our analysis, we computed the average of both dimensions as our appropriate variable, *Digitalization*, ranked from high (4) to low (1).

C.3.2.2 Independent Variable

In line with the literature (Rahim, 1983; Sorenson, 1999), the three conflict management strategies (i.e., avoidance, compromise, and collaboration) were measured by established multi-item scales, including nine items initially. The items were measured using a seven-point Likert scale anchored from "strongly disagree" to "strongly agree". We included eight items in the analysis because of reliability and validity issues. The final multi-item constructs are based on a PCA with varimax rotation (see Table C-3). The KMO measure verified the sampling adequacy of

the analysis: (KMO = .62 “mediocre” according to Kaiser & Rice, 1974), and all the KMO values for the individual items were higher than .51 (Kaiser & Rice, 1974). The eight items, therefore, indicated satisfactory reliability (see Table C-3) and loaded onto three factors. We termed the three resulting variables *Avoidance*, *Compromise*, and *Collaboration*. These three factors had eigenvalues over Kaiser’s criterion of 1 and jointly explained 75.39% of the variance.

C.3.2.3 Moderator Variable

Our moderator variable, *Generational Ownership Dispersion*, was measured using a single item based on previous family business studies (e.g., Kellermanns & Eddleston, 2007; Wanous *et al.*, 1997). We asked respondents to indicate how many family generations were part of the ownership structure (e.g., Eddleston *et al.*, 2008; Kellermanns & Eddleston, 2007;). Three options were available: one generation, two generations, and three or more generations. Based on this information, we developed the dichotomous variable *Generational Ownership Dispersion*, coded one for a family firm with two or more generations involved and zero for a family firm with one generation in charge.

Digitalization (Reflectively measured)	Factor loading (PCA)		
To support the sales function, does your organization use specific IT systems/applications for:	**1**	**2**	**3**
Receiving e-invoices?	**.675**		
Enabling payments online for ordered products and services?	**.771**		
Sending e-invoices?	**.757**		
Sending offers?	.346	**.715**	
Answering calls after proposals and tenders?		**.867**	
Launching sales auctions, for example, in B2B and B2C marketplaces?		**.563**	.308
Collaborating with customers to forecast their demand?			**.825**
Collaborating with customers to design new products and services?			**.774**
Managing the capacity and inventories of customers?	.304		**.726**
Cronbach’s α	.66	.60	.76
CR	.78	.76	.82
AVE	.54	.53	.60

To support the purchase function, does your organization use specific IT systems/applications for:	1	2
Ordering goods and services online?	**.787**	
Arranging payments online for ordered products and services?	**.866**	
Receiving e-invoices?	**.615**	
Running online auctions?		**.694**
Collaborating with suppliers to forecast your demand?		**.782**
Collaborating with suppliers to design new products and ser-		**.761**
Managing the capacity and inventories of suppliers?		**.708**
Cronbach's α	.66	.74
CR	.80	.83
AVE	.58	.54

Conflict Management Strategies (Reflectively measured)	Factor loading (PCA)		
	Avoidance	**Compromise**	**Collaborate**
We attempt to avoid being "put on the spot" and try to keep conflicts to themselves.	**.919**		
We usually avoid open discussions of differences.	**.908**		
We try to find a middle course to resolve an impasse.		**.733**	
We usually propose a middle ground for breaking deadlocks.		**.930**	
We use "give and take" so that a compromise can be made.		**.746**	
We exchange accurate information to solve the problem together.			**.782**
We try to bring all our concerns out in the open to resolve the issues in the best possible way.			**.846**
We try to work with one another for a proper understanding of the problem.			**.870**
Cronbach's α	.83	.76	.80
CR	.91	.85	.87
AVE	.83	.65	.69

Past Performance (Reflectively measured)	Factor loading (PCA)	
	Growth	**Return**
Growth in sales	**.935**	
Growth in market share	**.940**	
Growth in profitability	.326	**.808**
Return on equity		**.934**
Return on total assets		**.935**
The profit margin on sales		**.858**
Ability to fund growth from profits	.414	**.664**
Cronbach's α	.91	.92
CR	.94	.93
AVE	.88	.72

Note. AVE = average variance extracted; CR = composite reliability; PCA = principal component analysis.

Table C-3. Construct validity of *Digitalization*, the three conflict management strategies, and *Past Performance*

C.3.2.4 Control variables

In our model, we integrated several relevant control variables; hence, we controlled for the following four variables theoretically or empirically related to family firms' level of digitalization. First, we controlled for *Firm Size* because larger family firms often have better access to finance; hence, they have more resources to invest in radical innovations (Plomp *et al.*, 2012; Craig & Dibrell, 2006; George, 2005). By contrast, small and medium-sized family firms usually have less economic power and severe resource constraints (e.g., Casado-Belmonte *et al.*, 2021), often leading them to avoid or postpone digital transformation processes (Nambisan, 2017). The respective dichotomous variable *Firm Size* was measured based on the number of employees (e.g., Kellermanns & Eddleston, 2007), coded one if the family firm had more than 499 employees and zero otherwise.

Second, we controlled for *Industry* because some industries are traditionally more prone to adopt new technologies, and innovations such as digital transformation are relatively more important (Craig & Dibrell, 2006). Since most of the observed firms belong to the manufacturing industry (see Table C-5), we refrain from listing the various sectors individually. Therefore, *Industry* represents a dummy variable, coded if the firm primarily belongs to the manufacturing industry and zero otherwise (i.e., all other sectors).

Third, we controlled for *Strategy* since the family firm's strategic orientation can shape how it reacts to technological change (Liu *et al.*, 2023). We operationalized this variable based on two of Miles & Snow's (1978) strategic archetypes: prospectors and defenders. While "defenders operate in relatively stable product areas, offer more limited products than competitors, and compete through cost leadership, quality, and service", prospector firms "compete through new products and market development" (Simons, 1987, p. 359). Based on a short description of these two types of firms, we asked the respondents to choose which description fits their firm

best. Based on the respondent's choice, we developed the dichotomous variable *Strategy*, coded one for prospector firms and zero for defender firms.

Fourth, we controlled for *Past Performance* because a higher degree of retained earnings and financial resources may lead to higher investment (Werner *et al.*, 2021) – which can be expected to include investments in digitalization processes. We measured *Past Performance* on an eight-item scale based on the measurement proposed by Eddleston and Kellermanns (2007). We included seven items in the study because of reliability and validity issues. The respondents were asked to assess their firms' performance compared with their competitors in the three years before the survey. The items were measured using a seven-point Likert scale from "lower than competitors" to "higher than competitors". The PCA results showed that the items loaded onto two factors (see Table C-3). Both factors were metrically scaled and calculated as the mean value of the individual items. We computed the average of both performance factors as Past Performance.

C.3.3 Qualitative Interviews

To examine the modes of digitalization, the impact of multiple family generations, and applied conflict management strategies to overcome or prevent conflicts related to digitalization, we additionally conducted 13 semi-structured interviews with family business actors (Rabionet, 2011). Frank *et al.* (2011) have suggested that interviews are particularly valuable to analyze family business conflicts, as they can generate insights that could not be reached with empirical-quantitative methods. The interviews were conducted with representatives of German family firms: owners, top managers, family members, and non-family managers. We conducted these interviews after we had obtained the above quantitative results to better assess and make sense of these survey results.

The family firms selected for the interviews consisted of six participants from the prior quantitative study (i.e., family firms that have already been part of the quantitative-based research) and seven additional family firms. Similar to the above survey, we tried to use geographic proximity between survey authors and potential interviewees to increase the likelihood of participation. Thus, the firms were selected to be located close to our university, i.e., in the same or neighboring German federal state. For this procedure, we used Bureau van Dijk's Amadeus database again, which included the location of the firm's headquarters and each firm's contact information. We also searched for potential companies due to personal contact, e.g., at various fairs. An additional sample criterion was firm size. We focused on family businesses with more than nine employees to exclude microenterprises since we expected that most of the micro family firms will not be comparable to much larger family firms when it comes to problems and conflicts regarding digitalization. To keep the companies comparable between our survey and the interview study, the upper limit for the additional companies (i.e., 3,000 employees) was also applied when searching for interviewees. Another important criterion was the ownership structure. We were careful to include both family businesses whose ownership family spans only one and others that span several generations. This was necessary to connect our qualitative insights to the moderator variable from the survey study, i.e., ownership dispersion. This information could be crystallized through online research of the respective companies or asked in a personal exchange. Therefore, family firms of different ages, sizes, industries, generations, and generational ownership dispersion were included in our interview study (see Table C-4). One person was interviewed for each of the 13 companies in this article.

Case	Industry	Employees	Position	Family member	Interviewees Family Generation	Generational Ownership Dispersion	Interview Duration
Alpha	Non-Manufacturing	> 499	CEO	No		Yes	71 Min.
Beta	Non-Manufacturing	1 - 499	CEO	Yes	Younger generation	No	49 Min.
Gamma	Manufacturing	> 499	CFO	Yes	Middle generation	Yes	45 Min.
Delta	Non-Manufacturing	1 - 499	Employee	Yes	Younger generation	No	60 Min.
Epsilon	Manufacturing	1 - 499	CEO	No		No	52 Min.
Zeta	Non-Manufacturing	1 - 499	CEO	Yes	Younger generation	Yes	48 Min.
Eta	Non-Manufacturing	1 - 499	Middle manager	Yes	Younger generation	Yes	72 Min.
Theta	Non-Manufacturing	1 - 499	Entry into the company planned	Yes	Younger generation	No	52 Min.
Iota	Non-Manufacturing	1 - 499	CEO	Yes	Younger generation	Yes	48 Min.
Kappa	Non-Manufacturing	1 - 499	Entry into the company planned	Yes	Younger generation	No	51 Min.
Lambda	Manufacturing	1 - 499	CEO	Yes	Younger generation	Yes	51 Min.
My	Manufacturing	1 - 499	Middle manager	No		No	62 Min.
Ny	Non-Manufacturing	1 - 499	Middle manager	Yes	Younger generation	Yes	52 Min.

Note. All the names of the family firms and interviewees are anonymized throughout the paper, as confidentiality was guaranteed to all interview partners.

Table C-4. Descriptive information on case firms and interviewees

The interviews were conducted during the Covid-19 pandemic, and we thus used online video communication software. The interview guide developed for this follow-up survey was sent to the interviewees in advance. The interviews were recorded with the permission of the interviewees, transcribed immediately afterward, and analyzed alongside the prior insights from the literature and our quantitative results. Respondents were assured that all data would be kept confidential and their identity would not be revealed. In particular, to better understand the variance in conflict management strategies across several ownership generations, the strategies presented in the literature (e.g., Sorenson, 1999), namely avoidance, compromise, and collaboration, were analyzed using a deductive approach following Mayring and Frenzl (2019). At the same time, we remained open to additional inductive insights from our interviews. Thus, our additional interview findings cannot be viewed as fully resulting from a deductive approach but rather from a combination of deduction and induction methods, rendering our approach to analyzing the interviews abductive (Kennedy & Thornberg, 2018). We used a software-based evaluation tool to code and analyze our interview data and generate additional interview findings. For these investigations, we focus on the primary outcomes regarding digitalization, its potential for conflicts, and possible strategies for resolving such inconsistencies.

C.4 Results

C.4.1 Descriptive Statistics and Correlations

Table C-5 shows the descriptive statistics of our variables (e.g., N, Mean, Median, and Standard Deviation (SD)). *Digitalization* ranges from 1.2 to 3.0, with a mean of 2.15 (SD = .46). These descriptive statistics indicate a relatively modest extent of digitalization in the German family firms we analyzed, as the theoretical maximum of our *Digitalization* variable would be 4. Regarding the conflict management strategies, the respondents rated *Collaboration* the highest (mean = 5.33), followed by *Compromise* (mean = 4.57) and *Avoidance* (mean = 3.35).

Table C-6 presents the correlation matrix. Due to the various scale levels of our variables, we used different measures of associations (for further information, see Field, 2018). For the correlations between the metric and dichotomous variables, point-biserial correlation coefficients were applied. Pearson correlation coefficients were used for the correlations between the metric variables. For the correlations between the dichotomous variables, Phi values were deployed. Significant correlations at $p \leq .05$ are indicated in bold. There are some significant associations between the variables. *Digitalization* is negatively correlated with *Collaboration*, while it is positively correlated with *Firm Size* and *Generational Ownership Dispersion* is positively correlated with *Manufacturing*. However, all the correlations are below the accepted threshold of .70; hence, multicollinearity is unlikely to be a concern in our analyses (Bagozzi *et al.*, 1991; Dormann *et al.*, 2013; Sarstedt *et al.*, 2014).

Variable	N	Mean	Min	Max	Median	SD
Digitalization	85	2.15	1.22	3.00	2.06	.46
Avoidance	85	3.35	1.00	7.00	3.00	1.82
Compromise	85	4.57	1.00	7.00	4.67	1.32
Collaboration	85	5.33	1.00	7.00	5.67	1.25
Generational Ownership Dispersion	85	.73	.00	1.00	1.00	.45
Firm Size > 499	85	.39	.00	1.00	.00	.49
Manufacturing	85	.73	.00	1.00	1.00	.45
Strategy	85	.46	.00	1.00	.00	.50
Past Performance	85	4.56	1.00	6.80	4.60	1.08

Note. N = total number of cases; Min. = minimum; Max. = maximum; SD = standard deviation.

Table C-5. Descriptive statistics

	Variable	N	1	2	3	4	5	6	7	8	9	10
1	*Digitalization*	85	1									
2	*Avoidance*	85	.096	1								
3	*Compromise*	85	.024	.119	1							
4	*Collaboration*	85	-.089	-.046	**-.381**	1						
5	*Generational Ownership Dispersion*	85	.109	-.008	.017	.010	1					
6	*Firm Size > 499*	85	**.504**	.114	-.175	.031	.105	1				
7	*Manufacturing*	85	.164	-.059	-.084	-.146	**.225**	.105	1			
8	*Strategy*	85	-.100	-.138	-.090	.050	.029	-.055	-.077	1		
9	*Past Performance*	85	.116	-.060	-.182	.083	-.038	.143	-.117	.189	1	
10	*Donation (marker variable)*	85	-.009	.104	-.058	-.180	-.010	-.051	.115	-.018	-.185	1

Note. N = total number of cases; correlations significant at $p < .10$ are indicated in bold; *Point-biserial* correlation coefficients are used for correlations between metric and dichotomous variables; *Pearson* correlation coefficients are used for correlations between metric variables; *Phi* values are used between dichotomous variables (for further information see Field, 2018).

Table C-6. Correlation matrix

C.4.2 Multiple Regression Analyses

Following Hartmann and Moers (1999), Table C-7 provides the results of the hierarchical regression analysis. Our first model contains the control variables only (Model 1). The main effects suggested in *H1* are included in Model 2. Finally, the complete model (Model 3) adds the interaction terms between the conflict management strategies (*Avoidance*, *Compromise*, and *Collaboration*) and *Generational Ownership Dispersion*. To better interpret the main effects and further assess potential multicollinearity issues, we mean-center all the variables involved in the interaction term (Cronbach, 1987; Field, 2018; Hair *et al.*, 2011). In addition to the correlation matrix mentioned above, we further test whether multicollinearity issues might arise. Multicollinearity can be expected not to be an issue when the variance inflation factors (VIFs) are below the recommended threshold of 10 (e.g., Dormann *et al.*, 2013; Hair *et al.*, 2011). All the VIFs in our regression models are well below this threshold and even below 2. Hence, we do not have any indications that our results would suffer from multicollinearity issues.

	Dependent variable: Digitalization											
	Control variables only (Model 1)				**Main effects added (Model 2)**				**Interaction effects added (Model 3)**			
Independent variables	Stand. beta	t value	p value	VIF	Stand. beta	t value	p value	VIF	Stand. beta	t value	p value	VIF
Constant		8.329	0.000			5.029	.000	1.115		4.461	.000	
Firm Size > 499	.476	4.903	.000***	1.043	.508	5.084	.000***	1.116	.501	5.057	.000***	1.116
Manufacturing	.116	1.205	.232	1.032	.104	1.037	.303	1.074	.126	1.252	.215	1.157
Strategy	-.079	-.816	.417	1.047	-.060	-.607	.546	1.126	-.094	-.932	.354	1.166
Past Performance	.076	.772	.443	1.079	.120	1.194	.236	1.070	.158	1.557	.124	1.179
Avoidance					.011	.113	.910	1.323	.012	.126	.900	1.088
Compromise					.203	1.862	.067*	1.252	.216	1.907	.060*	1.466
Collaboration					-.174	-1.639	.105	1.069	-.145	-1.346	.182	1.322
Generational Ownership Dispersion					.037	.377	.707	1.115	.033	.340	.735	1.071
*Avoidance * Generational Ownership Dispersion*									-.098	-.985	.328	1.135
*Compromise * Generational Ownership Dispersion*									-.018	-.171	.865	1.241
*Collaboration * Generational Ownership Dispersion*									-.189	-1.797	.076*	1.256
R^2		.276				.318				.359		
Adjusted R^2		.240				.247				.262		
F		7.619***				4.438***				3.715***		
N		85				85				85		

Note. VIF = variance inflation factor; R^2 = coefficient of determination; adjusted R^2 = adjusted coefficient of determination; F = F ratio; N = total number of cases; Stand. β = standardized regression coefficient β.
** p < .10; ** p < .05; *** p < .01*

Table C-7. Hierarchical regression analysis

Our hierarchical regression setup is supported because our full model (Model 3) features the highest R^2 of all the models (.36). Further, all three models have significant F statistics ($p < .01$). To hold sufficient statistical power, our 11 independent variables in Model 3 would require a minimum number between 55 observations (that is, five times the number of independent variables in the complete regression analysis, see Hair *et al.*, 2011) and 75 observations (that is, 20 plus five times the number of independent variables, see Khamis and Kepler, 2010). Hence, all three models should hold appropriate statistical power since our number of observations (85) is above both these thresholds.

In Model 1, we estimated the control variables' effects. These variables explain a relatively large proportion of the variance ($R^2 = .28$). However, the control variables in Model 1 suggest only one significant effect. We find a positive relationship between *Firm Size* and *Digitalization* ($b = .476$, $p < .01$), following our assumption that small family firms would be less likely than large family firms to have the resources to invest in digital transformation processes (Plomp *et al.*, 2012; Kellermanns & Eddleston, 2006b).

In Model 2, we include the direct effects proposed in *H1(a–c)*. The explained variance increases significantly ($R^2 = .32$). However, we only find one significant direct effect on *Digitalization* besides its positive relationship with *Firm Size* ($b = .508$, $p < .01$). That is, *Compromise* is significantly associated with *Digitalization* ($b = .203$, $p < .10$), providing support for hypothesis *H1b*. Model 2 shows no significant direct effect of *Avoidance* and *Collaboration* on *Digitalization*. Hence, *H1a* and *H1c* are not supported.

In Model 3, we include the interaction terms of the conflict management strategies and *Generational Ownership Dispersion*. The significant predictors *Firm Size* ($b = .501$, $p < .01$) and *Compromise* ($b = .216$, $p < .10$) are also confirmed in Model 3. Therefore, *H1b* receives further

support from this model. In addition, one of the three proposed interaction effects, the moderating role of *Generational Ownership Dispersion* in the relationship between *Collaboration* and *Digitalization*, turns out to be significant (b = -.189, p < .10). These findings support *H2c.* In contrast, the other two interaction terms are unrelated to *Digitalization*. Thus, *H2a* and *H2b* are not supported.

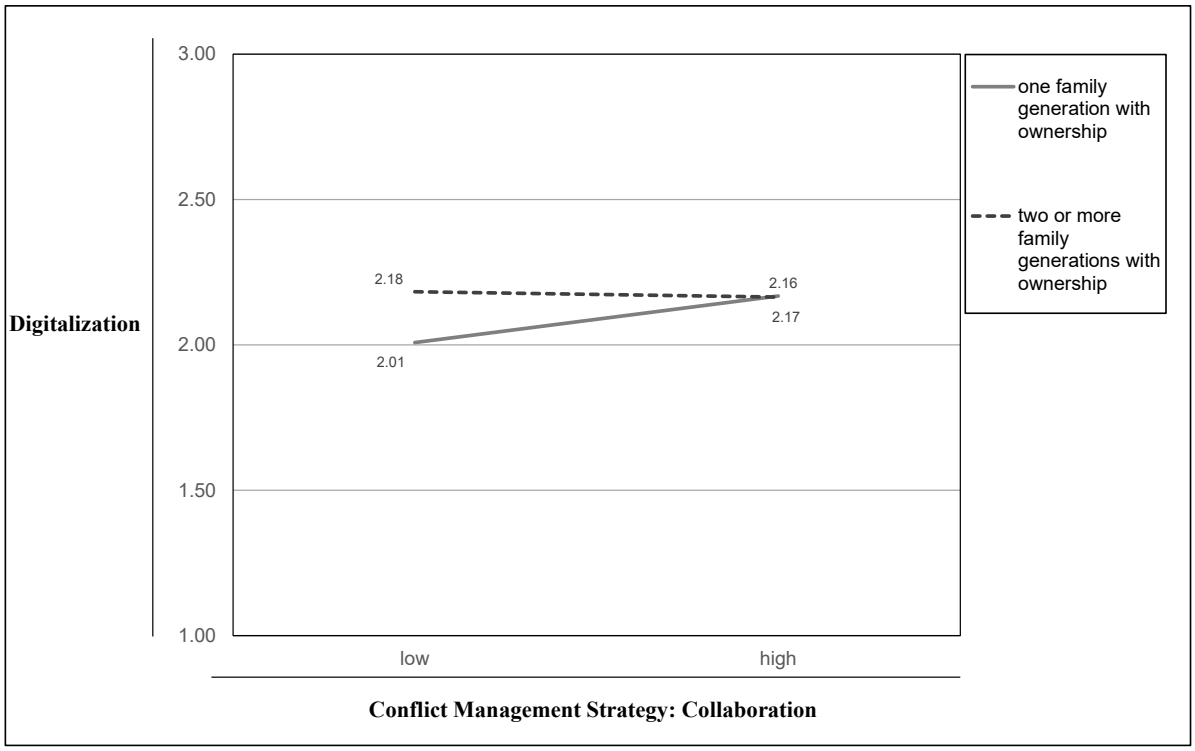

Figure C-2. Interaction between *Collaboration* and *Generational Ownership Dispersion*

Figure C-2 plots the significant interaction effect found in Model 3, showing that a *Collaboration* conflict management strategy positively impacts *Digitalization* in family firms with only one ownership generation (see the solid line in Figure C-2). By contrast, the results show that when family ownership is dispersed over two or more generations, a high level of *Collaboration* does not affect *Digitalization* in family firms (see the almost flat dotted line in Figure C-2). In summary, the plot in Figure C-2 suggests that the relationship between *Collaboration* and *Digitalization* is more pronounced for family firms with only one ownership generation. That is, while the interaction term is significant in Model 3, the underlying dynamic is different from

hypothesis *H2c*, where we proposed that this relationship would be more pronounced in family firms with ownership dispersed over two or more family generations. We thus turn to our insights from the qualitative interviews to make sense of this surprising finding.

C.4.3 Qualitative Interviews

The results of the interviews confirm our descriptive findings that digitalization is a hot and conflict-ridden topic for many contemporary family firms (see Table C-1). However, our interviewees' understanding of their family firms' current digitalization efforts is often related to process digitalization only, which aligns with earlier evidence presented by Soluk and Kammerlander (2021). That is, most interviewed family firm actors connect digitalization with efficiency and effectiveness improvements, which underpins our choice to focus on process digitalization in our quantitative survey. Only three of the 13 interviewees describe digitalization as the transformation of previously analog business models into digital ones. For instance, the younger generation family CEO of Beta, a company in the non-manufacturing industry with more than 500 employees and one-generation ownership, stated: *"Digitalization is not about organizational or production processes. For us, that would mean digitalizing organizational processes so that we have more time, more time for our employees, and more time for our customers."*

All interviewed family firm actors noted that the challenges of digitalization could not simply be avoided and that their firms are actively taking entrepreneurial actions. Therefore, our interviews confirm our non-significant results on avoidance and detail that avoiding conflicts triggered by digitalization by trying to evade the issue seems unsuitable. Indeed, only one interviewee mentioned this strategy as a possible approach. The younger generation family member soon to join the family firm Theta, a company in the non-manufacturing industry with less than 500 employees and a multi-generation ownership, acknowledged that he is "*more of a conflict-avoiding person if possible",* which explains his preference for the avoidance strategy.

In contrast, our survey findings suggest that adopting compromise as a strategy to overcome conflicts during the digitalization of family firms is a widespread and suitable approach. Many interviewees indicated a broad consensus in their firms about compromise strategies around digitalization. Several interviewees used expressions like “finding a consensus”, “using mediation”, and “convincing others” to describe their approaches to conflicts around digitalization. For instance, the non-family CEO of Epsilon, a company in the manufacturing industry with less than 500 employees and one-generation ownership, explained: *“(...) we drive forward here with a perfect consensus.”*

Our quantitative analyses in Table C-7 did not indicate a significant direct effect of collaboration as a conflict management strategy on digitalization. Our interviews show, however, that the respective family firms are resorting to this strategy to some extent. Here, words like “communication”, “transparency”, “opinion”, and “rules” were mentioned several times. For instance, the family CEO of Beta, a company in the non-manufacturing industry with less than 500 employees and one-generation ownership, noted: “(...) *everyone contributes their own opinion. And the decision or whether the opinion is subsequently considered or not is something else. However, that doesn’t depend on whether I don’t hold the opinion, or my esteemed colleague doesn’t hold the opinion. Therefore, the opinion that makes the most sense is always valued and taken. (...) The impulse before that is always thrown into the room, and then everyone can give their opinion on whether they like it or not.”*

In addition, our interview data illustrate how collaboration may help overcome conflicts during the digitalization of family firms and thus help to interpret our significant finding on the moderating role of generational ownership dispersion in the relationship between a collaboration conflict management strategy and digitalization. Our interviews indicate that in family firms with multiple ownership generations, digitalization is usually not addressed collaboratively by actors from different generations. In contrast, our interviews indicate that in such family firms

with generational ownership dispersion, the senior generations often delegate digitalization efforts to more junior generations due to the lack of expertise of the older generation around digitalization topics. Still, the different generations may need to compromise on a shared capital allocation, but collaboration is a less relevant conflict management strategy for such family firms with generational ownership dispersion. For instance, the non-family CEO of Alpha, a company in the non-manufacturing industry with more than 500 employees and multi-generation ownership, told us: "*In the young generation, the topic of digitalization has arrived very differently (...) these are digital natives, you don't have to tell them anything more about it. My generation (older generation) want to be convinced, but they understand that digitalization plays a role"*.

In contrast, the family firms covered by our interviews owned by one family generation are already exclusively led and owned by the younger, succeeding generation. While our interviews with actors from such family firms did not yield many conflict narratives, the notion that older generations do not actively collaborate in digitalization efforts may help explain our significant but surprising interaction results above (see Table C-7). That is, collaboration as a conflict management strategy may be most beneficial in family firms where just one ownership generation is left but where there are potentially several owners from the same (young) generation who need to collaborate on their family firms' further digitalization endeavors. Further illustrative quotes from our interviews can be found in Table C-8.

Interview statements regarding the understanding of digitalization	
business model digitalization	"When we talk about digitalization, one thing is to digitalize our business model." *(Alpha, multiple-generation ownership)*
process digitalization	"It is (digitalization) about paperless processes (...) to achieve advantages in efficiency and effectiveness." *(Gamma, middle generation, multiple-generation ownership)*

process digitalization	"For me, digitalization is (...) taking what I do today in analog form and putting it on a digital track, so that people in the company can be freed from the tasks that are forever recurring." *(Epsilon, one-generation ownership)*
process digitalization	"Ultimately, digitalization for our company is the digital mapping of legacy processes and the simplification and slagging of processes." *(Eta, younger generation, multiple-generation ownership)*
process digitalization	"In our company, digitalization actually takes place primarily in processes and process management." *(Ny, younger generation, multiple-generation ownership)*
Interview statements regarding compromise strategy	
consensus	"But it's (means: decision making) not yet to the point where we have governance, for example, to achieve certain majorities in the family tribes. So, now, this is still based on consensus." *(Delta, one-generation ownership)*
Interview statements regarding collaboration strategy	
communication, transparency	"I explain what we do, how the business has changed, what digitalization means for us, and so on. (...) We still try to be as transparent as possible or to give as much transparency as possible to the individual topics." *(Alpha, younger generation, multiple-generation ownership)*
communication, finding the best case	"Because understanding must be created, you need more communication, (…) in the best case, you find a level where you can say ok if we do it (means: the decision) now. But it just needs more (…) communication." *(Eta, younger generation, multiple-generation ownership)*
Interview statements regarding generational ownership dispersion	
older generation as enabler	"(The older generation) is in their late 50s now, so it's difficult for them to say what the latest trends (in digitalization) are right now (…) they are an enabler in the background." *(Delta, younger generation, one-generation ownership)*
conflicts concerning different understanding	"It's hard to argue things because sometimes the basic understanding isn't there either. Because they (the older generation) didn't grow up with it. (…) Then, they didn't focus on that anymore. You can derive the potential for conflict from this yourself." *(Epsilon, one-generation ownership)*
the young generation has the knowledge	"He (older generation) had given me free rein, but I knew (...) this is like open-heart surgery." *(Zeta, younger generation, multiple-generation ownership)*

the young generation has ideas, the old generation is backup	"(...) of course worlds collide. This is, of course, difficult. As the young generation, we may already have the ideas, but of course, that also needs backup." *(Eta, younger generation, multiple-generation ownership)*
missing acceptance of digitalization in the older generation	"There are issues (means digitalization) that simply do not arouse acceptance in certain (means older) generations or in certain circles of shareholders because the individual shareholders have had nothing to do with these topics before." *(Iota, younger generation, multi-generation ownership)*
not the topic for the older generation, the younger generation in charge	"Then my father (means: older generation) said to me, if you see this as your future path (means: digitalization), go for it, you must gain your experience on your own." *(Lambda, younger generation, multi-generation ownership)*

Figure C-8. Additional interview statements

To summarize our interview findings, we did not find much evidence of avoidance strategies here, but several indications of compromise strategies, which is consistent with the non-significant results on avoidance and the significant direct effect of compromise on family business digitalization levels in our quantitative survey. In addition, our interviews suggest that the significant interaction effect we found between collaboration and generational ownership dispersion can be explained by the notion that collaboration seems to be a relevant conflict management strategy only in family firms owned by same-generation, usually younger-generation family members. In contrast, in family firms with more than one family generation involved in ownership, collaboration does not seem to be an essential strategy as our interviews indicate that in such family firms, intergenerational collaboration on digitalization efforts does usually not occur, while a compromise strategy on the principal strategic direction of the family firm is still needed (as indicated by the significant direct effect of this conflict management strategy on digitalization in Table C-7). In contrast, in family firms with multiple ownership generations, digitalization tasks tend to be delegated to younger generations.

C.5 Discussion, Conclusions, and Limitations

C.5.1 Discussion and Contributions

With this article, we aimed to shed more light on how conflict management strategies may help family firms reach higher levels of digitalization since we assumed – and found – that many contemporary family firms experience conflicts around digitalization. In addition, we expected such conflicts to be particularly pronounced in family firms where ownership is dispersed among two or more family generations since we expected that conflicts might mainly occur between older and younger family owners. Our results indicate that not all conflict management strategies help to address digitalization issues. We found that avoidance is an ineffective conflict management strategy for digitalization issues in family firms. Our interviews indicate that digitalization is here to stay and discussions around this topic cannot simply be avoided. In contrast, our survey and interview findings show that compromise is positively related to higher levels of digitalization in family firms. Finally, the impact of collaboration is more pronounced in family firms with owners from a single-family generation. This article thus underscores the importance of tailored conflict management strategies to promote digitalization and enhance competitiveness in family firms. It highlights the need for family firms to recognize the significance of digitalization in modern business operations and to use effective conflict management strategies to address digitalization issues.

In summary, we contribute to the literature in three primary ways. First, we contribute to the family business literature on conflict theory (e.g., Kellermanns & Eddleston, 2007; Qiu & Freel, 2020; Sorenson, 1999). Former research has documented that for certain conflicts – for instance, relationship, process, and task conflicts – so-called conflict management strategies have an impact on the output of family firms, in particular, organizational performance (e.g., Kellermanns & Eddleston, 2007; Sorenson, 1999; Sorenson *et al.*, 2008; 2009) or innovation (e.g., De Clercq & Belausteguigoitia, 2015), especially for disruptive innovations (e.g., Guffler *et al.*, 2023). To

what extent conflicts are to be considered in the case of digitalization and digital transformation has not been empirically examined to date. Therefore, this article is among the first to deliver empirical evidence focusing on conflicts regarding the digitalization of family firms. In the literature, it has been assumed that there could be an increased potential for conflict in relation to digitalization (e.g., Soluk & Kammerlander, 2021), but this has not yet been analyzed in quantitative studies based on measurable conflict levels. Our survey shows that many family firms experience process conflicts regarding digitalizing their businesses.

At the same time, and second, we add to this literature by demonstrating that selected conflict management strategies – in particular, compromise and collaboration – may help to alleviate such conflicts and support family business digitalization. While Weyrauch *et al.* (2021) present one generic approach to deal with innovation-related conflicts, we highlight several established conflict resolution techniques that apply to family firms and, thus, most firms worldwide. Whereas collaboration has been studied more frequently in the literature as a strategy and has been found to increase corporate performance effectively (e.g., Sorenson *et al.*, 2008; 2009), compromise has not yet been studied so profoundly as a conflict management strategy. Our survey and interview data show that compromise is an important conflict management strategy that can solve digitalization conflicts and help foster family firms' digitalization – irrespective of whether ownership is dispersed among several family generations. In this way, this article adds to the growing literature on the digitalization of family firms (Batt *et al.*, 2020; Bürgel *et al.*, 2023; de Groote *et al.*, 2021; Soluk *et al.*, 2021; Soluk & Kammerlander, 2021; Löhde *et al.*, 2020) by highlighting an important strategy that can be used by family firms experiencing troubles or conflicts in their digitalization efforts.

Third, this article shows that the effectiveness of the collaboration conflict management strategy is contingent on the number of family generations holding ownership rights (i.e., generational ownership dispersion). This further adds to the literature on the digitalization of family firms

and the literature on the effectiveness of conflict management strategies in family firms (e.g., Kubíček & Machek, 2020; Qiu & Freel, 2020). This article indicates that the heterogeneity among large family firms renders some strategies more effective than others (e.g., Chua *et al.*, 2012; Dibrell & Memili, 2019). In family businesses where several family generations are involved as owners, collaboration is a less pronounced strategy to manage digitalization conflicts than in family businesses where only one family generation acts as owner. This finding is surprising, since we assumed from the earlier literature that collaboration between the generations could be strengthened by such a strategy, especially in the context of digitalization. However, our interview data suggest that older family generations often do not want to be actively involved with digitalization and pass this topic on to the younger and, in their opinion, more tech affine generations. This article thus contributes to the literature on family business conflicts (Kubíček & Machek, 2020; Qiu & Freel, 2020) by finding that conflict management strategies may need to be adapted for conflicts around digitalization, and that earlier findings on the effectiveness of specific strategies such as collaboration cannot just be applied to technology-related challenges such as family business digitalization. Hence, this article adds a significant moderator of the relationship between conflict management strategies and family business digitalization: that is, generational ownership dispersion.

C.5.2 Implications for Practice

As a practical implication, this article suggests that family firms facing conflicts around digitalization can benefit from implementing conflict management strategies to promote the digitalization of their business. In particular, compromise conflict management strategies seem advisable since they were found to directly impact the level of digitalization, regardless of the number of ownership generations in the family firm. In contrast, our findings suggest that family firms should only focus on collaboration conflict management strategies around digitalization when there is one ownership generation. In this case, they can sort out digitalization-related

conflicts in the same (younger) generation and thus foster higher levels of digitalization and ensure their business remains competitive in the rapidly evolving technological landscape. In contrast, in cases of multiple ownership generations, collaboration strategies do not promise much value for family firms as older generations tend to delegate digitalization efforts to younger generations. Finally, our findings imply that family firms should not use avoidance conflict management strategies when it comes to the digital transformation since digital business models are here to stay and their application cannot simply be avoided.

C.5.3 Limitations

Like other research, our findings are not free from limitations. First, the participating family firms are located in one European country, Germany; thus, our results cannot be generalized to other countries with different cultural settings and potentially different cultural norms regarding handling conflicts. Hence, family business research using data from additional regions (e.g., non-European countries) is needed to corroborate our findings. Second, our sample is composed of Mittelstand firms, which have been shown to have different dynamics when innovating than larger firms (De Massis *et al.*, 2013). At the same time, however, most family firms worldwide are not large and German Mittelstand firms are generally perceived as representing very typical family firms (Berghoff, 2006; Pahnke & Welter, 2019). Hence, while our results may not generalize to larger family firms, they are likely representative of the challenges faced by many family firms worldwide when it comes to digital transformation. Third, the data collection period represents a possible limitation. We collected the survey data during a global pandemic. Furthermore, a digital transformation cannot be accomplished quickly. Hence, we cannot determine how much the process has progressed or even been completed during the data collection period, which prevents us from objectively measuring the firms' digitalization effort's success or failure. This should be considered since the respondents' answers depend strongly on their

current mood, especially during mood-forming events such as a pandemic and potential discrepancies in the company's strategic direction (Podsakoff *et al.*, 2003). A longitudinal investigation may thus be warranted to understand the long-term influence of potential conflicts and conflict management strategies on the digital transformation of family firms. Fourth, the respondents' answers could be subjective, especially when they are a part of the older generation, which has a significant impact on decision-making (Reisinger & Lehner, 2015).

Consequently, their suggestions, especially conflict management solutions, could be caused by their perceptions and may deviate from the firms' objective situation (Becker *et al.*, 2016). Further corroborating and contextualizing our findings by in-depth case studies that are able to capture the views from multiple actors is thus an additional fruitful research avenue to create a deeper understanding of the successful digital transformation of family businesses. This topic is promised to accompany us for many years to come.

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D. Family Ownership, Conflict Resolution Strategies and Organizational Ambidexterity

Authors: Tobias R. Bürgel, Martin R. W. Hiebl

Paper's status: This paper has been submitted to International Journal of Entrepreneurial Venturing.

We, the authors of the paper, hereby declare that this paper's first author, Tobias R. Bürgel, was responsible for collecting and analyzing most of the data, developing the multiple regression models, and writing most of the paper.

Tobias R. Bürgel Martin R. W. Hiebl

D.1 Introduction

Organizational ambidexterity is often referred to as the ability of firms to engage in explorative and exploitative activities simultaneously. Explorative activities and knowledge creation include innovations, opportunities, and competencies for new products, services, or markets, while exploitative activities and knowledge include ensuring the quality and efficiency of existing strengths and capabilities (e.g., Junni *et al.*, 2013; O'Reilly & Tushman, 2004). This can be a challenging goal because it requires balancing the need for stability with continuous change (Goel & Jones, 2016; Sharma & Salvato, 2011). Making matters even more challenging, several scholars only view ambidexterity as achieved only when both exploitation and exploration reach a relatively high level (Baumbach *et al.*, 2020; Gedajlovic *et al.*, 2012; Raisch & Birkinshaw, 2008; Simsek, 2009). In today's rapidly changing business environment, this capability can be crucial for firms to remain competitive and achieve long-term success and continuity (Lubatkin *et al.*, 2006; O'Reilly III & Tushman, 2013; Raisch & Birkinshaw, 2008). In addition, previous literature has considered several further positive outcomes of organizational ambidexterity (for a detailed summary, see Chakma *et al.*, 2021), such as business survival, competitive advantage, continuity, growth, innovation, organizational resilience and firm performance (e.g., Gibson & Birkinshaw, 2004; He & Wong, 2004; Katou *et al.*, 2021; Moss *et al.*, 2014; Solís-Molina *et al.*, 2018; Stubner *et al.*, 2012).

Family firms face unique challenges in achieving these goals but can also have unique advantages that can be leveraged to achieve ambidexterity. On the one hand, family firms are often characterized by the stability and long-term orientation that has grown over the years (e.g., Heider *et al.*, 2022b; Hiebl, 2015; Sharma & Salvato, 2011); therefore, they may become highly innovative which is reflected in the notion that some of the most innovative firms worldwide are family firms (e.g., De Massis *et al.*, 2013; Diaz-Moriana *et al.*, 2018). On the other hand, several family firms have focus on specific niche products or services, which may make them

very dependent on their existing specialized products and markets and less willing to invest in innovative other ideas (Calabrò *et al.*, 2019; De Massis *et al.*, 2013; Duran *et al.*, 2016), which, for example, includes the willingness to seek digital transformation (Heider *et al.*, 2022a). Hence, family firms frequently engage in self-isolation, limit their access to external knowledge, and invest less in exploratory innovation (Pütz & Werner, 2023). The more so, the concept of organizational ambidexterity is crucial in family firms as these firms often must balance the need for innovation and growth with the need to maintain traditional family values and practices.

What distinguishes family firms from other forms of business is the ownership involvement that heavily influences a company's management and decision-making; that is, the activities that foster or hinder organizational ambidexterity (Lubatkin *et al.*, 2006). In this context, family ownership involvement can be defined as the percentage of the family shareholders' shareholding in the family business. Not all such controlling families hold 100% of the shares in "their" family business. Indeed, there are many situations in which the controlling family may have partnered up with non-family investors such as private equity funds or free float shareholders (e.g., Klein, 2000). Importantly for the present study, previous research has shown that family ownership may impact innovation and organizational ambidexterity (Filser *et al.*, 2016). In particular, some research has found that family ownership has a positive effect on organizational ambidexterity (Allison *et al.*, 2014; Gedajlovic *et al.*, 2012; Kammerlander *et al.*, 2015; 2020; Lubatkin *et al.*, 2006; Stubner *et al.*, 2012), whereas other research assumed that this effect would be considered negative (e.g., Arzubiaga *et al.*, 2018; Hiebl, 2015) or argue for a positive impact of non-family managers on organizational ambidexterity (e.g., Arzubiaga *et al.*, 2018; Veider & Matzler, 2016).

Despite this inconsistency in empirical findings, such research has usually found that family ownership may impact organizational ambidexterity due to two key drivers. First, fully family-

owned family firms tend to be risk-averse (González *et al.*, 2013; Hiebl, 2013; 2015; Hoessler & Carbon, 2022; Stubner *et al.*, 2012). Family enterprises are frequently bound to their businesses on an emotional level, resulting in a potential restriction on their capacity to diversify their portfolio holdings. Consequently, their primary focus is safeguarding the well-being of the family business and avoiding actions that could jeopardize its survival (Basly and Saunier, 2018; Hiebl, 2013). Recent studies indicate that family-related concerns often precede aspirations for growth and expansion within family firms since the firm is often regarded as an intergenerational asset (Campopiano *et al.*, 2020, Sjögrén *et al.*, 2014). This is mainly reflected by comparatively more incremental and exploitative than explorative innovations, hence, a relatively low level of organizational ambidexterity (Anderson *et al.*, 2012; Cucculelli & Marchionne, 2012; De Massis *et al.*, 2015; Hoessler & Carbon, 2022). In contrast, in family firms with lower family ownership, non-family investors in family firms may drive a broader strategic focus, encouraging riskier exploratory activities beyond the narrow scope of satisfying family shareholders through exploitative endeavors (Amit *et al.*, 1990; Chan *et al.*, 1990).

Second, family firms face unique challenges in achieving organizational ambidexterity due to tensions between exploitative and explorative activities and conflicts within the family (Kammerlander *et al.*, 2020; Martin *et al.*, 2019; Simsek, 2009). These conflicts arise from differing ideas, skills, or interests about the organization's direction (Kammerlander *et al.*, 2020; Martin *et al.*, 2019) and the need to maintain a strong sense of continuity and stability within the family (Eddleston & Kellermanns, 2007; Guffler *et al.*, 2023; Ingram *et al.*, 2016). Therefore, paradoxical tensions and the family's cohesion influence organizational ambidexterity (Stubner *et al.*, 2012). Organizational ambidexterity and conflict resolution strategies are closely linked, as achieving ambidexterity often requires navigating and resolving conflicts within the organization. Effective conflict resolution strategies might help family firms achieve ambidexterity by addressing these conflicts and finding mutually beneficial solutions (Sorenson, 1999). These

strategies might potentially shift the focus of family firms from a preservation-oriented mindset to a future-oriented one, with a greater emphasis on corporate welfare. By fostering a culture that prioritizes open communication and collaboration, this approach can mitigate risk by addressing the underlying issues that contribute to potential threats, thus allowing family firms to redirect their attention towards future opportunities, i.e., explorative activities. Consequently, conflict resolution strategies might diminish the risk-averse attitude, influencing the direct impact of family ownership and facilitating higher levels of organizational ambidexterity.

The present literature has mostly focused on the effects of family ownership on organizational ambidexterity but has ignored the impact of conflict resolution strategies. Given the potentially important role of these strategies in conjunction with family ownership, we address the following three research questions in this paper:

1. *Does the ownership structure of a family firm influence the level of organizational ambidexterity?*
2. *Do applied conflict resolution strategies in family firms influence organizational ambidexterity?*
3. *How do conflict resolution strategies impact the ownership–organizational ambidexterity relationship?*

To address these research questions, we rely on a quantitative survey approach with data from 91 German family firms with a maximum of 3,000 employees. Our findings contribute to the literature on family firms in at least three ways. First, we contribute to the literature on organizational ambidexterity in family firms by showing that the assumed direct effect of family influence does not always hold up but should be considered in context. Second, we also extend the conflict literature in family firms to show that the strategies of compromise and collaboration can contribute to a significant increase in organizational ambidexterity. Third, we add to

the literature that selected conflict resolution strategies, i.e., avoidance and collaboration, contribute to increasing organizational ambidexterity in fully family-owned family firms only, but not so in family firms with non-family investors.

The remainder of this paper is structured as follows. Section D.2 reviews our study's theoretical background and develops a total of seven hypotheses. Section D.3 describes our methods, the main characteristics of the sampled firms and respondents, and the procedures used to ensure valid data. Section D.4 presents our empirical findings. Section D.5 discusses our results, their implications, and the main limitations.

D.2 Theoretical Background and Development of Hypotheses

D.2.1 Organizational Ambidexterity in Family Firms

Extensive empirical investigations have consistently demonstrated that family businesses exhibit a distinct propensity for embracing and leveraging incremental innovations with greater efficacy than radical technological advancements. These studies highlight the marked preference of family businesses for iterative and gradual improvements rather than embracing disruptive and transformative technologies (e.g., Calabrò *et al.*, 2019; Filser *et al.*, 2016). Contrary to the traditional economic rationality perspective, empirical investigations have substantiated that decision-making behaviors among crucial actors in family businesses do not solely rely on financial considerations (Gomez-Mejia *et al.*, 2011; 2018). Instead, these decisions are often influenced by preserving Socioemotional Wealth (SEW), a multifaceted construct encompassing non-financial aspects such as family cohesion, legacy perpetuation, social reputation, and community engagement (Berrone *et al.*, 2010; 2012).

Consequently, confident choices are made by family business owners that may not align with immediate economic gains but are aimed at safeguarding and enhancing SEW, which holds significant importance for the well-being and longevity of the business. This can lead to an

inherent asymmetry between exploitative and explorative innovations. Such an imbalance runs contrary to the attainment of organizational ambidexterity, which necessitates the simultaneous pursuit and integration of both exploitative and explorative activities, establishing a harmonious equilibrium between these two innovation types. Former research by Simsek (2009) and Gedajlovic *et al.* (2012) has reported that organizational ambidexterity specifically pertains to organizations characterized by relatively high levels of exploration and exploitation. According to Simsek's (2009) perspective, organizations with low levels of exploration and exploitation cannot be considered ambidextrous. In line with this viewpoint, the present paper posits that while different degrees of organizational ambidexterity may exist, organizations lacking substantial exploration and exploitation might not be classified as ambidextrous (Hiebl, 2015).

Regarding the outcomes of organizational ambidexterity, researchers have studied many objectives for family firms. Researchers agree on the positive impact of organizational ambidexterity for fostering long-term success and competitiveness in family firms. It should be noted that achieving increased firm performance and long-term success requires simultaneous engagement in both exploratory and exploitative innovation. Notably, empirical studies have supplied evidence of organizational ambidexterity's positive influence on firm performance (He and Wong, 2004; Katou *et al.*, 2021; Moss *et al.*, 2014; Solís-Molina *et al.*, 2018; Stubner *et al.*, 2012). These studies have shown that organizations that effectively balance exploratory and exploitative activities tend to outperform those that focus solely on one type of innovation.

Furthermore, research has consistently reported a positive effect of organizational ambidexterity on organizations' long-term survival and resilience within family firms (Guffler *et al.*, 2023; Hiebl, 2015; Ingram *et al.*, 2016; Kammerlander *et al.*, 2020). This suggests that family firms that adopt a strategic approach encompassing exploration and exploitation are more likely to adapt to changing market conditions, innovate successfully, and sustain their competitive advantage over time. These findings highlight the critical role of organizational ambidexterity in

driving firm performance, long-term survival, and competitive advantage. This underscores the importance of fostering a balanced innovation portfolio encompassing both exploratory and exploitative activities within family firms.

Regarding the antecedents of organizational ambidexterity, researchers have studied many influencing factors. Former literature has revealed that by establishing a solid governance structure and creating a culture that encourages innovation, experimentation, and risk-taking, family firms can define organizational ambidexterity as the balance between stability and change to enhance their level of ambidexterity (Kammerlander *et al.*, 2020). Other examples of family firms becoming more ambidextrous include considering the institutional context (Canale *et al.*, 2023) and goal orientation (Mammassis & Kostopoulos, 2019), building on a solid culture of innovation (Röd, 2019), and navigating paradoxical tensions (Guffler *et al.*, 2023), for instance through professional management practices to reduce the destructive potential for conflicts between family members (Kammerlander *et al.*, 2020). Extensive research also highlights the pivotal role of the top management team, specifically the involvement of the owner's family, in enabling organizational ambidexterity (Kammerlander *et al.*, 2020). In summary, the entire management team, including the owner's family, plays a central role in facilitating organizational ambidexterity through their leadership and influence on the organization's culture and strategic direction (Alexiev *et al.*, 2010; Filippini *et al.*, 2012; Güttel *et al.*, 2012; Kammerlander *et al.*, 2015; 2020; Simsek, 2009). Not least, this family influence and leadership are influenced by a family firm's ownership structure (Kammerlander *et al.*, 2020). This is why, in the next section, we will look at the effects of ownership structure on ambidexterity.

D.2.2 Ownership Structure and Organizational Ambidexterity

The literature on risk behavior in family firms implies that family members follow a risk-averse attitude and behave as risk-averse actors (González *et al.*, 2013; Hiebl, 2013; 2015; Hoessler &

Carbon, 2022; Stubner *et al.*, 2012). This behavior is often rooted in their deep-seated commitment to safeguarding the holistic well-being of the family business, encompassing its financial stability, intergenerational succession, reputation, and overall sustainability (Eddleston & Kellermanns, 2007; Ingram *et al.*, 2016; Guffler *et al.*, 2023). It drives family business owners to refrain from engaging in actions or making decisions that could jeopardize the long-term survival and thriving of the family business (Basly & Saunier, 2018). This strong emotional bond is intricately intertwined with the desire to uphold the legacy, values, and intergenerational continuity of the family business, guiding their decision-making process with a nuanced understanding of the significance of its preservation beyond immediate economic considerations. SEW considerations can also be mentioned in this context, especially regarding decision-making. This emotional connection can lead them to make decisions driven more by personal sentiments and family considerations rather than solely focusing on strategic goals and financial outcomes (e.g., Kallmuenzer, 2016). Consequently, due to their attachment to the family's traditions, values, and identity, family members may resist embracing explorative innovations, perceiving them as risky and potential threats (Firfiray & Gomez-Mejia, 2021; Hoessler & Carbon, 2022). Therefore, family owners tend to focus on more risk-averse actions and invest in more incremental innovations (Anderson *et al.*, 2012; Cucculelli & Marchionne, 2012; De Massis *et al.*, 2015).

Empirical studies consistently indicate a significant decline in family ownership percentages in later-generation family businesses compared with their first-generation counterparts (e.g., Cruz & Nordqvist, 2012; Westhead & Howorth, 2006). These findings shed light on the complex dynamics of intergenerational transitions and have implications for the sustainability and success of family businesses. As subsequent generations of family businesses progress, there is a discernible trend toward an augmented presence of external investors, i.e., venture capital or private equity funds, as evidenced by empirical research (Wright & Robbie, 1998). This shift

can be attributed to the decrease in family ownership percentages, necessitating an infusion of external capital and expertise to sustain and propel the businesses forward. However, it has been observed that these non-family investors tend to assign less importance to family owners who do not actively participate in the operational aspects of the business (Le Breton-Miller & Miller, 2008). These external investors' focus primarily revolves around exerting influence and actively shaping the management functions themselves rather than according to significant value to the passive involvement of family owners (Cumming & Johan, 2010; Tan *et al.*, 2013). Non-family investors, characterized by their professional backgrounds, bring forth a unique vantage point regarding the company, drawing upon their extensive knowledge derived from diverse yet often analogous companies and industries, hence, act in a more risk-neutral manner (Amit *et al.*, 1990; Chan *et al.*, 1990). Their ownership involvement regularly fosters a multi-faceted perspective encompassing broader insights and expertise, augmenting the business's understanding and strategic decision-making capabilities. This cross-pollination of knowledge may contribute to a richer and more informed approach to managing a company, capitalizing on experiences from disparate organizational contexts. Hence, the external influence exerted by non-family investors manifests in a significantly higher volume and variety of exploratory ideas, innovations, and consequential decision-making (Hiebl, 2015). This heightened diversity stems from integrating external perspectives and expertise, which fosters a more expansive and dynamic landscape of exploratory initiatives within the business. The presence of non-family investors facilitates a broader range of creative and forward-thinking approaches, enhancing the capacity for innovative thinking and driving the exploration of novel opportunities. This phenomenon is notably pronounced through heightened endeavors concerning internationalization and research and development (R&D) projects (e.g., De Massis *et al.*, 2015). The influence of non-family investors fuels an amplified focus on expanding global reach and pursuing

innovative R&D initiatives within the business. Therefore, non-family investors may help family firms balance explorative and exploitative actions, i.e., getting a higher level of organizational ambidexterity. In contrast, it can be expected that family firms fully owned by family members often lack sufficient exploration activities (Hiebl, 2015). Therefore, such family firms may be hindered in reaching comparably high levels of organizational ambidexterity as compared to family businesses with non-family investors (see Figure D-1). Thus:

***Hypothesis 1** (H1).* *Entirely family-owned family businesses reach lower levels of exploration and thus lower levels of organizational ambidexterity than those with non-family investors.*

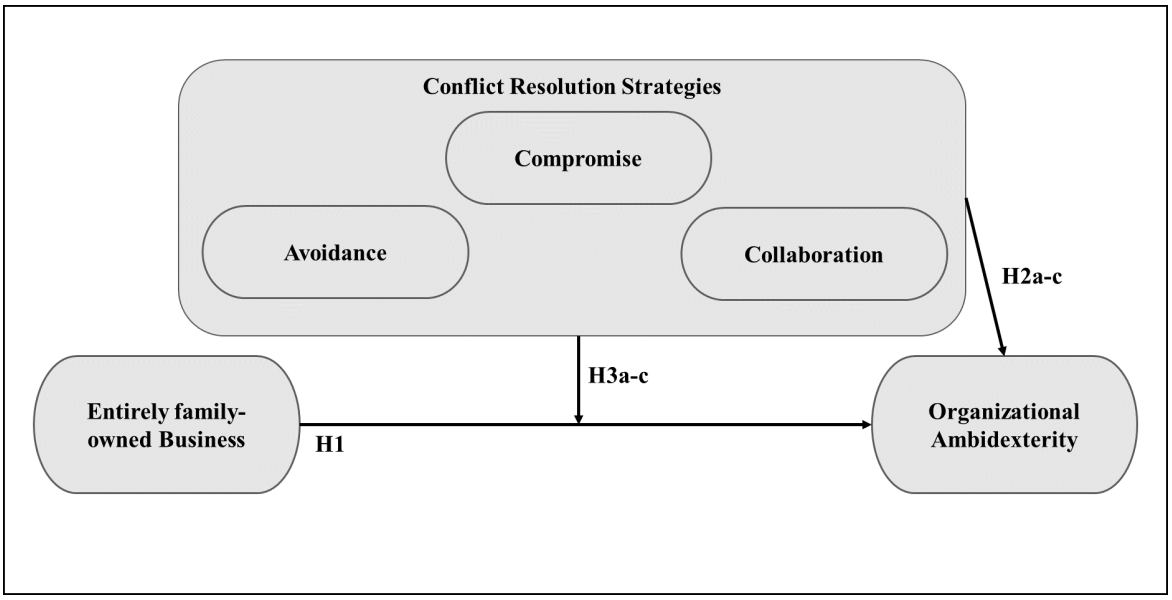

Figure D-1. Research Model

D.2.3 Conflict Resolution Strategies and Organizational Ambidexterity

Conflict theory is highly relevant to family firms due to their susceptibility to internal conflicts. These conflicts arise from the complex roles of family and non-family members involved in the business (Caputo *et al.*, 2018). These roles encompass not only family membership but also active involvement in the operations of the family firm and ownership (Qiu & Freel, 2020). Consequently, decision-making processes become an intricate cause of conflicts, as divergent

individual goals, interests, norms, and values exert personal influences on the choices made, leading to a simultaneous concern among family members for both family dynamics and business outcomes (Camfield & Franco, 2019; Chung *et al.*, 2023; Sorenson, 1999). Former research, such as by Weyrauch *et al.* (2021), underscores the often underestimated but crucial role of conflict and its resolution in driving vital innovation efforts within the organizational context. In managing conflicts between family investors and between family and non-family investors, specific strategies can be implemented to facilitate effective resolution. These strategies promote organizational ambidexterity by focusing on both exploratory and exploitative activities. Hence, we want to examine them more closely.

The extensive literature has established that conflicts stemming from personal or content-related variances can be effectively mitigated through diverse conflict resolution strategies (Caputo *et al.*, 2018; Chrisman *et al.*, 2004; Sorenson, 1999; Sorenson *et al.*, 2008, 2009). These strategies have been studied and documented in scientific research, providing valuable insights into the mechanisms and techniques contributing to successful conflict resolution. By leveraging these empirically supported approaches, individuals and organizations can navigate and address conflicts to promote understanding, cooperation, and mutually beneficial outcomes. One possible solution for solving conflicts are the strategies introduced by Sorenson (1999). Out of the conflict resolution strategies he suggested, avoidance, compromise, and collaboration appear to be the best-suited strategies for safeguarding high levels of organizational ambidexterity (Kassotaki, 2022; Martin *et al.*, 2019) and will be discussed in more detail below. Managers of family businesses can leverage these strategies as valuable tools to navigate and resolve issues, disagreements, and conflicts, enabling the elicitation of appropriate responses and the development of practical solutions (e.g., Lewicki & Litterer, 1985; Sorenson, 1999;

Walton & McKersie, 1965). We next discuss these three conflict resolution strategies and develop hypotheses on how they are expected to affect family firms' levels of organizational ambidexterity.

Avoidance is characterized by a primary goal of not directly addressing the underlying problem that triggered the conflict (Putnam *et al.*, 2016; Qiu & Freel, 2020; Sorenson, 1999). Instead, the focus is on avoiding further fueling the conflict or hoping for its natural dissipation over time. This strategy is associated with a low level of communication and lower levels of family cohesion in the case of family firms and owner families. However, in the worst-case scenario, the lack of communication can escalate a conflict and spread to other areas within the company or the owner family (Kellermanns & Eddleston, 2006a,b). Recent research by Guffler *et al.* (2023) reported that those underlying salient tensions harm innovation-related ambidexterity. Consequently, we propose that using the avoidance strategy is not conducive to enhancing organizational performance, hence, organizational ambidexterity (McCarthy, 1996; Perlow & Repenning, 2009). Thus:

> ***Hypothesis 2a*** *(H2a).* *Family firms that apply a conflict resolution strategy of avoidance to a comparatively greater extent reach lower levels of organizational ambidexterity.*

In contrast to avoidance, compromise, and collaboration play a vital role in actively engaging with conflicts and systematically addressing their underlying causes (Sorenson, 1999). The primary goals are maintaining harmony within the family business and the controlling family, leading to family cohesion (Smith & Lewis, 2011). Prior literature has reported a positive impact of family cohesion on innovation-related ambidexterity (Guffler *et al.*, 2023). Where compromise aims to find a middle ground that satisfies the involved actors and the family business as such, leading to an acceptable and effective solution for all parties involved, collaboration is

characterized by all participants striving to achieve optimal outcomes for themselves and the company (Putnam *et al.*, 2016; Qiu & Freel, 2020; Sorenson, 1999). While these strategies may be time-consuming for short-term decisions, they can be particularly beneficial for addressing crucial strategic issues such as investments, where a focus on exploratory actions can benefit the company (Jehn & Bendersky, 2003; Koster & van Bree, 2018), exceptionally long-lived family firms (Hiebl, 2015). Therefore, collaborative relationships are fostered through mutual support, trust, and high effort and creativity (Seymour, 1993). While compromises often involve decisions that may persist in a certain level of potential conflicts (Rahim, 1983, 2002), the compromise strategy can nevertheless help to minimize conflicts related to the company's strategic direction to a moderate level thanks to a more inclusive decision-making process (Kellermanns & Eddleston, 2006a,b; Schulze & Lubatkin, 2003). Harmful conflicts arising from the tension between exploitative and exploratory innovations can thus be thoroughly discussed and resolved in favor of family cohesion and the entire family firm (Cox, 1991; Jehn & Bendersky, 2003). Thus:

Hypothesis 2b *(H2b). Family firms that apply a conflict resolution strategy of compromise to a comparatively greater extent reach higher levels of organizational ambidexterity.*

Unlike compromise, where some residual conflicts may remain unresolved, collaboration aims to address and resolve the dispute entirely (Alderson, 2015), fostering perfect family cohesion (Guffler *et al.*, 2023). In this approach, no one must compromise or give in, and all parties involved might be satisfied with the outcome (Rahim, 2002; Sorenson, 1999). While certainly more time-consuming than compromise, this strategy enables intensive and open dialogue, allowing individuals to make decisions in the family firms' best interest and potentially enabling family firms to reach even higher levels of organizational ambidexterity than when focusing on a compromise strategy (Danes *et al.*, 2002; Sorenson *et al.*, 2008). Thus:

Hypothesis 2c *(H2c). Family firms that apply a conflict resolution strategy of collaboration to a comparatively greater extent reach higher levels of organizational ambidexterity.*

D.2.4 The Moderating Effects of Conflict Resolution Strategies

Besides their direct effect on organizational ambidexterity, the three discussed conflict resolution strategies may also affect the relationship between family ownership and organizational ambidexterity. That is, they may moderate the latter relationship.

Employing avoidance as the sole approach to resolve conflicts in fully family-owned family firms poses a noteworthy challenge. As previously mentioned, avoidance involves evading problem-solving, thereby refraining from addressing underlying issues, e.g., concerning exploration and exploitation (Putnam *et al.*, 2016; Sorenson, 1999; Qiu & Freel, 2020). This strategic preference for avoidance may perpetuate unaltered attitudes among responsible actors within fully family-owned family firms, leading to the continued display of risk-averse behavior. Consequently, potentially persistent conflicts occupy a significant space within the fully family-owned family firm, severely limiting its discourse and acquisition of novel skills (Guffler *et al.*, 2023). Lacking a risk-neutral perspective, as demonstrated by non-family investors who typically exhibit a less risk-averse stance, the avoidance strategy in fully family-owned family firms may fall short in effectively promoting organizational ambidexterity (Hiebl, 2015). Consequently, the proclivity towards risk-averse behavior hinders the pursuit of exploratory innovation (Anderson *et al.*, 2012; Cucculelli & Marchionne, 2012; De Massis *et al.*, 2015; Hoessler & Carbon, 2022). As a result, fully family-owned family firms may face even more limitations in their ability to balance both exploration and exploitation when heavily relying on avoidance as a conflict resolution strategy, potentially further impeding their capacity to evolve organizational ambidexterity (Hiebl, 2015). We thus assume that a high reliance on avoidance makes

the negative relationship between family ownership and organizational ambidexterity even more pronounced. Thus:

Hypothesis 3a *(H3a). The relationship described in H1 is more pronounced if a family business relies heavily on avoidance as a conflict resolution strategy.*

In contrast, compromise and collaboration serve as vital mechanisms to achieve two primary goals: maintaining cohesion within the family firm and promoting organizational goals within the family firm (Smith & Lewis, 2011). These strategies hold the potential to facilitate more transparent discussions concerning risky actions and innovations (Alderson, 2015; Guffler *et al.*, 2023), particularly in fully family-owned family firms. Both compromise and collaboration exhibit the capacity in overcoming risk aversion, thereby leading to a more exploratory decision-making approach (Martin, 2019). By prioritizing the overall well-being of the fully family-owned family firm over individual risk aversion, these strategies are poised to assist fully family-owned family firms in transcending their risk-averse tendencies and fostering a more conducive environment for embracing risk-taking (Rahim, 2002; Tjosvold *et al.*, 2014). Through proactive conflict resolution, resources and capacities may be more effectively redirected, allowing for a more rigorous examination and analysis of strategic decisions. This approach fosters a conducive environment for thoughtful and informed choices that can positively impact the family firms' outcomes (Guffler *et al.*, 2023). From this perspective, both strategies may limit the negative effect of full family ownership on organizational ambidextierty as suggested in hypothesis H1. Thus:

Hypothesis 3b *(H3b). The relationship described in H1 is less pronounced if a family business relies heavily on compromise as a conflict resolution strategy.*

Hypothesis 3c *(H3c). The relationship described in H1 is less pronounced if a family business relies heavily on collaboration as a conflict resolution strategy.*

D.3 Research Methods

D.3.1 Sample and Data Collection

To analyze our hypotheses, the data for this study were collected from the German Mittelstand in the summer of 2020 since the German Mittelstand is known to reflect a prototypical group of family firms (Bürgel & Hiebl, 2023; Pahnke *et al.*, 2023). The survey sample was constructed from Bureau van Dijk's Amadeus database, resulting in data collection via an electronic questionnaire sent to the CEOs of 1,118 German firms. The sampling criteria were as follows: First, listed firms and firms from the financial services industry and public sector were excluded; second, we focused on firms with more than nine but less than 3,000 employees since micro-enterprises seem not to cover our research focus of organizational ambidexterity; finally, since the methods literature (e.g., Bartholomew & Smith, 2006) has shown a positive relation of the geographic proximity between interviewer and interviewee on survey response rates, we addressed firms with headquarters situated close to our university.

We contacted all firms in our sample via e-mail and multiple weekly follow-up reminders, as Dillman *et al.* (2014) recommended. A foundation for family business research promoted our survey. We acknowledged this support from the foundation and our university's sponsorship for the study to obtain full transparency for interviewees about our survey and to further increase response rates (cf. Mellahi & Harris, 2016). Furthermore, as an incentive not only to participate in the study but also to take part in it thoroughly, we offered our survey addressees two possible incentives (Singer & Ye, 2013): an executive research report and a donation of EUR 10 to a charity of their choice. At the end of our survey, we received 156 valid responses, i.e., entirely or partially completed questionnaires, yielding a response rate of 13.95% for all

respondents. Excluding respondents with missing information and those from non-family firms, 65 of the 156 respondents had to be removed. Therefore, 91 data sets were included in the final family firm subsample. This number of observations is noticeably small but comparable to some recent survey research studies on family businesses (Wilson *et al.*, 2014; Chrisman *et al.*, 2004). This is because family firms, especially their top executives in charge, tend to be more reserved and averse to overly sensitive data, often trying to keep the secrets of the family and the family firm private (Pielsticker & Hiebl, 2020; Wilson *et al.*, 2014). In addition, our response rate is comparable to those achieved in former family business research (e.g., Pielsticker & Hiebl, 2020; Kammerlander *et al.*, 2020; Schulze *et al.*, 2003).

The analysis of our study is based on the survey answers provided by the CEOs of the family firms. This approach assumes CEOs have the best insights into family firm characteristics and activities (Auh & Menguc, 2005). The CEOs of our sample were, on average, 51 years old and had worked for almost 11 years within their current firms. In more than nine out of ten cases, the CEOs were male, and 82.00% of the CEOs had a university degree (bachelor's degree or higher). The firm size of the family firms in our sample, measured by the number of employees, is smaller than 500 in 60.00% of all cases. Approximately 75.00% of the observed family firms operated in the manufacturing sector and almost 85.00% were owned by family members only.

D.3.1.1 Common Method Bias

Given that common method bias is a typical problem when the observed variables are at the risk of potential subjective biases, i.e., the independent and dependent variables were obtained from the same source, we took several ex-ante steps while designing the survey and collecting the data, and we also conducted some ex-post analyses. First, to prevent respondents from answering the questions related to the variables in a socially desirable way, we ensured respondents' full anonymity and strict confidentiality (Podsakoff *et al.*, 2003). Second, we structured the order of the survey items so that a temporal separation of the measurements between the

independent and dependent variables was realized to prevent respondents from drawing mental conclusions regarding the hypotheses of the survey, so-called item context effects (Podsakoff *et al.*, 2003). Third, to reduce the so-called context-induced mood, i.e., the influence on how the questions are worded on the respondents' perspective and mainly their answers, we performed an extensive pretest of the questionnaire, which considered practitioners' and researchers' feedback equally for the enhancement of the questionnaire (cf. Hunt et al., 1982). Fourth, and moving to ex-post measures, we conducted Harman's one-factor test based on exploratory factor analysis (Podsakoff & Organ, 1986; Harman, 1976). Therefore, we computed all our study variables into a single factor, showing that this factor does not explain most of the covariance between these variables. These procedures indicate that the most prominent factor accounts for only 22.04% of the covariance. Therefore, the relationships in our survey regression are unlikely to suffer from common method bias.

Finally, we implemented a so-called marker variable, which we term *Report*, theoretically unrelated to all other included variables (Williams *et al.*, 2010). As indicated above, for full participation, survey respondents had the opportunity to choose between a donation of EUR 10 to a charity of their choice and a survey report. Based on this information, the marker variable *Report* was developed as a dichotomous variable, coded as 1 if a survey report was desired and 0 if not.[5] In the next step, as described in the literature (e.g., Lindell & Whitney, 2001; Calic & Ghasemaghaei, 2020), we computed the correlations between this marker variable and all variables of our study (see Table D-4). The measured correlations were neither significant nor were these values relatively high (i.e., .202; see Cohen (1988) for interpreting correlation effect

[5] To avoid enhancement of our questionnaire, we chose *Report* as our marker variable. We note that a single-item measure is not a perfect marker variable compared to a multi-item construct (e.g., Lindell & Whitney, 2001; Williams *et al.*, 2010). Nevertheless, with our procedure we are in line with recent related research such as Calic and Ghasemaghaei (2021).

sizes). Hence, these correlations did not indicate a potential common method bias (Bagozzi *et al.*, 1991).

D.3.1.2 Non-Response Bias

Since the percentage of non-respondents in our study is relatively, but not unusually high (cf. Pielsticker & Hiebl, 2020), we analyzed the appearance of a potential non-response bias by checking for differences between early and late respondents (Frohlich, 2002; van Loon, 2003). Since former literature (e.g., Oppenheim, 1966) figured out that late respondents acted more similarly to non-respondents than early respondents, we used late respondents as a proxy for non-respondents. Therefore, as recommended by Armstrong and Overton (1977), we compared two subsamples by their mean values (see Table D-1), which, on the one hand, represented the respondents at an early date (lower quantile) and, on the other hand, those later (upper quantile). To apply the correct mean value comparison and analyze whether the constructs in our study were distributed normally, we conducted a Kolmogorov–Smirnov and a Shapiro–Wilk test. These tests revealed that, except for *Past Performance,* none of the variables in our study were normally distributed. Hence, we use the T-Test for the variable *Past Performance*. For all other variables, except the dichotomous variables (i.e., *CEO gender*, *CEO education*, *Firm Size*, *Manufacturing firm*, *Strategy*, and *Entirely family-owned Business)*, we used the nonparametric Mann–Whitney U-Test. For the dichotomous variables, we used the chi-square test. As detailed in Table D-1, we found no significant difference between early and late respondents, suggesting that our sample yielded no indication of non-response bias.

Variable	Early Respondents	Late Respondents	p-value
	Mean	Mean	
CEO age	50.61	51.83	.965
CEO gender	.13	.09	.636
CEO education	.83	.83	1.000
CEO firm tenure	12.48	9.35	.257
Firm Size >499	.57	.43	.376
Past Performance	4.96	4.60	.167
Cognitive conflict	2.32	2.57	.342
Manufacturing	.65	.78	.326
Strategy	.39	.43	.765
Entirely family-owned business	.83	.96	.155
Avoidance	3.52	3.59	.843
Compromise	4.51	4.68	.643
Collaboration	5.42	5.52	.877
Organizational Ambidexterity	188.87	200.93	.513
Report (marker variable)	.57	.57	1.000

Table D-1. Comparison of the variables involved in this study for late and early respondents

D.3.2 Measures

Since the constructs in our study were based on established scales from prior English-language literature and our survey questionnaire was in German, we applied a two-way translation, i.e., all original questions in our survey were translated from English into German, to ensure the consistency of our questionnaire and to offer a maximum of understandability (cf. Brislin, 1970; Maneesriwongul & Dixon, 2004). Afterwards, all questions were backtranslated into English again by a fellow researcher not involved in our research project to ascertain whether any ir-regularities in our first translation would become apparent through this back translation.

To ensure the validity of the multi-item constructs in our study (see Table D-2), we performed several empirical tests (Nunnally, 1978), including confirmatory factor analysis (CFA) and re-port features of these constructs, including Cronbach's alpha, composite reliability (CR), and average variance extracted (AVE). All constructs reached the recommended thresholds of the

empirical test mentioned below (Cronbach's alpha = .70; AVE = .50). Therefore, adequate reliability and validity of the constructs in our study were indicated (e.g., Nunnally, 1978; Fornell & Larcker, 1981). If necessary, we suppressed factor loadings below the threshold of 0.40 (Field, 2018; Hair *et al.*, 2019).

Organizational Ambidexterity (Second-order construct formatively measured)	Factor loadings (CFA)
Exploration (Formative weight (path coefficient) = .566***; VIF = 1.459) (First-order construct reflectively measured**) (**Cronbach's α = .80; CR = .81; AVE = .53)	
Our firm looks for novel technological ideas by thinking "outside the box."	.953
Our firm bases its success on its ability to explore new technologies.	.777
Our firm creates products or services that are innovative to the firm.	.521
Our firm looks for creative ways to satisfy its customers' needs.	.573
Exploitation (Formative weight (path coefficient) = .566***; VIF = 1.459) (First-order construct reflectively measured**) (**Cronbach's α = .74; CR = .79; AVE = .58)	
Our firm commits to improve quality and lower costs.	.769
Our firm continuously improves the reliability of its products and services.	.991
Our firm is one that constantly surveys existing customers' satisfaction.	.425
* p < .10; ** p < .05; *** p < .01	
Conflict Management Strategies (Reflectively measured)	Factor loadings (CFA)
Avoidance (Cronbach's α = .80; CR = .82; AVE = .70)	
We attempt to avoid being "put on the spot" and try to keep conflicts to themselves.	.958
We usually avoid open discussions of differences.	.690
Compromise (Cronbach's α = .73; CR = .77; AVE = .53)	
We try to find a middle course to resolve an impasse.	.611
We usually propose a middle ground for breaking deadlocks.	.733
We use "give and take" so that a compromise can be made.	.821
Collaboration (Cronbach's α = .77; CR = .77; AVE = .53)	
We exchange accurate information to solve the problem together.	.611
We try to bring all our concerns out in the open to resolve the issues in the best feasible way.	.733
We try to collaborate for a proper understanding of the problem.	.821
Note. AVE = average variance extracted; CR = composite reliability; CFA = confirmatory factor analy-sis; VIF = average variance extracted.	

Table D-2. Construct validity of Organizational Ambidexterity, Conflict Management Strategies, Past Performance, and Cognitive Conflicts

D.3.2.1 Dependent Variable

The firms' level of *Organizational Ambidexterity* is a second-order construct[6] based on a 12-item measure by Lubatkin *et al.* (2006). The two factors in the first order represented exploration and exploitation and were each measured by initially including six items. All items were measured using a seven-point Likert scale ranging from 1 (= strongly disagree) to 7 (= strongly agree). A confirmatory factor analysis was conducted to test the construct validity (see Table D-2). The items loaded on the two respective factors. Due to low factor loadings and low AVE values with a threshold of 0.5 (Hair, 2019), we excluded two items for the exploration factor and three for the exploitation factor. The firms' levels of exploration and exploitation were calculated as the mean of the corresponding four and three items, respectively. Cronbach's alphas (composite reliabilities) are .80 (.81) for exploration and .74 (.79) for exploitation, suggesting satisfactory reliability (Hair, 2019).

We followed the measurement proposed by Bedford *et al.* (2019) to aggregate a multidimensional construct (Simsek, 2009; Bedford *et al.*, 2019). However, since these other approaches have already found wide acceptance in the literature, we report the results of additional calculations for additive, subtractive, and multiplicative ambidexterity in the robustness checks below. Due to this approach, it is ensured that a high level of *Organizational Ambidexterity* can only be achieved on a highly balanced level of exploitation and exploration rather than by any (lower) balanced levels (Bedford *et al.*, 2019). Therefore, we calculated the second-order formative construct of *Organizational Ambidexterity* for a given family firm as follows:

[6] Following the establishment of first-order constructs through confirmatory factor analyses, we proceeded to examine the significance of formative weights (path coefficients) and assess potential issues of multicollinearity by calculating Variance Inflation Factors (VIFs), as suggested in prior literature (Hair *et al.*, 2019). Consistent with existing research (e.g., Braumann *et al.*, 2020; van Riel *et al.*, 2017), we employed the repeated indicator approach. Notably, none of the VIF values exceeded the threshold of three, indicating the absence of multicollinearity concerns. Furthermore, all formative weights demonstrated statistical significance, further supporting the validity of our findings (Hair *et al.*, 2019).

$$\text{ORGANIZATIONAL AMBIDEXTERITY}_i = (7 - |\text{EXPLOITATION}_i - \text{EXPLORATION}_i|) * \text{EXPLOITATION}_i * \text{EXPLORATION}_i.$$

D.3.2.2 Independent Variable

Entirely family-owned Business were based on the level of family ownership. Therefore, we asked the respondents, "What percentage of the firm is owned by the family members?" We classified the participating firms into two classes: *Entirely family-owned Business* is coded as "1" if the firm is owned solely by the family members and coded as "0" if otherwise.

D.3.2.3 Moderating Variables

The conflict resolution strategies (i.e., *Avoidance, Compromise,* and *Collaboration*) were measured on a scale based on Sorenson (1999), which in turn adopted the measurement by Rahim (1983). Each Conflict Resolution Strategy was based on a multi-item construct, including nine items, and was measured using a seven-point Likert scale ranging from 1 (= strongly disagree) to 7 (= strongly agree). Because of reliability and validity issues, an item had to be removed. These final multi-item constructs were based on a CFA that showed satisfactory reliability. The remaining eight items were loaded onto the three expected factors (see Table D-2).

D.3.2.4 Control Variables

We controlled for several theoretically relevant factors associated with *Organizational Ambidexterity*. Concerning individual-level of CEO characteristics, we controlled for *CEO age*, *CEO gender*, *CEO level of education,* and *CEO tenure* (e.g., Gedajlovic *et al.*, 2012; Jansen *et al.*, 2006; Lubatkin *et al.*, 2006; Mom *et al.*, 2009; Kammerlander *et al.*, 2015; 2020). *CEO age* was measured by the number of years. Some literature posits that advanced age among CEOs is associated with reduced entrepreneurial behavior and less explorative activities (Kammerlander *et al.*, 2015). The *CEO gender* was measured as a dummy variable, coded as "0" for males and "1" for females. The investigation conducted by Mueller and Dato-On (2008) has revealed that masculine and feminine traits influence a firm's capability to foster and balance

exploratory and exploitative actions. The *CEO level of education* was measured the following Papadakis *et al.* (1998) and Kammerlander *et al.* (2020). The dummy variable "1" represents CEOs with bachelor's degrees or higher education, while "0" signifies those without such qualifications. It can be inferred that higher education cultivates a more analytical mindset among CEOs, making them more receptive to new opportunities and explorative innovation (Loukil *et al.*, 2020; Papadakis *et al.*, 1998). *CEO tenure* was quantified as the absolute number of years a CEO has served in their current position within the firm (Boling *et al.*, 2016; Mom *et al.*, 2009). Literature suggests that experienced CEOs possess enhanced capabilities in both exploratory and exploitative innovation, resulting in higher levels of *Organizational Ambidexterity* (e.g., Kammerlander *et al.*, 2020).

Regarding firm characteristics, we controlled for *Firm Size*, *Firm Performance*, *Manufacturing Firm,* and *Strategy* (e.g., Gedajlovic *et al.*, 2012; Jansen *et al.*, 2006; Kammerlander *et al.*, 2015; 2020; Lubatkin *et al.*, 2006; Mom *et al.*, 2009). *Firm size* was measured using a dummy variable with the value “1” if the firm size exceeded 499. Otherwise, it takes the value “0”. *Firm performance* was measured on an eight-item scale based on Eddleston and Kellermanns (2007). The participants were requested to evaluate their relative firms' performances over three years. However, due to reliability and validity considerations, we were limited to five of these items, which load on a single factor with a Cronbach’s alpha and a composite reliability of .92. Companies that have exhibited superior past performance may demonstrate a more significant exploration effort, allocating their financial resources toward innovative projects (Kammerlander *et al.*, 2020; Patel & Chrisman, 2014). Measuring the dynamism in different industries (Kammerlander *et al.*, 2015; 2020), the firms in our sample were asked to assign themselves to one of four default industries - manufacturing, trade, services, and others. Afterward, this variable was dummy coded and took the value “1” if the firm operates in the manufacturing sector;

otherwise, it takes “0”. *Strategy* was measured as a dichotomous variable, coded “1” for prospector firms and “0” for defender firms. To determine the strategic archetypes proposed by Miles and Snow (1978), respondents were prompted to indicate the description most accurately aligned with their company's characteristics. In contrast to defender firms, prospector firms proactively explore and pursue emerging market opportunities, willingly undertake risks, and readily embrace and adapt to changes in the business environment (e.g., Kafchehi *et al.*, 2016; Tayauova, 2011). Hence, we assume that firms pursuing prospector strategies, which emphasize exploration, are more inclined toward embracing exploratory innovation, demonstrating higher levels of *Organizational Ambidexterity*.

Regarding family firm characteristics, we controlled for *Cognitive Conflict* (e.g., Bedford *et al.*, 2019). Following Simons and Peters (2020), mental conflict levels impact family firms’ decision-making, especially regarding decision quality. Thus, these conflicts could influence firms' explorative and exploitative activities and, therefore, the level of organizational ambidexterity (e.g., Bedford *et al.*, 2018). We measured *Cognitive Conflict* using a four-item scale developed by Simons and Peterson (2000), adapted for the context of family firms (e.g., Kellermanns & Eddleston, 2007). The four items load on a single factor with a Cronbach's alpha of .88 and a Composite Reliability of .87.

D.4 Results

D.4.1 Descriptive Results and Correlations

The descriptive statistics, including the minimum and maximum values, means, medians, and standard deviations (SD) on all variables, are shown in Table D-3. The mean for *Exploitation* (5.58) is slightly higher than for *Exploration* (mean = 5.37). *Organizational Ambidexterity* ranges from 38.5 to 318.9, with a mean of 189.1 (SD = 63.8). Regarding the conflict resolution strategies, the respondents rated *Collaboration* the highest (mean = 5.39), followed by *Com-*

promise (mean = 4.63) and *Avoidance* (mean = 3.32). Concerning *Entirely family-owned business*, the mean value is .85, showing that more than every fourth observed family firm in our survey is entirely in the hands of the owner's family.

The correlations between the variables are shown in Table D-4. Since our variables feature different scale levels, we had to use various measures for calculating the exact correlations (for further information, see Field, 2018). This includes point-biserial correlation coefficients between metric and dichotomous variables, Pearson correlation coefficients between metric variables, and Phi values between dichotomous variables. The correlations that turned out to be significant at $p \leq .05$ are boldly highlighted. Multicollinearity seems unlikely to be a problem in our analysis since all the correlations are below the accepted threshold of .7 (Bagozzi *et al.*, 1991; Hair, 2019; Dormann *et al.*, 2013; Sarstedt *et al.*, 2014). In line with former studies (e.g., Gedajlovic *et al.*, 2012; Kammerlander *et al.*, 2015; 2020), the variables *Exploration*, *Exploitation*, and *Organizational Ambidexterity* are not only correlated with each other but are also positively correlated with *Past Performance*, *Strategy*, and *Collaboration*.

Variables	N	Theoretical range	Min.	Max.	Mean	Median	SD
CEO age	91	n/a	26.00	72.00	51.09	54.00	10.17
CEO gender	91	0 – 1	.00	1.00	.08	.00	.27
CEO education	91	0 – 1	.00	1.00	.82	1.00	.38
CEO firm tenure	91	n/a	1.00	40.00	10.54	9.00	8.93
Firm Size >499	91	0 – 1	.00	1.00	.40	.00	.49
Past Performance	91	1 – 7	2.50	6.63	4.64	4.63	.90
Cognitive conflict	91	1 – 7	1.00	5.25	2.35	2.00	1.09
Manufacturing firm	91	0 – 1	.00	1.00	.75	1.00	.44
Strategy	91	0 – 1	.00	1.00	.48	.00	.50
Entirely family-owned business	91	0 – 1	.00	1.00	.85	1.00	.36
Avoidance	91	1 – 7	1.00	7.00	3.32	3.00	1.80
Compromise	91	1 – 7	1.00	7.00	4.63	4.67	1.29
Collaboration	91	1 – 7	1.67	7.00	5.39	5.67	1.15
Organizational Ambidexterity	91	7 – 343	38.50	318.94	189.07	193.67	63.82
Donation (marker variable)	91	0 – 1	.00	1.00	.95	1.00	.23
Report (marker variable)	91	0 – 1	.00	1.00	.60	1.00	.49

Note. CEO = Chief Executive Officer; Min. = minimum; Max. = maximum; SD = standard deviation., n/a = not applicable. CEO gender: 0 = male, 1 = female, CEO education: 0 = no bachelor's degree, 1 = bachelor's degree or higher Strategy: 0 = defender firm, 1 = prospector firm.

Table D-3. Descriptives

	Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1.	CEO age	1														
2.	CEO gender	-.190	1													
3.	CEO education	-.007	.133	1												
4.	CEO firm tenure	**.571**	-.124	-.044	1											
5.	Firm Size >499	.044	.188	.138	.024	1										
6.	Past Performance	.063	.013	.031	.039	.199	1									
7.	Cognitive conflict	**-.221**	.051	.014	**-.351**	.006	-.139	1								
8.	Manufacturing firm	.040	-.022	.196	-.153	.160	.015	.075	1							
9.	Strategy	.057	-.032	-.015	.152	.027	**.270**	-.167	-.095	1						
10.	Entirely family-owned business	-.002	-.106	-.197	-.053	-.029	-.028	**.256**	**.243**	-.136	1					
11.	Avoidance	-.146	-.029	.116	.054	.167	-.047	.086	-.008	-.145	.120	1				
12.	Compromise	-.127	-.055	-.030	-.053	-.138	-.126	-.045	.021	-.055	.018	.175	1			
13.	Collaboration	.094	-.099	-.077	**.213**	-.035	.104	**-.557**	-.058	.175	-.058	-.062	**.310**	1		
14.	Organizational Ambidexterity	.055	.014	-.027	.105	.038	**.222**	-.134	.159	**.330**	-.058	.006	.175	**.324**	1	
15.	Report (marker variable)	-.117	-.019	.099	-.118	.011	.049	.108	.202	.198	.029	.008	.138	.114	.081	1

Note. N = 91. CEO = Chief Executive Officer. CEO gender: 0 = male, 1 = female, CEO education: 0 = no bachelor's degree, 1 = bachelor's degree or higher, Strategy: 0 = defender firm, 1 = prospector firm.

Table D-4. Correlation matrix

D.4.2 Regression Models

We applied hierarchical analysis with three regression models to test our hypotheses (see Table D-5). Model 1 contains only the control variables. Only control variables that exhibited statistical significance across multiple model specifications are displayed in the results Tables D-5, D-6, and D-7. However, to assess the robustness of our findings, we conducted several alternative model specifications by employing different combinations of control variables, including models without any control variables (untabulated). Hence, in Tables D-5, D-6, and D-7, we only included the control variables *Firm Performance, Cognitive Conflict*, *Manufacturing firm*, and *Strategy*, which explain a relatively large variance (e.g., in Table D-5, Model 1: $R^2 = .169$). Model 2 in Table D-5 includes the main effects as suggested in H1, i.e., the independent variable (*Entirely family-owned Business*) and H2a-c, i.e., the conflict resolution variables (*Avoidance*, *Compromise*, and *Collaboration*). Finally, the interaction terms as suggested in H3a-c were added in Model 3. The statistical power of our applied hierarchical model is ensured by sufficient validity as measured by R^2, increased with each model, and reached its peak in Model 3 ($R^2 = .37$), indicating that this model offers the highest explanatory power. To enhance the interpretability of the main effects in our study and mitigate potential multicollinearity concerns, we mean-centered all variables involved in the interaction terms. This method, as advocated by Cronbach (1987) and Field (2018), helps to alleviate issues associated with collinearity and facilitates a more accurate analysis of the results. In addition, all variance inflation factors (VIFs) are well below two and thus much below the recommended value of 10 (e.g., Dormann *et al.*, 2013; Hair *et al.*, 2011). Therefore, we have no indications that multicollinearity might negatively affect our analyses.

To secure sufficient statistical power for our regression analyses and to avoid overfitting, we followed the recommendations by Khamis and Kepler (2010). These authors suggest that 20 plus five times the independent variables equal the minimum necessary observations in multiple

regression models. In line with this notion, our 11 independent variables in Model 3 remain within this framework, respectively, and would require a minimum number of observations of 75. Hence, all three models in Table D-5 should hold appropriate statistical power since our number of observations (91) exceeds this threshold.

D.4.3 Multiple Regression Analyses

The results in Model 1 show that *Manufacturing Firm* has a marginally significant and positive impact on *Organizational Ambidexterity* (b = .192, p < .10). Furthermore, we found that *Strategy* has a positive and significant relationship with *Organizational Ambidexterity* (b = .301, p < .01). In Model 2, besides the positive effects from the control variables *Manufacturing firm* (b = .212, p < .05) and *Strategy* (b = .281, p < .01) on *Organizational Ambidexterity*, one significant direct effect can be found. The conflict resolution strategy *Collaboration* is significantly and positively associated with the level of *Organizational Ambidexterity* (b = .295, p < .05). In Model 3, the significant predictors of the previous models, i.e., *Manufacturing firm* (b = .224, p < .05), *Strategy* (b = .266, p < .01), and *Collaboration* (b = .373, p < .01) can also be confirmed. Moreover, the moderator *Compromise* had a marginally significant and positive impact on *Organizational Ambidexterity* (b = .170, p < .10). Hence, the hypotheses H2b and H2c could be confirmed. In contrast, the direct effects of *Entirely family-owned business* as suggested in H1 (b = -.073, p > .10) and of *Avoidance* as suggested in H2a (b = .038, p > .10) could not be confirmed. Two of the three interaction terms in Model 3 were significantly related to *Organizational Ambidexterity*. These two proposed interaction effects are the moderating effects of *Avoidance* (b = .303, p < .05) and *Collaboration* (b = .295, p < .05) on the relationship between *Entirely family-owned business* and *Organizational Ambidexterity*. These findings support hypotheses H3a and H3c. In contrast, H3b must be rejected (b = -.124, p >.10).

Dependent Variable	*Organizational Ambidexterity*											
	Control variables only (Model 1)				**Main effects added (Model 2)**				**Interaction effects added (Model 3)**			
Independent Variables	Stand. beta	t value	p value	VIF	Stand. beta	t value	p value	VIF	Stand. beta	t value	p value	VIF
Constant		3.079	.003***			-.321	.749			-.955	.343	
Cognitive Conflict	-.081	-.804	.424	1.043	.103	.854	.395	1.614	.182	1.513	.134	1.799
Manufacturing firm	.192	1.935	.056*	1.015	.212	2.157	.034**	1.075	.224	2.413	.018**	1.077
Strategy	.301	2.908	.005***	1.109	.281	2.766	.007***	1.147	.266	2.756	.007***	1.160
Past Performance	.126	1.229	.222	1.092	.140	1.402	.165	1.113	.096	.983	.329	1.189
Entirely family-owned business					-.086	-.835	.406	1.170	-.073	-.723	.472	1.260
Avoidance					.055	.560	.577	1.076	.038	.402	.689	1.134
Compromise					.109	1.042	.300	1.217	.170	1.677	.097*	1.288
Collaboration					.295	2.378	.020**	1.717	.373	2.964	.004***	1.973
Entirely family-owned Business * Avoidance									.303	2.638	.010**	1.645
Entirely family-owned Business * Compromise									-.124	-.988	.326	1.960
Entirely family-owned Business * Collaborate									.295	2.635	.010**	1.561
R^2		.169				.264				.368		
Adjusted R^2		.130				.192				.279		
Change in R^2 (p)		-				0.095 (.039)				.104 (.007)		
F		4.364***				3.674***				4.174***		

Note. VIF = variance inflation factor; R^2 = coefficient of determination; adjusted R^2 = adjusted coefficient of determination; F = F ratio; N = total number of cases; Stand. β = standardized regression coefficient β.
N = 91; * p < .10; ** p < .05; *** p < .01

Table D-5. Hierarchical regression analysis

To shed more light on the level of *Organizational Ambidexterity* with combinations of ownership and conflict resolution strategies, we plotted the significant interaction effects in Figures D-2 and D-3. To split the applied conflict resolution strategies, we calculated the median of each conflict resolution strategy. We labeled the values above the median as "high" and those below the median as "low." In the next step, we calculated the mean values of *Organizational Ambidexterity* for each of these four combinations.

The interaction between *Avoidance* and *Entirely family-owned business* in Figure D-2 indicates that family firms achieved the highest level of *Organizational Ambidexterity* (i.e., a score of 218) if they were not fully family-owned and had a low applied *Avoidance* strategy. In contrast, non-fully family-owned family businesses with a highly applied *Avoidance* strategy to prevent potential conflict feature the lowest level of *Organizational Ambidexterity* (i.e., 161). Moreover, the results show, unaligned with H3a*,* that only in scenarios with *Entirely family-owned businesses* did a highly applied *Avoidance* strategy become more beneficial, i.e., led to a higher level of *Organizational Ambidexterity*. Our results in Figure D-2 therefore suggest that the *Avoidance* strategy holds better for fully family-owned family businesses (see the dotted line). In summary, while a significant interaction effect was found, this effect runs in a different direction than suggested in hypothesis H3a, ultimately leading to the rejection of this hypothesis. Nevertheless, Figure D-2 confirms that it depends on the applied level of the *Avoidance* strategy to evaluate whether family businesses are more or less ambidextrous.

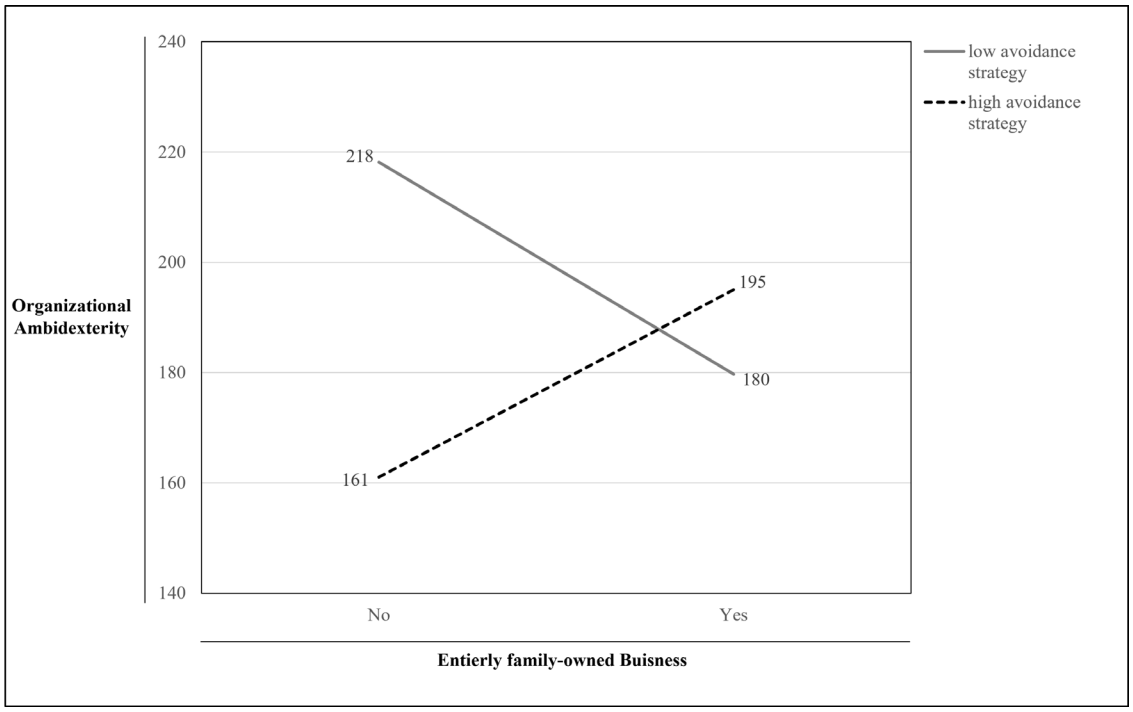

Figure D-2. Interaction between Entirely family-owned Businesses and Avoidance

Figure D-3 shows the interaction between *Collaboration* and *Entirely family-owned business*. The results indicate that family firms that are entirely family-owned and apply a low *Collaboration* strategy offer the lowest level of *Organizational Ambidexterity* (i.e., 169). Figure D-3 also shows that, as predicted in H3c, a highly used *Collaboration* strategy positively affects *Organizational Ambidexterity* in cases of *Entirely family-owned businesses* (see the dotted line in Figure D-3). Therefore, H3c was supported. In summary, Figure D-3 confirms that it depends on the applied level of the *Collaboration* strategy to prevent conflict potential to evaluate if non-family investors make family business more ambidextrous.

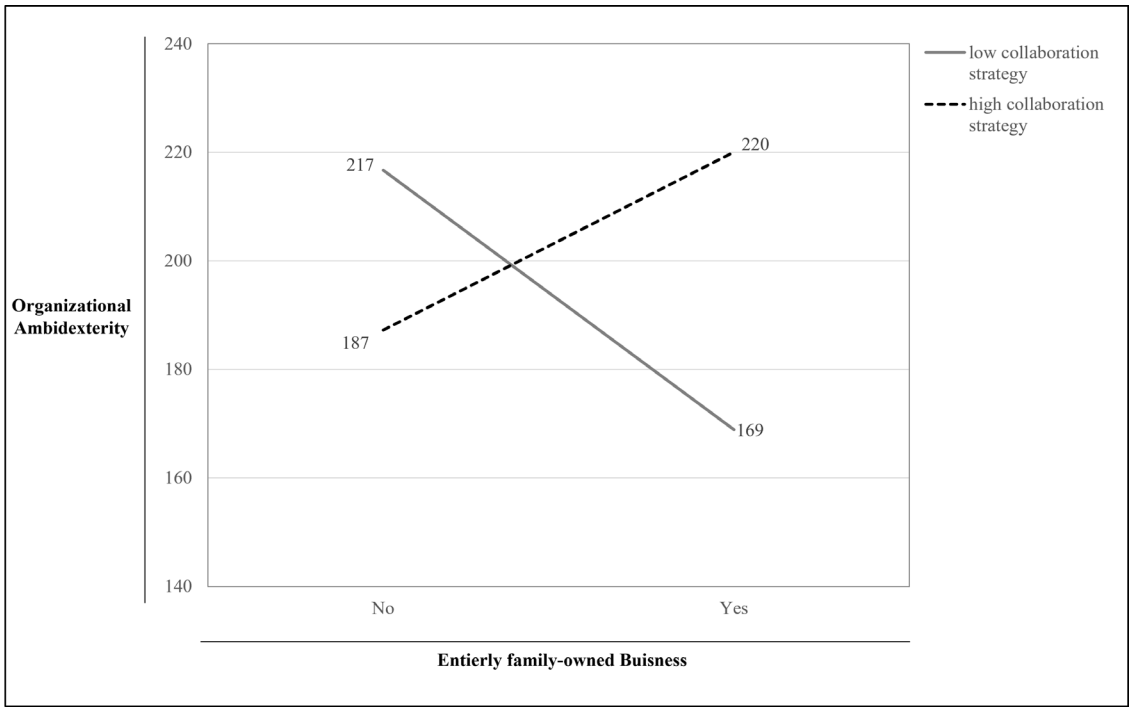

Figure D-3. Interaction between Entirely family-owned Businesses and Collaboration

D.4.4 Robustness Checks

Alternative Control Variables. We tested an alternative model specification by including additional control variables (untabulated). Like Kammerlander *et al.* (2020), we added *CEO age*, *CEO gender*, *CEO education*, *CEO tenure*, and *firm size (>499)*. The results regarding our hypothesis remain unaffected, with the further controls insignificantly related to *Organizational Ambidexterity*.

Additional measures for Organizational Ambidexterity. We ran ordinary least squares regressions using three additional computations of ambidexterity, i.e., additive (Lubatkin *et al.*, 2006), multiplicative (Jansen *et al.*, 2012), and subtractive (He & Wong, 2004). For the full models, the additive method (R^2 = .47; adj. R^2 = .36) has the highest explanatory power, followed by the multiplicative method (R^2 = .45; adj. R^2 = .37). However, the subtractive method has the considerably lowest explanatory power (R^2 = .11; adj. R^2 = .00). Therefore, this method was not further evaluated and remains untabulated. This ranking is consistent with Jansen *et al.* (2009) and Kammerlander *et al.* (2015; 2020). The additive and multiplicative method findings

remain similar to our main results in Table D-5, relying on the measurement by Bedford *et al.* (2019). That is, the additive and subtractive ambidexterity resulted in the same significant effects as our main analysis in Table D-5. However, in addition to *Manufacturing firms* and *Strategy*, the control variables *Cognitive Conflict* and *Past Performance* were also significant. For the full results using alternative measures of *Organizational Ambidexterity*, see Tables D-6 and D-7.

Dependent Variable	*Organizational Ambidexterity (Additive Measurement)*											
	Control variables only (Model 1)				**Main effects added (Model 2)**				**Interaction effects added (Model 3)**			
Independent Variables	Stand. beta	t value	p value	VIF	Stand. beta	t value	p value	VIF	Stand. beta	t value	p value	VIF
Constant		8.780	.001***			2.901	.005***			2.383	.020**	
Cognitive Conflict	-.071	-.728	.469	1.043	.162	1.449	.151	1.614	.222	2.021	.047**	1.799
Manufacturing firm	.157	1.635	.106	1.015	.179	1.960	.053*	1.075	.191	2.247	.027**	1.077
Strategy	.327	3.250	.002***	1.109	.296	3.140	.002***	1.147	.273	3.095	.003***	1.160
Past Performance	.202	2.027	.046**	1.092	.221	2.376	.020**	1.113	.182	2.041	.045**	1.189
Entirely family-owned business					-.096	-1.007	.317	1.170	-.070	-.756	.452	1.260
Avoidance					.023	.255	.800	1.076	.018	.208	.836	1.134
Compromise					.145	1.497	.138	1.217	.217	2.336	.022**	1.288
Collaborate					.374	3.240	.002***	1.717	.434	3.770	.000***	1.973
Entirely family-owned Business * Avoidance									.318	3.026	.003***	1.645
Entirely family-owned Business * Compromise									-.054	-.471	.639	1.960
Entirely family-owned Business * Collaborate									.220	2.144	.035**	1.561
R^2		.215				.364				.469		
Adjusted R^2		.178				.302				.359		
Change in R^2 (p)		-				.150 (.002)				.105 (.003)		
F		5.877***				5.873***				6.345***		

Note. VIF = variance inflation factor; R^2 = coefficient of determination; adjusted R^2 = adjusted coefficient of determination; F = F ratio; N = total number of cases; Stand. β = standardized regression coefficient β.
** p < .10; ** p < .05; *** p < .01*

Table D-6. Robustness Check

Dependent Variable	*Organizational Ambidexterity (Multiplicative Measurement)*											
	Control variables only (Model 1)				**Main effects added (Model 2)**				**Interaction effects added (Model 3)**			
Independent Variables	Stand. beta	t value	p value	VIF	Stand. beta	t value	p value	VIF	Stand. beta	t value	p value	VIF
Constant		3.472	.001***			-.558	.578			-1.251	.215	
Cognitive Conflict	-.076	-.779	.438	1.043	.143	1.265	.209	1.614	.205	1.833	.071*	1.799
Manufacturing firm	.166	1.723	.089*	1.015	.187	2.021	.047**	1.075	.199	2.303	.024**	1.077
Strategy	.332	3.296	.001***	1.109	.303	3.165	.002***	1.147	.281	3.129	.002***	1.160
Past Performance	.190	1.905	.060*	1.092	.207	2.201	.031**	1.113	.169	1.861	.066*	1.189
Entirely family-owned business					-.094	-.974	.333	1.170	-.069	-.732	.466	1.260
Avoidance					.025	.270	.788	1.076	.017	.190	.849	1.134
Compromise					.135	1.373	.174	1.217	.206	2.176	.033**	1.288
Collaborate					.351	3.000	.004***	1.717	.412	3.515	.001***	1.973
Entirely family-owned Business * Avoidance									.320	2.991	.004***	1.645
Entirely family-owned Business * Compromise									-.071	-.609	.544	1.960
Entirely family-owned Business * Collaborate									.231	2.212	.030**	1.561
R^2		.215				.346				.450		
Adjusted R^2		.178				.283				.373		
Change in R^2 (p)		-				.132 (.004)				.104 (.003)		
F		5.871***				5.431***				5.878***		

Note. VIF = variance inflation factor; R^2 = coefficient of determination; adjusted R^2 = adjusted coefficient of determination; F = F ratio; N = total number of cases; Stand. β = standardized regression coefficient β.
** p < .10; ** p < .05; *** p < .01*

Table D-7. Robustness Check 2

D.5 Discussion, Conclusions, and Limitations

D.5.1 Discussion and Contributions

This paper aims to deepen our understanding of how family ownership in family firms impacts organizational ambidexterity. We assumed that family firms characterized by exclusive family ownership would exhibit a stronger propensity toward exploitative decision-making and innovation than explorative innovation, leading to lower levels of organizational ambidexterity. By examining this relationship, we aimed to shed light on the influence of ownership structure on family firms' strategic orientations and innovation capabilities, particularly concerning their ability to balance exploratory and exploitative activities. However, our study did not yield significant evidence supporting a direct effect of exclusive family ownership on organizational ambidexterity as hypothesized. However, our research provided valuable insights into the influence of applied conflict resolution strategies on organizational ambidexterity in family firms and their moderating role in the ownership-ambidexterity relationship. Specifically, we found direct positive effects of the compromise and collaboration strategies on family firms' level of organizational ambidexterity. In addition, the avoidance and collaboration conflict resolution strategies emerged as positively impacting organizational ambidexterity within purely family-owned companies. These findings illuminate the significance of conflict resolution approaches in facilitating a balance between exploration and exploitation activities, thus fostering organizational ambidexterity within family firms.

When compared to existing findings in the literature, our findings for avoidance deviate from the prevailing literature, which generally posits that avoidance is insufficient in resolving conflicts and may harm organizational cohesion and performance outcomes (Kellermanns & Eddleston, 2006a; Rahim, 2002; Sorenson, 1999). Usually, such tensions that are perceived as salient, which are one possible outcome of avoidance as a conflict resolution strategy, can de-

velop into open tensions and increasing conflicts (Björnberg & Nicholson, 2007). Consequently, salient tensions, can harm innovation-related ambidexterity (Guffler *et al.*, 2023). Following Kellermanns and Eddleston (2006a), a more moderate conflict level benefits the business outcome more than lower levels of conflicts. Therefore, one plausible explanation for this unexpected result may be that the avoidance strategy primarily targets conflicts at the relational level, effectively reducing familial conflicts to a moderate level and mitigating the negative impact of fully family-owned family firms on organizational ambidexterity. However, this explanation is preliminary only and warrants further empirical testing and corroboration. Still, our findings may indicate that avoidance exhibits a more nuanced and multifaceted nature than suggested by previous research (e.g., Rahim, 2002, Sorenson, 1999).

Our findings for collaboration are more in line with former literature, since extensive research has consistently demonstrated the significant benefits of implementing this strategy, particularly in elevating ethical norms (Sorenson *et al.*, 2009), learning new behaviors (Rahim, 2002), enhancing firm performance (Sorenson *et al.*, 2008) and reducing conflict, especially relationship conflicts (Kellermanns & Eddleston, 2006a). Moreover, collaboration is widely acknowledged for its positive impact on strategic matters and appears to foster favorable outcomes for the family and the business, including cohesive and constructive relationships within the family firm and ownership family, but also between family and non-family owners (Sorenson. 1999). Our findings substantiate that collaboration within family firms not only fosters exploitative innovations but also significantly influences exploratory innovations, hence, impacts the relationship between fully family-owned family firms and organizational ambidexterity. Potentially, the collaboration strategy may exert an implicit impact on the risk attitude of family firms, shaping their approach to risk-taking and decision-making processes. These dynamics may be attributed to the inclination of managers to address and mitigate conflicts. It is plausible

that this concerted effort to reduce conflicts contributes to an environment conducive to optimizing existing values and capabilities while embracing and implementing disruptive innovations. Consequently, collaboration holds the potential to attenuate or even eliminate the impasse often encountered by family firms in balancing exploration and exploitation. The focal point of the collaboration strategy is to optimize overall company performance (e.g., Sorenson *et al.*, 2008), which may necessitate venturing into risky and uncertain innovations that could shape a positive mindset, hence, yield substantial returns (e.g., Ibrahim *et al.*, 2020). This, in turn, could motivate family firms to diminish their risk aversion and engage in investments targeting such ventures.

In summary, our study makes three contributions to the existing literature. First, we contribute to the family business literature on organizational ambidexterity. Former research has documented or assumed that family influence leads to ambivalent findings concerning organizational ambidexterity. While certain studies have demonstrated a positive association between family influence and ambidexterity (Allison *et al.*, 2014; Gedajlovic *et al.*, 2012; Kammerlander *et al.*, 2015; 2020; Lubatkin *et al.*, 2006; Stubner *et al.*, 2012), others have unveiled a negative impact attributable to owner families (e.g., Arzubiaga *et al.*, 2018; Hiebl, 2015), or conversely, a positive effect stemming from the involvement of non-family managers (e.g., Arzubiaga *et al.*, 2018; Veider & Matzler, 2016). These divergent findings underscore the intricate interplay of factors and the contextual specificity inherent in the relationship between family influence and the attainment of organizational ambidexterity. We advance the existing literature by revealing (1) that the direct effect of family ownership on organizational ambidexterity, irrespective of its positive or negative nature, may not always be statistically significant and (2) that this effect must be considered in the context – in our case within the specific context of applying conflict resolution strategies.

Second, we add to the ambidexterity literature further insights into the previously only assumed effect of conflict by showing that resolution strategies can address conflicts and thus increase organizational ambidexterity. We showed that willingness to compromise and collaboration, regardless of ownership structure, positively affects organizational ambidexterity in family firms. Hence, besides antecedents of ambidexterity such as a culture of innovation, navigating paradoxical tensions, top management teams, specifically the involvement of the owner family (e.g., Alexiev *et al.*, 2010; Canale *et al.*, 2023; Filippini *et al.*, 2012; Guffler *et al.*, 2023; Güttel *et al.*, 2012; Kammerlander *et al.*, 2015; 2020; Mammassis & Kostopoulos, 2019; Röd, 2019; Simsek, 2009), we were able to add two additional antecedents for ambidexterity in family firms which have so far not been uncovered: the conflict resolution strategies of collaboration and compromise.

At the same time, and third, we contribute to the literature on conflicts in family firms by demonstrating that the extensive use of selected conflict resolution strategies – in particular, avoidance and collaboration – might support fully family-owned family firms in reaching higher levels of organizational ambidexterity. We thus add to this conflict management literature (Kellermanns & Eddleston, 2006a; Sorenson, 1999; Sorenson *et al.*, 2008) another beneficial outcome of successfully applying conflict management strategies in family firms. At the same time, our significant interaction effects indicated that these conflict resolution strategies have to be considered in the context of different levels of family ownership.

D.5.2 Practical Implications

Our study provides practical insights for family firms, especially managers facing conflicts around strategic orientation and innovation. When addressing conflicts in family firms, specifically between exploratory and exploitative innovations, it is crucial to consider the context of chosen conflict resolution strategies alongside the ownership structure. As indicated by our re-

sults, the specific dynamics and composition of the company's ownership can impact the effectiveness of different strategies. In particular, fully family-owned family firms should prioritize an increased adoption of avoidance or collaboration strategies to maximize organizational ambidexterity.

Interestingly, our study reveals that when the family's ownership stake in the company is less than 100.00%, a more intensive application of these strategies can lead to lower organizational ambidexterity. Therefore, when considering the involvement of non-family investors through share sales, the choice of conflict resolution strategy becomes essential. In practice, it is recommended to apply these strategies moderately in cases where share ownership is shared between the entrepreneurial family and non-family investors. This means conflicts should not be avoided entirely but addressed openly through discussions. Moreover, while collaboration between these parties is essential, it should not become overly dominant. Our results imply that in such situations, the compromise strategy may be more effective as it requires fewer resources and less time than extensive collaboration.

D.5.3 Limitations

Like any empirical work, the results and contributions reported here should be considered in light of some limitations that reveal potential avenues for additional research. First, we rely on a single informant per firm, i.e., the answers of the company CEO. These answers are predominantly measured subjectively and could be biased through individual perspectives (Podsakoff *et al.*, 2003), like the subjective nature of organizational ambidexterity. However, we tried to diminish this problem by addressing the CEO since the CEO usually has deep insights into the firm’s high-level decisions and operations.

Second, our sample size used in the regression analyses is relatively small yet comparable with former studies in family business research (Wilson *et al.*, 2014; Chrisman *et al.*, 2004). In addition, when following the recommendations by Hair *et al.* (2019) or Khamis and Kepler (2010)

regarding the minimum number of observations in relation to the number of independent variables in our regression models, our analyses should also carry sufficient statistical power. Nevertheless, future research that may hopefully rely on larger sample sizes is needed to corroborate our results and may potentially unveil further contextual factors that may further qualify the impact of ownership structures or conflict management strategies and their effects on family firms' organizational ambidexterity.

Third, our study sample selection and the dataset are based on one specific European country, Germany, and can therefore not be readily generalized to all family firms worldwide since family firms outside of Germany might significantly differ in organizational culture and national culture surrounding them. To verify our results, we encourage other researchers to replicate the setting of our study for family firms in different geographical regions.

Finally, time constraints can be considered a limitation in our research for two reasons. This concerns the timing of our measurement, which occurred during a global pandemic. Therefore, respondents' answers may differ somewhat from those in "normal" times, as these subjective answers are highly dependent on the emotional mood of the respondents (Podsakoff *et al.*, 2003). Furthermore, we collected the data to observe the impact on organizational ambidexterity at one point in time. We encourage other researchers to collect and analyze long-range data to address potential processual dynamics around ownership structure, conflict management, and organizational ambidexterity.

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E. Discussion and Conclusion

E.1 Summary and Contributions

Family firms are characterized by their stability and long-term focus (Heider *et al.*, 2022b; Hiebl, 2015; Sharma & Salvato, 2011), fostering innovation and recognition as global innovators (De Massis *et al.*, 2013; Diaz-Moriana *et al.*, 2018). However, some family firms concentrate on niche products, relying on established markets and showing resistance to innovative exploration (Calabrò et al., 2019; De Massis *et al.*, 2013; Duran *et al.*, 2016), including digital transformation (Heider et al., 2022a). Empirical research has demonstrated that digitalization can be segmented into three progressive phases (Soluk & Kammerlander, 2021): process, product/service, and business model digitalization. Soluk and Kammerlander (2021) discovered that family firms undergoing digital transformation often experience conflicts stemming from the changes brought about by this process (Chakma *et al.*, 2021; Guffler et al., 2023). Conflict theory is a framework for understanding conflicts within family businesses, particularly in relation to decision-making (Chung *et al.*, 2021). In family firms, conflicts often arise due to differences in individual goals, interests, and values that influence the decision-making process (Frank *et al.*, 2011). Hence, striking a balance between innovation and growth on the one hand and preserving traditional family values and practices on the other is of importance. In addition to the potential for conflicts within the family firm highlighted by Soluk and Kammerlander (2021), German Mittelstand family firms are encountering novel prospects and challenges stemming from the growing digitalization trend. These dynamics could impact their crisis resilience and decision-making procedures, necessitating a careful balance between upholding traditional family values and practices and fostering innovation. Hence, as outlined in Section A.1, this dissertation had the overall aim to analyze three different challenges (Papers 1 to 3)

faced by family firms in the German Mittelstand to understand how such family firms can manage crises and conflicts as well as selected aspects such as digitalization, conflict management and resolution strategies and organizational ambidexterity.

To summarize, the findings of this dissertation underscore the intricate interplay of digitalization effects on family firms, explaining the emergence of conflicts, the role of family ownership dynamics, and the strategic nuances in conflict management approaches. Nonetheless, the extent of these effects manifests within a contextual framework shaped by intrinsic determinants. Contextual intricacies encompass diverse dimensions, including the dichotomy of family versus non-family ownership, the number of ownership generations (so-called generational ownership dispersion), and the extent of conflict resolution strategies. The investigation reveals that digitalization enhances resilience during crises, particularly in non-family firms. Furthermore, the conflict management strategy collaboration exhibits its ascendancy in elevating digitalization within family firms characterized by sole ownership generation. Again, highly applied conflict resolution strategies, particularly avoidance and collaboration, hold distinctive efficacy for fully-family-owned family firms, engendering heightened organizational ambidexterity. Thus, the findings suggest that family firms within the German Mittelstand are affected differently by the challenges posed by external shocks compared to non-family firms. Furthermore, family firms are challenged by increasing digitalization and internal conflicts differently. These findings are examined through the lens of six pertinent research questions summarized in the following subsections.

E.1.1 Do Higher Levels of Digitalization increase Entrepreneurial Firms' Resilience to Pandemic Crises?

As indicated by the findings, a direct effect of digitalization on the firms' crisis resilience could not be confirmed in Paper 1. However, there are significant differences regarding the level of digitalization. The results suggest that the effect depends on how much companies are affected

by globalization and influenced by a controlling family. The following subsection (E.1.2) discusses these moderating effects in more detail.

E.1.2 How do Mittelstand Firms' Characteristics (Firms' Level of Globalization, Family Firm Status, Firm Size, Industry Affiliation, Strategy, Past Performance, Transformational Leadership Style, and Embedding in Subnational Regions) impact the Digitalization–Crisis Resilience Relationship (Research Question 1)?

The empirical findings presented in Paper 1 provide robust evidence supporting the hypothesis that the relationship between digitalization and crisis resilience is influenced depending on the specific organizational context, such as the firm's family firm status and level of globalization. The findings reveal that firms possessing advanced digitalization of their business models before the pandemic crisis exhibit heightened resilience within globalized sectors and non-family contexts. This resilience is especially crucial in the context of reduced in-person interactions during the COVID-19 crisis, where robust digital integration mitigates the adverse effects of social distancing (Lewnard & Lo, 2020). The study indicates that digitalization effectively sustains cross-cultural relationships, facilitating knowledge exchange, technological collaboration, and international commercial activities (Nørfelt *et al.*, 2020). The significance of digitalization becomes even more pronounced within the global economic downturn triggered by the pandemic's impact (Fernandes, 2020), further underscoring its role in mitigating crisis consequences for globalized and non-family enterprises.

These insights expand the realm of organizational resilience literature (Hillmann, 2021; Hillmann & Guenther, 2021; Linnenluecke, 2017; Williams *et al.*, 2017), which has historically focused on context-dependent dynamics but often overlooked health crises' specific facets. Given the increasing prevalence of pandemics (Kraus *et al.*, 2020), the study contributes to a deeper understanding of resilience's nuanced manifestations during critical crises, extending beyond existing theoretical frameworks (Beninger & Francis, 2022) and qualitative illustrations

(Fath *et al.*, 2021). This empirical exploration underscores the nuanced interplay of organizational resilience (Linnenluecke, 2017), emphasizing that the effectiveness of digitalization in enhancing resilience is contingent upon contextual factors, notable for non-family entities and those deeply influenced by globalization.

E.1.3 How do different Conflict Management Strategies influence the Digitalization of Family Firms, and to what Extent does Generational Ownership Dispersion moderate this Relationship?

The results of Paper 2 indicate that not all conflict management strategies can help family firms to address digitalization issues and become more digitalized. The quantitative results of Paper 2 demonstrated that only compromise exhibited statistically significant results out of the three presumed direct effects on digitalization in family firms—namely, avoidance, compromise, and collaboration. The findings from the qualitative survey lend support to the non-significant avoidance effect. The interviews consistently indicate a common perspective that digitalization is unavoidable, rendering it unfeasible to avoid discussions on this topic. Furthermore, the results of Paper 2 suggest that a higher application of collaboration as a conflict management strategy in family firms with a low generational ownership dispersion, i.e., only one family generation within ownership, leads to a higher level of digitalization. In contrast, these results reveal that a high level of collaboration does not significantly influence digitalization in family firms with dispersed ownership over two or more generations. This counterintuitive result deviates from the hypothesized moderation effect, which assumed a more pronounced relationship between the direct impact of collaboration and digitalization in family firms with ownership spanning multiple generations. However, additional qualitative interview data suggest that older family generations tend to be reluctant to embrace digitalization proactively. Instead, they tend to delegate this task to younger generations, whom they perceive to be more tech-savvy.

These results add to the literature on conflict theory in family firms on the benefits of applied conflict management strategies (e.g., Kellermanns & Eddleston, 2007; Qiu & Freel, 2020; Sorenson, 1999; Sorenson *et al.*, 2008; 2009). The existing body of conflict theory literature has provided evidence of the benefits associated with implementing these strategies. It has been reported that their application influences performance, innovation capability, and the facilitation of disruptive innovation within organizations (e.g., De Clercq & Belausteguigoitia, 2015; Guffler *et al.*, 2023; Kellermanns & Eddleston, 2007; Sorenson, 1999; Sorenson *et al.*, 2008; 2009). However, the empirical exploration of the extent to which conflicts should be considered in digitalization and digital transformation remains limited, leaving a gap in the existing literature.

The results of Paper 2 show that many family firms experience process conflicts regarding digitalizing their businesses. Thus, the study represents a pioneering effort to deliver empirical evidence that explicitly addresses conflicts concerning family firms' digitalization. Paper 2 contributes to the existing literature by providing empirical evidence that selected conflict management strategies, notably compromise and collaboration, play a pivotal role in mitigating conflicts and fostering the digitalization of family firms. Paper 2 thus enhances the growing body of literature on the digitalization of family firms (Batt *et al.*, 2020; Bürgel *et al.*, 2023; de Groote *et al.*, 2021; Soluk *et al.*, 2021; Soluk & Kammerlander, 2021; Löhde *et al.*, 2020) by shedding light on a crucial strategy that family firms can utilize to address difficulties and conflicts in their digitalization endeavors. Furthermore, Paper 2 adds to the literature on the digitalization of family firms and the literature on the effectiveness of conflict management strategies in family firms (e.g., Kubíček & Machek, 2020; Qiu & Freel, 2020) by highlighting the importance of the collaboration conflict management strategy. The results indicate that the effectiveness of collaboration is contingent upon the number of family generations holding ownership rights, known as generational ownership dispersion. These counterintuitive results of Paper 2 can be

attributed to the qualitative interview data, which revealed that older family generations tend to avoid active involvement in digitalization, preferring to delegate this responsibility to younger, more technologically inclined generations. Additionally, the interviews suggest that the significant interaction effect between collaboration and generational ownership dispersion stems from the fact that collaboration appears to be a relevant conflict management strategy primarily within family firms owned by same-generation, typically younger-generation family members. The study thus provides a valuable contribution to the literature on family business conflicts (Kubíček & Machek, 2020; Qiu & Freel, 2020) by underscoring the importance of considering heterogeneity among large family firms, which renders certain strategies more effective than others (e.g., Chua *et al.*, 2012; Dibrell & Memili, 2019).

E.1.4 Does the Ownership Structure of a Family Firm influence the Level of Organizational Ambidexterity?

In contrast to prior investigations, Paper 3 presents novel findings that challenge the established notion of a direct and statistically significant relationship between family ownership and organizational ambidexterity. Regardless of the polarity of the association, whether it was previously posited or assumed as positive (Allison *et al.*, 2014; Gedajlovic *et al.*, 2012; Kammerlander *et al.*, 2015; 2020; Lubatkin *et al.*, 2006; Stubner *et al.*, 2012) or negative (e.g., Arzubiaga *et al.*, 2018; Hiebl, 2015), Paper 3 reveals that such a linkage may not always be empirically supported. These new insights shed light on the complex and multifaceted relationship between family ownership and organizational ambidexterity. The results showed that the influence depends on the conflict resolution strategies applied, in this context, avoidance and collaboration. These findings highlight the importance of conflict resolution approaches that promote organizational ambidexterity in family firms. The following subsection (E.1.6) discusses these moderating effects in more detail.

E.1.5 Do Applied Conflict Resolution Strategies in Family Firms Influence the Level of Organizational Ambidexterity?

Paper 3 has provided insights into the impact of conflict resolution strategies on organizational ambidexterity within family firms. Specifically, the direct and positive effects of both the compromise and collaboration strategies on the level of organizational ambidexterity in family firms were observed. Thus, these results indicate that a higher application of compromise and collaboration conflict resolution strategies leads to higher organizational ambidexterity. Contrarily, the evidence from this research did not support the notion that strategy avoidance plays a significant role in influencing the observed outcomes related to organizational ambidexterity. Therefore, Paper 3 highlights the importance of willingness to compromise and collaborate, irrespective of ownership structure, in fostering explorative innovations and, consequently, organizational ambidexterity. The findings emphasize the importance of seeking a middle ground and using constructive approaches, particularly in contentious strategic decisions within family firms (Putnam *et al.*, 2016; Qiu & Freel, 2020; Sorenson, 1999). This can lead to effective conflict resolution and increased family cohesion characterized by mutual support, trust effort, creativity, open dialogues, and satisfactory solutions for all parties involved (Alderson, 2015; Guffler *et al.*, 2023; Seymour, 1993). Thus, Paper 3 adds two more antecedents to the list of factors influencing ambidexterity, alongside existing elements such as the institutional context, culture of innovation, navigating paradoxical tensions, top management team, and the specific involvement of the owner family (Alexiev *et al.*, 2010; Canale *et al.*, 2023; Filippini *et al.*, 2012; Guffler *et al.*, 2023; Güttel *et al.*, 2012; Kammerlander *et al.*, 2015; 2020; Mammassis & Kostopoulos, 2019; Röd, 2019; Simsek, 2009).

E.1.6 How do Conflict Resolution Strategies impact the Ownership–Organizational Ambidexterity Relationship (Research Question 5)?

The results of Paper 3 provided further insights into the moderating role of applied conflict resolution strategies in the ownership-ambidexterity relationship. The results indicate that a higher application of conflict resolution strategies avoidance and collaboration in fully family-owned family firms leads to higher levels of organizational ambidexterity.

The results of Paper 3 suggest that avoidance holds better for fully family-owned family businesses, even if this effect runs in a different direction than assumed. The study's findings regarding implementing the avoidance strategy in conflict resolution diverge from the prevailing literature (e.g., Kellermanns & Eddleston, 2006a; Rahim, 2002; Sorenson, 1999). Generally, avoidance is considered insufficient in effectively resolving conflicts and may lead to detrimental consequences for organizational cohesion and performance outcomes. The avoidance strategy's potential outcome of salient tensions can further exacerbate conflicts, which, in turn, may negatively impact innovation-related ambidexterity (Guffler *et al.*, 2023). Notably, Paper 3 suggests that the avoidance strategy, as applied in the context of family firms, may primarily target conflicts at the relational level, moderating familial conflicts and potentially mitigating the adverse effects of fully family-owned businesses on organizational ambidexterity. However, it is crucial to acknowledge that this explanation remains preliminary and requires additional empirical investigation and validation. Despite the unexpected results, Paper 3 suggests that avoidance as a conflict resolution strategy may exhibit a more intricate and multifaceted nature than previously established in the existing research literature (e.g., Rahim, 2002; Sorenson, 1999). However, the findings of Paper 3 confirm that the evaluation of family firms, regarding their levels of organizational ambidexterity, depends on the extent of avoidance applied.

Furthermore, Paper 3 highlights the benefits of the conflict resolution strategy collaboration in fully family-owned family firms. Previous research consistently shows that collaboration brings significant advantages, including elevating ethical norms, learning new behaviors, enhancing firm performance, and reducing conflicts (e.g., Kellermanns & Eddleston, 2006; Sorenson *et al.*, 2008; 2009). Therefore, the argument that collaboration fosters positive outcomes for the family and the business can be supported, promoting cohesive relationships within the family firm and between family and non-family owners (Kellermanns & Eddleston, 2006; Sorenson, 1999). The collaboration strategy may shape the risk attitude of family firms, encouraging them to be more open to risk-taking and uncertain ventures, ultimately optimizing overall company performance. This concerted effort may reduce conflicts and create an environment conducive to embracing and implementing disruptive innovations. Collaboration thus holds the potential to overcome challenges family firms face in balancing exploration and exploitation, reaching higher levels of organizational ambidexterity. Hence, in Paper 3, the results indicate that the extent of collaboration applied to prevent potential conflicts is crucial in evaluating whether non-family investors contribute to family firms becoming more ambidextrous.

In summary, the findings of Paper 3 contribute to the growing body of evidence supporting the favorable consequences of employing conflict management strategies within family firms (Kellermanns & Eddleston, 2006; Sorenson, 1999; Sorenson *et al.*, 2008). Concurrently, these results highlight significant interaction effects, underscoring the importance of considering these conflict resolution strategies within diverse family ownership levels.

E.2 Practical Implications

The findings of this dissertation have the potential to inspire changes in corporate practice family firms in the Mittelstand. As the main practical implication, the dissertation's findings in Paper 1 imply that the effectiveness of digitalization as a protective measure against pandemic

crises hinges on two critical factors: first, the extent to which entrepreneurial firms are influenced by globalization, and second, the level of family influence they experience within their organizational structure. Therefore, globally active Mittelstand firms, i.e., operating in global markets or controlled by non-family shareholders, show higher resilience to pandemic crises as they invest more in digital technology. On the other hand, resilience to pandemic crises seems less strengthened for non-globally active Mittelstand firms due to digitalization, possibly caused by decreasing local anchoring and mutual support from the local community. Furthermore, the dissertation's findings from Paper 1 reveal that higher levels of digitalization are linked to increased crisis resilience in non-family firms. The observed differences in the impact of digitalization between family and non-family firms could be due to the inherent long-term orientation and built-in crisis resistance that often characterize family firms. Consequently, digitalization may be relatively less important for family firms in terms of strengthening their crisis resilience.

Also, the dissertation's findings of Paper 2 indicate that family firms grappling with conflicts related to digitalization can effectively navigate these challenges by implementing conflict management strategies, namely compromise and collaboration. Avoidance, however, should not be considered, as digital business models have become an integral and unavoidable aspect of the business landscape. Specifically, compromise is recommended, as this strategy directly influences the level of digitalization, irrespective of the number of ownership generations. Conversely, family firms should prioritize collaboration when dealing with digitalization conflicts in the presence of a single ownership generation. In such cases, resolving conflicts within the same (younger) generation can lead to higher levels of digitalization and ensure competitiveness in the rapidly evolving technological landscape. However, in family firms with multiple ownership generations, the value of collaboration strategies might be limited, as older generations often delegate digitalization efforts to younger generations.

Regarding practical implications for facing conflicts around strategic orientation and innovation, using specific conflict resolution strategies seems crucial for reaching higher levels of organizational ambidexterity. The dissertation's findings of Paper 3 emphasize the importance of considering the ownership structure context when choosing conflict resolution strategies. For fully family-owned firms, increased adoption of avoidance or collaboration strategies maximizes organizational ambidexterity. However, when family ownership is less than 100 %, a more intensive application of these strategies may lead to lower organizational ambidexterity. This approach entails addressing conflicts openly through discussions rather than avoiding them entirely. In shared ownership with non-family investors, moderate application of strategies like compromise is recommended to address conflicts openly and effectively as it demands fewer resources and less time compared to extensive collaboration.

E.3 Limitations and Further Research Avenues

In accordance with rigorous scientific standards, it is imperative to recognize that the findings of this dissertation are not devoid of limitations that reveal potential avenues for future research and, hence, should be acknowledged.

First, this dissertation utilized quantitative (Papers 1 to 3) and qualitative (Paper 2) empirical data exclusively from Germany, focusing on Mittelstand firms (Papers 1 to 3) and family firms (Papers 2 and 3). These firms exhibit distinct dynamics compared to other types of organizations. Additionally, the organizational and national cultures surrounding family firms in Germany might differ significantly from those of other countries. As a result, the findings cannot be generalized to economies with advanced levels of globalization (Paper 1) or different cultural contexts and norms concerning conflict management (Paper 2 and 3). Consequently, researchers should consider this limitation and endeavor to replicate the study's setting in diverse geographical regions worldwide.

Second, a further limitation of this research is the constraint of time, which influenced the data collection process. First, the data collection coincided with the global COVID-19 pandemic (e.g., Alalwan *et al.*, 2021; Rapaccini *et al.*, 2020), potentially affecting respondents' mood states (i.e., the way they see themselves and the world around them) and consequently their responses (Podsakoff *et al.*, 2003). This may have resulted in different answers compared to "normal" times. Collecting data after the pandemic crisis could lead to other findings; hence, the responses could have differed from before or after the problem (Podsakoff *et al.*, 2003). Therefore, the results could be reconstructed by collecting data after the COVID-19 pandemic crisis.

Additionally, the dissertation's data were collected at a single point, making it challenging to assess causal relationships. For instance, digital transformations and the impact of exploratory innovations on organizational ambidexterity may not yield immediate effects, warranting a longitudinal investigation to capture prospective relationships. Hence, it cannot be determined how much the process has progressed or been completed during the data collection. Therefore, this dissertation might encourage other researchers to replicate the study in a longitudinal setting, meaning that data should be collected at least two points in time in the same firm to explore further the determined association's relationships (van der Stede, 2014).

Third, it is crucial to acknowledge that the dissertation's findings heavily rely on a single informant per firm. This reliance on subjective measurements may introduce biases and dependence on respondents' perceptions and deviate from firms' objective situation (Becker *et al.*, 2016; Podsakoff *et al.*, 2003). Nevertheless, this concern was mitigated by involving CEOs who understand their firms comprehensively. However, to gain a deeper understanding, it would be valuable for future research to corroborate and contextualize the findings of this dissertation through in-depth case studies that capture the perspectives of multiple actors.

Fourth, it is essential to acknowledge that the sample sizes in this dissertation used in the regression analyses for Papers 2 and 3 (family business) are relatively small. However, these sample sizes align with previous studies in family business research (Wilson *et al.*, 2014; Chrisman *et al.*, 2004). In addition, the analyses conducted in this dissertation maintain sufficient statistical significance concerning the minimum number of observations relative to the number of independent variables in the regression (Hair *et al.*, 2019; Khamis & Kepler, 2010). Nonetheless, future research that relies on larger sample sizes is warranted to validate the dissertation's findings and potentially unveil additional contextual factors.

Finally, it is essential to note that the focus of this dissertation primarily revolves around Mittelstand firms, which have been observed to exhibit distinct innovation dynamics compared to larger firms (De Massis *et al.*, 2013). While most family firms worldwide are not large, German Mittelstand firms are often considered highly representative of typical family firms (Berghoff, 2006; Pahnke & Welter, 2019). As a result, the conclusions drawn from this study are likely to be relevant to the challenges encountered by many family firms worldwide. Still, they may not be generalized to larger firms. For a comprehensive understanding of how relationships with the firm evolve under the influence of growing globalization and digitalization, future research may provide additional insights.

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Appendix Dissertation

Appendix A: Survey Questionnaire

1. How would you describe your gender?
   a. Female
   b. Male
   c. Diverse

2. Which description is best suited to depict your position in the firm?
   a. Chair of the Board/CEO
   b. Managing Director/CEO
   c. Member of the Board, but not CEO
   d. Managing Director, but not CEO
   e. Other:

3. What is your highest level of education?
   a. Uneducated
   b. Elementary school
   c. Secondary school
   d. A-levels
   e. University degree
   f. PhD
   g. Other:

4. Are you a member of a family or the family that owns your firm?
   a. Yes
   b. No

5. Would you consider your firm as a family business?
   a. Yes
   b. No

6. What is your year of birth?

7. For how many years have you worked for your firm?

8. For how many years have your worked in your current function at your firm?

9. Do you hold a degree in a business-related field (including interdisciplinary fields of study related to business, such as business engineering)?
   a. Yes
   b. No

10. Does the current CEO belong to a family or the family that owns the firm?
   a. Yes
   b. No

11. Please indicate the shares of equity of your firm that the following parties hold.
   a. From yourself
   b. Family members (without yourself)
   c. Non-family members (without yourself)

12. Does your firm have a supervisory board?
   a. Yes
   b. No

13. Has your firm established an advisory board?
   a. Yes
   b. No

14. Has your firm established a Board of Family Members or a Shareholders Committee?
   a. Yes
   b. No

15. Please indicate the number of seats held by the following parties in the supervisory board.
   a. Family members
   b. Non-family members

16. Please indicate the number of seats held by the following parties in the advisory board.
   a. Family members
   b. Non-family members

17. Please indicate the number of seats in the top management team hold by the following parties.
   a. Family members
   b. Non-family members

18. How many generations of the owner family are the shares in the share capital distributed among?
   a. One generation
   b. Two generations
   c. Three and more generations

19. Which generation of family ownership in the firm do you belong to?
   a. 1st (Founder)
   b. 2nd
   c. 3rd
   d. 4th
   e. 5th generation or older

20. Which generation of family ownership in the firm does the current CEO belong to?
   a. 1st (Founder)
   b. 2nd
   c. 3rd
   d. 4th
   e. 5th generation or older

21. How many additional generations of family members are - apart from you - actively involved in the firm?
   a. One older family generation
   b. One younger family generation
   c. No family generation

22. How many additional generations of family members are — apart from the current CEO — actively involved in the firm?
   a. One older family generation
   b. One younger family generation
   c. No family generation

23. How many generations of the owner family are active in the firm?
   a. No generation
   b. One generation
   c. Two generations
   d. Three or more generations

24. Please indicate how the management of your firm is organized. (From 1 = “no family member”, 2 = “one family member” to 7 = “multiple family members”)

25. Please indicate to what degree you agree or disagree with the following statements. (From 1 = “completely disagree” to 7 = “completely agree”)
   a. There is much conflict of ideas in our family firm.
   b. We often have disagreements within our family firm about the tasks we are working on.
   c. We often have conflicting opinions about the projects we are working on in our family firm.
   d. We often have disagreements within our family firm about the future strategy.
   e. We often have disagreements about who should do what in our family firm.
   f. There is much conflict in our family firm about task responsibilities.
   g. We often disagree about resource allocation in our family firm.
   h. There is much relationship conflict in our family firm.
   i. People often get angry while working in our family firm.
   j. There is much emotional conflict in our family firm.
   k. There is much personal animosity among family members in our firm.
   l. There is much conflict of ideas in our family firm concerning digitalization.
   m. We often have disagreements within our family firm about the tasks we are working on regarding digitalization.
   n. We often have conflicting opinions about the digitalization projects we are working on in our family firm.
   o. We often have disagreements within our family firm about the future digitalization strategy.

26. Please indicate the intensity of the conflicts mentioned above between the following groups. (from 1 = "very little" to 7 = "very strong")

a. The older family generation and the middle family generation?
b. The older family generation and the younger family generation?
c. The middle family generation and the younger family generation?
d. The older family generation and non-family managers?
e. The middle family generation and non-family managers?
f. The younger family generation and non-family managers?
g. You and non-family managers?
h. The family CEO and non-family managers?
i. The members of the owner family and non-family managers?
j. The members of the owner family
k. Non-family managers?

27. Please indicate to what degree you and the member of the family that owns the firm agree or disagree with the following statements. (From 1 = "completely disagree" to 7 = "completely agree")

a. We generally try to fulfil each other's wishes.
b. Whenever possible, we try not to commit to something and try to keep conflicts to ourselves.
c. We usually avoid public discussions about differences.
d. We try to steer a middle course to avoid reaching an impasse.
e. We use our influence to push through our ideas.
f. We use our authority to ensure decisions are made in our favour.
g. Usually, we come to an accommodation.
h. We share precise information to solve problems together.
i. Usually, we encourage steering a middle course to get out of a deadlock situation.
j. We follow the "to give and to take"-principle to ensure that compromises can be found.
k. We try to disclose all our concerns to ensure that problems can be solved in the best way possible.
l. We try to fulfil each other's expectations.
m. We sometimes compete to get our will.
n. We try to avoid disagreements to prevent negative feelings.
o. We try to work together to gain a mutual understanding of a problem.

28. The relationship between your firm and your suppliers is:

a. From 1 = "unstable" to 7 = "stable"
b. From 1 = "short-term" to 7 = "long-term"
c. From 1 = "insecure" to 7 = "secure"
d. From 1 = "unsteady" to 7 = "steady"

29. The relationship between your firm and your customers is:

a. From 1 = "unstable" to 7 = "stable"
b. From 1 = "short-term" to 7 = "long-term"
c. From 1 = "insecure" to 7 = "secure"
d. From 1 = "unsteady" to 7 = "steady"

30. The relationship between your firm and your employees is:

a. From 1 = "unstable" to 7 = "stable"
b. From 1 = "short-term" to 7 = "long-term"
c. From 1 = "insecure" to 7 = "secure"
d. From 1 = "unsteady" to 7 = "steady"

31. Please make a statement about the degree of interaction of your firm. (From 1 = "not at all" to 7 = to "a very high degree")

a. We involve our customers closely in the cooperation in developing projects.
b. We communicate intensively with our customers.
c. We emphasize the firm's overall strategy through close collaboration and dialogue with our customers.

32. Please make a statement about the degree of interaction of your firm. (From 1 = "not at all" to 7 = to "a very high degree")

a. We involve our suppliers closely in the cooperation in developing projects.
b. We communicate intensively with our suppliers.
c. We emphasize the firm's overall strategy through close collaboration and dialogue with our suppliers.

33. Please indicate to what degree the following statements about your firm's employees are accurate. (From 1 = “very inaccurate” to 7 = “very accurate”)
   a. Employees talk up their organization to their friends as a great organization to work for.
   b. Employees feel very little loyalty to their organization.

34. Please provide the total number of firms or organizations you hold a mandate in the supervisory board.
   a. Your firm
   b. Other organizations

35. Is your compensation - including your salary, bonus, and other benefits - usually the highest among all firm employees?
   a. Yes
   b. No

36. Please name all functional departments in which you have worked in your current firm.
   a. Administration (accounting, management accounting, facility management)
   b. HR (recruiting, training, employee development)
   c. Research and development
   d. Procurement
   e. Purchasing logistics
   f. Production and operations
   g. Outbound logistics
   h. Marketing and sales
   i. Customer service

37. Please name the number of employees (full-time equivalent) who are currently employed at your firm.
   a. 1 – 49
   b. 50 – 99
   c. 100 – 249
   d. 250 – 499
   e. more than 499

38. Which industry would you primarily assign your firm to?
   a. Manufacturing
   b. Trading
   c. Services
   d. Other industry

39. Which of the following categories best describes most of the equipment that is being used in your firm?
   a. Hand tools and manual machines
   b. Powered machines and tools (e.g., by electric motors)
   c. Single-cycle automatic machines and self-feeding machines (concept: unloading, loading, starting by the operator)
   d. Automatics that repeat cycles (concept: automatic unloading and loading, no feedback)
   e. Self-measuring and adjusting by feedback (e.g., NC machines)
   f. Computer-controlled machines (e.g., CNC machines with sensors that provide data to computers to optimize the process using algorithms)

40. Which of the following categories best describes the equipment with the highest degree of automation that is being used in your firm?
   a. Hand tools and manual machines
   b. Powered machines and tools (e.g., by electric motors)
   c. Single-cycle automatic machines and self-feeding machines (concept: unloading, loading, starting by the operator)
   d. Automatics that repeat cycles (concept: automatic unloading and loading, no feedback)
   e. Self-measuring and adjusting by feedback (e.g., NC machines)
   f. Computer-controlled machines (e.g., CNC machines with sensors that provide data to computers to optimize the process using algorithms)

41. Which of the following categories best describes how you perform the quality control of your finished products?
   a. Personal control only. No measurement instruments for automatized quality controls are used.
   b. Semi-automatized control measurement. Some aspects of the output are automatically measured.
   c. Completely automatized control measurement. Control measurements are performed automatically for the entire output to ensure a comparison with exact specifications.

42. Which of the following categories best describes how you perform the quality control of your trade products?
   a. Personal control only. No measurement instruments for automatized quality controls are used.
   b. Semi-automatized control measurement. Some aspects of the output are automatically measured.
   c. Completely automatized control measurement. Control measurements are performed automatically for the entire output to ensure a comparison with exact specifications.

43. Which of the following categories best describes how you perform the quality control of your services?
   a. Personal control only. No measurement instruments for automatized quality controls are used.
   b. Semi-automatized control measurement. Some aspects of the output are automatically measured.
   c. Completely automatized control measurement. Control measurements are performed automatically for the entire output to ensure a comparison with exact specifications.

44. Which of the following categories best describes how you perform the quality control of your finished products or trade products or services?
   a. Personal control only. No measurement instruments for automatized quality controls are used.
   b. Semi-automatized control measurement. Some aspects of the output are automatically measured.
   c. Completely automatized control measurement. Control measurements are performed automatically for the entire output to ensure a comparison with exact specifications.

45. We define automation as the transfer of firm process functions, particularly process control and regulation, from humans to artificial systems.
Please indicate the current degree (in per cent from 0 - 100) of automation in your firm.

46. Please indicate to what degree the following statements apply to your firm. Does your firm use unique IT systems/applications to support the procurement to… (1 = “yes for (almost) all our suppliers”; 2 = “yes, for some of our suppliers”; 3 = “yes, for one supplier”; 4 = “no”).
   a. Ordering goods or services online?
   b. Make online payments for ordered products or services?
   c. Receive electronic invoices?
   d. Finding suppliers in the market?
   e. Inviting suppliers to quote prices or submit proposals?
   f. Running online auctions?
   g. Collaborating with suppliers to forecast your firm's demand?
   h. Collaborating with suppliers to design new products and services?
   i. Managing capacity or inventories of suppliers?

47. Please indicate to what degree the following statements apply to your firm. Does your firm use unique IT systems/applications to support the sales department to… (1 = “yes for (almost) all our customers”; 2 = “yes, for some of our customers”; 3 = “yes, for one customer”; 4 = “no”).
   a. Receiving online orders?
   b. Enabling payments online for ordered products or services?
   c. Sending electronic invoices?
   d. Sending offers?
   e. Answering calls after proposals or tenders
   f. Launching sale auctions, for example, on B2B- or B2C-marketplaces?
   g. Collaborating with customers to forecast their demand?
   h. Collaborating with customers to design new products or services?
   i. Managing capacity or inventories of customers?

48. How strongly do the following groups act as drivers of digitalization in your firm? (From 1 = “very little” to 7 = “very high”)
   a. Older family generation
   b. Middle family generation
   c. Younger family generation
   d. Non-family managers
   e. An owner who belongs to the family (in case there is no younger or older family generation)
   f. Non-family owners

49. The following statements describe your behaviour towards your employees in the working context. Please indicate how strongly you agree with the statements. (From 1 = "completely disagree" to 7 = "completely agree")

a. I communicate the meaning and background of upcoming tasks and goals.
b. I show new ways to understanding tasks and goals.
c. I encourage my employees to question their approaches and ways of thinking
d. I listen to new ideas for solving challenges.
e. I ensure that team members work well together.
f. I ensure that employees see themselves as team members rather than individuals.
g. I appeal to the sense of community or togetherness.
h. I make employees support goals and tasks together.

50. The following statements describe your behaviour towards your employees in the working context. Please indicate how strongly you agree with the statements. (From 1 = "completely disagree" to 7 = "completely agree")

a. I demand justified best performance from employees.
b. I explain why the top performance is required.
c. I communicate in a transparent and comprehensible manner that a high level of performance is essential.
d. I communicate my confidence in the ability of the respective employee when defining performance goals.
e. I know how my employees are doing personally.
f. I know my employees' individual interests and personal goals.
g. I support my employees with their professional performance and development.
h. I show my appreciation for my employees.

51. The following statements describe your behaviour towards your employees in the working context. Please indicate how strongly you agree with the statements. (From 1 = "completely disagree" to 7 = "completely agree")

a. I inspire through a vision of the future.
b. I communicate a clear and attractive vision of the future of my team.
c. I enthusiastically communicate my vision of long-term opportunities, tasks, and goals.
d. I make my employees understand the meaning and value of their work.
e. I exemplify what is important to me.
f. I am aware of my role as a role model.
g. I am a trustworthy role model as an executive.
h. I am myself a good example of how members of my organization (or firm) should behave.

52. The following statements describe your behaviour towards your employees in the working context. Please indicate how strongly you agree with the statements. (From 1 = "completely disagree" to 7 = "completely agree")

a. I define goals and tasks together with my employees.
b. I make it clear what my employees can expect as a reward or acknowledgement when working successfully.
c. When my employees show performance below average, I give them nuanced feedback to ensure that they can improve themselves.
d. I regularly check whether my employees have reached the agreed-upon performance goals.
e. I pay close attention to mistakes and deviations from the norm.
f. I focus on possible mistakes.
g. I act on established procedures.
h. I track rules and regulations actively.

53. We define digitalization in a corporate context as the utilization of digital technologies that complement and enrich current services and products and enable new business models.
Please evaluate to what degree (percent) your business model has been digitalized before the COVID-19-crisis.

54. Please evaluate to what degree (percent) your business model is currently digitalized.

55. To what extent is your firm impacted by the current COVID-19-crisis? (From 1 = "not at all" to 7 = "very strongly")

56. Please indicate to what degree you would agree or disagree with the following statements about the impact of the COVID-19-crisis on your firm. (From 1 = “not at all” to 7 = “very strongly”)

a. Was there a decline in orders?
b. Was there a decline in your turnover?
c. Have customers increasingly failed to pay?
d. Has the availability of capital decreased?
e. Have the suppliers been increasingly unable to deliver goods or services?

57. Please indicate to what degree the following statements about your firm are accurate. (From 1 = “completely disagree” to 7 = “completely agree”)

a. Many of our most important competitors' headquarters are abroad.
b. Most of our main competitors have distribution channels in Asia and Europe.
c. Cross-border flow of goods and capital normally happens typically in our industry without problems.
d. Within the last ten years, trade with foreign countries has increased enormously.
e. Within the last ten years, competition with overseas firms has increased enormously.
f. Within the last ten years, we came to the conclusion in our firm that international sales are an important source of additional revenue.

58. Please indicate to what extent you agree or disagree with the following statements about your firm's direction. (From 1 = “completely disagree” to 7 = “completely agree”)

a. Our firm is an organization that is looking for new technological ideas by thinking “out of the box”.
b. Our firm is an organization whose success is based on the ability to explore new technologies.
c. Our firm is an organization that develops products and services being innovative for the firm.
d. Our firm is an organization that is looking for creative ways to satisfy the customers' needs.
e. Our firm is an organization that aggressively ventures into new market segments.
f. Our firm is an organization that is actively targeting new customer groups.
g. Our firm is an organization that is committed to improving quality and reducing costs.
h. Our firm is an organization that continuously improves the reliability of products and services.
i. Our firm is an organization that steadily increases its degree of automation of the work processes.
j. Our firm is an organization that continuously examines the satisfaction of its existing clients.
k. Our firm is an organization which continuously improves its existing range to satisfy present customers.
l. Our firm is an organization that penetrates the existing client base more and more.

59. Please read the following descriptions of the two firms. Neither of the two firm types is "good "or "bad "per se.

Firm A

- Firm A occupies a niche in its market by offering a relatively stable range of products/services.
- In general, firm A has no leading position in market development related to new products/services.
- Firm A tends to ignore changes that do not directly affect the present field of activity and focuses on delivering the best performance in its field instead.

Firm B

- Firm B makes changes (especially supplements) to its products/services quite frequently.
- Firm B is consistently seeking to pioneer in new fields of the market activity even though not all efforts are successful in the end.
- Firm B responds quickly to early signals of market demands and market opportunities.

Looking at industry competitors as a reference and your firm, what type describes your firm best now?

a. Firm A
b. Firm B

60. How would you rate your firm's performance in the last three years compared to your competitors regarding the following performance indicators? (From 1 = “lower than competitors'” to 7 = “higher than competitors'”)

a. Sales growth
b. Growth in market shares
c. Growth in the number of employees
d. Increase in profitability
e. Return on equity
f. Return on assets
g. Profit margin on sales
h. Ability to fund growth from profits

61. What is the current weighting of the following priorities at your firm? (From 1 = “very low” to 7 = “very high”)
   a. Efficiency enhancement
   b. Being innovative
   c. Adaptation to changing business requirements
   d. Coordination of the work between the firm's subunits
   e. Alignment of employees' activities with the corporate objectives

62. We consider the management accounting system as the combination of steering systems and processes used at your firm (e.g., planning, accounting, evaluation/incentive systems, structure, management processes, HR processes, corporate culture, and guidelines).
What is the contribution of your management accounting system for reaching the following priorities now? (From 1 = “very low” to 7 = “very high”)
   a. Efficiency enhancement
   b. Being innovative
   c. Adaptation to changing business requirements
   d. Coordination of the work between the firm's subunits
   e. Alignment of employees' activities with the corporate objectives

63. Please indicate to what extent does the management accounting department or the management accounting responsible person perform the following tasks... (From 1 = “not at all” to 7 = “entirely”)
   a. Support of the target setting (e.g., by quantifying corporate objectives).
   b. Provision of strategic, relevant information/analyses (e.g., internal factors or continuous monitoring of competition, market, and customers).
   c. Administration/coordination of the strategy process.
   d. Assessment of the management’s proposals (e.g., related to feasibility, targets, and assumptions).

64. Please indicate to what extent the following statements apply to your firm. The management accounting department or the management accounting responsible person… (From 1 = “not at all” to 7 = “entirely”)
   a. Advises the management proactively by providing recommendations concerning the strategic development of the firm.
   b. Is influential in strategic matters.
   c. Participates in decisions in the choice of the strategy.

65. Please evaluate the relevance of the following criteria for IT systems and applications in management accounting (independently from the current situation within your firm). (From 1 = “very low” to 7 = “very high”)
   a. Quick access and computing time
   b. Usability
   c. Automation and standardization
   d. Flexibility/Customization
   e. Complete integration of the IT systems
   f. Data quality

66. Please evaluate the current status quo of your firm's IT systems and applications in management accounting regarding the following criteria. (From 1 = “very low” to 7 = “very high”)
   a. Quick access and computing time
   b. Usability
   c. Automation and standardization
   d. Flexibility/Customization
   e. Complete integration of the IT systems
   f. Data quality

67. Please indicate to what extent you agree or disagree with the following statements. (From 1 = “completely disagree” to 7 = “completely agree”)
   a. I often make innovative proposals to improve our business.
   b. I often generate new ideas by observing the environment.
   c. I often generate new ideas by observing how people interact with our products and services.
   d. I often generate new ideas by observing our customers.
   e. I boldly move forward with a promising approach when others are more careful.
   f. I devote my time to others helping them to find ways to improve our products and services.

68. To what extent do the following statements apply to your current position in your firm? (From 1 = “never” to 7 = “always”)

a. I have to work fast.
b. I have too much work to do.
c. I have to work extra to finish a task.
d. I work under time pressure.
e. I can do my job comfortably.
f. I have to deal with backlog at work.
g. I have problems with the pace of work.
h. I have problems with the workload.

Appendix B: Interview Guide for the Qualitative Interviews

Distribution	Topic	Guiding questions
Introductory questions	Career path	When you think about your career path, what specific experiences have you had regarding issues related to digital business models?
	Implementation of digitalization	To clarify: "In the corporate context, we understand digitalization to be the use of digital technologies that complement and improve existing services and products and enable new business models." How would you describe digitalization/digital transformation specifically for your company over the last 5-10 years?
		How was the digitalization of the business model conceived and implemented? It is best to start with the initial considerations and processes up to the present day.
	Motivation for digitalization	What has prompted you to focus specifically on digitalization or the digitalization of the business model in your company over the last 5-10 years?
Main questions	Drivers of digital alignment	Which individuals or groups were primarily responsible for driving the digital alignment of the business model?
	Role perception of the interviewee	How would you describe and classify your role within the company, particularly in the context of the digital alignment of the business model?
	Classification of the digital business model	How would you describe the progress of digitalization in your company?
		How can this progress be assessed in the market compared to competitors?
	Collaboration between CEO, management & owners	How is the collaboration between the CEO, management, and company owners structured?
	Challenges in the context of digitalization	Specifically for your company, what are the most significant challenges in planning and implementing the digital business model?
		Have there been increased potential disagreements in this regard?
	Measures	To what extent has your company taken measures to address and manage potential challenges, obstacles, and disagreements, specifically in the company's digitalization process?
Concluding questions	Future digitalization process	What are your company's plans for future digitalization efforts?
		To what extent do you expect (further) obstacles in planning and implementation?
		How do you plan to approach such (additional) obstacles or disagreements differently from the past?