

# DISCUSSION

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# DISCUSSION PAPER

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## Taking It Personally? The Role of Personality in Strategic Crisis Management

# Taking it Personally? The Role of Personality in Strategic Crisis Management

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## Abstract

Economic crises can have substantial impacts on companies and their stakeholders. The ability of organizations to manage and cope with crises is therefore central to the direction and severity of their impact. We explore an underidentified determinant of strategic crisis management by focusing on the role of decision-makers' non-cognitive and cognitive traits. In a representative sample of 1,408 young companies founded between 2012 and 2019 in Germany, we find that founders' personality impacts the choice of crisis management strategy in the COVID-19 context. Risk-tolerant founders respond with operative innovation rather than retrenchment. Conscientiousness is linked to choosing a perseverance strategy and openness to experience to strategic innovation. More agreeable founders, however, are generally less responsive. Finally, migration experience and education are positively associated with innovative crisis responses. Our results have implications for policymakers and practitioners when designing measures to cope with economic distress.

*Keywords:* Strategic Crisis Management, Crisis Responses, COVID-19, Founder Personality, Cognitive Traits

*JEL:* D21, L21, L26, M2, O30

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## 1. Introduction

In the last two decades, governments, organizations, and households had to overcome many crises. The 2000-2002 burst of the dot-com bubble was followed by the 2008-2009 financial crisis, the 2011 Fukushima nuclear accident, the 2015 migration crisis, COVID-19, and finally the wars in Ukraine and Israel bear many challenges. It is therefore crucial to understand how organizations and especially small and medium-sized companies (SME) which represent the backbone of many economies (Mayr et al., 2021), respond to such crises (Agarwal and Audretsch, 2020; Dushnitsky et al., 2020).

Even though the literature has conceptually identified different crisis management strategies and started empirically validating their effectiveness, we still know little about their antecedent conditions and determinants (Foss and Saebi, 2017; Wenzel et al., 2020; Klyver and Nielsen, 2021). We follow Wenzel et al. (2020) and Bartik et al. (2020)'s call to examine internal and external enablers that lead to managerial decisions under stress. Specifically, we shed light on inherent characteristics and traits of managing founders and how they shape innovative responses to distress.

Our study adds to previous research on the consequences of economic crises in three main ways. First, we identify the role of managers' observable and non-observable characteristics in strategic crisis management. While the generally important role of managers in firm decisions has long been empirically established (Hambrick and Mason, 1984), we know little about their role in crisis situations. Second, we examine young and small companies that are crucial for innovation and growth but are also vulnerable to limitations in managerial capital and adverse external conditions, such as economic volatil-

ity (Bruhn et al., 2018; Dushnitsky et al., 2020). Young and small firms often have flatter hierarchies, which allows them to adapt quickly and flexibly to changing environments (Hmieleski et al., 2013; Hsieh et al., 2019). Third, we focus on founders with active management roles and who founded their company in non-crisis times. In particular, we investigate panel survey data in which we observe manager and firm characteristics *before* and their strategic responses during the COVID-19 crisis. Therefore, the managing founders' characteristics should not be affected by the crisis situation. The focus on entrepreneurs is particularly interesting when investigating innovative crisis management strategies. Innovation-related research has consistently shown that entrepreneurs are the main locus and driver of innovation and they play a decisive role in the strategic orientation of their companies (Marcati et al., 2008).

To investigate the link between founders' inherent characteristics and crisis management strategies, we explore whether founders' cognitive and non-cognitive traits predict their strategic responses to a specific crisis, the COVID-19 pandemic. We follow the typology of crisis management strategies developed by Wenzel et al. (2020) and categorize founders' responses to COVID-19 into *retrenchment*, *perseverance*, *innovation*, and *exit* strategies. In addition, we differentiate between operational and strategic innovation which reflects short-term and longer-term innovation objectives. We measure non-cognitive traits with the established big five OCEAN personality dimensions (openness to experience, conscientiousness, extraversion, agreeableness, and emotional stability). In addition, we account for risk tolerance which is crucial in entrepreneurial and innovation settings (Zhao et al., 2010;

Covin et al., 2020; Zwick et al., 2017; Cervellati et al., 2022). Further, we proxy cognitive traits with founders' academic background, experience within the industry, entrepreneurial experience, and experience with migration.

Our analyses are based on a sample of 1,408 legally independent companies that were founded between 2012 and 2019 in Germany. These companies were repeatedly surveyed before and during the COVID-19 pandemic as part of the IAB/ZEW Start-up panel.

We find that founders' traits indeed predict crisis management strategies even after accounting for various other company characteristics and crisis impact. Our findings add to earlier insights on managers' improvisational behavior and dispositions as determinants of handling distress (Hmieleski et al., 2013) by showing that founders who are more agreeable or risk-tolerant are less likely to implement a *retrenchment* strategy. Moreover, we show that agreeableness negatively predicts *perseverance*, whereas conscientiousness is positively related. More risk-tolerant founders and those with an academic background rather implement *innovative* measures in their *operations* to cope with the crisis situation. Finally, migrant founders, founders who are less agreeable, and founders who are more open to experiences are more likely to implement *strategic innovations*. Founder traits, however, do not predict the likelihood of firm *exit*.

These results illustrate companies' heterogeneous reactions and the resulting economic implications of crisis situations. By exploring the entrepreneurial behavior channel, our findings help to understand whether and how companies cope with distress and extend their relevance beyond the COVID-19 context. Our findings can help practitioners recruit appropriate human re-

sources and anticipate how managers' cognitive and non-cognitive traits will influence their strategic and innovative decision-making in critical situations. Finally, our results can help policymakers design more effective policy instruments to support young and small businesses and facilitate the development of specific measures that take founder heterogeneity and their propensity for innovation into account.

With these insights, the results contribute to three main streams of literature. First, we contribute to the literature on economic crises. Our focus on founders as key decision-makers, allows us to directly link personal traits to management decisions. The founders we consider have been involved in the company prior as well as during the COVID-19 crisis. COVID-19 provides an interesting setting because of its unexpectedness and unrelatedness to founders' personalities and skills. Crisis situations apply pressure on the decision-maker, whose judgments and actions can have far-reaching economic effects. Second, we add to the strategic management literature by supporting and advancing the categorization of crisis response strategies proposed by Wenzel et al. (2020). To the best of our knowledge, we are first to examine the role of founders' personalities in strategic responses to economic crises. Our study helps understand young companies' resilience and innovative capabilities in the face of adversity and provides implications for designing start-up and crisis policy instruments. Third, we contribute to the innovation literature on the link between economic crises, personality traits, and companies' innovativeness (Archibugi et al., 2013; Hud and Hussinger, 2015; Runst and Thomä, 2022; Trunschke et al., 2024). We show that the uptake of innovation as a crisis management strategy strongly depends on decision-maker

characteristics.

## 2. Theory and Hypotheses

### 2.1. *Strategies for Crisis Management*

Crises can be caused externally or internally. They are often unanticipated, induce impactful changes, threaten the organizations' viability, and involve multiple stakeholders. The surprising element follows from a low probability of occurrence and requires a quick response, leaving limited time for decision-making (Pearson and Clair, 1998; Kraus et al., 2020). Despite the time pressure and high uncertainty, managers make strategic decisions that determine their company's reaction to the new environment and following performance.

In defining strategic responses to crises, we follow Wenzel et al. (2020) and consider four main crisis management strategies. The first can be called *Retrenchment* and consists of companies narrowing the scope of their business activities by reducing costs, assets, or products. Retrenchment thereby reduces the risk of running into resource limits. Scholars do not universally agree on its effectiveness to turn the business around. In the long term, *retrenchment* may rather lead to fewer synergy effects, fewer valuable resources, and potential underperformance (Ndofor et al., 2013; de Figueiredo Jr et al., 2019).

A second strategy focuses on maintaining the status quo through *perseverance*. The goal of this strategy is to sustain business activities while mitigating the negative impacts of the crisis. Especially in uncertain situations, this strategy has shown to be effective as long as slack resources are

available (Stieglitz et al., 2016).

Third, through *innovation*, companies can realize short- and long-term changes. Through *operative innovation*, they can adjust processes and operations. Through *strategic innovation*, they can renew and widen their scope of business activities in response to a crisis. This strategy can be effective and necessary for sustaining the business during crises that last for a prolonged time. Conditional on sufficient financial resources, young companies with decisive managers can have favorable conditions for implementing such a crisis response strategy (Dowell et al., 2011).

Finally, companies can choose to discontinue their business activities and *exit* the market. This strategy might be a response to failed alternative strategies or an active decision based on the belief of nonexistent opportunities without freeing up all resources (Carnahan, 2017; Ren et al., 2019; Wenzel et al., 2020). The probability of an *exit* has been shown to depend on the scope of the crisis' impact and potential government support mechanisms (Oh and Oetzel, 2011).

## *2.2. Determinants of Strategic Crisis Management*

The empirical evidence on the determinants of these strategies is mixed. The strategies' initiation and effectiveness depend on their timing, the nature of the crisis, and organizational and environmental influences. At different points in time, different strategies might be more effective (Wenzel et al., 2020; Klyver and Nielsen, 2021). This highlights the importance of considering a crisis as a dynamic, rather than a static change to the company's environment. Internal and external causes of the crisis, the organization's resources and competencies, and the environment's local competition and



regulatory changes have all been shown to influence crisis response strategies (Smith and Grimm, 1987; Audia et al., 2000; Kraatz and Zajac, 2001; Herrmann and Nadkarni, 2014).

This study adds new insights by exploring determinants of strategic crisis management and by shedding light on the decision-maker. The empirical literature confirms the upper echelon theory, where decisions of top management teams and chief executive officers often reflect their experiences, preferences, and dispositions with far-reaching impacts on the organizations they lead (Hambrick and Mason, 1984; Zajac and Westphal, 1996; Iaquinto and Fredrickson, 1997; Finkelstein and Boyd, 1998; Bertrand and Schoar, 2003; Jensen and Zajac, 2004; Chatterjee and Hambrick, 2007; Wang et al., 2016; Bruhn et al., 2018; Chandler et al., 2023). However, previous studies have mostly focused on managers' observable characteristics. Their tenure and age has been found to be negatively related to strategic dynamism, whereas the extent and diversity of managers' education and experience are often found to be positively related to strategic change (Finkelstein and Hambrick, 1990; Miller, 1991; Wiersema and Bantel, 1992; Xu and Li, 2023).

Only a handful of studies go beyond observable and cognitive skills and look at non-cognitive traits. Empirical evidence suggests that emotional components of individual attributes, such as confidence, proactiveness, stress tolerance, narcissism, machiavellianism, locus of control, and need for autonomy, have significant correlations with business creation, strategic action, and success (Miller and Toulouse, 1986; Boeker, 1997; Datta et al., 2003; Hiller and Hambrick, 2005; Peterson et al., 2003; Chatterjee and Hambrick, 2007; Sharma and Tarp, 2018; Cervellati et al., 2022; Recendes et al., 2022).

CEO's cultural background is associated with innovation (Gao et al., 2023) and CEO affiliative humor is positively associated with organizational ambidexterity (Campbell et al., 2025). Further, Almlund et al. (2011) show that conscientiousness is a strong predictor for job performance and half as important as IQ. Herrmann and Nadkarni (2014) find that effective strategic change implementation is positively moderated by conscientiousness and emotional stability, but negatively by agreeableness. Managers' risk tolerance has been shown to increase revenue and general worker training but to decrease safety training (Sharma and Tarp, 2018; Caliendo et al., 2024).

In young firms, Marcati et al. (2008) find correlations between the big five personality traits (OCEAN) and entrepreneurs' innovativeness. Judge et al. (2002) find correlations between these personality traits and effective leadership. They call for future research to additionally identify why specific traits are relevant for leadership and to explore situational moderators to traits' prediction of leadership. Additional traits, such as

Our study adds to this stream of literature in two ways. We are first to analyze non-cognitive and cognitive determinants of strategic responses to crises. Crisis situations are increasingly frequent and can determine companies' survival and economic prosperity. Crises typically require fast strategic decision-making and collaboration with external partners, which can vary largely by personality types (Heath, 1995; Reher et al., 2024). Second, we overcome the potential bias stemming from the selection of managers over the life-cycle of established firms. By focusing on active founders of young companies, we consider managers who were not selected as a consequence of outside considerations or the companies' performance.

### 2.3. *Development of Hypotheses*

In the following, we distinguish five crisis management strategies: *retrenchment*, *perseverance*, *operative innovation*, *strategic innovation*, and *exit* and differentiate between cognitive skills and non-cognitive traits in predicting their implementation. For the set of cognitive skills, we consider education level, industry, entrepreneurial, and migration experience. Prior literature points to a positive influence of education and university entrepreneurship programs on the quality of entrepreneurship (Shane, 2004; Eesley and Lee, 2021; Xu and Li, 2023). Delmar and Shane (2006) find that previous start-up experience increases new firm survival and extensive start-up experience, with four or more prior start-ups, increases new firm performance. Finally, we argue that migration experience, in particular a foreign nationality, reflects resilience, adaptability, and experience with changing environments and could be an important observable cognitive skill in the context of crisis management. Indeed, recent empirical evidence for the United States shows that a large share of inventors are foreign (Akcigit and Goldschlag, 2023) and that foreign entrepreneurs' businesses have higher growth and performance (Kulchina, 2017; Azoulay et al., 2022). Additionally, literature shows that international experience fosters innovation (Wang et al., 2016; Xu and Li, 2023).

Further, we hypothesize that personality influences strategic crisis management. We add risk tolerance to the big five traits as it an important indicator in both the entrepreneurial and crisis context. This leaves us with six non-cognitive personality traits (ROCEAN). Table 1 presents descriptions of preferences and behaviors typically associated with these traits.

Table 1: Description of the Big Five and Risk Tolerance

<b>Entrepreneurial Orientation</b>	
Risk Tolerance	Individual’s willingness to engage in risky behaviours, act outside of accepted practices and make risky investment commitments.
<b>Big Five</b>	
Openness to Experience	Extent to which individuals are imaginative, creative, curious, and open to novel and unconventional ideas, perspectives, and experiences.
Conscientiousness	Extent to which an individual is cautious, diligent, persistent, motivated, intolerant of ambiguity, shows reduced adaptability, and follows established rules.
Extraversion	Extent to which an individual is direct, assertive, sociable, influential, ambitious, active, and enthusiastic.
Agreeableness	Extent to which an individual is altruistic, empathetic, cooperative, trusting, caring, emotionally supportive, and avoids conflicts.
Emotional Stability	Extent to which an individual is emotionally stable, self-confident, calm, and adjusts well. It is the reverse concept of neuroticism.

This table describes the big five personality and entrepreneurial orientation traits and their influence on managerial and entrepreneurial behavior. We gather the theoretical foundation and empirical validation from previous literature (Miller, 1983; Miller and Toulouse, 1986; McCrae and Costa, 1987; Costa Jr et al., 1991; McCrae and John, 1992; Tetlock et al., 1993; Hogan et al., 1994; Judge and Bono, 2000; LePine et al., 2000; LePine and van Dyne, 2001; Judge et al., 2002; Peterson et al., 2003; Bono and Judge, 2004; Zhao and Seibert, 2006; Nadkarni and Herrmann, 2010; Shane et al., 2010; Pearce et al., 2010; Simsek et al., 2010; Herrmann and Nadkarni, 2014; Covin et al., 2020; Bainbridge et al., 2022).

ROCEAN traits have been shown to predict various actions and attitudes. We argue in the following that they likely also affect the decision-making of corporate leaders in crisis situations. Risk-tolerant individuals are willing to commit resources to an investment with an uncertain future, including development of innovations. They often act outside of accepted practices and norms (Pearce et al., 2010). Employees who are more risk tolerant often work on tasks with uncertain outcomes via unrequested and unauthorized job-related behavior (Covin et al., 2020).

Individuals who are open to experience demonstrate imagination, unconventional thought processes, divergent thinking, unpredictable and non-conforming behavior (McCrae and Costa, 1987). They actively seek new and unusual information and experiences and are able to identify creative

solutions to problems (Tetlock et al., 1993). Managers with higher openness show greater strategic flexibility and are better at recognizing and seizing opportunities (Nadkarni and Herrmann, 2010; Shane et al., 2010; Herrmann and Nadkarni, 2014).

Conscientious people share specific characteristics. They are cautious, deliberate, determined, persistent, intolerant of ambiguity, and show reduced adaptability (Costa Jr et al., 1991; LePine et al., 2000; Bono and Judge, 2004). Their strong self-discipline, persistence, and motivation help them to persevere despite difficulties, resistance, and conflicts, and work hard to accomplish goals (Goldberg, 1990; Judge et al., 2002). Leaders who reveal conscientious traits, often follow established rules and show lower strategic flexibility and willingness to change (Nadkarni and Herrmann, 2010).

Extraversion relates to enthusiastic, sociable, influential, ambitious, and assertive individuals (Judge et al., 2002; Bono and Judge, 2004). Extravert people have been shown to have favorable labor market outcomes (Fletcher, 2013). Extravert CEOs show direct, dominant, and forceful communication of their opinions. They prefer excitement and change over the status quo, but often lack acceptance of employees' influence and identification of bottlenecks (Herrmann and Nadkarni, 2014).

Agreeableness relates to altruism, empathy, kindness, cooperation, trust, and modesty (Bono and Judge, 2004). Agreeable leaders foster open and trust-based social affiliations with employees, care about employees' well-being, and tend to avoid conflicts (Judge and Bono, 2000). Agreeableness can result in passivity in situations of ambiguity and conflict (LePine and van Dyne, 2001) and inhibit strategic change (Zhao and Seibert, 2006). Agreeable

managers may have a dislike for cutting off or reducing employees' working hours.

Emotionally stable individuals show lower levels of neuroticism and are able to remain calm, self-confident, and adjust in stressful and varying situations (Hogan et al., 1994). CEO core self-evaluation and internal locus of control, traits that are associated with emotional stability, are positively related to strategic initiatives and changes, including new products and production methods (Miller and Toulouse, 1986; Simsek et al., 2010).

Based on these general patterns, we hypothesize that both cognitive and non-cognitive characteristics affect strategic reactions to crisis situations. We derive hypotheses for each active crisis management strategy and its cognitive and non-cognitive founder trait drivers.

***Hypothesis 1 (Retrenchment):***

*We expect founders who are more emotionally stable, agreeable, and risk-tolerant to be less likely to choose retrenchment as a crisis mitigation strategy.*

***Hypothesis 2 (Perseverance):***

*We expect a positive relationship between higher degrees of conscientiousness and industry and entrepreneurial experience and perseverance while we expect a negative relationship between extraversion and perseverance.*

***Hypothesis 3 (Operative Innovation):***

*We expect a positive relationship between higher degrees of emotional stability, risk tolerance, education, and migration experience*

and operative innovation while we expect a **negative relationship** between higher degrees of **agreeableness** and operative innovation.

**Hypothesis 4 (Strategic Innovation):**

We expect a **positive relationship** between **openness to experiences, risk tolerance, education, and migration background** and strategic innovation. We expect a **negative relationship** between higher **agreeableness** and strategic innovation.

With regard to *exit* as a response to crisis, we argue that while cognitive and non-cognitive traits predict the choice of strategic actions, they do not determine firm *exit* in the short-run when accounting for all strategic responses. *Exit* is clearly different as it does not represent a strategy choice, is rather driven by external forces, and hence depends less on the judgment and preferences of the decision maker.

### **3. Methods**

#### *3.1. Context*

The COVID-19 pandemic was a global, sudden, and impactful crisis. During the spring of 2020, when COVID-19 threatened global health, many governments took measures to slow down the virus' spread through lockdowns, which in turn affected the daily life of society. To reduce the number of infections, the German government implemented a two-month lockdown in the beginning of 2020 and a second, lighter, lockdown at the end of 2020. In general, 2020 and 2021 were characterized by social distancing guidelines, travel restrictions, and other public health measures. As a consequence, economists

forecasted recessions and stock markets crashed (Baker et al., 2020; Mckibbin and Fernando, 2021).

COVID-19 caused significant negative impacts on the corporate sector (Bartik et al., 2020; Bennedsen et al., 2020; Bloom et al., 2021; Buchheim et al., 2022; Eckey and Memmel, 2023). While complying with governments' lockdown measures, firms faced challenges ranging from binding financial constraints over reduced production and demand to value-chain disruptions (Klyver and Nielsen, 2021; Amore et al., 2022). Recent works point to a cross-sectional heterogeneity of the impacts depending on firm and industry characteristics (Carletti et al., 2020). Firms with higher financial flexibility from higher cash reserves and less debt experienced smaller crisis impacts (Ramelli and Wagner, 2020; Ding et al., 2021; Fahlenbrach et al., 2021; Dörr et al., 2022).

With some exceptions (e.g. Giones et al., 2020; Amore et al., 2022; Dörr et al., 2022; Eckey and Memmel, 2023), the impact of COVID-19 on young and small companies is less well-studied. Therefore, it is particularly interesting to study how these companies were affected and how managers responded to the crisis.

### *3.2. Data and Sample*

Our sample covers 1,408 unique independent companies that were founded between 2012 and 2019 in Germany and had been interviewed as part of the IAB/ZEW Start-up Panel. In this panel survey, companies are interviewed via computer-aided telephone interviews on an annually basis up to eight times. The sample is drawn as a stratified random sample from the the Mannheim Enterprise Panel which represents the universe of companies in



Germany.<sup>1</sup>

The advantage of drawing the survey sample from a known population is that we can track *exit* events directly which allows us to distinguish survey non-response from actual firm *exit* due to liquidation or insolvency.

The survey addresses founders who indicate to have been actively involved in the founding of the company and its management. The survey collects information about the founder(s) such as their professional experience, education, age, gender, and their company (e.g., founding year, founding motive, size of founding team, number of employees, and profits).<sup>2</sup>

The 2018 and 2019 waves of the survey included 15 specific items to measure the big five personality traits and two items for assessing risk tolerance. Risk tolerance has been shown to complement basic personality traits in explaining entrepreneurial behavior (Kerr et al., 2019). We validate the big five's multi-dimensional conceptualization (McAdams, 1992; Marcati et al., 2008; Covin and Wales, 2012) through a factor analysis which shows support for the validity of the scale (Chapman and Hottenrott, 2024). The corresponding survey questions are shown in Appendix Table A.4.

In 2020, founders were interviewed twice - in May and in October - about measures and actions taken to cope with the COVID-19 crisis. The crisis responses were collected based on 14 items measuring short- and long-term strategies in response to the crisis. These items are shown in Appendix Figure A.2.

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<sup>1</sup>The Mannheim Enterprise Panel consolidates information from the German business registry and Creditreform, Germany's largest credit rating agency.

<sup>2</sup>See Fryges et al. (2010) for a detailed description of the survey design.

Our final sample includes all companies that responded to both sets of questions (personality and COVID-19 responses). In line with earlier research on personality traits (Roberts and DelVecchio, 2000), we argue that these traits are pre-determined in adults and stable over time and treat them as independent of the crisis or company outcomes (Roccas et al., 2002). Importantly, the traits were collected separately and prior to the responses on crisis outcomes addressing a possible common method bias and the concern that extreme crisis situations may affect the personality responses in the survey (Podsakoff et al., 2003).

Finally, we complement the survey-based COVID-19 response items with information on firm *exits* from the Mannheim Enterprise Panel. We define an *exit* for companies that became insolvent in 2020 or 2021. In robustness tests, we check the sensitivity of the results to the inclusion of ‘voluntary *exits*’, i.e. liquidations without insolvency.

Based on the survey response items and information on firm *exits*, we aim to derive crisis management strategies following the typology by Wenzel et al. (2020). We conduct a confirmatory principal component factor analysis of the 14 binary COVID-19 response items and observe that these items map into five factors as shown in more detail in Appendix Table A.2. Corresponding to the typology in Wenzel et al. (2020) and our hypothesis development, we keep the four factors *retrenchment*, *perseverance*, *operative innovation*, and *strategic innovation* and use the predicted factor scores in our main analysis. The factor scores have a zero mean and a standard deviation of one. The scores provide a standardized measure of strategy implementation. We depict their density distribution in Appendix Figure A.1. We observe a plausible

range and distribution with sufficient mass below and above zero.

### 3.3. Research Design

We predict the choice of different crisis management strategies based on founder and firm characteristics with a specific focus on cognitive and non-cognitive traits of the key decision-maker. Since a multiple-strategy choice is common and choosing one strategy impacts the probability of implementing another strategy, we adopt an approach that allows for simultaneous choices. We estimate recursive mixed-process models that allow to model interrelated choices in a simultaneous equation model (Roodman, 2011). Specifically, we estimate the following five-equation multivariate OLS model that accounts for the fact that strategies can be interrelated.

$$\begin{aligned} CMM_m &= \mathbf{x}_m\beta_m + \varepsilon_m, \quad m = 1, \dots, 5. \\ \epsilon &= (\varepsilon_1, \dots, \varepsilon_5)' \sim N(0, \Sigma) \end{aligned} \tag{1}$$

*CMS* represents the set of crisis management strategies that firms adopt during the COVID-19 crisis and  $\varepsilon$  represents each equation’s error term. In all outcomes except *exit* which is binary, we employ the predicted factor scores as dependent variables. The variance-covariance matrix  $\Sigma$  has values of 1 on the diagonal due to normalization and correlations  $\rho_{jk} = \rho_{kj}$  as off-diagonal elements.

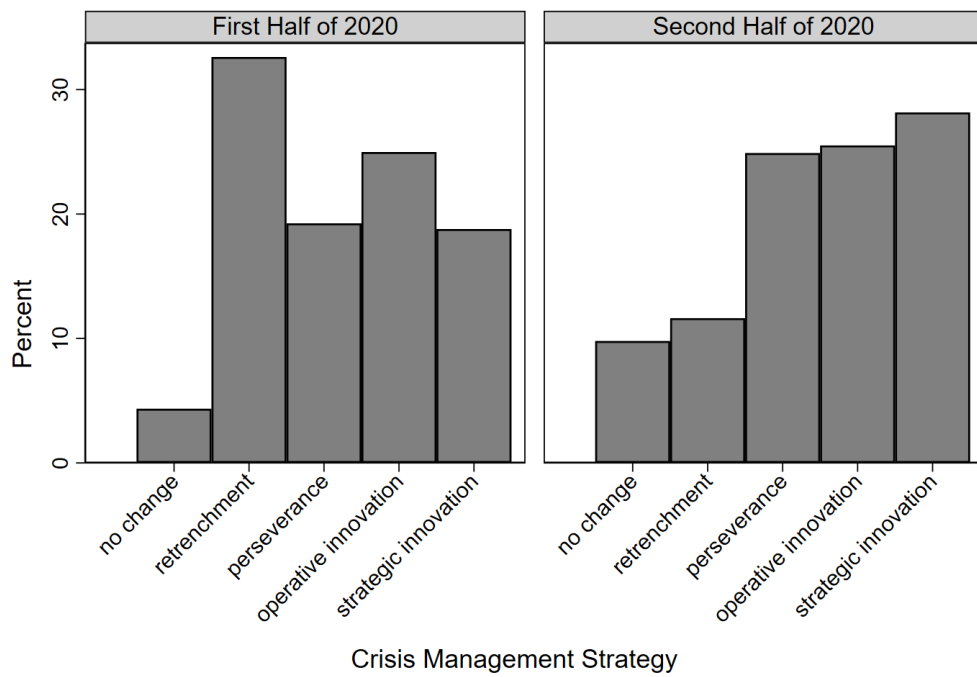
We differentiate between the founders’ reported COVID-19 responses in May and October 2020. Figure 1 depicts the frequency distribution of strate-

gies over companies.<sup>3</sup> While *retrenchment* is the most frequent crisis management strategy in the short term, our data shows that in the medium- to long-term, founders rather choose *perseverance* and *strategic innovation* measures. Response measures related to *operative innovation* are quite prominent both in the short and long term. Finally, we add the binary *exit* information to the strategies. *Exit* information is not asked during the survey but is directly observed from information on insolvency declarations as recorded in the Mannheim Enterprise Panel. We observe *exit* due to insolvency in 2020 and 2021 only for 2% of the companies. This is expected given that in 2020, the German government implemented several relief measures to preserve economic stability during the pandemic. One central measure exempted companies from the obligation to file for insolvency.

COVID-19 affected companies in different sectors to different extents. Moreover, the impact on business activities may also depend on the nature of the young business and we expect strategy choices to differ. We, therefore, visualize the distribution of strategies across two additional dimensions. In Figure 2, we depict the strategies' factor scores for different industries (a) and founding motives (b). *Retrenchment* and *perseverance* are evenly distributed across the four main sectors (high-tech manufacturing, low-tech manufacturing, knowledge-intensive services, and other services). The factor score for *operative innovation* is most unevenly distributed among the industries. As can be expected, other services and especially the low-tech industry are less

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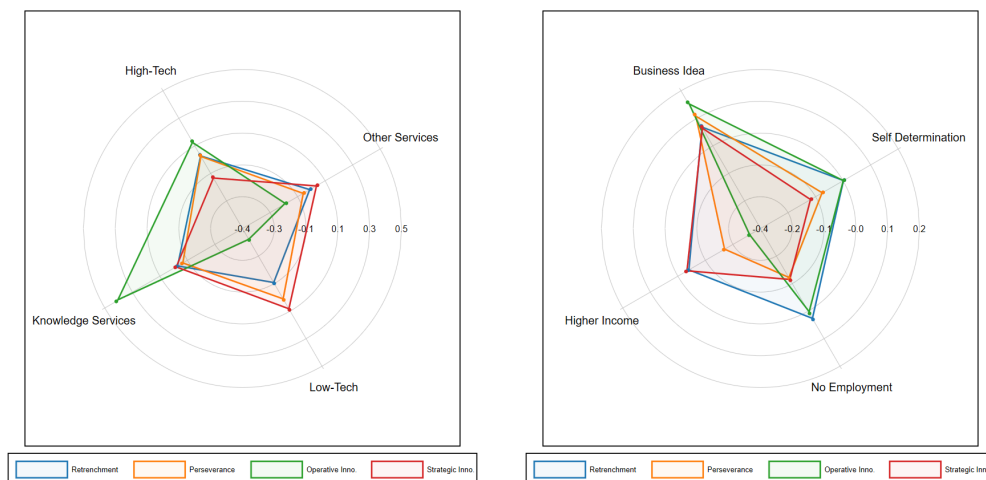
<sup>3</sup>For this illustration, we attribute one strategy to each firm by selecting the strategy with the biggest factor score. See Appendix Table A.3 for average single response item frequencies.



Graphs by Timing of Response

Figure 1: Frequency Distribution of Crisis Management Strategies

able or willing to adapt their distribution channels, digitalize their workflows, work from home, or innovate processes and products. Therefore, their *operative innovation* score is substantially lower. Knowledge services have the highest *operative innovation* factor score. *Strategic innovation* is also rather evenly distributed, with low-tech having the highest, and high-tech the lowest *strategic innovation* score.



(a) Industry Distribution

(b) Founding Motive Distribution

Figure 2: Crisis Management Strategy Factor Score Distributions

The distribution of the crisis management strategies' factor scores varies more across our four groups of founding motives.<sup>4</sup> *Retrenchment* is most evenly distributed, where opportunity-driven founders who started the company to pursue a specific business idea have slightly higher *retrenchment*

<sup>4</sup>Founders may pursue a valuable *Business Idea*, may seek more *Self Determination* in their professional life or start a business in expectation of a *Higher Income*. Some may also become entrepreneurs because they do not have any other employment possibility (*No Employment*).

scores. Again, *perseverance* and *operative innovation* are most likely for founders with a business idea and least likely for those who founded a company hoping to earn higher incomes. *Strategic innovation* has the highest scores for opportunity-driven founders and the lowest for those who became founders out of necessity or for reasons of self-determination. These differences highlight the need to control for firm characteristics besides founder traits in the following analyses.

In our analysis, we therefore include different sets of independent variables which can be divided into three groups. First, entrepreneurs' cognitive traits and observable demographics. These include education, experience, nationality, gender, and age. Second, for our non-cognitive traits, we focus on the big five factors to capture baseline personality and risk tolerance to capture an important business- and entrepreneurial-related trait (Miller, 1983; McCrae and Costa, 1987; McCrae and John, 1992; Covin et al., 2020; Bainbridge et al., 2022). Third, we control for further characteristics that likely impact strategy choice. From the literature, we gather two firm-specific determinants of strategic crisis management, namely the magnitude of the crisis' impact and the company's liquidity, measured by previous profits. Additionally, we include company age as a measure for maturity, the founding motive, and the current number of employees as a measure of firm size in our model specifications. In addition, we add an indicator variable for whether a firm is located in East Germany, an indicator for the second half of 2020, and 11 industry dummies. A description of all variable definitions is provided in Appendix Table A.1 and descriptive statistics are presented in Appendix Table A.5.

## 4. Empirical Results

### 4.1. Cognitive Determinants of Crisis Management Strategies

In Table 2, we report the results from the five-equation model (Equation 1) predicting the crisis management strategy factor scores and *exit* probability. We observe - as expected - a higher probability of implementation of all of the strategies when founders also report a high negative impact caused by the crisis. The results also show that strategic crisis responses are generally lower in the second half of 2020. For example, the factor score of *retrenchment* decreases by 0.86 for the second half of 2020, *ceteris paribus*. This result highlights the immediateness of the crisis responses and the diminished impact of the COVID-19 crisis in the second half of 2020.

Table 2: Cognitive Determinants of Crisis Management Strategies

	(1) Retrenchment	(2) Perseverance	(3) Operative Inno.	(4) Strategic Inno.	(5) Exit
<b>Crisis Controls</b>					
Second half 2020	-0.860*** (0.062)	-0.322*** (0.066)	-0.406*** (0.074)	-0.217*** (0.078)	0.003 (0.011)
Negative Impact Intensity	0.199*** (0.023)	0.205*** (0.023)	0.053** (0.025)	0.173*** (0.025)	0.012*** (0.003)
<b>Cognitive Traits</b>					
Founder Experience	0.015 (0.061)	0.058 (0.060)	0.132** (0.061)	0.062 (0.063)	0.010 (0.009)
Industry Experience	-0.000 (0.004)	0.009** (0.004)	-0.003 (0.004)	-0.001 (0.004)	0.001 (0.001)
Women in Founding Team	-0.026 (0.074)	0.095 (0.076)	-0.195** (0.077)	-0.109 (0.070)	0.005 (0.012)
Founder Age	-0.002 (0.003)	-0.008** (0.004)	-0.003 (0.003)	-0.003 (0.004)	-0.000 (0.000)
University Degree	0.051 (0.068)	0.158** (0.067)	0.329*** (0.067)	-0.009 (0.068)	0.015 (0.012)
German Founder(s)	-0.220* (0.128)	-0.137 (0.113)	0.041 (0.116)	-0.385*** (0.128)	-0.008 (0.020)
Firm Controls	Yes	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes
N	1,063	1,063	1,063	1,063	1,063

This table presents the predictability of cognitive skills and observable demographics on the strategic crisis management factors according to our simultaneous equation model. Standard errors clustered at the firm level are in parentheses; \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

While some demographics weakly predict specific crisis management strategies, only founders' academic background and nationality substantially affect



several of them. A university degree is associated with a 0.33 higher *operative innovation* score. Moreover, domestic nationality, i.e. German, is associated with a 0.39 lower *strategic innovation* score. *Perseverance* is positively associated with industry experience and education, as predicted, and with younger founders. Further, founders' entrepreneurial experience is positively related to *operative innovation*. No cognitive or non-cognitive traits can significantly predict firm *exit* through insolvency. These results confirm parts of our hypotheses and the existing empirical evidence on the impact of manager's cognitive characteristics on firm strategies.

We observe a couple of firm controls to be significantly related to the different crisis management strategies. The scores of *retrenchment* and *perseverance* increase by approximately 0.05 with a 10% increase in firm size as measured by the number of employees. Interestingly, neither *operative* nor *strategic innovation* are influenced by firm size. The probability of implementing an *innovative* strategy is higher for firms with lower financial slack as measured by previous profits. The *operative* and *strategic innovation* scores decrease by 0.2 if a firm reports having had profits in the previous years which may point to a higher willingness to transform the previous business model.

#### 4.2. *Personality Determinants of Crisis Management Strategies*

In Table 3, we present the set of results for the five-equation model (Equation 1) to which we add the big five personality traits and risk tolerance scores to predict each crisis management strategy. Again, founders are less likely to implement either active strategy in the second half of 2020 and the intensity of the pandemic's negative impact positively and significantly influences the

probability of implementing all strategies. The addition of personality traits to the specification does not render cognitive traits insignificant. This means that cognitive and non-cognitive traits are largely independent of each other (Zwick et al., 2017).

Table 3: Personality Determinants of Crisis Management Strategies

	(1)	(2)	(3)	(4)	(5)
	Retrenchment	Perseverance	Operative Inno.	Strategic Inno.	Exit
<b>Crisis Controls</b>					
Second half 2020	-0.852*** (0.062)	-0.313*** (0.065)	-0.400*** (0.074)	-0.207*** (0.078)	0.003 (0.011)
Negative Impact Intensity	0.203*** (0.023)	0.201*** (0.023)	0.046* (0.025)	0.167*** (0.025)	0.013*** (0.003)
<b>Cognitive Traits</b>					
Founder Experience	0.030 (0.061)	0.053 (0.061)	0.112* (0.061)	0.052 (0.063)	0.012 (0.009)
Industry Experience	0.000 (0.004)	0.009** (0.004)	-0.003 (0.004)	-0.001 (0.004)	0.001 (0.001)
Women in Founding Team	-0.046 (0.074)	0.077 (0.076)	-0.193** (0.077)	-0.109 (0.070)	0.001 (0.013)
Founder Age	-0.002 (0.003)	-0.008** (0.004)	-0.003 (0.003)	-0.003 (0.004)	-0.000 (0.000)
University Degree	0.079 (0.069)	0.169** (0.069)	0.313*** (0.068)	-0.011 (0.069)	0.018 (0.013)
German Founder(s)	-0.208* (0.123)	-0.124 (0.113)	0.049 (0.114)	-0.352*** (0.130)	-0.009 (0.020)
<b>Non-Cognitive Traits</b>					
Openness	-0.037 (0.033)	0.027 (0.034)	0.043 (0.033)	0.091*** (0.033)	-0.009 (0.006)
Conscientiousness	0.007 (0.031)	0.063** (0.032)	-0.004 (0.028)	0.012 (0.029)	0.006 (0.006)
Extraversion	0.049 (0.031)	0.018 (0.033)	0.006 (0.034)	-0.021 (0.032)	0.004 (0.007)
Agreeableness	-0.073** (0.030)	-0.055* (0.029)	-0.010 (0.031)	-0.075*** (0.028)	-0.004 (0.006)
Emotional Stability	-0.045 (0.030)	-0.013 (0.030)	0.017 (0.029)	-0.016 (0.029)	0.009* (0.005)
Risk Tolerance	-0.074** (0.034)	0.036 (0.035)	0.084** (0.035)	0.018 (0.034)	0.000 (0.006)
Firm Controls	Yes	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes
N	1,063	1,063	1,063	1,063	1,063

This table presents the predictability of baseline personality and entrepreneurial-related traits on the strategic crisis management factors according to our simultaneous equation model. Standard errors clustered at the firm level are in parentheses; \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

We find support for Hypothesis 1 with respect to *agreeableness* and *risk tolerance*. The *retrenchment* score decreases when the founder's *agreeableness* and *risk-tolerance* score increase. Further, we find a positive relationship between *conscientiousness* and *perseverance* as argued in Hypothesis 2. *Extraversion* and *emotional stability* do not significantly predict any strategy.

Except for *risk tolerance*, we do not find further significant personality determinants to *operative innovation* and can only partly confirm Hypothe-

sis 3. As predicted in Hypothesis 4, *openness to experience* indeed positively and *agreeableness* negatively influences *strategic innovation*. A one standard deviation increase in *openness to experience* leads to a 0.09 higher *strategic innovation* score. Especially in the long run, innovative crisis management strategies are most effective and might be unavoidable (Wenzel et al., 2020). Therefore, it is insightful to see which characteristics influence their implementation probabilities.

Finally, we cannot conclude that personality is a determinant of *exit*. Although the patterns are plausible in the sense that the negative COVID-19 impact intensity predicts *exit*, we do not find empirical evidence for personality influencing the *exit* probability. Thus, we conclude that *retrenchment*, *perseverance*, *operative innovation*, and *strategic innovation* as crisis management strategies rather than *exit* are to a larger extent driven by the decision-maker's personality.

We show in Appendix Table A.6 that the five strategies are indeed not independent from each other. The errors for the equations except  $\rho_{14}$  ( $= \rho_{41}$ ) and  $\rho_{25}$  ( $= \rho_{52}$ ) are significantly correlated with each other. These correlations stress the need to estimate the crisis management strategies jointly through simultaneous equation modeling.

#### 4.3. Founding Motive Heterogeneity of Crisis Management Strategies

Entrepreneurs are driven by different motivations when starting a company which may also impact their firms' strategies, especially the choice of long-term strategic decisions. Figure 2b shows the heterogeneous distribution of the crisis management strategies' factor scores across these four main founding motives indicating differences in the strategy scores depending on

the motive. At the same time, studies suggest that the entrepreneurial success of founders with a migration background largely depends on their founding motive. It seems therefore important to distinguish between immigrants who become entrepreneurs out of necessity and difficulties of entering the labor market and those who found to pursue an opportunity (Kalnins and Chung, 2006; Marinoni, 2023).

To explore the founding motive's role and how its role in strategic decision-making depends on the founders' migration background, we estimate a five-equation model in line with the previous ones in which we control for cognitive and non-cognitive traits as well as other relevant founder controls. We focus on the effects on *strategic innovation* as it is a long-term decision and is an important performance indicator for both crisis and non-crisis situations. The results are presented in Table 4 and show that German founding teams are more likely to choose *strategic innovation* when they became entrepreneurs out of necessity (reference category). Interestingly, the opposite holds true for founders with a migration background. The relationship inverts for all other founding motives, i.e. founders with a migration background are more likely than native founders to implement *strategic innovation* for all motives other than necessity. These findings illustrate that migration background as an important founder characteristic moderates the link between cognitive traits and strategy choice. Finally, it is worth noting that we do not find such a significant interaction effect with any of the other cognitive or non-cognitive traits.

Table 4: Founding Motive Heterogeneity of Migration Background

	(1) Strategic Inno.
<b>Crisis Controls</b>	
Second half 2020	-0.182** (0.077)
Negative Impact Intensity	0.163*** (0.025)
<b>Founding Motive Heterogeneity</b>	
German Founder(s)	0.767*** (0.207)
Higher Income	1.074*** (0.334)
Self Determination	1.171*** (0.267)
Business Idea	1.532*** (0.265)
Higher Income $\times$ German Founder(s)	-0.906** (0.363)
Self Determination $\times$ German Founder(s)	-1.172*** (0.282)
Business Idea $\times$ German Founder(s)	-1.393*** (0.282)
Founder Controls	Yes
Firm Controls	Yes
Industry Fixed Effects	Yes
N	1,063

This table presents the predictability of cognitive skills, observable demographics, and the interaction between founding motive and migration background on one strategic crisis management factor, *strategic innovation*, according to our simultaneous equation model. The reference founding motive category is 'No Employment'. Standard errors clustered at the firm level are in parentheses; \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

## 5. Discussion and Conclusion

The results presented here contribute four major findings on non-cognitive personality traits to the literature. First, *agreeable* founders were less likely to implement any crisis management strategy in response to the pandemic. Second, and perhaps intuitively, we find that *risk tolerance* reduces *retrenchment* and drives *operative innovation*. Third, *conscientious* founders have higher probabilities of implementing *perseverance* measures. Their self-discipline, motivation in times of conflict, and resistance may make them prefer to maintain the status quo. Fourth, *openness to experience*, which is characterized by imagination and unconventional thought processes, is positively related to *innovating strategically* following a crisis.

In addition, our findings stress the role of two cognitive traits that are

positively related to *innovative* strategic crisis response measures. While founders with a university degree are more likely to implement *operative innovations*, foreign non-German founders are positively related to *strategic innovations*. Universities may enable students to reflect critically on situations and problems, enable them to think outside the box, and provide transferable skills that equip graduates with tools for managing crises. Founders with migration background have more experience with changing environments, enabling them to adapt, and remain resilient in the face of adversity (Kahn et al., 2017).

These results empirically show that managers' personalities significantly influence strategic crisis management in young companies. We show that managers' cognitive and non-cognitive traits add to the organization's resources and competencies that have been shown to influence the implemented crisis management strategies (Kraatz and Zajac, 2001). Thereby, we expand the literature on environmental and structural antecedents of strategic and innovative change (Smith and Grimm, 1987; Zajac and Kraatz, 1993; Audia et al., 2000; Bundy et al., 2017). In particular, the effect of founders' personalities on the strategies they implement is robust to controlling for environmental (pandemic impact intensity and industry dummies) and firm-level (founding team, founding motive, size, age, and past performance) explanations.

While the role of managers in strategic change has been examined in a few studies, our study adds new insight on their role in the specific setting of crisis management. Furthermore, studying the setting of the sudden COVID-19 crisis resolves the problem that managers may get selected into companies

that fit their strategic profile. We overcome this selection problem by examining founders who actively managed their companies from the start and were not newly hired during or because of the crisis. These results contribute to a better understanding of the types of cognitive and non-cognitive manager traits that facilitate strategic change and those that hinder it in crises. Moreover, we show that broad and multifaceted components of personality matter for innovative crisis management in young and small companies.

Our findings have implications for managing young and small businesses in turbulent environments with increasingly frequent global crises. Implementing effective crisis management strategies can be seen as a source of competitive advantage with consequences for productivity, profitability, and even firm survival (Herrmann and Nadkarni, 2014; Klyver and Nielsen, 2021; Mayr et al., 2021). Especially *strategic innovation* is often the key to surviving in the longer term. Our results highlight that necessity is not the sole mother of invention. Migration background plays an important role for *strategic innovations*, especially when foreign founders become entrepreneurs voluntarily, rather than out of necessity, to pursue specific business opportunities. Moreover, founders who are more *open to experience* are likely to implement *strategic innovations* in crisis situations.

A couple of caveats apply to our setting. First, by the nature of our research design, our sample only includes young companies in Germany that are actively managed by their founders. When generalizing our results to larger and established companies, we need to keep in mind that young and small companies are often characterized by higher reactivity and individualized leadership (Hsieh et al., 2019). Second, other unobservable characteris-

tics such as social intelligence, networks, and COVID-19-related mental and other health distress could be related to founders' strategic responses. Third, we need to acknowledge a potential survey bias. Personality can influence how founders respond to survey questions (Jiang et al., 2024), e.g. personality could influence how founders perceive and respond to the crisis impact question. Still, the computer-aided telephone survey is designed as such that it does not leave much room for interpretation by the respondent.

Despite these caveats, these results provide insights into previously unidentified determinants of distinct crisis management strategies. They help practitioners, first, to better understand how certain managers will respond when facing turbulent environments, and second, to select managers whose cognitive and non-cognitive profiles match the company's most successful strategic change agenda based on previous behavior analyses and psychological tests. Finally, policymakers could further enable opportunity-driven migrant founders and consider personal traits and preferences when designing support instruments for small companies during crises.



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## Appendix A.

Appendix Table A.1: Variable Definitions

Variable	Unit of Measurement	Description
Retrenchment	Standardized	Latent Factor from COVID-19 response survey items.
Perseverance	Standardized	Latent Factor from COVID-19 response survey items.
Operative Innovation	Standardized	Latent Factor from COVID-19 response survey items.
Strategic Innovation	Standardized	Latent Factor from COVID-19 response survey items.
Exit	Binary (Yes/No)	Indicator variable for whether the firm became insolvent in 2020 or 2021.
Extraversion	Standardized	Latent Factor from personality survey items before 2020.
Openness	Standardized	Latent Factor from personality survey items before 2020.
Conscientiousness	Standardized	Latent Factor from personality survey items before 2020.
Emotional Stability	Standardized	Latent Factor from personality survey items before 2020.
Agreeableness	Standardized	Latent Factor from personality survey items before 2020.
Risk Tolerance	Standardized	Latent Factor from personality survey items before 2020.
Second half 2020	Binary (Yes/No)	Indicator variable for whether the crisis management measure was implemented in the second half year of 2020.
Negative Impact Intensity	Categorical (1 to 5)	Likert scale from survey item on COVID-19 impact.
Founder Experience	Binary (Yes/No)	Takes the value one if founder had previously founded a firm.
Industry Experience	Years	Number of years a founder has worked in the same industry as the start-up.
Women in Founding Team	Binary (Yes/No)	Indicator variable for whether at least one person in the founding team is female.
Founding Team	Binary (Yes/No)	Indicator variable for whether the firm has at least two founders.
Founder Age	Years	Average founder age in the firm.
University Degree	Binary (Yes/No)	Indicator variable for whether at least one of the founders has a university degree.
Ln(Employees)	Head Count	Total number of employees (excluding members of the founding team).
Profit in Previous Years	Binary (Yes/No)	Indicator variable for whether firm made profit at least once in the previous years.
East Germany	Binary (Yes/No)	Indicator variable for whether the firm is located in one of the five eastern German states.
Founding Year	Years	Year in which the firm was founded.
Founding Motive	Categorical (1 to 4)	Motive for which the firm was founded (self-determination, business idea, no employment, higher income).
German Founder(s)	Binary (Yes/No)	Indicator variable for whether at least one person in the founding team is German.

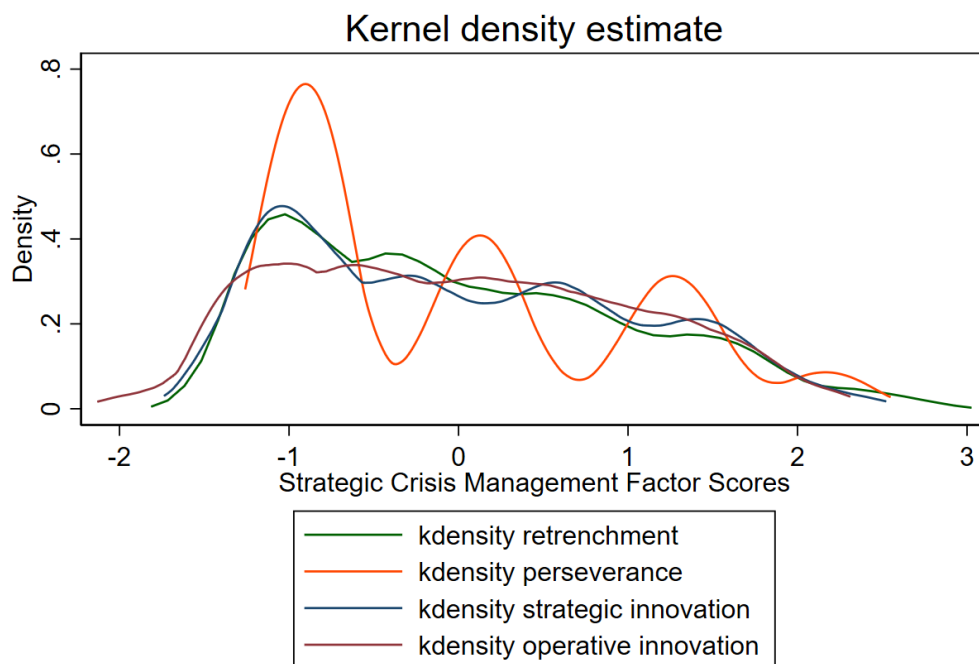
This table provides our variables, their units of measurement, and descriptions. All data stems from the IAB/ZEW Start-up panel and the Mannheim Enterprise Panel.



Appendix Table A.2: Strategy Factor Analysis

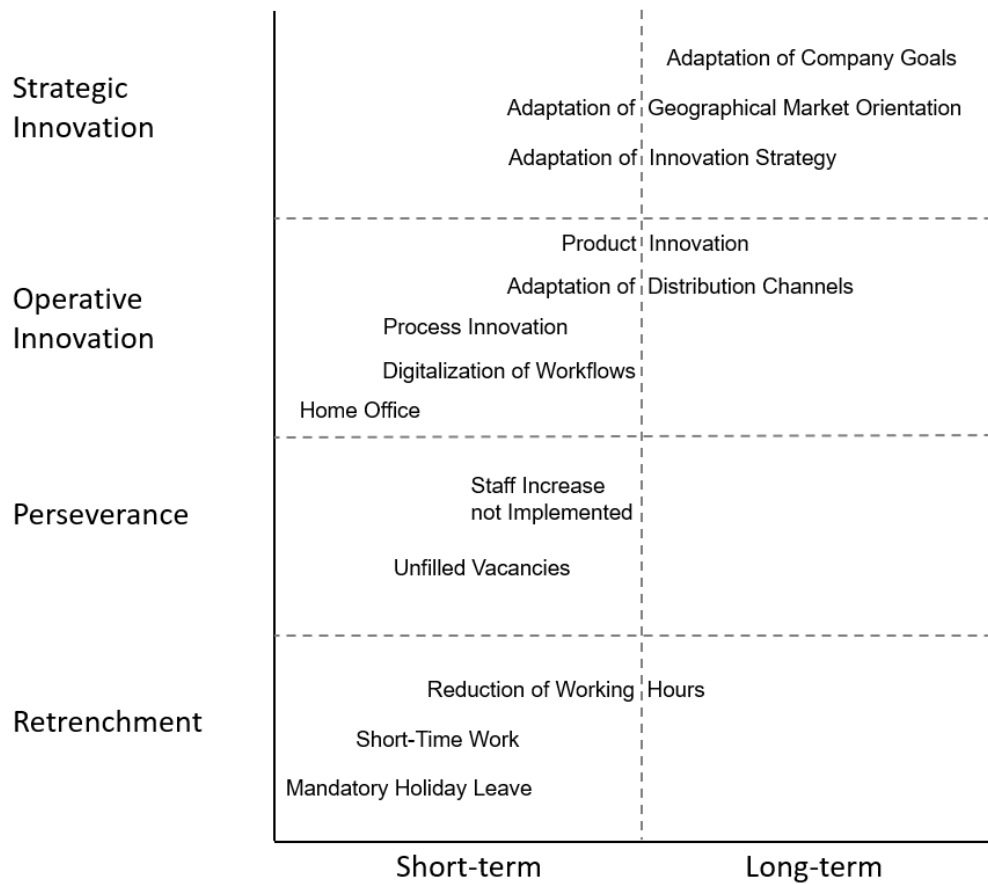
	Factor Loadings				
	Operative Innovation	Strategic Innovation	Perseverance	Retrenchment	Renovation
Reduction of Working Hours	-.004	.014	-.020	<b>.552</b>	.102
Short-Time Work	-.045	.010	-.073	<b>.772</b>	-.029
Mandatory Holiday Leave	-.209	.148	.010	<b>.596</b>	.222
Unfilled Vacancies	-.029	-.050	<b>.879</b>	-.031	-.031
Staff Increase not Implemented	.017	-.006	<b>.859</b>	-.038	.007
Home Office	<b>.426</b>	-.160	.020	.307	<b>-.530</b>
Remodeling and Renovation	.168	-.087	-.006	.113	<b>.863</b>
Process Innovation	<b>.682</b>	.078	.029	-.004	.116
Product Innovation	<b>.652</b>	.177	-.052	-.080	.002
Adaptation of Distribution Channels	<b>.506</b>	.102	.099	-.123	.044
Digitalization of Workflows	<b>.737</b>	-.035	.023	-.074	.107
Adaptation of Innovation Strategy	.272	<b>.653</b>	-.052	-.004	-.047
Adaptation of Geographical Market Orientation	-.025	<b>.747</b>	-.074	.013	.016
Adaptation of Company Goals	-.040	<b>.787</b>	.048	.052	-.085

This table presents rotated factor loadings of the response items' factor analysis. High factor loadings above 0.3 are highlighted in bold.



kernel = epanechnikov, bandwidth = 0.1846

Appendix Figure A.1: Kernel Densities of Crisis Management Strategy Factors



Appendix Figure A.2: Framework of Specific Strategic Crisis Management Measures

### Appendix Table A.3: Response Item Frequencies

Some of the 1,408 companies from our main sample were surveyed in May and October 2020 about their crisis responses, resulting in a count of 1,795 responses.

(a) Retrenchment Item Frequencies

	count	mean
Reduction of Working Hours	1,795	0.238
Short-Time Work	1,795	0.339
Mandatory Holiday Leave	1,795	0.284
Average Item Score		0.287

(b) Perseverance Item Frequencies

	count	mean
Free Vacancies	1,795	0.256
Staff Increase not Implemented	1,795	0.454
Average Item Score		0.355

(c) Operative Innovation Item Frequencies

	count	mean
Home Office	1,795	0.454
Process Innovation	1,795	0.395
Product Innovation	1,795	0.483
Adaptation of Distribution Channels	1,795	0.301
Digitalization of workflows	1,795	0.398
Average Item Score		0.406

(d) Strategic Innovation Item Frequencies

	count	mean
New Innovation Strategy	1,795	0.386
New Geographical Market Orientation	1,795	0.280
Adjustment of Company Goals	1,795	0.454
Average Item Score		0.373

Appendix Table A.4: Personality survey questions from big five measures (OCEAN) and risk tolerance from entrepreneurial orientation

<b>Openness to Experience</b>
Item 1: I am someone who is original and who brings up new ideas.
Item 2: I am someone who values artistic experiences.
Item 3: I am someone who has vivid fantasies and a good imagination.
<b>Conscientiousness</b>
Item 4: I am someone who works thoroughly.
Item 5: I am someone who is rather lazy. [REVERSE]
Item 6: I am someone who gets things done effectively and efficiently.
<b>Extraversion</b>
Item 7: I am someone who is communicative and talkative.
Item 8: I am someone who can get out and be sociable.
Item 9: I am someone who is reserved. [REVERSE]
<b>Agreeableness</b>
Item 10: I am someone who is at times a little rude to others. [REVERSE]
Item 11: I am someone who can forgive.
Item 12: I am someone who is considerate and kind to others.
<b>Emotional Stability</b>
Item 13: I am someone who worries often. [REVERSE]
Item 14: I am someone who gets nervous easily. [REVERSE]
Item 15: I am someone who is relaxed and can handle stress well.
<b>Risk Tolerance</b>
Item 16: Even in uncertain situations, my company tends to take a bold and offensive approach so as to reach the company's goals and not to miss any business opportunities.
Item 17: My company has a strong bias towards projects with high risk and possible high returns.

Original questions presented in German. Likert scale from 1 to 5 [1: does not apply to me at all, and 5: fully applies to me]; items 5, 9, 10, 13, and 14 enter the analysis in reversed scale.

Appendix Table A.5: Descriptive Statistics

	Obs.	Mean	S.D	Min.	Median	Max.
<b>Crisis Controls</b>						
Second half 2020	1,408	0.072	0.259	0	0	1
Negative Impact Intensity	1,131	3.286	1.176	1	3	5
<b>Cognitive Traits</b>						
Founder Experience	1,247	0.468	0.499	0	0	1
Industry Experience	1,407	17.919	10.390	0	17	56
Women in Team	1,306	0.206	0.405	0	0	1
Founder Age	1,367	47.110	11.142	21	47	101
University Degree	1,408	0.552	0.497	0	1	1
German Founder(s)	1,408	0.918	0.275	0	1	1
<b>Non-Cognitive Traits</b>						
Openness	1,408	0.061	0.949	-3.647	0.136	1.953
Conscientiousness	1,408	-0.047	1.004	-5.034	0.034	1.708
Extraversion	1,408	0.054	0.971	-2.993	0.119	1.813
Agreeableness	1,408	0.021	0.995	-3.173	0.069	2.330
Emotional Stability	1,408	-0.044	0.969	-3.803	0.034	2.014
Risk Tolerance	1,408	0.209	0.908	-1.393	0.240	1.953
<b>Firm Controls</b>						
Ln(Employees)	1,408	1.493	0.590	0.520	1.388	4.097
Profit in Previous Years	1,408	0.707	0.455	0	1	1
East Germany	1,408	0.131	0.338	0	0	1
Founding Year	1,408	2016	2.003	2012	2016	2019
Founding Motive	1,376	1.845	0.946	1	2	4
Founding Team	1,408	0.315	0.465	0	0	1

Appendix Table A.6: Crisis Management Strategy Correlations

$\rho_{12}$	
Constant	0.171*** (0.032)
$\rho_{13}$	
Constant	0.141*** (0.031)
$\rho_{14}$	
Constant	0.032 (0.032)
$\rho_{15}$	
Constant	-0.082*** (0.026)
$\rho_{23}$	
Constant	0.076** (0.032)
$\rho_{24}$	
Constant	0.149*** (0.033)
$\rho_{25}$	
Constant	0.042 (0.038)
$\rho_{34}$	
Constant	0.221*** (0.031)
$\rho_{35}$	
Constant	-0.059** (0.026)
$\rho_{45}$	
Constant	0.051* (0.031)

Equation 1 refers to *retrenchment*, 2 to *perseverance*, 3 to *operative innovation*, 4 to *strategic innovation*, and 5 to *exit* predictions. Standard errors in parentheses; \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ .



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