Corporate foresight and its impact on firm performance: A longitudinal analysis

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ABSTRACT

Corporate foresight is applied with the expectation that it will help firms to break away from path dependency, help decision makers to define superior courses of action, and ultimately enable superior firm performance. To empirically test this assumption, we developed a model that judges a firm's future preparedness (FP) by assessing the need for corporate foresight (CF) and comparing it to the maturity of its CF practices. We apply a longitudinal research design in which we measure future preparedness in 2008 and its impact on firm performance in 2015. The results indicated future preparedness to be a powerful predictor for becoming an outperformer in the industry, for attaining superior profitability, and for gaining superior market capitalization growth. In the article, we also calculate the average bonus/discount that can be expected by sufficiently/insufficiently future-prepared firms.

1. Introduction

The research and practice of strategic foresight (to which we refer as corporate foresight) has a tradition that reaches back to the late 1940s (Coates et al., 2010). Such practice in organizations had already seen a golden age in the 1950s, driven in particular by the "La Prospective" School of Gaston Berger in France and the works of Herman Kahn of the Rand Corporation in the US (Rohrbeck et al., 2015). Since then, many firms have invested in building corporate foresight (CF) units (Battistella, 2014; Becker, 2002; Daheim and Uerz, 2008), including Cisco (Boe-Lillegraven and Monterde, 2015), Daimler (Ruff, 2015), Deutsche Bank (Rollwagen et al., 2008), Deutsche Telekom (Rohrbeck et al., 2007), France Telecom (Lesourne and Stoffaes, 1996), L'Oreal (Lesourne and Stoffaes, 1996), Pepsi (Farrington et al., 2012), Siemens (Schwair, 2001), and SNCF (Lesourne and Stoffaes, 1996). The expectation is that CF will enable these firms to spot trends ahead of competitors, gain deeper insight into how such trends will affect their organization and identify the most effective response, and ultimately gain a competitive advantage (Hamel and Prahalad, 1994; Hines and Gold, 2015).

Despite the long tradition of applying CF practices, evidence on their impact on firm performance is scarce. The case study research has provided us with some insights into the causal links between corporate foresight practices and firm performance, and anecdotal evidence has been presented to determine its impact (Rohrbeck, 2012; Ruff, 2006; Ruff, 2015). The main reason for the scarcity of conclusive evidence on the impact of CF is the difficulties associated with measuring it. For example, establishing a causal link over time, whereby the impact can often be expected to play out over several years, is confounded by many other factors. Industry rivals may eventually find ways to offset the advantages that are gained through CF, macroeconomic factors may shift again, reducing the impact of CF-triggered actions, and the rules-of-the-game in the industry might change with the entry of new rivals (Helfat et al., 2007).

With this paper, using a longitudinal research design, we investigate the impact of CF on firm performance. Using data on CF maturity from 2008 and firm performance data from 2015, we are able to investigate the impact with a time-lag, which can be judged as sufficient for the impact of CF to play out. In addition, we propose a new construct, which we call future preparedness and which is built by comparing the CF need with CF maturity.

Our paper is structured into five main sections. In Section 2, we conceptualize future preparedness and introduce the main constructs of our measurement model, CF need, CF maturity and firm performance. In Section 3, we describe our research design. In Section 4 we report our findings. In Section 5, we discuss the limitations of our research and

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suggest future research trajectories. Finally, Section 6 summarizes our contributions.

2. Conceptualizing future preparedness

2.1. Corporate foresight

The interest in CF has always been fuelled by the expectation that CF practices, processes, and organizational units will boost the ability of a firm to attain superior performance (Vecchiato, 2015). The early work of Gaston Berger in the 1950s emphasized the need to create future perspectives that are shared in a management team (Berger, 1964). These representations can clarify the ultimate aims for which an organization strives and facilitate backward planning to inform the choice of means (Berger et al., 2008; Coates et al., 2010). Hamel and Prahalad (1994) argue that high profitability is only available for firms that can overcome crises by "competing for the future", which they contrasted against firms that compete by restructuring and downsizing. Rohrbeck (2012) studied 19 cases and concluded that CF serves as an important translational process that leads to the appropriation of new strategic resources, which then leads to an enhanced competitive position. Using a cross-sectional sample of 77 firms, Rohrbeck and Schwarz (2013) reported value creation from acting earlier than competitors and influencing other actors to act in a way that is favourable to the focal firm. Finally, Gavetti and Menon (2016) and Peter and Jarratt (2015) drew on behavioural strategy and single-case studies to propose that CF is a set of practices that enables strategists to identify a superior course of action and foresee its consequences.

For this paper, we define CF as a set of practices that enable firms to attain a superior position in future markets. However, we also acknowledge that more CF may not always be better. Day and Schoemaker (2005) argued for a state that they call 'neurotic', which occurs when a firm that has peripheral vision capabilities that exceed its needs. Burt et al. argue that foresight may trigger a condition in top management teams that they call 'managerial hyperopia', i.e., being too focused on managing distant futures, while failing to attach sufficient attention to what is close at hand. Hence, our approach will have to move beyond measuring absolute levels of CF and put them in context with the CF need. We expect that firms can make use of CF to identify the factors that drive environmental change, foresee future market changes, and define a course of action that leads towards a superior market position—and subsequently to superior firm performance.

2.2. Conceptualizing future preparedness

Compared to the previous studies, we advance the conceptualization by introducing the relative construct future preparedness (FP). This construct is built by comparing the need for CF with the maturity of the CF of the focal firm. The underlying rationale is that if we want to determine if, for example, better reflexes increase the likelihood of winning a sports competition, it will matter if my competitive environment is a game of chess or a game of table tennis. This importance of aligning the maturity to an environment-induced need has also been recognized in Day and Schoemaker's (2005) peripheral vision model. For our conceptual model, we build a CF need index on the basis of Day and Schoemaker's (2005) environmental complexity and environmental volatility scales. The maturity index is based on Rohrbeck's maturity model (Rohrbeck, 2010a; Rohrbeck, 2010b). Both indices are converted into a four-level score, which allows for a direct comparison of both. Therefore our model does not assess the absolute level of reflexes (the analogy being CF maturity in our model), but the level of appropriateness of the reflexes for a given competitive environment (FP in our model).

We expect that FP would as a consequence also be a more powerful indicator for judging a firm's attractiveness for investors than CF maturity alone. Similarly, an assessment that indicates a lack of FP would

be a strong signal for top management that mid- and long-term competitiveness is threatened (Hamel and Prahalad, 1994; Tushman and Oreilly, 1996). This view is also reflected in the German law that governs publicly traded organizations, as it formulates the firm requirement for such organizations to have a strategic foresight system. However, with the lack of a transparent indicator, the requirement is difficult to enforce. If FP hence proves to be measurable across industries,

- for shareholders, it could become a powerful indicator to hold management accountable to focus sufficiently on the mid- and long-term to ensure a firm's future success;
- for policy makers, it could become a formal requirement that ensures that firms have systems in place that raise the probability of survival and that management pays sufficient attention to mid-term value creation as opposed to short-term gains;
- for management, it could become a benchmarking tool to ensure that (a) they develop adequate future preparedness in their organization and (b) that their corporate foresight systems are competitive when compared with their industry rivals.

In the following section we will discuss the literature on which we draw to build our measurement model. The detailed operationalization of our constructs can be found in Table 3 in the appendix.

2.3. Measuring corporate foresight maturity

Different models have been proposed to measure the foresightedness of a person or organization. Grim (2009) proposed a model that combines process and leadership elements. Day and Schoemaker (2005) introduced such a model under the term *peripheral vision capabilities*, which includes the categories of leadership orientation, knowledge management systems, strategy making, organizational configuration, and culture. Hines et al. (2017) developed a competency model that can be applied to judge the proficiency of individuals in performing a futurist role.

For our study, we chose Rohrbeck's maturity model for three reasons. First, this model measures CF maturity on the organizational level. Second, it specifies practices that can be measured both through the descriptive four-level scale of the original model and as a Likert scale (Jissink et al., 2015; Paliokaitė and Pačėsa, 2015). Third, the maturity model has already been used to investigate the relationship between CF and firm performance (Jissink et al., 2014; Rohrbeck, 2012; Rohrbeck and Schwarz, 2013). From the original model, we decomposed the dimension 'people and networks' into its two subcomponents. We further added a process layer (see Fig. 1), which facilitates the understanding of how the different practices of the maturity models contribute to a firm's ability to transform signals into insights, which inform new courses of action.

In the process layer, we define three process steps:

- *Perceiving*: Practices that firm use to identify the factors that drive environmental change. Firm aim to identify (weak) signals ahead of competition to gain a lead-time advantage (Ansoff, 1980; van der Duin and Hartigh, 2009).
- *Prospecting*: Practices through which firms engage in sensemaking and strategizing. Practices include working with analogies, scenario analysis, systems-dynamics mapping, and back casting (Bezold, 2010; Daft and Weick, 1984; Rhisiart et al., 2015). In addition, firms aim to foresee the right time to act by identifying tipping points. The aim of this phase is to gain an insight advantage, which permits firms to identify a superior course of action that is distant from the status quo of the industry (Gavetti, 2012; Gavetti and Menon, 2016).
- *Probing*: Practices through which firms move from what Gavetti and Levinthal called 'cognitive search' in the perceiving and prospecting phase to 'experimental search' in the probing phase (Cunha et al.,
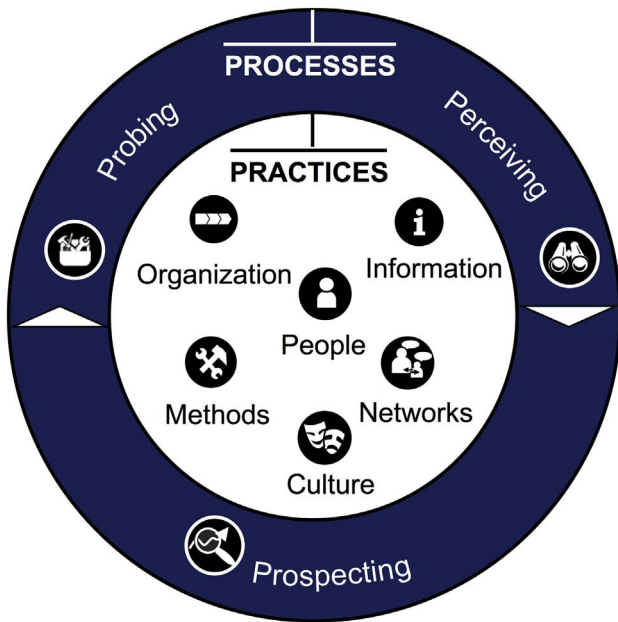
Fig. 1. Our CF maturity assessment model, based on Rohrbeck (2010a).

average of the items in the three Ps (a^{P1}, a^{P2}, a^{P3}). The items were scored by the respondents on a 5-point Likert scale. After calculating the averages for the three Ps, we transform them into our four-step maturity levels (ml^{P1}, ml^{P2}, ml^{P3}) by applying the following rule:

- $(a < 2) = (ml = 1)$
- $(3 > a \geq 2) = (ml = 2)$
- $(4 > a \geq 3) = (ml = 3)$
- $(5 \geq a \geq 4) = ml = 4$

This approach provides us with a measure that is comparable across the three Ps and is comparable to the four-level scale that we use for the CF need assessment. To aggregate the maturity-level scores across the three Ps, we apply a minimum function: MIN (ml^{P1}; ml^{P2}; ml^{P3}). This is in line with other maturity models, which are built on the assumption that the 'weakest link determines the strength of the chain', i.e., in our case the CF maturity of a firm is determined by the P with the lowest score.

2.4. Measuring corporate foresight need

To take into account that firms in, for example, a very stable environment would have a lower need for building CF practices, we built FP as a relative measure. To operationalize CF need, we adapted and reduced Day and Schoemaker's (2005) scales for the complexity and volatility of the environment. The transformation from the original Likert-scale scores into need levels (nl^C, nl^V) was performed analogous to the approach used for the maturity levels (see Fig. 3).

To aggregate the need level scores, we apply a maximum function: MAX (nl^C, nl^V). This is to reflect that both complexity and volatility can drive the need independently. This is in line with most authors and is also supported by our view of how a firm would think about preparation (Gephart et al., 2010; Vecchiato, 2012). If, for example, a firm is situated in an environment that is characterized by a level one complexity but only a level four volatility, we posit that it would still need to build CF practices on level four. The reasoning is that the high complexity drives inertia, which in turn can only be counterbalanced by identifying change early and having CF mechanisms in place that trigger organizational response.

One example could be a car manufacturer facing the disruption of electrically powered vehicles. While the environmental complexity is low (low number of competitors, competitors easily identifiable) the environmental volatility is high (extent to which is it affected by external change, forecastability of technological change). For such a firm,
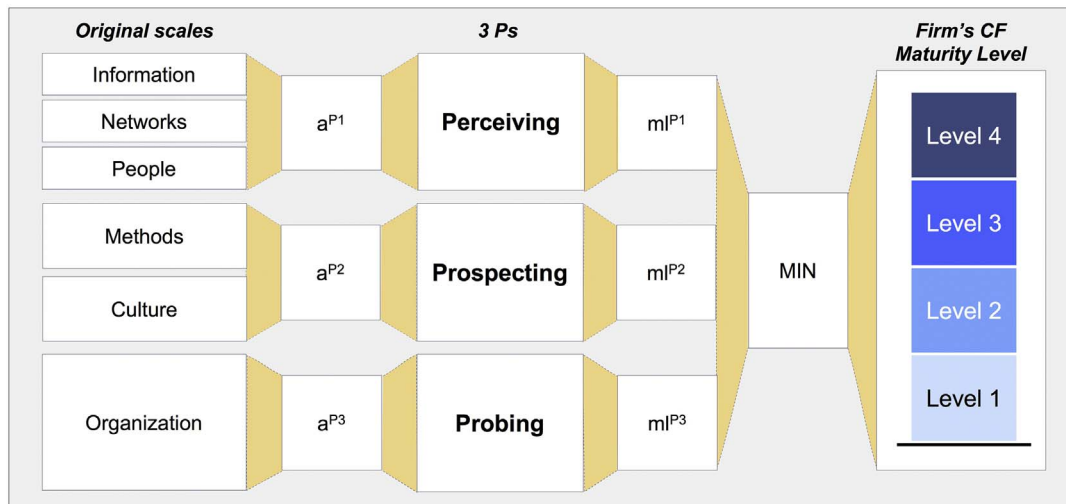
2012; Gavetti and Levinthal, 2000; Gavetti and Rivkin, 2007). In particular, in high-speed environments, the need to explore new markets through experimentation has been acknowledged (Costanzo, 2004; Gavetti and Rivkin, 2007). Probing practices occur either in dedicated accelerator units or in units that receive the mandate to act. This may include prototyping, R&D projects, consumer tests, internal venturing, strategic initiatives or external venturing (McGrath et al., 2006; Michl et al., 2012; Rohrbeck et al., 2009). Probing practices aim at legitimizing and starting a new course of action and ultimately at gaining a competitive advantage.

To measure CF maturity, we build on the existing items of Rohrbeck's maturity model but regroup them under the three Ps, see Fig. 2. We create the perceiving scale by integrating items that pertain to information, people, and network (14 items). We create the prospecting scale by integrating items that pertain to methods and culture (9 items). We create the probing scale by using the items that pertain to an organization (12 items). The detailed items are provided in Table 3 of Appendix A.

To assess the overall CF maturity level, we first calculate the

Fig. 2. Measuring corporate foresight maturity.
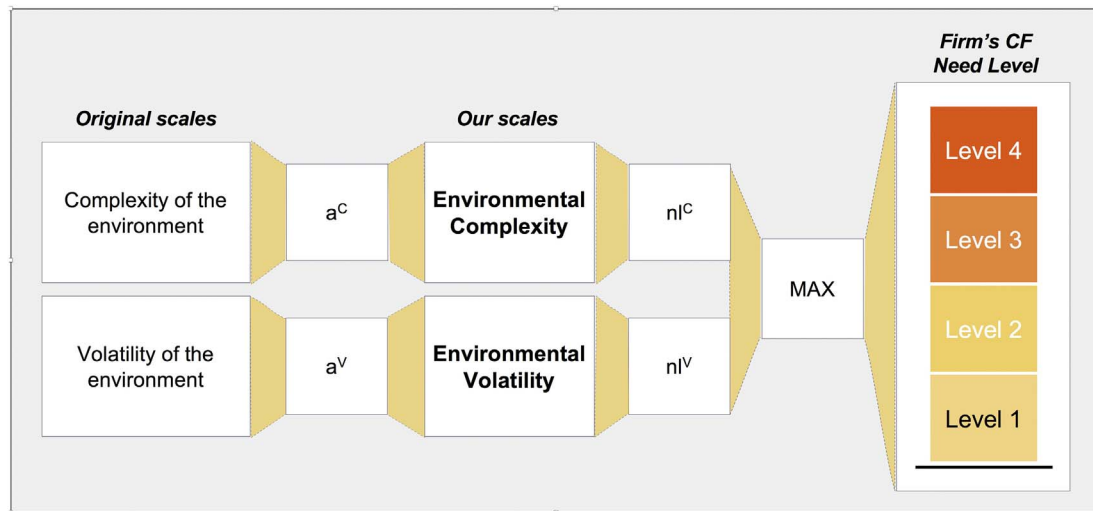
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Fig. 3. Measuring corporate foresight need.

if we then assessed it to be at a level four (volatility) and a level one (complexity), we would obtain a level two for CF need if we took an average of the two dimensions (volatility and complexity). This case illustrates that the appropriate level of CF process must match the highest need level in either of our two dimensions.

2.5. Constructing future preparedness

To determine systematic future preparedness, we propose that a firm has reached the optimum level of future preparedness if its CF need level (NL_{CF}) is matched by its CF maturity level (ML_{CF}). A deviation from this optimum can occur when firms have a maturity level below the CF need level or when firms have a maturity level above the CF need level. We define the following states:

- nl = ml: *Vigilant*, a firm has CF practices that are adequate for its given environment.
- nl < ml: *Neurotic*, a firm has CF practices that exceed its needs for a given environment.
- nl > ml (by one level): *Vulnerable*, a firm that has CF practices that fall one level short of what would be required to match the need.
- nl ≫ ml (by two or more levels): *In danger*, a firm that has CF practices that fall more than one level short of what would be required to match the need.

By introducing FP as a relative construct, we believe we have found a way to control for industry differences that may have confounded earlier findings on the impact of CF.

3. Research approach

3.1. Challenges and research design

We argued above that the lack of empirical research on the impact of CF is to a large extent routed in the difficulties in designing an appropriate empirical-investigation frame. To be more specific, the two main challenges that we aimed to overcome with our research-design are as follows.

The past research has found case-based and anecdotal evidence suggesting a link of CF activities (sometimes individual projects) to local outcomes (for example, the repositioning of a product portfolio, which leads to higher sales) (Battistella, 2014; Rohrbeck, 2012; Ruff, 2015). However, it has also noted the challenge of complex causal links

that may confound the relationship between CF and firm performance. In particular, competitor actions and industry-level factors have been reported to play an important role in determining firm performance. In our study, we addressed this in two ways: First, we controlled for potentially confounding environmental factors by integrating CF maturity and need into our FP construct to form our independent variable. Second, we used 'outperformer' and 'underperformer' clusters, which are populated on the industry level, to avoid inter-industry-performance differences that might confound our findings. We built performance clusters by identifying the 'outperformers' (top 20%) and 'underperformers' (bottom 20%) of each industry and then combining the firms in cross-industry performance clusters, i.e., creating a sample of all outperformers and underperformers of all industries. These samples are thus not confounded by strong intra-industry differences, and a robust classification allows the winners to be differentiated from the losers across industries.

Different measures are available to measure firm performance. It is widely assumed that profitability is the main objective of a business firm (Damodaran, 2001). In addition, public-listed firms may also target the optimization of shareholders' value, which can be quantified by market capitalization growth (Damodaran, 2001; Eberhart et al., 2004). In our study, we use both measures independently to test the relationship between FP and firm performance using the following:

- *Profitability* (*EBITDA*): operationalized as the earnings before interest, taxes, and the depreciation adjustment of the firms in 2015.
- *Market capitalization growth*: operationalized as the market valuation difference between 2008 and 2015.

The second main challenge is that CF cannot be expected to pay-off in the short term. The first consequence is that scholars who are willing to study the impact of CF need to adopt a longitudinal research design (Eberhart et al., 2004; Han Chan et al., 1990; Sheng-Syan et al., 2013). In our study, we chose to use a seven-year time-lag relying on future preparedness data from 2008, which we matched with firm performance data from 2015.

3.2. Sample and data collection

In our research, we focused on CF practices, which were observable on the firm level. The past research has documented that such firm-level practices can be observed in large organizations, while small and medium enterprises typically perform foresight on a personal level or in

an ad hoc and noninstitutionalized manner (Becker, 2002; Daheim and Uerz, 2008; Elenkov, 1997). We hence drew our sample from firms that have annual revenues of above €100 million.

We focused our research sample on multinational European firms that apply corporate foresight, which are suitable for our research endeavour. We contacted firms across industries, including the chemical, financial services, telecom, energy and utilities, healthcare an pharmaceutical, automotive, manufacturing, retail and consumer business, and transportation industries. The data were collected in the fall of 2008 during a period of four months. Managers operating in the areas of innovation, market research, corporate foresight and product development participated in the study. Potential respondents were contacted by phone to ensure that the survey was completed by the appropriate manager, who is knowledgeable on corporate foresight. This process optimized the reliability of our data.

In total, 467 firms were invited to participate in the study, out of which 135 participated. This represents a response rate of 29%. From the 135 participants, 52 firms provided data that were either incomplete or inconsistent. These firms were excluded from the sample, which was reduced to 83 participants.

To collect the future preparedness data, we relied on a questionnaire that measured CF maturity with 35 items and CF need with 10 items. The questionnaire was created both in English and German, a measure to boost the response rate from the German firms. The participants were approached by email, fax, or post. Additionally, an online survey page was created and distributed more broadly through social networks and through partner organizations. The participants were re-contacted by phone up to three times. As an incentive, the participants were offered a tailored benchmarking report.

To collect the firm-performance data, we used the S&P Capital IQ database. As a first step, for each firm, we collected the profitability and average profitability of the respective industry in our future preparedness database. Here, we were able to retrieve data from 70 firms. In addition to profitability we wanted to independently use market capitalization growth as an additional measure. However, this resulted in a decreased sample size as only 42 of the 70 firms were publicly listed. For these firms we collected the market capitalization values from 2008 and 2015 and calculated their market capitalization growth.

3.3. Five approaches to study the relationship between future preparedness and firm performance

To assess the impact of FP on firm performance, we use five different tests. First, we use our FP clusters, i.e., firms that in 2008 were vigilant, neurotic, vulnerable, or in danger and observe in which performance groups these firms are represented in 2015, i.e., outperformer, underperformer. This allows us to avoid confounding effects from inter-industry difference, which may result in judging a firm to be an outperformer merely because it is in a more profitable industry than other firms. In our study design, the firms must perform significantly better than their industry peers to be classified as outperformers. We expect to find that a firm with a high FP is significantly more likely to be among the outperformers in its industry than among the underperformers. If this were the case it would be a strong indicator of a positive relationship between FP and firm performance.

Second, we check if this result is significantly different from the testing the same relationships in a cross-sectional analysis, i.e., comparing the FP clusters membership in 2008 and performance group membership in 2008. This test helps us to isolate the longitudinal effect from FP on firm performance from confounding effects. A positive result from our first test may for example be only due to an inverse causality, e.g., high FP correlates with high performance, because firms that have high performance have better processes, including CF and R&D. We expect this test to show that there is no positive relationship between FP and firm performance, as we did not allow for the time-lag for the impact to play out. It may even be that we find a negative

relationship as the previous studies have shown that firms with high performance express less of a need to be future prepared (Chen, 2008; Jissink, 2017).

Third, we perform a migration analysis in which we test whether vigilant firms have a significantly higher likelihood of moving up in the ranking in their industry performance group, i.e., from underperformer to average, from average to outperformer, or from underperformer to outperformer in the seven years between 2008 and 2015. We also test the reverse relationship, i.e., if a firm with FP deficiencies (vulnerable, neurotic, in danger) has a higher likelihood of moving down in the ranking of performance groups. We expect these two relationships to be significant.

Fourth, we use interviews, public sources and research reports to look for causal evidence of the impact of FP on firm performance (Harrison and Reilly, 2011; Jick, 1979). For that we select the firms that we identify in the third test to have followed the predicted pattern, i.e., vigilant firms that have moved up in the ranking of performance clusters in their industry and firms with deficiencies that have moved down. We expect that we will find some evidence that high FP correlates with strategic moves that the focal firm applied to attain a gain in performance relative to its industry peers. While this study cannot be conclusive, it adds qualitative insights, which make our quantitative findings more robust and may even allow us to uncover some causal relationships (Creswell, 2013; Powell et al., 2008).

Fifth, we estimate the average bonus or discount of the different FP clusters in the seven-year time period. We expect that vigilant firms should have both a higher profitability and higher market capitalization growth. Similarly, we expect that firms with FP deficiencies to have lower profitability and market capitalization growth when compared with vigilant firms.

Applying these five tests we are able to boost the robustness of our findings. In the tests that apply descriptive statistics techniques we judge a percentage difference higher than 15% to be significant, which is in line with other studies that employ descriptive statistics.

4. Results

4.1. State of future preparedness in 2008

We first reported on the overall level and distribution of future preparedness in our 2008 sample. Our results showed (Fig. 4) that 62% of the surveyed firms had a strong to very strong level of CF need. This result indicated that the majority of firms had the need to apply more sophisticated CF practices. However, on the maturity side, the majority of firms did not reach above a level two. Only 2% of the firms had a maturity level of four, whereas 27% of the firms attained a level two, and 71% of the firms had a moderate to low CF maturity (level one-two). Thus, our results confirmed the limited implementation of systematic CF practices across industries (Rohrbeck and Schwarz, 2013). Although we are witnessing the rising adoption of CF within firms, its application seems to, on average, still lack comprehensiveness, continuity, and institutionalization (Daheim and Uerz, 2008; Rohrbeck et al., 2015).

The even more relevant question is how CF maturity fits the CF need of respective firms (Slaughter, 1996). Our results showed that only 36% of the firms were vigilant, applying an adequate level of CF according to their CF need. The remaining 64% of the firms had deficiencies that limited their responsiveness to change and their ability to proactively shape future markets. A total of 16% of the firms were neurotic, applying CF practices that may trigger managerial hyperopia that would paralyze them in the execution of rewarding business models. A total of 48% of firms were either vulnerable or in danger and hence insufficiently equipped for scanning, interpreting, and building new business models.
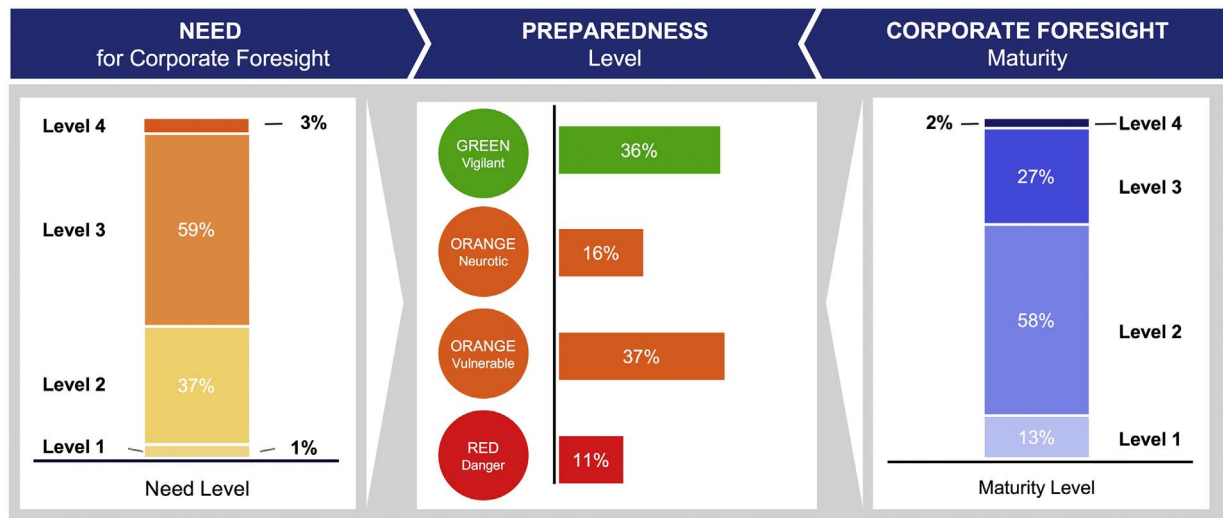
Fig. 4. State of future preparedness in our sample in 2008 (n = 83).

4.2. Relationship between future preparedness in 2008 and firm performance in 2015 (first test)

To test whether there is a positive relationship between FP and firm performance, we determine the representation of the FP clusters created in 2008 in the performance clusters created in 2015. We find that the share of vigilant firms in the outperformers cluster, with 63%, and the share of vigilant firms in the underperformers cluster, with 24%, is significant and supports our expectation of the positive relationship between FP in 2008 and firm performance in 2015 (see Fig. 5). In addition, there are neither neurotic nor in-danger firms among the outperformers in their industry.

To test the robustness of this finding, we also examined the market-capitalization outperformers vis-à-vis the underperformers and found a similar picture (Fig. 6). We find that the share of vigilant firms in the outperformer cluster was significantly higher than the share of vigilant firms in the underperformer cluster. In market capitalization, the share of the in-danger firms in the underperformer cluster was even higher, at 22%.

4.3. Relationship between future preparedness in 2008 and firm performance in 2008 (second test)

The longitudinal design that was applied in the first test has already reduced the risk of receiving results confounded by inverse causation. Still, we could be negatively affected by a tautological relationship in which we measure the same phenomenon with two constructs and find correlation. In our case, a firm could lead on practices and performance simply by being well run, and not, as we suggested, because it is more successful at systematically building superior positions in future

markets. To check for this risk in our research, we examined the relationship between our two constructs at a single point in time, in our case, 2008 (see Fig. 7).

The results show a significant relationship in the opposite direction. Explained differently, we observed that the outperformers were, on average, less well-prepared than the underperformers. To explain this odd finding, we can draw on the research on R&D investments and firm performance. For example, Chen (2008) found evidence that firms that face a future in which the returns are projected to be below aspirations increase their R&D investments, while firms that are doing well invest less in R&D (Chen, 2008). Translated to our context, we can speculate that the cause behind our findings is that the firms with good performance did not find it necessary to systematically prepare for the future, even though they would have deficiencies in their future preparedness and may face the future risk of being displaced from their favourable position in the industry by more future-prepared firms.

The result also indicates that the time-lag between FP and firm performance is vital for a positive relationship. This also strengthens the results from the first test as it shows that there is no positive cross-sectional correlation between FP and firm performance.

4.4. Migration analysis (third test)

For the migration analysis, we assess the migration of firms from one performance cluster (outperformer, average, underperformer) to another in the time between 2008 and 2016. We control again for industry differences by relying on the industry-specific performance categorization. We first assess the vigilant firms, which we expected to migrate towards higher performance clusters, i.e., enhancing their performance vis-à-vis industry rivals. Fig. 8 shows a strong upward
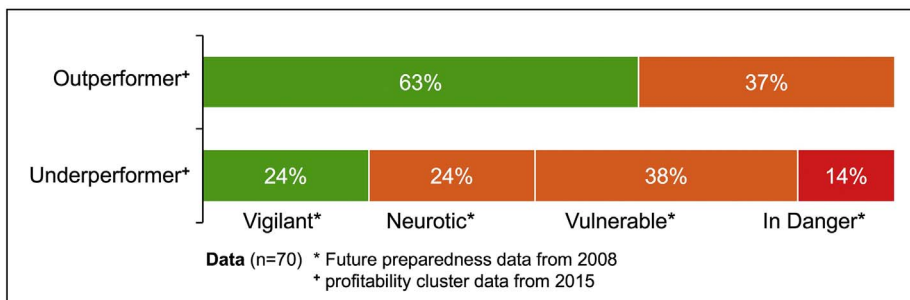
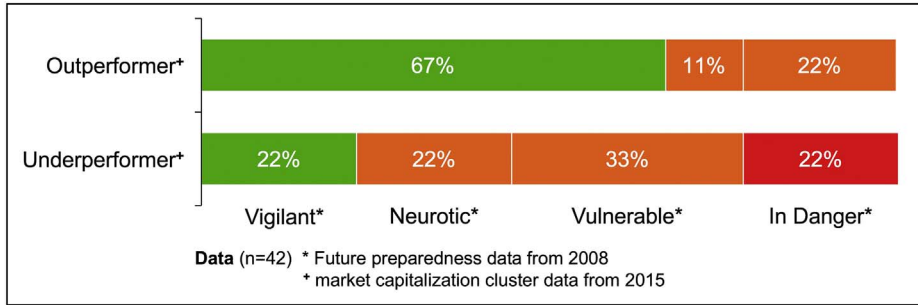Fig. 5. Profitability outperformers/underperformers and their future preparedness level.

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Fig. 6. Market-capitalization outperformers/underperformers and their future preparedness level.
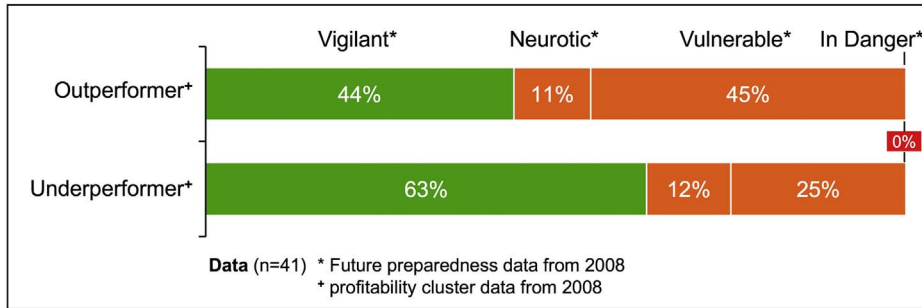

Fig. 7. Time-lag evidence of the impact of future preparedness on profitability.

migration. In our sample, 40% of the vigilant firms improved their profitability performance cluster position, 55% were able to maintain it and only 5% (1 firm) decreased their position.

Next, we analysed the migration of the firms with FP deficiencies. Fig. 9 shows that only 9% of the firms with corporate foresight deficiencies improved their profitability performance position. A total of 91% of the firms with corporate foresight deficiencies either decreased or maintained their position. These findings confirm the positive longitudinal relationship between FP and firm performance.

4.5. Qualitative investigation into the relationship between future preparedness and firm performance (fourth test)

Building on our third test, we use a qualitative research approach to study the relationship between CF practices and performance. We expect to find indications that superior future preparedness allowed the firms to embark on a superior course of action and increased their competitive advantage. Similarly, we expect that deficiencies in FP will have led firms to miss opportunities and threats, resulting in an inferior course of action and a loss of competitive advantage.

Table 1 reports our findings on the sample of firms that were vigilant and that were identified in the third test as having enhanced their performance cluster position.

While the observations that are reported in Table 1 cannot provide conclusions on causal links, they still provide some insights into how FP is translated into superior courses of action and an enhanced competitive position. The ten vigilant firms have all built a meaningful portfolio of corporate foresight practices, which in most cases are also institutionalized through a unit structure and processual links to processes such as R&D, marketing, and strategic decision-making. In addition, it is interesting to note that many have set up mechanisms to integrate start-ups, which suggests the use of venturing for the purpose of research.

Next, we investigate the firms that had future preparedness deficiencies in 2008 and which either stayed in or dropped into the underperformer category in their industry. Table 2 presents our findings.

The investigation into the firms that ended in the underperformer group in 2015 reveals a lack of CF practices and a lack of capabilities to
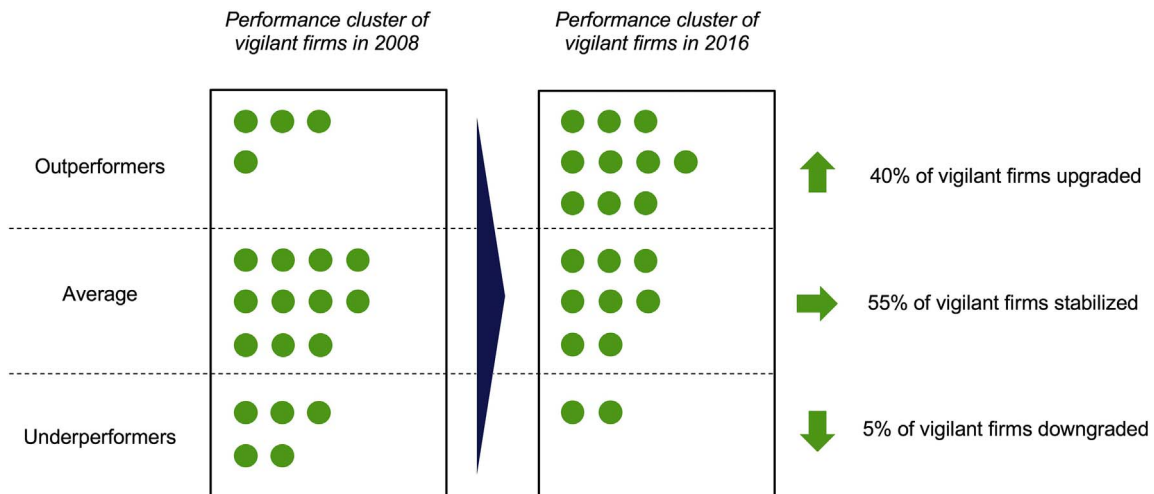

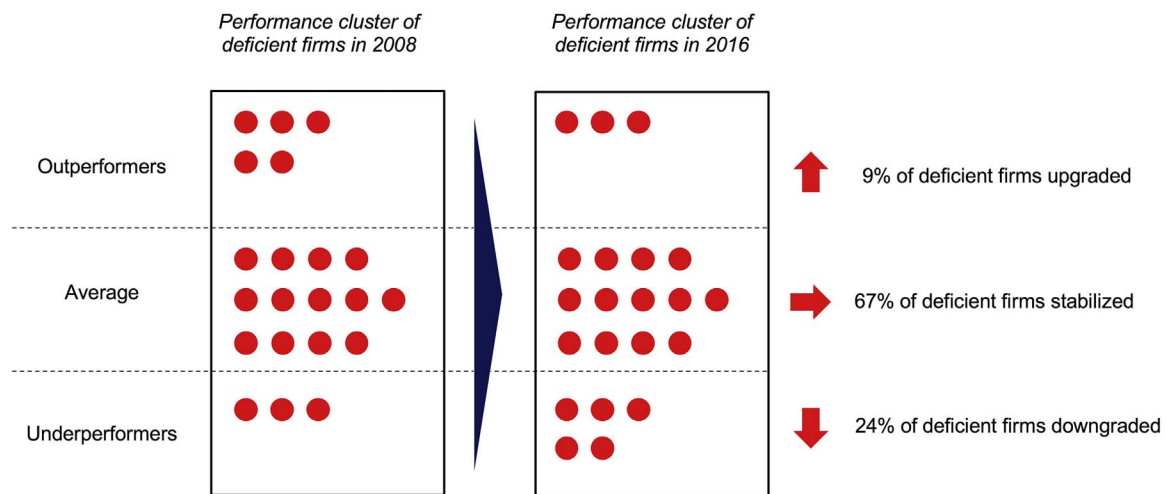**Fig. 8.** Migration analysis of vigilant firms.

Fig. 9. Migration analysis of firms with deficiencies.

Table 1
Observation of vigilant firms that attained or maintained their position as outperformers between 2008 and 2015.

Firm	Performance migration	Corporate foresight practices	Superior course of action, increased competitive advantage
Healthcare service provider	Underperformer to outperformer	• Global foresight unit, scouting and integrating market insights in strategic decision-making process • Venturing unit integrating start-ups to develop future business portfolio	• Leading player launching technology oriented services in emerging countries (e.g., malaria detection apps, pharmacy finder, telemedicine) • Considerable sales and market share growth contributed by technology driven services in emerging countries
Consumer business firm	Underperformer to outperformer	• Customer and supplier workshops to perceive and prospect organic food and sustainability trends • Customer insights clinics and platforms to perceive emerging customer preferences	• Merger with an organic producer of chocolate ingredients and successful market entry in the sugar-free chocolate business • Personalization of packages, as key differentiator towards customer needs, which led to sales increase
Food products producer	Average to outperformer	• Customer insights clinics to perceive future customer taste preferences • Set-up of joint research and customer-insights platform with suppliers	• Leading in development of sugar free and organic product-lines which heavily contributed to growth • Optimization of new pet food taste, balancing pet appetite and smell, as a key customer requirement
Fashion and fragrance producer	Average to outperformer	• Central foresight unit, identifying future customer preferences in the fragrance business	• Launch of new successful fragrance product lines addressing emerging customer requirements around sustainability, organic ingredients and value chain traceability
Automobile manufacturer	Average to outperformer	• Set-up of a global scouting team with focus on screening future technologies • Venturing unit, incubating start-ups to complement value chain	• Leader in the integration of new car features such as personalized infotainment, autonomous drive and parking, or context based search boosting sales performance
Automobile manufacturer	Average to outperformer	• Global scouting teams in the Silicon Valley, Asia and Berlin to anticipate preferences of young customers • Integration of foresight team in corporate strategy, product development, R&D and marketing functions	• Development of new car models attractive for the young-driver segment as well as boosting profitability • Successful execution of marketing campaigns on social media, with appropriate teasers appealing to key customer needs
Automobile manufacturer	Outperformer to outperformer	• Institutionalized foresight activities, integrated in strategy, R&D and marketing decision-making • Collaboration with start-ups, by steadily integrating valuable start-up ideas into the value chain	• First mover in the development of car-sharing business models • Leader in the development of electric and hybrid motors • Efficiency gains through integrated start-up technologies in the production process
Financial service provider	Outperformer to outperformer	• Institutionalized foresight activities, scanning new technologies and customer demand • Integration of foresight insights within portfolio extension decisions	• Leader in the digitalization of the customer experience, as a key requirement for banking services • First mover in new markets such as digital wallet, mobile payment, online finance planer, boosting recent sales performance
Credit card firm	Outperformer to outperformer	• Extension of global scouting hotspots from Silicon Valley to future markets (e.g., China, other Asian regions) • Collaboration with external market research and customer observation firms providing insights into future customer needs	• Launch of country specific digital banking solutions, leveraging insights from customer research • Successful player in new solutions addressing customer needs, such as mobile wallet, payment, location-based services and analytics, boosting sales
Technology provider	Outperformer to outperformer	• Continuous involvement of global scouting teams in key strategic decisions • Collaboration with start-ups to build and integrate a new operating system	• Launch of a leading operating system addressing customer needs around usability and collaboration • Strong revenue contribution of the new operating system

Table 2
Observation of firms with FP deficiencies that fell towards or stayed in their position as underperformers between 2008 and 2015.

Firms	Performance migration	Corporate foresight practices	Firm performance observations
Supplier of chemical products	Outperformer to underperformer	• Failed in setting-up effective sensors for market signals • Focus on the core product line (graphite electrode) accounting for 40% of the revenues • Poor attention on future technologies and trends	• Failed to anticipate that their core business of graphite electrode will become commoditized • Lack of investment in low-cost technologies • Loss of a large proportion of its market share
Finance and insurance service provider	Average to underperformer	• No systematic corporate foresight practices • Ad hoc market research based on top management requests	• No major improvement on the product line, focussing on traditional retail banking services • Missing of new opportunities in banking businesses such as digital banking, mobile wallet, analytics, reflected in current poor sales performance
Telecom provider	Average to underperformer	• No systematic scouting of market trends or technologies • Focus on incumbent telecom services and networks	• Stagnating revenues in the incumbent telecom market and increasing network maintenance costs, resulting in profitability decrease • No substantial portfolio extension with products and services beyond the core business
Aircraft producer	Underperformer to underperformer	• No systematic integration of gathered insights within strategic-decision marking • Execution of general market research activities	• Old and less innovative product lines, leading to continuous market share decrease • No tangible value of corporate foresight, beyond the documentation of market research results
Technology service provider	Underperformer to underperformer	• Short-sighted firm culture, with a strong management focus on short-term performance results • No foresight team	• Poor understanding of market shifts occurring in their industry, e.g., the demand for integrated services beyond their traditional ATM machine business • Lack of portfolio extensions towards new attractive adjacent markets such as security, maintenance, analytics service of ATM machines or new services on digital payment • Continuous loss of market share

translate insights into the future into organizational responses. All of the firms displayed an overt focus on the existing business, ultimately failing to renew their offerings and their competitive advantage. All of the firms were unable to alter their course of action or to pursue strategies that were distinct from the status quo in their industry. The result of these firms ending up in the underperformer groups appears to be a logical consequence.

4.6. Estimating the bonus/discount of high/low future preparedness (fifth test)

In our final analysis, we investigated the extent to which a firm could expect a performance bonus from upgrading its future preparedness. This analysis is important to justify investment in upgrading CF practices. To find a first proxy for the quantitative benefit of future preparedness, we calculated the average profitability of the different future preparedness clusters.

Our findings (Fig. 10) show that vigilant firms achieved, on average, 16% profitability, which surpassed the overall industry average profitability of 12% and made vigilant firms 33% more profitable than the average. The value of future preparedness became even more obvious when examining the discounts that the firms with deficiencies needed to assume. The neurotic and vulnerable firms had 37% lower

profitability when compared to the profitability of the vigilant firms and the in-danger firms realized a 44% lower profitability.

Next, we calculated the impact of future preparedness on market capitalization growth. Fig. 11 shows that the average growth in our sample over the seven years (from 2008 to 2015) was 25%. The vigilant firms achieved over the same period on average a 75% growth in market capitalization, or 200% additional growth.

Interestingly, the worst performing group was the neurotic firms, which had, on average, a negative growth of 6%. An explanation could be that neurotic firms lack the persistence to build sustainable growth or simply that they fail in the execution of new courses of action.

5. Discussion

Our study aimed to find evidence of the longitudinal effect of FP on firm performance. We drew on a proprietorial dataset of 83 multinational firms that we surveyed in 2008 to establish their level of future preparedness. When matching these firms with their performance data in 2015, we could not acquire data on the entire sample. Our reduced sample was, for the profitability analysis, 70 firms and, for the market capitalization growth analysis, 42 firms. While this is an important limitation of our research, we were able to boost the robustness of our findings by relying on the five different tests described in Section 3.3. In
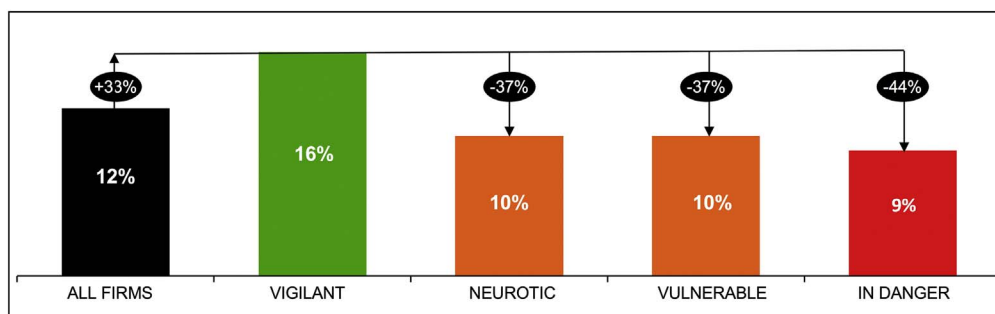

Fig. 10. Average profitability of firms in the future preparedness levels.
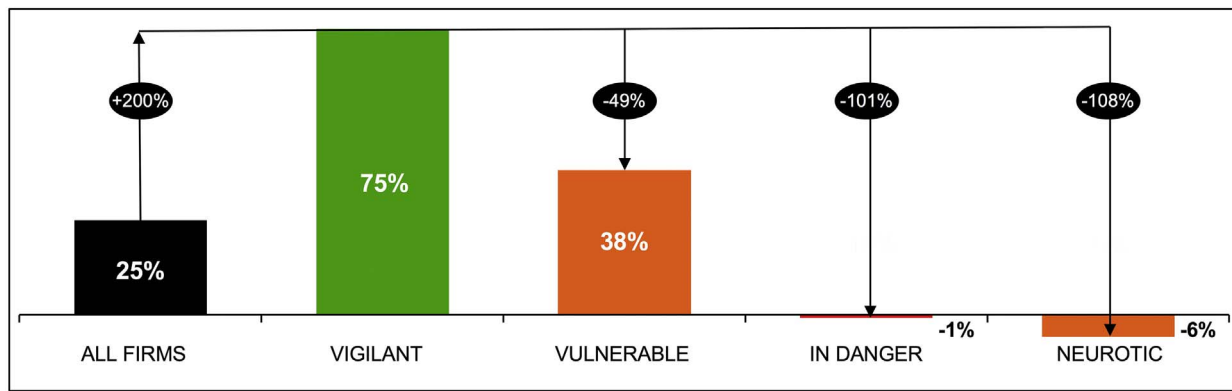
Fig. 11. Average market capitalization growth in future preparedness levels.

particular, the usage of the migration analysis in which we could track the relative competitive position of a firm vis-à-vis its peers in the industry provided us with a dependent variable that can be judged to be highly robust.

To assess future preparedness, we relied on the corporate foresight maturity model (Rohrbeck, 2010a; Rohrbeck, 2010b); however, we introduced the process level, which we believe to have been an important innovation to improve the measurability of the construct. While the earlier version, with its five dimensions, made it easy to link measurement to improvement steps, our new, three-process-step (3Ps) version (see Appendix A, Table 3), which employs Likert scales, has advantages when measuring large populations of firms. In our research, we proposed the dimensions of perceiving, prospecting, and probing, which are inspired by Choo's 'knowing organization' framework as well as Daft and Weick's model of organizations as interpretation systems (Choo, 1996; Daft and Weick, 1984). Our 3P model permits us to derive a more meaningful overall assessment and makes it possible to compare the maturity with the need level.

To construct the need level, we relied on Day and Schoemaker' (2005) scales on the complexity and volatility of the environment. This allowed us to control for industry differences. For future research, we recommend further enhancement of the measurement of CF need by adding two additional dimensions. First, we would follow the suggestions by Day and Schoemaker (2005) to include a "nature of strategy" dimension. However, our conceptualization of preference would not be to the scale of Day and Schoemaker, but rather the strategic orientation scale proposed by Miles and Snow, in which they differentiated a prospector, analyser, defender, and reactor strategy type (Miles et al., 1978). This would allow us to also control for inter-firm differences that occur between, for example, two firms in one industry of which one is an innovation leader and the other uses an innovation follower strategy. In addition, we believe that CF need is also driven by environmental hostility, or, as Michael Porter would call it, "rivalry" (Porter, 1979). As an environmental hostility scale we suggest the scale of Calantone et al. (1997).

Another important avenue for future research is simply to use larger samples. This would not only allow the replication of our study design, but it would also control for additional variables such as R&D intensity, past firm performance, investments, and ownership structures that influence firm performance.

6. Conclusion

Our study was motivated by the lack of evidence on the impact of CF

on firm performance. We explained the challenges associated with investigating the relationship, including the many other factors that influence the relationship and the time lag that must be expected between the exercising of superior CF practices, the adoption of a superior course of action and the effect on firm performance. To account for the time lag, there have been noteworthy single-case studies in which, for example, Gavetti and Menon (2016) show how Charles Merrill exercised strategic foresight to create the financial supermarket business model, revolutionize the industry, and attain a superior position in this transformed market.

To our knowledge, our study is the first to be able to report on the strategic foresight maturity of companies and its impact on firm performance in a large dataset. Our study has produced strong evidence for the positive impact of CF on firm performance. We used a seven-year time-lag to allow for the translational processes from corporate-foresight insight, to action, to value appropriation. We also used five different assessment approaches to overcome the limitations of one with the strengths of another technique. The analysis revealed that future prepared firms (vigilant) had a significantly higher likelihood of making it to the group of industry outperformers. We further calculated the positive performance impact of being future prepared. This analysis revealed that vigilant firms had a 33% higher profitability and a 200% higher market capitalization growth when compared with the sample average. The firms with future preparedness deficiencies had to accept a profitability discount (when compared to vigilant firms) of 37% to 44%. The discount effect for the firms with deficiencies was even greater on market capitalization and ranged from − 49% to − 108%.

An additional contribution for future research is the introduction of the 'future preparedness' construct, which is robust against industry-related confounding effects, and with the addition proposed above of the strategic orientation scale from Miles et al. (1978), it can also control for firm-specific confounding effects. We also proposed new scales and an enhanced model for measuring CF maturity and CF need. We hope that this will ease future research that is designed to further validate the positive effect of CF on firm performance. Our research also emphasizes the need to engage in multi-modal research, which complements large-scale survey data with migration analysis and qualitative analysis on the level of the individual firm.

We hope that our study can also enhance our understanding about how firms need to prepare to address disruptive change in the environment, to become more resilient and to be able to drive more long-term transformational strategies, which we also need to make our economies and societies more sustainable.

Appendix A

Table 3
Questionnaire and scale origin.

Environmental complexity	Based on Day and Schoemaker (2005) (original 8 items)

1. Does your company have a high number of competitors?
2. Are your company's competitors easily identifiable?
3. Are the actions of your competitors, contractors and customers predictable?
4. How strongly is your company affected by governmental decisions?

Environmental volatility	Based on Day and Schoemaker (2005) (original 12 items)

1. How strongly has your company been affected by major changes in the corporate environment in the past three years?
2. How strongly is your company affected by financial markets?
3. How strongly is your company influenced by the world economy?
4. How well can the speed of technological change be estimated in your industry sector?
5. How well can the direction of technological change be forecasted in your company's industry sector?
6. How well can the behavior of your company's stakeholders (competitors, contractors, customers, etc.) be forecasted?

Information usage	Based on Rohrbeck (2010b)

1. We are scanning current and adjacent businesses, as well as in unrelated areas.
2. We are scanning the technological environment.
3. We are scanning the political environment.
4. We are scanning the economic environment.
5. We are scanning the socio-cultural environment.
6. We are proactively scanning in both the long and medium term.
7. We use a large variety of sources.
8. We are using restricted or exclusive sources, such as personal contacts which yield a competitive advantage.

Method sophistication	Based on Rohrbeck (2010b)

1. We use methods that allow integrating market and technology perspectives as well as different time horizons.
2. We use methods that strongly support internal communication.
3. We use methods that strongly support external communication.
4. We select each of our SF methods to solve a specific problem.
5. Our methods have been chosen to reflect the specific context of our company (e.g., volatility of the environment).

People	Based on 'people' items from the 'people and networks' scale from Rohrbeck (2010b)

1. Foresighters in our company have a broad knowledge reaching beyond their own domain.
2. Foresighters in our company have a strong internal network.
3. Foresighters in our company have a strong external network.

Networks	Based on the 'networks' items from the 'people and networks' scale from Rohrbeck (2010b)

1. SF insights are rapidly diffused throughout the company.
2. SF insights are diffused mostly in a formal manner.
3. SF insights are diffused mostly in an informal manner.
4. What are the main obstacles faced by foresighters in your company?

Organization	Based on Rohrbeck (2010b)

1. Our SF activities are issue driven (i.e., directed by a specific question).
2. There are continuous SF activities in place (e.g., scanning for emerging technologies with disruptive potential).
3. Our SF activities are triggered top-down (e.g., by top management).
4. Our SF activities are triggered bottom-up.
5. Our SF activities are linked to corporate development.
6. Our SF activities are linked to strategic management.
7. Our SF activities are linked to innovation management.
8. Our SF activities are linked to R&D.
9. Our SF activities are linked to strategic controlling.
10. Our SF activities are linked to marketing.
11. In our company every employee is responsible for detecting weak signals.
12. There are incentives in place that reward scanning for change.

Culture	Based on Rohrbeck (2010b)

1. In our company, information is shared freely across functions and hierarchical levels.
2. Our company encourages building and maintaining an external network.
3. Most people in our company are actively scanning the periphery.
4. Basic assumptions are explicitly and frequently challenged.

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