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(When) Are Dynamic Capabilities Routine? A Mixed-Methods Configurational Analysis

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ABSTRACT Dynamic capabilities research is hampered by a theoretical divide. This divide concerns, first, whether dynamic capabilities are routine or not, and, second, whether firms in dynamic environments deploy routine or non-routine dynamic capabilities. The divide is significant for theory, as it pertains to the conceptualization and boundary conditions of dynamic capabilities. The present study offers a pathway for reconciling the divide by overcoming the bifurcation of routine and non-routine dynamic capabilities that dominates the debate. Conceptually, we relax extant assumptions on dynamic capability routineness by allowing for the possibility that dynamic capabilities may vary in dimensions of their routineness (i.e., the frequency and structuring of dynamic capability activities). Findings of a fuzzy-set Qualitative Comparative Analysis of 103 firms operating in more and in less dynamic environments reveal four configurations of dynamic capabilities (i.e., Experimental, Adaptive, Programmed, and Analytical) that fundamentally differ in their routineness. Moreover, we find that environmental dynamism does not constitute a boundary condition for the routineness of dynamic capabilities. In-depth analyses of 16 cases suggest that the different dynamic capability configurations we observe depend not only on environmental dynamism but also on distinct intra-firm conditions (i.e., organizational learning orientations and resource allocations). As its main contribution, this study offers a configurational framework explaining heterogeneity in the routineness of dynamic capabilities that advances our understanding of the nature and boundary conditions of dynamic capabilities.

Keywords: configurational perspective, dynamic capabilities, fsQCA, mixed methods

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INTRODUCTION

Scholars have commonly conceived dynamic capabilities as patterns of recurrent collective activity through which firms adapt to changing environmental circumstances, meet novel challenges, and exploit opportunities by systematically modifying their operating processes (Eisenhardt and Martin, 2000; Helfat et al., 2007; Teece et al., 1997; Zollo and Winter, 2002). Dynamic capabilities have received considerable attention in strategic management and beyond, as they provide a means for achieving organizational adaptation and performance benefits (Fainshmidt et al., 2016; Karna et al., 2016).

Despite a large amount of research on dynamic capabilities, a number of issues remain that invite further investigation. One long-standing debate concerns whether it is appropriate to conceptualize dynamic capabilities as being 'routine', that is, as highly structured patterns of activities that firms deploy at high frequency (Kurtmollaiev, 2020; Schilke et al., 2018; Wenzel et al., 2021; Wohlgemuth and Wenzel, 2016). Some scholars stress that firms deploy routine dynamic capabilities in dynamic environments (Winter, 2003; Zollo and Winter, 2002). Others argue that firms will *not* deploy routine dynamic capabilities in dynamic environments, as routines tend to turn capabilities into rigidities (Salvato and Vassolo, 2018; Schreyögg and Kliesch-Eberl, 2007). Instead, firms in dynamic environments utilize non-routine, experimental, and semi-structured dynamic capabilities (Eisenhardt and Martin, 2000).

The debate concerning the routineness of dynamic capabilities and the conditions under which firms deploy routine dynamic capabilities is significant for theory. More than 30 years after the inception of the concept, scholars still debate the conceptualization of dynamic capabilities (Kurtmollaiev, 2020). The divergent conceptualizations of dynamic capabilities as routine or not have impeded the coherence of the theory (Di Stefano et al., 2014). As individual scholars build their work on juxtaposed conceptualizations of dynamic capabilities, closed scholarly worlds have tended to limit constructive dialogue across the different positions (Peteraf et al., 2013). The conceptual divide is significant for theory, as the positions in the debate differ with regard to whether routineness constitutes a defining characteristic of dynamic capabilities and when, that is, under which conditions of environmental dynamism, routine dynamic capabilities are deployed (Peteraf et al., 2013). While scholars often discuss these issues as conceptual divides (Di Stefano et al., 2014; Peteraf et al., 2013; Wenzel et al., 2021), they lend themselves to empirical scrutiny. However, empirical studies on dynamic capabilities have largely ignored the question of when firms deploy routine or non-routine dynamic capabilities (Schilke et al., 2018; Wohlgemuth and Wenzel, 2016).

Based on mixed-methods configurational analysis, the present study seeks to contribute to this debate by abductively developing a theoretical framework offering one way of reconciling the noted divide in dynamic capabilities research. While a number of different labels have been proposed for the activities underlying dynamic capabilities, Teece's (2007) conceptualization has gained the greatest prominence (Schilke et al., 2018). It highlights three activities – sensing, seizing, and reconfiguring – constituting dynamic capabilities.[1] As dynamic capabilities thus subsume a set of distinct constituent activities, it seems overly general to view dynamic capabilities per se as either routine or not. Rather, we offer a more nuanced conceptualization that allows for the possibility that the

three constituent activities of dynamic capabilities may each vary independently in their routineness, thus going beyond the bifurcation of dynamic capabilities as routine or not that fuels the debate.

Moreover, we go beyond a unitary conceptualization of dynamic capability routineness in a second way by loosening the assumption of much of dynamic capabilities research that routine dynamic capabilities involve the high-frequency deployment of highly structured patterns of activities. According to the foundational contribution of Nelson and Winter (1982), routine capabilities involve repeated similar interaction patterns (Becker, 2004, 2005). This conceptualization implies that the routineness with which firms deploy dynamic capabilities can be gauged in terms of the frequency and structuring of sensing, seizing, and reconfiguring activities, as high execution frequency and structuring of activities will lead to repeated and similar interaction patterns (Cyert and March, 1963; March and Simon, 1958). We thus acknowledge the possibility that the dimensions of dynamic capability routineness need not always be tightly coupled. For instance, firms may perform their dynamic capability activities at high frequency, in order to be able to keep track of and respond to changing market conditions, yet not rely on highly structured sensing, seizing, and reconfiguring activities. Or they may deploy highly structured dynamic capability activities that follow fixed, formal execution rules that prescribe, for instance, the use of specific observation, analysis, or decision-making methods, yet utilize their dynamic capabilities only once a year in the context of an annual strategic planning process.

If the frequency and structuring of dynamic capabilities may vary independently and across the three constituent dynamic capability activities of sensing, seizing, and reconfiguring, it seems possible that firms can realize more complex configurations of dynamic capabilities in environments of high and low dynamism than previous research has envisaged. A configurational view is particularly suited to uncover such complex conjunctions of dynamic capabilities and contextual factors (Fainshmidt et al., 2019; Misangyi et al., 2017; Wilden et al., 2016). This is because a configurational view allows researchers to identify constellations of conceptually distinct elements that commonly occur together (Meyer et al., 1993) and display internal coherence (Wilden et al., 2019).

Accordingly, we utilize fuzzy-set Qualitative Comparative Analysis (fsQCA) (Ragin, 2000, 2008) – an analytical approach conceived to uncover configurations – to explore the routineness of dynamic capabilities (conceptualized via high or low frequency and structuring of sensing, seizing, and reconfiguring activities) deployed by 103 German small and medium-sized enterprises (SMEs) that operate in environments of high or low dynamism. In line with the notion that dynamic capabilities are rare (Ambrosini and Bowman, 2009), we find that 20 firms deployed one of four distinct dynamic capability configurations (i.e., Experimental, Adaptive, Programmed, and Analytical). Firms operating in high environmental dynamism realized three different configurations of dynamic capabilities. Some firms deployed highly structured dynamic capabilities at high frequency, that is routine dynamic capabilities (Programmed configuration); others deployed semi-structured dynamic capabilities only sparingly (Adaptive configuration); yet others relied on dynamic capabilities that are deployed at high frequency and only semi-structured (Experimental configuration).

Contrary to the opposing notions in extant research (Eisenhardt and Martin, 2000; Peteraf et al., 2013; Zollo and Winter, 2002), we thus find that environmental dynamism does not represent a discriminating condition for when the studied firms utilize routine dynamic capabilities, and when they rely on experimental, semi-structured activities. This raises the question of which other conditions can help to explain the different configurations of dynamic capabilities we observe. As such conditions have remained largely unexplored (Fainshmidt and Frazier, 2017; Schilke et al., 2018), we complement our fsQCA analysis by in-depth case analyses for 16 of the 20 cases displaying consistent dynamic capability configurations, covering all four configurations we found. On this basis, we generate a theoretical framework proposing that the interaction of two intra-firm conditions can help us understand when firms deploy a particular configuration of dynamic capabilities under conditions of high, respectively low, environmental dynamism: (1) organizational learning orientation (an entrepreneurial versus a problem-solving mode) and (2) the extensiveness of resource allocations towards dynamic capabilities.

As its main contribution, this study provides novel evidence and theory on when firms deploy routine dynamic capabilities. It reveals a greater variety of dynamic capability configurations than the bifurcation of routine and non-routine dynamic capabilities suggests, which has dominated the debate in dynamic capabilities research. Furthermore, this study adds to pertinent theorizing the notion that a particular learning orientation and resource allocation can additionally shape how firms deploy dynamic capabilities. Taken together, the theoretical framework we propose suggests a novel way of bridging the divide between the two main suppositions concerning the routineness of dynamic capabilities in dynamic environments (Peteraf et al., 2013).

THEORETICAL BACKGROUND: DYNAMIC CAPABILITIES

Within research on dynamic capabilities, there exists considerable disagreement with regard to the conceptualization of dynamic capabilities as being routine or not. The debate has mostly been waged at the conceptual level (Helfat and Peteraf, 2016; Peteraf et al., 2013; Wenzel et al., 2021). Only a few studies have addressed the issue empirically. The survey of small German manufacturing firms by Wohlgemuth and Wenzel (2016) finds that highly routine strategic-level activities are positively associated with dynamic capabilities. The comparative case study of 13 Irish metal and paint manufacturers by Hilliard and Goldstein (2019) reveals a positive association between the routineness of firms' search behaviour and change in operating processes, under conditions of environmental change. In contrast, Brown and Eisenhardt's (1997) inductive study of multiple-product innovation in six firms in the computer industry shows that firms deploy non-routine dynamic capabilities. Likewise, Salvato's (2009) longitudinal case study at Alessi finds no evidence of any routine dynamic capabilities driving the continued renewal of the product development process. It is difficult to derive over-arching conclusions from these prior studies. While they seem to suggest that dynamic capabilities can vary in their routineness, the studies focus on different activities constituting dynamic capabilities and conceptualize routineness in different ways.

The debate on the routineness of dynamic capabilities has mainly applied a bifurcated view, contrasting routine and non-routine dynamic capabilities. It has thus implicitly ignored the possibility that the two dimensions of dynamic capability routineness – frequency and structuring – might be only loosely coupled (Orton and Weick, 1990), that is, may vary independently and across the three constituent dynamic capability activities of sensing, seizing, and reconfiguring. Moreover, the studies cannot inform on the theoretical question that forms the core of the scholarly debate, as they do not contrast the routineness of dynamic capabilities under low and high levels of environmental dynamism.

Environmental Dynamism as a Boundary Condition for Routine Dynamic Capabilities

One important issue in the scholarly debate on dynamic capabilities concerns the question of whether or not firms utilize routine dynamic capabilities in dynamic environments (Peteraf et al., 2013). This is a theoretically significant question, as boundary conditions describe the limits of the generalizability of a theory, depicting 'the accuracy of theoretical predictions for any context' (Busse et al., 2017, p. 578).

Scholars of dynamic capabilities have made different theoretical claims in this regard. Some argue that firms deploy routine dynamic capabilities in rapidly changing environments, as the routine activities underlying dynamic capabilities provide a cost-effective solution for realizing adaptive change (Teece et al., 1997; Zahra et al., 2006; Zollo and Winter, 2002). In contrast, other scholars challenge the notion that firms deploy routine dynamic capabilities in rapidly changing environments. Schilke (2014, p. 183) argues that when environmental dynamism is high, 'the high frequency of novel situations and the necessity to bring about discontinuous organizational change in these settings make the routine-based mechanisms dynamic capabilities rest on comparatively less appropriate'. Rather, according to Eisenhardt and Martin (2000, p. 1106), 'in high-velocity markets… dynamic capabilities take on a different character. They are simple, experiential, unstable processes that rely on quickly created new knowledge and iterative execution to produce adaptive, but unpredictable outcomes.'

Highly influential papers have thus offered contrasting notions with regard to environmental dynamism as a potential boundary condition of dynamic capability deployment. However, despite burgeoning research on dynamic capabilities, we have only limited empirical evidence illuminating this important theoretical issue (Schilke et al., 2018). A few single-case studies provide detailed descriptions of the activities constituting dynamic capabilities under the particular environmental and intra-firm conditions of the studied case (e.g., Danneels, 2011; Salvato, 2009; Verona and Ravasi, 2003). As they focus on a single case, they are not suited, however, to inform on how firms deploy dynamic capabilities under different environmental conditions. Moreover, synthesis of findings across cases remains difficult due to the particularities of the studied cases and their environments (Hoon, 2013).

Unfortunately, we lack comparative case studies that scrutinize the routineness of dynamic capabilities under high and low environmental dynamism. A few large-scale surveys do provide comparative data. Yet these studies also provide only partial representations of routineness, the activities constituting dynamic capabilities, and/or environmental dynamism. Gelhard et al. (2016) and Schilke (2014), for instance, do not measure dynamic

capability routineness. Wilden and Gudergan (2015) focus on the frequency of sensing and reconfiguring activities. They report that firms in both stable and turbulent market and technological environments rely on the frequent use of dynamic capabilities. Wohlgemuth and Wenzel (2016) exclude from their main analysis all cases that did not exhibit a high level of environmental dynamism. Yet they mention that a sensitivity test showed that the observed routineness of dynamic capabilities does not vary with environmental dynamism.

Although these empirical studies provide valuable insights, we thus still lack research that has directly addressed the core of the debate by shedding light on when – that is, under which contextual conditions – firms will deploy routine dynamic capabilities (Peteraf et al., 2013). The present study seeks to inform on this question.

METHODS

To address our research question, we relied on a mixed-methods approach. As the first step, we used fsQCA (Ragin, 2000, 2008) to identify configurations of dynamic capabilities differing in routineness (high or low frequency and structuring of sensing, seizing, and reconfiguring activities) in environments of high or low dynamism. This technique is particularly well-suited to uncovering complex configurations of interconnected elements (Fiss, 2007; Misangyi et al., 2017). As the second step of our empirical analysis, we conducted in-depth qualitative analyses of individual cases and cross-case comparisons (Edmondson and McManus, 2007; Eisenhardt, 1989) to validate the findings of the fsQCA and better to understand the dynamic capability configurations we discovered during the first step. We then relied on the replication logic of the comparative case study approach (Eisenhardt, 1989; Yin, 2014) to explore the conditions of distinct dynamic capability configurations. In what follows, we describe our mixed-methods approach in more detail in order to ensure the required transparency in qualitative research (Aguinis and Solarino, 2019).

Case Selection

Because our goal is to explore the routineness of dynamic capabilities across different contextual conditions, we selected cases relying on the diverse case method (Seawright and Gerring, 2008). This method selects cases such that they reflect the variance within focal, theoretically relevant dimensions. To select firms likely to possess dynamic capabilities, we focused on small- and medium-sized industrial firms (SMEs) in Germany (employing between 40 and 500 people), because German Mittelstand firms are known for their ability to adapt quickly and successfully to changing circumstances (De Massis et al., 2018). To obtain cases from high and low dynamic environments, we focused on SMEs operating in three industrial sectors in Germany: manufacture of machinery and equipment (NACE code C28), rubber and plastics manufacturing (NACE code C22), and paper manufacturing and processing (NACE code C17). These industries differ fundamentally across categories of environmental dynamism, as reflected by core indicators emphasized by prior research (Pavlou and El Sawy, 2011; Protogerou et al., 2012): R&D expenditure, completion of innovation projects, and sales generated with product innovations (Child, 1972; McCarthy et al., 2010). Table I highlights the industry differences across these indicators.

Table I. Industry differences in indicators of environmental dynamism

	R&D expenditure		*Successfully completed innovation projects**	*Sales generated by product innovations**
Industry	*5-year mean (in billions EUR)*	*Percentage of sales*	*Percentage*	*Percentage*
Machinery and equipment manufacturing	13.0	5.6	72	27
Rubber and plastics manufacturing	2.0	2.6	59	14
Paper manufacturing and processing	0.6	1.5	49	13

*5-year mean. *Sources*: Statistisches Bundesamt (2010); ZEW (2013).

To obtain a wide variety of dynamic capability configurations, we decided to cast a wide net and collected data on 200 SMEs, forming a convenience sample.[2] Not all of these 200 SMEs matched our case selection criteria, however, so this number does not indicate our final sample size. We applied the same methodological approach as Fiss (2011, p. 402), who provides an extensive explanation of why the reliance on non-random samples is not an issue for case study–based research, such as fsQCA. We used a convenience sample because we got access to these data (Wilhelm et al., 2015), because the cases represent a broad range of values for particular, theoretically derived concepts, and because our goal – as is common in case study research (Eisenhardt, 1989; Yin, 2014) – was theory development and thus analytical generalizability and not statistical representativeness (Eisenhardt, 2021).

We focused on the deployment of dynamic capabilities in the functional area of procurement. Procurement processes involve the identification, sourcing (including market research as well as vendor selection and evaluation), bidding, and contracting of all externally provided material resources that a firm needs or may need to fulfil its strategic objectives (Turner, 2011). Given its operational and strategic significance (Chen et al., 2004), we suggest that procurement represents a not yet widely recognized (Brandon-Jones and Knoppen, 2018; Wilhelm et al., 2015) but potentially fruitful domain for studying dynamic capabilities.

Due to the small size and low professionalization of some of these 200 SMEs, some cases may lack standard procurement processes. This presents a potential problem, because – as we explain later in the Methods section – we use change in operating processes as an outcome to identify dynamic capability configurations by means of fsQCA. In cases lacking a standard procurement process, this outcome cannot be captured in a valid and reliable way, because operating process change presumes the existence of a regular operating process. To avoid this threat to the validity and reliability of our analyses, we needed to remove cases that lacked a standard procurement process. To do so, we cleared the data set of cases exhibiting below-sample median (4.0) values for Perrow's technology measure. We used this measure because it captures core characteristics of standard processes, i.e., the number of exceptions and the analysability of a task (Cronbach's alpha = 0.87) (Withey et al., 1983).

This operation reduced our data set to 103 cases in total that match our case selection criteria.[3]

Data Sources

We collected archival data, annual reports, and press releases on characteristics of the studied firms as well as survey data via a structured online questionnaire. The respondents were managers responsible for procurement (either as heads of the procurement department or, in the case of smaller firms, as the firms' top managers). To validate the questionnaire responses, we compared archival firm data (e.g., on the number of employees, sales, and firm age) obtained from the Markus database as well as from press releases and annual reports with the respective questionnaire responses. We found that the two did not differ substantially. To validate the survey responses (for instance on the firms' procurement processes), we obtained data from a second respondent within the originally sampled 200 firms for 10 per cent of the cases and 10 per cent of the study variables. We found substantial agreement ($\kappa_\gamma = 0.67$, $p = 0.00$) in the two responses from the same firm (Gwet, 2014; Klein, 2018).

To validate, enrich, and extend the findings of the fsQCA analysis, we conducted semi-structured interviews with top managers as well as procurement managers and staff from 16 firms deploying consistent dynamic capability configurations we identified via fsQCA. In addition, we conducted site visits and gathered archival firm records. These multiple data sources form the basis for exploring the conditions shaping the found dynamic capability configurations in the second step of our empirical analysis.

First Step: Analytical Approach for Identifying Dynamic Capability Configurations

We applied fsQCA (Ragin, 2000, 2008) to identify different dynamic capability configurations composed of sensing, seizing, and reconfiguring activities that vary in their frequency (high/low) and structuring (high/low) under high and low dynamic environmental conditions. Because pertinent research indicates that dynamic capabilities drive operating process change (Karna et al., 2016; Schilke et al., 2018), we used the presence of procurement operating process change to uncover dynamic capability configurations.

Outcome and explanatory conditions

Operating process change. To measure the extent of process change, we asked respondents to describe their procurement process twice, at the time of the survey and five years earlier. Our pre-test indicated – in line with prior research (Vergne and Depeyre, 2016) – that five years provide a time frame that ensures sufficient variance between firms (i.e., some firms will not change, others will change their procurement process extensively). To ensure comparable responses in the description of the procurement process, we presented generic procurement process steps and corresponding procurement practices to the respondents that we derived from procurement-process norms (ISO-Norm DIN EN ISO 9004:2005/9001, 2008) and pre-test field interviews. The procurement process steps

were: specifying goods; searching for suppliers; contracting; tracking orders; scheduling incoming goods; and inspecting incoming goods. For each of these steps, we provided respondents with predefined procurement practices that the respective procurement process step might entail (e.g., for searching for suppliers: [1] trade fairs, [2] local supplier search, [3] global supplier search, [4] multi-supplier catalogue). We measured the extent of change in the procurement process by counting the number of procurement practices that the firm had changed over the last five years, based on these procurement process descriptions (min.: 0; max.: 7).

Dynamic capabilities. Following the most widely applied conceptualization, we captured dynamic capabilities on the basis of their constituent activities: sensing, seizing, and reconfiguring (Teece, 2007). To ensure that respondents shared a common understanding of each activity in the context of procurement, we provided descriptions of each dynamic capability activity in managerial language. For sensing, we explained that it refers to 'the observation of procurement-relevant factors outside of the firm (e.g., market, technology, regulation, customers) and within (e.g., process improvement potentials, process disruptions)'. For seizing, we stated that it covers 'learning of procurement-relevant knowledge both from sources outside of the firm (e.g., suppliers, competitors) and within (e.g., experience of employees)'. For reconfiguring, we clarified that it covers 'how the procurement department, on the basis of the knowledge gained (e.g., new sourcing strategies), develops and tests measures for triggering changes in the procurement process (e.g., switching from local to global sourcing)'. Extensive pre-tests, based on a think-aloud protocol provided by 12 managers working for SMEs in the industries studied, demonstrated that these elucidations provided survey respondents with a clear understanding of sensing, seizing, and reconfiguring activities in the context of procurement processes.

Furthermore, we needed to ensure temporal precedence of explanatory conditions relative to the outcome. Thus, we followed the recommendations of Drnevich and Kriauciunas (2011) and asked managers to report on the dynamic capability activities' frequency and structuring five years prior to the survey. This approach is suitable, because all explanatory conditions captured by the survey are factual in nature (e.g., the frequency of sensing activities or the extent to which they are structured), and the survey pre-test suggested that respondents usually draw on their files to answer these questions.[4]

To measure the frequency of dynamic capability activities, we followed past research (Protogerou et al., 2012; Wilden and Gudergan, 2015) and asked survey respondents three questions (i.e., one question for each of the dynamic capability activities described earlier) on 'five years ago: how often did your procurement department perform…' procurement-related (1) sensing, (2) seizing, and (3) reconfiguring activities, respectively. The scale applied to each of these three questions was as follows: *daily*, *weekly*, *monthly*, *once a quarter*, or *once a year*. Survey responses covered the full frequency scale spectrum for sensing, seizing, and reconfiguring activities (min.: 1, max.: 5).

To measure the structuring of dynamic capability activities, we followed prior research and operationalized structuring via organizational rules (Davis et al., 2009; Zollo and Winter, 2002). Organizational rules define how employees should carry out particular activities. They will lead to repeated and similar interaction patterns and are thus indicative of routine execution (March and Simon, 1958). Again, respondents were asked three questions (i.e., one question for each dynamic capability activity) on whether five years ago,

'the procurement department had written standard operating procedures that prescribe activity patterns to be performed when engaging in…' procurement-related (1) sensing, (2) seizing, and (3) reconfiguring activities, respectively. The answers were rated on a 5-point Likert scale (1 = *fully disagree* to 5 = *fully agree*). Responses covered the full structuring scale spectrum for sensing, seizing, and reconfiguring activities (min.: 1, max.: 5).

Environmental dynamism. The measure of environmental dynamism draws on established objective indicators characterizing the three studied industries (manufacture of machinery and equipment, rubber and plastics manufacturing, and paper manufacturing and processing), as outlined in Table I.

Calibration

To capture meaningful differences in kind and degree among cases, fuzzy-set analysis requires all measures to be calibrated (Fiss, 2007; Ragin, 2008). Calibration determines the extent to which each empirical case is a member of a particular set (e.g., to what extent a case is a member of the set *high-frequency sensing*). This article's online Appendix 1 provides a detailed description of our calibration.

Fuzzy-set qualitative comparative analysis

To ensure transparency, our analysis is based on the established software package fsQCA version 2.5 (Ragin and Davey, 2009). To explain which (configurations of) conditions drive an outcome (e.g., operating process change), fsQCA identifies necessary and sufficient conditions. We found no necessary conditions (consistency threshold: 0.9; Ragin, 2006).

To uncover sufficient conditions, we used fsQCA 2.5's Quine-McClusky truth-table algorithm. The algorithm uses Boolean algebra to reduce the truth table rows to less complex expressions (i.e., configurations of conditions).[5] We followed Gelhard et al. (2016) and employed a threshold of two cases per truth-table row. While this frequency threshold captures most (74 per cent) of our 103 empirical cases for the analysis, it also reduces the impact of possible outliers and measurement errors on our analysis (Ragin and Fiss, 2008). We applied a consistency threshold of 0.825, which is stricter than Ragin's (2008) recommendation (0.80). Based on this frequency and consistency threshold, all rows in the truth table that exhibited the outcome showed PRI values (proportional reduction in inconsistency) (min.: 0.71, max.: 0.87) exceeding the 0.65 threshold suggested by Schneider and Wagemann (2012, p. 242). This suggests that our explanatory conditions are subsets of the outcome (and not the absence of the outcome). To ensure the robustness of our findings, we ran extensive robustness checks.[6] As a result of our first analytical step, the fsQCA identified 20 firms (out of a sample of 103 firms) that consistently deploy one out of four distinct configurations of dynamic capabilities.

Second Step: Analytical Approach for Identifying Conditions Shaping Dynamic Capability Configurations

In the second step of our empirical analysis, we applied a comparative case study approach (Eisenhardt, 1989; Yin, 2014) and employed elements of grounded theorizing (Corley, 2015; Strauss and Corbin, 1998). This approach seems particularly well

suited for our research question as it allows one to gain an in-depth understanding of the distinct dynamic capability configurations identified in step one and explore the so far under-researched conditions shaping these configurations. Combined with the insights of the fsQCA, these subsequent in-depth case analyses enabled us to generate abductively a novel theory on when firms deploy particular dynamic capability configurations.

Sample of cases and data collection. We contacted each of the 20 firms deploying the distinct dynamic capability configurations we had identified in our fsQCA, of which 16 agreed to participate, covering all found dynamic capability configurations. This selection of a diverse set of cases allowed us to apply the replication logic of a comparative case study approach (Eisenhardt, 1989; Yin, 2014).

The *semi-structured interviews* were our main source of data (see this article's online Appendix 2 for details). We interviewed 23 individuals (20 male and 3 female) in 19 interview sessions, each lasting 45 minutes on average. In most of the cases, two of the authors conducted the interviews. We digitally recorded and transcribed the interviews and complemented them by field notes to ensure reliability (Eisenhardt, 1989). The interviewees were the firms' general managers and/or procurement managers and in some cases included procurement staff. The flat hierarchies of the studied SMEs, the small unit sizes of their procurement departments, and a long job tenure of 12.31 years on average enabled the interviewed managers to provide sufficient, detailed information. We stopped adding new interview partners once the interviewees did not provide additional themes or insights (Strauss and Corbin, 1998) yet used archival data and site visits to complement the interview data. Table II presents details on our interviews.

We gained insights into several *archival records* regarding our case study firms. Documents such as process descriptions, process evaluations, or ISO certifications (as well as the lack thereof) allowed us primarily to collect background information and validate our interview and fsQCA findings with regard to the frequency and structuring of sensing, seizing, and reconfiguring activities within the procurement function.

In five cases, we conducted additional *site visits* of 30 to 60 minutes, which we documented with field notes. The site visits allowed us to further build up the depth of our data. For example, the particular accentuation on an entrepreneurial learning orientation in one interview became clearly visible when the site visit revealed paperless offices, innovative production facilities, and pioneering employee programs (all of which stood in sharp contrast to the remote and rural location of our medium-sized Swabian case study firm). Similarly, meeting rooms provided and designed specifically for performing training courses and continuous improvement gatherings or a virtual sandbox to simulate changes in operating processes nicely illustrated the extensiveness of resource allocations towards dynamic capabilities.

Data analysis. We engaged in iterative cycles of data collection and data analysis allowing us to move back and forth between the data collected from the multiple sources described previously and existing literature (Aguinis and Solarino, 2019). We analysed the qualitative data using MAXQDA software and following procedures

Table II. Semi-structured interviews

Dynamic capability configuration	*Configuration I 'Experimental'*	*Configuration II 'Adaptive'*	*Configuration III 'Programmed'*	*Configuration IV 'Analytical'*
Firms covered (id)	1, 3, 4, 12, 13, 15, 16, 17	5, 8, 9, 18, 19	6, 10, 11, 2, 20	7, 14
No. of firms covered	8	5	5	2
No. of firms selected for interviews	7	3	4	2
No. of interviews	9	3	5	2
No. of interviewees	11	3	6	3
No. and position of interviewees	Head of procurement (5×)	Head of procurement (2×)	Executive manager (3×)	Head of procurement (2×)
	Strategic procurement manager (1×)	Head of strategic procurement (1×)	Head of procurement (2×)	Procurement staff (1×)
	Procurement manager (1×)		Co-owner and head of procurement (1×)	
	Procurement staff (4×)			

recommended by Miles et al. (2013) as well as Strauss and Corbin (1998). Better to understand the dynamic capability configurations and their conditions, we conducted within-case analyses, which we then extended across cases to code our data. Three coders (i.e., two authors and one research assistant) independently engaged in this process to ensure reliable coding. We discussed codes and categorizations until we found strong agreement. Whenever we disagreed, we modified categories to achieve convergence. At first, we sought a richer and more reliable understanding of each dynamic capability configuration derived from the fsQCA. Therefore, we closely aligned our notion and coding of routine and non-routine dynamic capabilities with the conceptualization from extant empirical studies that had guided the fsQCA (e.g., 'sensing frequency' from Protogerou et al., 2012; Wilden and Gudergan, 2015). Accordingly, we searched interview data and archival records for concrete examples of sensing, seizing, and reconfiguring activities and analysed indications of execution frequency (e.g., weekly, monthly, quarterly) as well as structuring (e.g., written standard operating procedures). The detailed case descriptions resulting from this process enriched the fsQCA findings and additionally validated them as we found major similarities for each case.

Based on this sound understanding of the different dynamic capability configurations, we engaged in open coding (Strauss and Corbin, 1998) to explore the conditions shaping these configurations by breaking up raw data and looking for similarities and differences. This procedure resulted in phrasal descriptions of first-order codes, which we re-evaluated based on site visits and archival data (Tylor et al., 2016). In the subsequent higher-order coding, we uncovered relationships between first-order codes, probed the emergent categories with existing literature, and built aggregate dimensions. Figure 1 illustrates how we derived the aggregate dimensions 'learning orientation' and 'resource allocations' from our raw data (Pratt, 2009).

A final axial coding (Strauss and Corbin, 1998) allowed us to identify specific combinations of a firm's learning orientation and resource allocations as important conditions of dynamic capability activities' frequency and structuring and thus distinct dynamic capability configurations. This method helped us in understanding and theorizing the nature of dynamic capability configurations and the conditions shaping these configurations.

FINDINGS

Table III depicts the findings of the fsQCA conducted in step one of our research project. Given our aim to generate a novel theory from the data, it is not appropriate to impose a priori structure on how the explanatory conditions relate to the outcome. Therefore, we present the complex fsQCA solution (Ragin, 2000). To depict the characteristics of the found configurations, we use the notation suggested by Ragin and Fiss (2008). In this notation style, black dots (●) indicate the presence of a condition, while crossed circles (⊗) indicate the absence of a condition. Blank spaces indicate a so-called 'don't care' situation, in which the condition may be either absent or present. Based on their similar gestalts, and mirrored by the qualitative data of our

in-depth case analysis in step two, we discuss the configurations III.a and III.b as one configuration.

The dynamic capability configurations differ considerably in their routineness under conditions of high or low environmental dynamism. Nevertheless, they are equifinal in the sense that they all produce substantial change in firms' procurement processes. Stasis in operating processes – as shown in this article's online Appendix 3 – is not systematically associated with the deployment of dynamic capabilities.

The consistency indicators provided with each configuration capture 'how closely a perfect subset relation is approximated' (Ragin, 2008, p. 44). The overall consistency (0.88) and all individual consistency terms are above the minimum (0.80) recommended by Ragin (2008). This indicates that there is an appropriate correspondence between our empirical data and the set-theoretic relationships captured in the configurations. As indicated by the overall coverage, all configurations jointly account for approximately 42 per cent of the fuzzy-membership values in the outcome. This scenario implies that almost half of the observed operating process change is explained by the configurations, a value that is consistent with other fsQCA research (Fainshmidt et al., 2019; Fiss, 2011). In line with methodological recommendations (Greckhamer et al., 2018), we ran additional analyses explaining the absence of the outcome (i.e., ~high operating process change, which is different from stasis).[7]

Insights from the in-depth analysis further validate and enrich the fsQCA findings regarding the characteristics of distinct dynamic capability configurations. In the following, we characterize the four distinct ways in which the studied firms deployed their dynamic capabilities under conditions of high and low environmental dynamism and introduce the conditions shaping these distinct dynamic capability configurations. In this article's online Appendix 4, we present interview quotes from our case analyses illustrating the dynamic capability configurations and their conditions.

Dynamic Capability Configuration I – Experimental

Configuration I firms operate under high levels of environmental dynamism and deploy low-structured sensing, seizing, and reconfiguring activities together with a high-frequency execution of reconfiguring activities. Based on our in-depth case data, we further find that an entrepreneurial learning orientation supports the high-frequency deployment of reconfiguring activities, whereas limited resources lead to low-structured sensing, seizing, and reconfiguring activities.

Dynamic capability configuration: Low structuring and high frequency. Firms covered by this configuration do not set rules or have formal procedures in place for sensing the environment for relevant changes. Interviewees commented that sensing (via, e.g., business-association meetings, internal and external trainings or audits) is 'not officially regulated' (I_2),[8] 'based on one's own gut feeling' (I_10) and takes place 'without work orders' (I_12). Similarly, responding to sensed opportunities or challenges, firms do not guide their seizing activities by formal procedures. An interviewee described respective decision-making sessions as largely unstructured, similar to a 'game of pick-up sticks during which you begin to sort one colour after the other' (I_16). Firms also organize their reconfiguring activities in an informal fashion, as the following quote illustrates:

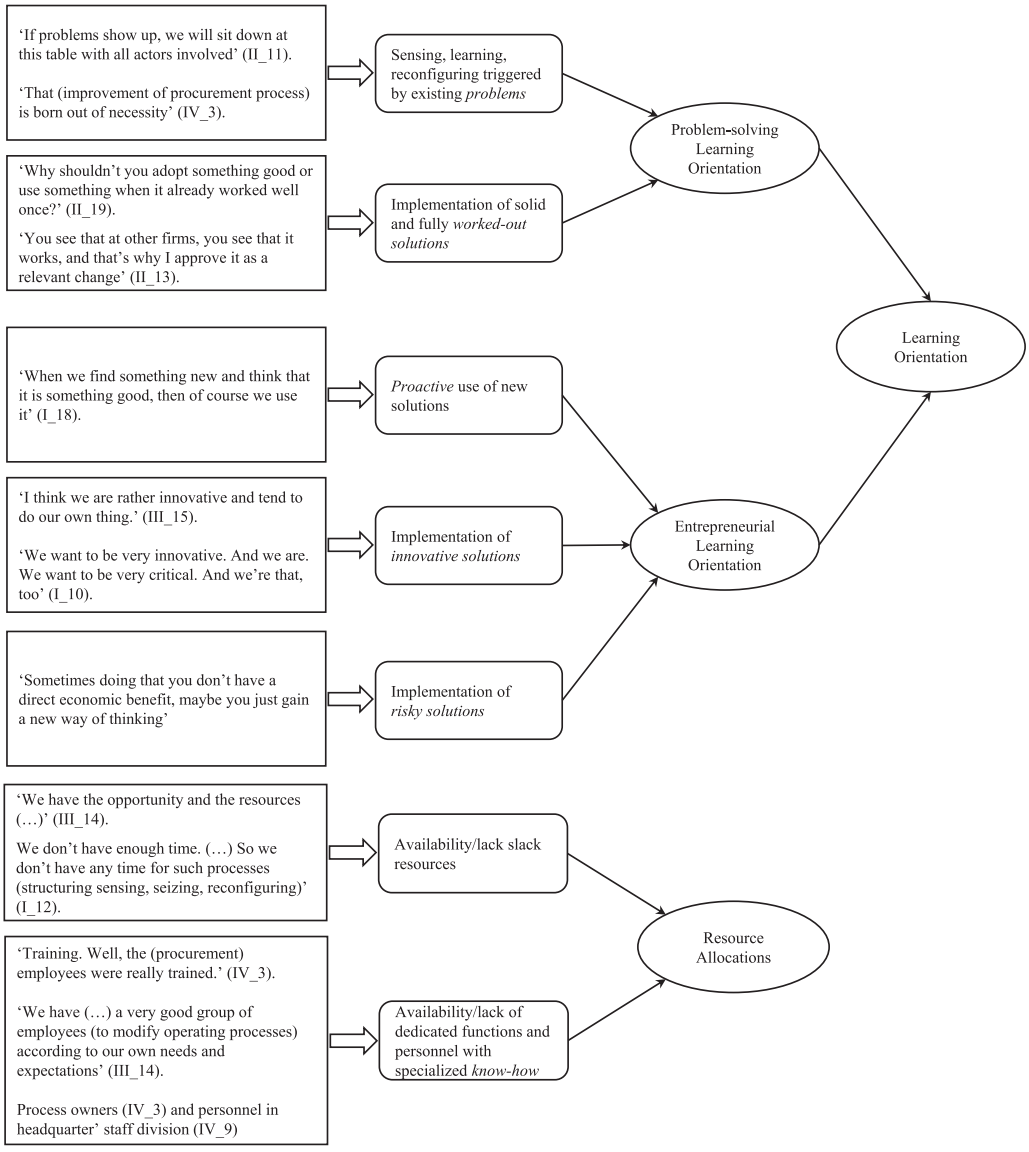


Figure 1. Qualitative data coding

'We changed this and that – that worked, we tried that, now we are going to do that differently in the future' (I_10). While showing low structuring of dynamic capability activities, reconfiguring activities take place at high frequency in Configuration I firms. As our data show, variations in the procurement process are proposed and tested at least on a monthly basis. In line with this finding, our interview partners in these firms regularly confirmed 'a very high frequency of change' (I_7).

Taken together, under conditions of high environmental dynamism, Configuration I firms' procurement staff probes novel ways of changing the procurement process at high frequency, yet in an unstructured way. Thus, this configuration of dynamic capabilities

Table III. Configurations causing change in operating processes

	Configuration				
			III (‘Programmed’)		
Condition	*I (‘Experimental’)*	*II (‘Adaptive’)*	*III.a*	*III.b*	*IV (‘Analytical’)*
High environmental dynamism	●	●	●	●	⊗
High execution frequency					
Sensing		⊗	●	●	⊗
Seizing		⊗	●	⊗	
Reconfiguring	●	⊗	●	●	⊗
High structuring					
Sensing	⊗	⊗	●	●	●
Seizing	⊗		⊗	●	●
Reconfiguring	⊗	●	●	●	●
Consistency	0.86	0.91	0.86	0.90	0.86
Raw coverage	0.24	0.15	0.11	0.13	0.06
Unique coverage	0.12	0.05	0.01	0.05	0.06
Overall consistency			**0.88**		
Overall coverage			**0.42**		

Note: ● = condition present; ⊗ = condition absent; blank spaces indicate that the condition may be either absent or present.

is inherently flexible. Its aim is, as one interviewee explained, ‘to improve through consistent, constant experimenting’ (I_2). Eight of our sample firms are members of this Experimental configuration of dynamic capabilities.

Conditions shaping dynamic capability configuration: Entrepreneurial learning orientation and limited allocation of resources. Our findings show that the organizations’ entrepreneurial orientation drives the high frequency of reconfiguring activities in these firms. Interviewees consistently confirmed that they were ‘open to change’ (I_7). Accordingly, managers in these firms ‘encourage’ (I_1) employees to come up and experiment with new ideas. As a result, they speak of their firm as an ‘innovation machine’ (I_1). This entrepreneurial orientation facilitates the high frequency in which reconfiguring activities occur. Employees of these firms share the understanding that ‘through this [high frequency of reconfiguring], many innovative ideas are brought into the firm’ (I_2). Another interviewee forcefully expressed the association between entrepreneurial orientation and high reconfiguration frequency: ‘We are critical of ourselves, otherwise we wouldn’t think the many process changes all the time were necessary. … I think that is our main motivator’ (I_10).

Furthermore, the lack of resources of Configuration I firms is associated with unstructured sensing, seizing, and reconfiguring activities. Interviewees typically reported

that there is neither a budget, nor personnel or time formally to establish dynamic capability activities. Other interview partners stated that they lack the necessary 'clout' (I_10) and 'time and money' (I_6) to focus on dynamic capabilities. Moreover, employees commonly have only limited know-how on, and are not sufficiently versed in, assessing their operating processes in a structured way. Either they only recently implemented process management practices ('It's hard to believe, but we didn't get certified until three years ago', I_2) or they do not use these tools in daily business ('There is a file on that, but nobody knows what's in it', I_16). Managers feel that a 'shirt-sleeved approach' (I_1) is appropriate, as they see no need for a more structured process. As one interview partner explained: 'There is no official procedure. How did that come about? It's really easy for two people to come to an agreement, so that [structure] isn't really necessary' (I_12).

Dynamic Capability Configuration II – Adaptive

Configuration II depicts a different dynamic capability configuration under high levels of environmental dynamism. In contrast to the Experimental Configuration I, Configuration II firms execute all activities constituting dynamic capabilities at low frequency, which is consistent with their problem-solving learning orientation. Similar to Configuration I, Configuration II firms engage in low structuring of sensing activities, which corresponds with the limited allocation of resources to the dynamic capabilities in these firms.

Dynamic capability configuration: Low frequency and low structuring. Our data show that Configuration II firms engage in sensing activities between once a quarter and once a year. Seizing and reconfiguring take place no more than once a year. Confirming the low frequency of dynamic capability activities, one interview partner, for example, commented with regard to reconfiguring: 'We are actually not yet at the point that we are always making modifications year to year' (II_11). At the same time, sensing activities are not guided by structured codified procedures. Instead, interview partners commonly described them as activities executed 'based on gut feeling' (II_11). Despite a clear emphasis on low structured sensing in these firms, managers deem formalized reconfiguring procedures necessary 'because otherwise everyone makes their own changes and then nothing fits together anymore' (II_11).

Thus, unlike in the Experimental Configuration I, Configuration II firms do not continuously generate and experiment with new ways of executing their procurement process. Rather, they prefer safe solutions. Accordingly, changes are, as one interviewee described, only 'triggered by problems you have. Then you notice: Oh, that's where the shoe pinches' (II_11). We coin this configuration as Adaptive because management realizes changes in operating processes in reaction to specific problems or by reacting to peers, adopting best practice from these firms. These changes are supported by concentrating sensing, seizing, and reconfiguring efforts temporally around events perceived as problematic and adjusting operating processes based on best practice solutions. Five of the firms in our study belong to this Adaptive configuration.

Conditions shaping dynamic capability configuration: Problem-solving learning orientation and limited allocation of resources. In contrast to the entrepreneurial orientation of Experimental Configuration I, Adaptive Configuration II firms show a problem-solving orientation that implies a low frequency of dynamic capability execution. Accordingly, our interviewees stress that operating process change is a way of coping with and mending 'errors' (II_13) or 'problems that exist' (II_11). One interviewee described that an accumulation of problems in assembly due to missing parts led to changes in the procurement process: 'To achieve planning reliability, it comes down to adapting the various operational processes' (II_13). In this particular case, process change referred to the establishment of a procurement centre. This interview partner further commented: 'That is not a novel idea; it has been around for a while' (II_13). The link between a problem-solving orientation and a low frequency of dynamic capability activities is nicely illustrated by the following quote indicating what happens in the absence of concrete problems: 'If our customers are satisfied, then we are satisfied too' (II_13).

As with firms deploying the Experimental Configuration I, Adaptive Configuration II firms possess only limited resources for their dynamic capabilities. Some interview partners mention the small to medium size of their firms when explaining the limited resource allocation to dynamic capabilities and the low structuring of the respective activities. As one interview partner stated: 'When you are a family-owned firm, you have different structures' (II_13). Another interview partner explained that 'due to the size of our firm, we are not yet there to have structured activities that would trigger change [in operating processes] in our firm' (II_11). Similarly, these firms operate without 'process owners' (II_11) or any other kind of specialized personnel. At the same time, they value the resulting less professionalized and comprehensive approach as the following quote shows: 'There is something to be said for being able to do things in a little more shirt-sleeved manner' (II_11).

Dynamic Capability Configuration III – Programmed

Configurations III.a and III.b (see Table III) represent the last two, very similar ways of organizing dynamic capabilities under conditions of high levels of environmental dynamism. In firms exhibiting the Programmed configuration, dynamic capability activities tend to be executed at high frequency *and* highly structured. Our findings suggest that such deployment of dynamic capabilities is associated with an entrepreneurial orientation and sizeable resource allocations to dynamic capabilities.

Dynamic capability configuration: High frequency and high structuring. Configuration III firms engage in daily to weekly sensing of their environment to detect relevant changes and opportunities. For example, one interview partner (head of procurement) established weekly trainings for procurement employees to support sensing and seizing activities: 'That is a requirement. All employees have to attend that. Fridays at 3 p.m.' (III_5). Additional sensing activities encompass monthly audits (III_14) or monthly meetings to report and internally consolidate new insights from trade-fair visits or on-site customer visits (III_15). Based on such activities, Configuration III firms engage in reconfiguring

activities on a monthly to quarterly basis.

Configuration III firms tend to execute high-frequency sensing, reconfiguring, and (in part) seizing activities relying on detailed and structured procedures. Interviewees emphasize 'clear rules' (III_5), 'systematic enforcement' (III_14), and a 'formal process' (III_8) or 'framework' (III_14) for identifying and realizing new opportunities. Typically, interview partners in these firms mention specific terms for their internally developed and institutionalized, continuous process optimization programs, such as 'navigation system', 'macro action plan', and 'integrated management system' (III_15, III_8).

Taken together, the high execution frequency and high structuring of dynamic capabilities within these firms suggests a Programmed configuration of dynamic capabilities under conditions of high environmental dynamism. These firms realize high execution frequencies, as Configuration I firms do, yet distance themselves from an experimental approach. Literally, one interviewee stated: 'So these change activities [i.e., reconfiguring existing operating processes] rely less and less on that experimental trial-and-error mentality' (III_8). Altogether, five firms exhibit a Programmed configuration: Configuration III.a includes one firm, and configuration III.b encompasses four.[9]

Conditions shaping dynamic capability configuration: Entrepreneurial learning orientation and sizeable allocation of resources. Similar to the pattern we find in the Experimental Configuration I, the high frequency in which Programmed Configuration III firms execute dynamic capability activities is associated with an entrepreneurial orientation of the firm. Accordingly, interviewees repeatedly mentioned the importance of proactively seizing something new, that is, searching for novel solutions, irrespective of a precise application area or problem. They, for example, described professional training as a stimulus for generating or probing new ideas. One interview partner explained why he unfailingly attends one training seminar per month: 'And it is totally irrelevant which seminar. It is all about just learning something new' (III_5). Another interview partner conveyed: 'My goal was to do something in each of the modules [of a professional training] and then learn something useful from each' (III_14). Employees highly value pioneering new ideas; often these ideas get implemented. 'The act [of bringing in new ideas] is a playground that everyone can take advantage of' (III_14). Proactiveness in these firms is coupled with perceptions of being 'innovative' (III_15). Employees in this and other Configuration III firms are 'supported' (III_8) to develop innovative solutions for improving operating processes and gently nudged to take on responsibility for new process improvement projects regularly (III_4). This is also the case when the outcome of such improvement efforts is uncertain and thus entails risk-taking, as one interviewee confirmed when discussing an optimization project: 'Sometimes doing that, you don't have a direct economic benefit, maybe you just gain a new way of thinking' (III_14).

These firms combine high structuring of dynamic capability activities with sizeable resources allocated to dynamic capabilities. Facing a high dynamic environment, these firms devote considerable material and/or human resources to their dynamic capabilities. One firm, for example, used a virtual sandbox to simulate changes in

their operating processes according to strict protocols (III_14). Moreover, employees are granted the time, facilities, and financial resources required to work on improving operating processes, for example, in the context of 'lean management' initiatives (III_8, III_15, and III_5) and continuous-improvement programs (III_5, III_14, and III_8).

Dynamic Capability Configuration IV – Analytical

This configuration is the only one occurring under the condition of low environmental dynamism. We find that despite low environmental dynamism, some firms nevertheless deploy a particular configuration of dynamic capabilities. In the Analytical Configuration IV, the firms deploy all three dynamic capability activities in a highly structured manner. At the same time, they execute sensing and reconfiguring activities at low frequency. Again, our in-depth case data reveal that a specific learning orientation and resource allocations shape dynamic capabilities: a problem-solving learning orientation is consistent with low execution frequency, while sizeable resources allocations to dynamic capabilities are associated with high structuring.

Dynamic capability configuration: High structuring and low frequency. Interviewees from Configuration IV firms regularly pointed out that sensing, seizing, and reconfiguring activities are 'highly regulated', executed 'according to clear action plans' (IV_9) and 'uniform' (IV_3). Firms utilize structured procedures prescribing the correct steps and sequences of scanning the environment for relevant changes, developing response patterns to such changes, and initiating measures directed towards reconfiguring the existing procurement process. Moreover, activities are centralized within authorized positions, as one interviewee commented: 'In the whole organisation, there are only three employees who can set something like that [i.e., the adaptation of operating processes] into motion' (IV_9). At the same time, firms anchor and back activities by fixed and binding benchmarking (IV_3) or priority systems (IV_9) as well as IT systems to analyse, prioritize, and implement changes.

Similar to the Adaptive configuration, firms' sensing and reconfiguring activities in the Analytical configuration occur at low frequency. An interview partner reported that procurement staff engages in sensing activities to gather new ideas and look at novel solutions about once a month – that is, at a much lower rate than the daily or weekly sensing activities observed in the Experimental and Programmed configurations. Reconfiguring activities are executed 'on a regular basis' (IV_3), yet rarely, 'two to four times a year' (IV_9). Two firms are members of the Analytical configuration.

Conditions shaping dynamic capability configuration: Problem-solving learning orientation and sizeable resource allocations. As in the Adaptive Configuration II, we find that the firms belonging to the Analytical Configuration IV exhibit a problem-solving orientation. Interviewees regularly commented that improvements of the procurement process were basically triggered by particular needs or dissatisfaction with existing processes: 'In the course of time, certain things tend to bother you again and again' (IV_4). Due to this problem-solving orientation, firms execute sensing and reconfiguring activities

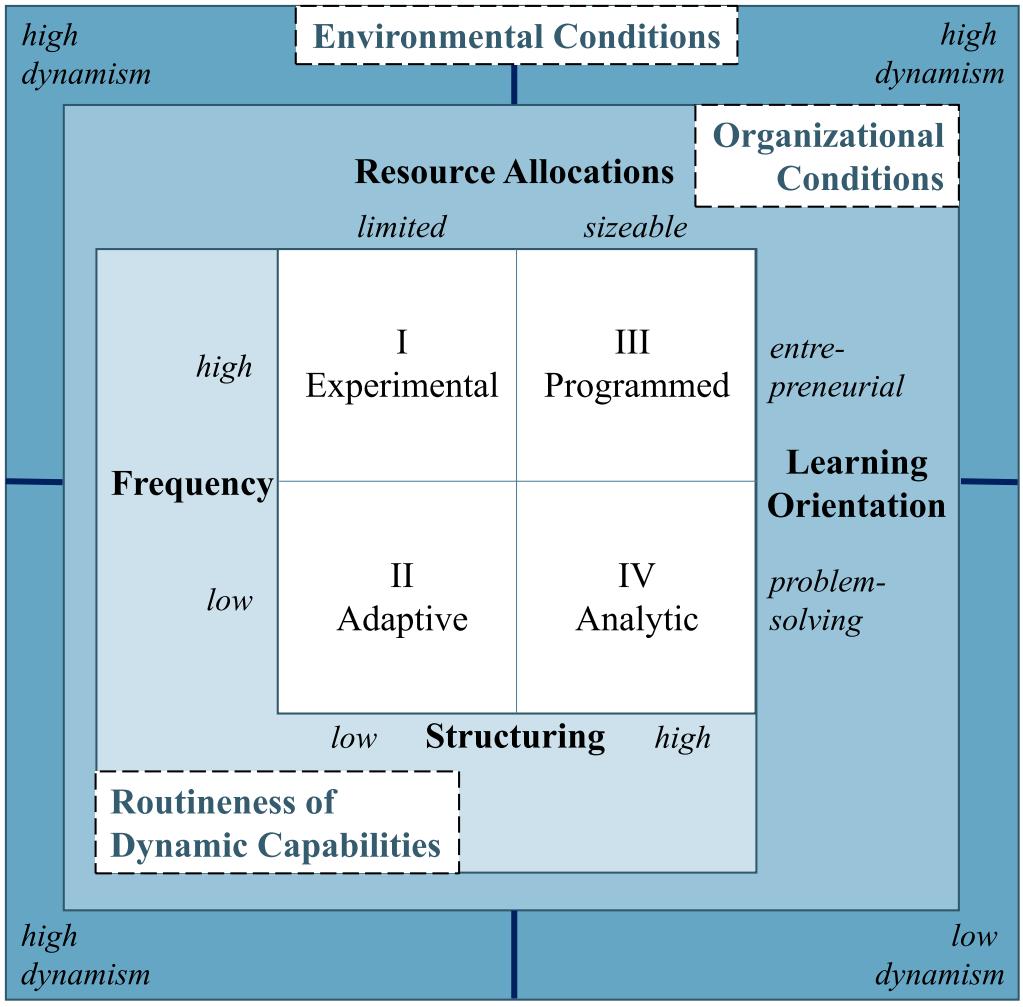
at low frequency; these activities are executed only when concrete problems require action.

Similar to the Programmed Configuration III, we find that firms possess sizeable material and human resources to support the structuring of dynamic capabilities in the Analytical Configuration IV. These firms employ dedicated staff, for example process owners (IV_3) or personnel in their headquarters' staff division (IV_9) who are responsible for auditing and adapting the firm's operating processes. One interviewee described the tasks and responsibilities of such functions: 'The process landscape is monitored. Which makes sense, because we have the same process worldwide' (IV_3). Additionally, employees receive specific trainings and thereby gain considerable know-how and expertise in process management. These trainings support firm-wide process reconfigurations, as they provide standardized procedures and outcomes. One interview partner explained: 'We are a little Konzernle [i.e., small group of firms], as you would say in Swabian. We have several locations that all have to, or at least should, perform work processes in the same way' (IV_9). In these firms, sizeable resources support a comprehensive process management that manifests in high-structured organization of dynamic capability activities. This provides 'a handle on our processes' (IV_3), as one interviewee put it.

Configurations of Dynamic Capabilities and their Conditions. Figure 2 provides a summary presentation of our findings that shows how the four distinct dynamic capability configurations and their conditions relate. Our findings reveal four distinct dynamic capability configurations under different conditions of environmental dynamism: Experimental, Adaptive, Programmed, and Analytical. In addition, they uncover two main intra-firm conditions important in shaping the distinct dynamic capability configurations we found: organizational learning orientations and resource allocations.

We identified two distinct, dominant organizational *learning orientations*. When firms exhibit a problem-solving learning orientation, their managers rely on existing knowledge when devising their configuration of dynamic capabilities and apply it to solving existing problems. When firms display an entrepreneurial learning orientation, managers devise a dynamic capability configuration that enables them proactively to pursue new opportunities and pioneer innovative and sometimes risky solutions. Our case analyses uncovered that these two distinct learning orientations mainly influence the frequency with which the studied firms utilize their dynamic capabilities. A problem-solving orientation induces deployment of low-frequency dynamic capabilities. This is because this learning orientation triggers dynamic capability activities only in the presence of concrete operational problems. Furthermore, a problem-solving orientation advocates the implementation of solid and fully worked-out solutions that take more time than trial-and-error approaches. In contrast, an entrepreneurial orientation is associated with a deployment of high-frequency dynamic capabilities. These firms tend to search for novel ways of improving operating processes at high frequency by regularly acquiring new knowledge through trainings and by engaging in trial-and-error actions, learning from experience.

The *resources* that firms *allocate* to dynamic capabilities include the financial budget, time, and the number and quality of human resources. Our data reveal that the amount



Key: The figure depicts three levels of analysis, linking two levels of conditions (environmental and organizational) to the routineness of dynamic capabilities (frequency and structuring). The outer layer (dark petrol) captures the environment an organization faces (i.e., high or low dynamism). The middle layer (petrol) depicts the organization's resource allocation (limited or sizeable) and learning orientation (entrepreneurial or problem-solving). The inner layer (light petrol) describes the associated routineness (high or low frequency, high or low structuring) of the firm's dynamic capabilities as reflected in the four dynamic capability configuration (white) we uncovered.

Figure 2. Configurations of dynamic capabilities and their conditions

of resources the firms we studied possess mainly influences whether they create structured sensing, learning, and reconfiguring activities. While sizeable resource allocations to dynamic capabilities facilitate structured activities, fewer resources and know-how lead to a less structured, 'shirt-sleeved approach'.

DISCUSSION

The present study offers evidence and theory on whether and when the firms we studied deploy routine dynamic capabilities. It addresses a debate on the nature of dynamic capabilities and the boundary conditions of the theory that has divided extant research (Peteraf et al., 2013; Schilke et al., 2018). It is among the first to show empirically that the main positions in the debate both have merit, may be less conflicting than it seems, and thus need not divide the field of study. Moreover, our findings contribute to nascent theorizing on the conditions under which firms deploy different configurations of dynamic capabilities (Fainshmidt et al., 2019; Helfat and Peteraf, 2016; Wilden et al., 2016).

Overcoming the Conceptual and Theoretical Divides in Dynamic Capabilities Research

The routineness of dynamic capabilities. The debate on whether it is appropriate to conceptualize dynamic capabilities as routine dividing extant research (Peteraf et al., 2013) has produced different suggestions for mitigating the divide, mostly of a conceptual nature. The present study contributes first empirical insights informing on the different suggestions.

Peteraf et al. (2013) propose that a contingency-based approach could integrate the two contrasting positions on the routineness of dynamic capabilities. They submit that – depending on environmental dynamism – firms rely either on routine activities or on simple rules and experimental action constituting dynamic capabilities. However, our findings challenge the notion that it depends on the dynamism of the environment whether firms deploy routine or non-routine dynamic capabilities. Our study provides evidence that firms in dynamic environments deploy both routine (the Programmed configuration) and non-routine dynamic capability configurations (the Experimental configuration). We shall return to this issue later when discussing boundary conditions. Our findings nevertheless generally support a contingency view, as they show that the dynamic capability configurations the studied firms deploy depend on distinct resource allocations and organizational learning orientations.

Di Stefano et al. (2014) offer a different avenue for overcoming the either-or view on the routineness of dynamic capabilities. Invoking the metaphor of a drivetrain, they propose that less routine dynamic capabilities – involving simple, fragile rules selected and controlled by a firm's top management – drive a set of more complex routine dynamic capabilities. Our findings indicate that firms indeed deploy routine dynamic capabilities at levels below top management, as indicated by the Programmed configuration we observe. However, at the functional department level we also find low routine dynamic capabilities involving experimentation and semi-structures (the Experimental configuration), a configuration the drivetrain model would rather expect to occur at the top management level. Thus, our findings do reveal a slightly more complex and varied picture of firms' dynamic capabilities than the drivetrain model implies.

Consistent with the positions outlined earlier, our study also observes that firms deploy either routine or non-routine dynamic capabilities. However, the different

configurations of dynamic capabilities we observe only partially match the patterns proposed by the contingency and drivetrain views on dynamic capability routineness. Instead, the findings of this study illustrate a different possible path towards reconciling the divide in research on dynamic capabilities. The implicit assumption of much research has been that dynamic capabilities are routine, or not. By employing a configurational view, we demonstrate that the debate juxtaposing routine and non-routine dynamic capabilities tends to overlook that firms can also realize other, more complex combinations of dynamic capabilities. Our findings show that core dimensions of dynamic capability routineness – structuring and frequency – are only loosely coupled (Orton and Weick, 1990) and can vary independently.[10] Firms deploy dynamic capability activities that are highly structured yet applied only at low frequency (the Analytic configuration) or vice versa (the Experimental configuration). As a first implication, our findings thus suggest that a configurational view allows research to move beyond an overly simplified bifurcation of routine and non-routine dynamic capabilities and thus gain a more nuanced understanding of the heterogeneity in firms' dynamic capabilities. This is important theoretically, because it represents one possible pathway for dynamic capabilities research towards explaining by means of within-type dynamic-capabilities heterogeneity differences in firm-level outcomes (Helfat and Peteraf, 2016).

Environmental dynamism as a boundary condition. The findings of this study further inform the second aspect in the debate dividing research on dynamic capabilities (Peteraf et al., 2013), concerning whether firms deploy routine, or non-routine, dynamic capabilities in dynamic environments. The present study provides empirical evidence for both positions. In environments that are highly dynamic, the Programmed configuration of dynamic capabilities matches the former position (Teece et al., 1997; Zollo and Winter, 2002). However, we also find experimental, unstable, and high-frequency-action semi-structures in the Experimental configuration of dynamic capabilities, resembling the latter position in the debate (Brown and Eisenhardt, 1997; Eisenhardt and Martin, 2000). Our findings thus show that the two positions demarcating the theoretical divide in the debate are not mutually exclusive. At the same time, they indicate that environmental dynamism may be less discriminating with regard to the deployment of routine or non-routine dynamic capabilities than the opposing positions in the theoretical debate postulate.

Furthermore, the findings of this study provide interesting new insights into dynamic capabilities in low environmental dynamism. Since the inception of dynamic capabilities (Eisenhardt and Martin, 2000; Teece et al., 1997), research closely linked the concept to conditions of high environmental dynamism (Schilke et al., 2018; Wilden et al., 2016). However, the Analytical configuration uncovered by our study supports recent research (e.g., Fainshmidt et al., 2019) showing that firms also deploy dynamic capabilities in environments characterized by low dynamism. More importantly – because our findings show that the Analytical configuration is tightly and exclusively associated with low environmental dynamism – it provides insights into how this type of dynamic capabilities operates. The Analytical configuration seems an unlikely choice in highly dynamic environments. Its high structuring renders it

costly (for the lack of predictability in this environment (Davis et al., 2009)). While a low execution frequency exposes firms to the risk of missing important developments in the environment, which sets it apart from the – also cost-intensive – Programmed configuration.

For similar reasons, we submit, it seems unlikely that the configurations deployed under conditions of high environmental dynamism function when environmental dynamism is low. The Experimental and Programmed configurations exhibit a high execution frequency, which likely generates unnecessary costs that do not pay off in more stable environments, whereas the Adaptive configuration lacks structuring, making it ineffective in environments in which the need for adaptation is rare. Rare events foster firms' superstitious learning (Denrell and March, 2001), and structuring limits superstitious learning in environments in which strategic decision-making happens rarely (Zollo, 2009). In consequence, the Adaptive configuration – because of its low structuring – is likely to produce misguided operating process change in low dynamic environments, putting these firms at a competitive disadvantage.

Together, our empirical findings imply that the complexity of the alignments between the patterns of routine, or non-routine, dynamic capabilities with the conditions of environmental dynamism may be greater than earlier research has envisioned. Moreover, they highlight that it may be fruitful for research to consider other conditions than the dynamism of the environment when seeking to explain when firms deploy routine dynamic capabilities.

Intra-firm Conditions Shaping Dynamic Capability Configurations

Researchers have called for a better understanding of the conditions that shape and enable different configurations of dynamic capabilities (Gelhard et al., 2016; Wilden et al., 2016).

Our findings lend support to the notion that a firm's learning orientation plays a crucial role in how firms deploy dynamic capabilities (Easterby-Smith and Prieto, 2008; Wilden et al., 2016; Zollo and Winter, 2002). In contrast to established research, our findings show that dynamic capabilities do not necessarily have to be associated with a proactive, entrepreneurial learning orientation (Augier and Teece, 2009). Rather – as illustrated by the Adaptive and Analytic configurations – a reactive, problem-solving stance that relies on established knowledge can also shape dynamic capabilities. Interestingly, we observe that firms exhibit a problem-solving approach in dynamic environments, as illustrated by the Adaptive configuration. This observation qualifies earlier research proposing that entrepreneurial learning orientations are a necessary condition for dynamic capabilities in highly dynamic environments (Eisenhardt and Martin, 2000).

Our cases further show that firms possessing greater human, organizational, and/or slack resources tend to deploy dynamic capabilities in a systematic and structured way. This finding underscores that the deployment of more elaborate dynamic capabilities requires greater investments (Teece, 2007; Zollo and Winter, 2002). However, our findings also show that sizeable resource allocations are not a precondition for the deployment of dynamic capabilities. Rather, as our Experimental and Adaptive

configurations illustrate, firms can utilize dynamic capabilities even with limited resources. These findings suggest that research seeking to understand why firms differ in the dynamic capabilities they deploy might fruitfully include firms' resource allocations as an explanatory factor.

Our findings finally suggest that the learning orientation a firm exhibits (entrepreneurial or problem-solving) and the amount of resources it has available to allocate to dynamic capabilities together shape the firm's deployment of dynamic capability configurations. These conditions enable a firm to realize a particular dynamic capability configuration. To the extent that firms cannot readily change these two conditions, however, they also constrain a firm's ability to adapt its particular dynamic capability configuration. These findings are consistent with – yet also qualify – Zollo and Winter's (2002) earlier theorizing that the size of firms' learning investments drives organizational learning that, in turn, shapes dynamic capabilities, whereas our theorizing and empirical findings imply that learning orientations and resource allocations can vary independently and may thus *interact* in shaping particular dynamic capability configurations. In all, our study thus suggests that one way of overcoming the conceptual and theoretical divide in dynamic capabilities research rests on acknowledging intra-firm conditions that distinctly shape the deployment of dynamic capabilities.

Implications for Future Research

The findings of this study emphasize the potential fruitfulness of three future avenues for research on dynamic capabilities. First, our study shows that the distinct activities constituting dynamic capabilities, as well as the frequency and structuring in which they are deployed, need not be closely aligned. Rather, by loosening the common assumption of alignment, we find that these elements do not always co-occur and different configurations of dynamic capabilities manifest. From a theoretical perspective, it seems important for future research to continue to unearth such heterogeneity in dynamic capability configurations, as the significance of dynamic capabilities for competitive advantage to some extent rests on the assumption of dynamic capability heterogeneity (Helfat and Peteraf, 2016).

Second, it seems important that research then also identify the origins and development paths that lead to distinct, heterogeneous dynamic capabilities. While our study suggests that learning orientations and organizational resource allocation together shape distinct dynamic capability configurations, future research might detect additional organizational enablers and constraints. Adopting a process perspective on dynamic capabilities (Schilke et al., 2018), future research could further explore these enabling and constraining conditions by studying whether and how – over a longer time frame – (some) dynamic capability configurations might recursively shape learning orientations and resource allocations. These pathways not only offer significant opportunities for research (Wilden et al., 2016) but also carry practical implications, as the knowledge generated can help managers develop and configure the dynamic capabilities of their firms.

Finally, as this and a few other studies demonstrate, configurational analysis is an appropriate and productive method for identifying heterogeneous configurations of

dynamic capabilities and their respective enablers and constraints. This method allows us to detect multiple, equifinal conditions that lead to an outcome of interest (Furnari et al., 2021), be it configurations of dynamic capabilities, operating process change, or performance (Fainshmidt et al., 2019).

Managerial Implications

Our study also has implications for managers seeking to deploy dynamic capabilities in their firms. First, managers leading firms in dynamic environments should be aware that intra-firm conditions enable and constrain them to choose between high-frequency and highly structured dynamic capability activities. Usually, managers are resource-driven. When resources are limited, they will thus avoid the substantial investments in formalized activities that come with Programmed dynamic capabilities. However, managers should also consider their firm's learning orientation. This is because managers attempting to deploy a dynamic capability configuration that is inconsistent with the firm's learning orientation will likely fail due to coordination issues. Second, managers leading firms in less dynamic environments may find it interesting to learn that dynamic capabilities are rare in their environment. If these managers seek to deploy dynamic capabilities in this context – provided that the firm follows a problem-solving learning orientation and has sizeable resources at hand – the Analytic Configuration of dynamic capabilities may serve as a blueprint.

Limitations

Comparable to other work applying fsQCA (e.g., Fiss, 2011), our analysis entails too few cases for each configuration to derive statistical generalizations. While we incorporate a larger number of cases than other comparative case studies on dynamic capabilities in order to be able to capture greater variety, this study attempts to stimulate theory development and future research, rather than provide empirical generalizations. Instead, this study offers a configurational framework that future research could elaborate, modify, or possibly reject by examining further industries with more fine-grained gradations of environmental dynamism, operating processes different from procurement, and larger firms with higher levels of resource endowment and formalization.

Furthermore, future research might fruitfully replicate and extend our study using a multi-wave longitudinal research design (e.g., Schilke, 2014). Because of the fixed time frame implied by our survey questions, we cannot untangle the role of temporality in the dynamic capabilities-outcome link. For example – due to our outcome measure cumulating change over five years – we cannot untangle at what point in time the dynamic capability configurations we found triggered operating process change.

Finally, the proposed conceptualization of dynamic capabilities is limited too. While routineness is characterized by frequency and structuring of activities (Becker, 2004, 2005; Davis et al., 2009) and thus is highly relevant for the analysis of dynamic capabilities, other organizational attributes might be of relevance too. For instance, the hierarchical level at which sensing, seizing, and reconfiguring activities take place could uncover additional dynamic capability configurations. We have to leave it to

future research to analyse the relevance of these and other attributes of deploying dynamic capabilities.

CONCLUSION

This study reveals considerable heterogeneity in how the firms we studied deploy dynamic capabilities. By taking a configurational perspective, the present study deepens our understanding of the conditions that shape the heterogeneity in the routineness of firms' dynamic capabilities. We hope that our efforts will inspire other researchers to study the different ways in which particular conditions and configurations of dynamic capabilities combine.

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NOTES

[1] Sensing comprises firms' activities directed towards identifying relevant changes and opportunities in their environment. Seizing encompasses activities for developing new ways of responding to observed environmental changes and opportunities. Reconfiguring activities develop and test measures that trigger changes in existing operating processes. In a later essay, Teece (2012) extends this view by proposing that a firm's dynamic capabilities consist of more than routine sensing, seizing, and reconfiguring activities. He states that, even in less volatile settings, routine dynamic capabilities likely require constant revamping. To achieve this, dynamic capability activities need to be complemented by top management's strategic entrepreneurial capabilities, an argument akin to the notion of dynamic managerial capabilities (Schilke et al., 2018).

[2] This sample nevertheless turned out to be representative of the underlying firm population in Germany in terms of firm size and industry composition. Details are available from the authors upon request.

[3] We also ran an additional analysis including the cases removed in this step. In line with our argument, this additional analysis shows that the number of solutions increases dramatically (from 5 to 14), while the unique coverage of the individual solutions is very low. However, the solutions show patterns that are similar to the solutions reported in our findings section. This suggests that the solutions uncovered in the larger data set provide limited (additional) theoretical insight, while increasing the risk of non-valid idiosyncratic findings.

[4] A number of arguments support the validity and reliability of our measurement. First, the majority of our respondents are experienced managers (mean job tenure: 8.03 years) who had been in their positions over the time frame covered by our study. Second, our extensive pre-test showed that both experienced and non-experienced procurement department managers could regularly draw on objective archival data, such as procurement controlling reports, when answering questions related to procurement. Third, we acknowledge that while our respondents had discretion over using such archival data when completing the survey, we highlight that senior management cross-validated the primary responses in 10 per cent of our cases. Fourth, we conducted Analysis of Variance, revealing no significant differences between less- (i.e., below-mean job tenure) and more-experienced (i.e., above-mean job tenure) respondents for all dynamic capabilities and operating process change survey data ($p > 0.10$). Accordingly, we are confident that our measurement approach is valid. Finally – and most importantly – we personally witnessed the correspondence between the frequency and structuring measurements of sensing, seizing, and reconfiguring when we collected our additional qualitative data. The managers

we talked to – and the archival data they showed to us – was fully consistent with the measurements we had received via the survey.

[5] Due to space limitations, the truth table is available from the authors upon request.

[6] Our robustness checks included different case frequency and consistency thresholds. Across all additional analyses, we continued to see the patterns described later. These analyses are available from the authors.

[7] These additional analyses are available from the authors.

[8] Case identifiers are structured as follows: DC-configuration_interview-number. The interview number is not related to the firm identification number printed in Table II.

[9] While our frequency threshold is two cases, we state that Configuration III.a includes only one firm. This is because our findings section reports only individual cases that exhibit the outcome of interest (i.e., high operating process change). Overall, 20 cases exhibit the outcome of interest, two cases do not (one covered by Configuration I, and by Configuration III.a). Such small inconsistencies are common in empirical research. They are reflected in the consistency values reported in Table III. Treating Configuration III.a as a logical remainder in the fsQCA does not alter our other findings (i.e., Configurations I, II, III.b, and IV).

[10] We thank the editor and one of the reviewers for alerting us to this point.

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