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Stemming the downturn: How ambidexterity and public policy influence firm performance stability during economic crises

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ABSTRACT

A key question confronting policy makers during economic crises is how they can support firms to maintain their performance levels until the economic storm has passed. The present study bridges insights from the ambidexterity and public policy literatures to examine how firm-internal responses (that is, ambidexterity) and external public policy incentives (that is, demand-pull policies) affect the stability of firms' performance in a recessionary economic context. Using data from private German renewable energy firms at a time following the global financial crisis, we find that only firms with low ambidexterity achieve performance stability in light of demand-pull policies. This research draws attention to the relevance of stability as a policy-relevant performance measure during times of economic crises. Further, we suggest that greater insight into the interplay of managerial and political factors is necessary to enable policy makers to support the stability of certain industries during crises.

1. Introduction

Times of recession challenge policy makers and firms to find ways to weather such economic storms, limit their damage, and exhibit resilience and stability in the face of significant industry downturns. These internal firm and external public policy responses should be considered in tandem (e.g., Agarwal et al., 2009). In this vein, the present research seeks to investigate what helps firms experience stable performance levels during an economic crisis by examining (i) the effects of an ambidextrous innovation approach (combining competence-renewing and competence-leveraging innovations), (ii) the impact of public policies emphasizing demand-pull economics, and (iii) the interplay between the two. Our research draws attention to the importance of the conceptualization of performance stability during times of economic crisis, and understanding the managerial and political factors that drive such stability.

While classical performance measures, such as growth or profitability, are instructive within stable environments, arguably different, but complimentary goals apply in times of crisis (Minoja, 2012; Palamida et al., 2015). Such goals illustrate the perspective and intention of actors involved in limiting the crisis' economic damage. Particularly to policy makers, stability (referring to a situation where firms' sales levels remain constant during certain periods) is a highly desirable outcome as it helps to avoid broad economic malfunction (Van Lear & Sisk, 2010) and maintain critical stakeholder relationships among suppliers, buyers, and employees with the goal of positioning firms and the broader economy for robust post-crisis growth. This relevance is, for example, expressed within the recent 'Stability and Growth Pact' by the European Union (EU) Ministers of Finance in light of the COVID-19 crisis to "ensure that the shock remains as short and as limited as possible" (Council of European Union, 2020). Notably, in this important and timely press release, stability is mentioned first, and growth second.

Prior research suggests that in times of change and uncertainty regarding technologies, markets, and business models, organizations respond by engaging in distinct and partly contradictory learning and innovation processes (Olk, 2019). On the one hand, they can strive to find new ways to exploit (or in other words make better use of) their existing capabilities to remain competitive in their core business. On the other hand, firms may engage in exploration and renewal of their competence base to respond to new market and technological trends (Birkinshaw et al., 2016). Since the seminal article by March (1991), this distinction between exploration and exploitation has become an influential concept within the management literature (Gupta et al., 2006). Researchers have examined how firms can benefit from exploration and

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exploitation and highlighted the importance of firms' ability to pursue both at the same time, referred to as ambidexterity (Benner & Tushman, 2002; Lubatkin et al., 2006; Raisch & Birkinshaw, 2008; Tushman & O'Reilly, 1996). However, ambidexterity studies have, to our knowledge, not looked at the question if and how ambidexterity might drive performance stability.

Besides exploration and exploitation as firm-internal reactions, public policy makers also respond to economic crises. According to Keynesian economics, demand-side market incentives can be an effective means of sustaining demand and alleviating the pressures on industries and firms during an economic crisis (Keynes, 1937; Perry, 2013). The stimulation to stabilize market demand is intended to eventually support firms and other economic actors in *helping them to help themselves* during a crisis and through innovation, especially in specific sectors of public interest, such as those relevant to addressing climate change (Tienhaara, 2010; Zenghelis, 2012). However, despite discussions concerning macro-level economic effects upon country- or industry-level indicators of innovation or entrepreneurial activity (i.e., see reviews by del Rio González and Penasco (2014) or Kemp and Pontoglio (2011)), there is presently little evidence concerning how such policies affect *firms'* performance stability during times of crisis and how they interact with firms' own responses to a downturn.

The central questions of this study are (i) how ambidexterity and public policy influence firm performance stability during times of crisis and (ii) how they interact. We approach these questions using a combination of qualitative interviews, a survey on innovation and public policy impact, as well as secondary performance data on 102 firms from the German renewable energy industry at a time of the global financial crisis following the Lehman bankruptcy in 2008. Policy interventions are especially relevant in the context of emerging markets, such as environmentally beneficial technologies being developed to mitigate global climate change (Mowery et al., 2010). At the same time, the energy industry is, in general, marked by a particularly strong need to engage in exploitative and exploratory innovation. The very long investment cycles and price pressures require strong exploitation of existing infrastructure and capabilities, while increasing international competition leads to a need for exploration to defend technological superiority and leadership positions (Doblinger et al., 2016; Gallagher, 2014; Hoppmann et al., 2013; Rogge & Schleich, 2018; Unruh, 2000).

Our key findings include that ambidexterity has a U-shaped effect on performance stability during a period of crisis, implying that firms with low and high levels of ambidexterity are associated with more stable performance, whereas those in the middle exhibit more performance fluctuations. This allows us to conceptually develop two groups of firms, which we refer to as turtles and hares. *Turtles* are firms with relatively low levels of ambidexterity, which benefit from their more conservative approach in terms of stability and experience more performance fluctuations when engaging in exploration and/or exploitation. Conversely, *hares* refer to firms with relatively high levels of exploration and exploitation, whose self-reinforcing effects strengthen performance stability as one or both are increased. Interestingly, public demand-pull policies, while focused on stimulating market demands, do not seem to directly improve the performance stability of firms. They, however, interact with the level of ambidexterity exhibited by the firms, but these effects are different for turtles and hares. While turtles show higher levels of performance stability when they are affected more strongly by policy interventions, such interventions are reducing the performance stability of hares.

By focusing on performance stability and its external and internal contingencies in the context of economic crises, our research makes the following contributions. We show how management scholars can benefit from considering the objectives of policy makers during economic crises when selecting their dependent variables. We highlight the importance of investigating *stability as an important alternative performance measure* that incorporates a broader policy perspective and complements the traditional focus on growth and/or profitability. This focus on performance stability and the U-shape relationship with ambidexterity allows us to contribute to research on organizational ambidexterity by complementing the positive and negative views on ambidexterity's performance effects and focusing on its external contingencies (Junni et al., 2013; O'Reilly & Tushman, 2013; Stettner & Lavie, 2014; Voss & Voss, 2013). Moreover, our evidence that demand-pull policies have no direct impact on performance stability but rather unfold their stabilizing impact through interactions with firm-internal strategic approaches (i.e., being turtles or hares) enables public policy scholars to gain a deeper understanding of the micro-impacts of demand-pull policies (Doblinger et al., 2016; Hoppmann et al., 2013; Rogge & Schleich, 2018). In the light of the economic recession following the Covid-19 pandemic, it may become crucial for policy makers to understand how the measures they have at their disposal interact with firm-level responses, allowing them to *help firms in helping themselves* during these challenging times.

2. Theory and hypotheses

Firm performance stability (or variability) is an important and understudied firm outcome (Baum et al., 2014; Wales et al., 2013). Firm performance has typically focused on gains or losses relative to the past (that is, growth) or relative to competitors (that is, comparative standing). Performance stability is concerned instead with understanding the relative distribution of performance outcomes that a firm experiences over time (Baum et al., 2014; Miner et al., 2003). It is a continuous and relative variable, constructed based on the standard deviation of sales that firms generated in specific years and adjusted by industry-effects (Wales et al., 2013). Performance stability is thus substantially different from growth in that it captures the variability of performance by combining both declines and increases in sales, providing a more nuanced account of firm's performance distribution. For instance, a firm may run through phases of excessive growth and later phases of consolidation or negative growth that average out to a modest gain (or loss). Thus, while growth indicates trajectory, measures of firm growth are not sensitive to turbulence in performance outcomes that collectively results in little or no average growth (Weinzimmer et al., 1998).

In this study, we consider that stability is a particularly significant aspect of performance within a recessionary economic context and when studying the interplay between managerial and political responses to such crisis. During these times, policy makers are interested first and foremost in stability, that is, keeping both negative and positive performance fluctuations as low as possible. Doing so likely allows the network of organizational stakeholder relationships throughout the economy to be the most robust, with stable (as opposed to highly variable) inputs and resource flows between economic actors. Negative performance deviations of firms, which typically result in firms' discontinuation and job losses, are certainly not desirable for policy makers (Geithner, 2015; Van Lear & Sisk, 2010). Yet, unchallenged positive performance deviations of individual firms or a limited group of firms during crisis times, while a potential byproduct of policy interventions, are also not intended. Policy makers are not responsible for improving the competitive position of individual firms—on the contrary, this might lead to ethical conflicts and accusations of bias (e.g., Waud, 1976).

Despite the importance of firm performance stability in times of crisis, we currently know very little about what organizational and environmental factors drive this stability. Prior research has mostly looked at the effects of individual senior executives, for instance by demonstrating that CEO narcissism is related to larger swings in firm performance (Chatterjee & Hambrick, 2007; Wales et al., 2013). Moreover, recent research has explored how effectual decision-making logic can enable firms within developing economies to achieve more reliable performance during economic crises (Shirokova et al., 2020). Beyond CEO traits and decision-making logic, we expect that in recessionary contexts, performance stability will be affected by (i) ambidextrous organizational competences which enable firms to drive *exploration* and *exploitation* at the same time (Tushman & O'Reilly, 1996) and (ii) *public policy* as policy makers attempt to support firms through the institution of demand-side measures (Perry, 2013).

2.1. Impact of ambidexterity on performance stability in times of crisis

Ambidexterity has become a central concept within management scholarship and describes the ability of firms to pursue both an exploratory and an exploitative orientation (Benner & Tushman, 2002; Lubatkin et al., 2006; Raisch & Birkinshaw, 2008; Tushman & O'Reilly, 1996). Exploration is defined as "things captured by terms such as search, variation, risk taking, experimentation, play, flexibility, discovery, innovation," whereas exploitation occurs when firms are engaged in "such things as refinement, choice, production, efficiency, selection, implementation, execution" (March 1991, p. 71). Based on this definition, scholars have applied the concept to capture firm-level innovation activities. Exploratory innovations include the proclivity to challenge existing technological trends and to search for new market opportunities and knowledge within and outside of existent industry boundaries, resulting in the development of more radical innovation (Auh & Menguc, 2005; Benner & Tushman, 2002; Jansen et al., 2006). Conversely, exploitative innovations refer to continuous improvements of existing technological knowledge, by targeting cost reduction and efficiency enhancement to satisfy existing market needs, and is more strongly associated with incremental innovation (Benner & Tushman, 2002; Lubatkin et al., 2006; Raisch & Birkinshaw, 2008).

In times of crisis, we expect that ambidexterity, or the pursuit of high levels of exploratory and exploitative innovation at the same time, may have mixed effects on stability. First, we would assume that firms that possess the ability to excel at both innovation types simultaneously are particularly able to maintain performance stability. On the one hand, strong exploration allows firms to develop a continuous stream of novel revenue sources that may compensate for those parts of the business that are most detrimentally affected by the crisis (Birkinshaw et al., 2016). This approach has also been referred to as the 'innovating' strategy in response to crisis, enabling strategic renewal (Wenzel et al., 2020). Accordingly, Tushman and O'Reilly (1996) argue that managers have to engage in a process of creative destruction to prepare for the next wave of competition and technology. On the other hand, strong exploitation drives the optimization and improvement of the more robust parts of the core business to defend market share even if competition increases (Jansen et al., 2006). This helps in 'preserving' the status quo of firms' business activities during times of crises, especially if the crises lasts longer (Wenzel et al., 2020). By creating mutually beneficial effects between exploratory and exploitative innovation (for example, through the coordination and sharing of knowledge and experience), ambidextrous firms may be able to establish a self-reinforcing cycle that helps them create performance stability in times of uncertainty or crisis (O'Reilly & Tushman, 2013). Due to their proactive reaction to crisis, we refer to such firms as *hares* and suggest that higher levels of ambidexterity may be related to higher levels of performance stability.

Second, however, there are also good reasons why low levels of ambidexterity, i.e., a pursuit of low levels of both exploration and exploitation, may be enhancing performance stability during times of economic crisis when slack resources are notably limited (Cowling et al., 2014; Pearson & Clair, 1998). Both exploratory and exploitative innovation compete for scarce organizational resources as more resources devoted to exploitation imply fewer resources left over for exploration and vice versa (Gupta et al., 2006). Accordingly, increasing both at the same time may often be a challenging balancing act, and thus some firms may arguably be better served focusing on neither during times of crisis (Voss & Voss, 2013). Limited ambidexterity during times of crisis implies a more defensive, conservative posture with low degrees of both exploratory and exploitative innovation to maintain stability. In this way, firms reduce their resource burn while waiting for economic recovery, also referred to as 'retrenchment' (Bruton et al., 2003). Thus, retrenchment via low-levels of exploratory and exploitative innovation may represent a viable strategic approach available to firms seeking performance stability on the short-term during times of economic crises (Wenzel et al., 2020). Due to their defensive reaction to crisis, we refer to these firms as *turtles* and suggest that their performance stability increases the less they engage in exploration and/or exploitation (i.e., the lower the level of ambidexterity is).

Besides those two categories, we expect some firms to be somehow stuck-in-the-middle in the sense that their level of ambidexterity is too high for a *turtle* but too low for a *hare*. This may either be due to the fact that they are aimless (in the sense that they cannot decide which way to go) or because they are in a transformation state of turning from a turtle into a hare or vice versa. We expect those firms to show the lowest levels of performance stability during times of crisis. For example, if we consider a firm transforming from a turtle into a hare, we may expect that the marginal cost associated with increasing ambidexterity may, at first, grow faster than the marginal benefits. There are strong resource trade-offs when building up exploratory and exploitative innovation activities in times of crisis, so that personnel dedicated to refining existing technologies, for example, may not be qualified to experiment with new technologies and vice versa (Stettner & Lavie, 2014). As a result, the outcomes of these initial innovation efforts will exhibit a wide distribution of outcomes (Wiklund & Shepherd, 2011). Nonetheless, research demonstrates that there are strong mutually reinforcing effects when exploratory and exploitative businesses graduate to a certain scale as the exploratory businesses contribute novel competences to the exploitative businesses and vice-versa (Raisch & Tushman, 2016). Accordingly, outcomes begin to stabilize during a crisis as resource synergies unfold that help ease trade-offs between the activities. We assume that after a certain tipping point, the marginal benefits of ambidexterity begin to outweigh the marginal costs or, in our words, a turtle has turned into a hare.

Summarizing, we posit that during economic crises, firms may achieve performance stability based upon their ambidextrous orientation if they follow one of two strategic approaches. They may be either *turtles* or *hares*. Turtles focus on a conservative strategic posture characterized by limited exploratory *and* exploitative innovation (i.e., low ambidexterity). Conversely, hares emphasize a proactive approach, engaging in high levels of *both* innovation types by combining the exploitative improvement of the core business with the exploration of new technologies and markets and by fostering the mutually reinforcing effects between the two (i.e., high ambidexterity). In accordance, we propose:

Hypothesis 1. *There is a U-shaped association between organizational ambidexterity and firm performance stability during an economic crisis.*

2.2. Impact of demand-pull policies on performance stability in times of crisis

Demand-pull policies represent widely applied instruments for stimulating market demand and are often used in the context of environmentally beneficial technologies aimed at mitigating the impact of climate change (Markard et al., 2012; Mowery et al., 2010). Such policies manifest in a variety of ways, including feed-in-tariffs, stated governmental goals, regulations and standards, and increased access to capital to incentivize private investments in markets and technologies during times of economic crisis (Tienhaara, 2010; Zenghelis, 2012).

Demand-pull policy instruments create incentives to acquire specific products or technologies for customers or investors who would not have invested in them otherwise due to high costs, uncertainty, or limited effectiveness in comparison to existing, more traditional technologies (Jaffe et al., 2002; Porter & van der Linde, 1995). Hence, these policy-induced demands can directly increase the sales potential for products and technologies, thereby managing potential declines in demand due to a recession.

A considerable amount of research examines the effectiveness of demand-pull policies for factors such as technology diffusion or patenting activities (see, for example, reviews by del Rio González and Penasco (2014) or Kemp and Pontoglio (2011)). By using highly aggregated indicators to suggest an overall positive performance impact on an industry- or country-level, these studies examine the effects of such policies on individual firm performance, if at all, only indirectly. Questions remain regarding the impact of such policies on firms' ability to stabilize their performance during times of economic downturn and crises.

Even though all firms operating within a particular industry such as renewable energy are affected by the same policies, the outcomes they experience may nonetheless vary based upon how strongly they respond to demand-pull policies when making strategic decisions. Some firms may place greater emphasis on aligning their business strategy to these external incentives and thus offer what the policy demands (Doblinger et al., 2016). As a result, they are likely to benefit more from the policy's ability to stabilize firms' performance by encouraging market demand when the economy overall is experiencing downturn. Conversely, the portfolio of firms which perceive that macro-level conditions have less bearing on their strategy-making can be expected to be less aligned with the demand-pull policies. Therefore, those firms might fail to benefit substantially from the potentially stabilizing effects of demand-pull policies.

Particularly during times of economic recession, firms are likely to be paying close attention to opportunities to make sales, to satisfy customer needs, and to stabilize their cash flow (Gallego-Álvarez et al., 2014; Grewal & Tansuhaj, 2001). Companies that perceive a policy-backed demand for their offerings may be more likely to adapt their products and technologies to take advantage of the benefits of enacted demand-pull policies, and therefore will be better positioned to stabilize their firm performance during economic crises than those which largely ignore external market-inducing influences. Given these preceding arguments, we propose:

Hypothesis 2. *There is a positive association between the perceived importance of demand-pull policies and firm performance stability during an economic crisis.*

2.3. Interaction effect of demand-pull policies and ambidexterity

While we assume a generally positive effect of demand-pull policies on firms' performance stability during times of economic crisis, we further consider whether this effect is contingent on the level of ambidexterity that firms have developed internally. As stated above, the main objective of demand-pull policies is to enable prompt technology diffusion (Markard et al., 2012; Mowery et al., 2010). Thus, such policy-induced dynamics encourage firms to sell products and technologies with certain pre-defined requirements in markets driven by political as opposed to solely classical market forces (Jacobsson & Lauber, 2006; Nemet, 2009).

This may be particularly beneficial for those firms that we characterize as *turtles*, with relatively low levels of exploratory and exploitative innovation (that is, low ambidexterity) during times of economic crisis. Given the absence of strong internal innovation efforts, they can be expected to be very open to guidance from public policy and react by focusing on products and technologies that draw upon available financing and meet regulatory requirements to maximize the pay offs from demand-pull policies (Doblinger et al., 2016; Schmookler, 1962). This greater disposition to act in line with policy-induced market expectations heralds more stable, predictable expectations for customers, investors, suppliers, and other interested parties such as debt financiers (Hult et al., 2005; Narver & Slater, 1990). Accordingly, firms with low levels of ambidexterity are likely to demonstrate a particularly positive relationship between the presence of demand-pull policies and performance stability.

Conversely, we expect *hares,* i.e., firms that have developed a strong ability to foster both exploratory and exploitative innovation, to benefit less from the potentially stabilizing effect of demand-pull policies. These policies tend to reward efficiency enhancements and cost reductions to enable rapid technology diffusion, but they bear the risk of locking firms into existing but potentially inferior technologies (Malerba, 2009; Schmookler, 1962). Ambidextrous firms will thus be torn between two strategic charters, the external guidance set by public policy and the internal efforts driven by the ability and willingness to engage in both exploratory and exploitative innovation and thus leave the terrain that public policy is imposing on them. Such dissonance between strategic exploration and/or exploitation charters potentially result in unfavorable organizational outcomes (Zimmermann et al., 2015).

Summarizing, we propose that those firms with relatively low levels of exploration and exploitation (which we call turtles) have both the openness and the ability to act in line with demand-pull policies and thus gain the most out of them in times of crisis. Conversely, firms with relatively high ambidexterity (which we call hares) are more reluctant to follow the policy guidance as it prevents them from leveraging their strong internal exploration and exploitation competences and thus will receive less stabilization from demand-pull policies:

Hypothesis 3. *The level of organizational ambidexterity negatively moderates the relationship between the perceived importance of demand-pull policies and firm performance stability during an economic crisis. That is, we expect that firms with lower levels of ambidexterity will benefit more than those with higher levels of ambidexterity.*

3. Method

3.1. Research context

We test our hypotheses on the importance of ambidexterity and demand-pull policies for performance stability in the context of German renewable energy firms (2009–2011) at the time of the global economic downturn following the Lehman bankruptcy in 2008. Such a three-year window is often used for measuring firm-level effects that, like in this case, only unfold over time (see, for example, the EU Community Innovation Surveys (CIS)). The renewable energy industry provides a rich empirical set-up for testing our hypotheses for the following reasons. The market demands are influenced by demand-pull policies, most prominently the feed-in-tariff (Jacobsson & Lauber, 2006). The German renewable energy industry further represents an emerging market for environmental beneficial technologies, where preventing firms from experiencing significant turbulence during the economic crisis is of particular interest to policy makers. In the context of German renewable energy firms, ambidexterity may be particularly relevant as these firms are encouraged to (i) focus on improvements of current products and technologies and price declines for fast market introductions (Nemet, 2009; Schmookler, 1962) and (ii) to defend technological superiority and leadership positions to maintain their competitive advantages in the light of increasing international competition, especially from Asia (Gallagher, 2014).

3.2. Data collection

The data collection for this study was conducted in three steps. We started with an in-depth qualitative pre-study based on industry reports and semi-structured interviews with seven CEOs and experts from renewable energy firms and associations following traditional methodological prescriptions (Eisenhardt, 1989; Yin, 2009). The purpose of this pre-study was to gain a detailed understanding of the research context.

In a second step, we conducted a survey among 1153 firms operating in the German renewable energy industry as suppliers, manufacturers, or project developers in the photovoltaic, solar thermal, wind, biomass, biogas, geothermal, hydropower, and thermal heat pumps sectors. The relevant firm names were obtained from a renewable energy research institute that analyzed trade association memberships, participation in industry fairs as well as other relevant databases, and updated with information from address directories from the wind and solar sectors. The measurements were professionally translated and back-translated (English/German) by an English native speaker to guarantee conceptual equivalence. We pre-tested the questionnaire with industry experts (nine CEOs from renewable energy firms from different sectors and academic representatives). In case of diversified firms, we asked the CEOs to respond to the questions for their most important renewable business unit in terms of sales volume. We further included several procedural remedies when designing the survey (for example, as suggested by Podsakoff et al. (2003)), and tested for non-response and functional bias. We received 140 useable responses (response rate = 12.14 percent).

Finally, we collected sales and company data for the 1153 firms from the database *dafne* (Bureau van Dijk). Out of the 140 firms that responded to our survey, we were able to match the sales data for 102, because we left it to the companies to decide whether they desired to stay anonymous or not (and benefit from a summary of our findings). We further compared the means for ambidexterity for the 102 firms in the final sample (26.01) and the 38 missing ones (25.90), which are not statistically significant. We found the same result for the perceived impact of demand-pull policies (mean for our sample of 102 firms: 4.67 and for the missing ones: 4.57). In Table 1, we compare the distribution between our sample and the total number of firms, which demonstrate comparable numbers.

3.3. Dependent variable

Firm performance stability was measured by combining archival and self-reported data using the approach suggested by Wales et al. (2013). We compiled sales data from our survey and from the *dafne* database from 2009 to 2011 and calculated the standard deviation of the sales for each of the 102 firms as well as for all of the firms in the same renewable sub-sector over the three-year period. To calculate our final measure, we first subtracted the industry-level median standard deviation of sales from the standard deviation of each firm. This approach allowed us to control for sector-specific effects that might cause significant sales fluctuations and to limit concerns of common method bias. In a second step, we reversed the variable to get to the final measure of performance stability.

3.4. Independent variables

We used seven point Likert scales for all latent variables that were collected in the survey. To assess their reliability and validity, we conducted an exploratory and a confirmatory factor analysis. The values for the reflective measures (Cronbach's alpha [α], factor loadings, factor reliability [FR], average variance extracted [A.V.E]) were all in line with the standard thresholds and are described below. We compared A.V.E. with the squared correlation of each pair of factors to assess discriminant validity of the constructs, where the values for A.V.E. exceeded the squared correlation between all of the relevant factors (Fornell & Larcker, 1981). Table 2 summarizes the main findings from the exploratory and confirmatory factor analysis of the latent variables.

3.4.1. Organizational ambidexterity

Ambidexterity was measured using the well-established reflective six item measure for the two orthogonal dimensions of exploratory and exploitative innovation provided by Lubatkin et al. (2006) and via multiplication of the two (Gibson & Birkinshaw, 2004). This measure reflects the theoretical basis of March (1991) and was measured on a seven point Likert scale (1 = strongly disagree to 7 = strongly agree). After the exploratory factor analysis, we reduced the measure for exploratory innovation to 4 items (In the period 2008 to 2011, the firm could be described as one that: "(a) looks for novel technological ideas by thinking 'outside the box', (b) bases its success on its ability to explore new technologies, (c) creates products or services that are innovative to the firm, and (d) looks for creative ways to satisfy its customers' needs" (Lubatkin et al., 2006, p. 656)). The measure showed strong reliability and validity *($\alpha = 0.86$, factor loadings ≥ 0.67, FR = 0.86, A.V.E. = 0.60)*. Similarly, the measure for exploitative innovation was reduced after the exploratory and confirmatory factor analysis to describe the firm as one that "(a) commits to improve quality and lower cost, (b) continuously improves the reliability of its products and services, and (c) constantly surveys existing customers' satisfaction" (Lubatkin et al., 2006, p. 656). The measure also showed good reliability and validity *($\alpha = 0.75$, factor loadings ≥ 0.64, FR = 0.78, A.V.E. = 0.54)*. Following Gibson and Birkinshaw (2004), and in line with our argumentation, we compute a multiplicative scale rather than a difference measure or the sum of exploration and exploitation. Furthermore, even though all of the options (multiplication, subtraction, or sum) reveal robust estimates, the multiplicative scale shows the highest explanatory power.

3.4.2. Demand-pull policies

To operationalize the importance of demand-pull policies, we used the variable from Doblinger et al. (2016) that builds on the measures established by Marcus et al. (1994) and Nishimura and Okamuro (2011). The CEOs of the firms were asked to evaluate on a seven point scale (1 = not relevant at all to 7 = very relevant) the relevance they give to the following three demand-pull policies when taking business decisions: (a) the renewable energy law (feed–in–tariff), (b) the measures that promote the financing of renewable projects (for example, credits from a state–owned bank), and (c) the renewable energy goals of the federal government or the European Union. The variable showed good reliability and validity *(Cronbach's alpha (α) = 0.79, factor loadings ≥ 0.67, factor reliability (FR) = 0.79, average variance extracted (A.V.E.) = 0.57)*.

3.5. Control variables

We controlled for the influence of regulatory uncertainty, which was measured as a reflective construct adapted from Engau and Hoffmann (2011), by asking the CEOs how certain they were about the different features of the demand-pull policies *($\alpha = 0.91$, factor loadings ≥ 0.84, FR = 0.91, A.V.E. = 0.78)*. In addition, we included in our models firm age (number of years since founding) and size (number of full-time employees), diversification (whether they additionally operate in other industries or not), the competitive intensity of the respective renewable sector (Jaworski and Kohli (1993),[1] the technology and market newness

Table 1
Overview and comparison of sample.

Distribution	Full (1,153)	Sample (102)	Full (%)	Sample (%)
Geothermal	52	7	5%	7%
Biogas	45	11	4%	11%
Biomass	25	2	2%	2%
Wind	491	43	43%	42%
Hydro power	57	6	5%	6%
Photovoltaic	263	21	23%	21%
Solar thermal	135	9	12%	9%
Heat pumps	18	3	2%	3%
Multiple[a]	67	–	6%	–

[a] There are firms that are active in more than one sector. In the survey, we asked the firms to respond for the business unit with most sales and controlled for this effect by including the variable diversification in our models.

[1] We reduced the measure for competitive intensity to four items after the exploratory factor analysis ($\alpha = 0.80$, factor loadings ≥ 0.54, FR = 0.79, A.V.E. = 0.50).

Table 2
Exploratory and confirmatory factor analysis.

	Construct	Items	Factor loadings[b]	Cronbach alpha[b]	Factor reliability[c]	A.V.E.[c,d]
	Demand-Pull Policies	Renewable energy law	0.67	0.79	0.79	0.57
		Finance policies	0.81			
		Political goals	0.76			
Ambidexterity (Exploration * Exploitation)	Innovation Exploration	Exploration 1	0.83	0.86	0.86	0.60
		Exploration 2	0.80			
		Exploration 3	0.81			
		Exploration 4	0.67			
		Exploration 5[a]				
		Exploration 6[a]				
	Innovation Exploitation	Exploitation 1	0.71	0.75	0.78	0.54
		Exploitation 2	0.78			
		Exploitation 3	0.70			
		Exploitation 4	0.64			
		Exploitation 5[a]				
		Exploitation 6[a]				

[a] Dropped after exploratory factor analysis.

[b] Calculated with SPSS 20.

[c] Calculated with AMOS 20.

[d] Average variance extracted.

of the product portfolio (Talke et al., 2011),[2] and their R&D expenditures as a percentage of sales. We also accounted for sector-fixed effects (accounting for potential differences between firms operating in the photovoltaic, solar thermal, wind, biomass, biogas, geothermal, hydropower, and thermal heat pumps sectors) and value chain fixed effects (accounting for potential differences between suppliers, manufacturers, or project developers) in our models.

4. Results

In Table 3, we summarize the descriptive statistics and correlations of the variables we used. The firms had an average performance stability of −4.98, ranging from −0.06 to as much as −40.10, with a standard deviation (s.d.) of 7.77. Ambidexterity ranges from 4 to 45.5, with a mean value of 26.01 and a s.d. of 9.42. Fig. 1 depicts how the importance of demand-pull policies varies among different groups of German renewable energy firms across company age and size.

Table 4 displays our results from OLS regressions with industry- and value-chain fixed effects. Supporting H1, our results indicate a significant U-shape relationship between ambidexterity and stability, as the three relevant conditions described by Lind and Mehlum (2010) and Haans et al. (2016) are met: (1) The coefficient of the squared term is positive and significant. (2) Ambidexterity and its squared term are both significant (see Model 2 and Fig. 2: *ambidexterity squared:* β *= 0.01/stand. b = 0.66, p-value = 0.043*; *ambidexterity:* β *= -0.56/stand. b = -0.68, p-value = 0.036)*, while the direct impact of ambidexterity on performance stability is not significant (Model 1). (3) The vertex or inflections point (first derivative) for the curve is at a value of 28.00 for ambidexterity (=-(-0.560/2 * 0.010), 95%-Confidence interval [26.2; 29.8]), which is within the range of observed values of ambidexterity [4.0; 45.5] (see Table 3). Fig. 2 shows the fitted, non-linear, regression line that predicts performance stability based on the OLS findings.[3]

When comparing the standardized betas of ambidexterity and its squared term to other independent variables that are measured on different scales, we see that both ambidexterity and its squared term have by far the highest values (*diversification has the next highest stand. b of 0.27, p-value 0.066*). In addition, the standard error for the squared term of ambidexterity is relatively low (*s.e. 0.005*). The overall η^2 indicates that Model 2 explains 30.79 percent of the variability in stability.[4] The partial η^2 for ambidexterity and ambidexterity squared mirror the findings from above, indicating that besides size and R&D intensity, these variables have the highest values, explaining 3.83 percent and 3.18 percent of the variability in stability respectively. Comparing Model 1 (direct effects) and Model 2 (direct effects and squared term (non-linear model), we observe that the second shows a better fit (compare adjusted R^2 of 0.225 and 0.236) and statistically significant findings for ambidexterity and its squared term. Moreover, we performed a Likelihood-ratio test to compare Model 1 and Model 2 (including the squared term for ambidexterity). The marginally significant test result (prob > chi2 = 0.069) further points to the relevance of the non-linear model (e.g., Greene, 2012).[5]

Even though we suggested a positive association between demand-pull policies and performance stability in H2, our results show a negative but insignificant relationship. However, when including the interaction effect between ambidexterity and demand-pull policies, we find support for H3, which proposed more stable business outcomes for increases in the importance of demand-pull policies for turtles (i.e., those 62 firms left of the vertex of 28.00, which on average show a negative relationship between ambidexterity and performance). For hares (i.e., those 40 firms right of the vertex of 28.00, which on average show a positive relationship between ambidexterity and performance), we find support for the suggested stability reducing effect of demand-pull policies (see Model 3 and Fig. 3, ambidexterity x demand-pull policy: β = *-0.06/stand. b = -0.51, p-value = 0.057*; individual effects: ambidexterity β *= 0.28/stand. b. = 0.34, p-value = 0.030;* demand-pull policy β *= 1.42/stand. b. = 0.31, p-value = 0.105*). Similar to the results in Model 2, the standard betas show the next highest levels for diversification (*stand. b. = 0.30, p-value = 0.054*). Model 3 further explains 30.47 percent of the variability in stability (η^2). The interaction effect accounts for 2.73

[2] We calculated variance inflation factors (VIF) for the two formative constructs market newness (VIF ≤ 2.46) and technology newness (VIF ≤ 2.04) and found no major problems of indicator collinearity.

[3] The formula to estimate the fitted regression line is: y=(−0.62)-(0.56) *ambidexterity+(0.01)*ambidexterity squared.

[4] Effect sizes were calculated for non–robust standard errors and excluding factor variables.

[5] We used the lrtest command in Stata and compared the models with non–robust standard errors and excluding factor variables.

Table 3
Descriptive results and correlations.

	Mean	S.D.	Min	Max	Stability	Ambidexterity	Demand-pull policy	Regulatory uncertainty	Technology newness	Market newness	Diversification	Competitive intensity	R&D intensity	Age	Size
Stability	−4.98	7.77	−40.1	−0.06	1										
Ambidexterity	26.01	9.42	4	45.5	−0.090 (0.368)	1									
Demand-pull policy	4.67	1.69	1	7	−0.145 (0.145)	0.020 (0.845)	1								
Regulatory uncertainty	4.1	1.49	1	7	0.184† (0.065)	−0.215* (0.030)	−0.052 (0.606)	1							
Technology newness	3.91	1.42	1	6.5	0.037 (0.710)	0.185† (0.062)	−0.103 (0.304)	−0.110 (0.269)	1						
Market newness	2.98	1.3	1	6.25	−0.068 (0.497)	0.202* (0.042)	−0.148 (0.138)	−0.100 (0.317)	0.630** (0.000)	1					
Diversification	0.56	0.5	0	1	0.227* (0.022)	0.085 (0.395)	−0.243* (0.014)	−0.048 (0.634)	0.162 (0.103)	0.092 (0.359)	1				
Competitive intensity	3.93	1.24	1.25	6.5	−0.149 (0.135)	−0.086 (0.388)	−0.029 (0.776)	−0.286** (0.004)	0.017 (0.867)	−0.110 (0.273)	0.161 (0.107)	1			
R&D intensity	6.3	7.8	0	50	0.196* (0.048)	0.053 (0.595)	−0.194† (0.051)	0.061 (0.543)	0.190† (0.056)	0.216* (0.029)	0.029 (0.769)	−0.062 (0.533)	1		
Age	35.4	42.09	3	242	0.086 (0.388)	−0.041 (0.684)	−0.234* (0.018)	−0.047 (0.641)	0.092 (0.358)	0.072 (0.472)	0.470** (0.000)	0.068 (0.495)	−0.009 (0.925)	1	
Size	74.99	178.84	1	1250	−0.396** (0.000)	0.045 (0.655)	0.114 (0.255)	−0.215* (0.030)	−0.035 (0.729)	−0.016 (0.871)	−0.024 (0.810)	0.158 (0.114)	−0.040 (0.691)	0.002 (0.982)	1

** < 0.01; *< 0.05; † < 0.1. P-values in parentheses.

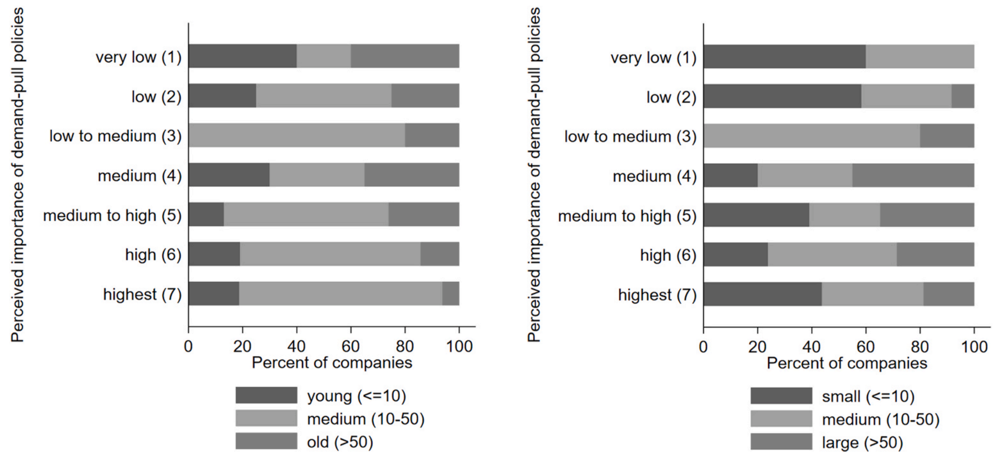

Fig. 1. Policy relevance varies across company age and size.

Table 4
Results of OLS regressions on performance stability.

Performance stability	(1) Direct effects	(2) Nonlinear effects	(3) Interaction effects
Intercepts			
Ambidexterity	0.007	−0.560*	0.283*
	(0.932)	(0.036)	(0.030)
	[0.081]	[0.262]	[0.128]
Ambidexterity squared		0.010*	
		(0.043)	
		[0.005]	
Demand-pull policy	−0.201	−0.043	1.423
	(0.547)	(0.905)	(0.105)
	[0.333]	[0.359]	[0.868]
Demand-pull policy x ambidexterity			−0.062†
			(0.057)
			[0.032]
Controls			
Regulatory uncertainty	0.347	0.265	0.330
	(0.544)	(0.617)	(0.572)
	[0.568]	[0.529]	[0.582]
Technology newness	0.664	0.837	0.597
	(0.353)	(0.248)	(0.388)
	[0.711]	[0.719]	[0.687]
Market newness	−1.159	−1.063	−1.175
	(0.252)	(0.294)	(0.240)
	[1.005]	[1.006]	[0.992]
Age	−0.007	−0.007	−0.002
	(0.661)	(0.654)	(0.880)
	[0.016]	[0.015]	[0.015]
Size	−0.012**	−0.011**	−0.012**
	(0.006)	(0.012)	(0.004)
	[0.004]	[0.004]	[0.004]
Competitive intensity	−0.463	−0.541	−0.395
	(0.587)	(0.521)	(0.641)
	[0.848]	[0.839]	[0.844]
Diversification	4.159†	4.142†	4.638†
	(0.069)	(0.066)	(0.054)
	[2.258]	[2.220]	[2.372]
R&D intensity	0.168*	0.191*	0.158*
	(0.027)	(0.017)	(0.033)
	[0.074]	[0.078]	[0.073]
Constant	−6.688	−0.621	−13.963†
	(0.341)	(0.926)	(0.062)
	[6.989]	[6.690]	[7.367]
Value chain fixed effects included	*YES*	*YES*	*YES*
Sector fixed effects included	*YES*	*YES*	*YES*
Observations	102	102	102
R-squared	0.386	0.402	0.402
Adjusted R-squared	0.225	0.236	0.235

** < 0.01; *< 0.05; † < 0.1. P-values in parentheses; robust standard errors in brackets.

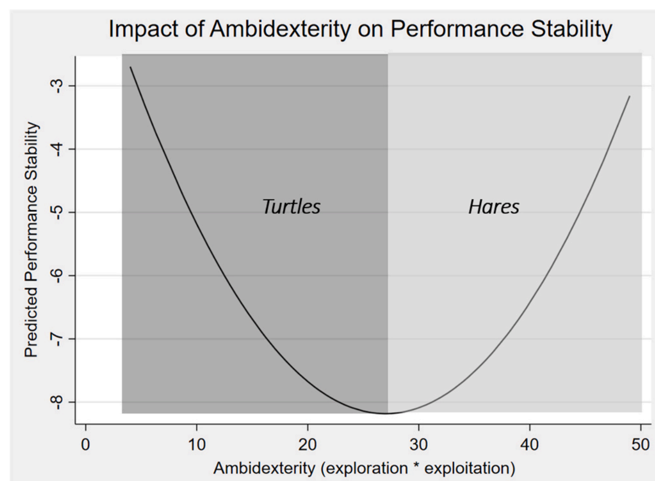

Fig. 2. Main effect.

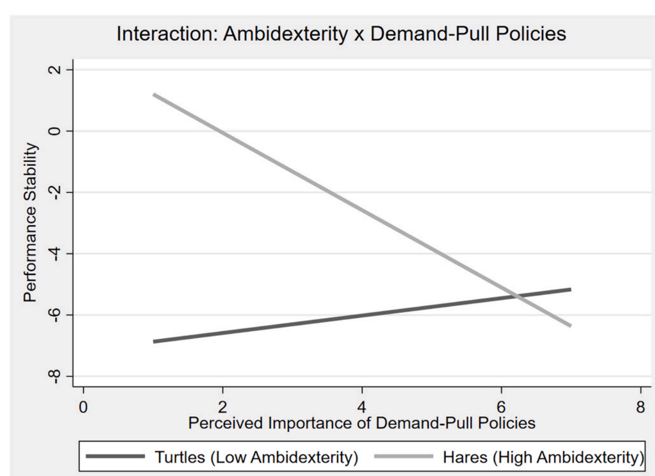

Fig. 3. Interaction effect.

percent of the variability in stability whereas the individual effects explain 1.3 percent (ambidexterity) and 1.90 percent (demand-pull policy). Fig. 3 shows that firms with high levels of ambidexterity (i.e., hares) experience less performance stability the stronger the impact of demand-pull policies (light grey line). On the contrary, the stability in

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sales increases for firms with low levels of ambidexterity (i.e., the turtles) when demand-pull policies increase (dark grey line).

To check the robustness of our results, we further ran the same statistics by dividing our sample into low and high levels of demand-pull policy.[6] The results for the sample splits also support our findings on the U-shape relation between ambidexterity and performance stability in the case of both high and low policy impacts on firms. Moreover, in line with our H3, we observe that increasing policy impact generally leads to less performance stability for highly ambidextrous firms.

While our theory and hypotheses suggest a causal, non-linear relationship between ambidexterity and performance stability, there is the possibility that our statistical results are driven by (i) more stable firms being more ambidextrous and by (ii) omitted variables.

From a theoretical perspective, one would expect that firms with higher sales have more resources and are therefore more likely to engage in exploration and exploitation (i.e., ambidexterity) (Lubatkin et al., 2006; Raisch & Birkinshaw, 2008), and the contrary being true for lower sales growth. However, we do not observe such a pattern in our analysis and data: Our dependent variable relates to the stability of performance, i.e., keeping both negative and positive performance deviations low, which is not likely to affect the degree of ambidexterity. OLS regressions using performance stability as an independent variable and ambidexterity (p-value = 0.543) or exploration (p-value = 0.632) and exploitation (p-value = 0.324) as dependent variables provide statistical insignificant insights that support these arguments. We also observed the same tendencies when using growth as an independent variable and ambidexterity (p-value = 0.526) or exploration (p-value = 0.294) and exploitation (p-value = 0.814) as dependent variables. Overall, while these arguments help in reducing concerns of the likelihood of endogeneity, they cannot fully rule out its possible impact on our findings.

Moreover, there is the possibility that omitted variables affect our findings. While we also cannot fully rule out these concerns, we would like to emphasize our thorough approach in (i) generating the data and (ii) conducting the statistical analysis. First, prior to conducting the survey and collecting the external data, we interviewed seven CEOs and industry experts to understand drivers, motivations, and firm-level specifics. These insights were used to develop the survey. When responding to the survey, the CEOs further had the option to comment on the survey and provide their insights. Second, we benefit from data from a single industry in one country, and even control for the potential impact of the sub-sector (accounting for potential differences between firms operating in the photovoltaic, solar thermal, wind, biomass, biogas, geothermal, hydropower, and thermal heat pumps sectors) and value-chain of the firm (accounting for potential differences between suppliers, manufacturers, or project developers). Moreover, we include many relevant control variables in all our statistical models, which we identified in the qualitative pre-study and based on previous literature: firm age (number of years since founding), size (number of full-time employees), diversification (whether they additionally operate in other industries or not), the competitive intensity of the respective renewable sector, the technology and market newness of the product portfolio, and their R&D expenditures as a percentage of sales.

5. Discussion

In light of the COVID-19 crisis, a statement released from the European Union (EU) Ministers of Finance focused on a 'Stability and Growth Pact' to mitigate the expected severe economic downturn (Council of European Union, 2020). Our article is aligned with these priorities as it draws attention to policy makers' emphasis upon firm performance stability as a policy-relevant dependent variable during economic crises and compliment to traditional firm performance variables within management research. We find that ambidexterity has a U-shaped effect on performance stability during an economic crisis. This is remarkably different from what we have learned from prior research about its relationship with firm growth, profitability, or overall performance, which mostly suggests a linear and positive effect (Junni et al., 2013), or a negative effect (Stettner & Lavie, 2014).

This study further highlights the need for a better integration of management and policy research. In particular, we emphasize the need for policy makers to account for more nuanced, firm-level mechanisms that support (or hinder) the effectiveness of policies to help firms in their efforts to successfully deal with economic crises. In our empirical sample of German renewable energy firms following the 2008 Lehman bankruptcy, the policies turned out more supportive for *turtles* (i.e., those firms with relatively low ambidexterity) rather than for *hares* (i.e., those firms with relatively high ambidexterity). Demand-pull policies notably help turtles experience more stable outcomes, however, hares experience less stable outcomes the more they are affected by demand-pull policies. This implies that hares might endure on their own; and the more they let policies guide them, the less likely they are to experience stable outcomes. This, however, might not have been the intention of policy makers who typically argue that they want to *help firms to help themselves* and thus aim at supporting those more proactive firms (i.e., the hares).

These theoretical reflections and empirical insights on the role of performance stability allow us to contribute in the following new ways to the ambidexterity and public policy literatures.

5.1. Theoretical contributions

Taking the perspective of policy makers, we explore the impact of ambidexterity on performance stability (instead of growth or profitability) and its interplay with demand-pull policies during times of economic crisis. That is, we show how macro-economic concerns can shape the performance impact of ambidexterity, allowing us to reconcile to some extent the conflicting views on ambidexterity's performance effects and its external contingencies.

Researchers have extensively debated ambidexterity's performance effects. While several reviews and meta-analyses highlight evidence of positive effects (Junni et al., 2013; O'Reilly & Tushman, 2013), some studies have shown that higher complexity, conflicting organizational routines and cognitive models may undermine these benefits and can even result in negative performance effects (Stettner & Lavie, 2014; Voss & Voss, 2013). Our data suggests that when looking at the effect of ambidexterity on firm performance stability, there is a third option that complements the cause and effect relationships observed in prior research. Specifically, we show that in times of crisis, ambidexterity has a U-shaped effect on performance stability. This suggests two different logics. Firms with relatively low levels of ambidexterity (turtles in our terminology) experience more stable performance the less they engage in exploration and/or exploitation. Conversely, firms with relatively high levels of ambidexterity (which we call hares) improve performance stability by further fostering exploration and/or exploitation. While high and low levels of ambidexterity thus seem to be beneficial in terms of performance stability, being stuck in the middle between the two appears to be associated with the lowest level of performance stability. This means that firms with low levels of exploration and exploitation will experience reduced performance stability if they slowly or inconsistently transition from low to high levels of ambidexterity. Yet, once firms are able to amass a sufficient level of ambidexterity beyond a certain threshold, increasing exploration and/or exploitation further appears to have positive implications. Given that performance stability is a policy goal specific to the context of economic crises, we encourage

[6] The detailed results for this additional test as well as for the following calculations are available upon request from the authors.

future research to build upon our findings and investigate whether similar effects are observable during other periods of crisis and/or for other performance variables such as firm survival.

Moreover, the insight that firms can achieve performance stability in times of crisis by either acting as turtles (with low levels of ambidexterity) or as hares (with high levels of ambidexterity) raises the question of whether both are equally applicable in all crisis contexts, and if the concept of equifinality applies more broadly. Our evidence suggests that the external regulatory environment may guide the choice between these strategic alternatives given their observed interaction, a point which may be further investigated in future research. While public policy incentives are more effective for turtles, hares seem to struggle using externally induced demand as a mechanism to improve their performance stability. As firms often have little influence on the development of their regulatory environment, they are advised to pursue an ambidexterity strategy with knowledge of how it will interact with the regulatory environment.

Summarizing, we add two insights for ambidexterity research. First, we complement views concerning the positive or negative linear effects between ambidexterity and different performance measures by providing evidence of a non-linear U-shaped effect on performance stability in times of crises. Second, we add to research on the boundary conditions for the ambidexterity-performance relationship by introducing public policy interventions as a novel moderator impacting the effectiveness of ambidextrous innovation behavior.

Our findings further allow public policy scholars to gain a better understanding of the micro-impacts of demand-pull policies and their interaction with firm-level factors to explain the performance stability of firms within the economy. While the aggregated industry- or country-level studies focus on policy effects across firms, industries, and countries (e.g., Newell et al., 1999; Porter & van der Linde, 1995), more recent research has also pointed to the importance of exploring policy impacts at the firm-level (Doblinger et al., 2016; Hoppmann et al., 2013; Rogge & Schleich, 2018). By shifting to the firm-level of analysis, surprisingly nuanced results are possible. For instance, industry-level findings suggest that demand-pull policies may directly affect the balance between exploration and exploitation, perhaps by favoring exploitation (Nemet, 2009; Schmookler, 1962). In contrast, our findings indicate no direct firm-level effect of demand-pull policies on performance stability and/or ambidexterity. Instead, we find evidence that the effectiveness of these policies may depend on the management approaches of the firms reacting to the economic crisis.

Our findings suggest that turtles are more likely to benefit from an embrace of demand-pull policies. Such demand-pull policies may therefore potentially incentivize some firms, particularly those exhibiting moderate levels of ambidexterity, to actively reign in their ambidextrous activities during times of economic crises. On the contrary, the absence of stabilizing benefits for hares during times of economic crises may lead to a selection effect, where these highly ambidextrous firms diversify into other industries, disappear, or are acquired, while the remaining firms are the ones with relatively little ambidexterity.

Summarizing, our research adds two main insights to the public policy literature. First, by looking at policy impacts at the firm-level instead of the aggregate industry-level, we provide evidence that demand-pull policies do not directly lead to more stable firm performance during times of economic crises. Second, this firm-level perspective allows us to explain how firm-internal and external responses to economic crises are interrelated, suggesting that the stabilizing impact of demand-pull policies does only unfold through the interplay with firm-internal strategic responses.

5.2. Policy and managerial implications

Our study contributes nuanced insights on how crises can be addressed by policy makers and managers. Our data shows that firm-internal reactions (ambidexterity) and the external reactions of public policy makers (demand-pull policies) can either support one another or get in each other's way. This finding is particularly interesting as it challenges the universality of a pervasive Keynesian rooted assumption that demand-side measures support firms in *helping them to help themselves* in times of economic crisis (Tienhaara, 2010; Zenghelis, 2012).

In the light of the upcoming recession following the Covid-19 pandemic, it may become crucial for policy makers to understand how the measures they have at their disposal interact with firm-level responses (Keynes, 1937; Perry, 2013). Our firm-level insights suggest that the impact of demand-pull policies depends on the existing internal abilities of firms to react to economic crises. Firms with limited exploration and exploitation activities do indeed benefit from demand-pull policies; however, firms that significantly engage in exploration and exploitation activities during a crisis experience less stable performance when facing such political interventions. While one could argue that this reduced stability is still beneficial, as ambidextrous firms show a positive growth, this is not what our data tells us. We find that, in practice, instability is not primarily driven by either growth or decline, but rather by more general performance fluctuations taking both directions. This is important as it confirms prior research suggesting that performance stability is indeed a distinct outcome of firm and political behavior and thus deserves specific attention given the intention of policy makers to foster stability and thus preserve the broader economy (Van Lear & Sisk, 2010).

These insights result in two challenges for policy makers. The first challenge relates to the predictability of firms' internal reactions to a crisis situation. While past exploration and exploitation activity may typically lead to path dependencies for the future, researchers have also shown that firms are able to adapt the extent of exploration and exploitation in response to environmental dynamics (Luger et al., 2018). Nonetheless, past track records (ideally from earlier crises) may provide policy makers with an indication of the shares of turtles and hares in those industries they would like to support. The second question relates to the political priorities. Our data suggests that policy makers have to take a choice if they want to help the turtles through a crisis situation, accepting the negative impact on the hares or if they want to leave the hares to help themselves, jeopardizing the future of the turtles. In both cases, we may anticipate a certain selection effect that may have implications on the industry beyond the crisis itself.

Moreover, accounting for the co-dependencies between public policies and the strategic alternatives firms have at their disposal when responding to economic crisis (i.e., acting as turtles or hares) also has implications for managers. As firms typically have little influence on the development of their regulatory environment, they are advised to manage their organization's ambidexterity in a way that allows them to benefit from demands and opportunities. Our insights help broaden their mental models when considering how to maneuver through economic crises.

5.3. Limitations and future research

We chose to focus on German renewable energy firms, i.e., one sector and in one country given our interest in understanding the impact of demand-pull policies created to stimulate market demand for specific technologies. Hence, while our findings might not be generalizable for all potential industries and the economy as a whole, it enables important policy insights for the positive and negative consequences of stimulating specific industries of public interest through demand-pull policies during times of economic crises.

These insights may be particularly important in the current economic environment caused by the Covid-19 pandemic, where policy incentives that stimulate economic stability and contribute to addressing climate change simultaneously are being discussed and implemented globally. Nonetheless, we strongly encourage future research to shed further light on the implications of the crisis type and context. While we focus on a specific past crisis, we may assume that the particularities of that crisis (e.g., its duration, its impact on the broader public etc.) might act as boundary conditions for the relationships with performance stability.

Additionally, during the limited duration of the financial crisis, we collected data on policy intervention and firm responses simultaneously, finding no significant relationship between the perceived importance of demand-pull policies and whether the firms qualified as turtles or hares. However, this cross-sectional aspect of our data does not allow us to study the potential effects that may occur between the two over time. While this was not the intention of our study, it could be an interesting avenue for future research to study such a longitudinal interplay during more enduring periods of crisis. As a second implication of our observation window, we did not gather data on the firms' post-crisis recovery. In particular, it would be interesting to understand the more long-term effects of policy interventions on changes in the industry structure (in terms of turtles and hares) once the economic storm has passed.

Furthermore, our theoretical and empirical insights focus on the assumption that individual firms are, on average, not able to affect the regulatory environment. However, there is also the possibility that firms may engage in lobbying activities and seek to shape policy measures. Similarly, policy makers can also interact directly with firms or industry associations to develop policy measures together with the private sector. We thus encourage future research to focus on the interactions between policy makers and firms, and to study their joint impact on performance outcomes.

Our research draws attention to the significance of considering the objectives of key stakeholders such as policy makers during economic crises when designing research questions and selecting dependent variables, and when it might be appropriate to investigate stability as an important alternative performance measure. Stability incorporates a broader policy perspective and complements the traditional focus on growth. However, given that our conceptualization of performance and empirical insights are born out of the challenges of economic crises, we encourage future research to build upon our findings and investigate whether and when similar effects might be observable in other contexts. Moreover, it would be helpful to consider other performance variables, such as firm survival, which are likely of similar importance to policy makers as firm performance stability. Overall, our findings suggest that such a broader perspective can provide novel insights and even help reconcile conflicting theoretical views.

Finally, our insights may raise policy makers' awareness of demand-pull policy implications (intended and possible non-intended). However, we cannot compare and contrast the long-term effects of different political regimes and can thus not provide specific recommendations for designing policies in times of crisis. Nonetheless, our findings indicate that one possible solution could be that policy makers develop complementary mechanisms in addition to market-based incentives (Rogge & Schleich, 2018). For example providing R&D, managerial, and financial support (Goldstein et al., 2020; Howell, 2017) may help firms to stabilize their performance during economic crises. Possible mechanisms could further be related to how policy makers can support firms in developing local ecosystems and providing infrastructure. They could also be related to funding opportunities through, for example, setting up incubators as stakeholder hubs (Clarysse et al., 2014; Clayton et al., 2018), that might be more resistant during crises times. Such a development of local ecosystems might require additional political action such as incentivizing behavioral changes within organizations and individuals, implying a detailed understanding of firm and policy perspectives for the design of tax incentives and educational programs.

It is our hope that this study stimulates additional research at the intersection of public policy and firm behavior, which enables new perspectives and insights for both policy makers and firm managers.

Declaration of competing interest

None.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.emj.2021.06.002.

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