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Firm responses to disruptive innovations

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Chapter 2: Firm Responses to Disruptive Innovations

How Capability and Motivation explain Defensive and Offensive Responses

“Hammer to Fall”

- Queen

Here we stand or here we fall
History won't care at all
Make the bed, light the light
Lady Mercy won't be home tonight

You don't waste no time at all
Don't hear the bell but you answer the call
It comes to you as to us all
We're just waiting for the hammer to fall

Oh every night, and every day
A little piece of you is falling away
But lift your face the Western Way
Build your muscles as your body decays

Toe your line and play their game
Let the anesthetic cover it all
Till one day they call your name
You know it's time for the hammer to fall

Rich or poor or famous for
Your truth it's all the same
Lock your door but rain is pouring
Through your window pane
Baby, now your struggle's all vain

For we who grew up tall and proud
In the shadow of the Mushroom Cloud
Convinces our voices can't be heard
We just wanna scream it louder and louder and louder

What the hell are we fighting for?
Just surrender and it won't hurt at all
You just got time to say your prayers
While you're waiting for the hammer to – hammer to fall

(..)

(END)

Firm Responses to Disruptive Innovations:

How Capability and Motivation Explain Defensive and Offensive Responses in the Music Industry

Abstract

Contrasting views persist on organizational survival during disruptiveness. A large body of research on disruptive innovation suggests that inertial forces inhibit incumbents' capability to adapt to disruptive innovations, but numerous empirical anomalies exist that demonstrate the resilience of incumbents and indicate the motivational dynamics that foster their adaptability during disruptiveness. The contradictions within the extant literature may be resolved by considering firm responses to disruptive innovations as an important mechanism towards organizational survival during disruptiveness. We include both capability- and motivation-to-respond as unique, different and interactive drivers of the relation between the impact of the disruption and firm responses. Our analysis of 118 firm responses to disruption in the music industry illustrates that offensive and defensive responses originate from different constellations of the impact of the disruption and the capability- and motivation-to-respond. The results provide a better understanding of the strategic actions of firms when confronted with a disrupted, uncertain future.

Keywords: Awareness-Motivation-Capability-framework, digitization, disruptive innovation, music industry, organizational responses, technological change

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Introduction

The introduction of MP3 sound compression technology (1993), coupled with increasing bandwidth Internet usage, caused a digital disruption in the music industry as they enabled the distribution, promotion and sale of digitized music files over the Net (Einhorn, 2003; Moreau, 2013). Around 2000, start-ups such as Napster (1999), LimeWire (2000), Kazaa (2001) and iTunes (2003) introduced innovative (il-)legal ways of distributing, promoting and selling music (Alexander, 2002; Leyshon, Webb, French, Thrift & Crewe, 2005; Liebowitz, 2006) which directly challenged incumbents in the music industry: these digital innovations disrupted traditional competencies, cut worldwide revenues in half and created new market opportunities (Ante, 2000; Seabrook, 2014; IFPI 2015).

The case of digitization in the music industry is not unique. Many industries – i.e. the newspaper, book, retail, travel and financial industry (Christensen & Raynor, 2003; Grossman, 2016)- have been confronted with extra-industry disruptions that disturb the strategic positions of incumbents and open up windows of opportunities for newcomers that aim to exploit the disruptive technologies (Christensen, 1997; Christensen & Roosenbloom, 1995). A large body of research indicates the shared and continued interest of researchers and practitioners in understanding how and why firms innovate and organize themselves in order to meet the challenges of (digital) disruptiveness (Christensen, Raynor & McDonald, 2015; Danneels, 2004; King & Baatartogtokh, 2015; Markides, 2006). Nevertheless, the divergence in firm responses to disruptiveness within extant research and within organizational practice indicates that coping with an uncertain, disrupted future remains a fundamental challenge (Adner & Snow, 2010ab; Charitou & Markides, 2003; Danneels, 2004; Vergne & Depeyre, 2016).

To explore how and why firms respond differently to disruptive innovations, we build upon the Awareness-Motivation-Capability perspective (Chen, 1996; Chen, Su & Tsai, 2007)

to dissect the contingencies that stand at the origin of different organizational responses to disruptive innovations. We argue that firms' awareness of the pervasiveness (i.e. the perceived impact) of the disruption urges firms to respond to the disruption (Bode, Wagner, Petersen & Ellram, 2011; Chen, 1996; Govindarajan & Kopalle, 2006), but that the type of response depends on both the firms' capability and motivation to do so (Charitou & Markides, 2003; Chen, 1996). To develop our argument, we synthesize two streams of disruptiveness research: 1) research on the drivers of organizational survival during disruptiveness, and 2) research on organizational responses to disruptive innovations.

The first stream of literature focuses on the so-called creative destruction of industries (Schumpeter, 1994) and examines entrant-incumbent dynamics during disruptive innovations (Bergek et al., 2013). These studies have identified numerous firm characteristics as drivers of firms' likelihood to survive disruptiveness. Early disruptiveness research mainly examines the role of inertial forces and firm attributes as key *ex post* predictors of firms' *unawareness* of the impact of the disruption (Bode et al., 2011; Christensen, 1997; Govindarajan & Kopalle, 2006) and *incapability* to adapt to the challenges posed by that disruption (Abernathy & Clark, 1985; Assink, 2006; Christensen & Roosenbloom, 1995; Cohen & Levinthal, 1990; Gilbert, 2005; Henderson & Clark, 1990; Leonard-Barton, 1992). More recent research within this stream of research has noted the resilience of firms during disruptiveness and indicates how firms' *cognitive-motivational* aspects enable them to surpass their initial position and grasp the opportunities of the disruption (Eggers & Kaplan, 2009; Kaplan & Tripsas, 2008; King & Tucci, 2002; Tripsas, 2009; Tripsas & Gavetti, 2000). The extant research on disruptive innovations thus acknowledges the influence of three different drivers -awareness, capability and motivation- on organizational survival during disruptiveness, but mainly examines the relations between these drivers and firm performance in isolation. Prior work

has therefore not considered that organizational survival might be contingent upon how drivers, such as the awareness of the disruption or the capability or motivation, interact.

The second stream of research addresses organizational responses to disruptive innovations as an important mechanism for firms to adapt to disruptive technological change. This stream argues that firms can respond *defensively* by preserving and exploiting the traditional business model (Adner & Snow, 2010ab; Bode et al., 2011; Charitou & Markides, 2003) or *offensively* by reallocating resources and investing in the disruptive business model either independently or via spin-off organizations or strategic partnering (Charitou & Markides, 2003; Christensen & Overdorf, 2003; Macher & Richman, 2004; Madhavan, Koka & Prescott, 1998; Rothaermel, 2001). Largely neglected in this literature, however, are the drivers and their interactions that make firms respond to disruptiveness in different ways (Charitou & Markides, 2003; Christensen, et al., 2015; King & Baartagtokh, 2015).

The two streams of disruptiveness research thus represent continuing discussions concerning which organizational drivers (stream 1) and which organizational responses (stream 2) enable firms to adapt to the challenges of disruptive innovations. Nevertheless, as these two streams of research have been developed relatively independent from each other, we lack understanding of the underlying decisions that make firms respond to disruptive innovations in a certain way (Charitou & Markides, 2003; Danneels, 2004; King & Baartagtokh, 2015). By bringing together the two streams of disruptiveness research we are able to explore the unique, different and interactive effects of different drivers (stream 1) on firms' defensive or offensive responses to disruptiveness (stream 2) in order to dissect the contingencies that stand at the origin of diverging organizational responses to disruptive innovations.

To empirically explore the hypothesized interactions of perceived impact, capability and motivation to respond, we collect data on the strategic reactions of publishers and record

companies in the Dutch music industry (Fowler, 2013). We analyse firm responses to the rise of a disruptive technology (Einhorn, 2003; Moreau, 2013) in a single industry in a set period (2000-2015) to keep constant a number of external factors, such as industry or disruption variations (Charitou & Markides, 2003; Govindarajan & Kopalle, 2006) that could influence the organizational responses to disruptiveness (Danneels, 2004).

The results of a sample of 118 responses show that firms respond differently to the same disruptive technological changes. The results further indicate that to understand the origin of such diverging organizational responses to disruptive innovations, it is necessary to go beyond considering the sole influence of the impact of the disruption, the capability-to-respond or the motivation-to-respond as the noted differences are conditional on the direction and interaction of these three drivers simultaneously. Together, the unique and interactive effects of these drivers on different organizational responses to disruptiveness contribute to a better understanding of how and, most importantly, why firms respond differently to the challenges of disruptiveness. The asymmetries that stand at the origin of diverging organizational responses to disruptiveness thus enable managers to identify possibilities to engage in strategic action to exploit (disruptive) opportunities during disruptiveness.

Theoretical background

Responding to disruptive innovations

Disruptive innovations¹ can (1) create discontinuity, destroying firms' existing (technical) competences, skills and knowledge base (Tushman & Anderson, 1986; 1990), or (2) disrupt market-based competencies, affecting firms' existing value network and business models (Bergek et al., 2013; Christensen, 1997; Christensen & Raynor, 2003). Such competence-destroying discontinuities fundamentally challenge, and even render obsolete, the required skills, capabilities and knowledge applied in the old technological paradigm (Christensen,

1997; Tushman & Anderson, 1986, 1990). Nevertheless, despite the pervasive effects of disruptive innovations, empirical studies show that most firms tend to ignore the disruption until it invades the mainstream market and reaches a more established stage of development (Christensen, Raynor & McDonald, 2015; Christensen & Roosenbloom, 1995). Due to this *unawareness* of disruptive innovations and their subsequent impact on the firm and the industry (Bode et al., 2011; Christensen, 2006; Govindarajan & Kopalle, 2006) main predictions find that incumbents' market leadership will be replaced by new entrants introducing innovations based on these technologies (Bergek et al., 2013; Christensen, 2006; Christensen et al., 2015; Schumpeter, 1994). Two streams of literature address the challenges that incumbents face when adapting to disruptive innovations.

On the one hand, disruptive innovation research has mainly focused on explaining organizational survival during disruptiveness. This research stream identifies firm attributes that inhibit the *capability* of incumbents to adapt to a disruption (Ansari & Krop, 2012; Assink, 2006). Such studies emphasize the constraining role of, for example, organizational inertia (Hannan & Freeman, 1977), organizational routines (Nelson & Winter, 1982), resource dependency (Christensen & Roosenbloom, 1995), prior investments to existing value networks (Henderson & Clark, 1990), a lack of absorptive capacity (Cohen & Levinthal, 1990) or the fear of cannibalizing existing (technology) investments (Kamien & Schwartz, 1982). New entrants are expected to be more successful during disruptiveness as they face fewer of these constraints due to their relative newness and strategic flexibility (Hannan & Freeman, 1977; Macher & Richman, 2004; Schumpeter, 1994).

Numerous empirical exceptions to this standard model of entrant-incumbent dynamics during disruptiveness indicate that incumbents are able to survive (i.e. Bergek et al., 2013; Hill & Rothaermel, 2003; King & Tucci, 2002; Rothaermel, 2001; Roy & Sarkar, 2016; Tripsas, 1997) and that new entrants also struggle (i.e. Golder & Tellis, 1993; Ozcan &

Eisenhardt, 2009; Suarez & Lanzolla, 2005). To explain such anomalies, more recent disruptiveness research focuses on the cognitive-*motivational* aspects that enhance the willingness of firms to engage in action in order to surpass their initial position and grasp the opportunities created by the disruption (Dewald & Bowen, 2010; Eggers & Kaplan, 2009; Kaplan & Tripsas, 2008; Mol, Chiu & Wijnberg, 2012; Tripsas, 2009; Tripsas & Gavetti, 2000). Nevertheless, this stream of disruptiveness research largely examines the effects of these drivers in isolation (Vergne & Depeyre, 2016), thereby neglecting how organizational survival might be contingent upon how such drivers interact.

Whereas most past research has thus mainly focused on organizational drivers that explain organizational survival during disruptiveness, a second stream of research has examined organizational responses to disruptive innovations as an important mechanism for firms to adapt to disruptive technological change. These studies have provided a taxonomy of strategic *organizational responses* firms could employ in response to such pervasive disruptions (Charitou & Markides, 2003; Macher & Richman, 2004). Table I shows the current state of research on organizational responses to disruptive innovations and classifies the reactions of firms to distinguish defensive and offensive responses. *Defensive* responses aim to defend, preserve and further exploit the traditional business model during disruption (Adner & Snow, 2010ab; Bode et al., 2011; Charitou & Markides, 2003). *Offensive* responses are focused on embracing the disruption by reallocating resources to invest in the disruptive business model either independently, via spin-off organizations or via strategic partnering (Charitou & Markides, 2003; Christensen & Overdorf, 2003; Macher & Richman, 2004; Madhavan et al., 1998; Rothaermel, 2001). Table I further illustrates that whereas prior survival studies have acknowledged the influence of different drivers on organizational survival, few studies link organizational drivers of firm survival to organizational responses to disruptive innovations and quantifies their effects.

Table I: Studies on organizational responses to disruptive innovations

Reference	Antecedents of organizational responses (empirical)			Identification of types of responses (taxonomy)	
	<i>Awareness</i>	<i>Capability</i>	<i>Motivation</i>	<i>Defensive</i>	<i>Offensive</i>
Adner & Snow, 2010				v	
Bode et al., 2011	v			v	
Charitou & Markides, 2003				v	v
Christensen & Overdorf, 2003					v
Dewald & Bowen, 2010			v	v	v
Macher & Richman, 2004					v
Rothaermel, 2001; Rothaermel & Boeker, 2008		v			v
This study	v	v	v	v	v

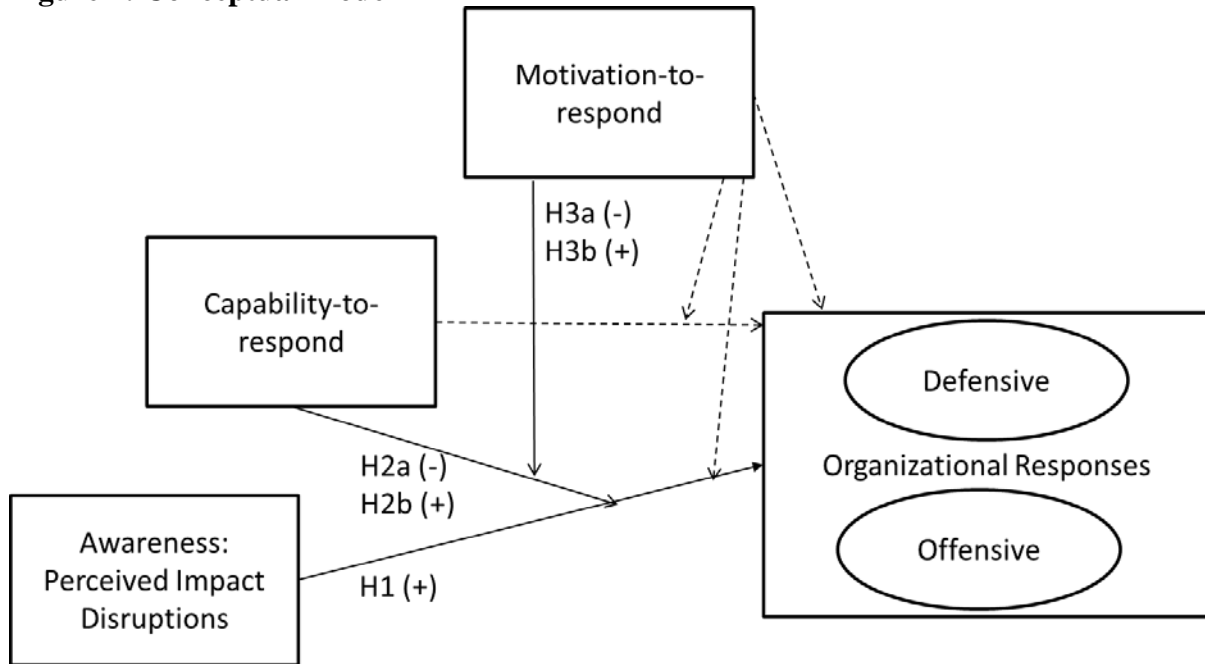
In sum, extant research on firm responses to disruptive innovations has identified 1) various drivers that affect organizational survival during disruptiveness, and 2) different organizational responses to disruptiveness. Very few studies have, however, linked the research on organizational drivers of firm survival to organizational responses to disruptive innovations. Moreover, prior work has not considered that firm responses to disruptiveness might be contingent upon how such drivers interact. As a result, extant research has provided valid, yet partial, insights into the drivers that predict the type and strength of organizational responses. There remains a lack of quantitative studies that explicitly examine the different strategic paths taken by multiple firms simultaneously (Danneels, 2004; King & Baartoghtokh, 2015; Vergne & Depeyre, 2016), and the drivers behind the origin of these different organizational responses (Ansari & Krop, 2012; Charitou & Markides, 2003; Govindarajan & Kopalle, 2006; Vergne & Depeyre, 2016). Our research addresses this gap by

exploring the contingencies that stand at the origin of different organizational responses to disruptive innovations.

Hypothesis development

Our theoretical framework, depicted in Figure 1, draws upon the Awareness-Motivation-Capability (AMC) perspective, which has been applied in competitive dynamics research (Chen, 1996). The AMC framework, which includes the unique, different and interactive effect of three different drivers, enables the exploration of the contingencies that inform firm's strategic reactions to uncertain developments that strongly impact firm performance². Applying the framework to the disruptive innovation context, we argue that the awareness of firms of the pervasiveness of the phenomenon (i.e. the impact of the disruption) urges firms to respond (Bode et al., 2011; Chen, 1996; Govindarajan & Kopalle, 2006), but the type of response depends on the motivation and capability to do so (Chen, 1996; Chen et al., 2007; He, Mahony & Wang, 2009). More specifically, we argue that the capability to respond and the motivation to respond are two moderating drivers of the type of response (Chen, et al., 2007). To understand why firms respond defensively or offensively to a disruption it is therefore necessary to simultaneously investigate a firm's awareness, capability and motivation to respond.

Figure 1: Conceptual Model



Awareness of disruptive innovations: Impact of the disruption

A technology's performance plays a central role in organizational endeavors and choice-making (Garud & Ahlstrom, 1997), especially during periods of disruptiveness (Christensen, 1997; Govindarajan & Kopalle, 2006). Disruptive technologies introduce novel performance attributes which are inferior to mainstream technologies along the dimensions of performance most important to mainstream consumers. Nevertheless, further development raises the performance of disruptive technologies to a level sufficient to satisfy mainstream consumer demands (Christensen, 1997; Govindarajan & Kopalle, 2006). As the disruption enters a faster stage of development and achieves increasingly higher degrees of impact on the established market (Christensen et al., 2015), firms start to question existing behavior, strategies and competitive advantages (Adner & Snow, 2010ab; Christensen, 2006). If the perceived impact of a given disruptive innovation on an industry's or a firm's performance objectives is noticed and exceptional- i.e. it exceeds acceptable levels (Adner & Snow, 2010ab; Bode et al., 2011)- it urges firms to respond to the inherent uncertainty of the disruption (Christensen, 1997).

Therefore, the impact of a disruption represents an important informational source (Chen et al., 2007) which firms interpret to assess the pervasiveness of the phenomenon and thus the necessity to respond (Garud & Ahlstrom, 1997; Govindarajan & Kopalle, 2006). As the impact of the disruption increases, firms are urged to consider relevant response options available to them in order to respond to the disruption (Adner & Snow, 2010ab; Bode et al., 2011). Hence, the greater the perceived impact of the disruption, the greater the pursuit of an organizational response, regardless of whether this response is defensive or offensive:

Hypothesis 1: The greater the perceived impact of a disruptive innovation on a firm, the greater its pursuit of organizational responses, regardless of the type of response.

Moderation effects

Awareness of the disruption is necessary, but not sufficient to explain why a firm chooses to respond in a certain way: a firm also has to be capable and motivated to respond to the disruption (Charitou & Markides, 2003; Christensen et al., 2015). We hypothesize that the capability-to-respond and motivation-to respond act as drivers of the type of response, because they provide the ability to implement the chosen response and the incentive to engage with the disruption (Chen, 1996; Chen et al., 2007)³.

Capability-to-respond

The urge to respond to the disruption –based on the perceived impact of the disruption- is affected by the capability of firms to respond to the disruption (cf. Chen, 1996; Chen et al., 2007). After all, without the requisite resource endowments, firms that are aware of the disruption will be restricted in their ability to implement a response (Chen, 1996; Charitou & Markides, 2003; He et al., 2009). We therefore argue that the capability-to-respond moderates the relationship between the impact of the disruption and the organizational response such that

firms are more likely to respond when they know the response can be successfully implemented (Assink, 2006; Chen, 1996; He et al., 2009). The capability-to-respond differently moderates the linkages between impact on the one hand, and defensive or offensive responses on the other hand.

First, prior investments in and dependency on certain resources, skills, organizational processes and value networks (Abernathy & Clark, 1985; Christensen & Roosenbloom, 1995; Gilbert, 2005; Henderson & Clark, 1990; Leonard-Barton, 1992; Nelson & Winter, 1982) inhibit firms in their capability to respond to the disruptive innovation because it increases switching costs (Adner & Snow, 2010ab; Gilbert, 2005; Hannan & Freeman, 1977).

Accordingly, if the disruption directly challenges such prior investments and resource dependencies (Charitou & Markides, 2003; Christensen, 1997; King & Baartagtokh 2015), core competencies become core rigidities (Leonard-Barton, 1992). As a consequence, firms might be less capable to respond to the disruption and use *defensive* measures to protect and exploit the traditional way of doing business (Charitou & Markides, 2003; Gilbert, 2005).

Hence:

Hypothesis 2a: The positive association between the impact of the disruption and the degree to which a firm responds defensively is significantly strengthened when the capability-to-respond is lower.

Second, firms might have (un-) knowingly developed the required capabilities needed to adapt to the disruption, which favors the development of offensive reactions. Firms can access new knowledge and resources, required to face the challenges of the disruption, via (existing) alliances and/or acquisitions (Christensen & Overdorf, 2003; Madhavan et al., 1998; Teece, 1992). This makes firms more likely to develop disruptive innovations. In addition, recent studies emphasize how some firms, without anticipation of foresight, are technologically preadapted to technological change: certain knowledge, skills and resources

accumulated, but unused, in the past turn out to be critical in the new technological domain (Cattani, 2006; Miller, Fern & Cardinal, 2007; Roy & Sarkar, 2016). In other words, by accessing external sources of knowledge and by redeploying historical investments and extant knowledge after a disruptive innovation (Cohen & Levinthal, 1990; Madhavan et al., 1998), firms are more capable to actually engage with the disruption and approach the disruption by going on the *offensive* (Charitou & Markides, 2003; Christensen et al., 2015; Gilbert, 2005):

Hypothesis 2b: The positive association between the impact of the disruption and the degree to which a firm responds offensively is significantly strengthened when the capability-to-respond is higher.

Motivation-to-respond

Classical disruptive innovation research suggests that cognitive failures and ignorance in senior management make firms less incentivized to embrace the disruption (Christensen, 1997; Christensen & Roosenbloom, 1995). Recent research in the field of technological change provides a more nuanced view. Exploring (managerial) cognitions and motivations these studies indicate how firm motivations (Charitou & Markides, 2003; Mol et al., 2012), cognitive frames (Eggers & Kaplan, 2009; Kaplan & Tripsas, 2008; Tripsas & Gavetti, 2000) and organizational beliefs and filters towards the new technology (Adner & Snow, 2010ab; Tripsas, 2009) influence organizational attention for new technologies and enable the creation of a firm culture that favors the adoption of new technologies (Eggers & Kaplan, 2009; Mol et al., 2012). Motivation-to-respond, which focuses on firms' cognitive-motivational aspects that provide the incentive, or, more specifically, the willingness for firms to engage in action (Charitou & Markides, 2003; Chen, 1996; Chen et al., 2007; Mol et al., 2012), therefore plays an important role in steering organizational responses. After all, aware and capable firms might not be willing to engage in action if they do not see the opportunities of the disruption.

In other words, to understand why a firm responds in a certain way we argue that it is important to investigate the joint interactive effects of both capability-to-respond *and* motivation-to-respond on the direct relationship between awareness and organizational responses. We develop arguments for two opposing moderation effects.

Following classical disruptive innovation research we focus on the role of cognition in explaining organizational inertia and rigid mindsets that limit the willingness to adapt to the disruption (Christensen, 1997; Garud & Rappa, 1994; Tripsas & Gavetti, 2000). In rapidly changing environments, senior management often has difficulty to adapt because their mental models are based on a firm's prior history rather than their current knowledge of the environment. As a consequence, managers tend to discount information about disruptive changes (Kiesler & Sproull, 1982; Tripsas & Gavetti, 2000). Such cognitive failures in senior management ultimately lead firms to refrain from taking action against the disruption (Christensen, 1997; Levitt & March, 1988). Consequently, we argue that if the impact of the disruption is high, but the capability- *and* the motivation-to-respond are not, firms are more likely to defend the traditional way of doing business (Charitou & Markides, 2003; Gilbert, 2005). Hence:

Hypothesis 3a: There is a three-way interaction between the impact of the disruption, the firm's capability to respond and the firm's motivation to respond in predicting the degree to which a firm responds defensively; defensive responses are highest when the impact is high but the capability and motivation to respond are low.

In contrast, it can be argued that the benefits and opportunities of the new technology, especially with regard to (future) organizational goal attainment, can have an enabling influence on firms (Eggers & Kaplan, 2009; Kaplan & Tripsas, 2008; Tripsas & Gavetti, 2000). Such considerations stimulate firm motivations and positive connotations with the disruption and ultimately provides firms with the willingness to engage with the disruption

and the incentive to surpass the hurdles of their initial positions (Dewald & Bowen, 2010; Markides, 2006; Mol et al., 2012; Tellis, 2006; Tripsas, 2009). For instance, one study into firm entry in the fiber optic market illustrated how managerial attention to a new technology created a firm environment favoring new technology (Eggers & Kaplan, 2009). Hence, we hypothesize that if the impact of the disruption is high and firms are capable to respond, firms are more likely to respond using offensive measures if their motivation to respond is also high (Charitou & Markides, 2003; Gilbert, 2005):

Hypothesis 3b: There is a three-way interaction between the impact of the disruption, the firm's capability to respond and the firm's motivation to respond in predicting the degree to which a firm responds offensively; offensive responses are highest when all three dimensions are high.

Empirical analysis

Methodology and research context

Data about the origin of organizational responses to disruptive innovations were collected by means of an online survey, administered among central actors in the Dutch music industry in 2015. The aim of the survey was to collect data in one industry, that faced the same disruption in a recent timeframe. Such a design kept constant a number of external factors that could have influenced the interpretation of the findings, like industry variations and inter-industry disruption variations (Danneels, 2004; Charitou & Markides, 2003; Markides, 2006).

The data were collected in the Dutch music industry, using the digitization of music as disruption. The possibility to produce, distribute and promote music digitally led to tremendous changes in the (Dutch) music industry over a time period of roughly 15 years (Christensen et al. 2015; IFPI, 2015; NVPI, 2015). Figure 2 illustrates the changes the music industry underwent. In the first phase of disruptiveness, the introduction of seemingly

underperforming new technologies, like MP3 technology and data compression technologies, enabled the digitization of music (Mol, Wijnberg & Carroll, 2005). The Internet then enabled the direct distribution and promotion of these digital formats of music to end consumers (Einhorn, 2003; Liebowitz, 2006). Soon illegal and often free P2P music file sharing services appeared, pioneered by new entrants like Napster (1999) and Kazaa (2001), that utilized these disruptive technologies (Alexander, 2002; Walsh, Kirchhoff & Newbert, 2002). As these services offered virtually free, but lower than CD quality music, most incumbents found selling digital music financially unattractive (Liebowitz, 2006; Zentner, 2006). Nevertheless, these services also offered consumers new performance criteria that were initially liked by a niche segment of consumers: the opportunity to personalize music consumption, the ease of sharing music with friends and family and the opportunity to take along music everywhere (Alexander, 2002).

Figure 2: The three phases of digital disruption in the Dutch music industry⁷

Phase 1 <i>P2P File Sharing</i> 1990s-2006	Phase 2 <i>Downloading</i> 2006-2010	Phase 3 <i>Streaming</i> 2010-2015
Demand for digital music grew out of unauthorized music file sharing services in the 1990's that build upon new technologies (i.e. MP3) and greater network bandwidth and internet accessibility to distribute music directly to end consumers.	Demand for digital music grew due to the introduction of mobile music, portable MP3 devices and the rise of social networks that enhanced the portability and share-ability of music. Legal music services provided more convenience and quality.	Demand for digital music grew even more as new cloud computing technologies enabled the development of streaming platforms where consumers congregate not to buy content but to buy access to it.

In the second and the third phase the increasing quality and quantity of digital music, fostered by developments in hardware (e.g. mobile music devices) and software (e.g. increasing portability and share-ability of music via increasing bandwidth Internet and cloud

computing technologies) accelerated the development of digital music consumption among mainstream consumers via services like iTunes (2003), Spotify (2006) and Deezer (2007) (Mol et al., 2012). As existing (technological) competencies in physical production, distribution and promotion of music lost most of their traditional value, the musical landscape and the way of competing in the music industry changed tremendously (Leysdon et al., 2005; Moreau, 2013, NVPI, 2015). Digitization of music therefore provides a unique opportunity to investigate the effects of and responses to the same disruption within the same industry in a relatively recent time period.

Survey design

Given the lack of established constructs and agreed-upon scales to measure the drivers of, and organizational responses to disruptive innovations we used several methods to develop valid and reliable measures. First, main constructs were identified from the literature on organizational responses to disruptive innovations (Miles & Huberman, 1994). Second, individual one-hour, face-to-face interviews with experts in the field (N=9) as well as with employees from several record companies (N=15) were used to help develop the constructs to survey questions which reflect the rationale within the music industry (Fowler, 2013). Finally, to establish the face validity of the survey, a-prior construct validation and a field pretest study were conducted among (un-) informed respondents and industry experts and firms (Cronbach & Meehli, 1955; Fowler, 2013).

Respondents were asked to indicate their response for a specific time period.

Therefore, the survey was constructed to collect data across the last two time periods of Figure 2: The Downloading period (2006-2010) and The Streaming period (2010-2015)⁴. To account for any recency effects, reference points and examples, identified during the pre-survey fieldwork, were given to guide respondents in their recall of the specific time period

(Miles & Huberman, 1994). The interviews with industry experts and record companies also confirmed that respondents would be able to recall the general sentiment of the two time periods and could clearly identify specific reference points or critical events (Van de Ven & Poole, 1995) that distinguish the two time periods.

Data collection

Early 2015, we distributed the questionnaire to firms via e-mail. Firms were informed via an introductory email about the aim of the study and the type of questions. Upon approval, we sent an invitation email with a link to the survey to the respondent's e-mail address. A week later, non-respondents were reminded of the survey via e-mail. Finally, after one month, non-respondents were contacted via telephone to encourage them to fill in the survey. In exchange for participation, respondents received a customized benchmark report (Miles & Huberman, 1994).

Given that our aim is to examine the drivers of actual responses to disruption the survey targeted managers and CEOs of Dutch music companies as they play an important and leading role in devising the strategic approach of the firm by taking into consideration the firms' activities, abilities, motivations and performance⁵. We used a representative company list from the NVPI, the industry association of the Dutch entertainment industry, complemented with the company list of Entertainment & Business, a Dutch news publisher for the entertainment industry. Using these lists ensures the exclusion of one-man companies, do-it-yourself artists and music companies where music is not the primary source of income (cf. Mol et al., 2005), as they generally do not sign up for membership at these organizations. This resulted in a contact list of around 200 companies, active in the Dutch music industry in 2015.

Of the 200 contacted firms, 141 firms agreed to fill in the survey, of which 86 provided complete responses, resulting in an effective response rate of 43%. Depending on the age and survival of the firm, these 86 firms either filled in 1 or 2 time periods, resulting in 118 total observations. About 90% of the respondents were the founder/CEO or general manager of the companies. The companies represent all musical genres. Firms were, on average, 15 years of age ($SD = 14$) and consisted of mainly (small to) medium sized companies. The majority of the respondents (80%) have been working long enough in the music industry to have experienced prior technological changes in the industry.

Measures and Measurement validity

To identify measures and test the validity and reliability of the latent constructs, we used SmartPLS 3.0 (Hair, Hult, Ringle & Sarstedt, 2014). Table II presents all items and their standardized loadings (SL), together with each scale's average variance extracted (AVE), composite reliability (CR) and Cronbach's alpha (α). All constructs demonstrate convergent validity as the SL are high and significant. The AVE for each construct is also satisfactory for all items, as the latent constructs account for at least 50 percent of the variance in the items. Evidence for discriminant validity is found because the square root of the AVE is higher than each of the inter-construct correlations (Fornell & Lacker, 1981), see Table III. In addition, we find evidence for sufficient construct reliability because the composite reliabilities as well as the Cronbach's alpha are well above .80 (Bagozzi, Yi & Philips, 1991). Finally, we ran VIF analyses to check for potential multicollinearity issues, but the maximum value of 2.57 indicates that multicollinearity was not likely an issue (Hair, Babin & Tatham, 2009).

Table II: Construct Validity and Reliability

Constructs	Items	SL	t-Value	AVE/ CR	α
Defensive Response	Sustain old value network	.76	16.81	.48/.87	.84
	Gain information about new possibilities	.75	18.11		
	Spread risks by contacting multiple potential partners	.44	4.46		
	Install protective measures against digital exploitation	.63	8.27		
	Reduce overhead costs	.62	9.16		
	Develop alternative sources of income in traditional physical business model	.63	9.91		
	Improve quality physical product	.76	14.89		
	Sustain focus on old business	.83	27.82		
Offensive Response	Invest resource to make digital core-business	.84	36.71	.55/.91	.89
	Invest in joint projects on new business	.80	22.36		
	Invest in collaborations on new business	.80	20.46		
	Invest in establishing new value network	.64	9.03		
	Search for knowledgeable potential partners	.54	6.96		
	Reallocate resources to embrace digital	.73	11.22		
	Initiate new activities independently	.85	33.92		
	Allocate resources for new skills in-house	.81	26.33		
Awareness: Impact of the Disruption (No. on a scale of 1 (low)-10 (high))	Impact on Production	.77	4.54	.64/.86	.85
	Impact on Distribution	.83	5.55		
	Impact on Promotion	.73	3.73		
	Impact on Sales	.78	4.58		
Capability-to-respond	My company is alert (scanning capacity)	.68	9.62	.50/.87	.82
	My company has the required skills (r)	.74	13.87		
	My company has the required knowledge (r)	.76	15.49		
	My company is informed of the disruption	.75	13.82		
	My company sees profit opportunities (r)	.76	15.29		
	My company experiences a positive influence of the disruption (r)	.44	4.64		
	There are no organizational dependencies(r)	.73	12.11		
Motivation- to-respond	Disruption will improve value of product	.83	5.55	.65/.88	.81
	Disruption is increasingly fast	.73	3.73		
	Disruption can increase market share	.78	4.58		
	Disruption creates potential for growth	.89	42.33		

Notes:

a. All items, unless otherwise noted, use a five-point Likert scale, anchoring at 1 = totally disagree to 5 = totally agree

b. SL = maximum likelihood standardized loadings with t-values, AVE = average variance extracted, CR = composite reliability, α = Cronbach's alpha, derived from bootstrapping with 5000 replications

c. (r) = reverse scored item

d. N = 118

e. Based on Partial Least Square (PLS) bootstrapping method

Dependent variables. The organizational responses are measured using items related to the strategic actions of firms in response to the disruption (see Table I). The items were measured using statements on which firms could indicate to what extent the action has been

pursued in the specific time period on a scale from 1, “not at all pursued”, to 5, “to a very large extent pursued” (Bode et al., 2011). *Defensive response* is measured using eight items related to the continued exploitation of the traditional business model. *Offensive response* is measured using nine items related to the extent to which firms adapt their firm and business model to new, digital business.

Independent variable. *Impact of the disruption* captures the extent (on a scale from 1-10) to which a firm perceived the disruption to have an effect on the firm (Bode et al., 2011; Christensen et al., 2015; Govindarajan & Kopalle, 2006). To capture the multifaceted nature of disruptiveness in the music industry, we constructed a 4-item scale that relates to both the impact of the disruption on core activities of music companies, namely production, distribution, promotion and the impact of the disruption on financial performance (sales revenues) (Mol et al., 2005; Moreau, 2013).

Moderators. The proposed moderators are measured using statements related to the motivations and capabilities of the firm to which firms could agree on a scale from 1, “totally disagree”, to 5, “totally agree” (Bode et al., 2011). *Capability-to-respond* is measured using seven measures that relate to the required skills, competences and resources needed to be able to adopt the disruption (i.e. Assink, 2006; Christensen, 1997; Christensen & Overdorf, 2003; Leonard-Barton, 1992)⁶. *Motivation-to-respond* is measured using four items related to the role of the disruption, which motivates firms to embrace the disruption (i.e. Charitou & Markides, 2003; Dewald & Bowen, 2010; Kaplan & Tripsas, 2008).

Control variables. We included firm age, firm size, genre, prior experience with technological change, time to respond, constraints from prior commitments and phase as control variables in the analyses. More specifically, these control variables account for variables that may explain the firms’ responses (Bergek et al., 2013; Danneels, 2004). First of all, *firm age* (Bode et al., 2011; Chandy & Tellis, 2000), and *firm size*, measured as the

number of fulltime employees in a firm (Bode et al., 2011; Chandy & Tellis, 2000; King & Baartartogtokh, 2015), are included to account for variance related to the incumbency of the firm (Hannan & Freeman, 1977; Nelson & Winter, 1982). In addition, *prior experience* with technological change, measured as the earlier experience of the firm with technological change (Bode et al., 2011; Roy & Sarkar, 2016; Tripsas, 1997), has been included as an additional check of possible path dependencies (Hannan & Freeman, 1977). Secondly, to account for resource dependence, the role of the existing value network and other a-priori commitments (Christensen & Roosenbloom, 1995; Henderson & Clark, 1990) a measure for *constraints* from prior commitments -i.e. prior commitments to technology, value network, resource allocation- were included. This measure includes contingencies that cannot be changed quickly by firms and influence the process and speed of responding (Christensen & Raynor, 2003; King & Baartartogtokh, 2015). *Time to respond*, measured as the time (in years) a firms takes to respond to a disruption after the firm becomes aware of it, was included because it may signal the firm's ability to transform quickly (Eggers & Kaplan, 2009; Gavetti & Rivkin, 2007). *Disruption phase* was added to control for dependency within the dataset on the time period in which the firm responded: the downloading or streaming period.

Research instrument

To assess the quality of the responses, several measures have been taken. First, to assess response bias, we compared early responders from late responders (Armstrong & Overton, 1997) and found no statistically significant mean differences except for the item age ($t= 2.30$, $p<.01$). Second, despite the careful design of the survey, limits to the ability of the respondents to recall the disruption over time was still a potential threat to the validity of the findings (Bode et al., 2011). Using year of entry, we split the data set into 3 equally sized

groups (early, mid and late). The MANOVA test using all items showed no significant mean differences across the groups, which suggests that there is no recency effect.

Using a single survey method may raise concerns of Common Method Variance (CMV) (Podsakoff, Mackenzie, Lee & Podsakoff, 2003). Although it has been shown that interaction effects are robust against CMV (Doty & Glick, 1998; Evans, 1985), we used several remedies to control for it: using reversed-scale items (Lindell & Whitney, 2001), making no explicit reference to the goal of the research to respondents and ensuring respondents anonymity and confidentiality (Fowler, 2013; Podsakoff et al., 2003). In addition, objective secondary data has been gathered from Orbis for the items “firm age” and “firm size”. For both items there were high correlations with their counterparts in the primary dataset, which suggests that the primary data were reflective of reality (Bode et al., 2011; Podsakoff et al., 2003).

To assess the degree to which common method could pose a threat to our study, we investigated whether item variance could be explained by a single latent common method variance factor or corresponding latent variable (Liang, Saraf, Hu & Xue, 2007), as further illustrated in Appendix B. The average explained variance by the method factor was negligible ($R^2 = 0.06$), whereas that of the substantive constructs is notable ($R^2 = 0.69$). In addition, thirty-eight of the forty-one paths between the common method variance factor and the items were insignificant, indicating that common method bias does not present a major concern.

Table III: Means, Standard Deviations, Correlations and Discriminant Validity

Variables	MEAN	SD	1	2	3	4	5	6	7	8	9	10	11
<i>Control</i>													
1) Age	15.63	14.79	n/a										
2) Size	1.56	1.00	.355 ***	n/a									
3) Prior experience	2.64	0.75	.08	.05	n/a								
4) Time to respond	3.57	3.99	.02	.12	-.02	n/a							
5) Given constraints	2.45	0.87	.08	.17 *	-.06	.17 *	.83						
6) Disruption phase	0.56	0.49	-.13	-.03	-.06	.05	-.13	n/a					
<i>Independent</i>													
7) Impact of disruption	5.14	2.87	-.10	-.03	.00	.14	.02	-.06	.82				
<i>Moderator</i>													
8) Motivation	3.31	0.97	-.10	-.05	.20 *	-.24 **	-.52 ***	.08	.10	.80			
9) Capability	2.72	0.72	-.08	-.05	.12	-.15 Ψ	-.63 ***	.15 Ψ	-.14	-.54 ***	.71		
<i>Dependent</i>													
10) Defensive	2.72	0.85	-.09	.10	-.07	.30 ***	.56 ***	-.03	.06	-.33 ***	-.48 ***	.69	
11) Offensive	2.99	0.96	.02	.04	.33 ***	-.14	-.33 ***	-.02	.12	.72 ***	.54 ***	-.14	.74

$\Psi = p < .10$, * = $p < .05$, ** = $p < .01$, *** = $p < .001$

Note: the diagonal displays the square root of each latent construct's AVE, derived from bootstrapping with 5000 replications, n/a = not applicable

Results

Hypothesis testing

To assess the structural relationships and the two-way and three-way moderation effects, we used the bootstrapping procedure offered by the PROCESS macro for SPSS as PROCESS is specifically designed to assess moderation effects (Hayes, 2012). Table IV presents the results. In Model I we include -apart from the control variables- the first-order associations. Model II adds all second-order associations, while model III includes the proposed three-way interactions. The impact of the disruption is considered in Models I - III. Contrary to hypothesized, the results indicate that the impact of the disruption does not have a direct effect on firm responses (with the exception of a negative influence on defensive response in model IIIB). We therefore reject H1. To test H2-H3, the direct and interactive effects of capability- and motivation-to-respond are considered in Model II and III. These interactive

effects show some striking differences between the drivers of offensive or defensive responses to disruptive innovations.

Offensive responses (Model IIB & Model IIIB) are strongly driven by the unique direct effect of motivation-to-respond (Model IIB, $\beta = .68, p < .001$). Including this direct effect in Model II contributes 44% in explained variance relative to Model I. The added two-way and three-way interactions in Model III are not significant and do not add to the understanding of the model. Therefore, we reject H2b and H3b.

Defensive responses (Model IIA & Model IIIA) are highly driven by the joint interaction of all three drivers, in support of H3a. Model IIIA in Table IV shows that the addition of the three-way interaction drives the decision to respond defensively and increases the explained variance from .35 in model IA to .49 in Model IIIA. Furthermore, Model IIIA in Table IV shows that the addition of the three-way interaction results in a statistically significant increase of the explained variance for defensive responses in Model IIIA ($\Delta R^2 = .029, p < .05$), which suggests that this contributes to the understanding of the nature of this relationship.

To facilitate the interpretation of the three-way interaction, Figure 3 plots the high and low levels of each variable (Aiken & West, 1991; Dawson & Richer, 2006). It shows that firms are most likely to respond defensively when all drivers are low. It further underlines that with the increasing impact of the disruption, the variety in firms decision to respond defensively decreases (firms converge). In addition, Figure 3 indicates that when firms are either highly motivated or highly capable, but not both, firms tend to respond more defensively when the impact of the disruption increases. When the impact of the disruption is high, the simultaneous presence of these three drivers thus make firms increasingly less likely to respond defensively (Model IIIA, $\beta = -.09, p < .05$). Nevertheless, if one of the three drivers is low or absent, then firms are more likely to respond defensively.

Table IV: Regression results for defensive and offensive responses

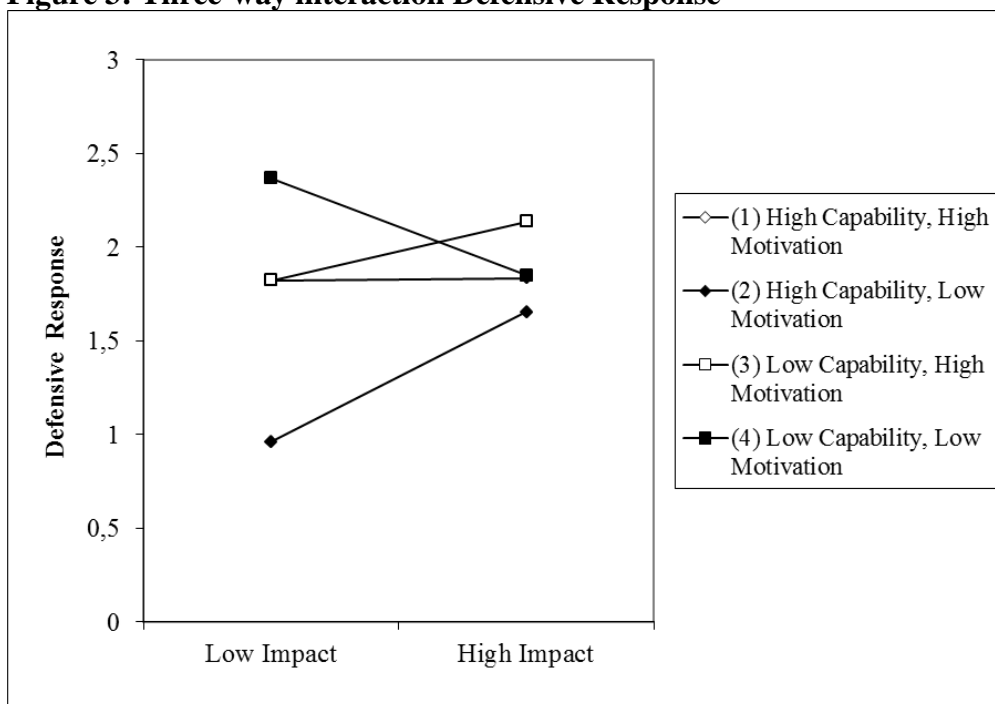
Process	Model I: Basic model		Model II: Two-way interactions		Model III: Three-way interactions	
Independent Variables	IA Defensive Response	IB Offensive Response	IIA Defensive Response	IIB Offensive Response	IIIA Defensive Response	IIIB Offensive Response
<i>Constant (B)</i>	1.382***	2.572**	3.479***	-1.396	9.523***	0.364
Firm age	-.16 ^ψ	-.00	-.01*	.00	-.01 ^ψ	.00
Firm size	.04	.10	.05	.06	.05	.06
Prior experience	-.00	.29***	-.00	.21**	-.05	.19*
Time to Respond	.23**	-.11	.05**	.00	.05**	.00
Given constraints	.54***	.31***	.36***	.21*	.37***	.21*
Phase	-.02	-.01	-.03	-.08	-.02	-.07
<i>Independent</i>						
Awareness: perceived impact	.04	.12	-.18	.01	-.99**	-.21
<i>Moderators</i>						
Motivation to respond	-	-	.17	.68***	-1.86**	.08n.s.
Capability to respond	-	-	-.78*	.29	-2.96***	-.35
<i>Interactions</i>						
Awareness × Motivation (int. 1)	-	-	-.01	-.01	.26*	.06
Awareness × Capability (int. 2)	-	-	.07 ^ψ	.02	.36**	.10
Motivation × Capability (int. 3)	-	-	-	-	.71**	.21
Awareness × Motivation × Capability (int. 4)	-	-	-	-	-.09*	-.03
R ²	.35	.18	.44	.62	.49	.63
R ² Change int. 1	-	-	.001	.001	-	-
R ² Change int. 2	-	-	.016 ^ψ	.001	-	-
R ² Change int. 4	-	-	-	-	.029*	.002
N	118	118	118	118	118	118

^ψ $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$, n.s.

Note: PROCESS macro for SPSS used for regression analyses (Hayes, 2012).

Finally, Table IV explores the role of the control variables, and provides some findings that challenge the assumption that incumbents can only act defensively. First, prior experience with technological change makes firms significantly more likely to consider offensive responses (Model IIIB, $\beta = .19, p < .05$). Firms thus can acquire valuable lessons from earlier technological innovations that make them less restricted to pursuing defensive responses. Furthermore, Table IV indicates that prior commitments – as measured by given constraints- make firms significantly more likely to respond defensively (Model IIIB, $\beta = .37, p < .001$) but also offensively (Model IIIB, $\beta = .21, p < .05$). The a-priori commitments may increase awareness of the necessity to respond to the disruption. The more friction firms experience with their prior commitments, the more likely firms take action to resolve this friction. Hence, in explaining strategic responses to disruptions, prior commitments and incumbency should not be seen as inertial forces, but rather as stimuli that challenge firms to react.

Figure 3: Three-way interaction Defensive Response



Robustness checks

To check the robustness of our results, we conducted several additional analyses. First, we used SmartPLS 3.0 bootstrapping method to re-estimate our results, which provides highly similar results. Second, we re-estimated the results by excluding the dependency on time period in our measurement, resulting in a smaller sample size (N=86). This did not affect the results. Third, we analyzed the data using alternative model specifications, i.e. only direct effects. For offensive responses the explained variance of this model is similar to that of model IIB in Table IV ($R^2 = .62$ versus $.63$), emphasizing how offensive responses are motivation-driven. Nevertheless, for defensive responses the explained variance of this direct-effects model is substantially lower ($R^2 = .42$ versus $.49$), which suggests that the contribution of the three-way interaction adds to the understanding of the nature of the relationships for defensive responses. Finally, we included additional control variables (e.g. music genre, location) to account for differences across firms that may not fully be captured by the specified model. The results are robust to the inclusion of these variables. In sum, we conclude that our results are rather stable to a number of robustness checks.

Discussion

Coping with the challenges of disruptive innovations is essential to ensure the viability of firms in the long-term. While the challenges of coping with disruptiveness have inspired researchers to examine the organizational drivers that can facilitate firms to adapt to disruption on the one hand, and the strategic organizational responses that firms can employ to react to disruption on the other hand, the link between them has remained underexposed. More specifically, extant research has not considered how the type of response to disruptiveness might be contingent upon how such drivers might interact.

The current study contributes to the study of disruptive innovations by suggesting that what leads firms to respond defensively, as opposed to offensively, to disruptions is not a divide between incumbents and new entrants: our empirical analysis shows that just as newly started firms can respond defensively to a disruption, so can incumbents respond offensively. Interestingly, our analysis indicates that firms use different drivers and logics to respond defensively or offensively to disruption that the existing literature has not recognized.

Extant disruptive innovation literature suggests that inertial forces and legacy costs make incumbents more likely to respond *defensively* when confronted with disruptive innovations. In contrast to this view, we demonstrate that a *defensive* response to a disruption cannot be predicted by the firms' age, size or prior experience with technological disruptions. Rather, assuming that firms make informed strategic decisions, we employ the Awareness-Motivation-Capability framework (Chen, 1996; Chen et al., 2007) to explore the direct, different and interactive effects between these drivers and different types of responses. We show that a *defensive* response to a disruption depends, indeed, on how aware a firm is about the impact of the disruption, how capable it is to respond and, in addition, how motivated a firm is to respond. The decision to pursue a defensive response results, however, from a complex interplay between these three drivers. While the separate, direct effects of each of these drivers actually makes firms less likely to respond defensively, when any two of these three drivers are *simultaneously* present firms are more likely to respond defensively – (Interactions 1, 2, and 3 in model IIIA of Table 2). However, when all three of the drivers are highly present firms are, again, less likely to respond defensively. The complex interplay between the three drivers (see Figure 3) thus provides a more complete understanding of why numerous “anomalous” cases (Christensen, 2006) can be found in the extant literature, and how to understand these.

A different logic seems at play when firms adopt an offensive response to disruptions. An *offensive* response to disruption depends strongly on how motivated a firm is to respond (model IIB of Table 2). The decision to pursue an offensive response is thus decoupled from the perceived impact and capability to respond and does not result from a complex interplay between the three drivers. The firm's decision to embrace the disruption can also not be adequately explained by firms' age or size -as suggested by extant disruptiveness research. Nevertheless, and contrary to what Christensen (1997) and others suggest, rather than being held back by prior constraints, for instance in the form of commitments and investments, or prior experiences with technological change, such prior constraints and experiences actually seem to enable firms to react: they seem to urge firms to take action, including offensive ones. Constraints and prior experiences thus do not paralyze firms' responsiveness, but actually trigger a need to respond. In other words, incumbents are not necessarily "cursed" because they cannot react (timely) to disruptiveness (cf. Chandy & Tellis, 2000): incumbents' responses are not limited to defensive ones as incumbent firms are able to adopt an offensive response, especially when motivated to engage with disruption (cf. Eggers & Kaplan, 2009; Kaplan & Tripsas, 2008).

Differing logics

As the research design purposefully diminished industry and disruption variations that might have influenced organizational decision making (cf. Charitou & Markides, 2003; Govindarajan & Kopalle, 2006), the results point to the need for a more complex account of firms' responses to disruptiveness: completely different considerations, or logics, seem to explain defensive as opposed to offensive responses. Research needs to account for the complex interplay between awareness, capability and motivation to be able to fully understand and explain how and why firms respond differently to disruptions.

A possible explanation for the differing logics centers around firms' opportunity recognition during disruptiveness: as firms differ in the extent to which they pay attention to highly uncertain and risky disruptions (March & Shapira, 1992; Ocasio, 1997), they consequently differ in their identification of new business opportunities (Adner & Snow, 2010b; Baron, 2006; Dewald & Bowen, 2010). Firms' awareness of potentially disruptive external events that trigger a need to respond should thus be considered *alongside* the identification and pursuit of such opportunities. Firm responses are intertwined with internal organizational considerations that may ultimately determine whether and which opportunities are also worthy to be actually pursued (Shepherd, McMullen & Ocasio, 2016).

In line with this argumentation, our results illustrate that when a disruption takes off and firms become increasingly convinced of the significant impact it will have on them, firms can first try to utilize the opportunity to exploit their traditional model more intensely before these resources become invaluable or obsolete. Such a strategy might involve low risk for firms that either have the capability or the motivation to make the necessary adjustments to pursue the opportunity to embrace the disruption in due time (see Figure 3). That is, if the firm is able to maintain a given level of organizational agility to manage the uncertainty of disruptiveness, be it defensively or offensively (Teece & Leih, 2016). Our results thus take prior research one step further and contributes to a deeper understanding concerning which responses (how) and which organizational drivers (why) enable firms to adapt to the challenges of disruptive innovations.

How adaptable firms are may in part be determined by the way opportunities are recognized during disruptions and by the way in which organizations learn. Firms adopting either an offensive or a defensive response are well aware of the constraints they face, but these make them adopt their chosen strategy more readily. Given constraints thus trigger a need to respond. As such, they play an important role in the recognition of new market

opportunities (Dewald & Bowen, 2010; Shepherd & DeTienne, 2005). In addition, firms pursuing an offensive response are reinforced in their decision by their prior experience with disruptions, that may have led to valuable lessons (Argote & Spekter, 2011; Levitt & March, 1988; Zollo & Winter, 2002). Firms' attention focus and prior learning may potentially be an important asset to compensate for, or even overcome, the inertia associated with path dependencies (Shepherd & DeTienne, 2005; Tripsas & Gavetti, 2000). These results stress the importance of incorporating in future research how firms learn from the disruptions they experience and re-apply such knowledge (Argote & Spekter, 2011; Shepherd et al., 2016).

Managerial implications

As firms across industries are increasingly confronted with extra-industry disruptions that disturb the traditional ways of doing business (Ansari et al., 2015; Christensen & Raynor, 2003; Grossman, 2016), providing meaningful responses to such disruptions has become an increasingly important task for managers. Our results yield several implications for managers. First, prior commitments and other legacy considerations that incumbents face need not constrain managers' decision making, but can be, rather, stimuli for firms to engage in action. Firms experiencing friction from prior commitments during disruption are more likely to take *any* action to resolve that friction between prior constraints and future demands. We further indicate that defensive responses are not necessarily limited to incumbents; our empirical analysis shows that just as newly started firms can respond defensively to a disruption, so can incumbents respond offensively.

Second, firms –incumbent and entrant- confronted with a disruptive innovation can employ a defensive or an offensive response. Incumbents are not bound to respond defensively, nor are new firms bound to act offensively. While the reasons for choosing either kind of response differs substantially, this study provides managers with insights into when

either defensive or offensive responses are typical responses to disruptive innovations for a firm such as theirs. Managers should then reflect on the question whether such a response is beneficial to their firm, considering the circumstances they find themselves in, and steer their firm in the desired direction by altering specific drivers. Simultaneously, managers can improve their competitiveness by making informed predictions of the strategic actions of competitors in response to the disruption, using the A-M-C framework.

For policy makers aiming at realizing offensive responses during disruptiveness, our findings imply that policy instruments and incentive schemes can be implemented that aim to motivate firms to embrace disruptive innovations. The finding that prior experience with technological change favors offensive responses indicates that supporting firms willing to engage with the disruption could benefit firms in highly disruptive industries in the short and long run: support may convince firms without such experience to pursue risky business opportunities from which they can learn, while firms with such experience can be more easily persuaded to embrace the disruption.

Limitations & future research

This study, like others, has limitations. First, while a focus on disruptions in a specific industry in a single country adds to the internal validity of the study, future research should explore whether the findings hold in other settings. Digitization in the music industry represents one kind of disruptive innovation (Moreau, 2013), but disruptive innovations can take different forms and intensities (Christensen, 1997; 2006; Danneels, 2004; Govindarajan & Kopalle, 2006; King & Baatartogtokh, 2015). Although the industry is considered exemplary in a number of different ways (Christensen et al., 2015; Mol et al., 2012; Moreau, 2013), industry and country contingencies can be expected (Danneels, 2004; Charitou &

Markides, 2003), as well as from different types of disruptions (see e.g. Christensen et al., 2015; Govindarajan & Kopalle, 2006).

Second, this study assumes that firms respond defensively or offensively. Although this broad classification was empirically supported and more detailed distinctions may reduce comparison with other industries, future studies could consider making use of more fine-grained classifications of firm responses (cf. Bode et al., 2011; Charitou & Markides, 2003). Even though our results did not indicate a significant correlation between the responses, an examination of hybrid strategies, such as when firms play “both games at once”, is a promising research area (cf. Charitou & Markides, 2003).

Third, firms’ responses may evolve over time, perhaps as a result of industry changes. Although our study uses data points that reflect different time periods, our study uses cross-sectional data to analyze firms’ responses which cannot capture firms’ response patterns over time. The collection of longitudinal data, using perhaps a case study design (Eisenhardt, 1989), is necessary to understand these possible patterns in firms’ responses. Such an approach could also investigate firm differences in organizational learning and identify the signals firms use to change their strategy (Argote & Spekter, 2011; Gavetti & Rivkin, 2007; Roy & Sarkar, 2016). Including firms that did not survive the disruption would provide additional insights about the critical challenges faced by firms during disruptive phases.

Notes

¹We follow previous work to define disruptive innovations as new products, processes or business models that utilize (disruptive) new technologies (Christensen, 1997; 2006). Such innovations are initially inferior to existing mainstream technologies on dominant product attributes that mainstream consumers value and are therefore considered financially unattractive to incumbents (Christensen, 2006; Markides, 2006). As they also introduce novel features (e.g. convenience), initially liked by a niche segment, mainstream consumers are ultimately convinced due to (technological) advancements and improvements over time (Christensen et al., 2015; Govindarajan & Kopalle, 2006).

²The effects of competitor actions and disruptive innovations on firms are similar: in both cases external developments create uncertainty that affect established strategic positions and resources. The ultimate consequences of these developments on firm performance provide an imperative to respond.

³In the hypothesis development, we have consciously chosen to develop the argumentation that high capability or high motivation to respond points to offensive responses. However, in the survey design we made sure this bias was not present, and included questions which were unique to either defensive or offensive responses. After data collection, our data analysis informed our decision to rescale the items so that they follow our argumentation.

⁴The first time period, the P2P file sharing period (1990s-2006), was dropped as issues arose in the ability of firms to recall their actions in that time period. Questions regarding the first time period were only asked when one would actively remember having taken action in that time period (Doty & Glick, 1998; Fowler, 2013). Due to the limited number of responses, this period has been excluded from analyses.

⁵Although traditional disruptive innovation research stresses that senior and top management (team) managers can be particularly slow in reacting to disruption (Christensen, 1997; 2006; Christensen & Roosenbloom, 1995), recent studies indicate that managers can play an important role in envisioning and accelerating firm adaptation to technological change (Eggers & Kaplan, 2008; King & Tucci, 2006; Tellis, 2006). The specificities of independent music companies -often smaller in size and experienced in signaling consumer developments (Alexander, 2002; Einhorn, 2003)-, further support our decision to target managers and CEOs.

⁶More recent competitive dynamics research considers awareness to be related to a firm's informational or sensing capacity, which can, as such, be treated as part of the capabilities of the firm (He, Mahony & Wang, 2009). In this study we distinguish the two concepts. Awareness, measured as the impact of the disruption, raises concerns with regard to the pervasiveness of the phenomenon at hand which triggers or urges firms to respond. Sensing capacity is included as an item within the dimension capability-to-respond.

⁷Similar patterns of digital innovation in the music industry are found in other parts of the world, although the exact timing and growth in each phase differs across nations and regions.