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# The Effect of Cultural Value Orientations on Responses to Supply-Side Disruption<sup>1</sup>

## ABSTRACT

**Purpose** – Past research has shown that culture has significant effects on people’s evaluation of and responses to risk. Despite this important role, the supply chain risk literature has been silent on this matter. The purpose of this paper is to examine the impact of cultural value orientations on managerial perception of and responses to a supply-side disruption risk.

**Design/methodology/approach** – The authors conduct a scenario-based experiment to investigate the effect of cultural value orientations – i.e. collectivism and uncertainty avoidance - on individuals’ perception of risk and supplier switching intention in the face of a supply-side disruption.

**Findings** – The findings highlight the negative effect of collectivism on disruption risk perception and switching intention in high uncertain circumstances. However, these relationships are non-significant in relatively less uncertain situations. Moreover, the findings show that the impact of uncertainty avoidance on risk perception and supplier switching is positive and significant in both low and high uncertain circumstances.

**Originality/value** – Extant research has traditionally assumed that when confronted with disruption risks, managers make decisions using an economic utility model, to best serve the long-term objectives of the firm. This paper draws from advances of behavioural research to show that cultural value orientations influence such decisions through a mediating mechanism of subjective risk perception.

## Keywords:

Research paper, supply-side disruption, behavioural operations

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<sup>1</sup> The authors declare no conflict of interest.

## 1. Introduction

To minimise the damaging consequences of supply-side disruptions (Chen, 2018; Hendricks and Singhal, 2003), firms need to actively evaluate and manage the sources of risks threatening their suppliers (Bode *et al.*, 2014). Many of these events could be averted before their actual occurrence, or their impact could be minimised, if identified and acted upon by supply chain managers (Ellis *et al.*, 2010). A rich body of supply chain risk literature has offered a range of risk management frameworks to assess and reduce the sources of supply disruption (Ho *et al.*, 2015; Ritchie and Brindley, 2007), and utilised simulation and analytical techniques to find optimal mitigation strategies (Tomlin, 2006). Extant research has also offered design strategies that mitigate the risk of supply-side disruptions using optimal numbers of suppliers, inventory and capacity levels, insurance premiums, and contractual governance (e.g. Dong & Tomlin, 2012; Hendricks *et al.*, 2009).

Traditionally, the literature has assumed that disruption risks can be assessed objectively (Tazelaar and Snijders, 2013), and hence the subsequent management responses are optimal and effective (Gurnani *et al.*, 2014). There is abundant evidence, however, that questions the validity of these assumptions (e.g. Carter *et al.*, 2007). In many cases, managers have access to limited historical information (if any) to evaluate risk objectively (Simchi-Levi *et al.*, 2014). This coupled with decision makers' susceptibility to a range of affective and cognitive biases, results in decision outcomes that may deviate from what is considered to be optimal (Tokar, 2010). Therefore, although these studies have contributed significantly to our understanding of the cause, effects, and *rational* management of supply disruption risk, we still know very little about how managers as organisations' decision-making agents view disruption risk, and when and why they choose to react to certain events (Vanpoucke and Ellis, 2019). Without understanding the underlying factors that shape such responses, it is hard to propose frameworks and strategies that are effective in the management of supply chain risk.

To address the gap in the literature, this study draws from risky decision-making theory (Sitkin and Pablo, 1992; Sitkin and Weingart, 1995; Vanpoucke and Ellis, 2019) to examine the impact of cultural value orientations (i.e. psychologically held cultural values) on managers' perception of and responses to supply-side disruption. When facing a disruption, a range of psychological and sociological factors influence managers' decision-making through a mediating mechanism of subjective risk perception (Sitkin and Pablo, 1992). Cultural values in particular, has been shown to systematically affect risk perception by directing individuals'

attention to important cues in the environment and assist in evaluation of information where information is missing or uncertain (Gibson *et al.*, 2009). This has important implications for decision-making in the face of a disruption, especially given that many of these decisions are made by individual agents (Polyviou *et al.*, 2018), who are exposed to and affected by various cultural values (*cf.* Chipulu *et al.*, 2014; Li *et al.*, 2019). The literature has previously investigated the effect of cultural values on variety of risk source and organisational risk management practices (Dowty and Wallace, 2010; Revilla and Sáenz, 2014). However, limited attention has been paid to the role of cultural values in directing managers' responses to supply chain disruption risk. Our study aims to address this gap in the literature.

We used a scenario-based behavioural experiment to study the effect of cultural value orientations on evaluations of risk and decision-making in a controlled decision-making situation (Rungtusanatham *et al.*, 2011; Eckerd, 2016). Making mitigation decisions is often challenging, because individuals have access to varying levels and quality of information about a disruption (Cantor *et al.*, 2014). Hence, such decisions are made under various uncertain conditions (Hult *et al.*, 2010). To account for the moderating impact of uncertainty in the relationship between cultural values and managerial responses (*cf.* Kirkman *et al.*, 2017), we manipulated two levels of uncertainty in the scenario. The results from our study show a positive effect of uncertainty avoidance and a negative effect of collectivism on disruption risk perception. While uncertainty avoidance is defined as the extent to which individuals can tolerate the lack of structure, clarity, and predictability in an uncertain situation (Steel and Taras, 2010), collectivism refers to the extent to which people are interdependent of their social group (Oyserman *et al.*, 2002). We find that uncertainty avoidant managers tend to perceive higher levels of disruption risk compared to their counterparts in a similar situation which in turn, leads to higher tendency to switch supplier in both low and high uncertain circumstances. Furthermore, we find support for the negative impact of collectivism on disruption risk perception in high uncertainty, that leads to lower switching intention. However, this was non-significant in relatively less uncertain circumstances.

Our findings contribute to the extant literature in three different ways. First, we provide empirical evidence on the importance of cultural values in managerial perceptions of and responses to a supply-side disruption. Second, by examining the moderating effect of uncertainty on the relationship between cultural value orientations and disruption risk perception, we move beyond operations and supply chain management (OSCM) work regarding “does culture matter” (Metters *et al.*, 2010, p. 183) and show “when and how it matters” the most (Kirkman *et al.*, 2017, p. 15). Lastly, by studying the effect of

psychologically held cultural values on perceptions of disruption risk, we contribute to previous research in analogous fields that has examined the effect of collectivism and uncertainty avoidance at the country level of analysis (Rieger et al., 2015; Weber and Hsee, 1998). These studies have either used Hofstede's survey items to collect primary data on cultural values at the society level (e.g. organisation, country), or applied his aggregated values scores to represent a country's culture. Given that risk perception is a psychological component that is formed at the individual level, we claim that our findings offer a richer insight into the micro-foundations of decision-making in situations of supply chain disruption risk (*cf. Reimann et al., 2017*).

The remainder of the paper is organised as follow. First, we review the extant research on supply-side disruption management, and cultural values. Subsequently, we develop our conceptual model and hypotheses. Then, we overview the methods employed, and results of the analyses. Finally, we discuss the theoretical and practical implications of our findings, the limitations of the study, and opportunities for future research.

## **2. Literature Review**

### **2.1. Supply-side disruptions**

Within today's supply chain environment, characteristics such as increased complexities, geographic dispersion, and reduced inventory levels have improved efficiencies, but have also exposed firms to higher risks of supply-side disruptions (Brandon-Jones et al., 2014). Supply-side disruptions refer to triggering events, ranging from strikes and factory fires, happening in upstream supply chain and affect a normal flow of materials to a focal firm (Craighead et al., 2007). As a consequence, the focal firm may be exposed to a range of operational and financial issues, such as stock-outs, unsatisfied demand, lower returns on sale, and decreased shareholder wealth (Chen, 2018; Ritchie and Brindley, 2007). Research has offered various mitigation strategies, such as temporary rerouting and building inventory to minimise the consequences of disruptions when they occur (e.g. Dong & Tomlin, 2012; Hendricks *et al.*, 2009). Many of these events could also be averted prior to their occurrence or their impact could be minimised, if identified and acted upon by supply chain managers (Bode et al., 2014). Facing an impending disruption, individual managers are required to evaluate the riskiness of the situation and take mitigation actions that are effective and cost efficient (Chopra and Sodhi, 2014).

Over years, supply chain scholars have developed a range of frameworks and analytical techniques to assist managers in such decision-making tasks (*e.g. Norrman and Jansson, 2004*;

Ritchie and Brindley, 2007). For instance, Dong and Tomlin (2012) apply an analytical technique to identify an optimal insurance deductible and coverage limit as well as an optimal inventory level for a firm facing a supply disruption risk. The majority of these models are based on objective and rational assumptions (Carter *et al.*, 2007; Tokar, 2010). Objective implies that managerial evaluations of disruption are based on extensive and accurate information about the frequency and impact of a disruption (Ellis *et al.*, 2010; Tazelaar and Snijders, 2013), and rational means that managers utilise all relevant information to assess risk and make an optimal decision (Kahneman & Tversky, 1974; Simon, 1972). However, due to uncertainty around disruption situations and individuals' bounded rationality, managerial decisions often deviate from such assumptions (Simon, 1972). Empirical and anecdotal evidence has shown that there are variations in managerial responses to disruption events (DuHadway *et al.*, 2018; Polyviou *et al.*, 2018).

Recent behavioural research has shown a range of behavioural factors that explain variations in managerial responses to supply-side disruptions (*e.g.* Ellis *et al.*, 2010, 2011; Mir *et al.*, 2017; Polyviou *et al.*, 2018). For instance, Vanpoucke and Ellis (2019) investigate the effect of individual-level factors – *i.e.* risk perception and risk preferences - on the choice of buffering and bridging strategies to manage disruption risks. Similarly, researchers (*e.g.* Mir *et al.*, 2017; Polyviou *et al.*, 2018) have shown the importance of attributions and emotions in explaining differences in managerial decisions following the occurrence of a disruption. While these studies have provided great insights into the underlying psychological mechanisms of decision-making, limited attention has been paid to the effect of cultural values. This is surprising given that research in analogous fields have already highlighted the significance of cultural values in shaping individuals' perception of risks (Dake, 1992; Weber and Hsee, 1998; Wildavsky and Dake, 1990). This has important implications for today's supply chain environment, where an ever-increasing number of firms are dealing with international partners, located around the world with different cultural values (Li *et al.*, 2019). Our research is motivated by such needs and gap in the literature and aims to investigate the effect of cultural values on disruption risk perception and responses.

## **2.2. Cultural values**

Cultural values refer to a set of beliefs defining what is *generally* preferred within a given society (Yoo *et al.*, 2011). To investigate the impact of culture on various outcomes, past research has relied on cultural value frameworks (*e.g.* Markus and Kitayama, 1991; House *et*

*al.*, 2001). These frameworks use a set of cultural values to capture similarities and differences in people's behaviour and interaction in the social world (Boscari *et al.*, 2018). Hofstede (1980), as the pioneer of the cross-cultural research, provides a framework that is based on five core cultural values: collectivism, uncertainty avoidance, power distance, masculinity, and long-term orientation. Hofstede's framework has been used predominantly in the literature, since it provides a comprehensive view of cultural values reflecting dimensions related to various contexts and aspects of life (Soares *et al.*, 2007; Yoo *et al.*, 2011). For instance, power distance focuses on individuals' reaction to authority and unequal distribution of power; masculinity is related to individuals' value about the dominant sex roles within a society; and uncertainty avoidance captures people's relationship with uncertain and unstructured environment (Yoo *et al.*, 2011). When studying culture in a given context, researchers have argued the effect of some dimensions are often pronounced (Bockstedt *et al.*, 2015).

When examining risk, the two dimensions – *i.e.* collectivism and uncertainty avoidance - have been widely studied as key cultural values (Bontempo *et al.*, 1997; Rieger *et al.*, 2015; Weber and Hsee, 1998). The first dimension, *i.e.* collectivism, captures individuals' relationship to oneself and other people within a given society (Hofstede, 1985). Collectivism is often referred to as an opposite end of the same continuum as individualism (Oyserman, Coon, *et al.*, 2002). People high on collectivism values (*i.e.* low on individualism) tend to see themselves as part of a group and view performance as a result of collective efforts (Hofstede, 1980; Oyserman, Coon, *et al.*, 2002; Triandis, 1993). Whereas, people low on collectivism values (*i.e.* high on individualism) see themselves as independent of other individuals within a society and view outcome as a result of their own individual effort (Hofstede, 1985). Collectivism has been shown to play a significant role in influencing individuals' risk perception (Illiashenko, 2019; Rieger *et al.*, 2015; Weber and Hsee, 1998).

The second dimension, *i.e.* uncertainty avoidance, reflects people's tolerance for unclear and unpredictable situations, and the extent to which they attempt to mitigate these by adopting formal codes of behaviour and eliminating unexpected behaviours (Doney *et al.*, 1998). Given the unexpected nature of disruption situations, uncertainty avoidance may play a significant role in directing managerial responses. Intuitively, one may infer that a high uncertainty avoidance corresponds to risk aversion and that a low uncertainty avoidance is associated with risk seeking, but Hofstede (2001, p. 148) has emphasised that “uncertainty avoidance does not equal to risk avoidance”. He further explains that individuals high on

uncertainty avoidance orientation may paradoxically take risks, such as starting fights, to reduce ambiguity (Rieger et al., 2015). Past research has found empirical evidence for the effect of uncertainty avoidance on the perception of gambling and financial risks (e.g. Bontempo et al., 1997; Rieger et al., 2015). These studies have either used Hofstede's survey items to collect primary data on cultural values at the society level (e.g. organisation, country), or applied his aggregated values scores to represent a country's culture. Our study departs from these studies by focusing on the individual-level effect of these values on perception of supply-side disruption.

Given today's mobility of people, diversity of workplaces, and global communication channels, individual's cultural values are exposed to and shaped by various subcultures. Therefore, relying solely on country-level culture to understand people's behaviour in an organisational or individual context may become less relevant (Yoo *et al.*, 2011). Recent literature has suggested the application of micro-levels (*i.e.* culture as reflected in individuals' cultural value orientations) in exploring individuals' cognitive, emotional, or motivational responses in business contexts (Chipulu et al., 2014; Kirkman et al., 2009). Using this approach, the cultural values of the individual respondent, as opposed to the societal-level cultural values (reflecting aggregated scores of individuals' beliefs within a given society<sup>2</sup>) are used as the unit of analysis. Since our study aims to investigate the effect of cultural values on managerial risk perception and responses to a supply disruption, we focus on cultural value orientations (or individually held cultural values). We define cultural value orientations as individuals' belief in collectivism and uncertainty avoidance values (Soares et al., 2007; Yoo et al., 2011).

### **3. Model Development (risky decision-making theory)**

To facilitate our conceptual development (Figure 1), we adopt the purchase of a particular direct material from a specific supplier as the context of our study. We refer to a supply-side disruption as a situation where a buying firm faces an impending triggering event that could stop delivery of the materials from the supplier. We characterised the situation as risky, because it is uncertain whether the event occurs and/or how significant the outcome will be (Sitkin and Weingart, 1995). We apply risky decision-making theory (Sitkin and Pablo, 1992) to advance

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<sup>2</sup> Scholars have seen the use of nationality or cultural values scores in explaining individual behaviours as an "ecological fallacy" (Yoo *et al.*, 2011).



a model which examines the effect of cultural values on mitigation decision through subjective perception of risk. The theory provides a process view of the individuals' decision-making process (Yates and Stone, 1992) and focuses on the prediction of "an individual decision-maker's behavioural responses" to situations characterised by varying levels of risk (Sitkin and Pablo, 1992, p. 25).

The focal dependent variable of our conceptual model is mitigation decision which we operationalise as managerial switching intention (cf. Ellis et al., 2010; Mir et al., 2017; Polyviou et al., 2018). Extant research has shown supplier switching as a common temporary strategy to hedge against the consequences of supply-side disruption risks (Park *et al.*, 2016). For instance, Tomlin (2006) proposes the use of temporary rerouting as an effective strategy to deal with the consequences of unexpected low-likelihood disruptions. In the context of our study, we focus on supplier switching decision because 1) it is a common strategy adopted by a firm to deal with an unexpected situation that could stop the supply of materials; and 2) it is a feasible approach that can be adopted relatively swiftly in the face of an impending disruption.

[Please insert Figure 1 about here]

### **3.1. Risk perception and supplier switching**

We define disruption risk perception as individual manager's subjective assessment of the risk inherent in a disruption (Sitkin and Pablo, 1992). Risky decision-making theory provides an explanation for the link between managerial perceptions of the risk with their adoption of mitigation tactics. Ellis et al. (2010) apply this logic and find that buyers who perceive high levels of supply disruption risk develop alternate suppliers to mitigate such risk. Yates and Stone (1992) assert that, *ceteris paribus*, individuals will select alternatives that minimise loss. Moreover, Zsidisin and Wagner (2010) show that the use of supply chain resilience practices, such as alternative sourcing, could reduce managerial perceptions of risk. In the context of our study, we argue that higher perception of disruption risk leads managers to temporarily source from a less risky supplier in order to minimise the likelihood of getting affected by a supply-side disruption (*i.e.* potential losses of disruption):

*Hypothesis 1. Higher perceived risk is associated with higher likelihood to switch suppliers in the face of disruption*

### **3.2. Cultural value orientations and risk perception**

Cultural values work like filters in the evaluation of information about risks (Douglas and Wildavsky, 1982; Sitkin and Pablo, 1992). This means that the values and worldviews of certain cultural contexts shape individuals' perception and evaluation of risks. Building on this argument, risky decision-making theory claims that cultural values influence risk behaviour by affecting perceptions of risk (Sitkin and Pablo, 1992). However, the theory is not specific about the definition of cultural values and hence, does not provide testable hypotheses. Here, we draw on the two dimensions of Hofstede's framework – *i.e.* collectivism and uncertainty avoidance – to investigate the effect of cultural values on disruption risk perceptions.

#### **3.2.1. Collectivism**

Collectivism primarily refers to the extent to which people feel interdependent with other people in their social group (Oyserman *et al.*, 2002). Collectivism is often measured on a continuum where the high end reflects strong collectivism values (*i.e.* high interdependence with other people in the social groups) and the low end reflects weak collectivism values (*i.e.* individualism). Individualism (*i.e.* low collectivism) refers to the extent to which people feel independent of other people in their social group. Extant research in analogous fields has found significant effects of collectivism on risk perception and relied on two competing hypotheses to explain the findings (“cushion hypothesis” versus “tough guy”) (Illiashenko, 2019).

The first hypothesis (*i.e.* the “cushion hypothesis”) focuses on the relationship between collectivism values, responsibility for losses and risk perception. People low on collectivism (*i.e.* individualism) value personal autonomy and see themselves as independent to their social group (Triandis, 1989; Markus and Kitayama, 1991; Oyserman *et al.*, 2002). Whereas, high collectivism refers to people as mutually obligated and compromising individuals (Oyserman *et al.*, 2002). As individuals orientate towards higher collectivism, they become more likely to see themselves as part of a larger group, mutually responsible to bear potential losses. Compared to people low on collectivism, these individuals become more likely to see their group as a “cushion” that acts as a buffer and socially diversifies the consequences of disruptions (Weber and Hsee, 1998). In the same sense that the purchase of an insurance policy reduces risk, social diversification of potential losses quite objectively reduces the risks for managers with high collectivism value orientations (Rieger *et al.*, 2015). Therefore, when compared to lower collectivism (*i.e.* individualism), “cushion hypothesis” argues that higher collectivism reduces individuals' perception of disruption risk.

On the other hand, the second hypothesis (i.e. the “tough guy” hypothesis) focuses on the relationship between collectivism values, unrealistic optimism and risk perception. Extant research has shown evidence on the association between collectivism values and unrealistic optimism bias (Chui et al., 2010; Joshi and Carter, 2013; Rose et al., 2008). Unrealistic optimism refers to when people underestimate the likelihood of experiencing negative events (Weinstein and Klein, 1996), and overestimate their abilities to succeed (Van den Steen, 2004). Unrealistic optimism has been shown to systematically reduce individuals’ perception of risk. A relatively higher emphasis on independence (versus interdependence) in low versus high collectivism increases people’s susceptibility to self-enhancement biases, such as unrealistic optimism (Joshi and Carter, 2013; Rose et al., 2008). As a result, people low on collectivism (i.e. individualism) tend to underestimate the likelihood of getting affected by a negative event, and feel in control of managing the potential losses – i.e. “tough guy” hypothesis (*cf.* Chui *et al.*, 2010). However, individuals high on collectivism have been shown to be generally, not under such influences (Rose et al., 2008). Therefore, when compared to lower level of collectivism, “tough guy” hypothesis argues that higher collectivism reduces individuals’ susceptibility to overconfidence and over-optimism and hence increases perception of disruption risk.

Previous research has shown that depending on a risk context, one of these argument may play the dominant role in driving individuals’ perception of risk (Choi and Geistfeld, 2004; Rieger et al., 2015). In the context of supply-side disruption risk, we argue for both negative and positive effect of collectivism on disruption risk perception. Therefore, we follow past studies’ approach in dealing with contracting arguments (e.g. Bockstedt *et al.*, 2016) by offering two competing hypotheses.

*Hypothesis 2a. Collectivism is negatively associated with perceptions of supply-side disruption risk*

*Hypothesis 2b. Collectivism is positively associated with perceptions of supply-side disruption risk*

Drawing from risky decision-making theory, we argue that collectivism also indirectly impacts supplier switching intention through a mediating role of disruption risk perception. In this way, collectivism values work like filters in the evaluation of information about risks (Stern et al., 1995, p. 726) and hence decisions made in response to disruption. In line with above hypotheses, there are two competing arguments for the effect of collectivism on supplier

switching intention. On the one hand, high collectivism is associated with higher social diversification of potential losses which leads to lower perceptions of risk (Hsee & Weber, 1999; Weber & Johnson, 2009). Therefore, people high on collectivism have lower tendency to switch to an alternative supplier (Ellis et al., 2010; Kull et al., 2014). On the other hand, people high on individualism (i.e. low on collectivism) tend to be more overconfident and optimistic in their ability to control the consequences of a supply-side disruption (Chui et al., 2010). They perceive lower levels of disruption risk and hence, are less likely to switch to an alternative source of supply (Cantor et al., 2014; Sitkin and Pablo, 1992; Sitkin and Weingart, 1995). In sum, we hypothesise:

*Hypothesis 2c.. Collectivism (i.e. low individualism) is indirectly associated with supplier switching intention through the mediating mechanism of disruption risk perception*

### **3.2.2. Uncertainty Avoidance**

Uncertainty avoidance refers to the extent to which individuals can tolerate uncertain and ambiguous situations (Steel and Taras, 2010). People high on uncertainty avoidance orientation feel more threatened by the ambiguity and unpredictability of uncertain situations (Bontempo et al., 1997). They actively seek security and value written rules, and structured relationships (Patterson et al., 2006). Whereas, people with low uncertainty avoidance orientation are more comfortable in dealing with uncertain circumstances (Rieger et al., 2015). They are more accommodating of unstructured and ambiguous situations and generally accept some level of personal risk (Patterson et al., 2006). Research has found that cultural differences in this value, as reflected in the relative emphasis on “fear of failure versus a desire to achieve success” (Bontempo et al., 1997, p. 483), could result in systematic differences in perceptions of risk (e.g. Bontempo et al., 1997; Choi and Geistfeld, 2004). In the context of supply chain disruption, we argue that individuals with higher uncertainty avoidance orientation feel more nervous in dealing with the unpredictability of an impending event and hence, perceive higher levels of disruption risks compared to their counterparts in a similar situation. Therefore, we hypothesise that:

*Hypothesis 3a. Uncertainty avoidance is positively associated with perceptions of supply-side disruption risk*

Moreover, we argue that uncertainty avoidance indirectly influences people's supplier switching intention through a mediating role of perceived disruption risk. People higher in uncertainty avoidance value tend to feel nervous and threatened by the uncertainty and lack of structure involved in a situation (Bontempo et al., 1997; Liu et al., 2015; Qu and Yang, 2015; Rieger et al., 2015). In the context of supply disruption risk, this may mean that uncertainty avoidant managers are less tolerant to the unpredictability of an impending event and hence, perceive higher levels of risk compared to their counterparts. Therefore, they tend to switch to an alternative supplier with more predictable operating outcomes in order to reduce the level of perceived risk and uncertainty of the situation (*cf.* Sitkin and Weingart, 1995; Kull, Oke and Dooley, 2014). Therefore, we hypothesise that:

*Hypothesis 3b. Higher uncertainty avoidance is indirectly associated with higher supplier switching intention through the mediating mechanism of disruption risk perception*

### **3.3. Moderating role of uncertainty**

We extend risky decision-making theory by arguing that the effect of cultural values on disruption risk perception depends on the level of uncertainty. The notion of uncertainty is inherent in every decision-making situation, and has been shown to influence the outcome of various social and organisational decisions (Carpenter and Fredrickson, 2001; Meyer *et al.*, 2010). We define uncertainty as *variability* of information (Flynn *et al.*, 2016) needed to evaluate risk, make decisions, and confidently assign probabilities to their outcomes (Carpenter and Fredrickson, 2001). Uncertainty in this sense represents the extent to which individuals are provided with clear and unambiguous cues on the nature, probability or potential consequences of the event. In other words, under high uncertainty, information about the event (*i.e.* nature, probability, and/or outcome) is insufficient and/or ambiguous; while, under low uncertain circumstances, people have access to adequate and/or clear information about a disruption.

We expect that cultural values play a stronger role in shaping risk perceptions and determining behavioural outcomes when the level of uncertainty is relatively high (Erez, 2010). When facing higher levels of uncertainty, managers draw from their cognitive schema to fill the gap in and/or make sense of unclear and ambiguous information (Gibson et al., 2009). Cognitive schema refers to individual's system of values and beliefs reflecting knowledge about a particular domain (Fiske and Taylor, 1991). Since cultural values are shown to have a significant influence on the development and structure of these schema (Gibson *et al.*, 2009),

we expect that collectivism and uncertainty avoidance play stronger roles in determining managerial risk perception and decisions under relatively more uncertain circumstances (Erez, 2010). In such conditions, people substitute or complement the uncertain information with their relevant cultural values in order to be able to make sense of the situation (Nouri et al., 2013). While when the level of uncertainty is low, individuals are likely to have access to clearer and unambiguous information (Nouri et al., 2013) about the likelihood and potential losses of a disruption. In such conditions, the effect of schema and subsequently cultural values on disruption risk perception may be weakened. Therefore, we hypothesise that:

*Hypothesis 4. Uncertainty positively moderates the relationship between a) collectivism and disruption risk perception; b) uncertainty avoidance and disruption risk perception*

#### **4. Method**

We used a scenario-based behavioural experiment to test our hypotheses (Eckerd, 2016). Experiments provide an opportunity to identify causal relationships between psychologically held cultural values, risk perception and decision outcomes; their designs control for the impacts of other individual and organisational compounding variables (Katok, 2011); and they involve little cost to run compared to their alternatives (Siemsen, 2011). Moreover, experiments present unique set-ups that allow the researcher to manipulate disruption environment and captures participant responses in the presence of varying levels of uncertainty (Eckerd, 2016). The use of experiments in operations and supply chain management studies has been gaining momentum during the last years, and provided opportunities for scholars to make new contributions to the field (e.g. Mir et al., 2017; Vanpoucke and Ellis, 2019).. Scholars have particularly, applied experiments to seek insight into the supply chain management decision making. For example, a recent study uses a vignette-based experiment to examine the effect of managerial anger on post-disruption non-retention decisions (Polyviou et al., 2018).

In this study, the use of an experiment allowed us to control for contextual and environmental factors that may confound individuals' perception of risk and affect their decision-making. In addition, it provided us a unique set-up to manipulate different levels of uncertainty in the scenario and capture responses in a controlled supply disruption environment.

#### 4.1. Subjects and Experimental Design

A total of 220 experienced professionals were recruited through a survey research firm, Qualtrics. In recent years, Qualtrics has been commonly used by operations and supply chain management scholars to run experiments (*cf.* Schoenherr *et al.*, 2015). Participants were required to have work experience in related operations and supply chain management areas (33.18% operations & production; 21.36% project management; 15.91% supply chain & distribution; 10.45% procurement & purchasing; 6.82% Risk analysis & management; 5.91% contract management & development; 4.55% export & import; 1.82% logistics & freight). We included a pre-screening test that automatically terminated the process for respondents who failed this criterion. In addition, 31% of the participants were from manufacturing and 51% were from service industry (others = 17%). Moreover, we controlled for a potential effect of national-level cultural values by collecting data only from the UK residents. The sample characteristics of the study were as follows: 52.72% female (*i.e.* 47.27% male); an average age of 41.7 years ( $SD = 11.73$ ); and an average work experience of 16.77 years ( $SD = 11.11$ ).

Drawing from news reported in the media, we developed a scenario that assigned respondents to the role of purchasing manager in a fictional manufacturer. The scenario described a situation in which the buying firm is facing a possible labour strike at one of their supplier's plants. The vignette was composed of an introduction to the firm and their supply base, as well as information on the demand, suppliers' order allocation and purchasing costs. The subjects were told that their firm supplies 80% of its total order volume from a supplier with purchasing costs of £18. While, the rest of their order (*i.e.* 20%) is provided by another supplier with purchasing costs of £30 (*cf.* Gurnani *et al.*, 2014). In addition, they were told that the former is exposed to an impending disruption risk at their plant, while there was no change in the risk of the latter. Facing a disruption, they were asked to rate their intention of switching (1 = "extremely unlikely"; 7 = "extremely likely") to the less risky supplier as well as the extent of switching (1 = "no switch"; 7 = "completely switch"). To control for the effect of contextual factors (*e.g.* sourcing difficulty, supplier dependability), subjects were told that the two suppliers are comparable in terms of their quality and delivery performance measures and there would be no switching costs involved in the decision. In the context of our study, this is plausible since we are interested in ruling out other causal explanations (apart from risk perception) that may drive or constrain individuals' action upon supply disruption risk.

We drew from the theoretical conceptualisation of uncertainty in risk assessment literature (Guyonnet *et al.*, 2003) to carefully craft uncertainty in terms of variations in possible

consequences of risk (*cf.* Johnson and Slovic, 1995). Thus, in low uncertain situation, participants were provided with a single point estimate of strike duration (“*a potential strike will last for 4 weeks*”), while they were given a possible range of strike duration in the high uncertain scenario (“*such events could last between 1 week to 2 months*”). Each respondent received only one version of the scenario, resulting in a simple between-subject design. To assess the clarity and realism of the scenario, we asked operations and supply chain academics to comment on the realism, clarity and comprehension of the scenario prior to our data collection. The process helped us to ensure that the vignette “as written and presented, is clear, realistic, complete (in that it contains all information necessary for human subjects to assume their role and to consequently provide their reactions and responses), and is effective” (Rungtusanatham *et al.*, 2011, p. 13). Table 1 provides a full description of the scenario.

After reading a scenario, we asked participants to answer a series of questions on their subjective perception of supply disruption risk, supplier switching intention, extent of switching, risk attitude, demographic characteristics, and manipulation and realism check. In addition, cultural value dimensions were measured using multi-item 7-point Likert scales. To control for potential demand effects in experiment (Lonati *et al.*, 2018), we organised the survey questions in a way that participants responded to questions about cultural values only when they completed the part on dependent variables (i.e. supply disruption risk, supplier switching intention and the extent of switching), manipulation and realism checks.

The results of the manipulation check indicated no concern pertaining the validity of our experimental manipulation ( $M_{high}= 4.97$  vs.  $M_{low}= 4.23$ ,  $p < 0.001$ ). As for the realism check, we asked participants to indicate the extent to which they perceived the situation described in the scenario to be realistic and could imagine themselves in the situation. The results confirmed that participants found the scenario to be realistic ( $M = 5.02$ ,  $SD = 1.21$ ) (*cf.* Mir *et al.*, 2017).

[Please insert Table 1 about here]

## **4.2. Measurements and Statistical Models**

To operationalise the constructs of collectivism and uncertainty avoidance, we adopted existing multi-item individual level cultural value measurement (CVSCALE) from Yoo *et al.* (2011). Participants were asked to respond to a series of statements regarding their principles at work on a 7-point Likert scale (1 = “strongly disagree”; 7 = “strongly agree”) (see Table 2). The CVSCALE is a psychometrically sound measure that has been used and validated by scholars



who examine the effect of individual level cultural values on various consumer and organisational-related outcomes (e.g. Winterich and Zhang, 2014; Simpson *et al.*, 2018). We also dummy coded uncertainty as 0 for low uncertainty and +1 for high uncertainty in our analyses.

Furthermore, to measure our dependent variables – *i.e.* disruption risk perception and supplier switching intention – we adapted existing scaled items from earlier research. A 3-item measure (Jia *et al.*, 2015) assessed participants' disruption risk perception on a 7-point Likert scale. In addition, we used a single-item 1-7 Likert point scale adapted from Mir *et al.* (2017) to measure individuals' intention to switch supplier (1 = "Extremely unlikely"; 7 = ""extremely likely). We used a single item, since past research has shown that such measures are suitable for operationalising "concrete constructs" such as intention (Nair *et al.*, 2016).

We also controlled for the systematic effect of individuals' age, gender, work experience and risk attitude on perceptions of risk and responses to risky situations (Cauffman *et al.*, 2010; Finucane *et al.*, 2000; Sitkin and Pablo, 1992). Age and work experience were kept as continuous variables; gender was a categorical variable coded as 0, 1 (Female = 1); and general business risk propensity was assessed as a continuous variable using an existing measure in the literature (Hung *et al.*, 2012; Hung & Tangpong, 2010).

We ran a confirmatory factor analysis (CFA) to examine the reliability and validity of our reflective measures. The corresponding CFA results indicated acceptable measurement fit indices and psychometric properties for all constructs:  $\chi^2/df = 1.38$  [ $\chi^2(129) = 177.88$  ( $p = 0.003$ )] indicated a satisfactory fit between the predicted and observed model (Kline, 2005); the comparative fit indices of TLI = 0.92 and CFI = 0.94 highlighted that our model has a better fit than the baseline model; and RMSEA = 0.04 [90% CI = (0.03, 0.05)] showed an acceptable approximation fit. Based on the CFA results shown in Table 2, all measurement indicators except one<sup>3</sup> loaded on their hypothesised factors with a large and significant loading (all the  $p$ -values are smaller than 0.001). In addition, Cronbach's alpha of all constructs showed values above the recommended cut-off point of 0.7, highlighting a high level of convergent validity and internal consistency (Hair *et al.*, 1998). Moreover, we evaluated discriminant validities of constructs using the average correlation among indicators across constructs, in relation to the

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<sup>3</sup> One of the risk attitude item ("*although a new thing has a high promise of reward, I do not want to be the first one who tries it. I would rather wait until it has been tested and proven before I try it*") loadings was below the threshold values of 0.5 (0.18). Given the context of the decision-making in our research, we decided to drop this item to maintain high convergent validity of risk attitude construct.

average correlation among indicators within their respective construct (Henseler *et al.*, 2014). The results showed satisfactory discriminant validity for all factor scores.

[Please insert Table 2 about here]

### 4.3. Findings

To test our hypotheses (Hypothesis 1, Hypotheses 2a-b, Hypothesis 3a, Hypotheses 4), we used hierarchical moderated regressions. We started our analysis by running correlation tests that indicated some significant associations among our independent variables (Table 3). To improve the interpretability of our results and reduce multicollinearity concerns, we standardised our independent variables (Aiken and West, 1991).

[Please insert Table 3 about here]

Table 4 illustrates our regression results. Models 1-3 and 4–5, respectively, employed disruption risk perception and switching intention as dependent variables. Models 1 and 4 included only the control variables. We also included realism (i.e. the extent to which participants perceived that the scenario as realistic and could imagine themselves in the situation described in the scenario) as an additional control variable in both models. Models 2 and 5 further incorporated the main effects of collectivism and uncertainty avoidance, and disruption risk perception. Models 3 included the interaction term between collectivism, uncertainty avoidance and uncertainty.

$$\textbf{Model 1: Disruption risk perception} = \beta_0 + \text{Controls} + \epsilon$$

$$\textbf{Model 2: Disruption risk perception} = \beta_0 + \beta_1(\text{Collectivism}) + \beta_2(\text{Uncertainty avoidance}) + \beta_3(\text{Level of uncertainty}) + \text{Controls} + \epsilon$$

$$\textbf{Model 3: Disruption risk perception} = \beta_0 + \beta_1(\text{Collectivism}) + \beta_2(\text{Uncertainty avoidance}) + \beta_3(\text{Level of uncertainty}) + \beta_4(\text{Collectivism} * \text{Level of uncertainty}) + \beta_5(\text{Uncertainty avoidance} * \text{Level of uncertainty}) + \text{Controls} + \epsilon$$

$$\textbf{Model 4: Supplier switching intention} = \beta_0 + \text{Controls} + \epsilon$$

$$\textbf{Model 5: Supplier switching intention} = \beta_0 + \beta_1(\text{Disruption risk perception}) + \text{Controls} + \epsilon$$

Our results supported Hypothesis 1, *i.e.* disruption risk perception leads to significantly higher supplier switching intention ( $\beta = 0.54, p < 0.01$ ). Moreover, our results showed a negative

association between collectivism and disruption risk perception ( $\beta = -0.21, p < 0.05$ ), in line with Hypothesis 2a – “cushion hypothesis”. Hence, the results rejected the competing that is collectivism (i.e. low individualism) is positively associated with disruption risk perception – i.e. Hypothesis 2b. In addition, as predicted by Hypothesis 3a, we found support for the direct effect of uncertainty avoidance on disruption risk perception ( $\beta = 0.31, p < 0.01$ ). Moreover, as hypothesised (Hypothesis 4a), we found a significant interaction between collectivism and uncertainty ( $\beta = -0.31, p < 0.1$ ). However, the interaction between uncertainty avoidance and uncertainty was non-significant (Hypotheses 4b) ( $\beta = 0.11, n.s$ ).

[Please insert Table 4 about here]

To facilitate the interpretation of the interaction terms, we ran spotlight analyses to find the conditional effect of cultural values on disruption risk perception at two levels of uncertainty – Figure 2 (Spiller et al., 2013). A spotlight analysis revealed that the effect of collectivism on the perceived disruption risk is non-significant in low uncertain condition ( $slope_{low\ uncertainty} = -0.04, n.s$ ). However, this becomes significant under high uncertain condition ( $slope_{high\ uncertainty} = -0.34, p < 0.01$ ), indicating that the uncertainty positively moderates the relationship between collectivism and disruption risk perception. Moreover, the impact of uncertainty avoidance on disruption risk perception were positive and significant at two levels of uncertainty ( $slope_{low\ uncertainty} = 0.26, p < 0.05$ ;  $slope_{high\ uncertainty} = 0.37, p < 0.001$ ). However, we found no significant moderating effect of uncertainty on the relationship between uncertainty avoidance and disruption risk perception.

[Please insert Figure 2 about here]

Moreover, to test the indirect effects of collectivism and uncertainty avoidance on supplier switching, we used an “explicit procedure” (Rungtusanatham *et al.*, 2014, p. 101). A bootstrapping method was applied to strengthen the statistical power of mediation effects and improve the validity and robustness of our statistical results (Malhotra et al., 2014). We used the *lavaan* package (Version 0.6-1) to reproduce Hayes (2013) macro PROCESS model results. Due to the inclusion of moderating variables (*i.e.* uncertainty) in our model, we examined the existence of the mediation effects as a function of different levels of uncertainty (Malhotra et al., 2014). The estimated indirect effect of collectivism on disruption risk perception was

significant at high levels of uncertainty ( $P.E_{high\ uncertainty} = -0.28, 95\% CI [-0.51, -0.05]$ ). However, we found a non-significant indirect effect under low uncertainty ( $P.E_{low\ uncertainty} = -0.10, 95\% CI [-0.36, 0.16]$ ). This can be explained by the lack of a significant relationship between collectivism and disruption risk perception in these situations, and not the absence of mediation effect. Moreover, the results indicated that disruption risk perception mediates the effect of uncertainty avoidance on switching intention under both levels of uncertainty ( $P.E_{low\ uncertainty} = 0.41, 95\% CI [0.04, 0.79]$ ;  $P.E_{high\ uncertainty} = 0.49, 95\% CI [0.17, 0.81]$ ). Altogether, mediation analyses confirmed our Hypothesis 2c and Hypothesis 3b– i.e. the effect of collectivism and uncertainty avoidance on supplier switching is mediated through disruption risk perception.

*Robustness check.* Prior to our analyses, we tested the effect of collectivism and uncertainty avoidance on disruption risk perception (Model 2) having controlled for the impact of power distance, masculinity and future orientation. While including these variables in the model reduced the significance level of collectivism to  $\alpha = 0.1$ , the findings remained qualitatively the same ( $b_{Collectivism} = -0.17, p < 0.1$ ;  $b_{Uncertainty\ avoidance} = 0.33, p < 0.01$ ). With regards to the drop in the significance level, given high correlation between cultural values<sup>4</sup> (Halkos and Tzeremes, 2013; Hofstede, 1980), it is not surprising that adding controlling cultural values into the model reduces the significance level of collectivism. High correlation between these variables mean that there are shared variances in the regression and hence adding the controls into the model may reduce the unique variance explained by and the significance level of collectivism (Atinc et al., 2012). Nonetheless, our results showed that having controlled for such variations, there is still a unique and significant effect of collectivism on disruption risk perception ( $b = -0.17, p < 0.1$ ). More specifically, the findings demonstrated that holding all other cultural values constants, there is a significant impact of collectivism on disruption risk perception. Therefore, to retain a parsimonious empirical model, we decided to keep only the dimensions that are theoretically relevant and of interest in the analyses.

Furthermore, to provide further support for our findings (Hypothesis 1), we reran model 5 with the extent of switching as dependent variable. The results supported our earlier findings

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<sup>4</sup> Close associations between values such as future orientation and collectivism mean that there are certain aspects of collectivism values that overlap with certain aspects of future orientation values.

on the significant positive effect of disruption risk perception on individuals' intention to place order from the alternative supplier ( $\beta = 0.48, p < 0.01$ ).

## 5. Discussion

### 5.1. Theoretical Contributions

Our findings provide several theoretical contributions. First, our study contributes to the understanding of the antecedents of managerial responses to supply chain disruptions (*cf.* Ellis *et al.*, 2010; Ellis *et al.*, 2011; Polyviou *et al.*, 2018). Research has previously suggested that organisational actions in the face of a disruption event are heterogenous, and hence used a range of behavioural and contextual factors to explain such differences (*e.g.* (Cantor *et al.*, 2014; Polyviou *et al.*, 2018; Vanpoucke and Ellis, 2019). Our study builds on this stream of work by investigating the effect of cultural value orientations on disruption risk perception and responses.

With regards to the competing hypotheses for the effect of collectivism on risk perception, our findings provide evidence for Hypothesis 2a – i.e. there is a negative relationship between collectivism and people's perception of supply-side disruption risk ( $\beta = -0.21, p < 0.01$ ). This is consistent with the prediction of “cushion hypothesis” that suggests higher collectivism is associated with lower levels of risk perception (Weber and Hsee, 1998, 2000). In other words, managers who value interdependence within their social groups see their co-workers/collaborators as buffer that protects them against potential losses of a disruption. Therefore, high collectivism is associated with lower perceptions of disruption risk. Our findings did not support the competing hypothesis (i.e. Hypothesis 2b). This may be explained by the fact that individual managers act as organisational agents in the face of disruptions. In other words, people are responsible to evaluate disruption risk and take actions on behalf of their home organisation. Therefore, we may expect people to assess risk in reference to their organisation/ social group (and to be less reliant on their view of themselves which may be overconfident or optimistic). While people high on collectivism see their social group as mutually responsible and obligate to bear the consequences of disruption, people low on collectivism (i.e. high individualism) feel independent of their social group and see themselves as solely responsible to bear potential losses.

Moreover, in line with past studies (Bontempo *et al.*, 1997; Rieger *et al.*, 2015), we find evidence on the positive relationship between uncertainty avoidance and disruption risk perception (Hypothesis 3a). In other words, people with higher uncertainty avoidance values

feel more anxious when facing a supply disruption situation and hence, tend to perceive a higher level of risk compared to their counterparts.

Second, we contribute to the extant literature by showing that the effect of collectivism and uncertainty avoidance on disruption risk perception is contingent upon uncertainty (*cf.* (Erez, 2010; Nouri et al., 2013)). While past operations and supply chain management research has been mainly concerned with *whether culture matters* (Metters et al., 2010), our findings provide evidence on *how and when it matters the most* (Kirkman et al., 2017). We find that while collectivism has a non-significant impact on the perceived disruption risk in low uncertainty circumstances ( $slope_{low\ uncertainty} = -0.04$ , n.s), the relationship becomes stronger and significant in high uncertainty situations ( $slope_{high\ uncertainty} = -0.35$ ,  $p < 0.01$ ). In the context of supply disruption management, this may have implications for the management of risk at the discovery stage of an event, when organisations become aware of an impending disruption (*cf.* Blackhurst et al., 2005) and information about an event tends to become unclear and more ambiguous (Hult et al., 2010). Nonetheless, our findings do not show significant differences between the effect of uncertainty avoidance on disruption risk perception in low and high uncertain circumstances ( $\beta = 0.11$ , n.s) (Hypothesis 4b). This could suggest that uncertainty avoidant individuals perceive high levels of risk when facing an unplanned and unprepared for supply disruption, regardless of how much actual uncertainty is involved in the situation.

Third, our study contributes to research in analogous fields that has examined the effect of collectivism and uncertainty avoidance at the country level of analysis (Rieger et al., 2015; Weber and Hsee, 1998). These studies have either used Hofstede's survey items to collect primary data on cultural values at the society level (e.g. organisation, country), or applied his aggregated values scores to represent a country's culture. Our study departs from these studies by focusing on the individual-level effect of these values on perception of supply-side disruption. We argue that the use of individual-level cultural values provides a more accurate understanding of managerial behaviour in supply chain disruption situations (Kirkman et al., 2009; Yoo et al., 2011). In other words, since risk perception is an individual construct, examining culture as reflected in individually held values offers richer insights into the systematic differences of supply chain disruption management decision-making. In particular, our study controls for the effect of country-level culture on decision-making by collecting data

from a single country<sup>5</sup>. The standard deviation for uncertainty avoidance ( $M = 5.47, SD = 0.83$ ) and collectivism ( $M = 4.9, SD = 0.9$ ) measurements confirm the variations in the extent to which people within the country hold these cultural values.

With regard to the supplier switching intention, our study finds empirical evidence on the systematic effect of individual-level cultural values on such responses. In other words, while people high on collectivism are more likely retain their current supplier in the face of an impending disruption, people high on uncertainty avoidance values are more likely to switch to an alternative source of supply in order to mitigate risk. These findings suggest the importance of integrating cultural value orientations into the extant supply chain risk management models and frameworks in order to improve the efficiency and predictability of such practices (*cf.* Tokar, 2010).

## **5.2. Managerial Implications**

From a managerial point of view, the results of our study highlight the importance of perception in managing supply chain disruptions. When facing a disruption, managers' behaviour is influenced by their subjective assessment of risk, that itself is shaped by cultural values. Given the high costs involved in such decision-making processes (Chen, 2018), it seems crucial that organisations understand the underlying cultural factors that lead to systematic differences, and develop techniques to counter biases (*cf.* Tokar, 2010). The findings from this study could be used by companies to design supply chain risk templates that accounts for potential cultural variations in managerial evaluation of risk. Organisations may also utilise human resource management practices to educate employees about the underpinning factors that bias decision-making (*cf.* Ellinger and Ellinger, 2014). Past studies have suggested that informing managers about the sources and implications of individual's biases, and providing appropriate training programmes could reduce the effect of such biases in people's decision-making (Tokar, 2010).

Moreover, our findings show that cultural differences are more pronounced under high uncertain circumstances. This may have implications for the design and application of early warning systems. In the early stages of a disruption discovery, information about the event tend to be uncertain and ambiguous. This becomes more certain and less ambiguous, as one gets closer to the actual point of the disruption. In light of our findings, this may suggest that cultural biases play a stronger role in the early stages of disruption discovery. Therefore, organisations

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<sup>5</sup> All respondents were current residents of the United Kingdom (83.64% UK nationals)

could opt to reduce the level of uncertainty in these stages by presenting complementary information on the characteristics of the product (*e.g.* product purchasing criticality), supplier performance capabilities, and a firm's past experiences with similar events. This may, in turn, enhance the clarity of the decision-making situation and provide a richer basis for managerial objective evaluations of risk.

## **6. Limitations and Opportunities for Future Studies**

Our study is not without limitations. Due to our focus on the effect of individual-level cultural values on supply disruption responses, we controlled for a range of organisational and relational factors, such as risk infrastructure and inter-firm trust (Bode et al., 2011; Brandon-Jones et al., 2014). In addition, we assumed no administrative costs of switching and homogeneity of supplier performance in quality. In the context of our study, this was justified and allowed us to focus specifically on the purely individual level behavioural effects (*cf.* Mir et al., 2017). Although, we acknowledge that such events are inter-organisational by nature and hence, the shadow of the past and/or the shadow of the future may interact with managerial subjective evaluation of the situation in responding to the event (*cf.* Bode et al., 2011).

Furthermore, in designing the scenario, we created a decision-making situation where the duration of switching for the focal firm was unknown. In the context of our study, this was realistic since facing a supply-side disruption, managers are often unaware of when and whether the affected supplier will go back to normal. Nonetheless, we acknowledge that uncertainty around the duration of switching might influence individuals' switching intention and encourage future studies to build on the findings of our research and examine the effect of switching duration on managerial decision-making. We would also encourage scholars to examine our results under different types of disruption. For example, studies could manipulate the impact and probability of a disruption to observe whether cultural orientation has a different effect for different levels of risk.

The use of a scenario-based experiment provided a controlled environment where we could carefully examine the impact of cultural values on risk perception and mitigation. In addition, it allowed for randomization of experimental manipulations across participants, which enhance external validity of the findings. However, we acknowledge such experiments are not without limitations. For instance, the order by which we presented the scenario and cultural values questions may have led to demand effect – *i.e.* bias that happens when the purpose of an experiment can be inferred by participants and so they respond in a way to help confirm a researcher's hypothesis (Lonati *et al.*, 2018). While recent empirical studies have



provided little evidence for such biases (Mummolo and Peterson, 2019), we encourage future studies to use more advanced experimental design that addresses such limitations. For instance, scholars could rely on randomisation of the order by which participants receive the scenario and respond to questions about culture to address potential demand effect. Similarly, future research could opt to rely on experimental manipulation instead of measurement of cultural values (cf. Brown and Baer, 2015) to provide a more conservative investigation into the effect of cultural values on disruption risk perception and mitigation.

Our research is one of the first studies in OSCM that sheds light on the contingency factors explaining *when culture matters* the most (Metters *et al.*, 2010). We identified a situational variable – i.e. the level of uncertainty – that provides an initial understanding of when culture is most likely to impact disruption risk perception. Uncovering and understanding contingency conditions is critical to the advancement of our field (Sousa and Voss, 2008), however we also recognise our empirical model still has a relatively large percentage of unexplained variance, and the interaction effect makes a relatively modest addition. We would like to encourage scholars to explore other contingency variables, such as organisational culture (Wallach, 1983) and managerial discretion (Ellis *et al.*, 2011). Past research has shown that in high discretion contexts, managerial behaviour is more likely to be driven by their values (Hambrick, 2007). On the other hand, in low-discretion contexts, behavioural variability is constrained by organisational internal factors that encourage consistency and pursue homogenous actions (Meyer *et al.*, 2010). Future studies may opt to study the interaction between these factors and cultural values in order to provide a richer understanding of *when culture matters* the most in OSCM (Gibson *et al.*, 2009).

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