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Does buyers' financial slack promote or inhibit suppliers' circular economy performance?

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Opposed Reviewers:	
Response to Reviewers:	

Highlights

- We find a nonlinear (U-shaped) relationship between slack resources and performance.
- Some relationship-specific contextual factors, i.e., buyer power and technology capability, have positive moderating effects.
- Buyer-supplier geographical distance has negative moderating effects on the main U-shaped relationship.

Does buyers' financial slack promote or inhibit suppliers' circular economy performance?

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Abstract: Extant research examining the link between slack resources and performance offers few insights into how buyer firms' financial slack influences suppliers' circular economy (CE) performance. We collect secondary data from 290 buyer-supplier dyads of listed firms in China during 2006-2018 from CSMAR database. Using panel data analysis, we find a nonlinear (U-shaped) relationship between them. In addition, some relationship-specific contextual factors, i.e., buyer power and technology capability, have positive moderating effects, while buyer-supplier geographical distance has negative moderating effects on the main U-shaped relationship. Our study contributes to the literature on the slack-performance debate confirming the CE performance effect of financial slack in the business-to-business (B2B) relationship.

Keywords: Financial slack; CE performance; B2B relationship; Dyadic data

1. Introduction

The circular economy (CE) is a highly relevant concept of corporate responsibility and has drawn increasing attention from both academics and practitioners (Russo and Tencati, 2009; Dossa and Kaeufer, 2014; Murray et al., 2017). It is considered to decrease waste by increasing the lifetime of products to create both environmental and economic benefits (Jia et al., 2020). Scholars suggest that commitment to corporate responsibility, such as through the CE, is important for firms as it can generate competitive advantages and create additional value for firms (Dossa and Kaeufer, 2014; Murray et al., 2017; Chang, 2017; Yang et al., 2019). Various firm-level attributes tend to affect a firm's CE investment, among which the resource base (especially the financial related recourse) of a firm plays a critical role in CE investment decisions (MacWilliams and Siegel, 2001; Campbell, 2007; Clarkson et al., 2011).

As a critical type in organizational resource base, slack resource is considered to be influential in the pursuit of corporate responsibility performance such as CE (Orlitzky and Benjamin, 2001; Amato and Amato, 2007; Brammer and Pavelin, 2008; Chiu and Sharfman, 2011; Chen et al., 2017; Symeou et al., 2019). Slack is defined as 'the pool of resources in an organisation that is in excess of the minimum necessary to produce a given level of organizational output' (Nohria and Gulati, 1996). Extant studies of slack

resources mainly focus on two types of slack: financial slack and operational slack (e.g., Wiengarten et al., 2017). Between them, financial slack is viewed as the most deployable resources that allow managerial discretion for participating in broader range of activities in addition to core activities in order to build reputation (Amato and Amato, 2007; Brammer and Pavelin, 2008; Chiu and Sharfman, 2011; Symeou et al., 2019). Compared to firms with limited financial slack, firms with considerable financial slack are found more responsive to stakeholder pressures through improving corporate responsibility performance (Waddock and Graves, 1997; Daniel et al., 2004; Xiao et al., 2018).

However, although the literature has explored financial slack—corporate responsibility performance such as CE to some extent, two limitations remain. First, inconsistent results are found in the relationships between financial slack and corporate responsibility performance (Symeou et al., 2019). This may be due to overlooking the level of slack resources and the influence of context-specific factors (Tan and Peng, 2003; George, 2005). Second, the focus of the implications of financial slack is often at an intra-organizational level, namely examining a firm's financial slack impact on its own corporate responsibility performance. Little is known about its performance implications for stakeholders, such as key suppliers (Modi and Cantor, 2020). In the business-to-business (B2B) context, understanding the impact of a firm's financial slack on its key suppliers' CE performance is particularly interesting for the focal buying firms. This is because buyers' interactions with suppliers through supplier development can significantly influence suppliers' CE performance (Pagell and Sheu, 2001; Johnston et al., 2004; Williams, 2006), which in turn, is considered to influence buyers' CE performance in a lagging manner (Blome et al., 2014).

Against the above backdrop and research gaps, we build on resource dependence theory (Pfeffer and Salancik, 1978) to investigate the varying effects of different levels of buyers' financial slack on suppliers' CE performance. In addition, scholars suggest that the consideration of proper contextual contingencies can contribute to the granularity of the investigation of slack's effect on performance (Daniel et al., 2004; Bradley et al., 2011; Wiengarten et al., 2017; Guo et al., 2020). In a B2B context, we further consider the influence of buyer-supplier relationship-specific contingent factors (Cannon and Homburg, 2001; Sanderson, 2009; Chicksand, 2015). This study aims to answer the following research questions:

RQ1. What is the impact of buyers' financial slack on suppliers' CE performance?

RQ2. What contingent factors influence the relationship between buyers' financial slack and suppliers' CE performance?

To conduct this study, we analyse panel data on Chinese listed buyer-supplier dyadic relationship firms from 2006 to 2018. China is selected for three reasons. First, as the largest emerging market and 'factory of the world' (Harney, 2008), China is still facing substantial challenges in meeting CE performance (Gong et al., 2018). Second, although there is evidence that CE consciousness is growing among Chinese managers, owing to the difference in cultural, political, and social structure, the way Chinese firms manage CE performance is different from that of Western companies (Moon and Shen, 2010; Yin and Zhang, 2012). Third, the Chinese version of B2B relationship management is also distinct (Ambler et al., 1999; Liu et al., 2008) and Western practitioners are advised to be aware of this when conducting business in or with China (Chen et al., 2011).

This study makes multiple contributions. First, we contribute to the B2B literature through highlighting the role of buyer-supplier relationship in the pursuit of CE performance. By extending the debate on slack from an intra-organizational focus to an inter-organizational level, financial slack is found to influence not only the focal firm itself, but also its stakeholders – the key suppliers – in the B2B context. Second, this study enriches the understanding of organizational slack by shedding light on a U-shaped relationship between buyers' financial slack and suppliers' CE performance. This may resolve the problem of the inconsistent findings in previous studies on financial slack's effects on corporate responsibility performance such as CE (Symeou et al., 2019). Third, by examining the role of B2B contextual contingencies, we respond to the call of Guo et al., (2020) on finer-grained studies of further considering external environment contingencies under which the influence of financial slack on performance is enhanced or constrained.

The remainder of this paper is structured as follows. Section 2 provides a literature review on financial slack and CE performance; B2B relationship studies are then explored, and hypotheses are developed through the lens of resource dependence theory. Section 3 describes the research design, including the sample selection, variables and model specification. The results are presented in Section 4, followed by a discussion in Section 5, including contributions, limitations of the study and a proposal for future research directions.

2. Theoretical background and hypotheses

This study adopts resource dependence theory (Pfeffer and Salancik, 1978). Resource dependence theory is highly relevant for the resource management in the B2B context, in which an imbalanced relationship between two parties, such as buyers and suppliers (Paulraj and Chen, 2007; Jajja et al., 2017; Zhang et al., 2021). According to resource dependence theory, the deployment of resource is not necessarily restricted to the firm but can go beyond the organizational boundary through supplier management activities, and subsequently create competitive advantages for both parties (Dyer and Singh, 1998; Barringer and Harrison, 2000; Paulraj and Chen, 2007).

Among various types of resources, scholars have viewed financial resources as a primary source of competitive advantage and used to pursue a higher level of performance (Grant, 1991; Amit and Schoemaker, 1993; Chen et al., 2021b). One type of financial resource is financial slack, which allows managerial discretion to redeploy resources into a range of strategic choices in concert with diverse performance goals (Hambrick and Finkelstein, 1987; Bradley et al., 2011). Compared to firms with limited financial slack, firms with considerable financial slack are more responsive to stakeholder pressures (Xiao et al., 2018). Scholars have developed a consistent set of theoretical arguments in which the presence of financial slack can facilitate firms' participation in corporate responsibility development such as CE (Waddock and Graves, 1997; Daniel et al., 2004). This is because, first, as financial slack accumulated, managers' attention will gradually shift to issues with long-term implications (Peng et al., 2010), such as CE; second, firms with sufficient financial slack are also capable of affording the substantial efforts to improve CE performance in their B2B relationships (Perez-Batres et al., 2012). In short, the presence of financial slack implies a pool of funds that can be adopted to enable the quest for corporate responsibility objectives, such as CE performance.

2.1. Financial slack and focal firm's CE performance

Financial slack is the excess financial resources available to firms in a certain time period to use in a discretionary manner either to overcome risks or explore opportunities (Bourgeois, 1981; Greenley and Okemgil, 1998; Weinzimmer, 2000). Researchers have classified financial slack into unabsorbed slack (or available slack), absorbed slack (or recoverable slack) and unborrowed slack (or potential slack) (Bourgeois and Singh, 1983; Singh, 1986; Cheng and Kesner, 1997; Tan and Peng, 2003). Unabsorbed slack

refers to resources that are uncommitted to a particular activity and are readily available for other activities, e.g., cash, credit lines and other financial instruments (Greve, 2003; Voss et al., 2008). Absorbed slack refers to resources dedicated to specific operations that cannot be redeployed for other activities, i.e., excess operational costs of capacity, workers and inventory (Bourgeois, 1981; Tan and Peng, 2003; Voss et al., 2008). Unborrowed slack refers to external resources that can be raised in forms such as debt or equity financing (Cheng and Kesner, 1997; Geiger and Cashen, 2002). Among these resources, unabsorbed slack is the most discretionary that can be easily mobilized and redeployed for other activities (Mishina et al., 2004). Studies examining the effect of slack on CE performance often regard slack as excess uncommitted financial resources (Brammer and Pavelin, 2006; Leyva-de la Hiz et al., 2018; Symeou et al., 2019). Therefore, we focus on unabsorbed financial slack in this study.

Studies have explored different aspects of the financial slack-corporate responsibility performance relationship and provided some support for their positive correlation (Buchholtz et al., 1999; Greve, 2003; Chiu and Sharfman, 2011; Wiengarten et al., 2017; Symeou et al., 2019; Wu and Hu, 2020). For example, Buchholtz et al., (1999) point out that financial slack is a determinant of corporate responsibility activities. Chiu and Sharfman (2011) suggest the positive effect of financial slack on corporate responsibility performance. Symeou et al. (2019) indicate that unabsorbed financial slack positively influences CE performance. These findings make sense as unabsorbed financial resources can be easily mobilized and redeployed, contributing to the building of corporate responsibility capabilities such as cleaner technologies, safety/ergonomic experts and CE innovations (Nohria and Gulati, 1996; Klessen and Whybark, 1999; Wiengarten et al., 2017). By doing so, companies with financial slack can engage in corporate responsibility activities such as CE, which finally improve their CE performance (Orlitzky et al., 2003; Daniel et al., 2004; Chin et al., 2013).

However, extant studies on financial slack are mainly concerned with focal firms' own CE performance, and little is known about whether or how it influences stakeholders' performance (Modi and Cantor, 2020). In the B2B context, the influence on business partners or stakeholders cannot be overlooked. As one of the important stakeholders, suppliers play a critical role in supporting a firm's production and achieving performance goals (Modi and Mabert, 2007; Peng et al., 2020; Benton et al., 2020). An increasing number of firms have realized the importance of supplier performance in establishing and maintaining their competitive advantages (Humphreys

et al., 2004). This is also in line with resource dependence theory that indicates a firm's competitive advantages are dependent on its partners such as key suppliers (Paulraj and Chen, 2007). As CE consciousness is perceived as a business imperative, it is meaningful for firms to develop their suppliers into being more committed to CE (Awasthi et al., 2010).

2.2. The effect of buyers' financial slack on suppliers' CE performance

The primary goal of business is to create value for firms to enhance profitability (Conner, 1991; Bradley et al., 2011). Value creation can be accomplished through the availability and deployment of given resources. As stated earlier, financial slack is the most easily deployed resource (Kim et al., 2008; Carnes et al., 2019). However, the effect of financial slack varies depending on its level (Tan and Peng, 2003; George, 2005). A low level of financial slack indicates resource constraints and limited managerial discretion, with which firms are likely to concentrate on as their primary goal and short-term performance, i.e., profitability, rather than other performance focuses, such as CE (Hambrick and Finkelstein, 1987; Baker and Nelson, 2005; George, 2005; Lin et al., 2019). At this stage, the financial slack of the buyer is mainly used to enhance profitability by investing in expanding its production and operations. As suppliers' operations have to align with the buyer's planning outcomes (Stadler, 2009; Wang et al., 2013), suppliers tend to maximize the utilisation of resources in production to meet the supply demands, which is often achieved at the expense of CE performance (Ambec and Lanoie, 2008).

However, as financial slack increases further and above a certain level, a positive effect on suppliers' CE performance may emerge. According to the slack resource view, managers consider investments in CE only if there are enough financial resources (Testa and D'Amato, 2017; Alexopoulos et al., 2018). Accumulated financial slack can help buyers achieve their primary performance goal, which would then allow buyers to invest the accumulated financial slack in CE commitments to meet expectations from broader groups of stakeholders (Lin et al., 2019). CE commitments can be a form of competitive advantage; in particular, CE initiatives are recognized as a critical source of competitiveness (Reuter et al., 2010; Hollos et al., 2012). Firms with greater financial slack have more managerial discretion and can more readily engage in CE initiatives than firms with lower financial slack (Orlitzky et al., 2003). The reason is that these initiatives, although often classified as discretionary expenditures, require advanced

capabilities and therefore rely greatly on the availability of excess financial resources (McGuire et al., 1990; Daniel et al., 2004; Chin et al., 2013). The high level of financial slack not only generates managers' willingness to shift focus to CE (Peng et al., 2010) but also makes buyer firms capable of affording the substantial efforts dedicated in CE initiatives (Perez-Batres et al., 2012). The success of such efforts is highly dependent on suppliers that provide raw materials (Wilhelm et al., 2016); an important component of CE initiatives is to develop suppliers' CE capabilities and improve their CE performance (Blome et al., 2014).

Therefore, it is reasonable to expect that the effects of buyers' financial slack on suppliers' CE performance vary depending on the level of slack. Up to a certain level, the buyer's financial slack harms suppliers' CE performance; beyond that point, however, the buyer's financial slack facilitates suppliers' CE performance. The nonlinear or curvilinear relationship is proposed in previous financial slack literature as a U-shaped relationship (Nohria and Gulati, 1996; Kim et al., 2008), although these studies focus on innovation performance and suggest an inverted U-shape. Thus, we hypothesize that:

H1. Buyers' financial slack will display a U-shaped relationship with suppliers' CE performance.

2.3. Moderating effects

According to the contingency theory (Donaldson, 2001), the relationship between slack resource and firm's performance may be influenced by multiple contingencies. There is a wide variety of contingency factors that have been examined by the extant literature, for example, market environment, industry discretion, geographical diversification, ownership structure and technology capability (Daniel et al., 2004; Kim et al., 2008; Bradley et al., 2011; Lungeanu et al., 2016; Symeou et al., 2019). Looking at the B2B relationship management research stream, we propose that relationship-specific contingencies, including buyer power, buyer technology capability and buyer-supplier geographical distance (Cannon and Homburg, 2001; Sanderson, 2009; Chicksand, 2015), may influence the effectiveness of buyers' financial slack.

2.3.1. The moderating effect of buyer's power

Power refers to the relative dependence between a firm and its partner (Anderson and Narus, 1990). It is generally considered important for understanding buyer-supplier relationships (Frazier and Antia, 1995; Cox, 2001). According to the notion of relative

power, if firm A depends on firm B more than firm B depends on firm A, then firm B has power over firm A (Pfeffer, 1981). In other words, high buyer's power means a high degree of supplier dependence on the buyer, and low buyer's power means a low degree of supplier dependence on the buyer. The use of power can influence access to resources (Ford et al., 2010), a firm's competitive advantages (Dyer and Singh, 1998) and finally performance (Benton and Maloni, 2005). The relative power of trading parties is decisive for the control and influence they exert in B2B relationships (Chen et al., 2021a). Thus, we expect the buyer's power to influence how the buyer's financial slack impacts suppliers' CE performance.

With limited financial slack, the buyer concentrates on its primary goal-profitability through expanding production and operations. This leads to acquisition of more raw materials from suppliers. Due to the high degree of power of the buyer, suppliers are more likely to adjust their production to the buyer's purchasing requirements by making substantial investments in production equipment (Buvik and Reve, 2002). In addition, cost reduction is also necessary for the buyer at this stage. With high bargaining power, the buyer more easily exploits suppliers by pressuring them for price reductions, non-cost-related payments or discounts, extended payment terms and warranty periods (Emiliani, 2003). Because of the high degree of dependence on the buyer, suppliers have to make price concessions and partially sacrifice their financial benefits (Schleper et al., 2015). Both investing in production and making price concessions reduce suppliers' financial resources. As financial resources are considered to be effective in improving CE performance (Amato and Amato 2007; Brammer and Pavelin, 2008; Chen et al., 2017), suppliers' CE performance can be negatively affected.

In contrast, with the increased financial slack, the buyer is more capable of engaging in CE initiatives and developing suppliers' CE capabilities through, for example, green procurement and green supplier development (Blome et al., 2014). A high level of buyer power can facilitate both of these aspects. First, because of the high degree of dependence on the buyer (i.e., high buyer's power), suppliers are more willing to fulfil the buyer's green procurement demands through, for example, the design of products for disassembly, recycling, waste reduction and obtaining ISO certificates (Blome et al., 2014). Second, high buyer power can be used as a tool to facilitate supply chain integration and collaboration (Maloni and Benton, 2000). This can benefit green supplier development by means of providing suppliers with capital for new investments in green technology, joint planning activities and close collaboration with suppliers on

CE matters (Krause and Scannell, 2002; Humphreys et al., 2004; Sauer and Seuring 2018). By doing either or both, suppliers' CE performance is enhanced. Therefore, we expect that:

H2. Buyer power positively moderates the relationship between buyers' financial slack and suppliers' CE performance, i.e., the U-shaped effect of buyers' financial slack on suppliers' CE performance is stronger with greater buyer power.

2.3.2. The moderating effect of buyer's technology capability

Technology capability is a firm's ability to acquire, deploy, combine and reconfigure technology resources in support of and enhancement of business strategies and work processes (Sambamurthy and Zmud, 1997). It involves three dimensions of capability: the technology infrastructure, the technology of human capital (e.g., experts), and technology-related intangibles (e.g., knowledge) (Grant, 1995). These three categories serve as firm-specific resources, which in combination create a firm-wide technology capability (Bharadwaj, 2000). Technology capability is a critical source of competitive advantage for firms (Dierickx and Cool, 1989; Nelson, 1991). The buyer's competitiveness facilitated by its technology capability does not only enhance its internal process of deploying resources but also influences the way it interacts with suppliers as well as suppliers' business processes (Makadok, 1991; Santhanam and Hartono, 2003; Hendricks et al., 2007; Wang et al., 2013). Therefore, we expect that a buyer's technology capability will influence the relationship between the buyer's financial slack and suppliers' CE performance.

With limited financial slack, the buyer tends to invest mainly in expanding production and operations. Under such condition, superior technology capability plays a critical role in helping streamline information flows within the firm and with key suppliers (Rabinovich et al., 2003; Melville et al., 2004; Shah and Shin, 2007; Hendricks et al., 2007). Technology infrastructure, such as electronic data interchange (EDI) and point-of-sale (POS) systems, increases the visibility of end-customer information between the buyer and its suppliers (Lee et al., 1997). Through the assistance of technology personnel, valuable information flows drive intangible organisational knowledge (Bharadwaj, 2000). This further facilitates joint efforts with suppliers, for example, collaborative planning, forecasting, and replenishment (CPFR) and vendor managed inventory (VMI) (Lee et al., 1997). The superior ability of the buyer to manage technology-based enterprise systems, such as enterprise resource planning (ERP), enables the buyer to coordinate business functions, such as

procurement, production, and logistics, with suppliers (Wang et al., 2013). All these factors facilitate better supplier engagement in the buyer's expansion of production and operations, which in turn further requires suppliers to invest more in adjusting their own operations to the buyer's business process (Stadler, 2009). Given the trade-off between operations objectives and CE performance (Ambec and Lanoie, 2008), suppliers' CE performance is likely to be further negatively influenced.

As financial slack accumulated, the buyer engages more in CE initiatives. Under such condition, the buyer's technology capability also plays an important facilitating role. This mainly reflects the buyer's human capital technology (e.g., experts) and technology-related intangibles (e.g., knowledge) dimensions (Fu et al., 2012). To develop suppliers' CE capabilities, the buyer tends to transfer green knowledge to suppliers in a variety of ways. It may transfer employees with CE expertise to suppliers, conduct CE evaluations of suppliers, provide feedback on suppliers' CE performance, implement CE training programs for supplier personnel, and give suppliers advice on technology, eco-design product development, green manufacturing, etc. (Sarkis 1999; Dunn and Young, 2004; Das et al., 2006; Williams 2006; Modi and Mabert, 2007; Wagner and Krause, 2008; Lawson et al., 2009). Suppliers' CE performance, finally, is enhanced. Therefore, we hypothesize that:

H3. Buyers' technology capability positively moderates the relationship between buyers' financial slack and suppliers' CE performance, i.e., the U-shaped effect of buyers' financial slack on suppliers' CE performance is stronger with greater buyers' technology capability.

2.3.3. The moderating effect of buyer-supplier geographical distance

The geographical distance between a buyer and its suppliers may also influence the pursuit of performance (Qian et al., 2010). The Chinese firms examined in this study are located in a country with a vast territory and huge regional differences (Ma et al., 2013). It is important to take into consideration the influence of geographical distance between Chinese firms (Tsai et al., 2019)—the Chinese buyer and its Chinese suppliers. Short buyer-supplier geographical distance refers to the proximity or colocation of the buyer and its suppliers. Proximity or colocation with suppliers is an important dimension of supplier relationship management and can influence the buyer's interaction with its suppliers (Mamavi et al., 2014). Therefore, we expect the buyer-supplier geographical distance to influence how buyers' financial slack impacts suppliers' CE performance.

Under the condition that buyer focuses on expanding production and operations due to its limited financial slack, the short geographical distance from suppliers can promote the expansion in two ways. First, a short buyer-supplier geographical distance reduces the cost of coordination, distribution, administration and logistics as well as decrease the complexity of management and negotiation (Williamson, 1985; Eisingerich et al., 2012). This further provides the buyer with more financial slack resources, which can be deployed to support the expansion of production and operations. Second, a short distance from suppliers facilitates efficient communication between the buyer and its suppliers (Qian et al., 2008; Arregle et al., 2009) and a more face-to-face mode of communication (Cannon and Homburg, 2001). The buyer's close communication and interaction is likely to make suppliers adjust their operations more quickly by maximizing resource utilization. Due to the trade-off between operational objectives and CE performance, suppliers' CE performance tends to be negatively influenced more quickly.

However, as financial slack accumulated and the buyer engages more in CE initiatives, being located a short distance from suppliers exerts a facilitating role in developing suppliers' CE capabilities. This is because a vast territory, such as China, is characterized by huge regional differences, including institutional development, CE policy and living standards and styles (Ma et al., 2013; Zhou et al., 2017). This implies heterogeneous production manners and CE issues across locations (Tsai et al., 2019). Colocation with suppliers implies that the buyer is familiar with local CE issues and standards and therefore is able to better support suppliers in developing their CE capabilities accordingly. Suppliers' CE performance can be finally improved. Thus, we hypothesize that:

H4. Buyer-supplier geographical distance negatively moderates the relationship between buyer's financial slack and suppliers' CE performance, i.e., the U-shaped effect of buyer's financial slack on suppliers' CE performance is stronger with a shorter buyer-supplier distance.

Fig. 1 shows the overall research model.

Insert Fig. 1 Here

3. Research design

3.1. Sample and data

Our sample included buyer-supplier dyadic relationship firms that were listed on the A-share markets of the Shanghai and Shenzhen Stock Exchanges in China from 2006 to 2018. The dyadic firm sample are collected from the CSMAR database (www.gtarsc.com), which identifies pairs of suppliers and buyers. The listed firms are chosen for two reasons. First, listed firms are often influential firms, which are considered to have more significant impact on corporate responsibility issues and should implement more CE related behaviours (Lynch-Wood and Williamson, 2007). Second, financial data of listed firms that are recorded in stock market databases are more objective and authentic than data of non-listed firms that may be obtained in various ways (Gligor et al., 2021). We chose 2006 as the starting year because the CE performance data from the database is available starting in 2006. After removing special treatment firms as well as firms with missing performance data, the final sample included 290 paired buyer-supplier firm-year observations.

3.2. Measures

Dependent variable. A firm's CE performance data were obtained from the Chinese Research Data Services Platform (CNRDS, www.cnrds.com), which is similar to the Kinder, Lydenberg and Domini database. There are strengths (positive initiatives) and concerns (controversies) in measuring CE performance in the database; each item is coded 1 if the firm has demonstrated this initiative and 0 otherwise.

At the firm level, CE mainly focuses on four aspects: eco-design, cleaner production, product recycling and compliance with government regulations on CE (Su et al., 2013; Ghisellini et al., 2016). For eco-design and product recycling, there is separately only one item to measure, i.e., whether the firm has demonstrated this initiative. Cleaner production is a strategy to reduce damage for humans and the environment by addressing the generation of pollution and the efficient use of resources towards processes, products and services (Su et al., 2013). Hence, we used the reduction of three wastes, energy conservation, and green office to measure cleaner production. For the governmental CE regulations, they mainly include policies, information platforms and other strategies and actions (Su et al., 2013). As Ghisellini et al. (2016) point out, the efficiency of CE strategies depends on the proactive policies by the government to stimulate societies to manage all resources in more sustainable ways; we thus used environmental recommendations by governments and environmental certifications to measure support.

Hence, we used eight items under the environmental category in the CNRDS database. i.e., eco-design, a reduction of three wastes, energy conservation, green office, recycling, environmental commendation, environmental certification, and other strengths, to measure CE performance strengths. Correspondingly, there are three items of concerns under the environmental category: environmental penalties, pollutant discharge and other concerns. As in previous research, we subtracted concerns from strengths to measure overall CE performance (Performance) (e.g., Flammer, 2015; Yuan et al., 2019).

Independent variable. Our key independent variable was financial slack (Slack). We measured it by the current ratio (current assets divided by current liabilities) (Tabesh et al., 2019; Symeou et al., 2019), which represents the firm's ability to meet its immediate obligations with untapped but available resources (Daniel et al., 2004).

Moderating variables. There were three moderating variables: buyers' power (Power), technology capability (TC) and buyer-supplier geographical distance (GD). According to previous research, buyers with power in the partnership may obtain favourable trade terms, such as credit terms and delivery arrangements (Pulles et al., 2014; Skilton, 2014), and may substantially reduce inventory (Mchugh et al., 2003). As Kim and Davis (2016) point out, if a buyer can shift some of its inventory tasks to the supplier because it is more powerful than the supplier, higher inventory turnover will be observed within the buying firm. Hence, a buyer's power over its suppliers is expected to be captured in its inventory turnover. Thus, following Dickinson and Sommers (2012) and Kim and Davis (2016), we used the inventory turnover ratio (the ratio of operating costs to the average inventory) as a proxy for buyers' power. In this study, we used data envelopment analysis (DEA) to estimate buyers' technology capability in terms of its technical efficiency relative to peers in transforming R&D input into valid patent output (Fung and Michael, 2017). For buyer-supplier geographical distance, we used the straight-line distance between the two cities in which the buyer and supplier were located. Then, to narrow down the range, we used the logarithmic form of the distance.

Control variables. We included four firm-specific variables to control for other potential influences on suppliers' CE performance. First, we controlled for suppliers' firm size (Size), measured as the natural logarithm of a firm's total assets. This is because firm size may influence the adoption of green strategies and CE performance (Zhu et al., 2011, Liu et al., 2017). In addition, financial performance has been found

to be associated with CE performance. We used return on assets (ROA) to measure financial performance, which was calculated as operating income/total assets. Additionally, firms with higher financial risk may pay less attention to CE investments (Bhattacharya et al., 2020). We also controlled for firms' financial risk proxies using leverage (Leverage), which was defined as long-term debt scaled by total assets. In addition, suppliers' own financial slack (SSlack) may also be associated with CE performance. The relevant data were collected from CSMAR.

3.3. Model specification

To test the effect of buyers' financial slack on suppliers' CE performance as well as the moderating effects, we developed the following regression models to test our hypotheses. To capture the U-shaped pattern, we included the quadric term in the representation of Slack in Model 1. Furthermore, we added the terms Slack*M and $Slack^2$*M to capture the moderating effects in Model 2. In this study, we addressed endogeneity in two ways. First, to address omitted variables, we estimated our models using firm fixed and year fixed effects to avoid any common trend and unobservable firm-level heterogeneity in CE performance over time. Second, to address reverse causality, we allowed a one-year lag between the dependent variable (at t+1) and explanatory variables (t). The final model is specified as follows:

$$Performance = \beta_0 + \beta_1 Slack + \beta_2 Slack^2 + \sum_{k=3}^{6} \beta_k Controls_k$$
$$+ YearDummy + FirmDummy + \varepsilon \qquad (1)$$
$$Performance = \beta_0 + \beta_1 Slack + \beta_2 Slack^2 + \beta_3 M + \beta_4 Slack * M$$
$$+ \beta_5 Slack^2 * M + \sum_{k=6}^{9} \beta_k Controls_k$$
$$+ YearDummy + FirmDummy + \varepsilon \qquad (2)$$

where M in Model 2 represents the three moderators. Moreover, we mean-centered the variables prior to creating the interaction term in order to reduce potential multicollinearity.

4. Results

4.1. Descriptive statistics

Table 1 presents the descriptive statistics and correlation matrix of the variables used in the regression analyses. We winsorised all the continuous variables at the top and

bottom 1% of the dataset to control for the effect of outliers. Moreover, we conducted variance inflation factor tests for potential multicollinearity among the variables. The values for all predictors were < 5.5. Hence, multicollinearity was not a significant matter.

Insert Table 1 Here

4.2. Regression results

Table 2 shows the results for the U-shaped relationship and moderating effects. Our first hypothesis posits that buyers' financial slack should have a U-shaped relationship with suppliers' CE performance. Following Haans et al., (2016), a U-shaped relationship should meet three conditions: (a) coefficients are in the expected direction, (b) the slope must be sufficiently steep at both ends of the data range, and (c) the turning point of the U curve is located well within the data range. In our empirical estimation, Slack's main effect is negative ($\beta = -2.219$, $p < 0.05$), and its quadric term is positive ($\beta = 0.704$, $p < 0.05$), which satisfy the first condition. Next, analysis reveals a negative slope of the lower bound ($\beta_1 + 2\beta_2 X_{min} = -2.03$) and a positive slope of the upper bound ($\beta_1 + 2\beta_2 X_{max} = 5.00$), which meets the second condition. Lastly, the turning point, 1.576 (= -(-2.219) / [2*0.704]), is located within the data range (0.135 to 5.129). Therefore, the third condition was satisfied. Hence, these confirm H1.

The second to fourth hypotheses focus on the moderating effects, which were tested by using Model 2. In the fourth column, the results reveal that Power not only significantly interacts with Slack but also with its quadric term ($\beta = 9.973$, $p < 0.05$). In addition, in the sixth and eighth columns, we can see that TC and GD interact with Slack^2 ($\beta = 3.482$, $p < 0.1$, and $\beta = -3.106$, $p < 0.05$). These findings confirm H2-H4. Furthermore, to illustrate how the moderators affect the U-shaped relationship, we checked whether a shift in the turning point and the curve becomes flat or steep (Haans et al., 2016). For the Power, on the one hand, the value for $\beta_1\beta_4 - \beta_2\beta_3$ is negative ((-1.905) * 9.973 - 0.962 * (-2.899)), so the turning point will move to the left when the Power become higher. On the other hand, $\beta_4 = 9.973$ is positive, showing that a steepening occurs for this U-shaped relationships. Similarly, for the technology capability, the value for $\beta_1\beta_4 - \beta_2\beta_3$ is also negative ((-2.616) * 3.482 - 0.759 * (-3.631)), so the turning point will move to the left when the technology capability become higher. In the meanwhile, $\beta_4 = 3.482$ is positive, showing that a steepening occurs for this U-

shaped relationships. Unlike the former two moderators, buyer-supplier geographical distance exerts a negative moderating effect. For GD, the value for $\beta_1\beta_4 - \beta_2\beta_3$ is also positive ((-3.166) * (-3.106) − 1.111 * (1.377)), so the turning point will move to the right when the distance become higher. A flattening will occur for the U-shaped relationship curve since the $\beta_4 = -3.106$ is negative.

To gain further insights into the moderating effects, we plotted the effect of Slack on the CE performance for values of the moderating variable at one standard deviation above and below the mean. The plots are shown in Fig. 2. In support of H1, these graphs illustrate the underlying U-shaped relationship between buyers' financial slack and suppliers' CE performance. Moreover, the figures reveal that the slopes in the U-shaped relationship become much steeper as buyers' power or technology capability increases. In support of H2 and H3, buyers' power and technology capability exert positive moderating effects on the slack–performance relationship, which postulate that the effect of slack on performance is stronger when buyers possess greater power or technology capability. In contrast, buyer-supplier geographical distance exerts a negative moderating effect, which is highlighted by the fact that the slopes in the U-shaped relationship become much flatter as the distance increases.

Insert Table 2 Here

Insert Fig. 2 Here

4.3. Robustness checks

We performed two robustness checks to show that our findings on the U-shaped relationship and the moderating effects are robust. The results are present in Table 3.

4.3.1. Alternative measure of CE performance

There is emerging evidence that corporate social responsibility (CSR) strengths and concerns differ in terms of their latent constructs and information content, with some studies suggesting that they should not be combined in empirical research (Mattingly and Berman, 2006; Erhemjamts et al., 2013). We followed these studies and only used CE strengths to re-estimate our models. The first four columns in Table 3 show the results. Across the columns, the coefficients of $Slack^2$ are positive and significant. Furthermore, the three coefficients of the interaction term in columns 2 to 4 are also significant ($\beta = 7.944$, $p < 0.05$; $\beta = 4.126$, $p < 0.1$; $\beta = -2.814$, $p < 0.1$). These results show that our former results hold, indicating that our findings are robust to the CE

performance measure.

4.3.2. Alternative measure of financial slack

Some studies suggest that financial slack can also be measured by cash slack (Singh, 1986). Similar to Opler et al., (1999), we used the ratio of cash and cash equivalents to total assets minus cash and cash equivalents to measure slack resources. The last four columns in Table 3 show the results. Across the columns, the coefficients of $Slack^2$ are also positive and significant. As the results show, both a U-shaped relationship and the moderating effects are still supported.

Insert Table 3 Here

5. Discussion

As the world faces serious CE issues, many suppliers have embraced CE performance as an important opportunity to build a good reputation (Cronin Jr et. al, 2011). Previous research has found that a firm's slack resources affects its own CE performance. However, according to the viewpoint from B2B studies, the buyer is increasingly perceived as a value co-creator in today's buyer-seller relationships (Vargo & Lusch, 2008). How buyers' financial slack influences suppliers' CE performance is still unknown. In this study, we find a U-shaped relationship between buyers' financial slack and suppliers' CE performance by using Chinese listed buyer-supplier dyadic firms' data. Specifically, when the financial slack is limited, the suppliers' operations have to align with the buyers' objections to improving profitability, which would sacrifice CE performance to some extent. This echoes the findings in Stadler (2009) and Wang et al., (2013) that the activities between supply chains members are inter-related. As financial slack accumulated to a certain level, buyers shift their focus to conducting supplier development towards CE to meet expectations from broader groups of stakeholders. This eventually improves the CE performance of suppliers and enhances the competitive advantages of the whole supply chain. Extant studies of slack resource commonly suggest that firms will benefit from CSR if they have financial slack (e.g., Lin et al., 2019). We further add to this by revealing the varying effects of different level of financial slack.

Both the slack resources and buyer-supplier relationship literature suggest that to better leverage the benefits of slack, a supplier should examine its relationship with its customers. We, therefore, attempted to identify relationship-specific contextual factors

surrounding the U-shaped effect of buyers' financial slack. We find that the outcomes of a buyer's financial slack depend on at least three contingencies. First, the U-shaped effect is stronger the greater the buyers' power. Pulles et al., (2014) point out that buyers would use power to produce intended changes in the supplier's behaviour by deliberately controlling the reinforcements guiding the supplier's response. Hence, the application of buyer power results in the intended changes in the behaviour of the supplier (Ramsay, 1996), which would positively moderate the U-shaped relationship. Second, buyers' technology capability also positively moderates the U-shaped relationship. Suppliers' CE performance is more likely to benefit from higher buyers' technology capability because it enhances the efficiency of usage and deployment of slack resources (Hendricks et al., 2007; Wang et al., 2013). Finally, this U-shaped effect is stronger with a shorter buyer-supplier distance. This viewpoint is aligned with Mamavi et al., (2014) and Qian et al., (2010), in which the geographical distance between buyer and supplier may influence the pursuit of relationship performance by increasing their interaction.

5.1. Theoretical contributions

This study makes three important contributions to the literature. First, our study contributes to the B2B literature by highlighting the role of buyer-supplier relationship while pursuing CE improvement. Buyers' financial lack is found to be influential for their suppliers in the pursuit of CE. Through extending the examination of slack from an intra-organizational to an inter-organizational level, our study enhances the understanding of the antecedents of CE performance in the B2B context (Rant et al., 2020; Stegehuis et al., 2020; Närvänen et al., 2021). In the B2B literature, to the best our knowledge, no significant study has explored the extended effect of resources on stakeholders' performance. Our study differs from existing research in examining such interrelationship by further considering the buyer-supplier relationship. This is a unique contribution to the B2B literature.

Second, this study also adds to the understanding of organizational slack studies by distinguishing the level of slack and revealing a U-shaped relationship between different level of slack and corresponding performance implications. Although attention has been given to the relationship between financial slack and firm performance, the results are inconsistent (Symeou et al., 2019). The U-shaped relationship provides a new perspective for slack–performance relationship research

and a theoretical basis for suppliers to use buyers' financial slack as a strategic option. In addition, existing studies of slack resources are mainly used to explain different organisational phenomena, such as influencing firm performance, organisational innovation, human capital investment, alliance formation, new product introductions and competitive releasing strategies (e.g., Natividad, 2013; Zhang et al., 2020; Guo et al., 2020), but are rarely used to explain the corporate responsibility behaviour. Given this, another academic significance of our study is that we innovatively combine these two variables and examine their relationship.

Third, this study also extends emerging research on the contingent effect of slack resources. While recent work has called for more research examining the contingencies of slack resources (Symeou et al., 2019; Guo et al., 2020), empirical work in this area is scarce. To the best of our knowledge, no prior studies have analysed the moderation effects of buyers' financial slack on suppliers' CE performance relationship in a B2B context. Our results show, for the first time in the literature, that the U-shaped relationship may be affected by some relationship-specific contextual factors. The relationship will become stronger under conditions of high levels of buyers' power and buyer's technology capability and weaker under long buyer-supplier geographical distance.

5.2. Managerial implications

Our research offers several implications for managers. First, this study suggests that suppliers should pay attention to the establishment of good relations with buyer firms when pursuing CE performance. The result shows that it is not sufficient for managers to exclusively focus on their own resources and activities to improve CE performance (Murray et al., 2017). Managers also need to be keenly aware of the financial situation of their key buyers, paying particular attention to the level of financial slack. This is because only buyers with a high level of financial slack are likely to invest in the development of suppliers' CE performance, and good relations with buyers can help disclose such information (Villena and Craighead, 2017). Meanwhile, from the buyers' perspective, managers should be aware that excess financial resources cannot simply contribute to the nonfinancial performance of business partners (Guo et al., 2020); the improvement of suppliers' CE performance may be a result of levels of financial slack. Therefore, to determine the beneficial level of financial slack, buyer firms are advised to measure suppliers' CE performance in a certain interval with increasing/decreasing

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levels of financial slack.

Second, the above finding is augmented in the B2B relationship characterized by powerful and technology-capable buyers. This is important, as it informs managers in supplier firms of the need to be more careful in building relations with buyers who are relatively powerful and have substantial technology capability. These buyers can be double-edged swords for supplier firms in the pursuit of CE performance. With a low level of financial slack, such buyers more easily take advantage of suppliers at a sacrifice of their CE performance, whereas with a high level of financial slack, such buyers may put more effort into developing and supporting their CE performance. This finding also informs managers of buyer firms, as their power and technology capability play an active role in managing the relationship between their financial slack and suppliers' CE performance. Before reaching the beneficial level of financial slack, they would be advised to pay more attention to the use of power and technology capability in their interaction with suppliers.

Third, the finding of the stronger U-shaped effect in a shorter buyer-supplier geographical distance suggests the colocation strategy for decision-makers in supplier firms that pursue CE performance (Jia et al., 2014). This is a very noteworthy finding for managers, as location decisions are relatively infrequent and highly important for firms. While supplying buyers with a high level of financial slack, suppliers are advised to locate their facilities geographically proximate to their buyers in consideration of CE performance. This may involve either maintaining current sites while adding another facility elsewhere or closing the existing facility and moving to another location (Heizer et al., 2017). The finding is also important for buyers. This highlights that managers of buyers should redeploy the highly accumulated financial slack strategically to continuously improve suppliers' CE performance by close communication and interaction with them.

Finally, according to our data, a firm's own financial slack, which acted as a control variable in the models, can have significant positive effects on its CE performance. This illustrates that possessing and taking advantage of financial slack is a viable option to improve CE performance.

5.3. Limitations and future directions

This study suggests the direction of improved studies in the future based on the following limitations. First, we only consider the most deployable slack—financial

slack. Future research could reveal additional insights by focusing on other slack resource effects, such as operational slack, human resource slack or technology slack, as well as explore their interaction effect. Second, our study only examines the impact of financial slack on CE performance. Future research could explore additional potential consequences of buyers' slack on buyer-supplier relationship performance, such as CSR performance, innovativeness and service quality. Third, we focus on buyers' power, technology capability and buyer-supplier distance as moderators. We do not address the moderating role from the suppliers' side. Further research could consider the role played by additional factors in deciding how to use slack resources, including a firm's structure and objectives, top management team characteristics or suppliers' capabilities. Adding these variables to our model in future studies would be interesting and significant. Additionally, we only choose the publicly listed firms as our sample, future studies – in particular based on primary data – could try to bring about the observed relationships in the current sample to smaller, private businesses to make a broader generalization.

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Table 1 Descriptive statistics and correlation matrix

Variables	Mean	SD	Performance	Slack	Sslack	Size	ROA	Leverage	Power	TC	GD
Performance	3.034	1.529	1								
Slack	0.795	0.585	-0.084	1							
Sslack	1.594	2.948	-0.136	0.089	1						
Size	23.569	1.677	0.373^{**}	-0.069	-0.452^{**}	1					
ROA	0.048	0.053	0.054	0.132	0.222^{**}	-0.104	1				
Leverage	0.506	0.197	0.189^{**}	-0.117	-0.579^{**}	0.405^{**}	-0.555^{**}	1			
Power	11.367	17.242	0.043	-0.047	-0.044	0.040	-0.040	0.054	1		
TC	0.010	0.071	0.027	-0.041	-0.005	0.114	0.013	-0.023	0.199^{**}	1	
GD	4.938	2.765	-0.030	0.066	-0.176^{*}	0.102	-0.135	0.190^{**}	-0.043	0.069	1

Notes: **Significant at the 5% level. ***Significant at the 1% level.

Table 2 Regression results

Variables	Model 1		Model 2		Model 2		Model 2	
Slack	-0.547	-2.219**	-2.141**	-1.905**	-2.142*	-2.616**	-2.184**	-3.166**
	(0.368)	(0.879)	(0.912)	(0.917)	(1.198)	(1.107)	(0.924)	(1.110)
Slack^2		0.704**	0.677**	0.962***	0.684*	0.759**	0.690**	1.111**
		(0.286)	(0.293)	(0.283)	(0.353)	(0.327)	(0.307)	(0.423)
Power			-0.004	0.071*				
			(0.045)	(0.041)				
Power*Slack				-2.899**				
				(1.181)				
Power*Slack^2				9.973**				
				(3.072)				
TC					-15.258	-30.064		
					(13.489)	(19.094)		
TC*Slack						-3.631*		
						(1.920)		
TC*Slack^2						3.482*		
						(2.013)		
GD							0.009	-0.061
							(0.059)	(0.062)
GD*Slack								1.377**
								(0.679)
GD*Slack^2								-3.106**
								(1.476)
Sslack	0.174***	0.182***	0.184***	0.172***	0.121**	0.115**	0.184***	0.185***
	(0.039)	(0.039)	(0.041)	(0.039)	(0.048)	(0.046)	(0.043)	(0.049)
Size	0.291**	0.323**	0.321**	0.312**	0.241*	0.241*	0.322**	0.354**
	(0.110)	(0.116)	(0.117)	(0.113)	(0.122)	(0.126)	(0.117)	(0.116)
ROA	9.463***	9.149***	9.167***	8.446***	10.797***	10.182***	9.205***	9.561***
	(2.659)	(2.476)	(2.496)	(2.478)	(2.106)	(2.153)	(2.577)	(2.587)
Leverage	4.315***	4.287***	4.342***	3.909***	3.553***	3.536***	4.287***	4.438***
	(1.059)	(1.042)	(1.074)	(1.122)	(1.035)	(1.002)	(1.050)	(1.111)
Constant	-4.388	-4.279	-4.259	-5.031	-2.374	-1.946	-4.352	-4.445
	(2.305)	(2.338)	(2.417)	(2.324)	(2.704)	(2.785)	(2.355)	(2.168)
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.2915	0.3031	0.3023	0.3308	0.2799	0.2884	0.3032	0.3120
N	285	285	276	276	211	211	285	285

Notes: *, ** and *** represent statistical significance at the 10, 5 and 1% levels, respectively. The robust standard errors are reported in parentheses.

Table 3 Robustness checks

Variables	Performance (Strengths)				Performance (Slack=Cash)			
Slack	-2.562**	-2.309***	-2.891***	-3.409***	-5.331***	-3.704*	-11.274***	-5.715**
	(0.843)	(0.877)	(1.057)	(1.060)	(1.783)	(1.946)	(3.867)	(2.388)
$Slack^2$	0.769**	0.988***	0.853**	1.133***	4.499***	2.745*	14.789***	5.630**
	(0.276)	(0.274)	(0.331)	(0.396)	(1.215)	(1.434)	(5.188)	(2.599)
Power	0.067*				-0.014			
	(0.040)				(0.041)			
Power*Slack	-2.027				-1.227*			
	(1.312)				(0.689)			
$Power*Slack^2$	7.944**				2.925***			
	(3.279)				(1.031)			
TC		-29.094				0.886		
		(21.210)				(21.560)		
TC*Slack		-3.905*				-10.659***		
		(2.103)				(3.687)		
$TC*Slack^2$		4.126*				20.333***		
		(2.103)				(7.076)		
GD			-0.054				-0.018	
			(0.061)				(0.060)	
GD*Slack			1.250*				0.369	
			(0.718)				(0.316)	
$GD*Slack^2$			-2.814*				-0.901*	
			(1.446)				(0.535)	
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	-4.499	-5.126	-2.149	-4.667	-3.806	-3.661	-2.787	-4.035
	(2.291)	(2.257)	(2.653)	(2.190)	(2.158)	(2.224)	(2.746)	(2.051)
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.3352	0.3574	0.3192	0.3426	0.3054	0.3241	0.3062	0.2961
N	285	276	211	285	285	276	211	285

Notes: *, ** and *** represent statistical significance at the 10, 5 and 1% levels, respectively. The robust standard errors are reported in parentheses.
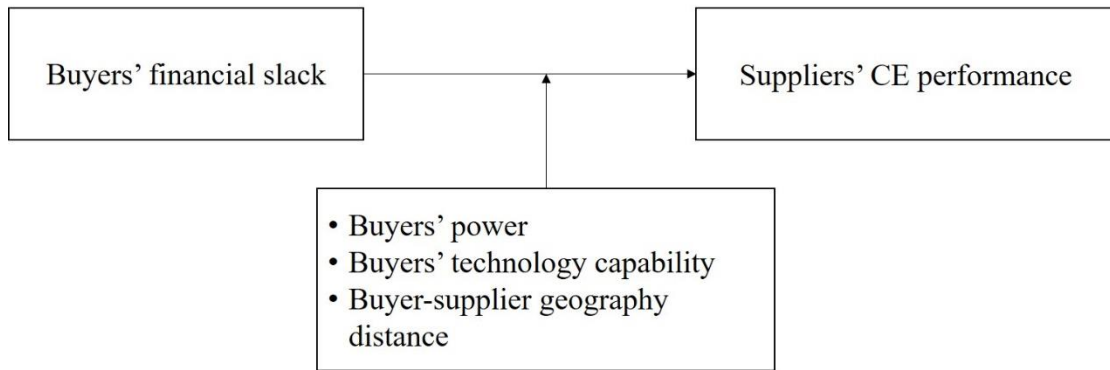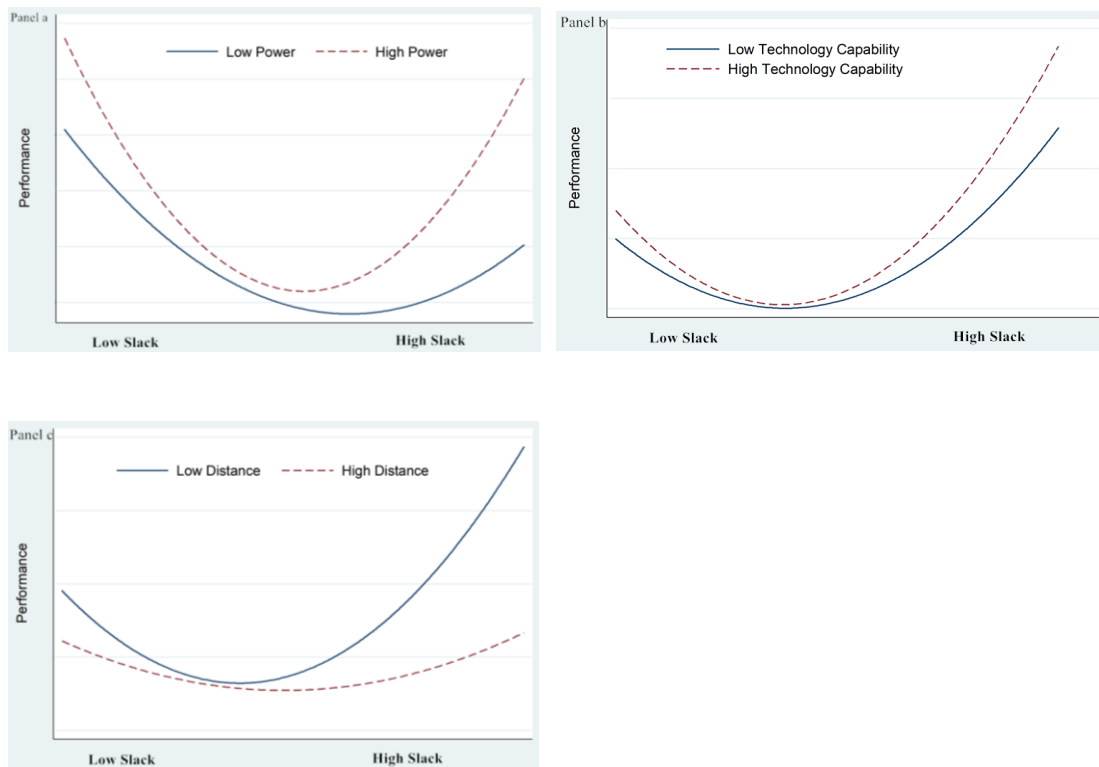
Fig. 1.   Research model

Fig. 2. Moderating effects (Panel a, buyers' power; Panel b, buyers' technology capability; Panel c, buyer-supplier geography distance)