The spillover effects of supply chain corruption practices on stock returns

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Abstract

Purpose: This study aims to explore the spillover effects of supply chain corruption practices (SCCPs) on stock returns along the supply chain and within the industry. Specifically, it investigates how SCCPs affect the stock returns of corrupt firms' bystander supply chain partners and industry peers, both of which are not involved in the SCCPs.

Methodology: We employ the event study methodology to quantify SCCPs' spillover effects in terms of abnormal stock returns. Our analysis is based on 117 SCCPs occurring in China between 2014 and 2021.

Findings: Our event study results show that SCCPs have negative effects on the stock returns of corrupt firms' bystander supply chain partners. Such negative effects are more pronounced for bystander buyers than bystander suppliers. However, SCCPs do not have a significant impact on the stock returns of corrupt firms' industry peers. Our additional analysis further suggests that SCCPs are more likely to affect the stock returns of domestic rather than overseas bystander supply chain partners.

Originality: This study is the first attempt to thoroughly examine the spillover effects of SCCPs along the supply chain and within the industry, advancing our understanding of the financial consequences of SCCPs and providing important implications for future research and practices related to supply chain corruption.

Keywords: Supply chain corruption, Event study, Stock returns, Spillover effects

1. Introduction

In recent years, there have been an increasing number of emerging market firms engaged in supply chain corruption practices (SCCPs) that involve offering and accepting bribes between buyers and suppliers (Silvestre *et al*., 2020). Taking China as an example, Millington *et al*. (2005) suggested that "70–80% of suppliers give advantages to purchasing staff in the form of vouchers or even ATM cards. This situation in China in this regard will not change for the next 10 to 20 years" (p. 261). Anecdotal evidence indicates that SCCPs have negative financial consequences for the firms concerned. For instance, DJI, one of the world's largest drone manufacturers, faced a loss of about one billion RMB in 2018 due to the corruption practices between its employees and suppliers (DJI Newsroom, 2019). Recent academic research has also documented SCCPs' negative financial consequences (Kim and Wagner, 2021; Silvestre *et al*., 2020). For example, Kim and Wagner (2021) found significant market penalties for firms involved in SCCPs. They further suggested that corrupt buyers suffer lower market valuations than corrupt suppliers when SCCPs are revealed.

However, SCCPs may affect not only the corrupt buyers and corrupt suppliers (i.e., the corrupt firms) but also other bystander firms that are not involved in the SCCPs but connected to the corrupt firms through supply chain relationships – a phenomenon commonly known as spillover effects (Kang, 2008; Xiong *et al*., 2021; Palkar, 2022). Although prior studies on organizational corruption have examined spillover effects through inter-organizational links such as industry ties and director interlocks (Paruchuri and Misangyi, 2015; Xu *et al*., 2006; Fich and Shivdasani, 2007; Kang, 2008), little is known about corruption's possible spillover effects in the supply chain context. In fact, we could not find any study investigating the spillover effects of corruption-related practices through buyer-supplier relationships. To fill this important gap, our research explores whether SCCPs may induce spillover effects along the supply chain, affecting the stock returns of corrupt firms' bystander supply chain partners.

Moreover, to provide a more comprehensive understanding of SCCPs' spillover effects, we also examine whether the negative effects of SCCPs spill over laterally to corrupt firms' industry peers, in addition to their vertical spillover effects along the supply chain (Pinto et al., 2008). Although prior corruption research has investigated intra-industry spillover effects (Paruchuri and Misangyi, 2015; Naumovska and Lavie, 2021; Palkar, 2022; Xu *et al*., 2006), the differences between SCCPs and organizational corruption make it questionable whether the findings documented in prior corruption studies can be applied in the supply chain context. In particular, SCCPs are inter-organizational corruption behaviors involving actors located within

a supply chain rather than corruption within or by an organization. Also, the financial harm caused by SCCPs is rooted in and may spread along the supply chain rather than across industry peers. Therefore, whether SCCPs' negative effects spill over within the industry remains an empirical question. Taken together, we seek to address the following questions in this research:

RQ1: How do SCCPs affect the stock returns of bystander supply chain partners that are not involved in the SCCPs but connected to the corrupt firms through buyer-supplier relationships?

RQ2: How do SCCPs affect the stock returns of industry peers that are not involved in the SCCPs but connected to the corrupt firms through industry ties?

To answer these questions, we follow prior spillover effect research (e.g., Ding *et al*., 2021; Xiong *et al*., 2021) and employ the event study methodology to quantify SCCPs' spillover effects in terms of abnormal stock returns. Our event study results based on 117 SCCPs occurring in China between 2014 and 2021 show that SCCPs have negative effects on the stock returns of bystander supply chain partners. Such negative effects are more pronounced for bystander buyers than bystander suppliers. However, SCCPs do not have a significant impact on the stock returns of corrupt firms' industry peers. Our additional analysis further suggests that SCCPs are more likely to affect the stock returns of domestic rather than overseas bystander supply chain partners. Overall, our research suggests that SCCPs' negative effects spill over vertically along the supply chain rather than laterally within the industry.

Our research makes several important contributions. First, it advances the nascent research stream on supply chain corruption by conducting the first investigation of SCCPs' spillover effects. Our study provides a more comprehensive understanding of SCCPs' financial consequences beyond their impacts on the corrupt firms documented in prior studies. Moreover, our investigation enriches the organizational corruption literature by illuminating how the negative effects of SCCPs spill over to bystander firms through buyer-supplier relationships, thereby extending beyond other inter-organizational ties that have been investigated in the literature. We also demonstrate how SCCPs' spillover effects are different along the supply chain and within the industry, challenging the applicability of prior organizational corruption findings in the supply chain context and encouraging researchers to study SCCPs to reveal new insights. Finally, the negative effects of SCCPs on bystander supply chain partners documented in our study suggest that these bystander firms are not viewed as "innocent" in the eyes of investors when corruption occurs in supply chains, urging firms to prevent not only themselves but also their supply chain partners from engaging in corruption activities.

2. Literature Review and Hypothesis Development

2.1 Conceptualization of SCCPs

Corruption is typically characterized by the presence of two parties, namely, the supply side and the demand side, where one party offers a bribe and the other party accepts it (Ashforth *et al*., 2008; Getz, 2006). Our research considers both the supply side and the demand side of corruption because the corruption data used in our research cover firms offering bribes as well as firms accepting bribes (further explained in section 3.2). In the supply chain context, buyers often hold more bargaining power than suppliers (Chae *et al*., 2017; Wagner *et al*., 2011). Consequently, suppliers as the supply side of corruption may offer bribes to buyers, or buyers as the demand side of corruption may demand bribes from suppliers to secure a contract or provide inside information on the bidding process. However, in certain scenarios, suppliers – particularly those with monopolistic power – may hold equivalent or even greater power over their buyers (Kim and Wagner, 2021). In such situations, buyers as the supply side of corruption may offer bribes to suppliers, or the suppliers as the demand side of corruption may demand bribes from buyers to secure goods or services. Nevertheless, we contend that the former scenario is more prevalent in practice because, like Kim and Wagner (2021), we found no cases of the latter scenario in our sample.

Therefore, we focus on SCCPs in which suppliers offer bribes to buyers to influence purchasing decisions, thereby obtaining unfair competitive advantages. These buyers then receive the bribes, forming a corrupt link. Additionally, Kim and Wagner (2021) introduced a supply chain view of corruption that includes upstream and downstream SCCPs. In our study, the corrupt suppliers were caught engaging in downstream SCCPs toward their buyers, and the corrupt buyers were caught engaging in upstream SCCPs toward their suppliers. Thus, we consider both upstream and downstream SCCPs in this research.

The enforcement process of a SCCP case could last for a long period and involve a few key stages. For instance, Karpoff *et al*. (2008) provided a comprehensive review of the enforcement process by the US Securities and Exchange Commission (SEC) and Department of Justice. They observed that the dissemination of corruption-related events to the market occurs in a specific sequence, starting with a trigger event, which is usually a press release initiated by the firm itself, private litigation or informal SEC inquiry, followed by a formal investigation. In a similar vein, Kim and Wagner's (2021) research in the US context included trigger events, investigation, regulatory, and resolution as the main stages of SCCPs.

In line with prior studies, we adopt a process perspective to investigate SCCPs but also take account of the special Chinese context being investigated in our research. Drawing on Karpoff *et al.*'s (2008) framework, our study centers on the typical sequence of events surrounding an enforcement action by Chinese legal systems and adopts the term enforcement action to signify the full sequence of related events for the firm suspected of engaging in SCCPs. According to the Criminal Procedure Law (CPL) of People's Republic of China enacted in 2012 (CPL, 2012), after a criminal case is filed, the enforcement process includes detention, arrest, prosecution, and judgment. Since we identify SCCP cases from the China Judgements Online (CJO) database, we are able to consider all these four key stages as the SCCP case process. In addition, since the disclosure of the verdict ("verdict," hereafter) is also a key information revelation after judgment, we regard this as the last stage of a SCCP case.

The five stages of detention, arrest, prosecution, judgment, and verdict are explained as follows. First, we regard criminal detention as the start of the enforcement action of SCCPs. In China, criminal detention occurs prior to arrest and is not equivalent to arrest under the Chinese legal system (McConville, 2011). The police are legally empowered to detain individuals who are suspected of being involved in criminal activity, particularly those who are major suspects (CPL, 2012, Article 113). After detention, criminal suspects and defendants who have evidence to prove the facts of the crime will be arrested (CPL, 2012, Article 113). Afterward, the police and the people's procuratorate will investigate the cases that meet the conditions sequentially. After the investigation is completed, if the people's procuratorate believes that the criminal facts of the suspect have been ascertained, the evidence is reliable and sufficient, and criminal responsibility should be investigated according to law, it shall decide to prosecute and file a public prosecution in the people's court (CPL, 2012, Article 160-161). After reviewing the case for prosecution, the people's court shall decide to hold a trial if there are clear facts (CPL, 2012, Article 181). The collegial panel shall make a judgment after trial (CPL, 2012, Article 180). Finally, the related verdict will be disclosed. In our event study, we consider a sample firm's abnormal return on each of the five stages to better quantify a SCCP case's overall stock price effect on the firm concerned (further explained in section 3.3).

2.2. Antecedents, Outcomes, and Anti-corruption Measures of SCCPs

A growing body of literature has started examining corruption in the supply chain context, which can be broadly categorized into three distinct research streams. The first stream concerns the antecedents of supply chain corruption. Silvestre *et al.* (2018), for instance, argued that stakeholder collaboration in highly volatile business environments can lead to opportunistic

behavior and corruption, particularly when combined with a conventional and profit-maximizing managerial approach. Arnold *et al*. (2012) explored the organizational-level factors that affect a firm's propensity to engage in corruption in the supply chain, such as organizational complexity, corporate culture, internationality, and functional complexity. Ntayi et al. (2012) investigated the relationship between moral schemas and corruption in public procurement from the perspective of public procurement staff.

The second research stream focuses on anti-corruption measures in supply chain management. For example, transparency can be utilized as a tool to combat corruption, promoting moral behavior in purchasing activities (Halter *et al.*, 2009). Two studies have also centered on anti-corruption measures in public procurement. Miroslav et al. (2014) introduced semantic technologies to enable data manipulation by machines, facilitating earlier recognition of potentially irregular procurements. Padhi *et al.* (2016) demonstrated that collusion in government procurement auctions could be substantially reduced by identifying the auction parameters in a system dynamics model.

The third research stream, which is more relevant to our research focus, deals with the outcomes of supply chain corruption. For instance, Silvestre *et al.* (2020) posited that supply chain corruption practices can have a significant effect on how supply chains are managed, potentially leading to mechanisms that circumvent sustainability standards and ultimately decreasing sustainability performance. Additionally, Kim and Wagner (2021) explored the stock price effects of supply chain corruption on firms involved in the corrupt practices. However, to the best of our knowledge, no study has examined the spillover effects of supply chain corruption. Therefore, our research aims to fill this research gap by providing a comprehensive investigation of SCCPs' spillover effects along the supply chain and within the industry, as discussed below.

2.3 Spillover effects of SCCPs along the supply chain

Recent supply chain research has studied spillover effects in supply chains through stock market reactions (e.g., Ding *et al*., 2021; Xiong *et al*., 2021). For example, Xiong *et al*. (2021) investigated the effects of environmental violations on the stock returns of the violators' supply chain partners, while Ding *et al*. (2021) focused on the 2016 Kumamoto earthquakes and documented how the earthquakes affected the stock returns of Chinese firms that were connected to Kumamoto-based Japanese firms via supply chain linkages. Consistent with these studies, we examine how SCCPs may affect the stock returns of corrupt firms' bystander supply

chain partners that are not involved in the SCCPs but connected to the corrupt firms through buyer-supplier relationships.

SCCPs may have negative effects on the stock returns of bystander supply chain partners as investors suspect that SCCPs may have been diffused along the supply chain (Bennett *et al.*, 2013). When a firm is found to engage in SCCPs, the existence of buyer-supplier relationships between the corrupt firm and other bystander firms may enable investors to generalize the corrupt firm's culpability to its bystander supply chain partners, leading to decreased stock returns for these bystander firms. Such a spillover effect can be understood from both the supply side and demand side perspectives. First, from the supply side perspective, investors may perceive that the corrupt supplier deploys bribes as a firm strategy to achieve its goals in buyer-supplier transactions (Xie *et al*., 2019). Bribery is therefore assumed to be acceptable within the organization and in accordance with its code of conduct, which is a result of organizational culture. The corrupt supplier is thus perceived to commonly use bribery as a tactic when dealing with its buyers. Therefore, even though the bystander buyers are not involved in the particular supply chain corruption case being disclosed, it is still likely that they are engaged in SCCPs with the corrupt supplier in other not-yet-disclosed instances. As investors take this risk into account, the bystander buyers' stock prices should drop accordingly.

Second, from the demand side perspective, when a buyer is found to engage in SCCPs, investors may assume that since the corrupt buyer has broken the law by accepting or demanding bribes from its suppliers, it may also accept or demand bribes from other bystander suppliers. This is particularly the case when the corrupt buyer has strong power in the buyer-supplier relationship (Chae *et al.*, 2017; Wagner *et al*., 2011). As a result, investors may perceive that the corrupt buyer also forces other bystander suppliers to engage in SCCPs, although such SCCPs have not been disclosed yet. Taken together, investors may expect SCCPs to be diffused to bystander supply chain partners through buyer-supplier relationships, affecting these bystander firms' stock returns negatively. Hence, we propose the following hypothesis:

H1: SCCPs have a negative effect on the stock returns of corrupt firms' bystander supply chain partners.

We have argued that SCCPs negatively affect bystander supply chain partners' stock returns, but the extent of the negative effects may be different for bystander buyers and bystander suppliers. Prior supply chain corruption research, although not focused on spillover

effects, also suggested that corrupt buyers and corrupt suppliers are punished differently by investors for their SCCPs. For example, Kim and Wagner (2021) found that investors react more negatively when buyers (rather than suppliers) are found to be involved in supply chain corruption. In line with prior research, we further examine the difference in stock market reactions between bystander suppliers and bystander buyers when SCCPs occur in their supply chains.

We posit that SCCPs have a more negative effect on the stock returns of bystander buyers (than bystander suppliers) because of their stronger power and higher visibility in the buyer-supplier relationships. Specifically, buyers have stronger power than suppliers in a typical supply chain setting (Chae *et al*., 2017; Wagner *et al*., 2011). This suggests that although both bystander buyers and bystander suppliers are expected to engage in corruption due to the diffusion of SCCPs along the supply chain, bystander buyers, with stronger power, should exert greater control over corruption than bystander suppliers. Investors may thereby attribute more responsibility to bystander buyers than to bystander suppliers, similar to what they did for corrupt buyers and corrupt suppliers suggested in prior research (e.g., Kim and Wagner, 2021). As a result, bystander buyers may be "punished" more severely by investors, leading to more negative stock returns.

Moreover, buyers, compared to suppliers, are more visible in a supply chain as they are closer to consumers and the public (Xiong *et al*., 2021). Thus, it is more likely that consumers and the public hold buyers accountable for the negative events occurring in their upstream supply chains. Anecdotal evidence has also suggested that downstream firms such as retailers are often blamed for the social and environmental issues occurring in their upstream supply chains, although the downstream firms are not directly involved in these issues (Hoskins, 2017; Chapman, 2018). By contrast, it is less likely that the less-visible, more-distant upstream suppliers are criticized by consumers and the public for the negative events occurring in their downstream supply chains (Kumar *et al*., 2019). Therefore, in our research context, consumers and the public may be more likely to hold bystander buyers (rather than bystander suppliers) accountable for the corruption activities occurring in their supply chains. As a result, bystander buyers' stock prices are more severely affected when investors take the evaluation of consumers and the public into account. Therefore, we propose the following hypothesis:

H2: SCCPs have a more negative effect on the stock returns of bystander buyers than bystander suppliers.

2.4 Spillover effects of SCCPs within the industry

We then focus on the spillover effects of SCCPs within the industry. Similar to our arguments about the spillover effects of SCCPs along the supply chain discussed above, investors may suspect that SCCPs have been diffused among industry peers, leading to negative stock market reactions for the industry peers even though they are not involved in the particular SCCPs being disclosed. Some prior studies, although not focused on the supply chain context, have also found that a firm's corruption-related practices have negative effects on the stock returns of its industry peers (Xu *et al.*, 2006; Paruchuri and Misangyi, 2015). For instance, Paruchuri and Misangyi (2015) documented that when a firm reveals financial misconduct, other firms in the same industry as the misconduct firm suffer lower market valuations. Jonsson *et al*. (2009) explained this phenomenon by suggesting that when the misconduct occurs, there is a "contagion of judgment from the culpable organizations to others the audience members see as related" (p. 196). When the audience members are investors, such a generalization process is mainly based on industry categorization (Paruchuri and Misangyi, 2015). Therefore, in our research context, when a firm is revealed to engage in SCCPs, the generalization of culpability suggests that investors expect all firms in the same industry category as the corrupt firm to engage in similar practices, leading to lower market valuations for all these firms.

However, the above view ignores the possible SCCP-induced competitive dynamics among firms operating in the same industry. In particular, when a firm is found to engage in SCCPs, its competitive position in the industry may be weakened due to potential legal penalties and reputational damage (Kim and Wagner, 2021). Moreover, because of reputational concerns, its existing customers and suppliers may switch to its competitors in the same industry while potential customers and suppliers may avoid doing business with the corrupt firm. This will reduce the corrupt firm's market share but also increase its sourcing difficulty. By contrast, the corrupt firm's industry peers may benefit from such customer and supplier switching and gain competitive advantages, resulting in positive stock market reactions. This suggests that as a result of the changing competitive dynamics between the corrupt firm and its industry peers following the disclosure of the SCCPs, the stock prices of the industry peers may move in the opposite direction (rather than in the same direction) of the corrupt firm's stock prices. Some previous studies in the non-supply chain context have also provided empirical support for this view (Goldman *et al.*, 2012; Naumovska and Lavie, 2021). For instance, Goldman *et al*. (2012) found that as a firm admits its financial misconduct, its industry peers gain an average increase of around $690 million in market value.

Therefore, there are two opposite views on how SCCPs may affect the stock returns of the corrupt firm's industry peers: one focusing on the diffusion of SCCPs to industry peers which may lead to negative stock market reactions, while the other emphasizing the competitive advantages gained by industry peers which may result in positive stock returns. As a result, we propose two competing hypotheses:

H3a: SCCPs have a negative effect on the stock returns of corrupt firms' industry peers.

H3b: SCCPs have a positive effect on the stock returns of corrupt firms' industry peers.

3. Methodology

3.1 Research context

Our study focused on the SCCPs of publicly listed companies in China for three main reasons. First, companies are more likely to engage in bribery to achieve their goals when they are embedded in developing markets (Martin *et al.*, 2007; Tonoyan *et al.*, 2010; Zhou and Peng, 2012). In recent years, China has sustained rapid economic growth and is now one of the largest economies in the world. The country has, however, experienced significant corruption since the reforms began in the late 1970s (Feng and Johansson, 2018). The observed facts between the incidence of corruption in commercial transactions and China's rapid economic growth provide an ideal context for investigating the effects of SCCPs. Second, the choice of Chinese publicly listed companies meant that their stock prices would be accessible, making it possible to determine the financial penalties arising from SCCPs. Third, there is a growing call for investigating the financial outcomes of SCCPs in emerging markets as the perception of SCCPs could be different from that in developed markets (Kim and Wagner, 2021). In line with this call, our study focused on Chinese listed companies.

3.2 Data collection

Our study employed the following steps to identify publicly listed Chinese firms involved in SCCPs (i.e., corrupt firms), and their associated bystander supply chain partners and industry peers in China. First, the dataset of SCCPs was compiled from the CJO database. As CJO is a government institution, the court verdicts in criminal cases relating to Chinese firms are publicly disclosed. An important advantage of this database is that the court verdict announcements provide fruitful information about SCCPs (e.g., detailed information about the companies involved and exact event dates) which allows us to precisely identify the firms involved in SCCPs. Following the study of Kim and Wagner (2021), a combination of SCCP-related keywords was used to search the CJO database for court verdict announcements related

to SCCPs. The search input used was (suppl* OR buyer* OR purchas* OR procurement OR bid* OR tender*) AND (extortion OR bribe* OR kickback* OR benefit fees). The initial search identified 1798 court verdict announcements related to SCCPs over the period 2007 to 2021.

We then carefully read each court verdict announcement and used the following three criteria to identify the firms involved in SCCPs: (1) The announcements should refer directly to corruption issues occurring among supply chain parties (e.g., bribe-offering by supplier companies or bribe-taking by buyer companies). Announcements were excluded where corruption behaviors did not occur along supply chains or that involved unethical supply chain practices other than corruption. (2) At least one of the parties involved in SCCPs was a publicly listed firm on the Chinese stock market and not a private firm. This screening process resulted in a total of 117 publicly listed Chinse firms involved in SCCPs over the period of 2014 to 2021. The sample consisted of 91 corrupt buyers and 26 corrupt suppliers. Examples of court verdict announcements relating to SCCPs are shown below. Table 1 presents the descriptive statistics for the corrupt firms (i.e., corrupt buyers and corrupt suppliers) based on the year of court verdict announcements.

- The defendant, Xu Mou who served as a senior procurement manager in Huawei, received a benefit fee of RMB 1.16 million from Liu Mou who is the manager of Donghua Software Co., Ltd to include Donghua Software in the supplier list of Huawei.
- The defendant, Ma Mou, took advantage of his position as a buyer of Nanchang Oufeiguang Technology Co., Ltd. to accept bribes from the defendant Ning Mou, the deputy general manager in charge of sales of Shenzhen Hualin Circuit Technology Co., Ltd., a supplier of Nanchang Oufeiguang Technology Co., Ltd., totaling RMB 234,300.
- The defendant, Wang Guochao, during his tenure as a salesperson in the sales department of Hubei Fubon Technology Co., Ltd, offered RMB 370,000 bribes for defendant Zhang Jun, who was the manager of Xindu Chemical Compound Fertilizer Co., Ltd, a key buyer company of Hubei Fubon Technology.

---Table 1 about here---

We then identified bystander buyers of each corrupt supplier and bystander suppliers of each corrupt buyer through gathering the supply chain relationship data from the Bloomberg Supply Chain (Bloomberg SPLC) database, which has been frequently used in recent supply chain studies (e.g., Kim and Davis, 2016; Lam, 2018; Xiong *et al.*, 2021). However, Bloomberg SPLC only provides this data for publicly listed Chinese companies from 2018 onward. Thus,

only corrupt firms with SCCPs from 2018 to 2021 were used to identify their associated bystander supply chain partners. Specifically, the corrupt firms were matched with their first-tier bystander suppliers and bystander buyers listed on Bloomberg SPLC, according to the following two criteria: (1) The time for the search of bystander supply chain partners was set to agree with their corresponding corrupt firms' dates of verdict announcements. This approach ensured that the bystander supply chain partners had the stated buyer-supplier relationships with the corrupt firms when the SCCPs events occurred. (2) As our research aim was to quantify the bystander supply chain partners' stock returns in relation to SCCPs, only the bystander supply chain partners that were publicly listed on the Chinese stock market and had available stock data were included. We finally identified 304 bystander supply chain partners from Bloomberg SPLC, including 264 bystander suppliers and 40 bystander buyers. Table 2 presents the descriptive statistics for these bystander supply chain partners based on the year of court verdict announcements.

---Table 2 about here---

Finally, we identified corrupt firms' industry peers based on their industry codes indicated in the China Stock Market & Accounting Research (CSMAR) database. Specifically, obtaining each corrupt firm's industry code, we searched CSMAR and viewed all other firms with the same industry code as the corrupt firm as its industry peers. For two or more corrupt firms with the same industry code and event date, we only used one of them for identifying industry peers to avoid possible double counting issues. We also excluded all corrupt firms from the industry peer group to ensure that these industry peer firms were not involved in any SCCPs identified by our research.

3.3 Event study

We adopted the event study method (Ding *et al.*, 2018) to quantify the effects of SCCPs on the stock returns of corrupt firms' bystander supply chain partners and industry peers. This method has been extensively used by researchers to investigate the financial effects of various supply chain events, such as environmental violations (Xiong *et al.*, 2021) and corruption risk in supply chains (Kim and Wagner, 2021). The first step of the event study is to choose the event dates. As discussed in section 2.1, a typical SCCP case in China involves five key stages including detention, arrest, prosecution, judgment, and verdict. As we were able to identify the dates of these five stages from the CJO database, we viewed the dates of detention, arrest, prosecution, judgment, and verdict as the event dates for each SCCP case. Then, we calculated

the abnormal return (AR) to quantify the financial effects of SCCPs on each event date, which is the difference between a firm's actual stock return on the event date and its expected stock return (i.e., the value of the stock return in a no-SCCPs event scenario) on the same date, as shown in Equation 1.

$$AR_{it} = R_{it} - E(R)_{it}\,, \tag{1}$$

where AR_{it}, R_{it} and $E(R)_{it}$ are the abnormal, actual, and expected returns, respectively, for firm *i* on day *t*. Only the actual return can be observed in practice, we therefore relied on the Fama-French five-factor model, as shown in Equation 2, for estimating the expected return (Fama and French, 2015). The Fama-French five-factor model outperforms other traditional asset pricing models in explaining expected stock returns (Huang, 2019). We selected an estimation period covering 200 trading days, ending 11 days prior to the event date, denoted by (-210, -11) for estimating the expected return.

$$E(R)_{it} = a_i + b_i\left(R_{mt} - R_{ft}\right) + c_i SMB_t + d_i HML_t + e_i RMW_t + f_i CMA_t\,, \tag{2}$$

where R_{ft} is the risk-free return, R_{mt} is the market return, SMB_t is the size factor, HML_t is the book-to-market value factor, RMW_t denotes the profitability factor, and CMA_t indicates the investment factor. Data about firms' stock returns and the Fama-French five factors were collected from CSMAR.

After obtaining the abnormal return on each event date, we calculated the cumulative abnormal return (CAR) for each SCCP case, which involves summing the abnormal returns over the five event dates of detention, arrest, prosecution, judgment, and verdict, as shown in Equation 3. The CARs thus represent the overall or total financial impacts of SCCPs on firms' stock returns (Sood and Tellis, 2009; Wu *et al*., 2015). Finally, to reduce the influence of outliers, we used a combination of *t*-test and Wilcoxon signed-rank test to examine whether the average CARs pertaining to SCCPs were significantly different from zero.

$$CAR_i = ARD_i + ARA_i + ARP_i + ARJ_i + ARV_i\,, \tag{3}$$

where ARD_i, ARA_i, ARP_i, ARJ_i, and ARV_i are the abnormal returns of firm *i* on the event dates of detention, arrest, prosecution, judgement, and verdict, respectively.

When calculating the ARs and CARs for corrupt firms' industry peers, we followed prior studies (e.g., Erwin and Miller, 1998; Xu *et al.*, 2006) and adopted an industry portfolio approach. Specifically, we first obtained an equal-weighted average of the daily stock returns of all industry peers within the same industry. We then used the industry-level daily stock

returns, instead of the firm-level daily stock returns, to calculate the ARs and CARs for each industry based on Equations 1 and 3, respectively. This industry portfolio approach helps address the potential issues arising from the cross-sectional correlation among firms' stock returns in the same industry (Xu *et al.*, 2006).

4. Test Results

In this section, we present the event study results for testing our proposed hypotheses (H1 to H3). Specifically, in section 4.1, we first calculate the CARs for corrupt firms' bystander supply chain partners to test H1. Then, we perform a comparative analysis of CARs among bystander buyers and bystander suppliers to test H2. In section 4.2, we calculate the CARs for corrupt firms' industry peers to test H3. Finally, in section 4.3, we perform additional analysis to examine the impacts of SCCPs on the stock returns of corrupt firms and their overseas bystander supply chain partners.

4.1 Stock market reactions for bystander supply chain partners

Table 3 shows the stock market reactions for 304 matched bystander supply chain partners, consisting of 264 bystander suppliers and 40 bystander buyers. Specifically, Panel A in Table 3 presents the average abnormal return (AAR) on each of the five event dates for all bystander supply chain partners. It should be noted that the number of observations varied across event dates because we excluded bystander supply chain partners from an event date if they had confounding events (e.g., mergers and acquisitions, new product introductions, changes in board members, and dividend announcements) coinciding with this event date. This step helped ensure that the abnormal returns documented in our research were due to SCCPs rather than other confounding events (Ding *et al.*, 2018). The AARs are negative and significant ($p < 0.05$) on the dates of detention, arrest, prosecution, and judgment, based on both parametric and nonparametric tests. Yet, the AAR on the verdict date is not significant ($p > 0.1$). This finding is reasonable given that the final resolution for a SCCPs case has been achieved by the judgment date, which is one stage before the verdict stage. The verdict date is more related to summarizing and reviewing the entire SCCPs process rather than disclosing new information about the SCCPs case, thus leading to non-significant AAR on this date. Panel B of Table 3 presents the CAAR for all bystander supply chain partners over the five stages of SCCPs, which is negative and significant ($p < 0.01$). This finding indicates that, on average, bystander supply chain partners experience substantial stock price declines due to SCCPs, thereby supporting H1.

After examining the stock market reactions for all bystander supply chain partners, we divided the 304 bystander supply chain partners into (i) 264 bystander suppliers and (ii) 40 bystander buyers and examined the stock market reactions for these two groups separately. As shown in Panels C and D of Table 3, the CAARs for both groups are negative and significant at the 1% level over the five stages of SCCPs, which aligns with our previous finding. The test results also suggest that the CAAR is more negative for bystander buyers (-2.18%) than bystander suppliers (-1.08%).

Panel E in Table 3 further documents the CAAR difference between bystander buyers and bystander suppliers. The CAAR difference (-1.10%) between them over the five stages of SCCPs is significant ($p < 0.1$). In summary, our results indicate that the stock market penalizes bystander buyers more than bystander suppliers when SCCPs are found in their supply chains, supporting H2.

Given the relatively small sample size of bystander buyers ($N = 40$), we followed Barnes (2011) and conducted a power analysis to check the minimum sample size required for achieving the desired power. The power analysis result from the G*Power software suggests that the minimum sample size required for adequately explaining the magnitude of the mean difference between the two groups is 260. Our sample size for all bystander supply chain partners is 304, satisfying the minimum sample size requirement. Therefore, it is unlikely that our test results suffer from the small sample size concern.

---Table 3 about here---

4.2 Stock market reactions for industry peers

Table 4 presents the stock market reactions for corrupt firms' industry peers. It should be noted that *N* in Table 4 indicates the number of industry portfolios rather than the number of individual firms because we adopted an industry portfolio approach to address possible cross-sectional correlation among stock returns in the same industry, as explained in section 3.3. Panel A in Table 4 shows that the AARs for industry peers are not significant ($p > 0.1$) on the five event dates of the SCCPs process. Panel B in Table 4 further suggests that the CAAR for industry peers over the five stages of SCCPs is also not significant ($p > 0.1$). Basically, our research suggests that corrupt firms' industry peers do not experience significant stock market reactions when corrupt firms are found to engage in SCCPs. Thus, both H3a and H3b are rejected.

---Table 4 about here---

4.3 Additional analysis

After testing all proposed hypotheses, we conducted two additional event studies to examine the stock market reactions for corrupt firms and their overseas bystander supply chain partners, respectively. Table 5 presents the event study results for corrupt firms. First, Panel A in Table 5 demonstrates that the stock market reactions for corrupt firms are negative and significant on the dates of detention, arrest, prosecution, and judgment, but not significant on the verdict date. This pattern is similar to that for bystander supply chain partners. Second, as illustrated in Panel B of Table 5, the CAAR for corrupt firms across the five stages of SCCPs is also negative (-1.83%) and significant ($p > 0.01$). Overall, our test results suggest that SCCPs have an overall negative impact on the stock returns of corrupt firms, consistent with the findings documented in prior research (e.g., Kim and Wagner, 2021).

After identifying 92 overseas bystander supply chain partners of the corrupt firms from Bloomberg SPLC, we conducted an event study based on these firms and documented the test results in Table 6. Panel A in Table 6 reveals that the AARs for overseas bystander supply chain partners are not significant ($p > 0.1$) on all the five event dates of SCCPs, except based on the nonparametric test on the arrest date that is significant at the 0.05 level. Furthermore, the CAAR for overseas bystander supply chain partners across the five stages of SCCPs, although negative, is also not significant ($p > 0.1$), as shown in Panel B of Table 6. Taken together, these test results suggest that overseas bystander supply chain partners do not experience significant stock price decreases due to SCCPs.

---Table 5 about here---

---Table 6 about here---

5. Discussion and Conclusion

In conclusion, our study examines the spillover effects of SCCPs along the supply chain and within the industry. By analyzing 117 SCCPs occurring in China between 2014 and 2021, our event study results show that SCCPs have negative effects on the stock returns of corrupt firms' bystander supply chain partners. Such negative effects are more pronounced for bystander buyers than bystander suppliers. However, SCCPs do not have a significant impact on the stock returns of corrupt firms' industry peers. This finding indicates that neither the negative diffusion effect nor the positive competitive effect dominates in the intra-industry context, resulting in a non-significant spillover effect for the industry peers. Our additional analysis further suggests that SCCPs do not affect the stock returns of overseas bystander supply chain

partners, implying the possible inability of SCCPs to spill over across national borders. Below, we discuss the implications of our findings for both research and practice.

5.1 Implications for research

Our study contributes to the emerging literature on supply chain corruption. Although prior research (e.g., Kim and Wagner, 2021) has documented the negative effects of SCCPs on the stock returns of corrupt firms, little is known about how such negative effects may spill over to other firms that are not involved in the SCCPs but connected to the corrupt firms through buyer-supplier relationships. Our study, by investigating SCCPs' spillover effects along the supply chain, advances our understanding of SCCPs' financial consequences beyond their impacts on the focal firms. In particular, our research shows that SCCPs have a significant negative effect on the stock returns of corrupt firms' bystander supply chain partners, the magnitude of which is not statistically different from that on the corrupt firms ($p > 0.1$; not tabulated). This finding suggests that SCCPs' spillover effects along the supply chain is not trivial, which deserves more attention and investigation. Our study may inspire future research to further explore how SCCPs may affect other firms not involved in such practices. For example, future research can examine SCCPs' spillover effects beyond the first-tier bystander suppliers and buyers considered in our study, looking at how SCCPs may spill over in multi-tier supply chains.

Our study also enriches the literature on the spillover effects of corruption-related behaviors. Although prior studies have investigated spillover effects through various inter-organizational ties, such as industry ties, director interlocks, country-of-origins, and listing methods, minimal attention has been paid to the role of buyer-supplier relationships in spreading the negative impacts of corruption-related practices. Our study, by considering the supply chain nature of SCCPs, identifies the overlooked, yet important supply chain channel that can facilitate the transmission of the negative spillover effects. This finding may encourage researchers to re-examine whether other corruption-related practices also induce negative spillover effects through supply chain relationships. Moreover, different from prior studies that have documented either a positive or a negative intra-industry spillover effect (Goldman *et al*., 2012; Paruchuri and Misangyi, 2015; Xu *et al*., 2006), our research suggests that SCCPs do not have a significant effect on the stock returns of corrupt firms' industry peers. Such a difference suggests that researchers should not view SCCPs as yet another type of corporate corruption as SCCPs, with their supply chain nature, may exhibit spillover effects that are different from other corruption practices. Thus, future research may gain new insights by investigating how

SCCPs induce spillover effects through other channels such as director interlocks, country-of-origins, and listing methods that have been well studied in the corruption literature.

Finally, our research provides important implications for future event studies. Taking a process view on supply chain corruption, we identify five key stages and thus five event dates for a SCCP case. We then calculate a firm's abnormal return on each event date and sum the abnormal returns across the five event dates to represent the SCCP case's total stock price effect on the firm concerned. This calculation approach, compared with those focusing on a specific key stage or event date, provides a more comprehensive and accurate evaluation of a SCCP case's overall impact (Sood and Tellis, 2009; Wu *et al*., 2015). We believe our approach provides a valuable reference for future event studies investigating SCCPs and corruption practices in general.

5.2 Implications for practice

Firms may pay less attention to supply chain corruption if they are not involved in SCCPs. However, our empirical findings demonstrate that the negative effects of SCCPs could spill over to bystander firms through buyer-supplier relationships. Specifically, our research shows that on average SCCPs reduce the stock returns of corrupt firms' bystander supply chain partners by 1.23%, representing a drop of 1.07 billion RMB in market value. Although this percentage is smaller than that for the corrupt firms (i.e., 1.83%), such a difference in fact is not statistically significant ($p > 0.1$; not tabulated). This indicates that investors may view SCCPs as collective behaviors and suspect firms that are not involved in a particular reported SCCP case may still engage in other supply chain corruption activities if they are the supply chain partners of the corrupt firms. Firms thus should not only prevent themselves from becoming corrupt suppliers or corrupt buyers but also need to avoid doing business with firms that are involved in supply chain corruption. This is especially the case when firms are located in the same country as the corrupt firms since our research further suggests that SCCPs have a stronger spillover effect through domestic (rather than international) supply chains. This is because investors may perceive that SCCPs are more likely to be diffused among firms located in the same country rather than across different countries.

Interestingly, our research further shows that not all bystander supply chain partners are affected similarly by SCCPs. In particular, SCCPs have a more negative impact on the stock returns of bystander buyers than bystander suppliers. This suggests that investors are more likely to generalize culpability to bystander buyers than bystander suppliers when their

corresponding supply chain partners are involved in SCCPs. It is also more likely for consumers and the public to hold bystander buyers (rather than bystander suppliers) accountable for the corruption activities occurring in their supply chains (Hoskins, 2017; Chapman, 2018). As firms may have to decide the allocation of their limited resources to address supply chain corruption (OECD, 2016), our finding indicates that as bystanders, firms should allocate more resources to deal with the corruption activities in their upstream (rather than downstream) supply chains in order to minimize the negative financial impact.

Finally, consistent with the common belief that SCCPs should have negative financial consequences for corrupt firms, our additional test suggests that corrupt firms do suffer from their own SCCPs. Specifically, on average, SCCPs lead to a decrease of 1.83% in stock returns, or a drop of 1.19 billion RMB in market value, for each corrupt firm. This value is much higher than the typical amount of benefit fees or bribes received in supply chain corruption or the punishment inflicted by the court. Firms thus need to pay more attention to SCCPs because the negative financial consequences, as demonstrated in our study, may be much higher than expected.

5.3 Limitations and future research

Despite its novel findings, this study also has certain limitations. First, our sample size of corrupt suppliers is relatively small as it is rare for publicly listed firms to engage in SCCPs as the supply side due to strict regulations. Future research could increase the sample size by considering private firms, especially SMEs, and examining SCCPs' effects based on non-stock price data such as sales. Second, we only use corrupt firms that were involved in SCCPs after 2018 to identify their bystander supply chain partners as data on Chinese firms has been included in Bloomberg SPLC since 2018. This may have narrowed the scope of the original sample to some extent. Future research could explore other supply chain databases to investigate SCCPs' effects on bystander supply chain partners prior to 2018. Third, we only investigate firms' short-term stock price movements due to SCCPs, leaving an interesting avenue for future research to explore the possible long-term stock market implications. Finally, similar to the approach of Kim and Wagner (2021), we focus on cases where suppliers engaged in SCCPs as the supply side of corruption, offering bribes, kickbacks, and benefit fees to their buyers. We thus ignore a scenario (although it is rare) in which buyers may bribe their powerful suppliers to receive products, which may result in different spillover effects and are worth further investigation.

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Table 1. Descriptive Statistics of Corrupt Firms

Panel A: Firm Characteristics

Variable	Unit	Mean	Standard Deviation	Min	Max
Total Assets	Millions	78606.78	288947.23	433.33	2405376.00
Total Liabilities	Millions	40755.10	138756.54	29.43	1087616.00
Total Shareholders' Equity	Millions	37851.68	152110.82	64.58	1317760.00
Net Inventories	Millions	9676.98	30193.06	0.86	188223.00

Panel B: Top 10 Industries

Industry	Industry Code	Frequency	Percentage
Electrical Machinery and Equipment Manufacturing	C76	19	16.24%
Information Technology	G	18	15.38%
Raw Chemical Materials and Chemical Products	C43	9	7.69%
Computer Application Service	G87	8	6.84%
Retail Trade	H11	7	5.98%
Non-Ferrous Metal Smelting, Rolling, Drawing, And Extruding	C67	6	5.13%
Medicine Manufacturing	C81	6	5.13%
Special Equipment Manufacturing	C73	5	4.27%
Oil and Gas Extraction	B03	4	3.42%
Transportation Equipment Manufacturing	C75	4	3.42%

Panel C: Distribution Across Years

Year	Frequency	Percentage
2014	11	9.40%
2015	14	11.97%
2016	17	14.53%
2017	14	11.97%
2018	9	7.69%
2019	15	12.82%
2020	31	26.50%
2021	6	5.13%
Total	117	100%

Table 2. Descriptive Statistics of Bystander Supply Chain Partners

Panel A: Firm Characteristics					
Variable	Unit	Mean	Standard Deviation	Min	Max
Total Assets	Millions	758427.39	2786000.30	424.99	30109436.00
Total Liabilities	Millions	638026.32	2536904.70	40.95	27417432.00
Total Shareholders' Equity	Millions	120401.08	301426.10	146.75	2692003.00
Net Inventories	Millions	25929.89	72464.92	2.71	578917.63

Panel B: Top 10 Industries			
Industry	Industry Code	Frequency	Percentage
Electrical Machinery and Equipment Manufacturing	C76	37	12.17%
Information Technology	G	34	11.18%
Computer Application Service	G87	28	9.21%
Raw Chemical Materials and Chemical Products	C43	19	6.25%
Manufacture of Petroleum, Chemical, Rubber and Plastic Products	C4	16	5.26%
Special Equipment Manufacturing	C73	16	5.26%
Transportation Equipment Manufacturing	C75	16	5.26%
Wholesale and Retail Trade	H	16	5.26%
General Machinery Manufacturing	C71	12	3.95%
Civil Engineering Construction	E01	12	3.95%

Table 3. Event Study Results for Bystander Supply Chain Partners

Panel A: Average Abnormal Return (AAR) for Bystander Supply Chain Partners				
Event Day	*N*	AAR	*t*-statistic	*z*-statistic
Detention	272	-0.31%	-2.72***	-3.73***
Arrest	274	-0.35%	-3.07***	-3.81***
Prosecution	268	-0.52%	-3.30***	-2.74***
Judgement	279	-0.26%	-1.87**	-2.66***
Verdict	262	0.10%	0.55	1.01
Panel B: Cumulative Average Abnormal Return (CAAR) for Bystander Supply Chain Partners				
Event Window	*N*	CAAR	*t*-statistic	*z*-statistic
Five Stages	304	-1.23%	-4.82***	-4.59***
Panel C: Cumulative Average Abnormal Return (CAAR) for Bystander Suppliers				
Event Window	*N*	CAAR	*t*-statistic	*z*-statistic
Five Stages	264	-1.08%	-3.87***	-3.69***
Panel D: Cumulative Average Abnormal Return (CAAR) for Bystander Buyers				
Event Window	*N*	CAAR	*t*-statistic	*z*-statistic
Five Stages	40	-2.18%	-3.86***	-3.35***
Panel E: Comparison between Bystander Buyers and Bystander Suppliers				
Event Window	*N*	CAAR Difference	*t*-statistic	*z*-statistic
Five Stages	304	-1.10%	-1.45*	-1.31*

Notes: *$p < 0.1$, **$p < 0.05$, ***$p < 0.01$ (one-tailed tests).

Table 4. Event Study Results for Industry Peers

Panel A: Average Abnormal Return (AAR) for Industry Peers				
Event Day	*N*	AAR	*t*-statistic	*z*-statistic
Detention	101	0.06%	0.29	0.82
Arrest	102	0.04%	0.29	0.86
Prosecution	108	-0.22%	-1.18	-1.28
Judgement	108	0.03%	0.19	0.59
Verdict	106	0.17%	1.12	0.85
Panel B: Cumulative Average Abnormal Return (CAAR) for Industry Peers				
Event Window	*N*	CAAR	*t*-statistic	*z*-statistic
Five Stages	109	0.07%	0.19	0.48

Notes: *N* indicates the number of industry portfolios included in the event study.

Table 5. Event Study Results for Corrupt Firms

Panel A: Average Abnormal Return (AAR) for Corrupt Firms				
Event Day	*N*	AAR	*t*-statistic	*z*-statistic
Detention	100	-0.41%	-2.13**	-1.81**
Arrest	98	-0.49%	-2.43***	-1.73**
Prosecution	105	-0.51%	-2.80***	-2.76***
Judgement	105	-0.43%	-2.37***	-1.36*
Verdict	109	-0.24%	-1.09	-0.56
Panel B: Cumulative Average Abnormal Return (CAAR) for Corrupt Firms				
Event Window	*N*	CAAR	*t*-statistic	*z*-statistic
Five Stages	117	-1.83%	-4.41***	-3.83***

Notes: *$p < 0.1$, **$p < 0.05$, ***$p < 0.01$ (one-tailed tests).

Table 6. Event Study Results for Overseas Bystander Supply Chain Partners

Panel A: Average Abnormal Return (AAR) for Overseas Bystander Supply Chain Partners				
Event Day	*N*	AAR	*t*-statistic	*z*-statistic
Detention	82	-0.30%	-0.20	-0.99
Arrest	85	-0.34%	-0.94	-1.62**
Prosecution	84	-0.12%	-0.13	-0.42
Judgement	85	0.13%	0.36	0.66
Verdict	84	-0.31%	-0.64	-0.45
Panel B: Cumulative Average Abnormal Return (CAAR) for Overseas Bystander Supply Chain Partners				
Event Window	*N*	CAAR	*t*-statistic	*z*-statistic
Five Stages	92	-0.85%	-0.55	-0.87

Notes: *$p < 0.1$, **$p < 0.05$, ***$p < 0.01$ (one-tailed tests).