Firm Environmental and Social Sustainability in Supply Chains

by

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ABSTRACT

Firms have increasingly taken on the commitment to sustainability due to environmental and social concerns. Environmental and social sustainability can create firm value and social welfare through cost reduction and revenue growth. While indicating a desire to do more, firms face challenges while engaging with stakeholders in their supply chains – suppliers and consumers. Suppliers are key partners to achieve cost reduction while customers can be the driver for revenue growth. If firms do not overcome the challenges properly, such a win-win situation of both firms and their supply chain stakeholders may not exist. This dissertation aims to understand and suggest ways to overcome the challenges which firms and their supply chain stakeholders face while collaboratively pursuing sustainability.

In the first essay, I investigate the financial impact of a buyer-initiated supplier-focused sustainability improvement program on suppliers' profitability. The results indicate that a supplier sustainability program may lead to short-term financial loss but long-term financial gain for suppliers, and this effect is contingent on supplier slack resources. The second essay of this dissertation focuses on the consumers and investigates their reactions to two types of firm environmental sustainability claims – sustainable production versus sustainable consumption. The results indicate that firm sustainable consumption claims increase consumers' purchase, thus leads to larger firm sales, whereas firm sustainable production claims decrease consumers' buying intention, then result in smaller firm sales. Therefore, I show that, contrary to extant belief, firm environmental sustainability can decrease consumers' intention to buy. Finally, a firm may be impacted when some of its upstream or downstream stakeholders, or its own operations, are impacted by a natural disaster, which are becoming more frequent due to climate change. In the third essay I study the joint effect of market attention and donation timing on firm stock returns based on the experiences of firms who

donated to the 2017 Hurricane Harvey. I conclude that neither the first donors nor the followers can mitigate the negative stock returns due to disasters. However, firms who match their donation timing with market attention experience less negative stock market returns compared to other counterparts.

DEDICATION

I dedicate this work to my parents for their wholehearted support and trust.

I also dedicate this work to my four grandparents who are rejoicing for me from Heaven. I miss you all deeply.

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CHAPTER 1

THE BUYER MADE ME DO IT: BUYER SUPPLY CHAIN SUSTAINABILITY PROGRAMS AND SUPPLIER FINANCIAL PERFORMANCE

Abstract

Consumer awareness and government regulation have increased pressure for buying organizations (i.e., buyers) to improve the sustainability performance of their supply chains. In response, buyers have initiated supply chain sustainability programs, setting supplier goals for environmental impact reduction. Previous studies indicate that buyers benefit financially from the implementation of such programs. It is still unknown, however, whether suppliers also benefit financially. We posit that suppliers experience short-term economic loss and this loss is moderated by the supplier past environmental performance and operational slack. We tested our hypotheses using a panel dataset of 1202 suppliers. Our results show that Buyer Supply Chain Sustainability programs negatively impact suppliers' financial performance in the short term. This negative effect is more pronounced when suppliers have high capacity slack and high inventory slack. Interestingly, suppliers with high past environmental performance tend to experience greater financial loss. Our results also show that, in the long run, suppliers do eventually experience financial benefits from compliance with such programs.

Introduction

Consumers, investors, and activists are creating pressure on firms to make progress towards sustainability goals. Sustainability goals should encompass the performance of a buyer's suppliers as well since the majority of environmental and social impacts occur upstream from the manufacturer or service provider (Bové and Swartz, 2016; CDP, 2017). In the eyes of these stakeholders, buyers are responsible for ensuring that their suppliers are managing sustainability-related risks (Hartmann and Moeller 2014). As a response, buyers have developed supplier-focused sustainability programs to improve their suppliers' sustainability performance (termed Buyer Supply Chain Sustainability programs in this study). These programs communicate a set of sustainability requirements that suppliers are expected to comply with or aspirational targets they are to make progress towards.

For example, Unilever has developed mandatory requirements for its suppliers to be environmentally sustainable (Unilever 2018a), such as reducing the use of non-renewable material for soil amendments (Unilever 2018b). According to 3M, the implementation of its Buyer Supply Chain Sustainability (BSCS) program benefitted both 3M and its suppliers, led to increased environmental sustainability, and secured economically beneficial business relationships (Pivot EDM 2016). The financial outcomes of BSCS programs have received attention by empirical researchers (e.g., Sodhi and Tang, 2018). The literature shows that buyers generally benefit financially from suppliers' adoption of environmental practices (Tate et al. 2011), which is consistent with the broad literature of "it pays to be green" (Berchicci and King 2007).

In contrast, to date, little work has taken the perspective of the supplier (Narasimhan et al. 2008; Saunders et al. 2020); thus, the impact of BSCS programs on supplier financial performance is not clear. A few recent papers have examined the impact of BSCS programs

on supplier financial performance. By modeling suppliers' decisions on the level of sustainability to achieve, Saunders et al. (2020) claim that suppliers can benefit financially from their improved sustainability required by buyers, however, Villena and Gioia (2018) conclude that suppliers struggle financially to comply with buyers' requirements mainly because of the expensive costs of the investments needed for environmental practices. Hence, it is still unknown whether suppliers will experience financial loss or gains after being involved in BSCS programs. More so, a supplier may need to engage in multiple, different BSCS programs to satisfy multiple buyers, and these programs may not be aligned or synergistic with one another. Therefore, our first research question is: *Does the number of BSCS programs that a supplier is engaged in lead to greater short-term financial loss for the supplier?*

There may be variables that moderate this potential causal linkage. Specifically, a supplier's past environmental performance and a supplier's operational slack may moderate the negative relationship between BSCS programs and supplier financial performance. If a supplier's past environmental performance is low, it can achieve low implementation costs by harvesting the "low-hanging fruits" of sustainability. Likewise, a supplier may draw on slack resources to achieve implementation at a lower cost. Thus, our second and third research questions are: *How does a supplier's environmental performance/operational slack moderate the supplier's financial loss resulting from the implementation of BSCS programs?*

To answer our research questions, we used a large-scale empirical panel study. We collected data from the Thomson Reuters ASSET 4, Thomson Reuters Worldscope, Compustat NA & Global, and FactSet Supply Chain Relationship databases. Data from 2004 to 2017 is used, yielding 1202 total suppliers and 6624 total data points. In empirics, we address the potential endogeneity of BSCS programs by using two-step General Moment of Methods (2-step GMM) in which we employ proper instrumental variables.

Our results show that there is a negative relationship between the total number of BSCS programs a supplier must respond to and the supplier's short-term financial performance. Furthermore, supplier environmental performance, capacity slack, and inventory slack enlarge the supplier's financial loss due to BSCS programs. In other words, a supplier's financial loss is amplified if the supplier has high environmental performance, high capacity slack, and high inventory slack. In addition, we explored these effects over a longer time frame. We found that, on average, supplier financial loss would become financial gain in four years.

The remainder of the paper is organized as follows. Section 2 provides a brief review of the BSCS program background, followed by the literature review and hypothesis development. The empirical setting and data are described in Section 3. The analysis and results are provided in Section 4. We conclude with a discussion of the findings and contributions in Section 5.

Related Literature and Hypotheses

BSCS programs have become increasingly prevalent (Logic 2018; Thorlakson et al. 2018). Such a program consists of a set of sustainability requirements that a buyer expects its suppliers to comply with. These requirements may be process-oriented or outcome-oriented, in the form of a supplier code of conduct or key performance indicators, and serve as both guidance for suppliers and a framework to do supplier assessment (Klassen and Vachon 2003; Klassen and Vereecke 2012; Marshall et al. 2015). For instance, Unilever has developed environmental impact calculators for suppliers to assess their environmental improvements against stated environmental goals, such as water usage (Unilever 2018b). Unilever's requirements are applied to both future and existing suppliers identically, aiming at continuous environmental

improvements. As another example, 3M states in its Supplier Responsibility Code that "……Conformance to this Code is required to become or remain a supplier to 3M, anywhere in the world…If a supplier does not develop such a plan or fails to comply, 3M may move to terminate the business relationship…" (3M, 2019, p.4), which formally defines the mandatory nature of its BSCS program.

To assess the effectiveness of such programs, several buyers acknowledge suppliers' improvements in the area of environmental sustainability by giving selective supplier awards (3M 2020; Pivot EDM 2016; The Chain Magazine 2018). For instance, BASF, a chemical producer and long-time supplier of BMW, received BMW's Supplier Sustainability Award (BMW Group 2018). BASF achieved the best performance in CO_2 emissions in the report published by CDP and also developed solutions to help BMW reduce CO_2 emissions by an innovative integrated coating process during which the energy consumption of coating can be significantly reduced (BASF 2018). Both parties praised the effectiveness of the BSCS program and considered their business relationship as stable and beneficial.

Prior literature has investigated whether "it pays to be green" (PTBG) (Berchicci and King 2007). Studies generally show that a positive financial performance should result from the adoption of environmental practices (e.g., Chen and Ho, 2019; Flammer and Kacperczyk, 2015; Hart and Ahuja, 1996; Jacobs et al., 2010; King and Lenox, 2001; Klassen and McLaughlin, 1996). The literature also suggests that the adoption of BSCS programs benefits buyers financially (Rao and Holt 2005; Tate et al. 2011; Zhu and Sarkis 2004). The logic behind such a positive relationship is the minimized cost of sustainable operations resulting from cost-sharing with suppliers (Busse 2016) and increasing revenue resulting from the willingness of consumers to pay more for sustainably-produced products (Nielsen 2018).

However, potential economic benefits for suppliers who are involved in BSCS programs are unclear. Compared to buyers, the initial investments made by suppliers to comply with sustainable requirements are costly, which could postpone short-term financial benefits to long-term monetary gains (Ortiz-de-Mandojana and Bansal 2016). However, before getting there, suppliers need to maintain compliance during the short term to wait for the time when the initial costly investments can eventually be offset by long-term gains.

After conducting in-depth case studies of leading sustainable buyers' efforts on supplier sustainability improvement, however, Villena and Gioia (2018) concluded that, in fact, the scenario of suppliers not struggling with financial loss is the exception rather than the norm. During the interviews with suppliers, the authors found that suppliers cannot survive in the market if not keeping costs down, while full compliance with the requirements of sustainability improvements is too costly (Villena and Gioia 2018). In particular, they found that struggling suppliers tend to lack sustainability knowledge and have limited operational resources, which limits suppliers' ability to make proper investments on sustainability improvements to comply with buyers' requirements, which is consistent with Wiengarten et al. (2019). Therefore, whether suppliers struggle financially while complying with the requirements from BSCS programs remains unsure, and the situations vary among heterogenous suppliers. The disadvantageous position that suppliers often are in, compared to their buyers, does not imply that they are always worse-off with their investments on environmental sustainability. In their mathematical model, Saunders et al. (2020) found that a supplier could determine an optimal level of sustainability to match with buyers' perceived preference of supplier sustainability, therefore, maximize its expected revenue.

To conclude, the literature suggests that the adoption of BSCS programs is beneficial for buyers but is inconclusive with regard to suppliers. Despite these anecdotal and theoretical indications, we are unaware of any empirical work that expressly investigates suppliers' financial benefits following the adoption of BSCS programs. Further, the recent literature has acknowledged the important roles of supplier environmental performance and operational slack in the relationship between suppliers' financial performance and BSCS programs but has yet to provide an empirical investigation. Hence, we seek to address these gaps in the literature by conducting a large-scale empirical study to investigate the impact of BSCS programs on supplier financial performance, and the moderating effects of supplier environmental performance and supplier operational slack onto this main relationship.

For suppliers to comply with their buyer's BSCS programs, they must assess the gap between the BSCS requirements or goals and their current performance, design appropriate changes in product design or operations, implement the changes, report to the buyer, and maintain compliance to the program over time (Kroes et al. 2012). Costs to the suppliers can be accrued in two time periods. First, in planning and implementation, the supplier will expend time and money to create a solution that meets the needs of the BSCS program. For example, if the buyer requested a change to more sustainable packaging, then significant expenses could be incurred in not only design but also re-tooling and branding. Second, after the changes are made, the on-going operational costs for the supplier may be higher than what they were before the change. For example, if the buyer required that the supplier use an input material that was eco-certified, this could increase the cost of goods to the supplier. A particular requirement or goal may be impractical for the supplier, making it too expensive to implement and sustain (Jaffe and Palmer 1997; Kroes et al. 2012; Walley and Whitehead 1994) or too long to create payback (Rau et al. 2010).

Suppliers cannot expect these costs to be picked up by their buyers. A study by McKinsey & Company reveals that the willingness of buyers to pay for suppliers' sustainable operations is probably at minimum (Berg et al. 2019). According to their survey, one fifth of the interviewed sourcing executives are not willing to pay for suppliers' sustainable improvements at all. One third are expecting to accept an increase of 1 to 3 percent, while the remaining half of the respondents are willing to pay up to 5 percent.

It may be that after the improvements are made, operational costs to the supplier decrease. For example, a farmer who switches from a traditional to an organic farming approach may find that as they optimize operations around the new organic model, that operating costs decrease because of cost savings from not purchasing fertilizer. In this case, there may be a short-term loss of profit as implementation costs create negative cash flow in the short term. However, in the long term, there is financial payback, i.e., accumulated cost savings become greater than the implementation cost. A particular BSCS requirement may indeed have the potential to create cost savings. However, due to the mandated nature of the buyer program, some suppliers tend to symbolically comply with the mandated procedures (Haunschild and Rhee 2004). These procedures may not lead to the necessary knowledge that can penetrate the supplier's routines and practices, thus not result in critical competitive advantages that can offset the cost.

There is a chance that the changes which the supplier makes to comply with the BSCS programs could generate additional revenue for the supplier. If the supplier's compliance is differentiating from other competing suppliers, the buyer may increase business to them. On the other hand, suppliers may also confront a higher possibility of losing business from their buyers due to the conflicts between buyers' traditional purchasing targets and the new sustainable goals. As Villena (2019) summarized, the 65 procurement staff interviewed in her

study indicated that cost-savings, quality improvement, and on-time delivery are the top three priorities. To fulfill those priorities, some suppliers already have been operating overtime or under unsafe working conditions, then any sustainable goals can hardly be achieved (Pagell et al. 2014). Consequently, suppliers may not be able to comply with both traditional procurement and sustainable goals simultaneously. The mishandling of any of these purchasing targets could lead to a reduced business volume from buyers, which would harm the supplier's financial performance.

The changes made by the supplier may make the product or service more attractive to the buyer's customers, leading to increased sales or profit margin. In the organic farming example, the new organic product may get a price premium in the market. However, downstream market interest in sustainable product or service attributes is still low so that the actual revenue opportunity may be low. Even if it is not, suppliers may not be passed on the increased revenue from any price premiums that consumers are willing to pay the buyers (Whelan and Kronthal-Sacco, 2019; Nielsen Report, 2018).

Finally, most suppliers have more than one buyer, and any number of those buyers may have BSCS programs. Unless a supplier's multiple buyers agree on common BSCS requirements, which is uncommon, then as the number of the buyer programs increases, the total amount of investments required to comply with various buyer programs will also increase. There may also be mismatches between requirements that cause extra-normal expenditures or break economies of scale. For example, if two retailers differ in what they consider "chemicals of concern" within a personal care product, then the manufacturer may have to make two different products for the two retailers or create a common formulation that is not optimal.

In summary, a supplier will incur costs to plan and implement a solution that meets the needs of the BSCS programs. It may experience higher or lower operational costs once

the changes have been made. However, suppliers cannot expect these costs to be picked up by their buyer, so there may be a short-term financial loss. A BSCS program may have the potential to create cost savings, but mediocre implementation by the supplier leads to no cost savings. Supplier changes may create opportunities for revenue in downstream markets, but this increased revenue may not be passed onto the supplier. A buyer may send mixed messages about priorities, in which case the BSCS requirements will not get well-implemented and will not have a chance to decrease operating costs or improve revenue. Finally, implementation and operating costs are likely to increase as the number of BSCS programs that a supplier has to engage in increases. Thus, we hypothesize:

H1: *The number of BSCS programs implemented by a supplier is negatively associated with the supplier's short-term financial performance.*

When complying with the sustainable requirements or goals, the costs of implementation can be affected by a supplier's past environmental performance. When a supplier's past environmental performance is high, the efficiency of acquiring new sustainable know-how is high. Thus, the supplier may be able to quickly adapt and develop its resources to match the buyer's sustainable requirements without making excessive investments. In contrast, suppliers with little prior knowledge of environmental improvements might have to spend more time and investments to comply with the mandated requirements due to lack of internal knowledge concerning either what solution and changes are needed or how to implement the changes effectively (Su et al. 2015). Villena and Gioia (2018) show that suppliers tend not to address their environmental issues, mainly because of the lack of sustainability knowledge.

H2a: *A supplier's past environmental performance positively moderates the relationship between the number of BSCS programs and supplier financial performance. Suppliers with high environmental performance experience lower financial loss compared to suppliers with low environmental performance.*

On the other hand, high past environmental performance may preface an even higher cost of implementation. There is a learning curve associated with a firm's sustainable practices (Gittell et al. 2012). Therefore, high past environmental performance may indicate that the usefulness of existing knowledge on sustainability increases at a decreasing rate. Suppliers with limited experience of environmental sustainability can improve environmental performance by harvesting the "low-hanging fruits" at the early stage of the learning curve. However, it becomes progressively more difficult and costly to reduce environmental impact when suppliers' environmental performance improves (Flammer 2012). For instance, as a supplier gets closer to zero emissions, the more expensive it becomes to reduce pollution further or realize efficiency for such reductions (Florida 1996). Thus, suppliers with high past environmental performance may need to make even more costly investments to comply with buyers' requirements, thus leads to greater financial loss. Hence, we posit as an alternative to H2a:

H2b: *A supplier's past environmental performance negatively moderates the relationship between the number of BSCS programs and supplier financial performance. Suppliers with high environmental performance experience greater financial loss compared to suppliers with low environmental performance.*

Operational slack in the form of under-utilized internal resources, such as labor or tangible equipment, may alleviate some of the suppliers' financial loss due to buyers' requirements for sustainable improvements (Wiengarten et al. 2019). Operational slack can refer to three types of resources: finished-goods inventories (i.e., inventory slack), excess capacity (i.e., capacity slack), and cash-to-cash cycle (Bourgeois 1981; Hendricks et al. 2009;

Kovach et al. 2015). Cash-to-cash cycle measures the overall responsiveness of the firm's supply chain, an indicator of the supply chain leanness (Hendricks et al. 2009).

Operational slack serves as a buffer by helping firms absorb any variation to internal operations. As such, it enables a supplier's responses to changes in external requirements. Higher levels of resources provide the supplier with greater flexibility and a better understanding of external influences (Cyert and March 1963). Slack enhances a supplier's adaptability because a supplier's repertoire of strategic choices is more abundant, and thus this supplier can respond faster and more effectively than firms with limited resources (Berrone et al. 2013). Thus, slack-abundant suppliers facing external changes should be more capable of securing the necessary resources to deliver sustainability improvements. In contrast, suppliers with less operational slack have a reduced ability to change and have to "put out fires." Thus, we posit:

H3a: *A supplier's capacity slack positively moderates the relationship between the number of BSCS programs and supplier financial performance. Suppliers with high capacity slack experience lower financial loss compared to suppliers with low capacity slack.*

H3b: *A supplier's inventory slack positively moderates the relationship between the number of BSCS programs and supplier financial performance. Suppliers with high inventory slack experience lower financial loss compared to suppliers with low inventory slack.*

H3c: *A supplier's cash-to-cash cycle positively moderates the relationship between the number of BSCS programs and supplier financial performance. Suppliers with a long cash-to-cash cycle experience lower financial loss compared to suppliers with a short cash-to-cash cycle.*

The complete conceptual model is presented in Figure 1.

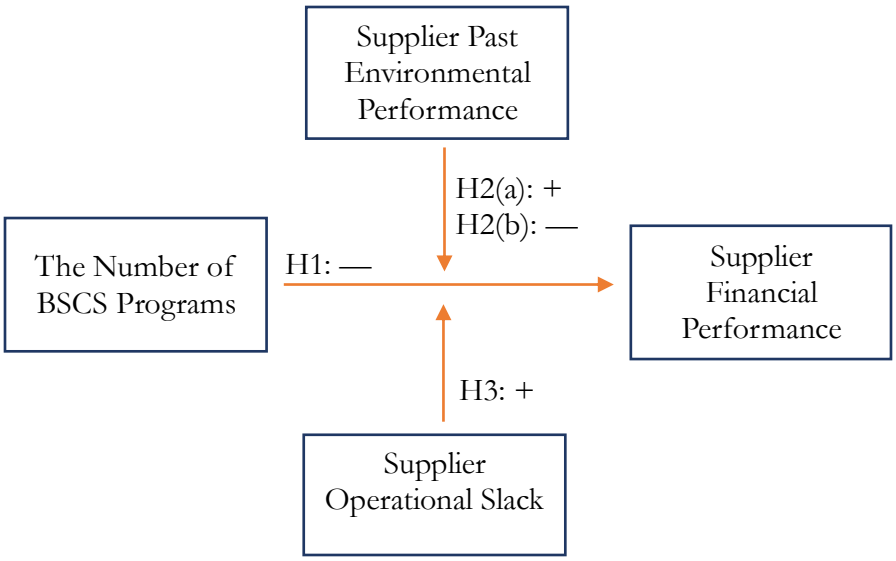


FIGURE 1: Conceptual Model

Data and Empirical Strategy

We collected buyer-supplier information from FactSet Supply Chain Relationship database (Factset 2018) from 2003 to 2017. The database covers more than 20,000, both domestic and international buyer-supplier relationships and is not limited to SEC reporting requirements[1]. Therefore, this dataset has a broader coverage of supply chain relationship compared to Compustat, which is based on SEC reporting only, thus has increasingly been employed in the literature (e.g., Chae et al., 2019; Wang et al., 2019).

Then each buyer was labeled to indicate whether it launched the BSCS program and matched its environmental sustainability performance from ASSET 4. This data source is widely used in the literature (Cheng et al. 2014a; Eccles et al. 2014; Ioannou and Serafeim 2012; Villena and Dhanorkar 2020). To construct the ASSET 4 dataset, Thomson Reuters

[1] The SEC's regulation SFAS No. 131 requires all US-listed firms to disclose their buying firms comprising more than 10% of their total annual sales. This methodology leads to limited buyer-supplier pairs for two reasons. First, the majority of the buyer-supplier pairs is missing because of the 10% threshold. Second, reported firms are limited to the US.

analysts collected information from annual reports, CSR reports, NGOs, and news releases for firms from over 50 countries. According to ASSET 4, every data point went through a multi-step verification process, including a series of data entry checks, automated quality rules, and historical comparisons to ensure validity and traceability. For these buyers, we further obtained the financial information from Compustat NA, Compustat Global, and Thomson Reuters Worldscope. As for each supplier, environmental sustainability performance, financial information, and country GDP were collected from World Bank, Compustat NA & Global, Thomson Reuters Worldscope, and ASSET 4. All financial information was measured in U.S. dollars.

For empirical validation, we consolidated the final dataset at the supplier level, encompassing 1,202 suppliers operating in 62 industry sectors, and 6,624 supplier-year observations over 14 years (2004-2017) from 48 countries. Table 1 presents the industry distribution of these suppliers.

TABLE 1: Firm Industry Distribution (Based on 2-digit Standard Industry Classification)

SIC	Industry Name	Supplier
01	Agriculture Forestry Fishing	1
10-14	Mining	106
15-17	Construction	47
20-39	Manufacturing	551
40-49	Transportation & public utilities	212
50-51	Wholesale trade	28
52-59	Retail trade	50
60-67	Finance insurance real estate	46
70-87	Service	149
99	Others	13

Consistent with prior studies (Jacobs 2014; Mackelprang et al. 2015; Wagner et al. 2012), we operationalized the dependent variable, the supplier's financial performance, as

supplier return on assets (ROA) to measure a supplier's short-run profitability. We calculated ROA as the ratio between supplier net income and total assets (Bharadwaj et al. 1999; Chung and Pruitt 1994; Modi and Mishra 2011; Villalonga 2004).

The number of BSCS programs (*Program*) for a specific supplier was counted as the total number of programs launched by buyers that are in the supplier's buying base. We define "buying base" as all buyers identified in the data for each supplier. *Program* is then the integer count of how many buyers in the buying base have a BSCS program. In our analyses, we used the natural logarithm of (*Program* + 1) to account for the skewness and potential economies of scale of suppliers' efforts in dealing with multiple BSCS programs because some requirements from multiple BSCS programs may overlap. Consequently, suppliers' efforts in the form of profitability loss for each program will decrease as the total number of programs increases. Further, to test the robustness of our analysis, we replaced the Ln (*Program*+1) with the count variable, *Program,* and found consistent findings.

Supplier past environmental performance (*Supplier ENV*) is a Z-Score to capture the overall supplier environmental performance by measuring one supplier's impact on living and non-living natural systems, including the air, land, water, as well as complete ecosystems, according to ASSET 4 codebook. To construct this indicator, several questions have been asked. For instance, does the company set specific objectives to be achieved on emission reduction? Does the company report on initiatives to recycle, reduce, reuse, substitute, treat,

or phase out any type of waste? To account for the differences in supplier environmental performance across industries, this variable was normalized at the 2-digit SIC industry level.

Supplier capacity slack (*Supplier Capacity Slack*) was measured by the ratio of annual sales to net property, plant, and equipment (SOP), then adjusted at industry-level by dividing the difference of SOP between each supplier and the industry mean by the industry mean (Hendricks et al., 2009). Hence, all else being equal, suppliers with high industry-adjusted SOP are likely to operate with little capacity slack (i.e., tight capacity usage). Second, supplier inventory slack (*Supplier Inventory Slack*) was operationalized as inventory days after being adjusted at the industry level, calculated as 365 times the ratio of the average of beginning and ending inventory to cost of goods sold (Hendricks et al., 2009). Lastly, supplier cash-to-cash cycle (*Supplier Cash-to-cash Cycle*) was calculated and normalized by dividing the difference between cash-to-cash cycle of the industry mean and each supplier by the sum of the industry mean of the inventory cycle, accounts receivable collection cycle, and accounts payable deferral cycle (Hendricks et al., 2009). Hence, a higher value of this industry adjusted cash-to-cash cycle is indicative of leaner supplier chains (i.e., higher efficiency of using liquidity). Following Hendricks et al. (2009), the three operational slack measures were centralized at the 2-digit SIC industry level. Since all three measures were centralized at the industry level, the estimations would be comparable across industries.

We incorporated several control variables to account for the heterogeneity at the country level, industry level, supplier level, and buying base level, respectively. As for country level, we incorporate Gross Domestic Product (GDP) per capita to control for the purchasing power of consumers in each country (*Supplier GDP*). Supplier Herfindahl-Hirschman Index (*Supplier HHI*) was used to control for industry competition, which was computed as the sum of squared market shares of all firms in the industry multiplied by one hundred. Suppliers in

competitive industries focus more on sustainable activities as an effective marketing strategy (Simmons and Becker-Olsen 2006). Therefore, the estimation of BSCS programs could simply capture the extent of market competition that impacts firm profitability (Hart 1983; Nickell 1996).

As for the supplier- level, we control for supplier size, which was measured by a supplier's total assets (*Supplier Total Assets*) (King and Lenox 2001). Supplier financial leverage (*Supplier Leverage*) is expected to affect supplier performance. A higher debt ratio implies a lower borrowing ability; thus, firms with high financial debt are more likely to default or go bankrupt (Bromiley 1991; Hendricks et al. 2009). We measured this by the ratio of debt to total assets (Barnett and Salomon 2012; Capon et al. 1990). Capital intensity (*Supplier Capital Intensity*), calculated by dividing capital expenditures by sales, can also impact supplier performance since capital-intensive firms possess capital assets such as plants, factories and equipment that are expensive and may require a longer time of use to produce an adequate return on investment (Miller and Cardinal 1994). Supplier market share (*Supplier Market Share*) is also a control, which represents leading positions of firms. Since leading firms tend to perform better, a percentage measure of market share at the 2-digit SIC level was used (Hendricks et al. 2009). For each supplier, the total number of buyers who indicate that they have not launched BSCS programs (*No Programs*) was incorporated in the model to capture the underlying reporting trend of buyers' decisions on BSCS programs.

At the buying base level, we followed Serpa and Krishnan (2017) and control for buying base diversification, buyer-supplier relationship tenure, and other buyer idiosyncratic characteristics, including buyer environmental performance, buyer capital, and financial leverage, as supplier performance can be impacted by buyer characteristics through contextual channels (Serpa and Krishnan 2017). Specifically, we measured buying base diversification by

calculating the entropy over all buyers of a supplier at each time period, calculated as [-Sum (p*log(p))], in which p is the probability of each buyer being in one industry for one supplier at one period (Jacobs and Swink 2011; Narasimhan and Kim 2002; Schommer et al. 2019). Buyer-supplier relationship tenure was calculated as the average relationship duration over all buyers of a supplier at one period. The same procedure was applied to buyer capital (i.e., buyer plant and equipment) and buyer leverage. In addition, we included firm fixed effects to account for any remaining heterogeneity.

All of the continuous variables are log-transformed, except for ratio-type variables. We provide a descriptive summary of the variables and data sources in Table 2 and the correlation table in Table 3.

To account for unobserved heterogeneity across firms, industries, and countries, we use panel data fixed effects models for both the base model (without moderators) and the full model (with moderators). The main econometric model for supplier *i* in year *t* is as follows:

$$\ln(ROA_{it}) = \beta_0 + \beta_1 * \ln(Program_{it-1} + 1) + \beta_2 * X_{it-1} + \zeta * W_{it} + \gamma_i + \epsilon_{it} \quad (1)$$

where $X_{i,t-1}$ is a vector of the variables of interest (moderators: *Supplier ENV, Supplier Capacity Slack, Supplier Inventory Slack, Supplier Cash-to-cash Cycle* and the interaction terms of moderators with *Program*). Prior literature indicates that the realization of bottom-line benefits for firms depends on the time-lagged effects of such programs (Dowell and Muthulingam 2017), which is usually reflected in one year. Therefore, we used one-year lagged $\ln(Program_{it-1} + 1)$ and one-year lagged environmental performance and three types of operational slack in the model.

(Table 2 and Table 3 on next two pages)

TABLE 2: Summary of variables

Variable	Description	Data source	Mean	Std. Dev.	Min	Max
Supplier ROA	Supplier Return on Assets (Log)	Compustat	1.150	0.028	0.657	1.473
Program	The number of BSCS programs (Log)	ASSET 4	0.973	0.784	0	3.932
Supplier ENV	Supplier Environmental Performance: Z-Score to capture the overall firm environmental performance by measuring "a firm's impact on living and non-living natural systems, including the air, land, water, as well as complete ecosystems." at 2-digit SIC industry level.	ASSET 4	0.123	0.573	-0.866	3.127
Supplier Capacity Slack	Supplier industry-adjusted ratio of sales to property, plant, and equipment	Compustat	-0.142	2.678	-0.999	104.34
Supplier Inventory Slack	Supplier industry-adjusted days of inventory	Compustat	-0.040	1.451	-1.470	52.575
Supplier Cash-to-cash Cycle	Supplier industry-adjusted cash-to-cash cycle	Compustat	-0.147	22.100	-1138.398	303.25
Supplier HHI	Supplier Herfindahl-Hirschman Index	Compustat	1.990	4.047	0.000001	99.936
Supplier Total Assets	Total assets (Log)	Compustat	9.085	1.458	3.452	13.928
Supplier Leverage	Ratio of debt to total assets	Worldscope	29805.1	502718.5	-1124.1	25500000
Supplier Capital Intensity	Ratio of capital expenditure to sales	Compustat	0.00003	0.00043	0	0.03347
Supplier Market Share	Supplier market share	Compustat	0.01520	0.03679	0.00000006	0.75324
No Programs	The number of reporting of no BSCS programs (Log)	ASSET 4	0.7728672	0.6293879	0	3.258
Supplier GDP	GDP per capita in suppliers' countries	World Bank	44920.47	15462.75	1101.961	118823.6
Buyer Diversity	Entropy of buying base	Compustat & FactSet	0.316	0.288	0	1.245
Duration	Average duration of buyer-supplier relationship	FactSet	6.026	3.314	1	17
Buyer ENV	Average buyer environmental performance	ASSET 4	67.347	23.292	8.72	97.16
Buyer PPE	Average buyer plant and equipment	Compustat	30881.5	46046.1	0	447337
Buyer Leverage	Average buyer financial leverage, ratio of debt to total assets	Worldscope	24222.1	252997.6	0.5754	7213206

TABLE 3: Correlation table

	Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	Supplier ROA	1																	
2	Program	-0.033	1																
3	Supplier ENV	0.005	0.092	1															
4	Supplier Capacity Slack	0.064	0.043	-0.041	1														
5	Supplier Inventory Slack	-0.034	-0.046	0.014	-0.045	1													
6	Supplier Cash-to-cash Cycle	0.003	0.022	-0.027	-0.107	-0.023	1												
7	Supplier HHI	0.015	-0.090	0.032	0.005	0.002	-0.010	1											
8	Supplier Total Assets	0.045	-0.068	0.405	-0.140	0.018	-0.026	0.048	1										
9	Supplier Leverage	-0.061	-0.025	0.017	0.001	-0.020	0.001	0.225	-0.013	1									
10	Supplier Capital Intensity	-0.080	0.008	-0.042	0.001	0.002	0.001	-0.006	-0.079	-0.001	1								
11	Supplier Market Share	0.013	0.088	0.000	-0.004	0.001	-0.007	-0.079	-0.016	-0.145	0.017	1							
12	No Programs	0.038	0.153	0.099	-0.008	-0.006	0.018	0.002	0.195	0.036	-0.012	0.065	1						
13	Supplier GDP	0.027	0.551	0.157	-0.014	-0.062	0.011	-0.040	0.119	0.009	-0.019	0.058	0.554	1					
14	Buyer Diversity	0.035	-0.043	0.215	0.011	0.008	-0.027	0.358	0.316	-0.015	-0.022	0.064	0.072	0.045	1				
15	Duration	0.067	-0.103	-0.130	-0.021	0.033	0.019	-0.013	-0.034	-0.013	0.002	0.104	-0.025	-0.207	-0.006	1			
16	Buyer ENV	-0.031	0.438	0.003	0.036	-0.048	0.015	-0.051	-0.167	-0.005	0.006	-0.045	-0.354	0.126	-0.085	-0.118	1		
17	Buyer PPE	-0.084	0.174	-0.014	-0.005	-0.072	0.003	-0.001	-0.050	-0.019	0.026	-0.020	-0.118	0.024	-0.032	0.005	0.326	1	
18	Buyer Leverage	-0.022	-0.036	0.042	-0.011	0.006	-0.0001	0.050	0.063	0.031	0.001	-0.010	0.014	-0.004	0.100	-0.005	0.016	0.004	1

W_{it} is included as a vector of control variables (*Supplier GDP, Supplier HHI, Supplier Total Assets, Supplier Leverage, Supplier Capital Intensity, No Programs, Buyer Diversity, Duration, Buyer ENV, Buyer PPE,* and *Buyer Leverage*). Since the panel covers 2004 to 2017, the 2008 financial crisis that caused widespread recession inevitably affected our firms. We included a dummy variable to account for the board impact of the recession, and the resulting negative coefficient confirms our suppliers were negatively impacted by that financial crisis. γ_i represents supplier fixed effects. ϵ_{it} is the remaining error term.

The *Program* variable can be endogenous due to unobservable factors. For example, a buyer's productivity may be associated with both the buyer's decision to launch a BSCS program and the suppliers' financial performance. Buyers with high productivity may be more likely to launch a BSCS program. Serpa and Krishnan (2017) showed that buyers' high productivity can spill over to their suppliers. In fact, suppliers with high productivity tend to perform better financially while undertaking sustainability improvements (Jacobs et al. 2016). It is also possible that buyers could predict potential supplier financial loss so that buyers may decide to co-invest with their suppliers to ensure the suppliers' economic viability (Economist Intelligence Unit 2017; Huq et al. 2016). In this case, the estimation of *Program* could simply reflect the buyers' financial aid to their suppliers. To ascertain this endogeneity concern, we followed the flowchart of Lu et al. (2018). We tested for endogeneity using the GMM distance test (the χ^2 statistic is 5.738, $p = 0.0166$), and the results lent support to the endogeneity of *Program*[2].

To account for this potential endogeneity issue, we used three instrumental variables for the *Program* variable: (1) lagged proportion of buyers from the countries of European

[2] GMM distance test is viewed as superior to the endogeneity tests of Durbin-Wu-Hausman test and Davidson-MacKinnon tests since the former does not require conditional homoscedasticity (Baum et al. 2003).

Union (proportion of buyers of EU among the whole buying base), (2) lagged proportion of buyers from countries of civil law systems (proportion of buyers of civil law countries among the whole buying base) and (3) the time of announcing the Directive 2014/95/EU (European Union, 2014) on supply chain sustainability reporting. We explain the rationale of including each instrumental variable as follows.

First, buyers headquartered at EU countries tend to operate in a high standard of supply chain sustainability (Lament 2015), thus are more likely to develop BSCS programs for their suppliers, thereby driving the total number of programs responded by suppliers. However, buyers' country orientations are not likely to directly impact supplier financial performance, satisfying the exclusion condition of instrumental variables.

Second, we also calculated the proportion of buyers whose headquarters are located in counties of civil law system. Liang and Renneboog (2017) found that firms of civil law countries tend to have higher sustainability performance than those of common law countries. We, therefore, expect this variable to be positively correlated with the total number of BSCS programs. To categorize the legal origin of buyers, we coded this variable based on La Porta et al. (2008). The distribution of country legal origin is illustrated in Figure 2. There is no reason to believe, however, that a buyer's choice of locating in a civil or common law country could have a direct effect on supplier performance.

(Figure 2 on next page)

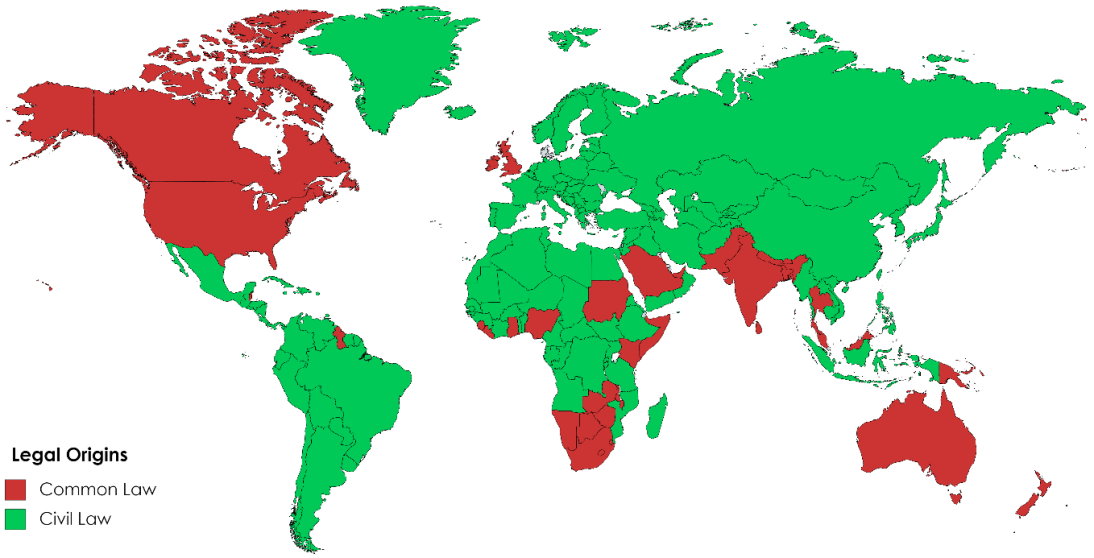


FIGURE 2: Legal origins around the world (adapted from La Porta et al. (2008))

To be ready to report supplier sustainability performance, buyers need to know their suppliers' activities of environmental sustainability and further minimize any potential adverse impact from suppliers to comply with the Directive 2014/95/EU, which would drive the total number of BSCS programs. However, this policy year decision is exogenous to the buyer and supplier relationship system. Therefore, it will not directly relate to supplier financial performance.

We performed several tests to ascertain the validity of our instrumental variables. First, a Hanson J overidentification test showed a 2.152 ($p=0.341$) χ^2 statistic, which indicated that our instruments are not correlated with the error terms in Equation (1). Next, we conducted further tests for the validity of our instruments. In the first stage, the test for excluded instruments for *Program* rejected the null hypothesis of excluded instruments having no explanatory power, the F-statistic (p-value) is 38.84 ($p<0.001$). This supports the strength of our instruments (Staiger and Stock 1994). Moreover, the Rank Lagrange Multiplier test (Kleibergen and Paap 2006) ($p=0.0003$), the Sanderson-Windmeijer Chi-squared test

(Sanderson and Windmeijer 2016) ($p<0.001$) both rejected the null hypothesis that the model is under-identified. The Sanderson-Windmeijer F test also rejected the null hypothesis that the model is weakly identified. All test results provide validity to our model specification and the use of instruments to address the endogeneity of *Program*.

We used xtivreg2 command in Stata 15.1 to estimate our models. Specifically, we adopt the two-step Generalized Method of Moments estimation (2-step GMM), which generates more efficient estimators compared to 2SLS when the model is over-identified (Lu et al. 2018). Our model is over-identified because the number of instrumental variables is larger than the number of endogenous variables. Further, industry heterogeneity clearly exists in our sample: the top three industries represented by the suppliers are manufacturing (42%), transportation and public utilities (18%), and service (12%). Table 1 lists all the industries in the sample. Given the unequal presence of industries and their corresponding measurement complexities of BSCS programs, industry level control is necessary. As such, we clustered by industry in our estimations based on 2-digit SIC codes.

Results

Our goals are first, to (in)validate the negative relationship between the total number of BSCS programs and supplier short-term profitability; second, to test potential moderators of this relationship; third, to explore the dynamics therein.

We reported the estimates of Equation (1) in Model 1 (model without interactions) and Model 2 (model with interactions) in Part A, Table 4. As expected, suppliers experience decreasing ROA in the short term ($\beta = -0.01184, p < 0.01$) as the number of BSCS programs increases. This supports H1. Supplier environmental performance and cash-to-cash cycle are not significantly related to ROA. Capacity slack (reverse coded such that a positive coefficient

means there is a negative effect on supplier ROA) and inventory slack have significant and negative effects on supplier ROA. This supports the arguments for lean operations that operational slack hinders profitability (Modi and Mishra 2011).

In Model 2, we test the hypothesized moderation effects. The coefficient of Ln (*Program*+1) remains negative and significant ($\beta = -0.00159, p < 0.01$). To visualize the moderating effects, interaction plots (Figure 3) were plotted at one standard deviation above and below the mean values of the moderator variables. H2a and H2b, respectively, proposed positive and negative moderating roles of supplier environmental performance on supplier financial performance. We find support for H2b ($\beta = -0.00333, p < 0.05$), such that suppliers with high environmental performance experience a larger decrease in their ROA as the number of BSCS programs increases. As illustrated in Figure 3(a), as the number of BSCS programs increases, suppliers with high past environmental performance realize a decline in ROA; however, suppliers with low environmental performance do not experience the decline.

Next, H3a, H3b, and H3c proposed a positive moderating role of the three operational slack variables on the relationship between the number of BSCS programs and supplier financial performance. We find H3c is insignificant. Both H3a and H3b are significant but in the opposite direction as hypothesized. H3a hypothesized that capacity slack would lessen supplier financial loss (i.e., the coefficient of the interaction term of capacity slack and the number of BSCS programs was expected to be negative.). The direction of the impact, however, is positive and significant ($\beta = 0.00086, p < 0.01$). The interaction plot, Figure 3(b), shows that suppliers with higher capacity slack realize a decrease in ROA while their counterparts with low capacity slack experience a slight increase instead. The coefficient of the interaction term of supplier inventory slack and the number of BSCS programs is significant

and negative ($\beta = -0.00182, p < 0.01$), which is opposite to H3b. In Figure 3(c), suppliers with higher inventory slack experience a decline in ROA. Conversely, under an increasing number of BSCS programs, suppliers with lower inventory slack realize an increase.

These results suggest that suppliers may be penalized by holding the excess capacity and inventory as the number of BSCS program increases. This may be because the business operating environments of suppliers become to be responsiveness-driven as the number of BSCS programs increases. When the number of BSCS programs is low, suppliers are likely operating in an efficiency-driven environment, in which suppliers would be awarded financially by holding extra capacity and inventory slack while facing external interruptions (Hendricks et al. 2009). However, as the number of BSCS program increases, suppliers need to be responsive to buyers' new sustainable requirements for suppliers' operations and products. In such a responsiveness-driven environment, the in-hand capacity and inventory slack are likely becoming obsolete, thus financially burdensome since these tangibles would not generate revenue but keep depreciating instead. This misfit between buyer requirements and supplier slack resources could lead to financial loss (Wagner et al. 2012).

In order to confirm that the results are not driven by the form of measure we use, we replace the natural logarithm (*Program* + 1) by the count variable of *Program* and re-estimate the models. We present the estimates in Model 3 and Model 4, Part B, Table 4. The coefficients are qualitatively consistent between two measures, indicating that our results are robust to alternative measurements.

(Table 4 on next page)

TABLE 4: Main analysis - Two-step General Moment of Methods Estimates

	Part A: Ln (*Program* + 1) $_{t-1}$		Part B: *Program* $_{t-1}$	
	Model 1	Model 2	Model 3	Model 4
VARIABLES			Robustness Check: replace Ln (*Program* + 1) by count *Program*	
Ln (*Program* + 1) $_{t-1}$	-0.01184***	-0.00159***		
	(0.004)	(0.001)		
Program $_{t-1}$			-0.00238***	-0.00019**
			(0.001)	(0.000)
Supplier ENV $_{t-1}$ *		-0.00333**		-0.00375**
Ln (*Program* + 1) $_{t-1}$		(0.002)		(0.002)
Supplier Capacity Slack $_{t-1}$*		0.00086***		0.00091***
Ln (*Program* + 1) $_{t-1}$		(0.000)		(0.000)
Supplier Inventory Slack $_{t-1}$*		-0.00182***		-0.00189***
Ln (*Program*+1) $_{t-1}$		(0.001)		(0.001)
Supplier Cash-to-cash Cycle $_{t-1}$*		0.00001		0.00001
Ln (*Program*+1) $_{t-1}$		(0.000)		(0.000)
Supplier ENV $_{t-1}$	0.00001	-0.00228**	-0.00088	-0.00250***
	(0.002)	(0.001)	(0.002)	(0.001)
Supplier Capacity Slack $_{t-1}$	0.00060***	0.00070***	0.00048**	0.00070***
	(0.000)	(0.000)	(0.000)	(0.000)
Supplier Inventory Slack $_{t-1}$	-0.00140***	-0.00122***	-0.00154***	-0.00122***
	(0.000)	(0.000)	(0.000)	(0.000)
Supplier Cash-to-cash Cycle $_{t-1}$	0.00001	0.00000	0.00001	0.00000
	(0.000)	(0.000)	(0.000)	(0.000)
Supplier HHI $_{t}$	0.00000	0.00003	0.00006	0.00003
	(0.000)	(0.000)	(0.000)	(0.000)
Supplier Asset $_{t}$	0.00430*	0.00073	0.00210	0.00079
	(0.003)	(0.001)	(0.002)	(0.001)
Supplier Leverage $_{t}$	-0.00000***	-0.00000***	-0.00000***	-0.00000***
	(0.000)	(0.000)	(0.000)	(0.000)
Supplier Capital Intensity $_{t}$	-1.21375***	-1.62094***	-1.35407***	-1.65231***
	(0.207)	(0.126)	(0.169)	(0.126)
Supplier Market Share $_{t}$	0.04223	0.06837	0.06503	0.06797
	(0.060)	(0.044)	(0.073)	(0.045)
Supplier GDP $_{t}$	-0.00000	-0.00000**	-0.00000	-0.00000***
	(0.000)	(0.000)	(0.000)	(0.000)

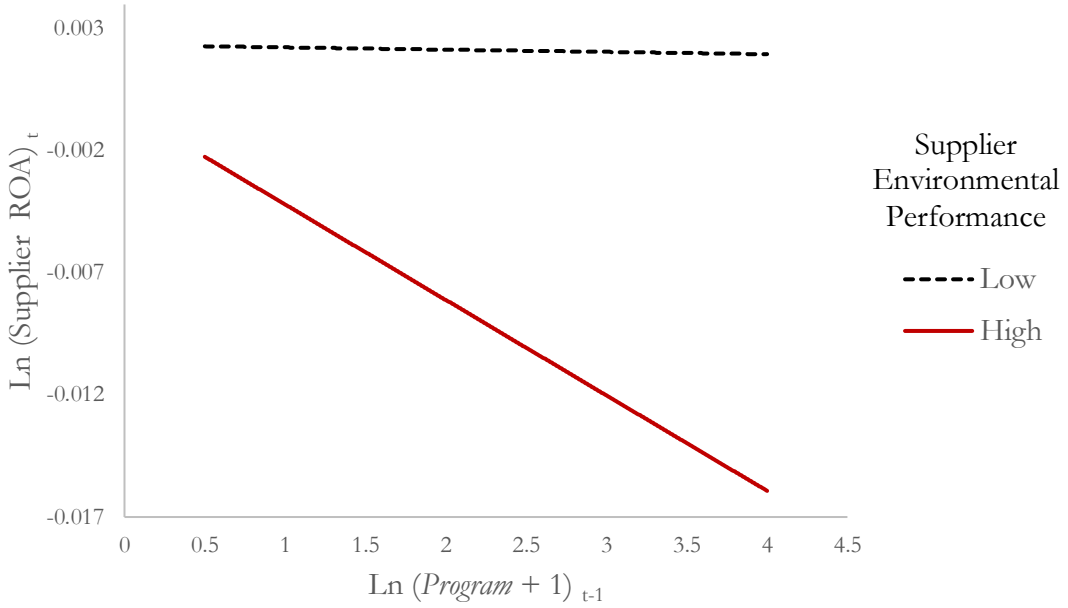
TABLE 4: Main analysis - Two-step General Moment of Methods Estimates

	Part A: Ln (*Program* + 1) $_{t-1}$		Part B: *Program* $_{t-1}$	
	Model 1	Model 2	Model 3	Model 4
VARIABLES			Robustness Check: replace Ln (*Program* + 1) by count *Program*	
No Programs $_t$	-0.00022	0.00098	-0.00014	0.00105
	(0.001)	(0.001)	(0.002)	(0.001)
Duration $_t$	-0.00046**	-0.00020	-0.00048**	-0.00018
	(0.000)	(0.000)	(0.000)	(0.000)
Buyer Diversity $_t$	0.00935**	-0.00019	0.00814**	-0.00094
	(0.004)	(0.002)	(0.004)	(0.002)
Buyer ENV $_t$	0.00009*	0.00003	0.00004	0.00002
	(0.000)	(0.000)	(0.000)	(0.000)
Buyer PPE $_t$	0.00000***	0.00000**	0.00000**	0.00000**
	(0.000)	(0.000)	(0.000)	(0.000)
Buyer Leverage $_t$	-0.00000***	-0.00000***	-0.00000***	-0.00000***
	(0.000)	(0.000)	(0.000)	(0.000)
Dummy2008 $_t$	-0.00815**	-0.00963***	-0.00916**	-0.00961***
	(0.004)	(0.002)	(0.004)	(0.002)
Observations	6624	6624	6624	6624
Model fit-F	55.05	90.56	44.88	101.36
Probability > F	0.000	0.000	0.000	0.000
Clusters	62	62	62	62

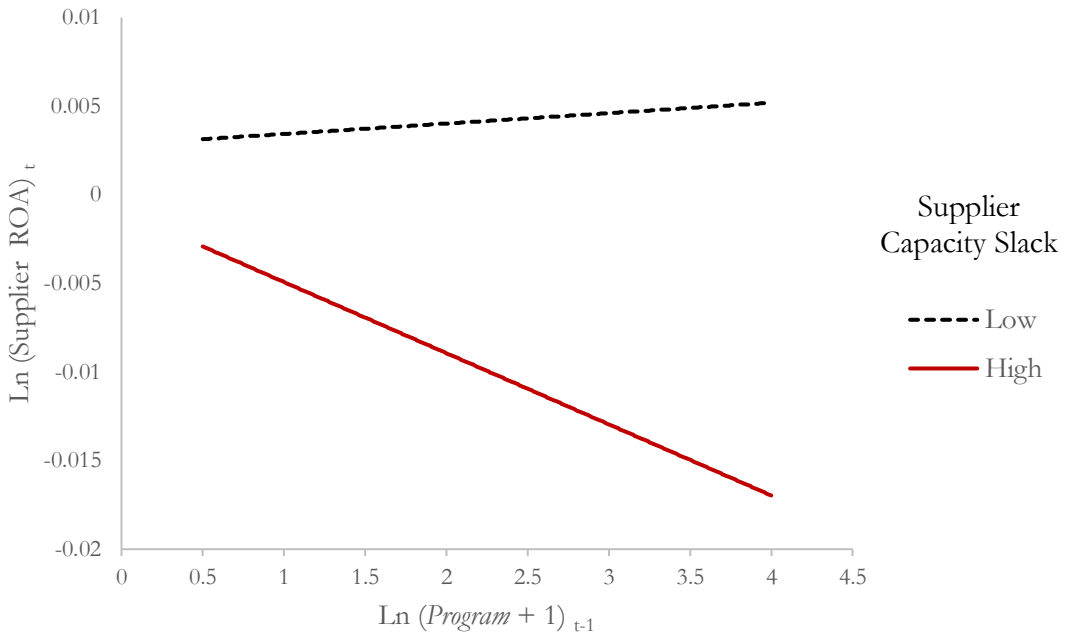
Notes: * p<0.10, ** p<0.05, *** p<0.01. Clustered Robust Standard errors in parenthesis.

(Figure 3 on next two pages)

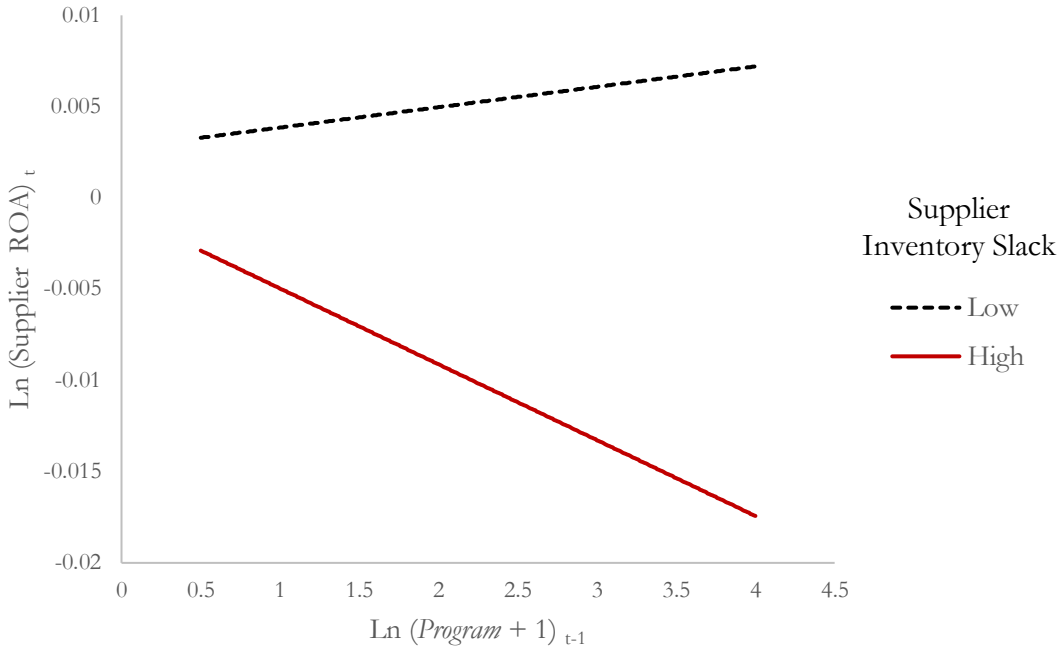
FIGURE 3: Interaction plots



(a)Moderating effect of Supplier Environmental Performance



(b)Moderating effect of Supplier Capacity Slack



(c)Moderating effect of Supplier Inventory Slack

The focus of this research is to examine a supplier's short-term financial loss and the moderating role of supplier environmental performance and operational slack. While our main results confirm such effects, long-term assessment of financial performance may provide depth beyond the main results as the literature indicates that "it pays to be green" in the long term (Ortiz-de-Mandojana and Bansal 2016). In this section, we explore supplier long-term profitability and the role of the moderators.

We conducted temporal analysis following the main analysis above by changing the time lag between a supplier's ROA and the number of BSCS programs the supplier needs to respond to. In Table 5, the results show that as the time differences increases, the impact of the number of BSCS programs is first significant and negative ($\beta = -0.01184, p < 0.01$), then becomes insignificant and eventually turns to be significant and positive ($\beta = 0.04708, p < 0.05$). This result indicates that suppliers will suffer short-term financial loss

and gain financial benefits in four years on average, which is consistent with the PTBG literature.

TABLE 5: Short-term versus Long-term financial impact – Base model

VARIABLES	Model 1 DV: Ln ROA $_{t}$	Model 2 DV: Ln ROA $_{t+1}$	Model 3 DV: Ln ROA $_{t+2}$	Model 4 DV: Ln ROA $_{t+3}$
Ln (*Program* + 1) $_{t-1}$	-0.01184***	-0.00709	-0.00239	0.04708**
	(0.004)	(0.007)	(0.005)	(0.020)
Supplier ENV $_{t-1}$	0.00001	-0.00140	-0.00376	0.00144
	(0.002)	(0.008)	(0.007)	(0.014)
Supplier Capacity Slack $_{t-1}$	0.00060***	-0.00106***	0.00004	-0.00071**
	(0.000)	(0.000)	(0.000)	(0.000)
Supplier Inventory Slack $_{t-1}$	-0.00140***	0.00032	0.01505	0.00047
	(0.000)	(0.002)	(0.011)	(0.007)
Supplier Cash-to-cash Cycle $_{t-1}$	0.00001	-0.00006	-0.00005	-0.00019**
	(0.000)	(0.000)	(0.000)	(0.000)
Supplier HHI $_{t}$	0.00000	0.00038	0.00097	0.00061
	(0.000)	(0.001)	(0.001)	(0.001)
Supplier Asset $_{t}$	0.00430*	-0.03908***	-0.04452***	-0.04672
	(0.003)	(0.008)	(0.017)	(0.029)
Supplier Leverage $_{t}$	-0.00000***	0.00000***	0.00000***	0.00000***
	(0.000)	(0.000)	(0.000)	(0.000)
Supplier Capital Intensity $_{t}$	-1.21375***	51.10497	4.70206	-62.82026***
	(0.207)	(52.803)	(23.485)	(6.281)
Supplier Market Share $_{t}$	0.04223	0.29885*	0.38293	0.19469
	(0.060)	(0.151)	(0.443)	(0.245)
Supplier GDP $_{t}$	-0.00000	0.00000	0.00000	-0.00000
	(0.000)	(0.000)	(0.000)	(0.000)
No Programs $_{t}$	-0.00022	-0.00756	-0.01147***	0.00831
	(0.001)	(0.006)	(0.004)	(0.011)
Buyer Diversity $_{t}$	0.00935**	0.02421	0.01282	-0.04040*
	(0.004)	(0.018)	(0.014)	(0.021)
Duration $_{t}$	-0.00046**	-0.00048	-0.00102	0.00120
	(0.000)	(0.001)	(0.001)	(0.001)
Buyer ENV $_{t}$	0.00009*	0.00009	0.00006	-0.00020
	(0.000)	(0.000)	(0.000)	(0.000)
Buyer PPE $_{t}$	0.00000***	-0.00000	-0.00000	-0.00000**

TABLE 5: Short-term versus Long-term financial impact – Base model

VARIABLES	Model 1 DV: Ln ROA $_t$	Model 2 DV: Ln ROA $_{t+1}$	Model 3 DV: Ln ROA $_{t+2}$	Model 4 DV: Ln ROA $_{t+3}$
	(0.000)	(0.000)	(0.000)	(0.000)
Buyer Leverage $_t$	-0.00000***	-0.00000	0.00000	0.00000
	(0.000)	(0.000)	(0.000)	(0.000)
Dummy2008 $_t$	-0.00815**	-0.01471***	0.00108	0.01257
	(0.004)	(0.005)	(0.005)	(0.008)
Observations	6624	4262	3960	3029
Model fit-F	55.05	36.02	3.57	87.68
Probability > F	0.000	0.000	0.000	0.000
Clusters	62	62	59	58

Notes: * p<0.10, ** p<0.05, *** p<0.01. Clustered Robust Standard errors in parenthesis.

We further conducted an analysis of the full model to assess the effects of moderators. The results are reported in Table 6. We found that as time goes by, the negative moderating effect of supplier environmental performance becomes insignificant, and so does the inventory slack. The coefficient of the interaction terms of capacity slack and the number of BSCS programs remains significant, which indicates that the financial burden of excessive capacity slack sustains over time. The moderating effect of supplier cash-to-cash cycle changes from insignificant to significant and positive (supplier cash-to-cash cycle is reverse coded), which indicates a shorter cash-to-cash cycle may, on average, benefit suppliers financially in three years. Namely, the financial benefits of the operational efficiency due to the leanness of the supply chain would be realized in three years. Thus, establishing a lean supply chain characterized by a short cash-to-cash cycle at an early stage is important for suppliers to achieve the potential financial gain of BSCS programs in the long run.

(Table 6 on next page)

TABLE 6: Short-term versus Long-term financial impact – Full model

VARIABLES	Model 1 DV: Ln ROA $_{t}$	Model 2 DV: Ln ROA $_{t+1}$	Model 3 DV: Ln ROA $_{t+2}$
Ln (*Program* + 1) $_{t-1}$	-0.00159***	-0.01007***	-0.00113
	(0.001)	(0.003)	(0.003)
Supplier ENV $_{t-1}$ *	-0.00333**	0.00129	-0.00615
Ln (*Program* + 1) $_{t-1}$	(0.002)	(0.010)	(0.008)
Supplier Capacity Slack $_{t-1}$*	0.00086***	0.00709***	0.01117***
Ln (*Program* + 1) $_{t-1}$	(0.000)	(0.002)	(0.004)
Supplier Inventory Slack $_{t-1}$*	-0.00182***	0.00056	0.00294
Ln (*Program*+1) $_{t-1}$	(0.001)	(0.004)	(0.003)
Supplier Cash-to-cash Cycle $_{t-1}$*	0.00001	-0.00059	0.00131**
Ln (*Program*+1) $_{t-1}$	(0.000)	(0.000)	(0.001)
Supplier ENV $_{t-1}$	-0.00228**	0.00421	-0.00610
	(0.001)	(0.005)	(0.004)
Supplier Capacity Slack $_{t-1}$	0.00070***	-0.00028	0.00077**
	(0.000)	(0.000)	(0.000)
Supplier Inventory Slack $_{t-1}$	-0.00122***	-0.00045	0.01856***
	(0.000)	(0.002)	(0.005)
Supplier Cash-to-cash Cycle $_{t-1}$	0.00000	0.00001	0.00007
	(0.000)	(0.000)	(0.000)
Supplier HHI $_{t}$	0.00003	0.00012	0.00108
	(0.000)	(0.001)	(0.001)
Supplier Asset $_{t}$	0.00073	-0.03215***	-0.05557***
	(0.001)	(0.005)	(0.008)
Supplier Leverage $_{t}$	-0.00000***	0.00000***	0.00000***
	(0.000)	(0.000)	(0.000)
Supplier Capital Intensity $_{t}$	-1.62094***	-2.8e+01	10.68415
	(0.126)	(31.877)	(19.869)
Supplier GDP $_{t}$	-0.00000**	-0.00000**	0.00000
	(0.000)	(0.000)	(0.000)
No Programs $_{t}$	0.00098	-0.00255	-0.01284***
	(0.001)	(0.004)	(0.003)
Buyer Diversity $_{t}$	-0.00019	0.01969	0.01006
	(0.002)	(0.015)	(0.009)
Supplier Market Share $_{t}$	0.06837	0.25220*	0.72855**
	(0.044)	(0.144)	(0.290)

TABLE 6: Short-term versus Long-term financial impact – Full model

VARIABLES	Model 1 DV: Ln ROA $_t$	Model 2 DV: Ln ROA $_{t+1}$	Model 3 DV: Ln ROA $_{t+2}$
Duration $_t$	-0.00020	0.00018	-0.00085
	(0.000)	(0.001)	(0.001)
Buyer ENV $_t$	0.00003	-0.00005	0.00019**
	(0.000)	(0.000)	(0.000)
Buyer PPE $_t$	0.00000**	-0.00000	-0.00000***
	(0.000)	(0.000)	(0.000)
Buyer Leverage $_t$	-0.00000***	-0.00000*	0.00000
	(0.000)	(0.000)	(0.000)
Dummy2008 $_t$	-0.00963***	-0.01664***	0.00185
	(0.002)	(0.004)	(0.003)
Observations	6624	5125	3960
Model fit-F	90.56	46.34	22.50
Probability > F	0.000	0.000	0.000
Clusters	62	62	59

Notes: * p<0.10, ** p<0.05, *** p<0.01. Clustered Robust Standard errors in parenthesis.

Conclusions and Discussion

The purpose of this paper was to determine if suppliers benefit from the implementation of their buyers' BSCS programs. We found that, on average, suppliers experience financial loss in the short term (i.e., one year) and financial benefits longer term (i.e., four years). This result indicates that it would take a longer time for suppliers to realize the financial benefits since the cost of compliance occurs before potential additional revenue or cost savings can be realized.

In addition, we show that this relationship is moderated by supplier past environmental performance and operational slack. Specifically, suppliers with higher past environmental performance experience greater financial loss. The reason could be that high environmental performance indicates that one supplier has already picked up the "low-hanging fruits" of environmental sustainability. Afterwards, it would become progressively more difficult and costly to reduce environmental impact. Additionally, capacity slack and inventory

slack are found to be financially burdensome for suppliers complying with the programs. Literature find that operational slack is beneficial when firms experience external changes (Azadegan et al. 2013; Hendricks et al. 2009). The external changes have been studies are from the supply side. However, in the context of BSCS programs, the buyers' requirements are from the demand side. Such distinction results in the obsoleteness of both capacity slack and inventory slack.

Most research in the BSCS literature focuses on the financial benefits from the buyers' perspective but overlooks the suppliers' side. Our findings concur that such programs can eventually lead to financial benefits for suppliers as well. However, we contend that such benefits take a longer time to be realized while in the short run, suppliers need to deal with financial loss instead. Contrary to existing literature (e.g., Hendricks et al., 2009; Villena & Gioia, 2018), we found that high environmental performance, capacity slack, and inventory slack enlarge suppliers' financial loss.

We make significant contributions to the sustainable supply chain literature. First, we provide evidence for a negative relationship between the number of BSCS programs and the supplier financial performance in the short run but a positive one in the longer term. Second, we show how supplier environmental performance and operational slack moderate this relationship. These findings add nuance to the existing literature.

From a managerial perspective, this study offers important insights for both suppliers and buyers. First, suppliers might not be incentivized at the beginning, which hinders suppliers from seriously participating in BSCS programs and realizing the financial benefits in the longer term. Therefore, buyers need to have a rational view of suppliers' financial loss in the short term. As one shared sentiment from suppliers interviewed in Villena (2019) conveys: "We hope that our customers understand there is a cost to be good corporate citizens."

Consequently, suppliers might need access to financing at the early stage of the implementation of BSCS programs. As suppliers struggle with short-run financial loss, they experience a hard time surviving until the potential benefits can be realized. One option that buyers can offer is supply chain financing. For instance, HBSC and Walmart have launched a green supply chain finance program to offer suppliers quicker payments as awards to suppliers' sustainability improvements (Cuff 2019). Namely, this approach can turn supplier sustainability performance into financial aid, which is critical for suppliers. As a result, suppliers can achieve greater sustainability performance and survive until the time of financial benefits, which, in turn, benefits the buyers as well. In addition, green supplier chain finance can also help suppliers by shortening their cash-to-cash cycle, thus building a lean supply chain, which will benefit suppliers in the long term.

The content of requirements is also recommended to be updated based on suppliers' feedback. Because suppliers know themselves better than the buyers do, they can better identify areas of sustainability worth investments. For instance, one purchasing director of a buyer described a five-year program starting point as asking the supplier to do a materiality assessment and then, based on the results, the supplier would pick up two areas, such as, energy and recycling, which are most relevant to their business (Villena and Gioia 2018). By doing so, suppliers incorporate the sustainability improvements with their core business, which would lead to effective organizational learning (Haunschild and Rhee 2004) and institutional legitimacy (Westphal et al. 1997), thus financial benefits. For suppliers who already have established a certain level of sustainability, buyers should also adjust their goals accordingly and be patient with suppliers' progress.

This research also suggests actions for suppliers. Setting rational expectations about financial consequences in the short run with knowing their resource attributes is

recommended. Even some suppliers who have established a certain level of environmental sustainability performance might face greater financial loss. However, such loss is not a signal for failure of their own sustainable operations. In fact, they should be proactive in protecting themselves and express their concerns with the buyers. The rational expectations can also help suppliers plan out their investments on sustainability as they know what they have not done and what can be done better to identify possible unpicked "low hanging fruits." With such expectations, suppliers would go through the transition from financial loss to financial benefits with expected struggles and minimized loss. Besides providing feedback proactively, suppliers should also learn their buyers for supportive programs, such as the green finance program. Taking advantage of those resources can not only alleviate short-term financial loss but also develop a virtuous cycle of buyer-supplier understanding and mutual benefit.

Although our findings provide unique insights into the sustainable supply chain literature, our research includes a few limitations, which are mainly from the data sources. While we propose the number of BSCS programs as the independent variable, we investigate the effects of the program adoptions but not the depth of the adoption. In addition, since the data are from public suppliers, these findings may not be generalizable to private suppliers. As more data become available, further research can examine the degree of buyers' efforts toward pushing and helping suppliers to be sustainable. This research can serve as a step forward to a better understanding of the effects of BSCS programs, especially taking the perspective of the suppliers.

CHAPTER 2

SEEING IS BELIEVING:

FIRM ENVIRONMENTAL SUSTAINABILITY AND FIRM SALE

Abstract

We revisit the paradox between the increasing consumer purchasing intentions from environmentally sustainable firms and the disproportionally changed firm sale. We contend that the inconclusive findings from prior literature may be attributed to the fact that firms' environmental sustainability claims are of two different stages of the product life cycle – production and consumption. Although both firm environmental sustainability claims can reduce the information asymmetry regarding firms' environmental activities, firm environmental sustainability of consumption can further reduce the information asymmetry regarding firms' motives. Hence, we posit sustainable consumption is positively related to firm sale, whereas the effect of sustainable production on firm sale is less clear. To test our hypotheses, we used panel data of 411 US firms. Our results support our reasoning. Namely, we show that contrary to extant belief, firm environmental sustainability can decrease consumers' intentions to buy firms' products when the information asymmetry regarding firm motives is present.

Introduction

Consumers increasingly prefer to buy products that promote environmental sustainability (Nielsen 2018; Sparling 2018). Nielsen revealed that certain categories of products with sustainability claims showed twice the growth of their traditional counterparts (Nielsen Report 2018). To respond, firms spend billions of dollars on environmental sustainability-related marketing each year (Luo and Bhattacharya 2009). Given these facts, one might expect that this would lead firms with more sustainable products to have larger sales. However, recent studies concluded that consumers sometimes do not do as they say (White et al. 2019) – while 65% of the subjects said they would like to buy from firms that advocate sustainability, only about 26% actually did so (BBMG and GlobeScan 2017).

The lack of a strong link between sustainably-made and marketed products and firm sales has been debated in the literature. Prior literature finds that there is information asymmetry between firms and their consumers regarding firm environmentally sustainable activities (Banerjee et al. 2003). Namely, consumers may not be fully aware of firms' green efforts. Consequently, a necessary condition for consumers to reward firms is that firms communicate about their environmental sustainability efforts to reduce the information asymmetry (Galbreth and Ghosh 2013; Guo et al. 2017; Mishra and Modi 2015). As a result, such firm environmental sustainability claims can increase firm sales since the customers would be aware of what firm environmental sustainability has been done.

However, recent marketing literature shows that a firm's green claims in firm marketing efforts might not necessarily be interpreted as reputable and responsible activities but rather as "greenwashing" (Wu et al. 2020). Here, greenwashing refers to the situations that firms focus on or exaggerate the salient aspects of sustainability and neglect the unobservable

aspects. For instance, fast-fashion firms often claim to being "green" by using eco-friendly materials, while paying less attention to environmental issues in the production process (Morgan 2015). Although the negligence of some unobservable environmental sustainability does not always indicate the cases of unsustainability, customers tend to interpret the unobservables as activities with issues, thus conclude that firm claims on green activities as greenwashing and reduce purchase as a result. Hence, this paradox in the relationship between firm environmental sustainability and firm sale is still not well-answered.

We contend that the inconclusive findings may be attributed to the fact that firms' environmental sustainability claims are of two different stages of the product life cycle – production and consumption. The environmental impacts of one product occur over its life cycle including product production and product consumption (or usage) (Dooley 2014). Therefore, firms' environmentally sustainable activities focus on these two aspects by claiming environmental sustainability of production process, such as emission reduction, and environmental sustainability of product usage and recycles, such as after-sale services including instructions on environmentally friendly usage and take-back procedures of the products. Consumers might react differently to firm environmental sustainability efforts targeted at production versus consumption since the former is not as observable as the latter from the consumers' perspective. As a result, the relationship between environmentally sustainable production and firm sales and that between environmentally sustainable consumption and firm sale may differ. However, research has not placed much attention on distinguishing the types of firm claims on environmental sustainability (Jayachandran et al. 2013). Since the directional effects of two types of firm environmental sustainability can be the opposite, the combined effect of firm environmental sustainability as one construct may go either direction or be insignificant.

Give these considerations, we focus on two research questions in this chapter. First, *is the firm environmental sustainability of production positively or negatively associated with firm sales?* Second, *is the firm environmental sustainability of consumption positively associated with firm sales*? We draw from the literature of green marketing communications and information asymmetry between consumers and firms to answer our research questions. To test for the association between firm environmentally sustainable production/consumption and firm sale, we employ ASSET 4 dataset over the period 2004-2018, which covers the firm environmental sustainability claims of U.S. firms, and combine it with financial statement data obtained from Compustat. In empirics, we address the potential endogeneity of firm environmental sustainability by using two-step General Moment of Methods (2-step GMM) in which we employ proper instrumental variables.

We find that firm environmental sustainability of production is negatively associated with firm sale whereas the relationship between firm environmental sustainability of consumption and firm sale is positive. These findings indicate that consumers tend to increase purchases from firms when they can observe and experience firms' activities of sustainable consumption. In contrast, consumers react negatively to the environmental sustainability of product production since these are unobservable for the consumers. Namely, we show that contrary to extant belief, firm environmental sustainability can decrease consumers' intentions to buy firms' products when the information asymmetry regarding firm motives is present. We discuss these findings in the discussion section.

The remainder of the paper is organized as follows. In section 3, we provide a brief review of the literature and hypothesis development. Section 3 describes our data collection procedure and variable construction. Out results are contained in section 4. Section 5 concludes the paper, discuss the findings, and proposes several avenues for further research.

Literature Review and Hypotheses Development

After reviewing 12 academic disciplines, Elliot (2011) defines environmental sustainability as firm activities to minimize the environmental impacts through design, production, usage, disposal of products, and services throughout the product life cycle. From the perspective of consumers, the product environmental impact that occurs in the product life cycle consists of two stages – any environmental impacts associated with the products before the consumers own the products and that after consumers own them. Accordingly, before the products reach the end consumers, firms implement the environmental sustainability of production. For instance, Sandisk works on reducing its carbon footprint on several fronts including raw materials and manufacturing processes. After consumers purchase the products, firms offer instructions on environmentally friendly usage or take-back procedures to help consumers reduce environmental impacts that may occur during product consumption or usage. For instance, 3M provides take-back procedures of products for consumers[3] as after-sale services and also present to consumers how to repetitively use their hooks. Specifically, the product description of 3M hooks always has one sentence: "rehanging them is as easy as applying a Command™ Clear Refill Strip, so you can take down, move and reuse them again and again!"

Consumers react positively to firms' activities of environmental sustainability. According to a survey recently conducted by Cone Communications and Ebiquity jointly, the majority of the 9709 consumers from nine largest countries in the world by GDP have strong accountability to address environmental issues and are primed for participation in understanding that firms should more than just making a profit (Cone Communications 2015).

[3] http://www.3m.com/us/surplus/plastics.html

Only 10% of the participating consumers would not care about firm environmental sustainability in making their purchasing decisions whereas the remaining 90% would either reward a firm for environmental responsibility or punish a firm of irresponsible operations. As a result, a positive relationship between firm sale and firm environmentally sustainable activities is expected.

Prior research has examined the relationship between environmental sustainability and consumers' attitudes, brand evaluation, and consumer purchasing behaviors (Klein and Dawar 2004; Sen and Bhattacharya 2001; Torelli et al. 2012; Wagner et al. 2009). Scholars also investigate reactions from other stakeholders, such as employees (Korschun et al. 2014), and shareholders (Luo and Bhattacharya 2009, 2009), indicating increased firm sale. The relationship between firm environmental sustainability and firm financial performance has received a lot of attention, yet with mixed results. Therefore, researchers explore this relationship at a more nuanced level by including firm-specific attributes (Luo and Bhattacharya 2006) and consumer-specific attributes (Sen and Bhattacharya 2001), but overlooking the attributes of firm environmentally sustainable claims, which is the necessary channel to connect the consumers and firms, and thus can reduce the information asymmetry between firms and consumers. Ignoring the role of firms' green messages to consumers may lead to an incomplete understanding of the financial rewards for firm environmental sustainability. This paper aims to fill in this gap by assessing if different types of environmental sustainability reduce information asymmetry differently, thus influence firm sale differently. In the next subsection, we discuss this in detail.

Information asymmetry between firms and consumers could be a potential barrier preventing consumers from purchasing from environmental sustainable firms (Galbreth and Ghosh 2013; Guo et al. 2017). Galbreth and Ghosh (2013) find that a necessary condition for

consumers to reward firms of environmental sustainability is their awareness of firm environmental sustainability. Mishra and Modi (2015) further prove that such consumer awareness can be improved by firm marketing capability which can reduce the information asymmetry. But, marketing literature shows that not only the information asymmetry of environmentally sustainable activities, but also the information asymmetry of firm motives can influence consumers' purchasing decisions (Sen et al. 2006; Sen and Bhattacharya 2001). In fact, merely knowing the true firm motives of environmental sustainability might lead to a charge of "greenwashing" (Banerjee et al. 2003), which leads to decreased consumer purchasing intentions.

Kitzmueller and Shimshack (2012), after extensive research with scholars and industrial practitioners, categorize firm motives into altruistic environmental sustainability and strategic environmental sustainability. In the case of altruistic environmental sustainability, firms may engage in environmental sustainability because of their innate preference for doing good (Baron 2009). This genuine concern for the environment has been found to secure the positive effects of firm environmental sustainability on firm sale (Sen et al. 2006). However, in the case of strategic environmental sustainability, profit-maximizing firms may engage in environmental sustainability when consumers reward environmentally sustainable behaviors. Such a scenario refers to the catchphrase "doing well by doing good". These firms would be labeled as self-interested which is opposed to green consumers' belief that firms should care more than their own profitability. Such divergence between consumers' view and their perceived firms' view can decrease consumers' intentions to buy from these firms (Sen and Bhattacharya 2001). When the information of firm motives in environmental efforts is sufficiently clear, consumers would likely categorize these firms as altruistic ones. In contrast, when the information asymmetry regarding firm motives is present between firms and

consumers, consumers may categorize the firms as either altruistic or strategic. As a result, consumers' purchasing intentions for the firms may increase or decrease.

In summary, prior research shows that between firms and consumers, there is information asymmetry regarding firm environmentally sustainable activities and firm motives which could prevent consumers from purchasing from these firms. Reducing information asymmetry regarding firm environmentally sustainable activities can improve consumer awareness of the firms. After being aware of the firms' environmental sustainability, consumers are more likely to consider buying from these firms. However, to indeed improve consumers' purchasing intentions, firms also need to present themselves as altruistic environmentally sustainable firms by reducing the information asymmetry regarding their motives behind their environmental sustainability.

As we discussed above, the environmental sustainability offered by firms can be categorized into two groups – environmental sustainability of product production and that of consumption/usage. And both can reduce the information asymmetry regarding firms' environmental activities. Consequently, consumers should be aware of firms' practices, be ready to understand firms' motives, and make purchasing decisions. However, firm environmental sustainability of production and that of consumption may not reduce the information asymmetry regarding firms' motives the same. The key difference between the environmental sustainability of production and that of consumption for the consumers is the observability.

When firms' efforts on environmental sustainability are observable, the information asymmetry regarding firms' motives can be reduced. Consumers, therefore, can develop joint efforts with firms by observing what the firms claim about in terms of their environmental efforts. Due to the observability, consumers would believe in firms' green claims and thus

perceive the firms as altruistic environmentally sustainable. Then this trust would truly increase consumers' purchasing intentions. In contrast, the information asymmetry regarding firms' motives can hardly be reduced if firms' efforts on environmental sustainability are unobservable. In that case, consumers may not have self-observations to fully trust in firms' green claims but have to judge if what firms claimed is actually trustworthy. The final conclusions of such judging processes can be either way – believing firms as either altruistic or strategic. Consequently, the implications for sales due to firms' green claims may go either up or down.

When it comes to the environmental sustainability of production, consumers are already aware of firms' efforts on environmental sustainability since it reduces the information asymmetry regarding firms' activities. But it is difficult for consumers to observe such efforts unless the consumers have observed the production process in the manufacturing factories. Without experiential information to assess firms' motives, consumers may make reference from other known information, which are and only are firms' descriptions of their environmentally sustainable activities. On the one hand, literature shows that environmental sustainability has the "halo effect" which can be spilt over to other firm attributes including firm motives behind the environmental sustainability of production (Klein and Dawar 2004; Luchs et al. 2010). Therefore, consumers tend to develop an altruistic understanding of firm motives after knowing the environmental sustainability of production. On the other hand, literature also shows that, rather than making inference from other positive attributes, consumers may interpret the negligence in providing information on firm motives as deliberate firm behaviors to hide the true/complete stories from the consumers. As we argued above, those firm behaviors may be perceived by consumers as profit-maximizing strategies which would further label firms self-interested. Such an impression is opposed to green consumers'

belief that additional profits as rewards for sustainable firms are the by-product of being truly environmentally sustainable. Sometime, consumers may even interpret such situations as "greenwashing"(Wu et al. 2020). Such divergence between consumers' beliefs and their perceived firms' motives can decrease consumers' intentions to buy from these firms (Sen and Bhattacharya 2001).

Yet, the association between a firm's environmental sustainability of the product and firm sale performance has been largely overlooked in the literature. With an increasing awareness of firms' efforts in this regard, we propose that a firm's environmental sustainability of production may have a positive relationship with the firm sale.

H1: Environmental sustainability of production is positively associated with the firm sale.

In contrast, the environmental sustainability of consumption, such as the instructions of repetitive product usage and take-back procedures, can easily be observed by consumers since these efforts are centered around consumers' sustainable behaviors. In fact, consumers need to experience these environmental activities themselves. During these experiential processes, consumers would develop a common environmental sustainability-based identification with theirs and the firms' (Bhattacharya and Sen 2003; Lichtenstein et al. 2004; Maignan and Ferrell 2004). Such perception of oneness with a firm is selective and volitional, fulfilling consumers' higher-level needs for self-definition and self-enhancement. Therefore, consumers tend to believe that the firms are altruistic and do care about the environment beyond the consideration of profitability. It is, then, more likely for these consumers to buy from the firms who conduct the environmental sustainability of consumption[4]. Thus, we hypothesize:

[4] To note, this hypothesis is proposed regardless if the firm green claims are true. If the claims are true, the observability of consumption attribute can lead to more trust. Even if the claims are not true, consumers would

H2: Environmental sustainability of consumption is positively associated with the firm sale.

Data and Model

In this paper, we combine two databases. To measure information regarding firm environmental sustainability, we employ the ASSET 4 dataset. This data source is widely used in the literature and has been shown to have valid measures (Cheng et al. 2014b; Eccles et al. 2014; Villena and Dhanorkar 2020). Firm financial and control variables were collected from Compustat. Annual data were collected from 2004 to 2018.

The firm list was first drawn from ASSET 4 dataset and the original sample size consists of 2,995 firms. All firms are based in the United States. Then this firm list was matched with Compustat to obtain firm-level and industry-level controls. Lastly, the data were merged with two variables of interests – environmental sustainability of production and environmental sustainability of consumption. The sample size was greatly reduced due to missing values in the reported firm activities of environmental sustainability. The final sample is an unbalanced panel data consisting of 411 firms operating in 6 industry sections based on two-digit SIC codes. Table 7 presents the industry distribution of these firms.

TABLE 7: Firm Industry Distribution (Based on 2-digit Standard Industry Classification)

SIC	Industry Name	Firms
20-39	Manufacturing	238
40-49	Transportation & public utilities	9
50-51	Wholesale trade	1
52-59	Retail trade	2
60-67	Finance insurance real estate	3
70-87	Service	158

still observe the consumption attributes since these attributes require consumers' participation. Consumers' participation during the consumption process is limited and oftentimes not informative enough to notice some firms' claims are not true. For instance, one consumer can follow firms' instructions to recycle the product without knowing if the product would ultimately be recycled by the city services as described by the firm.

As we focus on consumers' reactions to firm environmental sustainability, we employ firm sale (*Sale*) as a dependent variable since it can directly measure revenues collected from consumers. Another advantage of using this variable is that consumer reaction via firm sale can happen relatively quickly (Lev et al. 2010), whereas other potential benefits of firm environmental sustainability, such as cost saving and operations efficiency, are more likely to materialize in the long term (King and Lenox 2001, 2002a, 2002b).

Our two independent variables are environmental sustainability of production (*Production*) and environmental sustainability of consumption (*Consumption*). Both are binary variables from ASSET 4 dataset. Environmental sustainability of production takes the value of 1 if a firm reports that the environmental impacts during the production process are minimized; otherwise 0. Environmental sustainability of consumption takes the value of 1 if a firm provides consumers with either environmental responsible usage or take-back programs; otherwise, 0.

In line with Chen and Ho (2019), Lins et al. (2017), Luffarelli et al. (2019), and Lu and Shang (2017), the following control variables are included to account for firm-level and industry-level heterogeneity. As for the latter, we included industry sale (*Industry Sale*) to control for the underlying financial condition of the industry which the firms are in. Herfindahl-Hirschman Index (*HHI*) was also included to control for industry competition, which was computed as the sum of squared market shares of all firms in the industry multiplied by one hundred. Firms in competitive industries focus more on sustainable activities as an effective marketing strategy (Simmons and Becker-Olsen 2006). Therefore, the estimation of firm environmental sustainability could simply capture the extent of market competition that impacts firm sale (Hart 1983; Nickell 1996).

As for the supplier-level heterogeneity, we control for firm size (*Size*), which was measured by firm total assets (King and Lenox 2001). Firm financial leverage (*Leverage*) is expected to affect the firm sale. A high debt ratio implies a lower borrowing ability; thus, firms with high financial debt are more likely to go bankrupt (Bromiley 1991; Hendricks et al. 2009). We, therefore, measured leverage by the debt to total assets (Barnett and Salomon 2012; Capon et al. 1990). Capital intensity (*Capital Intensity*), calculated by dividing capital expenditure by total assets, was also included. Firms with high capital intensity tend to focus more on environmental sustainability. Without capturing this relationship in the analysis, our model would suffer from omitted variable bias. Firm market share (*Market Share*) is also a control, which represents leading positions of firms since leading firms tend to enjoy higher sales (Lu and Shang 2017). This variable is a percentage measure at the two-digit SIC level (Hendricks et al. 2009). Lastly, we included research and development intensity (*R&D Intensity*) and advertising intensity (*Advertising Intensity*) as controls since both have been proved to have a positive relationship with the firm sale in the context of firm sustainability (McWilliams and Siegel 2000; Servaes and Tamayo 2013).

All of the continuous variables are log-transformed to correct for skewness. We provide a descriptive summary of the variables and data sources in Table 8 and the correlation table in Table 9[5].

(Table 8 and Table 9 on next two pages)

[5] Note: the correlation between two variables of interest is high. However, it is not problematic because it does not cause multicollinearity in the estimation as the Variance Inflation Factors (VIFs) are all less than 10 (Belsley et al. 2013; Flom 1999).

TABLE 8: Summary of variables

Variable	Description	Data Source	Mean	SD	Min	Max
Sale	Sale (Log)	Compustat	9.879	0.581	9.435	12.41
Environmental Sustainability of Production	If a firm reports that the environmental impacts of product productions are minimized.	ASSET 4	0.418	0.493	0	1
Environmental Sustainability of Consumption	If a firm provides consumers with environmental responsible usage or take-back programs	ASSET 4	0.460	0.499	0	1
Advertising Intensity	Ratio of advertising expense to assets	Compustat	-4.656	1.525	-10.40	0.247
R&D Intensity	Ratio of research and development expense to assets	Compustat	-3.209	1.267	-8.210	-0.023
Leverage	Ratio of debt to assets	Compustat	-0.723	0.562	-2.926	0.729
Size	Assets (Log)	Compustat	8.335	1.734	3.589	13.18
Capital Intensity	Ratio of capital expenditure to assets	Compustat	-1.389	0.820	-6.015	0.638
Market Share	Firm market share calculated at 2-digit SIC industry level	Compustat	0.020	0.047	0	0.632
Industry Sale ($K)	Industry Sale at 2-digit SIC industry level	Compustat	1000	459	17.70	2280
HHI	Herfindahl-Hirschman Index at 2-digit SIC industry level	Compustat	4.628	4.017	2.089	43.31

TABLE 9: Correlation table

	Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
(1)	Sale	1										
(2)	Environmental Sustainability of Production	0.2782*	1									
(3)	Environmental Sustainability of Consumption	0.3137*	0.9185*	1								
(4)	Advertising Intensity	0.1817*	-0.0846*	-0.0921*	1							
(5)	R&D Intensity	-0.1739*	-0.0201*	-0.0272*	-0.0799*	1						
(6)	Leverage	0.2290*	0.0588*	0.0752*	0.1869*	-0.2418*	1					
(7)	Size	0.8591*	0.3007*	0.3379*	0.1132*	-0.2507*	0.2357*	1				
(8)	Capital Intensity	0.1808*	0.2180*	0.2106*	0.1367*	-0.2405*	0.1500*	0.1316*	1			
(9)	Market Share	0.5633*	0.0935*	0.1112*	0.1180*	-0.1803*	0.2155*	0.4797*	0.1110*	1		
(10)	Industry Sale ($K)	0.1096*	0.0328*	0.0500*	-0.0072	0.1960*	0.0386*	0.0297*	-0.0985*	-0.3429*	1	
(11)	HHI	0.0994*	0.0665*	0.0762*	-0.0460*	-0.2963*	0.1669*	0.1210*	0.1475*	0.6336*	-0.4743*	1

To account for unobserved heterogeneity across firms and industries, we used panel data fixed effects model. The main econometric model for firm *i* in year *t* is as follows:

$$Sale_{it} = \beta_0 + \beta_1 * Production_{it} + \beta_2 * Consumption_{it} + \boldsymbol{\zeta} * \boldsymbol{W_{it}} + \gamma_i + \epsilon_{it} \quad (1)$$

Where W_{it} is a vector of control variables (*Advertising Intensity, R&D Intensity, Leverage, Size, Capital Intensity, Market Share, Industry Sale,* and *HHI*). γ_i represents supplier fixed effects. ϵ_{it} is the remaining error term. β_1 and β_2 are coefficients of interest to be estimated. ζ is the vector of the coefficients of control variables.

Estimation and Results

The *Production* and *Consumption* variables may be endogenous because both environmental sustainability of production and consumption and sale may be associated with stakeholder influence capacity, the ability of a firm to identify, act on, and profit from sustainability opportunities (Barnett 2007). Similar to absorptive capacity in the literature of innovation, stakeholder influence capacity measures the underlying firm's capability to design, implement, and benefit from environmentally sustainable activities. This innate firm capability as an unobservable omitted variable can bias our estimation. To account for this potential endogeneity issue, we followed the flowchart of Lu et al. (2018). We tested for endogeneity using the GMM distance test (the Chi-sq statistic is 4.957, p = 0.0839), and the result lent support to the endogeneity of *Production* and *Consumption.*

To tackle this endogeneity issue, we used three instrumental variables for *Production* and *Consumption* variables: state rank of the religious congregation and religious adherents and a blue state dummy. State rank of religious adherents (congregation) measures the religion rank of the state in which the firm's headquarters is located, which ranges between 1 and 50. The ranking is based on the ratio of the number of religious adherents (congregation) in the

firm's state to the total population in the state each year. This information was retrieved from the Association of Religion Data Archive.[6] A higher ranking indicates more religiosity. Angelidis and Ibrahim (2004) find that the degree of religiousness is positively correlated with attitudes toward social and environmental sustainability. This finding suggests that the state rank of religious adherents/congregation is likely to be positively correlated with a firm's environmental sustainability activities, thus satisfying the relevance condition of instrumental variables. However, given that the construction of the religion rank variable is based on the state in which a firm is located, it is unlikely that this variable has a direct effect on the firm sale, satisfying the exclusion condition of instrumental variables.

Blue state is a dummy variable that equals one if the Democratic Party won in the state during the most recent presidential election and 0 otherwise. Rubin (2008) finds that firms with high social and environmental ratings tend to be located in Democratic states. Therefore, we expect this variable to be positively correlated with the *Production* and *Consumption* variables. However, there is no reason to believe that the choice of locating in a blue or red state could have a direct significant effect on firm sale except via its effect on firm environmental sustainability of production and consumption.

We performed several tests to ascertain the validity of our instrumental variables. First, a Hanson J overidentification test showed a 0.193 (p=0.6608) Chi-sq statistic, which indicated that our instruments are not correlated with the error terms in the Equation (1). Next, we conducted further tests for the validity of our instruments. In the first stage, the tests for excluded instruments for both *Production* (F-stat = 3.03, p = 0.293) and *Consumption* (F-stat = 4.38, p = 0.0048) rejected the null hypothesis of excluded instruments having no explanatory

[6] http://www.thearda.com/Archive/browse.asp

power. This supports the strength of our instrumental variables (Staiger and Stock 1994). Furthermore, the Rank Lagrange Multiplier test (Kleibergen and Paap 2006) (Chi-sq stat = 5.92, p = 0.0517), and the Sanderson-Windmeijer Chi-squared test (Sanderson and Windmeijer 2016) (*Production*, p = 0.0304; *Consumption*, p = 0.0122) both rejected the null hypothesis that the model is under-identified. The Sanderson-Windmeijer F test also rejected the null hypothesis that the model is weakly identified. All test results provide validity to our model specification and the use of instruments to address the endogeneity of *Production* and *Consumption*.

We used xtivreg2 command in Stata 15.1 to estimate our model. Specifically, we adopt the two-step Generalized Method of Moments estimation (2-step GMM), which generates more efficient estimators compared to 2SLS when the model is over-identified (Lu et al. 2018). Our model is over-identified because there are more instrumental variables than the endogenous variables. Finally, we use robust standard errors clustered at the firm level in the analysis to mitigate serial correlation within firms across years (Ioannou and Serafeim 2017). As an additional test for the robustness of our model, we also use robust standard errors clustered at the industry level based on two-digit SIC codes as literature acknowledges that firm environmental sustainability varies a lot across industries (Banerjee et al. 2003), and find consistent results. The results of the first-stage analysis and second-stage analysis are reported in Table 10 and Table 11 respectively.

Table 11, column 1 presents the results. Hypothesis 1 states that firm environmental sustainability of production is positively associated with firm sale. We do not find support for Hypothesis 1 ($\beta = -0.58377, p < 0.05$), which suggests a 58.38% increase in firm sale if a firm claims to the consumers that it minimizes the environmental impacts during product

production. This indicates that consumers tend to react negatively to firm environmental sustainability when the information asymmetry of firm motives is present. In contrast, firm environmental sustainability of consumption, which focuses on consumers' experiential participation with firms' green services, is positively associated with firm sale. Specifically, compared to their counterparts, firms with the environmental sustainability of consumption will experience a 58.357% increase in firm sale on average ($\beta = 0.58357, p < 0.05$). These findings provide strong evidence that the information asymmetry regarding firm motives in environmental sustainability can significantly reduce consumers' purchasing intentions even when the consumers are aware of the firms' green efforts. In column 2, Table 11. We use robust standard errors clustered at the industry level. The results are consistent with the main results and the negativity of firm environmental sustainability of production is even larger.

(Table 10 and Table 11 on next two pages)

TABLE 10: First-stage analysis

VARIABLES	DV: Production	DV: Consumption
State Rank of Religious Congregations	0.11060	0.14895*
	(0.083)	(0.079)
State Rank of Religious Adherents	0.05077***	0.04354**
	(0.019)	(0.019)
Blue State	0.03335	0.10882**
	(0.069)	(0.052)
Advertising Intensity	-0.04908*	-0.02634
	(0.026)	(0.026)
R&D Intensity	0.12789**	0.13367***
	(0.056)	(0.052)
Leverage	0.05086	0.02639
	(0.056)	(0.046)
Size	0.11530***	0.15525***
	(0.043)	(0.036)
Capital Intensity	0.04722	0.04006
	(0.055)	(0.054)
Market Share	-1.64922**	-1.87998***
	(0.711)	(0.632)
Industry Sale	0.00000***	0.00000***
	(0.000)	(0.000)
HHI	0.01903	0.02197*
	(0.013)	(0.013)
Observations	2217	2217
F test of excluded instruments	3.47	4.37
Probability > F	0.03	0.01

Notes: * p<0.10, ** p<0.05, *** p<0.01. Clustered Robust Standard errors in parenthesis.

TABLE 11: Second-Stage Analysis – Two-step General Moment of Methods Estimation

VARIABLES	(1)	(2)
	DV: Log Sale	
Production	-0.58377**	-0.60183**
	(0.248)	(0.275)
Consumption	0.58357**	0.58450**
	(0.257)	(0.241)
Advertising Intensity	-0.01362	-0.01733
	(0.017)	(0.014)
R&D Intensity	0.06372**	0.07059**
	(0.027)	(0.030)
Leverage	0.00742	0.00449
	(0.025)	(0.014)
Size	0.19173***	0.19354***
	(0.031)	(0.026)
Capital Intensity	0.11900***	0.11602***
	(0.032)	(0.029)
Market Share	3.62799***	3.58750***
	(0.717)	(0.959)
Industry Sale	0.00000	0.00000
	(0.000)	(0.000)
HHI	-0.00839	-0.00764
	(0.006)	(0.005)
Observations	2217	2217
Model fit-F	16.79	147.04
Probability > F	0.000	0.000

Notes: * p<0.10, ** p<0.05, *** p<0.01. Clustered Robust Standard errors in parenthesis.

Conclusions and Discussion

We set out to resolve the paradox between the increasing consumer purchasing intentions from environmental firms and the disproportionally changed firm sale. To do so, we investigate if different types of firm environmental sustainability reduce information asymmetry differently, thus, influence firm sale differently. We contend that while firm environmental sustainability of consumption can reduce information asymmetry regarding both firm green activities and firm motives, firm environmental sustainability may only make

consumers aware of firms' green activities but not firms' motives, which can reduce consumers' purchasing intentions.

Our results lend support to our reasoning. We find that firm environmental sustainability of production is negatively associated with firm sale whereas the relationship between firm environmental sustainability of consumption and firm sale is positive. The results highlight the important role of information asymmetry regarding firms' motives in promoting environmental sustainability. When this information asymmetry is present, consumers tend to categorize firms with environmental sustainability activities as profit hunters who are self-interested and doing green activities only for the purpose of profitability. This can, in turn, decrease consumers' purchasing intentions, thus lead to a decreased firm sale.

More specifically, we show that contrary to extant belief, firm environmental sustainability can, under some conditions, decrease consumers' intention to buy from firms who already invest in communicating with consumers about their sustainable activities. The condition is information asymmetry regarding firm motives. Failing to reduce this type of information asymmetry, firms would face a situation where consumers surprisingly punish firms' green activities by reducing purchase.

This paper also has managerial implications. Two most commonly seen environmentally sustainable practices are studied – environmental sustainability of production and that of consumptions. Although firms invest resources and capital in both, consumers' reactions may differ considerably. This difference is rooted in the product life cycle. Specifically, the environmental sustainability of production is less observable to consumers than that of consumption since the former occurs at the early stage of the product life cycle, which is before consumers can own the product. In fact, the gains of the former are not sought

from strengthening the relationship with consumers but through cost savings achieved from improving the efficiency of operations which is a by-product of firm environmental sustainability of production (Barnett 2007; King and Lenox 2002a). This paper further shows that the environmental sustainability of production may even worsen the relationship with consumers, which is largely not expected by the firms. There is also good news – environmental sustainability of consumption, such as instructions on environmental-friendly usage and take-back procedure of products, can strengthen the relationship between firms and consumers. Therefore, firms need to strategically communicate with consumers in terms of their environmentally sustainable activities based on our evidence.

Although our findings provide unique insights in terms of firm strategies for communicating with consumers based on different types of their environmental practices, this paper includes a few limitations, which are mainly from the data source. First, the sample only includes the U.S. firms and therefore study U.S. consumer reactions only. Lament (2015) finds that consumers from European Union countries generally have higher expectations for firms to behave socially- and environmentally- responsible than consumers in the U.S. consumers. Therefore, our findings may not be generalized to other consumer markets in the world. Second, this study employed firm archival data so that we do not directly observe consumers' reactions to different types of firm environmental sustainability. In future studies, we hope to inspire research on this topic in different consumer markets to test the external validity of our findings. And we also hope additional research can employ behavioral experiments in controlled environments so that researchers can directly observe consumers' reactions.

One interesting and natural question following our findings is that if the information asymmetry regarding firm motives in the firm environmental sustainability of consumption can be reduced. If so, how? One possible way is the framing of the firm green claims (Olsen

et al. 2014). Therefore, it is worth asking, e.g., what are the characteristics of the framing for environmental sustainability of production that can reduce the information asymmetry regarding firm motives? And do those framing characteristics work with the environmental sustainability of consumption as well? Studying these questions, and, more broadly, the interactive effects of green claims framing and different types of environmental sustainability on firm performance, would be a fertile area for further work.

CHAPTER 3

GOOD TO BE EARLY, BETTER ON RIGHT TIME: FIRM DONATIONS AND STOCK MARKET REACTION

Abstract

From 1990 to 2015 firms increased their donations to natural disaster recovery by 18X. At the same time, many also suffer economic loss during these natural disasters. This firm behavior of giving money while also losing money at the same time has received a lot of attention from the literature. In summary, scholars argue that firms do this because the market may interpret the donations during an emergency as pro-social behaviors which may attract more consumers after the disaster, but also is a signal about a firm's ability to bounce back from the disaster's adverse effects. Therefore, disaster donation can mitigate the negative effects of natural disasters on firm stock market performance. However, examples in practice suggest that such a mitigating effect may depend on when the donation is made. The paper hypothesizes that neither the donations of first movers nor the followers can mitigate the negative stock market returns due to disasters. Instead, the moderating effect of donations will hold when the timing of firm donation and stakeholder attention match with each other. To test our hypotheses, we investigate the experiences of firms who donated to the 2017 Hurricane Harvey disaster. We find that Business-to-business (B2C) firms, on average, experienced a significant and negative stock market return on the second day after Hurricane Harvey landed at Houston at its utmost power. Business-to-business (B2B) firms, instead, received market attention on the third day with significant negative stock market returns. We also find that the match between the timing of firm donations and the timing of market attention can help strengthen the moderating role of firm donations. In particular, early B2C firm donors and late B2B firm donors experienced less negative stock market returns compared to their counterparts.

Introduction

Firms often respond charitably to humanitarian needs in times of crisis (Patten 2008; Zhang et al. 2009). The generosity of firm donations has led to claims that corporate philanthropic disaster response has become a part of business life (Fritz Institute 2005). For example, following the 9/11 attacks in 2001, $203 million were donated by 216 Fortune 500 firms in the United States (Crampton and Patten 2008). In another example, Fortune Global 500 firms pledged nearly $1.2 billion for disaster relief and reconstruction in response to the South Asian tsunami, Hurricane Katrina, and the Kashmiri earthquake combined (Muller and Whiteman 2009). Firm donations to disasters have increased by 1800% from 1990 to 2015 (Ballesteros 2017).

However, firms also suffer economic loss during these natural disasters (Hendricks and Singhal 2003; Muller and Kräussl 2011a; Schmidt et al. 2020). This firm behavior of giving money while also losing money at the same time has received a lot of attention from the literature. Prior research shows that while firms experience negative stock market returns due to the loss from disasters, firm donations are effective to mitigate such negative impacts (Liket and Simaens 2015; Muller and Kräussl 2011b, 2011a; Zhao and Zhang 2019). In summary, they argue that this is because the market may interpret the donations during the emergency as a signal about firms' ability to bounce back from the disaster's adverse effects. However, such a mitigating effect is not unconditional. The literature of corporate philanthropy (disaster giving is one type of corporate philanthropy) indicates that the timing of donations matters (Zhao and Zhang 2019). Namely, first-mover advantages (Lieberman and Montgomery 1998) exist in the context of regular firm donations.

But whether that logic applies to firm donations to disasters remains unclear due to the high uncertainty. In fact, this conflicts with examples in practice. Samsung donated to the 2008 Sichuan earthquake first followed by Nokia. Interestingly, Samsung spurred public backlash with worse stock market performance, whereas Nokia won applauses as a follower (Ballesteros 2017). In contrast, the first mover, Anglo American, and its followers made donations during the aftermath of the 2010 earthquake and tsunami in Chile and all benefited financially (Ballesteros 2017).

These examples suggest that the mitigation effect of firm donations during a disaster may still be true, but the timing of donations may also play a role in its effectiveness. The fact that the literature on timing strategy has understudied the role of stakeholders (Fosfuri et al. 2013; Lieberman and Montgomery 1998) is relevant because the timing of stockholders' attention may differ from firm donating dates. Madsen and Rodgers (2015) show that the stakeholder groups may reward firms for their pro-social activities is under the assumption that stakeholders pay attention and attend to firm social initiatives. Therefore, if firms make donations while the stakeholders do not pay attention, then stakeholders may not be aware of firms' pro-social behaviors, thus not rewarding the donations as firms expect. In comparison, a firm's loss due to disasters may be mitigated if they donate when the stakeholders are paying attention to them. Therefore, we propose neither the donations of first movers nor the followers can mitigate the negative stock market returns due to disasters. Instead, the moderating effect of donations will hold when the timing of firm donation and stakeholder attentions match with each other.

To verify our logic above, we specifically investigated the timing of market attention to two groups of firms (i.e., business to business (B2B) firms and business to consumer (B2C) firms) during disaster relief. Due to their different supply chain position, these two groups of

firms might be hurt differently and receive market attention at different times. In particular, we ask: *Are B2B firms or the B2C firms first to receive market stock market attention after a natural disaster?* Then, we ask: *Will the timing of stock market attention impact the moderating effects of firm donations to firm stock market returns?*

We investigate these research questions based on the experiences of firms who donated to the 2017 Hurricane Harvey disaster. We first consider the negative impacts of Hurricane Harvey on firms' stock market returns, and we find that the natural disaster is associated with negative stock market returns to firms. Second, we empirically test the timing of the stock market's attention to B2B firms versus B2C firms. We find that B2C firms, on average, experienced a significant and negative stock market return on the second day after Hurricane Harvey landed at Houston at its utmost power. B2B firms, instead, received market attention on the third day with significant negative stock market returns. Third, we confirm our reasoning and find that the match between the timing of firm donations and the timing of market attention would ensure the moderating role of firm donations. In particular, early B2C firm donors and late B2B firm donors experienced less negative stock market returns compared to their counterparts. This suggests that firms need to play it by ear while donating to disasters. I discuss the findings in the discussion section.

The remainder of the paper is organized as follows. Section 2 provides a brief review of the literature, followed by hypothesis development. Data and methodology are described in section 3. Section 4 provides analysis and results. I conclude with a discussion of the findings and contributions in section 5.

Literature Review and Hypotheses Development

Corporate philanthropy is defined as the voluntary and unconditional transfer of cash or other assets by private firms for public purposes (FASB 1993). According to a study by the Committee Encouraging Corporate Philanthropy (2018), charitable giving by the largest global corporations totaled $23.8 billion in 2017, up 15 percent from 2015, an increase for the third consecutive year. Notably, among several categories of corporate philanthropy, the average donation of firm disaster giving between 1990 and 2015 increased by 1800 percent (Ballesteros 2017).

Natural disasters, such as hurricanes and earthquakes, can be linked to concerns of "deadweight costs" to firms (Godfrey et al. 2009; Kleindorfer and Saad 2005), which usually causes investors to engage in reevaluation of firms (Pfarrer et al. 2010). Prior research shows that following natural disasters, the firm value in the stock market would decrease (Madsen and Rodgers 2015; Muller and Kräussl 2011a). Despite being negatively affected by disasters, firms increasingly donate to impacted areas and people of disasters. In fact, firm disaster donations are an increasingly prominent element of corporate philanthropy (Crampton and Patten 2008; Muller and Whiteman 2009). In contrast, the literature on firm disaster giving has expanded at a slow rate.

Unlike the research on firm value and corporate philanthropy which shows that there is a positive relationship between firm regular donations and firm financial performance (Liket and Simaens 2015; Muller and Kräussl 2011a; Wang et al. 2008; Zhao and Zhang 2019), the relationship between firm disaster giving and firm value remains unclear. Liang and Renneboog (2017) and Wang et al. (2008) find a positive relationship between firm disaster giving and firm value. However, Muller and Kräussl (2011b) show disaster donation

announcements by U.S. firms in response to Hurricane Katrina is associated with negative abnormal stock market returns. Whether firms can be rewarded by their pro-social activities depends on if stakeholders are aware of their activities (Madsen and Rodgers 2015). In other words, the stock market would reward firm disaster giving when it is paying attention to the donating behaviors. Based on this logic, we propose that in order to understand when firm disaster giving can minimize negative stock market returns due to disasters, we need to understand when the market pays attention to a certain group of firms. To do so, we first establish the negative relationship between stock market returns and the natural disaster, Hurricane Harvey. Then we explore supply chain position and firm stock market reactions, demonstrating the mechanism of market attention. Finally, we present the effect of match/mismatch between supply chain position and market attention on firm value after disasters.

Hurricane Harvey has been classified a 1000-year storm by the Space Science and Engineering Center at the University of Wisconsin, bringing 30 inches of rain or more to the areas inhabited by 6 million people, and well over 40 inches in many parts of Huston (Gilmer 2018). According to the National Oceanic and Atmospheric Administration (NOAA) (Blake and Zelinsky 2018), the damage estimate for Harvey is $125 billion, which would tie Hurricane Katrina, the costliest hurricane ever. However, this number may be conservative. Different than Katrina, Harvey brought exceptional rainfall over some of the densely populated areas of the U.S. Gulf Coast, leading to widespread flooding, which would contribute to a larger loss for a much longer period of time as compared to Katrina. According to the latest estimate from AccuWeather (AccuWeather 2019), a weather forecasting service provider, "Hurricane Harvey is predicted to be more costly than Katrina and Sandy combined", and would reach

$190 billion. As of June 2020, the total cost due to Hurricane Harvey is yet completely calculated due to the profound indirect costs caused by the disaster.

In fact, at the end of August 2017, the impact of Hurricane Harvey on the nation's economy was largely unknown and was expected to be limited, according to the New York Times, since people believed they learned from Hurricane Katrina and thus were well prepared (e.g., Dougherty and Schwartz 2017). This misconception made Harvey an unprecedented catastrophe, which extended well beyond the geographic area of Houston. NPR reported on August 28, 2017, that Harvey's effects would be felt nationwide (Zarroli 2017). Moody's adjusted their estimate for 2017 Q3 real GDP growth down from 3% to 2.5%, due to the impact of Harvey. Goldman Sachs was also anticipating lower economic growth due to the storms, revising its Q3 estimate of real GDP growth down from 2.8% to 2.0% (Ciolli 2017; Liesman 2017). Non-impacted area based firms that depend on Houston's industry were also affected by supply disruptions (Roos 2017). For instance, the supply chain of oil production was dependent on the "just-in-time" availability of resources from crews to sand, water, chemicals, pipe, and sophisticated equipment. The flooding of equipment and supply yards, as well as highways along the Gulf Coast, interrupted the steady growth of oil production from the Permian Basin of West Texas to the Bakken fields of North Dakota, which is 1,500 miles away to the north (Arnold 2017). Such supply chain disruptions caused by natural disasters could lead to negative stock market reactions (Hendricks and Singhal 2003; Schmidt et al. 2020).

The concern of the "deadweight" cost may be induced by the uncertainty associated with Hurricane Harvey's economic impact (Godfrey et al. 2009; Kleindorfer and Saad 2005). For instance, Newell Brands, the maker of Rubbermaid storage products, lowered its earnings guidance for 2017 due to supply chain disruptions, one type of "deadweight" cost, from

Harvey (Business Wire 2017). This type of uncertainty associated with salient negative events like Harvey can be expected to "engage investors in active sensemaking and reevaluation of a firm" (Pfarrer et al. 2010). It is this kind of attention, and the uncertainty associated with it, that we expect drives active reevaluation of firms by investors.

If such reevaluations led to the anticipation of future deadweight costs to firms (DiChristopher 2017), this may have driven down perceptions of asset value. Hence, we hypothesize that:

H1: *Negative firm abnormal stock market returns occur after a natural disaster.*

Supply chain position refers to a firm's position in a supply chain. For instance, firms operating in the downstream supply chain, such as business to consumer (B2C) firms, are more proximate to the consumers, and thus may be more visible than firms operating in the relative upstream supply chain, such as business to business (B2B) firms, which are more distant from the consumers and thus are less well known. In the context of disaster relief, B2C inventories may be impacted more immediately than B2B inventories. Consistent with prior studies, we distinguish between B2B and B2C firms based on firm industry codes to measure supply chain position.

Prior research shows that new information is a major factor influencing stock returns and quickly leads to stock price changes (Hong et al. 2000; Malkiel and Fama 1970; Qian and Rasheed 2007). In this process, media plays an important role by disseminating information to a broad audience, especially individual investors (Fang and Peress 2009). Stock market returns are significantly impacted by media coverage, a commonly used measure for market attention (García 2013; Peress 2008; Tetlock 2007; Tetlock et al. 2008). Tetlock (2007) find that large media coverage leads to stronger price and trading volume. The sentiment of news further predicts the direction of stock market price changes. Negative news forecasts low firm

earnings (Tetlock et al. 2008). During exogenous negative events, such as recessions, such negative impacts are more pronounced (García 2013).

While processing the firm loss information due to Hurricane Harvey from media coverage, investors could do the calculations of which firms would incur losses and when. In this context, firms at different supply chain positions are exposed to different levels of loss. Severe storms often dampen economic activity in the short term by destroying existing inventories and disrupting the consumption of inventories (Stupak 2017). Therefore, B2C firms who always hold inventories for consumers and depend on consumer consumption will incur the immediate loss, whereas B2B firms would experience loss later when B2C firms' loss will travel upstream supply chain then reach B2B firms later.

In the case of Hurricane Harvey, the federally declared disaster region covers about 41,500 square miles of landmass, larger than the states of Connecticut, Massachusetts, New Hampshire, Rhode Island, and Vermont combined (South Texas Economic Development Center 2018). On top of that, this large area is the fourth largest metropolitan area and one of the most populous areas in the US, thus, has a tremendous contribution to consumer consumptions while holding a lot of B2C inventories. According to advance figures from the Census Bureau, national retail sales decreased by 0.2% in August 2017, after rising 0.3% in the previous month (the Census Bureau 2017). Consequently, B2C firms would incur a great amount of immediate loss after Hurricane Harvey and such loss would take some time to reach B2B firms. Thus, the negative stock market reactions first occur to B2C firms then B2B firms.

It is also possible that investors may not have the complete firm loss information due to Hurricane Harvey for both B2B and B2C firms at the same time. Usually the larger the media coverage (i.e. market attention), the quicker the information diffuses. And the speed of

information diffusion influences how quickly stock prices change (Sul et al. 2017). Peress (2008) finds that more visible firms tend to have larger media coverage, thus experience stock market return changes more immediately.

At the early stage of Hurricane Harvey, B2C firms were covered by mass media more than B2B firms because of their higher visibility to the consumers and the market. Consequently, information of B2C firms diffused more quickly than that of B2B firms, thus would influence the investors first. In contrast, it would take longer for news focusing on B2B firms to reach the investing public. Therefore, the market would react to B2B firms at the later stage of the disaster. Hence, we hypothesize that:

H2: *B2C firms experience negative stock market returns earlier than B2B firms after a natural disaster.*

Firm disaster donations are an increasingly prominent element of corporate philanthropy (Crampton and Patten 2008; Muller and Whiteman 2009). In contrast, the literature on firm disaster giving remains scarce and becomes increasingly inconclusive overtime. Behind this ambiguity, there is a crucial difference between firm disaster giving (an emergency giving) and regular firm giving: uncertainty of financial implications of such donations due to high uncertainty of the disasters.

Prior studies have shown that there is an overall positive relationship between firm regular donations and firm financial performance (Liket and Simaens 2015; Muller and Kräussl 2011a; Wang et al. 2008; Zhao and Zhang 2019). The implicit premise is that firms already have complete knowledge of how the stakeholders would react to their regular donations. For instance, one typical corporate philanthropy practice is to donate to the local education system, the impact of which is certain and positive. In comparison, the potential direct and indirect impact of disasters on the firms and retail markets are often difficult to estimate. Information on social needs is often unavailable or inaccurate for months (Kousky 2014). Therefore, firms

would not know what or when to donate in order to minimize their loss due to the disasters. In fact, firms often make donation decisions that conflict with the logic of market operations (Lampel et al. 2009), which may lead to market backlash instead of rewards. On the one hand, if firms donate at the early stage of disasters, they could take advantage of first movers and enjoy a high reputation from the market. On the other hand, if firms donate at the late stage of a disaster, they would have more relevant estimations to donate a more relevant package to the impacted area and experience a positive market reaction. To date, scholars have not reached a consensus on the moderating effect of timing of firm donations to disasters.

Madsen and Rodgers (2015) show that the stakeholder groups may reward firms for their pro-social activities, which is the assumption that stakeholders pay attention and attend to firm social initiatives. Therefore, in order for the market to award firms for their disaster giving, the market needs to be aware of those behaviors. As argued above, the stock market pays attention to B2C firms more than B2B firms early, then changes attention later. Then, if B2C firms make donations early, those disaster relief efforts will be known by the market and interpreted as a positive sign for strong liquidity which may indicate a high chance of bouncing back after the disaster. However, if B2C firms make donations late instead of early on, such a positive signal would be largely unknown to the market, thus not receiving expected market rewards. The same logic applies to B2B firms as well. Early donations from B2B firms might not be guaranteed to be known by the market. Instead, late B2B firm donors are more likely to be awarded by the market since market attention to B2B firms comes late. Therefore, we argue firm donating timing needs to match with market attention to experience less negative stock market returns. Or more formally:

H3a: *B2C firms donating at the early stage of a natural disaster experience less negative market returns than B2C firms donating at the later stage of a natural disaster.*

H3b: *B2B firms donating at the later stage of a natural disaster experience less negative market returns than B2B firms donating at an earlier stage of a natural disaster.*

Data and Methodology

For firm disaster donations to Hurricane Harvey, we combined data from Disaster corporate aid trackers of the Corporate Citizenship Center (CCC) at the U.S. Chamber of Commerce Foundation[7] and RavenPack News Analytics, a data provider that aggregates news from publishers including Dow Jones Newswires, the Wall Street Journal, Direct Regulatory and Press Release feeds, and over 22,000 other traditional media organizations. In total, 311 firms and organizations in the U.S. were identified. After dropping organizations and firms which were not publicly listed on the New York Stock Exchange during the period of Hurricane Harvey, we obtained a sample of 206 active firms. This number closely represents the entire population of firms which donated to Hurricane Harvey during the impacted period. For these firms, stock return data were then collected from the Center for Research in Security Prices (CRSP) database from May 2016 to September 2017.

Then, firm financial data were collected from Compustat North America from May 2016 to September 2017. Firm social responsibility score of year 2016 was collected from ASSET 4 dataset. This data source is widely used in the literature and has been shown to have valid measures (Cheng et al. 2014b; Eccles et al. 2014; Villena and Dhanorkar 2020). After merging the donating firm list with firm financial data and social responsibility score, 188 firms were left for analyses. Table A1 (APPENDIX A) presents all 206 donating firms during Hurricane Harvey.

[7] These data are available at https://www.uschamberfoundation.org/aid-event/hurricane-harvey.

Consistent with prior studies (Flammer and Kacperczyk 2015b; Schmidt et al. 2017), we measure supply chain position by categorizing the firms into business-to-consumer (*B2C*) and business-to-business (*B2B*) sectors based on four-digit Standard Industrial Classification (SIC) codes. Delineating in this manner leads to 124 *B2B* donating firms and 74 *B2C* donating firms. This variable takes the value of 1 for *B2C* firms and 0 for *B2B* firms.

In accordance with the literature on corporate philanthropy, we controlled for firm size (*Firm Size*) which has a known correlation with corporate philanthropy and stock market performance (Muller and Kräussl 2011a). We measure size as the natural logarithm of the number of firm employees in the most recent fiscal year (Schmidt et al. 2020). We further control for leverage measured as the ratio of debt to equity (*Debt to Equity Ratio*), where the book value of the debt reflects the most recent fiscal year prior to Hurricane Harvey, and the market value of equity is considered 10 days before the event date (Hendricks and Singhal 1996; Schmidt et al. 2020). As an indicator of financial slack (Bhandari 1988; Fama and French 1993), higher debt to equity ratios may soften the stock market reaction to negative events. Following Hendricks et al. (2009), we calculated a percentage measure of market share (*Market Share*) since leading firms tend to perform financially better. Firm growth potential could impact the stock market prices as well. We calculated book to market ratio (*Book to Market Ratio*), using the book value of the equity in 2016 divided by the market value of equity 10 days prior to the event date, to control firm future growth potential. Industry competitiveness, measured by the Herfindahl index (*HHI*), can also impact stock market return (Hendricks and Singhal 2003). *HHI* was computed as the sum of squared market shares of all firms in the industry multiplied by one hundred. *Market Share* and *HHI* were measured at the three-digit SIC level (Hendricks and Singhal 2003). Besides financial measures, we also control for firm social responsibility (*Social Responsibility*), which is the weighted average relative rating of a firm

based on the reported social information from four social categories including workforce, human rights, community service, and product responsibility. Social responsibility has proved to show the "insurance-like" protection for a firm value when experiencing negative events (Godfrey 2005; Godfrey et al. 2009), thus impact stock market return.

We analyze Hurricane Harvey's impact on the stock market price by using the standard event study methodology (Brown and Warner 1985). Similar studies have examined stock market returns to natural disasters (Madsen and Rodgers 2015; Muller and Kräussl 2011a). Because prior studies provide excellent summaries of this method (Kothari and Warner 2007; MacKinlay 1997; McWilliams and Siegel 1997), we limit our discussion here to a brief summary of the steps we undertook.

We calculate the abnormal returns (AR) associated with Hurricane Harvey from day 0 (i.e., Friday, August 28th) to day +4 (i.e., Friday, September 1st) to observe how the market reacted over time. Then we calculated the cumulative abnormal returns (CAR) over the 3-day event window over [0, 2] (Monday, August 28th to Wednesday, August 30th). Hurricane Harvey hit Houston at its utmost power on August 26th (Fernandez et al. 2017), which was a Saturday. So, the market was not able to react until the next trading day, August 28th, which was set as the event date. We further included stock market returns on day 3 and day 4 to explore if market reaction changed throughout the whole disaster as Hurricane Harvey ends on day 4, September 1st.

Daily returns were calculated using the log-normal formula $R_t = \ln (P_t/P_{t-1})$ over the interval from October 24th 2016 to August 17th 2017 which is the 200-day estimation window with a 10-day offset prior to Hurricane Harvey (Brandon-Jones et al. 2017; Schmidt et al. 2020). Abnormal returns represent the differences between the *ex post* return of a stock over the event window and the normal, expected return for the firm over the event window. We

use the Fama-French three factor model (Fama and French 1993) linking the return of a stock to the market portfolio of that stock in order to derive the normal expected return as:

$$R_{it} = \alpha_i + \beta_i * R_{mt} + S_i * SMB_t + H_i * HML_t + \varepsilon_{it},$$

where R_{it} is the model return of firm *i* on day *t* and R_{mt} is the return of the market portfolio, SMB_t is the average return of small capitalization securities overlarge capitalization securities, HML_t is the average returns of high book-to-market stocks over low book-to-market stocks, and ε_{it} is the disturbance term that has a mean of 0. To derive the abnormal return, we calculated:

$$AR_{it} = R_{it} - \left(\hat{\alpha}_i + \hat{\beta}_i * R_{mt} + \hat{S}_i * SMB_t + \hat{H}_i * HML_t\right),$$

Where AR_{it} is the abnormal return, which is the difference between the actual stock return, R_{it}, of firm *i* on day *t* and the expected returns predicted by the three-factor models (i.e., $\hat{\alpha}_i + \hat{\beta}_i * R_{mt} + \hat{S}_i * SMB_t + \hat{H}_i * HML_t$). AR_{it} is then cumulated over the event window becoming the cumulative abnormal return:

$$CAR_i(t_1, t_2) = \sum_{t=t_1}^{t_2} AR_{it} ,$$

Considering all N firm donations in our sample, the average abnormal return on day t is:

$$\overline{AR}_t = \sum_{i=1}^{N} \frac{AR_{it}}{N},$$

Then the average cumulative abnormal return over the event window is calculated as:

$$\overline{CAR}(t_1, t_2) = \sum_{t=t_1}^{t_2} \overline{AR}_t ,$$

Event studies with the whole sample and split samples were conducted to test all three hypotheses. To further ensure the robustness of our analysis, we also include seemingly

unrelated regression and OLS including the financial and non-financial control variables to test hypotheses 2 and 3. Details are explained below.

After we obtained abnormal returns and cumulative abnormal returns of firms from event study above, we examined if B2C firms experience negative stock market returns earlier than B2B firms (H2) by regressing abnormal stock market returns on a set of regressors including supply chain position and controls. In particular, we used the seemingly unrelated regression (SUR) model which improves estimation efficiency when all regressors remain identical but dependent variable of each equation changes in each equation (Greene 2002). This is because SUR would handle the situation in which the errors of each equation in the SUR equation system are correlated with the errors of the other equations, which is the case in our analysis. The system of SUR equations estimated for Hypothesis 2 is detailed in Table 12. Once we obtain the pattern of market attention, we would be able to construct an indicator to distinguish early donors and late donors. This indicator and supply chain position would together decide the variable of interest in Hypothesis 3, (mis)match with firm donating timing and timing of market attention. Then the ordinary least square regression was employed to test Hypothesis 3. We explain the analysis step by step in the next section.

(Table 12 on next page)

TABLE 12: Seemingly unrelated regression (SUR): estimated equations.

$$\overline{AR}_{t=0} = \beta_0 + \beta_1 * B2C + \beta_2 * Firm\ Size + \beta_3 * Book\ to\ Market\ Ratio + \beta_4 * Debt\ to\ Equity\ Ratio + \beta_5 * HHI + \beta_6 * Marekt\ Share + \beta_7 * Social\ Responsibility + \varepsilon_{t=0}$$

$$\overline{AR}_{t=1} = \beta_0 + \beta_1 * B2C + \beta_2 * Firm\ Size + \beta_3 * Book\ to\ Market\ Ratio + \beta_4 * Debt\ to\ Equity\ Ratio + \beta_5 * HHI + \beta_6 * Marekt\ Share + \beta_7 * Social\ Responsibility + \varepsilon_{t=1}$$

$$\overline{AR}_{t=2} = \beta_0 + \beta_1 * B2C + \beta_2 * SFirm\ ize + \beta_3 * Book\ to\ Market\ Ratio + \beta_4 * Debt\ to\ Equity\ Ratio + \beta_5 * HHI + \beta_6 * Marekt\ Share + \beta_7 * Social\ Responsibility + \varepsilon_{t=2}$$

$$\overline{AR}_{t=3} = \beta_0 + \beta_1 * B2C + \beta_2 * Firm\ Size + \beta_3 * Book\ to\ Market\ Ratio + \beta_4 * Debt\ to\ Equity\ Ratio + \beta_5 * HHI + \beta_6 * Marekt\ Share + \beta_7 * Social\ Responsibility + \varepsilon_{t=3}$$

$$\overline{AR}_{t=4} = \beta_0 + \beta_1 * B2C + \beta_2 * Firm\ Size + \beta_3 * Book\ to\ Market\ Ratio + \beta_4 * Debt\ to\ Equity\ Ratio + \beta_5 * HHI + \beta_6 * Marekt\ Share + \beta_7 * Social\ Responsibility + \varepsilon_{t=4}$$

Analysis and Results

Table 13 presents the correlations for all the measures in our study. To examine Hypothesis 1 and test whether the abnormal returns on any day of the 3-day event window (days 0, +1, and +2) as well as the cumulative abnormal return in that window are statistically different from zero, we performed the generalized rank test (GRANK) which outperforms both the parametric and nonparametric tests without suffering from either the serial correlation of errors or the event-induced volatility (Kolari and Pynnonen 2011). Results are present in Table 14. We observe that on Day 0, there is no significant stock market reaction to the disaster yet. Then on Day +1, there is a negative abnormal stock market return of 0.22%. The GRANK test shows that the abnormal stock returns on Day +1 are significantly different from zero, indicating a negative market reaction. Similar to Day +1, analysis on Day +2 suggests that firms also experienced significant negative stock market returns. After Day +2, there are no more significant abnormal returns observed on Day 3 and Day 4. The last column

presents the cumulative results in the event window and indicates that Hurricane Harvey is associated with a negative cumulative abnormal stock market return of 0.45% across the 3-day window. The result is illustrated in Figure 4. To conclude, these results provide support for Hypothesis 1. This indicates that the market interprets the deadweight costs of firms occurring after Hurricane Harvey and thus reevaluates firm values negatively.

(Table 13, Table 14, and Figure 4 on next two pages)

TABLE 13: Correlations

	Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
(1)	$\overline{AR}_{t=0}$	1											
(2)	$\overline{AR}_{t=1}$	0.3236	1										
(3)	$\overline{AR}_{t=2}$	0.004	0.1449	1									
(4)	$\overline{AR}_{t=3}$	0.0762	-0.0207	-0.2221	1								
(5)	$\overline{AR}_{t=4}$	0.154	-0.199	-0.3144	0.0518	1							
(6)	B2C	-0.0826	-0.1462	0.1023	-0.0942	0.152	1						
(7)	Firm Size	0.1278	0.157	-0.0397	-0.0122	-0.0077	0.2672	1					
(8)	Book to Market Ratio	-0.1135	-0.2411	-0.0243	0.0981	0.0262	-0.2082	-0.1535	1				
(9)	Debt to Equity Ratio	0.0668	0.0275	-0.0795	0.0549	-0.055	-0.1194	0.2683	0.3598	1			
(10)	HHI	-0.0954	-0.022	0.039	-0.2072	0.1858	0.1639	0.2083	-0.1827	-0.1276	1		
(11)	Market Share	0.0534	0.1148	0.1182	-0.0628	-0.052	0.0697	0.4094	-0.2336	-0.0472	0.7103	1	
(12)	Social Responsibility	0.0378	0.0862	-0.1376	0.024	-0.0501	0.0645	0.6404	-0.106	0.2588	0.0288	0.1931	1

TABLE 14: Stock market reactions to Hurricane Harvey

	Abnormal stock return					
Dependent variable	Day 0	Day +1	Day +2	Day +3	Day +4	Cumulative [Day 0, Day +2]
Abnormal stock return percentage	-0.03%	-0.22%**	-0.20%**	-0.07%	0.30%	-0.45%***
P-value	0.4073	0.0113	0.0126	0.5347	0.1842	0.0097

Note: N = 206

*** p-value < .01, ** p-value <.05, * p-value <.1, + p-value <.15

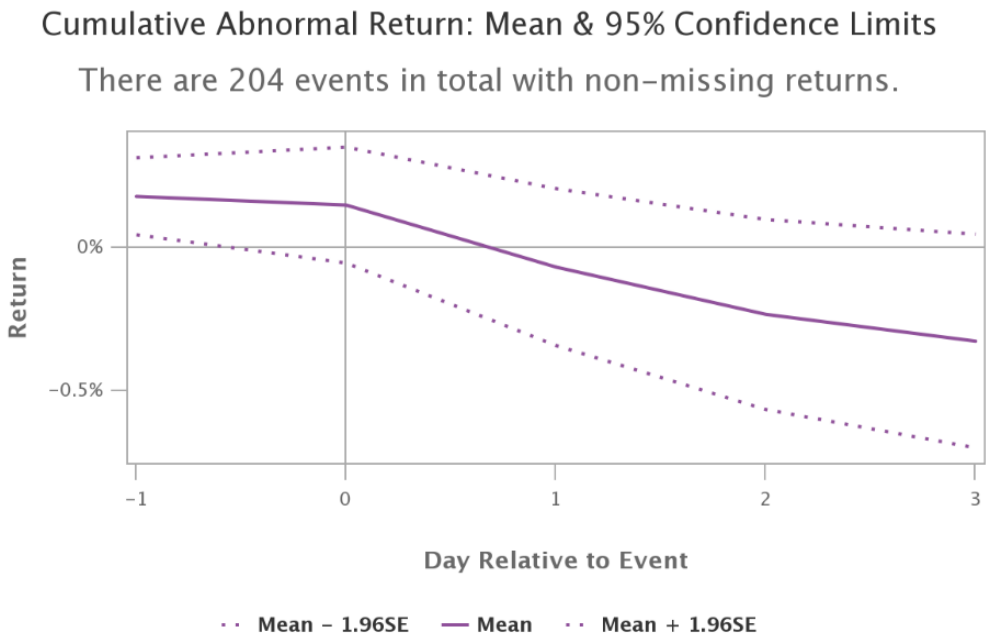


FIGURE 4: Stock market returns to Hurricane Harvey.

To examine support for Hypothesis 2, we first report the results of a split-sample analysis in Table 15. Our intention is to explore whether B2C firms receive more market attention first than B2B firms so that they experience the negative stock market return earlier than B2B firms consequently. Consistent with the results for Hypothesis 1, there is no significant stock market reaction to the disaster from either B2C or B2B firms on Day 0. However, on Day +1, B2C firms experienced significant and negative stock market returns while there is no significant stock market reaction to the B2B firms. Then we observe that the situation flipped on Day +2. B2B firms experienced negative and significant stock market reactions while the negative reactions to B2C firms were gone.

(Table 15 on next page)

TABLE 15: Stock market reactions to Hurricane Harvey – B2B firms versus B2C firms

	Abnormal stock return				
Dependent variable	Day 0	Day +1	Day +2	Day +3	Day +4
B2B firm donors					
Abnormal stock return percentage	0.02%	-0.07%	-0.26%**	0.02%	0.16%
P-value	0.9491	0.1451	0.015	0.5398	0.732
B2C firm donors					
Abnormal stock return percentage	-0.11%	-0.46%**	-0.10%	-0.22%	0.54%
P-value	0.1868	0.031	0.3327	0.8049	0.1386

Note: N(B2B) = 128, N(B2C) = 78
*** p-value < .01, ** p-value <.05, * p-value <.1, + p-value <.15

As an alternative means to examine support for Hypothesis 2, we estimated a SUR model to confirm that B2C firms experience the negative market return first, then followed by the B2B firms. Results are present in Table 16. We observe that B2C firms experience more negative stock market returns than B2B firms on Day +1 ($\beta = -0.0052,\ p < 0.01$). In contrast, on Day +2, B2B firms significantly experience more negative stock market returns compared to B2C firms ($\beta = 0.0035,\ p < 0.1$). This result is consistent with the split-sample event study above. And it provides additional supports to hypothesis 2 that B2C firms receive market attention first so that they experience negative stock market returns early, on Day +1. On Day +2, however, B2C firms' stock market returns were significantly lower than B2B firms, which indicates that the market paid more attention to B2B firms on Day +2 resulting in negative stock market returns.

(Table 16 on next page)

TABLE 16: Seemingly unrelated regressions – stock market reactions to Hurricane Harvey

	Abnormal stock return				
Variables	Day 0	Day +1	Day +2	Day +3	Day +4
B2B (base)	-	-	-	-	-
B2C	-0.0027+	-0.0052***	0.0035*	-0.0011	0.0026
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Firm Size	0.0014*	0.0014**	-0.0004	-0.0000	0.0005
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Book to Market Ratio	-0.0053**	-0.0097***	0.0010	0.0034	0.0023
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Debt to Equity Ratio	0.0000	0.0000	-0.0000	-0.0000	-0.0000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
HHI	-0.0001**	-0.0001	-0.0001	-0.0003***	0.0003***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Market Share	0.0084	0.0059	0.0201**	0.0138	-0.0262***
	(0.007)	(0.006)	(0.008)	(0.009)	(0.008)
Social Responsibility	-0.0001	-0.0000	-0.0001*	0.0000	-0.0000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Constant	0.0028	0.0024	0.0026	-0.0005	-0.0015
	(0.003)	(0.003)	(0.004)	(0.004)	(0.003)
Firms	188	188	188	188	188
Chi-square	16.74	31.85	13.16	13.16	25.17
Probability > Chi-square	0.0192	0.0000	0.0683	0.0684	0.0007

Notes: Standard errors are in parentheses. +, *, **, and *** denote 15%, 10%, 5% and 1% significance levels for two-tailed tests, respectively.

Hypothesis 3 proposes that early B2C firm donors and late B2B firm donors would experience less negative stock market reactions than late B2C firm donors and early B2B firm donors, respectively. Similar to the analysis for Hypothesis 2, we conducted both split-sample analysis and regression of the whole sample. In Table 17, we find that late B2B firms and early B2C firms did not experience significantly negative stock market returns. Instead, early B2B firm donors and late B2C firm donors experienced significant negative stock market returns. In addition, the results in Table 18 lend additional support to Hypothesis 3. The coefficient of match is positive and significant ($\beta = 0.006,\ p < 0.15$). This indicates that compared to late

B2C firm donors and early B2B firm donors, the stock market returns of early B2C firm donors and late B2B firm donors are significantly higher.

TABLE 17: Cumulative abnormal stock returns to Hurricane Harvey for early B2B/B2C, late B2B/B2C firm donors

Dependent variable	Early B2B firm donors	Late B2B firm donors	Early B2C firm donors	Late B2C firm donors
Abnormal stock return percentage	-0.50%*	-0.33%	-0.57%	-1.02%**
P-value	0.0683	0.1622	0.3179	0.0263
N	48	46	27	35

*** p-value < .01, ** p-value <.05, * p-value <.1, + p-value <.15

TABLE 18: Regression analysis on early B2B/B2C, late B2B/B2C firm donors

Abnormal stock return Variables	Cumulative [Day 0, Day +2]
Match (donation and market attention)	0.0060+
	(0.004)
B2C	-0.0047
	(0.004)
Early Donations	-0.0025
	(0.004)
Firm Size	0.0028*
	(0.002)
HHI	-0.0001
	(0.000)
Capital Intensity	0.0000
	(0.000)
Constant	-0.0304*
	(0.016)
Firms	132

Notes: Standard errors are in parentheses. + and * denote 15% and 10% significance levels for two-tailed tests, respectively.

Conclusions and Discussion

The purpose of this study was to determine if donation timing can impact the effectiveness of firm disaster giving on mitigating the negative stock market returns due to natural disasters. We find that, after Hurricane Harvey, firms whose donation timing matched with the timing of market attention to them experienced less negative stock market returns compared to other firms. This is because the market is aware of these firms' efforts in disaster relief, which could be interpreted as a strong bounce-back signal, and it reacts less negatively. Matching the donation timing with market attention timing is the key.

In particular, we find that the stock market first focused on B2C firms first after Hurricane Harvey since B2C firms tend to incur the immediate loss and receive large media coverage. Then the market shifted attention to B2B firms. Following this pattern of market attention, we find that early B2C firm donors and late B2B firm donors tend to experience less negative stock market returns. In contrast, their counterparts, early B2B and late B2C firm donors all experienced more negative stock market reactions since these firms' disaster relief efforts may not be known by the market as their donation timings did not match with the market attention.

As such, we propose a scheme for firms to better understand the decision-making process of the stock market (or the investors) under uncertainty with limited information. The three hypotheses, therefore, serve as three sequential nodes of the decision tree, which is formally called Fast-and-frugal trees (Martignon et al. 2003, 2008). Fast-and-frugal trees (FFTs) are simple algorithms that facilitate efficient decisions based on limited information and they have been employed to provide guidance for a variety of domains including finance (Aikman et al. 2014; Woike et al. 2015). This can be used as a tool to understand investors' decision-making during disasters while they assess firms' potential to recover from the adverse

effects due to disasters. In particular, the first node of the decision tree is supported by our findings for the first hypothesis, which is investors' negative reaction to firm loss. The second decision node is, then, asking the question: which firms will experience significant loss first? Therefore, the market would react negatively first to some firms then switch to other firms. By understanding this decision-tree process, firms can make better decisions to minimize the negative market return. For instance, choosing the optimal donation timing which should be depending on the timing of market attention, decided by the FFTs of the first and second hypotheses. To summarize, we illustrate, in the context of disaster period, how the market evaluates the firms based on FFTs and we recommend firms themselves to understand such FFTs to make better decisions.

We highlight the contributions of this study as follows. Although being understood as a strategic firm behavior to mitigate firm loss after disasters, firm donations, in practice, show opposite effects including both mitigation and exacerbation. To investigate this issue, we learned from stakeholder attention theory and contribute to the literature of firm disaster giving by showing that if firm donation timing matches with market attention, the mitigating effect of firm donation is maximized. To make this contribution, we first explore the pattern of market attention towards firms at different supply chain positions. Combining supply chain position literature and literature of timing strategy, we predict and find that after Hurricane Harvey, the stock market pays attention to B2C firms first then B2B firms since the formers may be covered by media and encounter immediate loss. In fact, this study extends the literature of timing strategy, supply chain position, and firm disaster giving by organically organizing them together.

From a managerial perspective, this study offers important insights for firms to understand the timing of donations to minimize firm loss due to natural disasters. As firm

disaster giving has become a part of business life (Muller and Kräussl 2011a), it is crucial for firms to know how to maximize potential financial gains from making donations to disasters. To conclude, neither being the first movers nor the followers would be the best choice. Instead, firms need to play by their eyes to watch market attention based on their supply chain positions and match their donation timing with the market attention.

Although our findings provide unique insights into firm disaster donation strategy, our study includes a few limitations, which open the doors for future research. First, we only include the firms who made donations to Hurricane Harvey. As a result, we cannot compare the stock market performance between donating firms and non-donating firms, which can be used to understand the direct impacts of firm donations on firm stock market performance in the future. Second, we studied the experiences of firms donating to Hurricane Harvey only. In future studies, we hope to inspire research on this topic that includes more observations from additional cases. It is critical to verify the external validity of our findings. This study can, therefore, serve as a first step to motivate future research in this area.

REFERENCES

3M. 2019. "3M Supplier Responsibility Code."

3M. 2020. "Supplier of the Year Award." (https://www.3m.com/3M/en_US/suppliers-direct/suppliers/SOY/, accessed March 21, 2020).

AccuWeather. 2019. "AccuWeather Predicts Hurricane Harvey to Be More Costly than Katrina, Sandy Combined," , July 1. (https://www.accuweather.com/en/weather-news/accuweather-predicts-hurricane-harvey-to-be-more-costly-than-katrina-sandy-combined/357513, accessed May 29, 2020).

Aikman, D., Galesic, M., Gigerenzer, G., Kapadia, S., Katsikopoulos, K. V., Kothiyal, A., Murphy, E., and Neumann, T. 2014. "Taking Uncertainty Seriously: Simplicity versus Complexity in Financial Regulation," SSRN Scholarly Paper No. ID 2432137, SSRN Scholarly Paper, Rochester, NY: Social Science Research Network, May 2. (https://doi.org/10.2139/ssrn.2432137).

Angelidis, J., and Ibrahim, N. 2004. "An Exploratory Study of the Impact of Degree of Religiousness Upon an Individual's Corporate Social Responsiveness Orientation," *Journal of Business Ethics* (51:2), pp. 119–128. (https://doi.org/10.1023/B:BUSI.0000033606.27489.bf).

Arnold, B. 2017. "Hurricane Harvey Puts Squeeze on Oil Supply Chain," *TheHill*. (https://thehill.com/blogs/pundits-blog/energy-environment/349060-hurricane-harvey-puts-squeeze-on-oil-supply-chain).

Azadegan, A., Patel, P. C., and Parida, V. 2013. "Operational Slack and Venture Survival," *Production and Operations Management* (22:1), pp. 1–18. (https://doi.org/10.1111/j.1937-5956.2012.01361.x).

Ballesteros, L. 2017. "Drivers and Consequences of Non-Market Decision-Making: Evidence from Global Corporate Disaster Giving," Ph.D., Ph.D., United States -- Pennsylvania: University of Pennsylvania. (http://search.proquest.com/docview/1930528867/abstract/1CBF72B3CACD4899PQ/1).

Banerjee, S. B., Iyer, E. S., and Kashyap, R. K. 2003. "Corporate Environmentalism: Antecedents and Influence of Industry Type," *Journal of Marketing* (67:2), SAGE Publications Inc, pp. 106–122. (https://doi.org/10.1509/jmkg.67.2.106.18604).

Barnett, M. L. 2007. "Stakeholder Influence Capacity and the Variability of Financial Returns to Corporate Social Responsibility," *Academy of Management Review* (32:3), Academy of Management, pp. 794–816. (https://doi.org/10.5465/amr.2007.25275520).

Barnett, M. L., and Salomon, R. M. 2012. "Does It Pay to Be Really Good? Addressing the Shape of the Relationship between Social and Financial Performance," *Strategic Management Journal* (33:11), pp. 1304–1320. (https://doi.org/10.1002/smj.1980).

Baron, D. P. 2009. "A Positive Theory of Moral Management, Social Pressure, and Corporate Social Performance," *Journal of Economics & Management Strategy* (18:1), pp. 7–43. (https://doi.org/10.1111/j.1530-9134.2009.00206.x).

BASF. 2018. "BASF Is Most Sustainable Innovation Partner for BMW." (https://www.basf.com/us/en/who-we-are/sustainability/whats-new/sustainability-news/2018/basf-is-most-sustainable-innovation-partner-for-bmw.html, accessed March 27, 2020).

Baum, C. F., Schaffer, M. E., and Stillman, S. 2003. "Instrumental Variables and GMM: Estimation and Testing," *The Stata Journal* (3:1), SAGE Publications, pp. 1–31. (https://doi.org/10.1177/1536867X0300300101).

BBMG and GlobeScan. 2017. "Brand Purpose in Divided Times: Four Strategies for Brand Leadership."

Belsley, D. A., Kuh, E., and Welsch, R. E. 2013. *Regression Diagnostics: Identifying Influential Data and Sources of Collinearity*, (22062nd edition.), Hoboken, N.J: Wiley-Interscience.

Berchicci, L., and King, A. 2007. "11 Postcards from the Edge," *The Academy of Management Annals* (1:1), Routledge, pp. 513–547. (https://doi.org/10.1080/078559816).

Berg, A., Hedrich, S., Ibanez, P., Kappelmark, S., Magnus, K.-H., and Seeger, M. 2019. "Fashion's New Musthave: Sustainable Sourcing at Scale," McKinsey's 2019 Chief Purchasing Officer (CPO) Survey, McKinsey & Company, October 11. (https://www.mckinsey.com/~/media/mckinsey/industries/retail/our%20insights/fashions%20new%20must%20have%20sustainable%20sourcing%20at%20scale/fashions-new-must-have-sustainable-sourcing-at-scale.ashx).

Berrone, P., Fosfuri, A., Gelabert, L., and Gomez-Mejia, L. R. 2013. "Necessity as the Mother of 'Green' Inventions: Institutional Pressures and Environmental Innovations," *Strategic Management Journal* (34:8), pp. 891–909. (https://doi.org/10.1002/smj.2041).

Bhandari, L. C. 1988. "Debt/Equity Ratio and Expected Common Stock Returns: Empirical Evidence," *The Journal of Finance* (43:2), pp. 507–528. (https://doi.org/10.1111/j.1540-6261.1988.tb03952.x).

Bharadwaj, A. S., Bharadwaj, S. G., and Konsynski, B. R. 1999. "Information Technology Effects on Firm Performance as Measured by Tobin's q," *Management Science* (45:7), pp. 1008–1024. (https://doi.org/10.1287/mnsc.45.7.1008).

Bhattacharya, C. B., and Sen, S. 2003. "Consumer–Company Identification: A Framework for Understanding Consumers' Relationships with Companies," *Journal of Marketing* (67:2), SAGE Publications Inc, pp. 76–88. (https://doi.org/10.1509/jmkg.67.2.76.18609).

Blake, E., and Zelinsky, D. 2018. "National Hurricane Center Tropical Cyclone Report: Hurricane Harvey," No. AL092017, NATIONAL HURRICANE CENTER TROPICAL CYCLONE REPORT, National Oceanic and Atmospheric Administration, May 9.

BMW Group. 2018. "Supplier Award." (https://www.bmwgroup.com:443/content/grpw/websites/bmwgroup_com/en/responsibility/sustainable-value-report/popup/supplier-award.html, accessed March 27, 2020).

Bourgeois, L. j. 1981. "On the Measurement of Organizational Slack," *Academy of Management Review* (6:1), pp. 29–39. (https://doi.org/10.5465/amr.1981.4287985).

Bové, A.-T., and Swartz, S. 2016. "Starting at the Source: Sustainability in Supply Chains," Sustainability & Resource Productivity, McKinsey Global Institute, November. (https://www.mckinsey.com/~/media/McKinsey/Business%20Functions/Sustainability/Our%20Insights/Starting%20at%20the%20source%20sustainability%20in%20the%20supply%20chain/Starting-at-the-source-Sustainability-in-supply-chains.ashx).

Brandon-Jones, E., Dutordoir, M., Frota Neto, J. Q., and Squire, B. 2017. "The Impact of Reshoring Decisions on Shareholder Wealth," *Journal of Operations Management* (49–51), Competitive Manufacturing in a High-Cost Environment, pp. 31–36. (https://doi.org/10.1016/j.jom.2016.12.002).

Bromiley, P. 1991. "Testing a Causal Model of Corporate Risk Taking and Performance," *Academy of Management Journal* (34:1), pp. 37–59. (https://doi.org/10.5465/256301).

Brown, S., and Warner, J. B. 1985. "Using Daily Stock Returns: The Case of Event Studies," *Journal of Financial Economics* (14:1), Elsevier, pp. 3–31.

Business Wire. 2017. "Newell Brands Revises 2017 Earnings Guidance," *Businesswire*. (https://www.businesswire.com/news/home/20170906005684/en/Newell-Brands-Revises-2017-Earnings-Guidance).

Busse, C. 2016. "Doing Well by Doing Good? The Self-Interest of Buying Firms and Sustainable Supply Chain Management," *Journal of Supply Chain Management* (52:2), pp. 28–47. (https://doi.org/10.1111/jscm.12096).

Capon, N., Farley, J. U., and Hoenig, S. 1990. "Determinants of Financial Performance: A Meta-Analysis," *Management Science* (36:10), pp. 1143–1159. (https://doi.org/10.1287/mnsc.36.10.1143).

CDP. 2017. "Missing Link: Harnessing the Power of Purchasing for a Sustainable Future." (https://www.cdp.net/en/research/global-reports/global-supply-chain-report-2017).

Chae, S., Yan, T., and Yang, Y. 2019. "Supplier Innovation Value from a Buyer–Supplier Structural Equivalence View: Evidence from the PACE Awards in the Automotive Industry," *Journal of Operations Management* (1:19). (https://doi.org/10.1002/joom.1063).

Chen, C.-M., and Ho, H. 2019. "Who Pays You to Be Green? How Customers' Environmental Practices Affect the Sales Benefits of Suppliers' Environmental Practices," *Journal of Operations Management* (1:20). (https://doi.org/10.1002/joom.1018).

Cheng, B., Ioannou, I., and Serafeim, G. 2014a. "Corporate Social Responsibility and Access to Finance," *Strategic Management Journal* (35:1), pp. 1–23. (https://doi.org/10.1002/smj.2131).

Cheng, B., Ioannou, I., and Serafeim, G. 2014b. "Corporate Social Responsibility and Access to Finance," *Strategic Management Journal* (35:1), pp. 1–23. (https://doi.org/10.1002/smj.2131).

Chung, K. H., and Pruitt, S. W. 1994. "A Simple Approximation of Tobin's q," *Financial Management* (23:3), pp. 70–74. (https://doi.org/10.2307/3665623).

Ciolli, J. 2017. "Hurricanes Irma and Harvey Cause Goldman Sachs to Slash Its Outlook for the US Economy," *Business Insider*. (https://www.businessinsider.com/goldman-sachs-hurricane-irma-harvey-gdp-impact-2017-9).

Cone Communications. 2015. "Global CSR Study."

Crampton, W., and Patten, D. 2008. "Social Responsiveness, Profitability and Catastrophic Events: Evidence on the Corporate Philanthropic Response to 9/11," *Journal of Business Ethics* (81:4), pp. 863–873. (https://doi.org/10.1007/s10551-007-9553-7).

Cuff, M. 2019. "HSBC and Walmart Launch Green Finance Program to Drive Carbon Cuts in Retail Supply Chain," *GreenBiz*, , April 23. (https://www.greenbiz.com/article/hsbc-and-walmart-launch-green-finance-program-drive-carbon-cuts-retail-supply-chain, accessed October 31, 2019).

Cyert, R. M., and March, J. G. 1963. *Behavioral Theory of the Firm*, (1 edition.), Cambridge, Mass., USA: Wiley-Blackwell.

DiChristopher, T. 2017. "Harvey Has 'paralyzed' a Critical Part of US Manufacturing Supply Chain," *CNBC*. (https://www.cnbc.com/2017/09/06/harvey-has-paralyzed-a-critical-part-of-the-us-manufacturing-chain.html).

Dooley, K. J. 2014. "The Whole Chain," *Science* (344:6188), American Association for the Advancement of Science, pp. 1108–1108. (https://doi.org/10.1126/science.1256025).

Dougherty, C., and Schwartz, N. D. 2017. "Hurricane to Cost Tens of Billions, but a Quick Recovery Is Expected," *The New York Times*. (https://www.nytimes.com/2017/08/28/business/economy/texas-hurricane-harvey-economic-impact.html).

Dowell, G. W. S., and Muthulingam, S. 2017. "Will Firms Go Green If It Pays? The Impact of Disruption, Cost, and External Factors on the Adoption of Environmental Initiatives," *Strategic Management Journal* (38:6), pp. 1287–1304. (https://doi.org/10.1002/smj.2603).

Eccles, R. G., Ioannou, I., and Serafeim, G. 2014. "The Impact of Corporate Sustainability on Organizational Processes and Performance," *Management Science* (60:11), pp. 2835–2857. (https://doi.org/10.1287/mnsc.2014.1984).

Economist Intelligence Unit. 2017. "No More Excuses. Responsible Supply Chains in a Globalising World," London: Economist Intelligence Unit. (https://growthcrossings.economist.com/report/no-more-excuses/).

Elliot, S. 2011. "Transdisciplinary Perspectives on Environmental Sustainability: A Resource Base and Framework for IT-Enabled Business Transformation," *MIS Quarterly* (35:1), Management Information Systems Research Center, University of Minnesota, pp. 197–236. (https://doi.org/10.2307/23043495).

European Union. 2014. "DIRECTIVE 2014/95/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 22 October 2014," *330* (Vol. OJ L). (http://data.europa.eu/eli/dir/2014/95/oj/eng).

Factset. 2018. "FactSet Supply Chain Relationships." (https://open.factset.com/catalog/products/factset-supply-chain-relationships/en-us, accessed October 8, 2018).

Fama, E. F., and French, K. R. 1993. "Common Risk Factors in the Returns on Stocks and Bonds," *Journal of Financial Economics* (33:1), Elsevier, pp. 3–56.

Fang, L., and Peress, J. 2009. "Media Coverage and the Cross-Section of Stock Returns," *The Journal of Finance* (64:5), pp. 2023–2052. (https://doi.org/10.1111/j.1540-6261.2009.01493.x).

FASB. 1993. "Statement of Financial Accounting Standard No. 116: Accounting for Contributions Received and Contributions Made.," Norwalk: Norwalk: Financial Accounting Sttandards Board.

Fernandez, M., Blinder, A., and Romero, S. 2017. "Hurricane Harvey Strikes a Powerful Blow to Texas, and Lingers," *The New York Times*. (https://www.nytimes.com/2017/08/26/us/hurricane-harvey-strikes-a-powerful-blow-to-texas-and-lingers.html).

Flammer, C. 2012. "Corporate Social Responsibility and Shareholder Reaction: The Environmental Awareness of Investors," *Academy of Management Journal* (56:3), pp. 758–781. (https://doi.org/10.5465/amj.2011.0744).

Flammer, C., and Kacperczyk, A. 2015a. "The Impact of Stakeholder Orientation on Innovation: Evidence from a Natural Experiment," *Management Science* (62:7), pp. 1982–2001. (https://doi.org/10.1287/mnsc.2015.2229).

Flammer, C., and Kacperczyk, A. 2015b. "The Impact of Stakeholder Orientation on Innovation: Evidence from a Natural Experiment," *Management Science* (62:7), pp. 1982–2001. (https://doi.org/10.1287/mnsc.2015.2229).

Flom, P. L. 1999. "Multicollinearity Diagnostics for Multiple Regression: A Monte Carlo Study," *ETD Collection for Fordham University*, pp. 1–149.

Florida, R. 1996. "Lean and Green: The Move to Environmentally Conscious Manufacturing," *California Management Review; Berkeley* (39:1), pp. 80–105.

Fosfuri, A., Lanzolla, G., and Suarez, F. F. 2013. "Entry-Timing Strategies: The Road Ahead," *Long Range Planning* (46:4), Entry Timing Strategies, pp. 300–311. (https://doi.org/10.1016/j.lrp.2013.07.001).

Fritz Institute. 2005. "Logistics and the Effective Delivery of Humanitarian Relief." (http://www.fritzinstitute.org/ PDFs/Programs/TsunamiLogistics0605.pdf.).

Galbreth, M. R., and Ghosh, B. 2013. "Competition and Sustainability: The Impact of Consumer Awareness," *Decision Sciences* (44:1), pp. 127–159. (https://doi.org/10.1111/j.1540-5915.2012.00395.x).

García, D. 2013. "Sentiment during Recessions," *The Journal of Finance* (68:3), pp. 1267–1300. (https://doi.org/10.1111/jofi.12027).

Gilmer, R. W. 2018. "Harvey in Perspective: The Houston Economy and Hurricanes Past and Present," University of Houston: Institute for Reginal Forecasting, January 8. (https://www.bauer.uh.edu/centers/irf/houston-updates-jan18.php).

Gittell, R., Magnusson, M., and Merenda, M. 2012. *The Sustainable Business Case Book*, Saylor Foundation. (https://open.umn.edu/opentextbooks/textbooks/the-sustainable-business-case-book).

"Giving in Numbers (2018 Edition)." 2018. *Committee Encouraging Corporate Philanthropy*. (http://cecp.co/wp-content/uploads/2018/12/GIN2018_web.pdf, accessed June 1, 2020).

Godfrey, P. C. 2005. "The Relationship Between Corporate Philanthropy And Shareholder Wealth: A Risk Management Perspective," *Academy of Management Review* (30:4), Academy of Management, pp. 777–798. (https://doi.org/10.5465/amr.2005.18378878).

Godfrey, P. C., Merrill, C. B., and Hansen, J. M. 2009. "The Relationship between Corporate Social Responsibility and Shareholder Value: An Empirical Test of the Risk Management Hypothesis," *Strategic Management Journal* (30:4), pp. 425–445. (https://doi.org/10.1002/smj.750).

Greene, W. H. 2002. *Econometric Analysis*, (5th edition.), Upper Saddle River, N.J: Prentice Hall.

Guo, X., Xiao, G., and Zhang, F. 2017. "Effect of Consumer Awareness on Corporate Social Responsibility under Asymmetric Information," SSRN Scholarly Paper No. ID 3039862, SSRN Scholarly Paper, Rochester, NY: Social Science Research Network, September 19. (https://doi.org/10.2139/ssrn.3039862).

Hart, O. D. 1983. "The Market Mechanism as an Incentive Scheme," *The Bell Journal of Economics* (14:2), pp. 366–382. (https://doi.org/10.2307/3003639).

Hart, S. L., and Ahuja, G. 1996. "Does It Pay to Be Green? An Empirical Examination of the Relationship Between Emission Reduction and Firm Performance," *Business Strategy and the Environment* (5:1), pp. 30–37. (https://doi.org/10.1002/(SICI)1099-0836(199603)5:1<30::AID-BSE38>3.0.CO;2-Q).

Hartmann, J., and Moeller, S. 2014. "Chain Liability in Multitier Supply Chains? Responsibility Attributions for Unsustainable Supplier Behavior," *Journal of Operations Management* (32:5), pp. 281–294. (https://doi.org/10.1016/j.jom.2014.01.005).

Haunschild, P. R., and Rhee, M. 2004. "The Role of Volition in Organizational Learning: The Case of Automotive Product Recalls," *Management Science* (50:11), pp. 1545–1560. (https://doi.org/10.1287/mnsc.1040.0219).

Hendricks, K. B., and Singhal, V. R. 1996. "Quality Awards and the Market Value of the Firm: An Empirical Investigation," *Management Science* (42:3), pp. 415–436. (https://doi.org/10.1287/mnsc.42.3.415).

Hendricks, K. B., and Singhal, V. R. 2003. "The Effect of Supply Chain Glitches on Shareholder Wealth," *Journal of Operations Management* (21:5), pp. 501–522. (https://doi.org/10.1016/j.jom.2003.02.003).

Hendricks, K. B., Singhal, V. R., and Zhang, R. 2009. "The Effect of Operational Slack, Diversification, and Vertical Relatedness on the Stock Market Reaction to Supply Chain Disruptions," *Journal of Operations Management* (27:3), pp. 233–246. (https://doi.org/10.1016/j.jom.2008.09.001).

Hong, H., Lim, T., and Stein, J. C. 2000. "Bad News Travels Slowly: Size, Analyst Coverage, and the Profitability of Momentum Strategies," *The Journal of Finance* (55:1), pp. 265–295. (https://doi.org/10.1111/0022-1082.00206).

Huq, F. A., Chowdhury, I. N., and Klassen, R. D. 2016. "Social Management Capabilities of Multinational Buying Firms and Their Emerging Market Suppliers: An Exploratory

Study of the Clothing Industry," *Journal of Operations Management* (46), Special Issue on Supply Chain Management in Emerging Markets, pp. 19–37. (https://doi.org/10.1016/j.jom.2016.07.005).

Ioannou, I., and Serafeim, G. 2012. "What Drives Corporate Social Performance? The Role of Nation-Level Institutions," *Journal of International Business Studies* (43:9), pp. 834–864. (https://doi.org/10.1057/jibs.2012.26).

Ioannou, I., and Serafeim, G. 2017. "The Consequences of Mandatory Corporate Sustainability Reporting," *Working Paper*. (https://papers.ssrn.com/abstract=1799589).

Jacobs, B. W. 2014. "Shareholder Value Effects of Voluntary Emissions Reduction," *Production and Operations Management* (23:11), pp. 1859–1874. (https://doi.org/10.1111/poms.12201).

Jacobs, B. W., Kraude, R., and Narayanan, S. 2016. "Operational Productivity, Corporate Social Performance, Financial Performance, and Risk in Manufacturing Firms," *Production and Operations Management* (25:12), pp. 2065–2085. (https://doi.org/10.1111/poms.12596).

Jacobs, B. W., Singhal, V. R., and Subramanian, R. 2010. "An Empirical Investigation of Environmental Performance and the Market Value of the Firm," *Journal of Operations Management* (28:5), pp. 430–441. (https://doi.org/10.1016/j.jom.2010.01.001).

Jacobs, M. A., and Swink, M. 2011. "Product Portfolio Architectural Complexity and Operational Performance: Incorporating the Roles of Learning and Fixed Assets," *Journal of Operations Management* (29:7), Special Issue: Product Safety and Security on the Global Supply Chain, pp. 677–691. (https://doi.org/10.1016/j.jom.2011.03.002).

Jaffe, A. B., and Palmer, K. 1997. "Environmental Regulation and Innovation: A Panel Data Study," *The Review of Economics and Statistics* (79:4), pp. 610–619. (https://doi.org/10.1162/003465397557196).

Jayachandran, S., Kalaignanam, K., and Eilert, M. 2013. "Product and Environmental Social Performance: Varying Effect on Firm Performance," *Strategic Management Journal* (34:10), pp. 1255–1264. (https://doi.org/10.1002/smj.2054).

King, A. A., and Lenox, M. J. 2001. "Lean and Green? An Empirical Examination of the Relationship Between Lean Production and Environmental Performance," *Production and Operations Management* (10:3), pp. 244–256. (https://doi.org/10.1111/j.1937-5956.2001.tb00373.x).

King, A., and Lenox, M. 2002a. "Exploring the Locus of Profitable Pollution Reduction," *Management Science* (48:2), INFORMS, pp. 289–299. (https://doi.org/10.1287/mnsc.48.2.289.258).

King, A., and Lenox, M. 2002b. "Exploring the Locus of Profitable Pollution Reduction," *Management Science* (48:2), INFORMS, pp. 289–299. (https://doi.org/10.1287/mnsc.48.2.289.258).

Kitzmueller, M., and Shimshack, J. 2012. "Economic Perspectives on Corporate Social Responsibility," *Journal of Economic Literature* (50:1), pp. 51–84. (https://doi.org/10.1257/jel.50.1.51).

Klassen, R. D., and McLaughlin, C. P. 1996. "The Impact of Environmental Management on Firm Performance," *Management Science* (42:8), INFORMS, pp. 1199–1214. (https://doi.org/10.1287/mnsc.42.8.1199).

Klassen, R. D., and Vachon, S. 2003. "Collaboration and Evaluation in the Supply Chain: The Impact on Plant-Level Environmental Investment," *Production and Operations Management* (12:3), pp. 336–352. (https://doi.org/10.1111/j.1937-5956.2003.tb00207.x).

Klassen, R. D., and Vereecke, A. 2012. "Social Issues in Supply Chains: Capabilities Link Responsibility, Risk (Opportunity), and Performance," *International Journal of Production Economics* (140:1), Sustainable Development of Manufacturing and Services, pp. 103–115. (https://doi.org/10.1016/j.ijpe.2012.01.021).

Kleibergen, F., and Paap, R. 2006. "Generalized Reduced Rank Tests Using the Singular Value Decomposition," *Journal of Econometrics* (133:1), pp. 97–126. (https://doi.org/10.1016/j.jeconom.2005.02.011).

Klein, J., and Dawar, N. 2004. "Corporate Social Responsibility and Consumers' Attributions and Brand Evaluations in a Product–Harm Crisis," *International Journal of Research in Marketing* (21:3), pp. 203–217. (https://doi.org/10.1016/j.ijresmar.2003.12.003).

Kleindorfer, P. R., and Saad, G. H. 2005. "Managing Disruption Risks in Supply Chains," *Production and Operations Management* (14:1), pp. 53–68. (https://doi.org/10.1111/j.1937-5956.2005.tb00009.x).

Kolari, J. W., and Pynnonen, S. 2011. "Nonparametric Rank Tests for Event Studies," *Journal of Empirical Finance* (18:5), pp. 953–971. (https://doi.org/10.1016/j.jempfin.2011.08.003).

Korschun, D., Bhattacharya, C. B., and Swain, S. D. 2014. "Corporate Social Responsibility, Customer Orientation, and the Job Performance of Frontline Employees," *Journal of Marketing* (78:3), SAGE Publications Inc, pp. 20–37. (https://doi.org/10.1509/jm.11.0245).

Kothari, S. P., and Warner, J. B. 2007. "Chapter 1 - Econometrics of Event Studies**We Thank Espen Eckbo, Jon Lewellen, Adam Kolasinski, and Jay Ritter for Insightful Comments, and Irfan Safdar and Alan Wancier for Research Assistance.," in

Handbook of Empirical Corporate Finance, Handbooks in Finance, B. E. Eckbo (ed.), San Diego: Elsevier, pp. 3–36. (https://doi.org/10.1016/B978-0-444-53265-7.50015-9).

Kousky, C. 2014. "Informing Climate Adaptation: A Review of the Economic Costs of Natural Disasters," *Energy Economics* (46), pp. 576–592. (https://doi.org/10.1016/j.eneco.2013.09.029).

Kovach, J. J., Hora, M., Manikas, A., and Patel, P. C. 2015. "Firm Performance in Dynamic Environments: The Role of Operational Slack and Operational Scope," *Journal of Operations Management* (37), pp. 1–12. (https://doi.org/10.1016/j.jom.2015.04.002).

Kroes, J., Subramanian, R., and Subramanyam, R. 2012. "Operational Compliance Levers, Environmental Performance, and Firm Performance Under Cap and Trade Regulation," *Manufacturing & Service Operations Management* (14:2), pp. 186–201. (https://doi.org/10.1287/msom.1110.0357).

La Porta, R., Lopez-de-Silanes, F., and Shleifer, A. 2008. "The Economic Consequences of Legal Origins," *Journal of Economic Literature* (46:2), pp. 285–332. (https://doi.org/10.1257/jel.46.2.285).

Lament, M. 2015. "Trends in Corporate Social Responsibility (CSR) Reporting," *International Journal of Economic Practices and Theories* (5:5), pp. 503–509.

Lampel, J., Shamsie, J., and Shapira, Z. 2009. "Experiencing the Improbable: Rare Events and Organizational Learning," *Organization Science* (20:5), INFORMS, pp. 835–845. (https://doi.org/10.1287/orsc.1090.0479).

Lev, B., Petrovits, C., and Radhakrishnan, S. 2010. "Is Doing Good Good for You? How Corporate Charitable Contributions Enhance Revenue Growth," *Strategic Management Journal* (31:2), pp. 182–200. (https://doi.org/10.1002/smj.810).

Liang, H., and Renneboog, L. 2017a. "On the Foundations of Corporate Social Responsibility," *The Journal of Finance* (72:2), pp. 853–910. (https://doi.org/10.1111/jofi.12487).

Liang, H., and Renneboog, L. 2017b. "Corporate Donations and Shareholder Value," *Oxford Review of Economic Policy* (33:2), Oxford Academic, pp. 278–316. (https://doi.org/10.1093/oxrep/grx024).

Lichtenstein, D. R., Drumwright, M. E., and Braig, B. M. 2004. "The Effect of Corporate Social Responsibility on Customer Donations to Corporate-Supported Nonprofits," *Journal of Marketing* (68:4), SAGE Publications Inc, pp. 16–32. (https://doi.org/10.1509/jmkg.68.4.16.42726).

Lieberman, M. B., and Montgomery, D. B. 1998. "First-Mover (Dis)Advantages: Retrospective and Link with the Resource-Based View," *Strategic Management Journal* (19:12), pp. 1111–1125. (https://doi.org/10.1002/(SICI)1097-0266(1998120)19:12<1111::AID-SMJ21>3.0.CO;2-W).

Liesman, S. 2017. "Harvey and Irma Economic Hit Could Total $200 Billion: Moody's," *CNBC*. (https://www.cnbc.com/2017/09/11/harvey-and-irma-economic-hit-could-total-200-billion-moodys.html).

Liket, K., and Simaens, A. 2015. "Battling the Devolution in the Research on Corporate Philanthropy," *Journal of Business Ethics* (126:2), pp. 285–308. (https://doi.org/10.1007/s10551-013-1921-x).

Lins, K. V., Servaes, H., and Tamayo, A. 2017. "Social Capital, Trust, and Firm Performance: The Value of Corporate Social Responsibility during the Financial Crisis," *The Journal of Finance* (72:4), pp. 1785–1824. (https://doi.org/10.1111/jofi.12505).

Logic, R. 2018. "Why Supply Chain Planning with Sustainability Is Growing in Importance," , February 12. (https://blog.riverlogic.com/why-is-supply-chain-sustainability-becoming-important-manufacturing, accessed October 27, 2019).

Lu, G., Ding, X. (David), Peng, D. X., and Hao-Chun Chuang, H. 2018. "Addressing Endogeneity in Operations Management Research: Recent Developments, Common Problems, and Directions for Future Research," *Journal of Operations Management* (64), pp. 53–64. (https://doi.org/10.1016/j.jom.2018.10.001).

Lu, G., and Shang, G. 2017. "Impact of Supply Base Structural Complexity on Financial Performance: Roles of Visible and Not-so-Visible Characteristics," *Journal of Operations Management* (53–56), pp. 23–44. (https://doi.org/10.1016/j.jom.2017.10.001).

Luchs, M. G., Naylor, R. W., Irwin, J. R., and Raghunathan, R. 2010. "The Sustainability Liability: Potential Negative Effects of Ethicality on Product Preference," *Journal of Marketing* (74:5), American Marketing Association, pp. 18–31. (https://doi.org/10.1509/jmkg.74.5.018).

Luffarelli, J., Markou, P., Stamatogiannakis, A., and Gonçalves, D. 2019. "The Effect of Corporate Social Performance on the Financial Performance of Business-to-Business and Business-to-Consumer Firms," *Corporate Social Responsibility and Environmental Management* (26:6), pp. 1333–1350. (https://doi.org/10.1002/csr.1750).

Luo, X., and Bhattacharya, C. B. 2006. "Corporate Social Responsibility, Customer Satisfaction, and Market Value," *Journal of Marketing* (70:4), SAGE Publications Inc, pp. 1–18. (https://doi.org/10.1509/jmkg.70.4.001).

Luo, X., and Bhattacharya, C. B. 2009. "The Debate over Doing Good: Corporate Social Performance, Strategic Marketing Levers, and Firm-Idiosyncratic Risk," *Journal of Marketing* (73:6), pp. 198–213. (https://doi.org/10.1509/jmkg.73.6.198).

Mackelprang, A. W., Habermann, M., and Swink, M. 2015. "How Firm Innovativeness and Unexpected Product Reliability Failures Affect Profitability," *Journal of Operations Management* (38), pp. 71–86. (https://doi.org/10.1016/j.jom.2015.06.001).

MacKinlay, A. C. 1997. "Event Studies in Economics and Finance," *Journal of Economic Literature* (35:1), American Economic Association, pp. 13–39.

Madsen, P. M., and Rodgers, Z. J. 2015. "Looking Good by Doing Good: The Antecedents and Consequences of Stakeholder Attention to Corporate Disaster Relief," *Strategic Management Journal* (36:5), pp. 776–794. (https://doi.org/10.1002/smj.2246).

Maignan, I., and Ferrell, O. C. 2004. "Corporate Social Responsibility and Marketing: An Integrative Framework," *Journal of the Academy of Marketing Science* (32:1), SAGE Publications Inc, pp. 3–19. (https://doi.org/10.1177/0092070303258971).

Malkiel, B. G., and Fama, E. F. 1970. "Efficient Capital Markets: A Review of Theory and Empirical Work*," *The Journal of Finance* (25:2), pp. 383–417. (https://doi.org/10.1111/j.1540-6261.1970.tb00518.x).

Marshall, D., McCarthy, L., Heavey, C., and McGrath, P. 2015. "Environmental and Social Supply Chain Management Sustainability Practices: Construct Development and Measurement," *Production Planning & Control* (26:8), pp. 673–690. (https://doi.org/10.1080/09537287.2014.963726).

Martignon, L., Katsikopoulos, K. V., and Woike, J. K. 2008. "Categorization with Limited Resources: A Family of Simple Heuristics," *Journal of Mathematical Psychology* (52:6), pp. 352–361. (https://doi.org/10.1016/j.jmp.2008.04.003).

Martignon, L., Vitouch, O., Takezawa, M., and Forster, M. 2003. "Naive and Yet Enlightened: From Natural Frequencies to Fast and Frugal Decision Trees," in *Thinking : Psychological Perspectives on Reasoning, Judgement and Decision Making, 189-211 (2003)*, pp. 189–211. (https://doi.org/10.1002/047001332X.ch10).

McWilliams, A., and Siegel, D. 1997. "Event Studies In Management Research: Theoretical And Empirical Issues," *Academy of Management Journal* (40:3), Academy of Management, pp. 626–657. (https://doi.org/10.5465/257056).

McWilliams, A., and Siegel, D. 2000. "Corporate Social Responsibility and Financial Performance: Correlation or Misspecification?," *Strategic Management Journal* (21:5), pp. 603–609. (https://doi.org/10.1002/(SICI)1097-0266(200005)21:5<603::AID-SMJ101>3.0.CO;2-3).

Miller, C. C., and Cardinal, L. B. 1994. "Strategic Planning and Firm Performance: A Synthesis of More Than Two Decades of Research," *Academy of Management Journal* (37:6), pp. 1649–1665. (https://doi.org/10.5465/256804).

Mishra, S., and Modi, S. B. 2015. "Corporate Social Responsibility and Shareholder Wealth: The Role of Marketing Capability," *Journal of Marketing* (80:1), pp. 26–46. (https://doi.org/10.1509/jm.15.0013).

Modi, S. B., and Mishra, S. 2011. "What Drives Financial Performance–Resource Efficiency or Resource Slack?: Evidence from U.S. Based Manufacturing Firms from 1991 to

2006," *Journal of Operations Management* (29:3), pp. 254–273. (https://doi.org/10.1016/j.jom.2011.01.002).

Morgan, A. 2015. *The True Cost*. (https://truecostmovie.com/).

Muller, A., and Kräussl, R. 2011a. "Doing Good Deeds in Times of Need: A Strategic Perspective on Corporate Disaster Donations," *Strategic Management Journal* (32:9), pp. 911–929. (https://doi.org/10.1002/smj.917).

Muller, A., and Kräussl, R. 2011b. "The Value of Corporate Philanthropy During Times of Crisis: The Sensegiving Effect of Employee Involvement," *Journal of Business Ethics* (103:2), p. 203. (https://doi.org/10.1007/s10551-011-0861-6).

Muller, A., and Whiteman, G. 2009. "Exploring the Geography of Corporate Philanthropic Disaster Response: A Study of Fortune Global 500 Firms," *Journal of Business Ethics* (84:4), pp. 589–603. (https://doi.org/10.1007/s10551-008-9710-7).

Narasimhan, R., and Kim, S. W. 2002. "Effect of Supply Chain Integration on the Relationship between Diversification and Performance: Evidence from Japanese and Korean Firms," *Journal of Operations Management* (20:3), Managing the Interface between Marketing and Operations, pp. 303–323. (https://doi.org/10.1016/S0272-6963(02)00008-6).

Narasimhan, R., Talluri, S., and Mahapatra, S. 2008. "Effective Response to RFQs and Supplier Development: A Supplier's Perspective," *International Journal of Production Economics* (115:2), Institutional Perspectives on Supply Chain Management, pp. 461–470. (https://doi.org/10.1016/j.ijpe.2008.07.001).

Nickell, S. J. 1996. "Competition and Corporate Performance," *Journal of Political Economy* (104:4), pp. 724–746. (https://doi.org/10.1086/262040).

Nielsen. 2018. "Was 2018 the Year of the Influential Sustainable Consumer?," *Nielson Insights*. (https://www.nielsen.com/us/en/insights/article/2018/was-2018-the-year-of-the-influential-sustainable-consumer).

Nielsen Report. 2018. "Sustainability Sells: Linking Sustainability Claims to Sales," , October 16. (https://www.nielsen.com/us/en/insights/article/2018/sustainability-sells-linking-sustainability-claims-to-sales).

Olsen, M. C., Slotegraaf, R. J., and Chandukala, S. R. 2014. "Green Claims and Message Frames: How Green New Products Change Brand Attitude," *Journal of Marketing* (78:5), pp. 119–137. (https://doi.org/10.1509/jm.13.0387).

Ortiz-de-Mandojana, N., and Bansal, P. 2016. "The Long-Term Benefits of Organizational Resilience through Sustainable Business Practices," *Strategic Management Journal* (37:8), pp. 1615–1631. (https://doi.org/10.1002/smj.2410).

Pagell, M., Johnston, D., Veltri, A., Klassen, R., and Biehl, M. 2014. "Is Safe Production an Oxymoron?," *Production and Operations Management* (23:7), pp. 1161–1175. (https://doi.org/10.1111/poms.12100).

Patten, D. M. 2008. "Does the Market Value Corporate Philanthropy? Evidence from the Response to the 2004 Tsunami Relief Effort," *Journal of Business Ethics* (81:3), pp. 599–607. (https://doi.org/10.1007/s10551-007-9534-x).

Peress, J. 2008. "Media Coverage and Investors' Attention to Earnings Announcements," *Working Paper, INSEAD*. (https://doi.org/10.2139/ssrn.2723916).

Pfarrer, M. D., Pollock, T. G., and Rindova, V. P. 2010. "A Tale of Two Assets: The Effects of Firm Reputation and Celebrity on Earnings Surprises and Investors' Reactions," *Academy of Management Journal* (53:5), Academy of Management, pp. 1131–1152. (https://doi.org/10.5465/amj.2010.54533222).

Pivot EDM. 2016. "EDM Named 3M Supplier of the Year," *Electronic Design & Manufacturing*, , October 6. (https://pivotedm.com/2016/10/edm-named-3m-supplier-of-the-year/, accessed March 13, 2020).

Qian, B., and Rasheed, K. 2007. "Stock Market Prediction with Multiple Classifiers," *Applied Intelligence* (26:1), pp. 25–33. (https://doi.org/10.1007/s10489-006-0001-7).

Rao, P., and Holt, D. 2005. "Do Green Supply Chains Lead to Competitiveness and Economic Performance?," *International Journal of Operations & Production Management* (25:9), Emerald Group Publishing Limited, pp. 898–916. (https://doi.org/10.1108/01443570510613956).

Rau, A., Toker, R., and Howard, J. 2010. "Can Technology Really Save Us from Climate Change?," *Harvard Business Review* (January–February 2010). (https://hbr.org/2010/01/can-technology-really-save-us-from-climate-change).

Roos, G. 2017. "Resilinc: Hurricane Harvey's Supply Chain Impact May Be Worse than Expected," *EPS News*, , September 6. (https://epsnews.com/2017/09/06/resilinc-hurricane-harveys-supply-chain-impact-may-worse-expected/, accessed May 29, 2020).

Rubin, A. 2008. "Political Views and Corporate Decision Making: The Case of Corporate Social Responsibility," *Financial Review* (43:3), pp. 337–360. (https://doi.org/10.1111/j.1540-6288.2008.00197.x).

Sanderson, E., and Windmeijer, F. 2016. "A Weak Instrument F-Test in Linear IV Models with Multiple Endogenous Variables," *Journal of Econometrics* (190:2), Endogeneity Problems in Econometrics, pp. 212–221. (https://doi.org/10.1016/j.jeconom.2015.06.004).

Saunders, L. W., Brooks, J. P., Merrick, J. R. W., and Autry, C. W. 2020. "Addressing Economic/Environmental Sustainability Trade-Offs in Procurement Episodes with

Industrial Suppliers," *Production and Operations Management* (Forthcoming). (https://doi.org/10.1111/poms.13162).

Schmidt, C. G., Foerstl, K., and Schaltenbrand, B. 2017. "The Supply Chain Position Paradox: Green Practices and Firm Performance," *Journal of Supply Chain Management* (53:1), pp. 3–25. (https://doi.org/10.1111/jscm.12113).

Schmidt, C. G., Wuttke, D. A., Ball, G. P., and Heese, H. S. 2020. "Does Social Media Elevate Supply Chain Importance? An Empirical Examination of Supply Chain Glitches, Twitter Reactions, and Stock Market Returns," *Journal of Operations Management* (forthcoming). (https://doi.org/10.1002/joom.1087).

Schommer, M., Richter, A., and Karna, A. 2019. "Does the Diversification–Firm Performance Relationship Change Over Time? A Meta-Analytical Review," *Journal of Management Studies* (56:1), pp. 270–298. (https://doi.org/10.1111/joms.12393).

Sen, S., and Bhattacharya, C. B. 2001. "Does Doing Good Always Lead to Doing Better? Consumer Reactions to Corporate Social Responsibility," *Journal of Marketing Research* (38:2), SAGE Publications Inc, pp. 225–243. (https://doi.org/10.1509/jmkr.38.2.225.18838).

Sen, S., Bhattacharya, C. B., and Korschun, D. 2006. "The Role of Corporate Social Responsibility in Strengthening Multiple Stakeholder Relationships: A Field Experiment," *Journal of the Academy of Marketing Science* (34:2), SAGE Publications Inc, pp. 158–166. (https://doi.org/10.1177/0092070305284978).

Serpa, J. C., and Krishnan, H. 2017. "The Impact of Supply Chains on Firm-Level Productivity," *Management Science* (64:2), pp. 511–532. (https://doi.org/10.1287/mnsc.2016.2632).

Servaes, H., and Tamayo, A. 2013. "The Impact of Corporate Social Responsibility on Firm Value: The Role of Customer Awareness," *Management Science* (59:5), pp. 1045–1061. (https://doi.org/10.1287/mnsc.1120.1630).

Simmons, C. J., and Becker-Olsen, K. L. 2006. "Achieving Marketing Objectives Through Social Sponsorships," *Journal of Marketing* (70:4), pp. 154–169. (https://doi.org/10.1509/jmkg.70.4.154).

Sodhi, M. S., and Tang, C. S. 2018. "Corporate Social Sustainability in Supply Chains: A Thematic Analysis of the Literature," *International Journal of Production Research* (56:1–2), pp. 882–901. (https://doi.org/10.1080/00207543.2017.1388934).

South Texas Economic Development Center. 2018. "The Economic Aftermath of Harvey," Corpus Christi, Texas: Texas A&M Univeristy, September 27. (https://stedc.atavist.com/harvey-economic-aftermath).

Sparling, N. 2018. "2018 Was the Year of the 'sustainable Shopper,' Nielsen Says," *Food Dive*. (https://www.fooddive.com/news/2018-was-the-year-of-the-sustainable-shopper-nielsen-says/544983/).

Staiger, D., and Stock, J. H. 1994. "Instrumental Variables Regression with Weak Instruments," Working Paper No. 151, Working Paper, National Bureau of Economic Research, January. (https://doi.org/10.3386/t0151).

Stupak, J. M. 2017. *Economic Impact of Hurricanes Harvey and Irma*, Congressional Research Service.

Su, H.-C., Dhanorkar, S., and Linderman, K. 2015. "A Competitive Advantage from the Implementation Timing of ISO Management Standards," *Journal of Operations Management* (37), pp. 31–44. (https://doi.org/10.1016/j.jom.2015.03.004).

Sul, H. K., Dennis, A. R., and Yuan, L. (Ivy). 2017. "Trading on Twitter: Using Social Media Sentiment to Predict Stock Returns," *Decision Sciences* (48:3), pp. 454–488. (https://doi.org/10.1111/deci.12229).

Tate, W. L., Dooley, K. J., and Ellram, L. M. 2011. "Transaction Cost and Institutional Drivers of Supplier Adoption of Environmental Practices," *Journal of Business Logistics* (32:1), pp. 6–16. (https://doi.org/10.1111/j.2158-1592.2011.01001.x).

Tetlock, P. C. 2007. "Giving Content to Investor Sentiment: The Role of Media in the Stock Market," *The Journal of Finance* (62:3), pp. 1139–1168. (https://doi.org/10.1111/j.1540-6261.2007.01232.x).

Tetlock, P. C., Saar-Tsechansky, M., and Macskassy, S. 2008. "More Than Words: Quantifying Language to Measure Firms' Fundamentals," *The Journal of Finance* (63:3), pp. 1437–1467. (https://doi.org/10.1111/j.1540-6261.2008.01362.x).

the Census Bureau. 2017. "Advance Monthly Sales for Retail and Food Services," U.S. Department of Commerce, August.

The Chain Magazine. 2018. "BMW Group – Supplier Innovation Awards," *Chain Magazine*, , October 19. (https://www.thechainmagazine.com/bmw-group-supplier-innovation-awards/, accessed March 27, 2020).

Thorlakson, T., Zegher, J. F. de, and Lambin, E. F. 2018. "Companies' Contribution to Sustainability through Global Supply Chains," *Proceedings of the National Academy of Sciences* (115:9), pp. 2072–2077. (https://doi.org/10.1073/pnas.1716695115).

Torelli, C. J., Monga, A. B., and Kaikati, A. M. 2012. "Doing Poorly by Doing Good: Corporate Social Responsibility and Brand Concepts," *Journal of Consumer Research* (38:5), Oxford Academic, pp. 948–963. (https://doi.org/10.1086/660851).

Unilever. 2018a. "Sustainable Sourcing for Suppliers," *Unilever Global Company Website*. (https://www.unilever.com/about/suppliers-centre/sustainable-sourcing-suppliers/, accessed October 27, 2019).

Unilever. 2018b. "Sustainable Sourcing Tools," *Unilever Global Company Website*. (https://www.unilever.com/about/suppliers-centre/sustainable-sourcing-suppliers/sustainable-sourcing-tools/, accessed October 27, 2019).

Villalonga, B. 2004. "Intangible Resources, Tobin's q, and Sustainability of Performance Differences," *Journal of Economic Behavior & Organization* (54:2), pp. 205–230. (https://doi.org/10.1016/j.jebo.2003.07.001).

Villena, V. H. 2019. "The Missing Link? The Strategic Role of Procurement in Building Sustainable Supply Networks," *Production and Operations Management* (28:5), pp. 1149–1172. (https://doi.org/10.1111/poms.12980).

Villena, V. H., and Dhanorkar, S. 2020. "How Institutional Pressures and Managerial Incentives Elicit Carbon Transparency in Global Supply Chains," *Journal of Operations Management* (1:38). (https://doi.org/10.1002/joom.1088).

Villena, V. H., and Gioia, D. A. 2018. "On the Riskiness of Lower-Tier Suppliers: Managing Sustainability in Supply Networks," *Journal of Operations Management* (64), pp. 65–87. (https://doi.org/10.1016/j.jom.2018.09.004).

Wagner, S. M., Grosse-Ruyken, P. T., and Erhun, F. 2012. "The Link between Supply Chain Fit and Financial Performance of the Firm," *Journal of Operations Management* (30:4), pp. 340–353. (https://doi.org/10.1016/j.jom.2012.01.001).

Wagner, T., Lutz, R. J., and Weitz, B. A. 2009. "Corporate Hypocrisy: Overcoming the Threat of Inconsistent Corporate Social Responsibility Perceptions," *Journal of Marketing* (73:6), SAGE Publications Inc, pp. 77–91. (https://doi.org/10.1509/jmkg.73.6.77).

Walley, N., and Whitehead, B. 1994. "It's Not Easy Being Green," *Harvard Business Review*, , May 1. (https://hbr.org/1994/05/its-not-easy-being-green, accessed May 14, 2018).

Wang, H., Choi, J., and Li, J. 2008. "Too Little or Too Much? Untangling the Relationship Between Corporate Philanthropy and Firm Financial Performance," *Organization Science* (19:1), INFORMS, pp. 143–159. (https://doi.org/10.1287/orsc.1070.0271).

Wang, Y. (Iris), Li, J., Wu, D. (Andrew), and Anupindi, R. 2019. "When Ignorance Is Not Bliss: An Empirical Analysis of Sub-Tier Supply Network Structure on Firm Risk," *Working Paper*. (https://papers.ssrn.com/abstract=2705654).

Westphal, J. D., Gulati, R., and Shortell, S. M. 1997. "Customization or Conformity? An Institutional and Network Perspective on the Content and Consequences of TQM Adoption," *Administrative Science Quarterly* (42:2), pp. 366–394. (https://doi.org/10.2307/2393924).

Whelan, T., and Kronthal-Sacco, R. 2019. "Research: Actually, Consumers Do Buy Sustainable Products," *Harvard Business Review*. (https://hbr.org/2019/06/research-actually-consumers-do-buy-sustainable-products).

White, K., Hardisty, D. J., and Habib, R. 2019. "The Elusive Green Consumer," *Harvard Business Review* (July–August 2019). (https://hbr.org/2019/07/the-elusive-green-consumer).

Wiengarten, F., Fan, D., Pagell, M., and Lo, C. K. Y. 2019. "Deviations from Aspirational Target Levels and Environmental and Safety Performance: Implications for Operations Managers Acting Irresponsibly," *Journal of Operations Management* (65:6), pp. 490–516. (https://doi.org/10.1002/joom.1032).

Woike, J. K., Hoffrage, U., and Petty, J. S. 2015. "Picking Profitable Investments: The Success of Equal Weighting in Simulated Venture Capitalist Decision Making," *Journal of Business Research* (68:8), Special Issue on Simple Versus Complex Forecasting, pp. 1705–1716. (https://doi.org/10.1016/j.jbusres.2015.03.030).

Wu, Y., Zhang, K., and Xie, J. 2020. "Bad Greenwashing, Good Greenwashing: Corporate Social Responsibility and Information Transparency," *Management Science*, INFORMS. (https://doi.org/10.1287/mnsc.2019.3340).

Zarroli, J. 2017. "Economic Impact Of Harvey Could Be Felt Nationwide Before It's Over," *NPR.Org*. (https://www.npr.org/2017/08/28/546714566/economic-impact-of-harvey-could-be-felt-nationwide-before-its-over).

Zhang, R., Rezaee, Z., and Zhu, J. 2009. "Corporate Philanthropic Disaster Response and Ownership Type: Evidencefrom Chinese Firms' Responseto the Sichuan Earthquake," *Journal of Business Ethics* (91:1), p. 51. (https://doi.org/10.1007/s10551-009-0067-3).

Zhao, W., and Zhang, Z. 2019. "How and When Does Corporate Giving Lead to Getting? An Investigation of the Relationship Between Corporate Philanthropy and Relative Competitive Performance from a Micro-Process Perspective," *Journal of Business Ethics*. (https://doi.org/10.1007/s10551-019-04149-0).

Zhu, Q., and Sarkis, J. 2004. "Relationships between Operational Practices and Performance among Early Adopters of Green Supply Chain Management Practices in Chinese Manufacturing Enterprises," *Journal of Operations Management* (22:3), pp. 265–289. (https://doi.org/10.1016/j.jom.2004.01.005).

APPENDIX A

LIST OF DONATING FIRMS DURING HURRICANE HARVEY

TABLE A1: List of Donating Firms during Hurricane Harvey

Firms	Industry	Donation Date
Altria Group, Inc. Contributions Program	B2C	8/24/2017
Walmart, Walmart Foundation	B2C	8/25/2017
Lowe's Companies, Inc. Contributions Program	B2B	8/26/2017
Humana Foundation, Inc.	B2B	8/26/2017
Caterpillar Foundation	B2B	8/26/2017
Coca-Cola Company	B2C	8/26/2017
United Air Lines, Inc. Corporate Giving Program	B2B	8/26/2017
H. E. Butt Grocery Company Contributions Program	B2C	8/27/2017
PepsiCo Foundation, Inc.	B2C	8/27/2017
Starbucks Foundation	B2C	8/27/2017
CVS Health Foundation, Corporation Contributions Program	B2C	8/27/2017
Amazon.com, Inc. Contributions Program	B2B	8/27/2017
BB&T Corporation Contributions Program	B2B	8/28/2017
Kindred Healthcare, Inc. Contributions Program	B2C	8/28/2017
Union Pacific Corporation Contributions Program	B2B	8/28/2017
Southern Company Charitable Foundation, Inc.	B2B	8/28/2017
UBS Financial Services Inc. Contributions Program	B2B	8/28/2017
Sempra Energy Foundation	B2B	8/28/2017
Wells Fargo & Company Contributions Program	B2B	8/28/2017
Ford Motor Company Fund	B2C	8/28/2017
Allergan Foundation	B2C	8/28/2017
Tegna Foundation, Inc.	B2C	8/28/2017
Under Armour, Inc. Contributions Program	B2C	8/28/2017
Cheniere Energy, Inc. Contributions Program	B2B	8/28/2017
BP America Corporate Giving Program	B2B	8/28/2017
Microsoft Corporation Contributions Program	B2B	8/28/2017
SunTrust Foundation	B2B	8/28/2017
Scholastic Corporation Contributions Program	B2C	8/28/2017
Kroger Co Foundation	B2C	8/28/2017
MasterCard Inc. Contributions Program	B2B	8/28/2017
Apple	B2B	8/28/2017
Stanley Black & Decker, Inc. Contributions Program	B2B	8/28/2017
Kellogg Company Contributions Program	B2C	8/28/2017
JPMorgan Chase & Co. Contributions Program	B2B	8/28/2017
Dollar General Corporation Contributions Program	B2C	8/28/2017
UPS Foundation	B2B	8/28/2017
Royal Bank of Canada Corporate Giving Program	B2B	8/28/2017
Aetna Foundation	B2B	8/28/2017
BMO Financial Group Corporate Giving Program	B2B	8/28/2017
BBVA Compass Corporate Giving Program	B2B	8/28/2017

Firms	Industry	Donation Date
FedEx Corporation Contributions Program	B2B	8/29/2017
CarMax, Inc. Contributions Program	B2C	8/29/2017
Marriott International, Inc. Contributions Program	B2C	8/29/2017
General Mills, Inc. Contributions Program	B2C	8/29/2017
Hilton Worldwide Corporate Giving Program	B2C	8/29/2017
eBay Inc. Contributions Program	B2B	8/29/2017
Google.org	B2B	8/29/2017
Exxon Mobil Corporation Contributions Program	B2B	8/29/2017
Avangrid Foundation, Inc.	B2B	8/29/2017
NextEra Energy, Inc. Contributions Program	B2B	8/29/2017
Verizon Communications Inc. Contributions Program	B2C	8/29/2017
LyondellBasell North America Inc. Contributions Program	B2B	8/29/2017
Shell Oil Company Contributions Program	B2B	8/29/2017
NBCUniversal, Inc. Contributions Program	B2C	8/29/2017
PNC Foundation	B2B	8/29/2017
Facebook, Inc. Contributions Program	B2C	8/29/2017
HCA Healthcare Corporate Giving Program	B2C	8/29/2017
Cisco Systems Foundation	B2B	8/29/2017
Qualcomm Inc. Contributions Program	B2C	8/29/2017
Lennar Foundation	B2B	8/29/2017
Pacific Gas & Electric Company Contributions Program	B2B	8/29/2017
Comerica Incorporated Contributions Program	B2B	8/29/2017
Visa Inc. Contributions Program	B2B	8/29/2017
Prudential Foundation	B2B	8/29/2017
Southwest Airlines Co. Contributions Program	B2B	8/29/2017
Toronto-Dominion Bank Corporate Giving Program	B2B	8/29/2017
UnitedHealth Group Incorporated Contributions Program	B2B	8/29/2017
AT&T Foundation, Corporate Contributions Program	B2C	8/29/2017
Walt Disney Company Contributions Program	B2B	8/29/2017
Kansas City Southern Charitable Fund	B2B	8/29/2017
Abbott Fund, Corporate Giving Program	B2C	8/29/2017
Camping World, Inc.	B2B	8/29/2017
Regions Financial Corporation Contributions Program	B2B	8/29/2017
NRG Energy, Inc. Contributions Program	B2B	8/29/2017
Boeing Company Charitable Trust	B2B	8/29/2017
Williams Companies, Inc. Contributions Program	B2B	8/30/2017
Amgen Foundation	B2C	8/30/2017
International Paper Company Foundation	B2B	8/30/2017
Coach Foundation	B2C	8/30/2017
Ameren Corporation Contributions Program	B2B	8/30/2017

Firms	Industry	Donation Date
United Rentals, Inc. Contributions Program, Inc.	B2B	8/30/2017
Ross Stores, Inc. Contributions Program	B2C	8/30/2017
Waste Management, Inc. Contributions Program	B2B	8/30/2017
General Electric Foundation, Inc.	B2B	8/30/2017
Orbital ATK	B2B	8/30/2017
Tempur Sealy International, Inc.	B2C	8/30/2017
Intercontinental Exchange, Inc. Contributions Program	B2B	8/30/2017
QVC, Inc. Contributions Program	B2C	8/30/2017
MetLife Foundation	B2B	8/30/2017
Cigna Foundation	B2B	8/30/2017
Dow Chemical Company Foundation, Contributions Program	B2B	8/30/2017
TechnipFMC plc	B2B	8/30/2017
Sealed Air Corporation Contributions Program	B2C	8/30/2017
Exelon Corporation Contributions Program, Exelon Foundation	B2B	8/30/2017
ConocoPhillips Corporate Giving Program	B2B	8/30/2017
Toyota Motor North America, Inc. Contributions Program	B2C	8/30/2017
American Express Company Contributions Program	B2B	8/30/2017
Sanofi Foundation for North America	B2C	8/30/2017
Amegy Bank of Texas Corporate Giving Program	B2B	8/30/2017
Blue Cross Blue Shield of Massachusetts, Inc.	B2B	8/30/2017
NuStar Energy L.P. Corporate Giving Program	B2B	8/30/2017
TD Ameritrade Holding Corporation Contributions Program	B2B	8/30/2017
Abbvie Foundation	B2C	8/30/2017
Canadian Imperial Bank of Commerce Corporate Giving Program	B2B	8/30/2017
FirstEnergy Foundation	B2B	8/30/2017
Bank of America Charitable Foundation, Inc.	B2B	8/30/2017
Taylor Morrison Home Corporation Contributions Program	B2B	8/30/2017
Vistra Energy Corporate Giving Program	B2C	8/30/2017
Archer Daniels Midland Company Contributions Program	B2C	8/30/2017
McDonald's Corporation Contributions Program	B2C	8/30/2017
Vectren Foundation, Inc.	B2B	8/31/2017
Weatherford International, Inc. Contributions Program	B2B	8/31/2017
CEMEX, S.A.B. de C.V.	B2B	8/31/2017
M&T Bank Corporate Giving Program	B2B	8/31/2017
Monsanto Company Contributions Program	B2B	8/31/2017

Firms	Industry	Donation Date
Crestwood Equity Partners	B2C	8/31/2017
J.C. Penney Company, Inc. Contributions Program	B2C	8/31/2017
McKesson Foundation, Corporate Contributions Program	B2C	8/31/2017
Lockheed Martin Corporation Contributions Program	B2B	8/31/2017
Novo Nordisk Inc. Contributions Program	B2C	8/31/2017
USANA True Health Foundation	B2C	8/31/2017
American Honda Motor Co., Inc. Contributions Program	B2C	8/31/2017
ONEOK Foundation, Inc.	B2B	8/31/2017
Hilltop Holdings Inc. Contributions Program	B2B	8/31/2017
BASF Corporation Contributions Program	B2B	8/31/2017
Aflac Corporate Giving Program	B2B	8/31/2017
Casey's General Stores, Inc. Contributions Program	B2C	8/31/2017
Dollar Tree, Inc. Contributions Program	B2C	8/31/2017
Kohl's Corporation Contributions Program	B2C	8/31/2017
Novartis Pharmaceuticals Corporation Contributions Program	B2C	8/31/2017
Diageo North America, Inc.	B2C	8/31/2017
Merck & Co., Corporate Contributions Program	B2C	8/31/2017
Hess Corporation Contributions Program	B2B	8/31/2017
Range Resources Corporation Contributions Program	B2B	8/31/2017
HanesBrands	B2C	9/1/2017
Mizuho Financial Group, Inc.	B2B	9/1/2017
Charter Communications, Inc. Contributions Program	B2C	9/1/2017
FCA US LLC, FCA Foundation	B2C	9/1/2017
Academy, Ltd. Contributions Program	B2B	9/1/2017
Chevron Phillips Chemical Company LLC Contributions Program	B2B	9/1/2017
Olin Corporation Contributions Program	B2B	9/1/2017
Tribune Media Company Charitable Foundation	B2C	9/1/2017
Target Corporation Contributions Program	B2C	9/1/2017
Dominion Foundation	B2B	9/1/2017
Patterson Companies	B2C	9/1/2017
Assurant Foundation	B2B	9/1/2017
Wynn Resorts, Limited Contributions Program	B2C	9/1/2017
Frost Bank Charitable Foundation	B2B	9/1/2017
Michael Kors Holdings Ltd. Contributions Program	B2C	9/1/2017
Aaron's, Inc.	B2B	9/1/2017
AstraZeneca Pharmaceuticals LP Contributions Program	B2C	9/1/2017
CenterPoint Energy	B2B	9/1/2017
Conn's, Inc.	B2C	9/1/2017

Firms	Industry	Donation Date
Norfolk Southern Foundation	B2B	9/1/2017
The Travelers Companies, Inc. Contributions Program	B2B	9/1/2017
Rite-Aid Foundation	B2C	9/1/2017
Texas Instruments Incorporated Contributions Program	B2B	9/2/2017
Pentair Foundation	B2B	9/3/2017
Gap Foundation, Gap, Inc.	B2C	9/3/2017
Citi Foundation	B2B	9/3/2017
Pioneer Natural Resources Company Contributions Program	B2B	9/3/2017
TransCanada Corporation Contributions Program	B2B	9/3/2017
Eli Lilly and Company Foundation	B2C	9/3/2017
Campbell Soup Company Contributions Program	B2C	9/3/2017
IBM Corporate Giving Program	B2B	9/3/2017
Dell Inc. Corporate Giving Program	B2B	9/3/2017
Wolverine World Wide, Inc.	B2C	9/5/2017
Andeavor Corporation Contributions Program	B2B	9/5/2017
Fortis Inc. and ITC Holdings Corp	B2B	9/5/2017
Century Communities	B2B	9/5/2017
Frontier Communications<.strong>	B2B	9/5/2017
Phillips 66 Corporate Giving Program	B2B	9/5/2017
Santander US	B2B	9/5/2017
American International Group (AIG)	B2B	9/5/2017
Louisiana-Pacific Corporation	B2B	9/5/2017
Hanmi Bank	B2B	9/5/2017
Total	B2B	9/6/2017
Nexstar Media Group, Inc.	B2C	9/6/2017
Sinclair Broadcasting Group (and affiliates)	B2C	9/6/2017
Entergy Corporation Contributions Program	B2B	9/6/2017
Hercules Capital, Inc.	B2B	9/6/2017
Stage Stores, Inc.	B2C	9/6/2017
Renaissance Family Foundation	B2B	9/6/2017
EOG Resources, Inc. Corporate Giving Program	B2B	9/7/2017
Macy's	B2C	9/7/2017
Anadarko Petroleum	B2B	9/7/2017
Valero Energy Corporation Contributions Program	B2B	9/7/2017
Carnival Cruise Line, Carnival Foundation	B2B	9/7/2017
KeyBank Foundation	B2B	9/7/2017
Discover Financial Services Corporate Giving Program	B2B	9/7/2017
Walgreens Corporate Giving Program	B2C	9/7/2017
Kinder Foundation	B2B	9/7/2017

Firms	Industry	Donation Date
Xcel Energy Foundation	B2B	9/7/2017
KBR, Inc. Contributions Program	B2B	9/7/2017
Scotiabank Corporate Giving Program	B2B	9/8/2017
Honeywell	B2C	9/9/2017
GM Corporate Giving Program	B2C	9/10/2017
Home Depot Foundation, Inc.	B2B	9/11/2017
New York Community Bank	B2B	9/11/2017
Dick's Sporting Goods, Inc.	B2C	9/12/2017
Allstate Foundation, Company Contributions Program	B2B	9/15/2017
Xerox Corporation Contributions Program/strong>	B2C	9/19/2017
AmerisourceBergen Foundation	B2C	9/19/2017
Norbord Corporate Giving Program	B2B	9/19/2017
3M Foundation and 3M Company Contributions Program	B2C	9/22/2017
Tenet Healthcare Foundation	B2C	9/28/2017