

Greenwashing and Trade Credit

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Abstract

This study investigates the impact of corporate greenwashing practices on the provision and use of trade credit. Using firm-year observations of U.S. listed firms, we document that both the provision and adoption of trade credit by firms are negatively associated with corporate greenwashing activity. We also examine the channel effect for the relationship, and our results show that greenwashing activity influences firms' trade credit through the channel of financial constraints rather than social capital. Our results further indicate that the association between trade payables and greenwashing is more pronounced for firms with a higher level of institutional ownership. In addition, we discover that the strength of the link between trade receivables and greenwashing increases when the associated analyst forecast accuracy is higher. We finally provide supportive evidence that both greenwashing and trade credit play a role in relieving firms' financial constraints and they work as substitutions for each other.

JEL classification: G30, G32, G34

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1. Introduction

The business world and the financial markets have paid an increasing level of attention to corporate social responsibility (CSR) activities in recent years. Prior studies indicate that non-financial information can affect a firm's market competitiveness, in terms of credit and reputation (Vanstraelen et al., 2003; Dhaliwal et al., 2012; Eccles et al., 2011). However, when firms undertake CSR investments and disclose their CSR related information to meet the expectations of the stakeholders and society, firms can only signal to the markets by providing information and attempting to influence the opinions of their stakeholders owing to the credence attributes of CSR. Critics of this signaling mechanism have raised questions on the legitimacy of such information, since some firms offer misleading information on their CSR performance and only claim to be “green” instead of being genuinely green. In this study, we refer to “greenwashing” as being an action where a firm strategically discloses CSR information and tries to influence the perceptions of the markets and stakeholders. Critics argue that corporations are dissuaded from making real environmental efforts because of disclosures of misleading information on CSR performance (Laufer, 2003; Wu et al., 2020; Szabo et al., 2021). The purpose of this study is to understand whether greenwashing firms, as suppliers, provide more (or less) trade credit or, as buyers, adopt more (or less) trade credit.

We seek to examine the mechanisms in which greenwashing affects the supply and use of trade credit, and there are two schools of thought that are in direct contrast with one another. First, combining the views obtained in prior studies, we argue that greenwashing plays a role in improving a firm's financial condition, whereas trade credit also serves as a device for reducing financial constraints as an informal source of financing. The two devices may play substituting roles in reducing financial constraints, and we expect that an increase in greenwashing activities is associated with a reduction in the adoption of trade credit by firms. Second, we argue from the angle of social trust. Greenwashing has been proved to be harmful to firms' reputation and damage trust between firms and stakeholders, and consequently we expect it has a negative impact on trade credit. We provide detailed discussion of the two mechanisms in following paragraphs.

Prior research demonstrates that the improvement in environmental, social, and governance (ESG) practices reduces firm risk and increase firm access to external financing with lower costs of capital

and corporate loans (Goss and Roberts, 2011; Hoepner et al., 2016; Nandy and Lodh, 2012; Sharfman and Fernando, 2008). Chen et al. (2014) argue that an improved ESG performance is linked to enhanced stakeholder orientation, which reduces the likelihood of engaging in short-sighted opportunism and lowers the overall costs associated with contracting. Moreover, firms with better ESG performance are more likely to disclose their ESG activities and provide higher quality of financial reporting, and consequently they have more chances to draw the interest of institutional investors, as well as the attention of financial analysts (Dhaliwal et al., 2011). In particular, a decrease in the gap in knowledge between a company and its investors is a direct effect of improved data availability and quality (Hail and Leuz, 2006; El Ghouli et al., 2011; Khurana and Raman, 2004), and this reduces the constraints on capital access (Hubbard, 1997). A lower cost of financing for firms is achieved by increasing the information accessibility to lending parties (Hubbard, 1997).

However, investors may have difficulty selecting assets that integrate ESG features since companies may engage in "greenwashing" by distorting their ESG disclosures. As a consequence, it is reasonable to expect that businesses acknowledge the importance of ESG performance and use ECG disclosure to sway public attitudes, while also reaping the financial benefits. Previous studies have shown that corporations may lessen the negative effect of environmental damage (or comparable incidents) on its corporate reputation and fair value by increasing the transparency of its ESG performance (Brown and Deegan, 1998; Cho and Patten, 2007). This method can also be used as a means of reestablishing a firm's legitimacy (Campbell et al., 2003).

Meanwhile, stakeholders put a certain amount of faith in corporate messages, despite the fact that they may not always be an accurate representation of a company's actual ESG performance (Marquis et al., 2016; Van Halderen et al., 2016). Companies with limited financial resources have a stronger motivation to reveal their ESG engagements, which leads to a greater level of greenwashing (Zhang, 2022). Furthermore, firms that are highly leveraged may face additional financial pressure in the short- and long-run, thus, exacerbating their greenwashing behaviour. Berrone, Fosfuri, and Gelabert (2017) find that companies acquire environmental legitimacy by conforming to external environmental expectations.

From the perspective of trust, the second channel we proposed, it is suggested that greenwashing damages customer trust and the reputation of a firm that is conveyed to the stakeholders, thus, reducing the provision and adoption of trade credit. Based on prior empirical research, it appears that trust and/or reputation may be used as an effective method for ensuring the continuation of incomplete contracts, such as trade credit agreements (Wu et al., 2014; Levine et al., 2018; Cheung and Pok, 2019). While there may be no official enforcement mechanisms in place, Karlan (2005) finds that individuals are more likely to lend and repay loans in communities that they believe to be honest. Evidence such as this bolsters the argument that trust is a useful tool for ensuring the continuity of incomplete contracts, such as trade credit. Furthermore, prior studies document that greenwashing, instead of building trust in firms, can bring harmful effects to a firm's reputation and can damage the trust between firms and stakeholders (Hamann and Kapelus, 2004; Pomeroy and Johnson, 2009; Lyon and Maxwell, 2011; Chen and Chang, 2013a; Guo et al., 2017). Consequently, we conjecture there to be a negative association between greenwashing and trade credit, since firms which undertake greenwashing activities are perceived as being untrustworthy.

Despite the fact that greenwashing is often associated with a poor information environment, private lenders' insider information about potential greenwashing practices may reduce the costs associated with adverse-selection and moral-hazard for these loans (Boot, 2000; Bhattacharya and Chiesa, 1995). Relationship lending dominates the private debt market (e.g., Bharath et al., 2011), giving private lenders (as opposed to public debt holders) superior capabilities for collecting and processing borrowers' private information (e.g., Fama, 1985; James and Smith, 2000). This gives them an advantage when pricing the securities of informationally opaque firms (Hadlock and James, 2002). Attig et al. (2021) show that greenwashing in public reporting can trick private lenders, who have access to extensive private information, into providing cheaper loans. They indicate that greenwashing firms face higher collateral requirements and stricter covenants in terms of private loans. In line with these arguments, we propose that trade creditors, as an informal form of financing, depend more on private information and require stricter policies to compensate for the risks associated with greenwashing.

Due to its arm's-length connection, trade credit serves as one of the most critical external financial intermediaries. Zhang and Lucey (2022) document that companies with higher ESG performance

can obtain more trade credit to help them to overcome financial restrictions and improve their performance (Zhang and Lucey, 2022). However, greenwashing activities have a negative effect upon a firm's "green reputation", leading to stricter policies being used for greenwashing firms and a higher overall cost of lending on trade credit, which finally induces a reduced use of trade credit by these firms.

In this study, we make the first attempt to investigate the impact of greenwashing on provision and adoption of trade credit by companies in the U.S. markets for the period from 2002 to 2019. Following Roulet and Touboul (2015), we collect the CSR performance score data of U.S. firms from the Thomson Reuters ASSET4 ESG database. We differentiate firms' substantive CSR scores (e.g., total direct flaring or venting of natural gas emissions, percentage of women employees.) from their symbolic CSR scores (e.g., does the company report on initiatives to reduce, reuse, recycle, substitute, or phase out SO_x (sulfur oxides) or NO_x (nitrogen oxides) emissions? Does the company have a policy to ensure the freedom of association of its employees?). We construct the first measure of greenwashing, *GW_ratio*, by computing the ratio of symbolic scaled by substantive CSR scores. The second measure of greenwashing, *GW_diff*, is constructed as the difference between symbolic and substantive CSR scores. Our empirical results indicate that both trade receivables and trade payables are negatively associated with greenwashing. We further show that the negative association between trade payables and greenwashing is driven by the financial constraints channel rather than social trust. Moreover, our results suggest that the association between greenwashing and trade credit is less pronounced for firms with higher institutional investor ownership and more information asymmetry.

Motivated by the limited research on the influence of greenwashing practices on firms' financing strategies, our study makes a three-fold contribution to the related literature. First, to our best knowledge, this is the first study on the impact of greenwashing activities on firms' trade credit policies. The existing literature pays their attention to how greenwashing affects market outcomes and the information environment of a firm, while little attention has been paid to alternative financing activities. In particular, previous studies have mainly focused on the harmful effects of greenwashing on the market reaction, customer perception and corporate reputation (i.e. Du, 2015;

Akturan, 2018; Brouwer, 2016). With an increasing number of corporations relying on trade credit to make transactions, our study sheds light on the factors that drive this phenomenon.

Second, following the two schools of thought about mechanisms, financial constraints and social trust, in which greenwashing affects the supply and use of trade credit, we further investigate the channel effects for the negative association between corporate greenwashing practices and firms' trade credit policies. Our results indicate that corporate greenwashing activities manifests a negative effect on firms' trade credit via the financial constraints channel rather than social trust. Moreover, we provide the evidence to support the argument that if greenwashing is a considered as a vehicle for improving a company's financial situation and it may be used in place of trade credit to reduce financial distress, we can infer that it has an impact on trade credit and there is a substitutional effect between greenwashing and trade credit.

Finally, we also make contributions to literature of institutional investors, in terms of their monitoring role in reducing agency problems associated with greenwashing. We further document that, due to the external monitoring effects of institutional investors, firms with stronger external monitoring forces have less incentives to adopt greenwashing. Consequently, for firms with greater ownership of institutional investors, the negative association between greenwashing activity and trade credit is less pronounced. In addition, we contribute to the literature of greenwashing in a way to prove information asymmetry moderate the impact of greenwashing activities. We provide supportive evidence that the negative association between greenwashing and trade payables are less pronounced for firms with higher information asymmetry. Our results suggest that information asymmetry reduces the returns that a firm can pursue by conducting more greenwashing activities and in turn reduce impact of greenwashing on trade payables.

Our paper differs from previous studies including Cheung and Pok (2019) and Xu et al.(2020) as we focus on greenwashing activities instead of corporate social responsibility performance. We argue that firms adopt greenwashing to relieve financial distress, and consequently depend less on trade credit. In addition, we adopt measures of greenwashing, computed by the difference between symbolic CSR ratings and the substantive CSR ratings, and the ratio of symbolic CSR ratings over

the substantive CSR ratings, while these two studies look at the overall CSR ratings of the firms. Finally, we provide additional evidence to support the financial constraints theory of trade credit.

This paper is structured as follows. Section two lays out the related literature and the development of the hypotheses. Section three describes the data and the empirical methodology. section four presents the empirical results of our baseline models, moderating and channel effects, robustness checks and additional tests. Finally, section five concludes.

2. Related literature and hypothesis development

2.1 Greenwashing

2.1.1 Impact of greenwashing

The public discussion regarding corporate social responsibility (CSR) has shifted over recent decades to focus on corporations' instrumental and strategic embrace of environmental and social claims. An increasing number of businesses have been criticised for "not walking the walk." Essentially, "not walking the walk" refers to the fact that many businesses have been criticised for failing to back up their corporate social responsibility (CSR) assertions about environmental or social concerns with action (Walker & Wan, 2012). When there is a mismatch between environmentally and socially responsible rhetoric and actions, it is called "greenwashing." Mason and Mason (2012) analyse the corporate environmental reports of 100 businesses included in the 2009 Fortune 1000 and show that these reports use ideological propaganda in an effort to sway the views of their audiences on the subject of corporate environmental sustainability. Many people are against greenwashing because they believe that it prevents businesses from undertaking environmentally friendly actions (Dahl, 2010).

There are several reasons and incentives for firms to engage in greenwashing activities based on the previous literature. Mitchell and Ramey (2011) suggest that greenwashing activities are motivated by unconventional consumer habits in relation to green products. The competitive altruism theory argues that consumers are willing to pay extra, in terms of time, money and resources, for items and services that they believe to be environmentally friendly. Consequently, businesses are gearing up to fulfil the expectations brought about by the new norm, and some of those businesses are succumbing to greenwashing. Some businesses, however, see the current

"green" movement as a chance to gain an edge over rivals by committing to unethical means of competition. Several businesses, lured by the promise of increased profits through green premiums, may exaggerate the positive impact of their goods on the environment in order to entice customers into choosing them over the competition. Moreover, as per Budinsky and Bryant (2013), the current system of advertising rhetoric promotes individuality, greed, and consumerism, all of which weaken the importance of addressing collective societal problems, such as environmental protection. Bazillier and Vauday (2009) suggests that the method of conceiving instrumental CSR favors the diffusion of greenwashing, since it discourages engagement in substantive socially responsible activities that do not maximize profit. In particular, Hummel and Festl-Pell (2015) document the shortcomings of current disclosure guidelines, explaining that they are inadequate and are unable to account for material sector-specific sustainability issues.

Greenwashing activities have also lead to internal consequences for corporations and stakeholders, such as consumers, and the environment and society at large (Gatti et al., 2019). First, greenwashing activities may have certain internal consequences for corporations. An increasingly environmentally conscious population has been targeted by an infusion of "ecofriendly" goods, as discussed by Furlow (2010), prompting many businesses to reconsider the usefulness of "green" marketing. Promises which appear to be environmentally conscious are often made by these businesses, but consumers tend to be sceptical because of the lack of specificity and the likelihood that the claims are misleading. Corporations may have less incentive to create ecologically friendly goods if customers "discount" all green marketing promises. Walker and Wan (2012) demonstrate that companies who take concrete steps to address environmental challenges (the "green walk") observe neither detrimental or positive effects on their financial performance, but those that only talk the talk (the "green talk") do harm their financial records.

Social media may have a negative effect on a company's greenwashing efforts as citizens and activists may see a company's environmental marketing as being excessive self-promotion (Lyon and Montgomery, 2013). Du (2015) demonstrates that greenwashing is closely and negatively linked with cumulative abnormal returns (CAR) surrounding the exposure of greenwashing, whereas corporate environmental performance is positive and significantly connected with greenwashing exposure. Using a combination of signaling theory and legitimacy theory, Seele and

Gatti (2017) provide a new definition of "greenwashing" and claim that an external charge is what constitutes greenwashing epistemologically. The charge of greenwashing is recognised as a signal-altering factor which distorts the actual green accomplishments being conveyed by the firms, and the phenomena of "greenwashing" exists at the intersection of unmet expectations, misinterpreted signals, and skewed perspectives.

In addition, some studies reveal that greenwashing leads to a series of consequences for consumers. Furlow (2010) states that greenwashing confuses consumers knowledge of firms' green products, resulting in increased consumer scepticism. According to Parguel et al. (2011), customers are often unable to recognise truly responsible businesses as they are inundated with corporate social responsibility (CSR) claims that are, in some cases, well-founded. This misconception promotes a practice known as "greenwashing" and may reduce the efficiency of CSR practices. The authors come to the conclusion that consumers' perceptions of a company's social responsibility is negatively impacted when businesses have low sustainability ratings and engage in communication practices that are seen to be greenwashing. Chen and Chang (2013) claim that greenwashing undermines environmental confidence, and this negative connection between greenwashing and green trust is further mediated by green consumer perplexity and green perceived risk. Similarly, Chen et al. (2014) show that greenwashing has a detrimental effect on environmental word of mouth as greenwashing lowers both the perceived quality of a firm's green performance and the consumer satisfaction with the green goods. Using information from 500 customers, Akturan (2018) also find that greenwashing has a harmful effect on consumer perceptions of, and trust in, green brands, which in turn influences green brand capital and the consumer desire to buy.

However, by applying the attribution theory from the field of psychology to the question of what makes green advertisements effective, Nyilasy et al. (2012) suggest a substantial interaction effect between green advertisements and corporate environmental performance, such that when the environmental performance of a company is good, green advertising leads to somewhat more positive brand attitudes than general positive corporate messaging. By contrast, when a firm's environmental performance is unfavourable, green advertising leads to significantly less positive brand attitudes than when a general corporate communication is utilised. In the same vein, Nyilasy et al. (2014) also show that green advertising exacerbates the negative impact on brand image, and

when a company's environmental record is good, consumers are less likely to view the brand favourably after being exposed to either green or conventional corporate advertising.

2.1.2 Positive externality

Some research shows that greenwashing may, in fact, have a beneficial effect on the marketplace. Lee et al. (2018) argue from an economic perspective that greenwashing should not be regulated, since greenwashing encourages firms to “go green” and eventually improves the overall level of CSR engagement in the market. Several pieces of literature prove that “market informedness” plays an important role in firms’ marketing and pricing decisions. Lee et al. (2018) define “market informedness” as the proportion of customers who know a product’s environmental quality. The authors argue from two scenarios, these being when the market is informed and uninformed. When greenwashing is regulated, all firms (both green and brown firms) choose to engage in CSR activities based on the cost and profit equilibrium of the CSR investments. Especially when recognition of CSR is not high and environmental consideration is not considered to be critical in society, CSR engagements are an inferior strategy when the cost of implementing CSR is high. Firms will eventually choose to go brown as CSR is profit-reducing. However, when greenwashing is not regulated, the authors discuss the market outcomes from two informedness scenarios. When there is a lower level of market informedness, there are two types of customers: informed and uninformed. The brown business, on the other hand, has the incentive to greenwash the market by advertising itself as being a friendly firm, even when CSR reduces profits. This is because, if a brown company admits to having poor environmental standards, it may increase its profits by appealing to uninformed consumers who, had they had the facts, would have placed a lower value on that company’s goods. When a brown company raises its prices to compete with a green company’s high product price, the informed consumers, who previously preferred the brown company's product owing to the cheaper price, would now choose to buy from the green company. Due to the dynamic adjustments in how the market works, an increasing number of companies are offering environmentally friendly products to their clients, even though CSR has a negative impact on profits.

2.2 Trade credit

Short-term financing may be accomplished in a significant part via the use of trade credit. Wilson and Summers (2002) indicate that more than 80 % of business-to-business transactions in the United Kingdom (UK) are done on credit, while in the United States (U.S.), around 80 percent of companies provide their goods on trade credit. Account payables provide 15% of total financing for large non-financial enterprises in the United States, while small businesses depend even more heavily on this source of funding. These levels may be considerably higher on a global scale, because short-term bank lending cannot compare to the magnitude of the trade credit among businesses (Seifert et al., 2013).

Prior studies demonstrate that businesses depend extensively on trade credit, not only to fund inventory purchases, but also to fulfil unforeseen financial demands (Haley and Higgins, 1973; Yang and Birge, 2018), and a firm's decision to use and provide trade credit can be affected by its access to external financing (Petersen and Rajan, 1997a; Fisman and Love, 2003; Love et al., 2007; Shenoy and Williams, 2017; Abdulla et al., 2017; Shang, 2020). When businesses are confronted with more difficulties when attempting to acquire external finance, they have a tendency to depend more heavily on trade credit.

There are also a variety of motivations for providing trade credit. Schwartz (1974) identifies two reasons for using credit sales: the financing motive and the transactions motive. The transactions motive contends that there is a cost associated with coordinating the payment for commodities at the time that they are received. When invoices are allowed to build for periodic payment, purchasers have more time to prepare for the payment of unforeseen purchases, are able to make more accurate projections of their future cash expenses. Consequently, their cash management is simplified when they have access to trade credit. Moreover, due to the benefit that accrues on money over time, customers are at an advantage when they receive credit sales that allow them to buy more goods of production. Consequently, when corporations have more convenient and less expensive access to the capital markets, they have incentives to make use of their borrowing capacity for the purpose of extending credit to their customers. Moreover, Smith (1987) proposes a model which defines that suppliers provide two-part credit to customers so that they can identify a prospective customer default more quickly than when only short-term bank credit is adopted. At the same time, suppliers also provide trade credit as a product quality guarantee to their customers

and with the aim of building a long-term relationship with their customers (Long et al. 1993). When there is incomplete knowledge about the quality of a product between suppliers and customers, trade credit works as a tool to distinguish between high-quality products and low-quality products. In the same vein, Deloof and Jegers (1996) and Ng et al. (1999) find similar results that support the product quality guarantee hypothesis.

According to the research of Chant and Walker (1988), trade credit may act as a supplement to, or perhaps a replacement for, traditional bank lending. Similarly, Emery (1984) argues that the financial intermediary motivation for trade credit is explained by the seller's need to maintain a liquid reserve in the event of imperfect financial markets, and by the seller's desire to obtain a return on the reserve above the market rate. Ono (2001) and Danielson and Scott (2004) also suggest the same point of view that trade credit is a substitute for bank loans. Elliehausen and Wolken (1993) state that, compared with other sources of finance, the use of trade credit helps to lower transaction prices. Wilson and Summers (2002) corroborate this finding by demonstrating that small businesses use trade credit to lower the costs embedded in their transactions.

In addition, customers with a significant amount of influence in the market may demand to buy the items on credit from the seller, which will boost their customer surplus, as explained by Van Horen (2011). This benefit to the consumer surplus rises as the degree of asymmetry in product quality information between the buyer and the supplier rises. Similarly, Petersen and Rajan (1997) show that companies with restricted access to outside funding from financial institutions are more likely to rely on trade credit. Firms with a competitive advantage in their ability to gather information about their clients, an advanced ability to liquidate assets, or an implied ownership interest in their customers are more likely to offer trade credit to those consumers.

Using samples from 43 countries, Fisman and Love (2003) document that, in less developed financial markets, trade credit serves as a substitutional source of financing and firms benefit from the use of trade credit. By using samples of 890 firms from six emerging markets, Love et al. (2007) show that bank lending is transferred from financially stronger companies to weaker companies in the form of trade credit, which is consistent with the "redistribution perspective" of trade credit. Garcia-Appendini and Montoriol-Garriga (2013) discover that businesses that were more liquid

before the financial crisis are more inclined to extend trade credit to their clients. With tighter constraints during a financial crisis, firms with limited liquidity adopt more trade credit as an alternative source of financing. The authors argue that suppliers provide liquidity insurance to their customers when bank loans are limited. Similarly, Shenoy and Williams (2017) show that corporations with a greater ability to obtain bank loans are more likely to provide trade credit to their clients. Abdulla et al. (2017) argue that, since public firms can have easier access to cheaper and less risky external sources of financing, they depend less on trade credit.

Wu et al. (2014) investigate how social trust influences the adoption of trade credit in China. Their results indicate that, in regions with a higher level of social trust, the suppliers are willing to provide more favorable trade credit to their customers as social trust can help to overcome the problems faced by private firms in their financing activities. Fabbri and Klapper (2016) document that suppliers with weaker bargaining power tend to offer more favorable trade credit terms, such as longer credit terms, a larger proportion of products being sold by credit and a higher possibility of the extension of credit sales in China. Kong et al. (2020) argue that, since a closer hometown connection reduces information asymmetry and establishes stronger social trust, suppliers are more certain about customers' creditworthiness and are willing to provide more favorable trade credit to firms with hometown CEOs.

2.3 Hypotheses development

Prior research demonstrates that an increase in ESG practices reduces corporate risk and facilitates access to cheaper external financing and bank credit (Goss and Roberts, 2011; Hoepner et al., 2016; Nandy and Lodh, 2012; Sharfman and Fernando, 2008). A superior ESG performance may also be indicative of better access to outside financing and a greater capacity to overcome economic constraints. Chen et al., (2014) found that firms with superior ESG practices had reduced capital restrictions. First, an improved ESG performance is connected with better stakeholder orientation, a limiting of short-term opportunistic behaviour and a lowering of total contracting costs, resulting in higher long-term revenue and profit. A higher ESG performance increases a company's probability of exposing its ESG activities, thus attracting institutional investors and analysts (Dhaliwal et al., 2011). The increase in corporate information availability and the quality of financial reporting decreases the information asymmetry between the company and investors (Hail

& Leuz, 2006; El Ghouli et al., 2011), resulting in reduced capital restrictions (Hubbard, 1997). As a result, lending groups have better quality information and firms pay less for external financing (Hubbard, 1997).

Consequently, it is feasible for corporations to acknowledge the significance of their environmental, social, and governance (ESG) performance and to make use of it to influence public opinion and to benefit from it. An increase in the level of disclosures may assist a company in preventing or lessening the unfavourable impacts of considerable environmental damage (or similar occurrences) on its reputation and firm value, or in reinstating its legitimacy. This may be the case if a company chooses to provide more information (Campbell et al., 2003).

However, it has become increasingly difficult for investors to select assets that integrate ESG factors because of the way that firms engage in "greenwashing" and manipulate their ESG disclosures. In particular, stakeholders place a significant amount of trust in corporate information, despite the fact that such information may not always accurately reflect the actual environmental, social, and governance performance of the companies (Marquis et al., 2016; Van Halderen et al., 2016). Greenwashing is more prevalent among corporations that have fewer financial resources, since they are more likely to deceitfully declare an inaccurate ESG disclosure score (Zhang, 2022). Moreover, highly indebted enterprises may experience additional financial pressures, which may exacerbate their greenwashing behaviour. According to Berrone, Fosfuri, and Gelabert (2017), corporations earn environmental legitimacy by complying with external environmental expectations. In addition, Gregory (2021) indicates that greenwashing is especially advantageous for companies with strong pricing power and is more financially feasible for these companies due to the significant knowledge gap between the firms and stakeholders involved. Similarly, he also argues that companies with lower stock volatility favour greenwashing since the penalty for being caught engaging in greenwashing is less severe.

Previous studies reveal that one rationale for employing trade credit is that, by offering and adopting trade credit, firms can reduce their financial constraints through this informal source of financing (e.g., Smith, 1987; Biais and Gollier, 1997; Aktas et al., 2012). Combining the views obtained in prior studies, we argue that greenwashing can be substituted for trade credit as a device

for mitigating the financial constraints of firms in the market. Therefore, we expect that an increase in a firm's greenwashing activities is associated with a lower level of the adoption of trade credit by firms.

In addition, the trust view of greenwashing suggests that greenwashing damages the trust of stakeholders and firm reputation, which in turn reduces the provision and adoption of trade credit. The empirical research indicates that trust between suppliers and customers and corporate reputation may offer an effective mechanism for maintaining the continuation of incomplete contracts, such as trade credit. People who have a keen awareness of the degree of honesty in their communities are more likely to lend money and pay it back, even when there are no disciplinary mechanisms in place, according to Karlan (2005). Prior studies find that greenwashing, instead of building trust in firms, can damage a firm's reputation and the trust between firms and their stakeholders (Hamann and Kapelus, 2004; Pomeroy and Johnson, 2009; Lyon and Maxwell, 2011; Chen and Chang, 2013a; Guo et al., 2017). Therefore, we conjecture that there is a negative association between greenwashing and trade credit, since firms which undertake greenwashing activities are perceived as being untrustworthy. Hence, combining the above points of views, we propose our first hypothesis as:

H1: The adoption and provision of trade credit is negatively associated with greenwashing.

Shleifer and Vishny (1986, 1997), who characterise the monitoring stance of institutional investors, argue that the large amount of stock ownership of these shareholders provides them with more motivation than smaller investors to acquire information and to supervise management. In a similar vein, Monks and Minow (1995) argue that complex institutions with considerable share ownership have a tendency to monitor and discipline managers in order to ensure that the firm's investment strategy is consistent with the objective of maximising long-term value, rather than meeting short-term earnings goals. This is because sophisticated institutions are more concerned with maximising long-term value than with meeting short-term earnings goals.

A large number of empirical studies also provide evidence on the monitoring force of institutional investors. Callen et al. (2020) compare and contrast two competing theories on the monitoring of

institutional investors and short-termism. The authors present evidence that is in line with the monitoring hypothesis of institutional investors, but not with the short-termism hypothesis, which states that the stability of institutional investors has a negative association with the risk of a crash in the stock market occurring one year in the future. By asking whether the incentive of institutional investors in supervising a company is positively connected to the relative significance of the firm's stock in their portfolios, Ward et al. (2018) further examine the role of institutional investors as guardians. They conclude that a higher level of active institutional ownership fulfilling their supervisory roles is connected with an increase in the marginal value of corporate cash holdings.

We argue that a stronger external monitoring force, which reduces information asymmetry between corporations and shareholders, reduces a firm's cost of capital and improves a firm's ability to raise funds through loans and equity capital. The existing literature provides evidence that attention from institutional investors reduces the cost of capital. Saci and Jasimuddin (2021) find that an increase in institutional investor research on a firm reduces the cost of capital. They explain that institutional investor research reduces the risk borne by investors, since more comprehensive information is revealed. In this way, compensations to risk premiums decrease, leading to a lower cost of capital. Attig et al. (2013) also find that long-term dedicated institutional investor ownership is negatively associated with firms' cost of capital. They state that long-term institutional investors impose greater monitoring on firms, enhancing corporate transparency. Following these arguments and findings, we expect that with a stronger external monitoring force imposed by institutional investors, the information asymmetry is reduced, and firms then have a reduced cost of capital and rely less on trade credit. We consequently propose the second hypothesis as:

H2: The negative association between the adoption and provision of trade credit and greenwashing is less pronounced for firms with a higher level of institutional ownership.

Firms commit greenwashing intend to convey stakeholders in return for greater green trust and reputation, hence transmitting into higher profitability and lower costs (Laufer, 2003; Parguel et al., 2011). The return on greenwashing highly depends on green trust (Chen and Chen, 2010) and

negatively associated with green scepticism and perceived risk due to confusion (Chen and Chang, 2013). Green scepticism arises due to lack of trustworthy information provided to stakeholders, such as customers. Companies can't simply say their goods are "green," therefore they need to be more transparent about how they achieve it. Stakeholders may be sceptical of green marketers' promises if they are not convinced of the quality of their goods, which makes it difficult for green marketers to succeed (Chen and Chen, 2008). According to Turnbull et al. (2010), consumer confusion occurs when a buyer is unable to build a coherent mental picture of a product's many features after being presented with an information processing procedure. Misunderstanding or misreading of the market is the result of consumer confusion. Information, especially that is comparable, complicated, ambiguous, or abundant, may lead to customer confusion. Chen and Chang (2013) extend this notion to green information processing procedure of the audiences and argue that green scepticism increases because audiences are limited in their cognitive ability to in information processing. Mitchell (1999) state that confusion may arise due to unclarified information conveyed by the firms. The author claims that marketing communications that are muddled, deceptive, or just insufficient to be accountable for the resulting misunderstanding.

Chen and Chang (2013) and Chen et al. (2014) demonstrate that green trust is significantly related to green confusion and perceived risk associated with it. Therefore, we argue that firms with higher level of information asymmetry induce greater green confusion and greater perceived risk of stakeholders, dampening the return of greenwashing communication, and hence reduce the effect of greenwashing on trade credit. We then propose the following hypothesis:

H3: The negative association between the adoption and provision of trade credit and greenwashing is less pronounced for firms with higher information asymmetry.

3. Data and Methodology

3.1 Greenwashing measures and trade credit

We obtain data of greenwashing from Thomson Reuters ASSET4 ESG database. The accounting data is obtained from Compustat database. Data of analyst forecast is collected from I/B/E/S database. We also collect data of institutional investor ownership from Thomson Reuters F13

database. Our sample covers listed firms from the U.S. and a sample period ranges from 2002 to 2019. We distinguish firms' substantive CSR scores (e.g., total direct flaring or venting of natural gas emissions, percentage of women employees), from their symbolic CSR scores (e.g., does the company report on initiatives to reduce, reuse, recycle, substitute, or phase out SO_x (sulfur oxides) or NO_x (nitrogen oxides) emissions? Does the company have a policy to ensure the freedom of association of its employees?). ASSET4 claims that its ratings are able to measure firms' "talk" versus their "walk" in relation to corporate social activities. We construct the first measure of greenwashing, *GW_ratio*, by computing the ratio of symbolic to substantive CSR scores. The second measure of greenwashing, *GW_diff*, is constructed as being the difference between symbolic and substantive CSR scores.

Following Shang (2020), we use three measures of firms' trade credit policies. The first measure is Receivables (*TR*), measuring the willingness by a firm to offer trade credit to its customers, which is calculated as trade accounts receivable divided by total sales. The second measure is Payables (*TP*), measuring a firm's willingness to rely on trade credit provided by its suppliers. The second measure is calculated as accounts payable divided by the cost of goods sold. The third measure is Net Payables (*Net*), which is the difference between Receivables and Payables. We obtain firm accounting and stock data from the Compustat database.

3.2 The baseline regression

We adopt panel regression models to examine the impact of greenwashing activities on a firm's trade credit policies. We estimate the following models to examine the first hypothesis:

$$TradeCredit_{i,t+1} = \beta_0 + \beta_1 Greenwashing_{i,t} + FirmControl_{i,t} + Industry_i + Year_t + \varepsilon_{it} \quad (1)$$

where *TradeCredit* represents the three measures of trade credit: *TR*, *TP* and *Net*. *TR* is the trade receivable days measured as being a firm's accounts receivable scaled by total sales. *TP* is the trade payable days measured as being a firm's accounts payable scaled by the cost of goods sold. *Net* is the net trade credit measured as being the difference between trade receivables and trade payables. *Greenwashing* represents the two measures of the level of greenwashing by the firms.

GW_ratio, a greenwashing ratio, is computed as the symbolic CSR scores scaled by the substantive CSR scores. *GW_diff* is the difference between the suggested level of greenwashing and the actual level of greenwashing, computed as the symbolic CSR scores minus the substantive CSR scores.

We include firm-level control variables to control for their effects on trade credit. We control for firm size, since larger firms may have easier access to finance compared with smaller firms, and may therefore use or provide less trade credit (Shang, 2020). Xu et al. (2020) argue that smaller firms generally have higher information asymmetry and are, therefore, less trustworthy than larger firms. We use the natural logarithm of total assets to proxy for firm size. We also include firm age as one of our control variables, as older firms are more trustworthy and less dependent on trade credit (Ng et al., 1999). Molina and Preve (2012) find that firms with greater changes in sales are more like to alter their dependence on trade credit. We calculate the sales growth rate as being the difference between sales in the current period and sales in the previous period, scaled by the previous sales. We control for firm profitability by using ROA (return on assets), computed as a firm's net income scaled by total assets, since profitable firms are more likely to receive advanced trade credit settings (Zhang et al., 2014). Firm growth opportunity is proxied by the market-to-book ratio. This is because a firm experiences a higher demand for trade credit when it experiences high growth (Petersen and Rajan, 1997). We also incorporate the leverage ratio, which is computed as the total liabilities divided by total assets in the regression model, since trade credit is perceived to be a substitution for loan and equity finance. Firms with more current assets are more dependent on trade credit (Petersen and Rajan, 1997), and we therefore control for cash holdings and PPE. The two variables are scaled by total assets. We also control for capital expenditure, since firms that spend more on capital tend to be more dependent on trade credit (Carbo-Valverde, Rodriguez-Fernandez and Udell, 2016). We also control for the industry and year fixed effects.

3.3 Sample and data

Following Roulet and Touboul (2015), we collect the CSR performance score data of U.S. firms over the period between 2002 and 2019 from the Thomson Reuters ASSET4 ESG database. Data used to compute trade credit and other accounting data are obtained from Datastream, and Compustat. Data of institutional investors are obtained from the Thomson Reuters 13F database

and the analyst data are collected from the I/B/E/S database. We first construct greenwashing measures, *GW_Diff* and *GW_Ratio*. We then merge the trade credit measures with the greenwashing measures. We add in control variables, such as firm size, firm age, sales growth, ROA, PPE, market-to-book ratio, cash holdings, leverage and capital expenditure. After eliminating the missing values, we finally obtain a sample of 13,847 firm-year observations.

4. Empirical Results

4.1 Descriptive summaries

The descriptive statistics provide a summary of the variables employed for our empirical investigation. The table of descriptive statistics includes the number of observations, mean, median, standard deviation and 25% and 75% quantile of variables. Table 1 represents the descriptive statistics of the variables incorporated when analyzing the influence of greenwashing on a company's trade credit. As per the above findings, *GW_diff* has a mean of -17.391 and *GW_ratio* has a mean of 0.638. It is implied that a firm's symbolic CSR score is, on average, lower than the substantive CSR score. The dependent variables in our primary test (*TR* and *TP*) have means of 0.307 and 0.122, indicating that trade receivables accounts for, on average, 30.7% of a firm's total assets, and that trade payables accounts for 12.2% of the cost of goods sold. The average firm size and firm age of our sample are 8.595 and 27.652, respectively, with a market-to-book ratio of 2.119. On average, the firms are large in size and old in age. The average leverage ratio is 0.279, indicating that, on average, the firms depend more on long-term and short-term debt to fund their operating, whereas trade payables only account for 0.122. PPE and cash holdings are 0.234 and 0.152, on average. The average capital expenditure accounts for only 3.6% of the total assets, indicating that the sample firms have low capital expenditure. The sales growth rate and ROA are, on average, low at 3.8% and 10%, respectively.

[Insert Table 1 around here]

Table 2 represents the correlation coefficients between dependent variables and independent variables. High correlation between independent variables raises multicollinearity concerns, which may result in an inaccurate estimation of the coefficients of interest. The coefficients between independent variables and control variables are less than 0.5, which indicates that there is no

multicollinearity concern within our models. We notice that the correlation coefficients between greenwashing measures, *GW_diff* and *GW_ratio*, and trade receivables are -0.031 and -0.033. The two correlation coefficients are significant at the 5% level. The correlation coefficients between the greenwashing variables, *GW_diff* and *GW_ratio*, and trade payables are -0.005 and -0.012, respectively. The negative coefficients provide primary evidence that greenwashing and trade credit are negatively related. This is consistent with our prediction in Hypothesis 1, as we argue that from both the financial constraints view and the social trust view, trade credit is negatively associated with the level of greenwashing.

[Insert Table 2 around here]

4.2 The impact of greenwashing activities on trade credit

Previous studies suggest that greenwashing activities bring positive externalities and induce firms to go green and improve their CSR performance, thus reducing the information asymmetry. Trade credit also serves as a device for reducing information asymmetry between management and buyers and external investors. In addition, analysts also serve to diffuse greenwashing information, since they please the management in order to obtain private firm information. Therefore, greenwashing acts as a substitution for trade credit and reduces the demand for trade credit.

Table 3 reports the regression results of the impact of trade credit on greenwashing measures when control variables are added to the regression models. The coefficients of *GW_diff* and *GW_ratio* are shown to be negative and significant at the 1% significance level, indicating that the results support the hypothesis H1 and provide evidence that greenwashing reduces the demand for trade credit and serves to reduce the information asymmetry of firms. The results show that with a one point increase in difference between firms' symbolic CSR scores and their substantive CSR scores, the trade receivable ratio decreases by 0.004 and the trade payables ratio decreases by 0.248. With a 1% increase in *GW_ratio*, the trade receivables ratio decreases by 0.22% and the trade payables ratio decreases by 11.695%. Moreover, the coefficient of net trade payables also shows negative significance.

[Insert Table 3 around here]

Most of the control variables show significance and signs that are consistent with the existing literature. We find in Table 3 that the trade receivables and trade payables ratios are both positive and significantly related to firm size and are negative and significantly linked with firm age. These findings are consistent with the studies by Shang (2020) and Xu et al.(2020). Sales growth rate is significant and negatively related to TR and TP and this is in line with Xu et al. (2020). We find a significant and negative relationship between ROA and trade receivables, but an insignificant relationship between ROA and trade payables. PPE, cash holdings, leverage and capital expenditure are positive and significantly related to trade receivables. The trade payables ratio is positive and significantly related to PPE, which is consistent with Xu et al. (2020), and is negative and significantly related to market-to-book ratio, cash, and leverage.

4.3 The effect of institutional investors

Previous studies on institutional ownership concentration provide theoretical and empirical evidence on the monitoring function of institutional investors in reducing the agency problems between shareholders and managers (Hartzell and Starks, 2003; Khan et al., 2005; Janakiraman et al., 2010). Due to the monitoring mechanism of institutional investors, firms are less likely to engage in greenwashing activities, demonstrating that there would be a moderating effect of institutional ownership concentration on the relationship between the two main variables. We measure institutional investor concentration by using the total proportion of institutional investor ownership.

Table 4 reports the regression of trade credit measures on greenwashing measures when the interaction terms of greenwashing (*GW_diff* and *GW_ratio*) and total institutional investor ownership are added to the baseline regression models. The coefficients of *GW_diff* and *GW_ratio* remain negative and significant at the 1% significance level, reinforcing that the results support hypothesis H1 and providing evidence that greenwashing reduces the demand for trade credit and serves to reduce the information asymmetry of firms. The results show that with a one point increase in the difference between a firm's symbolic CSR score and its substantive CSR score, the trade receivable ratio decreases by 0.009 and the trade payables ratio decreases by 0.516. With a

1% increase in the *GW_ratio*, the trade receivables ratio decreases by 0.444% and the trade payables ratio decreases by 25.643%. The coefficients of the interaction term show positive significance for the regression with the trade payables ratio. It is implied that institutional investor concentration has a moderating effect on the adoption of trade credit due to its monitoring function. However, the coefficients of the interaction terms are not significant for the trade receivables ratio, indicating no effect of the institutional investor concentration on the relationship between greenwashing and trade receivables.

[Insert Table 4 around here]

4.4 The effect of information asymmetry

Many pieces of literature based on analysts reveal that analysts work as an information intermediary to enhance firms' corporate governance and to reduce agency problems (Dhaliwal et al., 2012; Chen et al., 2015, 2017). Chen et al. (2017) reveal that, through information intermediary and monitoring channels, the analyst forecast quality, measured by analyst forecast accuracy and dispersion, affects firms' investment decisions. The authors provide evidence of the effect of analysts' information intermediary functions on firm value and corporate governance. We use analyst forecast dispersion, which measures the difference between analyst estimations on future earnings per share, to proxy the information asymmetry of the firms. We argue that, through firms exhibit higher level of information asymmetry (measured by analyst forecast dispersion) have the reduced return on greenwashing activities, implying a moderating effect of information asymmetry on the relationship between greenwashing and trade credit.

Table 5 presents the regression results when we add in the interaction term of greenwashing measures and analyst forecast dispersion. The results show that the coefficients of *GW_diff* and *GW_ratio* for both trade receivables and trade payables remain negative and significant at the 1% significance level. However, the coefficients of interaction terms are shown to be positive and significant only for the trade payables ratio. This indicates that the moderating effect of analyst forecast dispersion is only effective on the reduction of trade payables. The regression results show that for firms with different level of information asymmetry, the impact of greenwashing on trade receivables are indifference among them. However, in terms of trade payables, firms with greater information asymmetry exhibit stronger negative impact of greenwashing on trade payables. The

test results are consistent with our expectation in Hypothesis 3. We argue that information asymmetry induces greater level of green scepticism among stakeholders, causing damage of green trust of firms. The effect of greenwashing on trade payables therefore is less pronounced in firms of higher information asymmetry.

[Insert Table 5 around here]

5. Extended analyses: the channel effects

We then examine whether greenwashing affects trade credit through the channel of financial constraints. We use three measures of financial constraints, these being the KZ index, no-dividend payer dummy and the short-term debt holdings of the firms. According to previous research, firms have an incentive to engage in greenwashing activities to reduce cost of funding and for the relief of financial constraints (Attig et al., 2021; Zhang, 2021; Zhang, 2022). We expect that firms which are faced with severer financial constraints are more likely to engage in greenwashing activities, and, thus, have a reduced tendency to adopt trade credit. Firms that do not pay dividends are often perceived to be more financial constrained (Schiantarelli, 1996; Farre-mensa, 2016; Campello et al., 2010). We compute the KZ index by following Kaplan and Zingales (1997) and the measure of short term debt according to Shang (2020). A higher ratio in the KZ index represents more severe financial constraints confronted by those firms. ST1 and ST3 of short-term debts refer to the ratio of current liabilities over total debt and the ratio of current liabilities plus liabilities due within three years over total debt.

Table 6 presents the results when the interaction term between greenwashing measures and the KZ index and no-dividend payer are added to the models. The coefficients of the interaction terms, $KZ*GW_diff$ and $KZ*GW_ratio$, are both negatively significant at the 5% significance level when trade payables is used as the dependent variable (Columns (3) and (4)). The coefficients of the interaction terms, Non_Div*GW_diff and Non_Div*GW_ratio , are both negatively significant at the 5% and 10% significance level, respectively, when trade payables is used the dependent variable (Columns (7) and (8)). This demonstrates that, with a higher level of financial constraint, the negative association between greenwashing and the adoption of trade credit is more

pronounced. This proves that greenwashing influences trade credit through the channel of financial constraints. However, the coefficients of the interaction terms are insignificant when trade receivables are used as the dependent variable (Columns (1), (2), (5) and (6)), indicating financial constraints channel does not explain the negative association between greenwashing and trade receivables.

[Insert Table 6 around here]

We then demonstrate that the results are robust when alternative measures of financial constraints are employed. Following Shang (2020), we apply short-term debt to measure financial constraints. We use two measures of financial constraints, these being the short-term debt due within one year, *ST1*, and the short-term debt due within three years, *ST3*. The existing literature provides evidence that a higher level of short-term debt is associated with lower liquidity, higher refinancing risk, more cash holdings and a lower ability to invest (Almeida et al., 2004; Harford et al., 2014; Fu and Tang, 2016). Table 7 shows that the coefficients of the interaction terms of both *ST1* and *ST3* with greenwashing are negatively significant when trade payables is used as a dependent variable, except for *ST1*GW_ratio*. In general, the results show that the negative association between greenwashing and trade payables is more pronounced in firms facing greater financial constraints.

[Insert Table 7 around here]

We then test the channel of social trust. We argue that, if greenwashing activities result in damage to the green reputation of a firm and it reduces the social trust between the suppliers and customers, trade credit and greenwashing should be negatively associated with one another. Trade credit is an informal form of unsecured debt which is highly dependent on trust and reputation. We then test the channel effects on social trust. Following Deng et al. (2013), we construct a social trust measure by using an social capital index (SCI), computed from community relations, diversity, human rights and environmental dimensions of the KLD ratings. The concern scores are subtracted from the strength scores for each dimension assigned to a firm. The overall index is equal to the sum of the four dimensions scores. We obtain the data from the MSCI KLD ESG database. The adjusted index is computed by using standardized dimension scores and an unadjusted index is computed by using non-standardized dimension scores.

Table 8 reports the results when the interaction terms of the adjusted SCI index and greenwashing are added to the regression model. The coefficients of the interaction terms are insignificant, which shows that social trust does not serve as a channel for explaining the association between greenwashing and trade credit. We then repeat the test using an alternative measure of SCI index, this being the unadjusted SCI index. The results are presented in Table 9. The coefficients of the interaction terms remain insignificant, confirming that there is no channel effect through social trust.

[Insert Table 8 and Table 9 around here]

6. Endogeneity concerns

A firm's CSR performance may affect its financial performance, the firm value and other firm characteristics, thus, influencing the supply and provision of trade credit. However, we may also expect that the supply and provision of trade credit can also affect the firm performance and firm characteristics, thus, directly affecting a firm's adoption of CSR and its greenwashing activities. To alleviate the endogeneity problem caused by reverse causality, we adopt instrumental variables 2SLS tests and GMM tests.

Previous studies show that investments in CSR activities may lead to a reduction in a firm's financial performance and could damage firm value, based on the over-investment theory. Barnea and Rubin (2010) argue that CSR engagements, instead of serving to maximize shareholder wealth, are only used as a tool to fulfill managers' self-interests and to advance their careers. Di Giuli and Kostovetsky (2014) suggest that some managers believe that additional resource expenditure is a diversion from the main aim of the firm and that investments in CSR activities do not serve to maximize the profit of shareholders. The enhancement in a firm's future sales induced by CSR engagements cannot withstand the direct damage of such investments to the firm value. Gillan et al. (2021) also state that over-investment in CSR activities can cause damage to firm value due to agency problems between managers and shareholders. In addition, Dai et al. (2019) argue that CSR reporting is used by managers as a tool for the pursuit of self-interests, instead of being used to

disclose useful information about a firm's CSR performance, thus, magnifying the problem of greenwashing.

However, other researchers provide an abundance of theoretical and empirical evidence that CSR activities can enhance a firm's financial performance and other firm characteristics. Jensen (2001) suggests that firms who engage in CSR activities consider the interests of all stakeholders, as opposed to only the interests of shareholders, in order to establish their corporate reputation and to maintain the long-term goals of profit maximization. This approach results in better long-term profitability and efficiency. Firms also build up a better relationship with their stakeholders, such as customers, suppliers and employees, in order to obtain their support by engaging in CSR activities. Simultaneously, CSR activities help to reduce the information asymmetry between stakeholders and firms (Cui et al., 2018). CSR engagement also serves as a tool for risk management, especially when firms are faced with negative circumstances, such as a financial crisis and an economic downturn (Lins et al., 2017). Previous studies reveal that CSR activities help to reduce firm risks (Tang and Shum, 2003; Harjoto and Laksmana, 2018). Firms with higher CSR performances are also able to obtain capital and debt with lower costs (El Ghoul et al., 2011b; Cooper and Uzun, 2015).

At the same time, firms adopt CSR as a business strategy based on the condition of their current firm performance and firm characteristics, which also are affected by the supply and provision of trade credit. Martínez-Sola et al. (2013) find a non-linear relationship between the firm provision of accounts receivable and firm value in Spanish firms. The results obtained show a positive relationship between firm value and trade credit at low levels of receivables, and a negative relationship at high levels. Trade credit also helps to reduce the cost of financing for firms without close relationships with banks, and helps to diffuse information from firms to the suppliers (Biais and Gollier, 1997). Alex Yang et al. (2021) identify three roles of trade credit: first, trade credit provides cash flow to firms when they are financially constrained; second, trade credit helps to smooth a supplier's cash flow; third, trade credit serves as a tool for risk management for protecting against the default risk by customers. We expect that trade credit affects a firm's financial conditions and, thus, has an influence on the decisions made around CSR activities and greenwashing strategies.

To alleviate the endogeneity concerns, we adopted instrumental variables and performed 2SLS and GMM estimations. Following Leszczensky and Wolbring (2019) and Hu (2021), we use the first lagged values of the independent variables as the instrumental variables. The first stage includes the regression of original *GW_diff* and *GW_ratio* regressed on the first lagged *GW_diff* and *GW_ratio* (instrumental variable) and a set of control variables. In the second stage, we regress TR and TP on predicted values obtained from the first stage. Table 10 reports the results using the 2SLS estimation and our results remain robust when using the first lag of the dependent variables as the coefficients of greenwashing are significantly negative at 1% significance level.

[Insert Table 10 and 11 around here]

We also perform GMM estimation and the results are shown in Tables 12 and 13. The results remain consistent, and they are in line with those of the baseline regression models. We then repeat the estimations by using the second lag of the dependent variables. The results are shown in Table 11 and Table 12, and they remain robust. We then use the industry-mean value of greenwashing as the instrumental variable, and the results are shown in Table 13. The results show that the coefficient on greenwashing measures remain negative and statistically significant. These results confirm that greenwashing reduces the supply and provision of trade credit after addressing the reverse causality.

[Insert Table 12 and 13 around here]

7. Conclusion

This study investigates how greenwashing by firms can affect the provision and use of trade credit. Firms often use trade credit for several reasons. First, trade credit is adopted for financing purpose when firms are faced with financial constraints or have difficulty in obtaining loans from banks. Second, trade credit is used to insure against the credit risk of customers. Third, trade credit works as a tool to facilitate the information transfer from customers to suppliers, a tool which is even suggested to be more effective than banks.

Our results indicate that firms' greenwashing activities have significant and negative associations with the provision and adoption of their trade credit. More specifically, we show that financial

constraints channel can explain the negative association between greenwashing and trade payables. We also document that, due to the external monitoring effects of institutional investors, firms with more effective external monitoring have less incentive to adopt greenwashing. Therefore, for firms with greater ownership of institutional investors, the negative association between greenwashing and trade credit is less pronounced. Our results further reveal that the negative association between greenwashing and trade payables are less pronounced for firms with a higher level of information asymmetry. This implies that information asymmetry reduces return a firm can pursue from greenwashing activities, hence reduce impact of greenwashing on trade payables.

Our study contributes to the literature in three ways. First, to our best knowledge, this is the first study on the impact of greenwashing activities on firms' trade credit policies. Previous literature has focused on how greenwashing affects the market outcome and the information environment of a firm, but less attention has been paid to the role of greenwashing in the field of corporate governance. As the use of trade credit between suppliers and customers account for a large part of firms' short-term financing activities, our study provides vital evidence on the rationale for the adoption of trade credit as an alternative financing source, besides traditional explanations such as the financing motives. Second, this study contributes to the literature on greenwashing and supports the theory that firms commit greenwashing activities for the improvement in their financing situations rather than social trust. With higher tendency to greenwashing, firms adopt less trade credit, and consequently we conclude that firms use greenwashing as a substitute to trade credit to seek for relief from financial distress. Finally, we also provide supportive evidence to suggest the monitoring role of institutional investors and the moderating effect of corporate information asymmetry.

References

- Abdulla, Y., Dang, V.A. and Khurshed, A. (2017) Stock market listing and the use of trade credit: Evidence from public and private firms. *Journal of Corporate Finance*, 46: 391–410.
- Aktas, N., Bodt, E. de, Lobe, F., et al. (2012) The information content of trade credit. *Journal of Banking and Finance*, 36 (5): 1402–1413.
- Akturan, U. (2018) How does greenwashing affect green branding equity and purchase intention? An empirical research. *Marketing Intelligence and Planning*.
- Alex Yang, S., Bakshi, N. and Chen, C.J. (2021) Trade credit insurance: Operational value and contract choice. *Management Science*, 67 (2): 2021.
- Almeida, H., Campello, M. and Weisbach, M.S. (2004) The cash flow sensitivity of cash. *Journal of Finance*, 59 (4): 1777–1804.
- Attig, N., Cleary, S., Ghoul, S. El, et al. (2013) *Institutional Investment Horizons and the Cost of Equity Capital*, pp. 441–477.
- Barnea, A. and Rubin, A. (2010) Corporate Social Responsibility as a Conflict Between Shareholders. *Journal of Business Ethics*, 97 (1): 71–86.
- Bazillier, R. and Vauday, J. (2009) The Greenwashing Machine: is CSR more than Communication. *Document de Recherche du LEO*.
- Biais, B. and Gollier, C. (1997) Trade credit and credit rationing. *Review of Financial Studies*, 10 (4): 903–937.
- Brouwer, A. (2016) Revealing Greenwashing: A consumers’ perspective. *International Association for Development of the Information Society*.
- Brown, N. and Deegan, C. (1998) The public disclosure of environmental performance information—a dual test of media agenda setting theory and legitimacy theory. *Accounting and business research*, 29 (1): 21–41.
- Budinsky, J. and Bryant, S. (2013) “It’s Not Easy Being Green”: The Greenwashing of Environmental Discourses in Advertising. *Canadian Journal of Communication*, 38 (2): 207–226.
- Callen, J.L., Fang, X., The, S., et al. (2020) Religion and Stock Price Crash Risk. *Journal of Financial and Quantitative Analysis*, 50 (1): 169–195.
- Campbell, D., Craven, B. and Shrivess, P. (2003) Voluntary social reporting in three FTSE sectors: a comment on perception and legitimacy. *Accounting, Auditing & Accountability Journal*, 16 (4): 558–581.
- Campello, M., Graham, J.R. and Harvey, C.R. (2010) The real effects of financial constraints : Evidence from a financial crisis \$. *Journal of Financial Economics*, 97 (3): 470–487.
- Carbo-Valverde, S., Rodriguez-Fernandez, F. and Udell, G.F. (2016) Trade Credit , the Financial Crisis , and SME Access to Finance. *Journal of Money, Credit and Banking*, 48 (1): 113–143.
- Chant, E.M. and Walker, D.A. (1988) Small business demand for trade credit. *Applied Economics*, 20 (7): 861–876.
- Chen, T., Harford, J. and Lin, C. (2015) Do analysts matter for governance? Evidence from natural experiments. *Journal of Financial Economics*, 115 (2): 383–410.
- Chen, T., Xie, L. and Zhang, Y. (2017) How does analysts’ forecast quality relate to corporate investment efficiency? *Journal of Corporate Finance*, 43: 217–240.
- Chen, Y. and Chen, Y. (2008) The Positive Effect of Green Intellectual Capital on Competitive Advantages of Firms. *Journal of Business Ethics*, 77 (3): 271–286.
- Chen, Y. and Chen, Y. (2010) *The Drivers of Green Brand Equity : Green Brand Image , Green Satisfaction , and Green Trust*., pp. 307–319.
- Chen, Y.S. and Chang, C.H. (2013a) Greenwash and Green Trust: The Mediation Effects of Green Consumer Confusion and Green Perceived Risk. *Journal of Business Ethics*, 102 (1): 15–28.
- Chen, Y.S. and Chang, C.H. (2013b) Greenwash and Green Trust: The Mediation Effects of Green Consumer Confusion and Green Perceived Risk. *Journal of Business Ethics*, 114 (3): 489–500.

- Chen, Y.S., Lin, C.L. and Chang, C.H. (2014) The influence of greenwash on green word-of-mouth (green WOM): The mediation effects of green perceived quality and green satisfaction. *Quality and Quantity*, 48 (5): 2411–2425.
- Cheung, A.W. and Pok, W.C. (2019) Corporate social responsibility and provision of trade credit. *Journal of Contemporary Accounting & Economics*, 15 (3): 100159.
- Cho, C.H. and Patten, D.M. (2007) The role of environmental disclosures as tools of legitimacy: A research note. *Accounting, organizations and society*, 32 (7–8): 639–647.
- Cooper, E.W. and Uzun, H. (2015) Corporate social responsibility and the cost of bank debt. *Journal of Accounting and Finance*, 15 (8): 2158–3625.
- Cui, J., Jo, H. and Na, H. (2018) Does Corporate Social Responsibility Affect Information Asymmetry? *Journal of Business Ethics*, 148 (3): 549–572.
- D Van Halderen, M., Bhatt, M., Berens, G.A., et al. (2016) Managing impressions in the face of rising stakeholder pressures: Examining oil companies' shifting stances in the climate change debate. *Journal of Business Ethics*, 133 (3): 567–582.
- Dai, J., Lu, C. and Qi, J. (2019) Corporate Social Responsibility disclosure and stock price crash risk: Evidence from China. *Sustainability (Switzerland)*, 11 (2): 448.
- Danielson, M.G. and Scott, J.A. (2004) Bank loan availability and trade credit demand. *Financial Review*, 39 (4): 579–600.
- Deloof, M. and Jegers, M. (1996) Trade Credit, Product Quality, and Intragroup Trade: Some European Evidence. *Financial Management*, pp. 33–43.
- Deng, X., Kang, J. koo and Low, B.S. (2013) Corporate social responsibility and stakeholder value maximization: Evidence from mergers. *Journal of Financial Economics*, 110 (1): 87–109.
- Dhaliwal, D.S., Radhakrishnan, S., Tsang, A., et al. (2012) Nonfinancial disclosure and analyst forecast accuracy: International evidence on corporate social responsibility disclosure. *Accounting Review*, 87 (3): 723–759.
- Du, X. (2015) How the Market Values Greenwashing? Evidence from China. *Journal of Business Ethics*, 128 (3): 547–574.
- Eccles, R.G., Serafeim, G. and Krzus, M.P. (2011) Market Interest in Nonfinancial Information. *Journal of Applied Corporate Finance*, 23 (4): 113–127.
- Elliehausen, G. and Wolken, J. (1993) The Demand for Trade Credit: An Investigation of Motives for Trade Credit Use by Small Businesses. *Federal Reserve Bulletin*, 79: 929.
- Emery, G.W. (1984) A Pure Financial Explanation for Trade Credit. *The Journal of Financial and Quantitative Analysis*, 19 (3): 271–285.
- Fabbri, D. and Klapper, L.F. (2016) Bargaining power and trade credit. *Journal of Corporate Finance*, 41: 66–80.
- Farre-mensa, J. (2016) Do Measures of Financial Constraints Measure Financial Constraints? *The Review of Financial Studies*, 29 (2): 271–308.
- Fisman, R. and Love, I. (2003) Trade Credit, Financial Intermediary Development, and Industry Growth. *Journal of Finance*, 58 (1): 353–374.
- Fu, X. and Tang, T. (2016) Corporate Debt Maturity and Acquisition Decisions. *Financial Management*, 45 (3): 737–768.
- Furlow, N.E. (2010) Greenwashing in the New Millennium. *The Journal of Applied Business and Economics*, 10 (6): 22.
- Garcia-Appendini, E. and Montoriol-Garriga, J. (2013) Firms as liquidity providers: Evidence from the 2007-2008 financial crisis. *Journal of Financial Economics*, 109 (1): 272–291.
- Gatti, L., Seele, P. and Rademacher, L. (2019) Grey zone in – greenwash out. A review of greenwashing research and implications for the voluntary-mandatory transition of CSR. *International Journal of Corporate Social Responsibility*, 4 (1): 1–15.
- El Ghouli, S., Guedhami, O., Kwok, C.C.Y., et al. (2011a) Does corporate social responsibility affect the cost of capital? *Journal of Banking and Finance*.

- El Ghouli, S., Guedhami, O., Kwok, C.C.Y., et al. (2011b) Does corporate social responsibility affect the cost of capital? *Journal of Banking and Finance*, 35 (9): 2388–2406.
- Gillan, S.L., Koch, A. and Starks, L.T. (2021) Firms and social responsibility: A review of ESG and CSR research in corporate finance. *Journal of Corporate Finance*, 66: 101889.
- Di Giuli, A. and Kostovetsky, L. (2014) Are red or blue companies more likely to go green? Politics and corporate social responsibility. *Journal of Financial Economics*, 111 (1): 158–180.
- Goss, A. and Roberts, G.S. (2011) The impact of corporate social responsibility on the cost of bank loans. *Journal of Banking and Finance*, 35 (7): 1794–1810.
- Guo, R., Tao, L., Li, C.B., et al. (2017) A Path Analysis of Greenwashing in a Trust Crisis Among Chinese Energy Companies: The Role of Brand Legitimacy and Brand Loyalty. *Journal of Business Ethics*, 140 (3): 523–536.
- Hail, L. and Leuz, C. (2006) International differences in the cost of equity capital: Do legal institutions and securities regulation matter? *Journal of accounting research*, 44 (3): 485–531.
- Haley, C.W. and Higgins, R.C. (1973) Inventory policy and trade credit financing. *Management Science*, 20 (4-part-i): 464–471.
- Hamann, R. and Kapelus, P. (2004) Corporate social responsibility in mining in Southern Africa: Fair accountability or just greenwash? *Development*, 47 (3): 85–92.
- Harford, J., Klasa, S. and Maxwell, W.F. (2014) Refinancing risk and cash holdings. *Journal of Finance*, 69 (3): 975–1012.
- Harjoto, M. and Laksmana, I. (2018) The Impact of Corporate Social Responsibility on Risk Taking and Firm Value. *Journal of Business Ethics*, 151 (2): 353–373.
- Hartzell, J.C. and Starks, L.T. (2003) Institutional Investors and Executive Compensation. *The Journal of Finance*, 58 (6): 2351–2374.
- Hoepner, A., Oikonomou, I., Scholtens, B., et al. (2016) The effects of corporate and country sustainability characteristics on the cost of debt: An international investigation. *Journal of Business Finance & Accounting*, 43 (1–2): 158–190.
- van Horen, N. (2007) Customer Market Power and the Provision of Trade Credit: Evidence from Eastern Europe and Central Asia. *World Bank Publications*, 4284.
- Hu, J. (2021) Do facilitation payments affect earnings management? Evidence from China. *Journal of Corporate Finance*, 68: 101936.
- Hubbard, R.G. (1997) *Capital-Market Imperfections and Investment*.
- Hummel, K. and Festl-Pell, D. (2015) Much Ado About Nothing? Sustainability Disclosure in the Banking Industry. *Zeitschrift für Wirtschafts- und Unternehmensethik*, 16 (3): 369–393.
- Janakiraman, S., Radhakrishnan, S. and Tsang, A. (2010) Institutional investors, managerial ownership, and executive compensation. *Journal of Accounting, Auditing and Finance*, 25 (4): 673–707.
- Jensen, M. (2001) Value maximisation, stakeholder theory, and the corporate objective function. *European Financial Management*, 7 (3): 297–317.
- Karlan, D.S. (2005) Using experimental economics to measure social capital and predict financial decisions. *American Economic Review*, 95 (5): 1688–1699.
- Khan, R., Dharwadkar, R. and Brandes, P. (2005) Institutional ownership and CEO compensation: A longitudinal examination. *Journal of Business Research*, 58 (8): 1078–1088.
- Khurana, I.K. and Raman, K.. (2004) Litigation risk and the financial reporting credibility of Big 4 versus non-Big 4 audits: Evidence from Anglo-American countries. *The Accounting Review*, 79 (2): 473–495.
- Kong, D., Pan, Y., Tian, G.G., et al. (2020) CEOs' hometown connections and access to trade credit: Evidence from China. *Journal of Corporate Finance*, 62: 101574.
- Laufer, W.S. (2003) Social Accountability and Corporate Greenwashing. *Journal of Business Ethics*, 43 (3): 253–261.
- Lee, H.C.B., Cruz, J.M. and Shankar, R. (2018) Corporate Social Responsibility (CSR) Issues in Supply Chain Competition: Should Greenwashing Be Regulated? *Decision Sciences*, 49 (6): 1088–1115.

- Leszczensky, L. and Wolbring, T. (2022) How to Deal With Reverse Causality Using Panel Data? Recommendations for Researchers Based on a Simulation Study. *Sociological Methods and Research*, 51 (2): 837–865.
- Levine, R., Lin, C. and Xie, W. (2018) *Corporate Resilience to Banking Crises : The Roles of Trust and Trade Credit.*, 53 (4): 1441–1477.
- 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. *Journal of Finance*, 72 (4): 1785–1824.
- Long, M.S., Malitz, I.B. and Ravid, S.A. (1993) Trade Credit, Quality Guarantees, and Product Marketability. *Financial Management*, pp. 117–127.
- Love, I., Preve, L.A. and Sarria-Allende, V. (2007) Trade credit and bank credit: Evidence from recent financial crises. *Journal of Financial Economics*, 83 (2): 453–469.
- Lyon, T.P. and Maxwell, J.W. (2011) Greenwash: Corporate environmental disclosure under threat of audit. *Journal of Economics and Management Strategy*, 20 (1): 3–41.
- Lyon, T.P. and Montgomery, A.W. (2013) Tweetjacked: The Impact of Social Media on Corporate Greenwash. *Journal of Business Ethics*, 118 (4): 747–757.
- Marquis, C., Toffel, M.W. and Zhou, Y. (2016) Scrutiny, norms, and selective disclosure: A global study of greenwashing. *Organization Science*, 27 (2): 483–504.
- Martínez-Sola, C., García-Teruel, P.J. and Martínez-Solano, P. (2013) Trade credit policy and firm value. *Accounting and Finance*, 53 (3): 791–808.
- Mason, M. and Mason, R.D. (2012) Communicating a Green Corporate Perspective: Ideological Persuasion in the Corporate Environmental Report. *Journal of Business and Technical Communication*, 26 (4): 479–506.
- Mitchell, L.D. and Ramey, W.D. (2011) Look How Green I Am! An Individual-Level Explanation for Greenwashing. *Journal of Applied Business and ...*, 12 (6): 40–45.
- Mitchell, V. (1999) *Marketing causes and implications of consumer confusion.*, 8 (4): 319–339.
- Molina, C.A. and Preve, L.A. (2012) An Empirical Analysis of the Effect of Financial Distress on Trade Credit. *Financial Management*, 41 (1): 187–205.
- Nandy, M. and Lodh, S. (2012) Do banks value the eco-friendliness of firms in their corporate lending decision? Some empirical evidence. *International Review of Financial Analysis*, 25: 83–93.
- Ng, C.K., Smith, J.K. and Smith, R.L. (1999) Evidence on the determinants of credit terms used in interfirm trade. *Journal of Finance*, 54 (3): 1109–1129.
- Nyilasy, G., Gangadharbatla, H. and Paladino, A. (2012) Greenwashing: A consumer perspective. *Economics and Sociology*, 5 (2): 116.
- Nyilasy, G., Gangadharbatla, H. and Paladino, A. (2014) Perceived Greenwashing: The Interactive Effects of Green Advertising and Corporate Environmental Performance on Consumer Reactions. *Journal of Business Ethics*, 125 (4): 693–707.
- Ono, M. (2001) Determinants of Trade Credit in the Japanese Manufacturing Sector. *Journal of the Japanese and International Economies*, 15 (2): 160–177.
- Parguel, B., Benoît-Moreau, F. and Larceneux, F. (2011) How Sustainability Ratings Might Deter “Greenwashing”: A Closer Look at Ethical Corporate Communication. *Journal of Business Ethics*, 102 (1): 15–28.
- Petersen, M.A. and Rajan, R.G. (1997a) Trade credit: Theories and evidence. *Review of Financial Studies*, 10 (3): 661–691.
- Pomering, A. and Johnson, L.W. (2009) Advertising corporate social responsibility initiatives to communicate corporate image: Inhibiting scepticism to enhance persuasion. *Corporate Communications*.
- Roulet, T.J. and Touboul, S. (2015) The Intentions with Which the Road is Paved: Attitudes to Liberalism as Determinants of Greenwashing. *Journal of Business Ethics*, 128 (2): 305–320.
- Saci, F. and Jasimuddin, S.M. (2021) Does the research done by the institutional investors affect the cost of equity capital? *Finance Research Letters*, 41 (November 2020): 101834.
- Schiantarelli, F. (1996) Financial constraints and investment: methodological issues and international evidence. *Oxford Review of Economic Policy*, 12 (2): 70–89.

- Schwartz, R.A. (1974) An Economic Model of Trade Credit. *The Journal of Financial and Quantitative Analysis*, 9 (4): 643–657.
- Seele, P. and Gatti, L. (2017) Greenwashing Revisited: In Search of a Typology and Accusation-Based Definition Incorporating Legitimacy Strategies. *Business Strategy and the Environment*, 26 (2): 239–252.
- Seifert, D., Seifert, R.W. and Protopappa-Sieke, M. (2013) A review of trade credit literature: Opportunities for research in operations. *European Journal of Operational Research*, 231 (2): 245–256.
- Shang, C. (2020) Trade credit and stock liquidity. *Journal of Corporate Finance*, 62: 101586.
- Sharfman, M.P. and Fernando, C.S. (2008) Environmental risk management and the cost of capital. *Strategic management journal*, 29 (6): 569–592.
- Shenoy, J. and Williams, R. (2017) Trade credit and the joint effects of supplier and customer financial characteristics. *Journal of Financial Intermediation*, 29: 68–80.
- Shleifer, A. and Vishny, R.W. (1986) Large Shareholders and Corporate Control. *Journal of Political Economy*, 94 (3 Part 1): 461–488.
- Shleifer, A. and Vishny, R.W. (1997) A survey of corporate governance. *Journal of Finance*, 52 (2): 737–783.
- Smith, J.K. (1987) Trade Credit and Informational Asymmetry. *The Journal of Finance*, 42 (4): 863–872.
- Szabo, S., Webster, J. and Webster, J. (2021) Perceived Greenwashing : The Effects of Green Marketing on Environmental and Product Perceptions. *Journal of Business Ethics*, 171 (4): 719–739.
- Tang, G.Y.N. and Shum, W.C. (2003) The relationships between unsystematic risk, skewness and stock returns during up and down markets. *International Business Review*, 12 (5): 523–541.
- Turnbull, P.W., Leek, S., Ying, G., et al. (2000) Customer Confusion : The Mobile Phone Market. *Journal of Marketing Management*, 16 (1–3): 143–163.
- Vanstraelen, A., Zarzeski, M.T. and Robb, S.W.G. (2003) Corporate nonfinancial disclosure practices and financial analyst forecast ability across three European countries. *Journal of International Financial Management and Accounting*, 14 (3): 249–278.
- Walker, K. and Wan, F. (2012) The Harm of Symbolic Actions and Green-Washing: Corporate Actions and Communications on Environmental Performance and Their Financial Implications. *Journal of Business Ethics*, 109 (2): 227–242.
- Ward, C., Yin, C. and Zeng, Y. (2018) Institutional investor monitoring motivation and the marginal value of cash. *Journal of Corporate Finance*, 48: 49–75.
- Wilson, N. and Summers, B. (2002) Trade credit terms offered by small firms: Survey evidence and empirical analysis. *Journal of Business Finance and Accounting*, 29 (3–4): 317–351.
- Wu, W., Firth, M. and Rui, O.M. (2014) Trust and the provision of trade credit. *Journal of Banking and Finance*, 39: 146–159. doi:10.1016/j.jbankfin.2013.11.019.
- Wu, Y., Zhang, K. and Xie, J., 2020. Bad greenwashing, good greenwashing: Corporate social responsibility and information transparency. *Management Science*, 66(7), pp.3095-3112.
- Xu, H., Wu, J. and Dao, M. (2020) Corporate social responsibility and trade credit. *Review of Quantitative Finance and Accounting*, 54 (4): 1389–1416.
- Yang, S.A. and Birge, J.R. (2018) Trade credit, risk sharing, and inventory financing portfolios. *Management Science*, 64 (8): 3667–3689.
- Zhang, D. (2022) Environmental regulation and firm product quality improvement: How does the greenwashing response? *International Review of Financial Analysis*, 80: 102058.
- Zhang, M., Ma, L., Su, J., et al. (2014) Do Suppliers Applaud Corporate Social Performance ? *Journal of Business Ethics*, 121 (4): 543–557.

Table 1: Summary Statistics

Variables	Count	Mean	Median	Standard Deviation	25%	75%
TR	13847	0.307	0.139	0.865	0.086	0.199
TP	13847	0.122	0.048	0.199	0.048	0.105
GW_Diff	13847	-17.391	-20.202	13.056	-26.818	-9.927
GW_Ratio	13847	0.638	0.557	0.271	0.441	0.780
Size	13847	8.595	8.544	1.663	7.517	9.654
Firm age	13847	27.652	24.000	17.064	13.000	44.000
Sale growth	13847	0.038	0.057	0.297	-0.011	0.131
ROA	13847	0.100	0.107	0.129	0.051	0.162
PPE	13847	0.234	0.140	0.242	0.045	0.356
Market-to-book ratio	13847	2.119	1.566	1.576	1.137	2.425
Cash	13847	0.152	0.081	0.184	0.030	0.197
Leverage	13847	0.279	0.253	0.211	0.106	0.406
CAPEX	13847	0.036	0.023	0.042	0.007	0.049

This table reports the descriptive statistics. The sample period is from 2002 to 2019. The definitions of all variables are given in Appendix A.

Table 2: Correlation Matrix

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
(1)TR	1.000													
(2)TP	0.444	1.000												
(3)Net	0.121	-0.814	1.000											
(4)GW_Diff	-0.031	-0.005	-0.014	1.000										
(5)GW_ratio	-0.033	-0.012	-0.007	0.985	1.000									
(6)Size	0.151	-0.030	0.134	0.369	0.391	1.000								
(7)PPE	-0.170	-0.063	-0.038	0.087	0.098	0.149	1.000							
(8)ROA	-0.034	-0.279	0.280	0.023	0.032	0.289	0.038	1.000						
(9)MTBR	-0.037	0.167	-0.189	-0.030	-0.035	-0.244	-0.065	-0.507	1.000					
(10)EBIT	-0.020	-0.271	0.280	0.021	0.030	0.293	0.001	0.997	-0.506	1.000				
(11)Cash	-0.008	0.132	-0.163	-0.073	-0.092	-0.388	-0.367	-0.189	0.184	-0.174	1.000			
(12)Cash flows	-0.017	-0.270	0.277	0.020	0.029	0.278	0.037	0.971	-0.526	0.969	-0.151	1.000		
(13)Leverage	0.040	0.096	-0.069	0.045	0.042	0.015	0.147	-0.374	0.285	-0.381	-0.198	-0.451	1.000	
(14)CAPEX	-0.127	-0.031	-0.044	-0.015	-0.012	0.025	0.650	0.014	0.022	-0.025	-0.191	0.013	0.059	1.000

This table reports the correlation matrix of the variables. The sample period is from 2002 to 2019. A correlation in bold indicates the statistically significance at 5 percent level or above. The definitions of all variables are given in Appendix A.

Table 3: The impact of greenwashing on trade credit

	(1)	(2)	(3)	(4)
	TR	TR	TP	TP
GW_diff	-0.004*** (-3.237)		-0.203*** (-3.928)	
GW_ratio		-0.227*** (-3.301)		-9.332*** (-3.525)
Size	0.102*** (4.503)	0.104*** (4.529)	2.573*** (5.360)	2.560*** (5.329)
Age	-0.509*** (-7.263)	-0.502*** (-7.125)	-7.376*** (-3.468)	-7.227*** (-3.368)
Sales growth	-2.321*** (-5.328)	-2.331*** (-5.329)	-76.045*** (-5.992)	-77.614*** (-6.111)
ROA	-0.018** (-2.467)	-0.018** (-2.449)	-0.361 (-1.623)	-0.362 (-1.611)
PPE	1.511*** (3.737)	1.526*** (3.762)	60.542*** (4.860)	62.078*** (4.982)
MTB	0.091 (0.701)	0.090 (0.695)	-20.668*** (-5.141)	-20.858*** (-5.204)
Cash	0.197* (1.849)	0.195* (1.822)	-12.170*** (-3.832)	-11.911*** (-3.744)
Leverage	0.258** (2.238)	0.253** (2.199)	-28.749*** (-10.504)	-28.936*** (-10.536)
Capex	1.333*** (4.622)	1.316*** (4.564)	7.711 (1.193)	7.814 (1.190)
Constant	-0.527*** (-2.668)	-0.345** (-2.106)	-20.394*** (-4.225)	-11.199*** (-2.867)
<i>Industry dummy</i>	-0.527***	-0.345**	-20.394***	-11.199***
<i>Year dummy</i>	(-2.668)	(-2.106)	(-4.225)	(-2.867)
R ²	0.234	0.234	0.335	0.335
Obs.	13847	13847	13847	13847

The table presents regression results of the provision and adoption of trade credit on greenwashing measures. The sample period is from 2002 to 2019. Estimates are based on panel data regressions with standard errors adjusted for heteroskedasticity and firm-level clustering. T-statistics, in parentheses, are based on two-sided tests. Significance at the 10%, 5%, and 1% level is indicated by*, **, and ***, respectively. The definitions of all variables are given in Appendix A.

Table 4: The moderating effect of total institutional ownership

	(1)	(2)	(3)	(4)
	TR	TR	TP	TP
GW_diff	-0.009*** (-3.157)		-0.004*** (-5.040)	
GW_diff *Total_IO	0.005 (1.439)		0.004*** (3.395)	
GW_ratio		-0.444*** (-3.335)		-0.213*** (-5.354)
GW_ratio*Total_IO		0.236 (1.474)		0.185*** (3.786)
Total_IO	0.103 (1.222)	-0.132 (-1.156)	0.022 (1.172)	-0.158*** (-4.068)
Size	0.136*** (4.807)	0.139*** (4.846)	0.023*** (6.498)	0.023*** (6.374)
Age	-0.003** (-2.481)	-0.003** (-2.349)	0.001*** (2.713)	0.001*** (2.783)
Sale_growth	-0.169*** (-2.653)	-0.170*** (-2.660)	0.011* (1.815)	0.011* (1.890)
PPE	-0.488*** (-6.299)	-0.483*** (-6.161)	-0.118*** (-6.102)	-0.118*** (-6.039)
MTB	-0.030*** (-3.522)	-0.029*** (-3.488)	-0.010*** (-4.574)	-0.010*** (-4.533)
Cash	0.312** (2.034)	0.313** (2.036)	-0.076*** (-3.121)	-0.078*** (-3.163)
Leverage	0.318** (2.353)	0.314** (2.328)	-0.202*** (-10.138)	-0.204*** (-10.195)
Capex	0.787*** (2.974)	0.772*** (2.912)	0.136** (2.195)	0.136** (2.185)
Constant	-0.848*** (-3.301)	-0.457** (-2.123)	-0.179*** (-4.475)	0.027 (0.718)
<i>Industry dummy</i>	Y	Y	Y	Y
<i>Year dummy</i>	Y	Y	Y	Y
R ²	0.241	0.242	0.415	0.414
Obs.	10379	10379	10379	10379

The table presents regression results of the moderating effect of total institutional investor on relationship between trade credit and greenwashing. The sample period is from 2002 to 2019. Estimates are based on panel data regressions with standard errors adjusted for heteroskedasticity and firm-level clustering. T-statistics, in parentheses, are based on two-sided tests. Significance at the 10%, 5%, and 1% level is indicated by*, **, and ***, respectively. The definitions of all variables are given in Appendix A.

Table 5: The moderating effect of analyst forecast dispersion

	(1)	(2)	(3)	(4)
	TR	TR	TP	TP
GW_diff	-0.005***		-0.002***	
			(-5.221)	
GW_diff *Analyst_FD	(-3.692)		0.048**	
	(1.759)		(2.189)	
GW_ratio		-0.282***		-0.080***
		(-3.686)		(-5.038)
GW_ratio* Analyst_FD		9.756*		1.994*
		(1.702)		(1.876)
Analyst_FD	4.993**	-4.670	1.371***	-0.741
	(2.077)	(-1.269)	(3.054)	(-0.885)
Size	0.149***	0.151***	0.024***	0.024***
	(4.715)	(4.749)	(6.053)	(6.035)
Age	-0.003**	-0.002**	0.001***	0.001***
	(-2.078)	(-1.963)	(4.033)	(4.106)
Sale_growth	-0.188**	-0.188**	0.020**	0.020**
	(-2.266)	(-2.281)	(2.312)	(2.345)
PPE	-0.475***	-0.468***	-0.121***	-0.120***
	(-5.365)	(-5.235)	(-5.822)	(-5.719)
MTB	-0.029***	-0.029***	-0.011***	-0.011***
	(-2.689)	(-2.660)	(-4.401)	(-4.351)
Cash	0.318*	0.320*	-0.048	-0.049
	(1.680)	(1.684)	(-1.602)	(-1.612)
Leverage	0.306**	0.302**	-0.176***	-0.177***
	(2.024)	(1.999)	(-8.158)	(-8.207)
Capex	0.757***	0.733**	0.148**	0.144**
	(2.595)	(2.504)	(2.187)	(2.104)
Constant	-1.135***	-0.892***	-0.164***	-0.086***
	(-4.423)	(-3.946)	(-4.577)	(-2.976)
<i>Industry dummy</i>	Y	Y	Y	Y
<i>Year dummy</i>	Y	Y	Y	Y
R ²	0.247	0.248	0.420	0.420
Obs.	8358	8358	8358	8358

The table presents regression results of the moderating effect of analyst forecast dispersion on relationship between trade credit and greenwashing. The sample period is from 2002 to 2019. Estimates are based on panel data regressions with standard errors adjusted for heteroskedasticity and firm-level clustering. T-statistics, in parentheses, are based on two-sided tests. Significance at the 10%, 5%, and 1% level is indicated by*, **, and ***, respectively. The definitions of all variables are given in Appendix A.

Table 6: The channel effect of financial constraints

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	TR	TR	TP	TP	TR	TR	TP	TP
GW Diff	-0.004** (-2.419)		-0.231*** (-4.201)		-0.004*** (-3.638)		-0.147*** (-3.572)	
GW Diff* KZ Index	0.001 (0.728)		-0.033** (-2.385)					
GW Diff* Non Div					-0.001 (-0.770)		-0.159** (-2.514)	
GW_Ratio		-0.192** (-2.447)		-10.977*** (-3.881)		-0.235*** (-3.868)		-8.221*** (-4.108)
GW Ratio*KZ Index		0.029 (0.824)		-1.516** (-2.273)				
GW_Ratio* Non_Div						-0.044 (-0.615)		-5.959* (-1.949)
KZ Index	0.037** (2.200)	0.009 (0.432)	1.022*** (2.869)	2.540*** (5.414)				
Non_Div					-0.005 (-0.141)	0.046 (0.849)	-2.883** (-2.406)	3.793* (1.662)
Constant	-0.586*** (-2.914)	-0.429** (-2.376)	-24.321*** (-4.923)	-14.200*** (-3.423)	-0.686*** (-3.230)	-0.503*** (-2.790)	-27.405*** (-5.378)	-20.526*** (-4.908)
<i>Controls</i>	Y	Y	Y	Y	Y	Y	Y	Y
<i>Industry dummy</i>	Y	Y	Y	Y	Y	Y	Y	Y
<i>Year dummy</i>	Y	Y	Y	Y	Y	Y	Y	Y
R ²	0.229	0.229	0.336	0.335	0.228	0.229	0.340	0.339
Obs.	13729	13729	13729	13729	13847	13847	13847	13847

The table presents regression results of the channel effect of financial constraints on relationship between trade credit and greenwashing. The sample period is from 2002 to 2019. Estimates are based on panel data regressions with standard errors adjusted for heteroskedasticity and firm-level clustering. T-statistics, in parentheses, are based on two-sided tests. Significance at the 10%, 5%, and 1% level is indicated by*, **, and ***, respectively. The definitions of all variables are given in Appendix A.

Table 7: The channel effect of financial constraints with alternative measure

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	TR	TR	TP	TP	TR	TR	TP	TP
GW Diff	-0.007*** (-4.518)		-0.138*** (-3.028)		-0.007*** (-4.357)		-0.152*** (-2.723)	
GW Diff*ST1	0.010 (1.051)		-0.536* (-1.749)					
GW Diff*ST3					0.006 (1.035)		-0.333** (-2.453)	
GW_Ratio		-0.313*** (-4.596)		-7.421*** (-3.315)		-0.337*** (-4.424)		-7.762*** (-2.843)
GW_Ratio*ST1		0.362 (0.703)		-22.117 (-1.381)				
GW_Ratio*ST3						0.216 (0.778)		-14.900** (-2.145)
ST1	0.799*** (2.892)	0.380 (1.310)	21.005*** (2.978)	44.847*** (4.676)				
ST3					0.483*** (3.225)	0.247 (1.530)	3.300 (1.126)	18.717*** (4.049)
Constant	-0.892*** (-3.742)	-0.627*** (-3.101)	-30.983*** (-4.789)	-24.962*** (-4.390)	-1.019*** (-3.898)	-0.727*** (-3.344)	-31.273*** (-5.205)	-24.946*** (-4.986)
<i>Controls</i>	Y	Y	Y	Y	Y	Y	Y	Y
<i>Industry dummy</i>	Y	Y	Y	Y	Y	Y	Y	Y
<i>Year dummy</i>	Y	Y	Y	Y	Y	Y	Y	Y
R ²	0.269	0.269	0.396	0.396	0.263	0.263	0.358	0.357
Obs.	12772	12772	12772	12772	12772	12772	12772	12772

The table presents regression results of the channel effect of financial constraints on relationship between trade credit and greenwashing. The sample period is from 2002 to 2019. Estimates are based on panel data regressions with standard errors adjusted for heteroskedasticity and firm-level clustering. T-statistics, in parentheses, are based on two-sided tests. Significance at the 10%, 5%, and 1% level is indicated by*, **, and ***, respectively. The definitions of all variables are given in Appendix A.

Table 8: The channel effect of social capital (adjusted SCI index)

	(1)	(2)	(3)	(4)
	TR	TR	TP	TP
GW_Diff	-0.005*** (-2.752)		-0.064** (-1.979)	
GW_Diff*Adj_SCI	-0.001 (-0.732)		0.062 (1.074)	
GW_Ratio		-0.238*** (-2.759)		-3.501** (-2.052)
GW_Ratio*Adj_SCI		-0.050 (-0.624)		3.066 (1.089)
Adj_SCI	-0.021 (-0.981)	0.034 (0.384)	1.416 (1.268)	-1.581 (-0.774)
Size	0.163*** (4.093)	0.165*** (4.086)	0.980*** (3.200)	1.018*** (3.238)
Age	-0.003** (-2.304)	-0.003** (-2.223)	0.093*** (3.348)	0.095*** (3.397)
Sale_growth	-0.124* (-1.888)	-0.125* (-1.888)	-0.033 (-0.072)	-0.039 (-0.086)
PPE	-0.400*** (-3.880)	-0.393*** (-3.811)	-4.739*** (-3.147)	-4.602*** (-2.977)
MTB	-0.031** (-2.261)	-0.031** (-2.215)	-0.536** (-2.175)	-0.520** (-2.087)
Cash	0.594** (2.380)	0.592** (2.373)	1.426 (0.424)	1.429 (0.428)
Leverage	0.634** (2.163)	0.631** (2.154)	-6.754*** (-3.406)	-6.810*** (-3.425)
Capex	0.802* (1.948)	0.773* (1.873)	2.842 (0.654)	2.423 (0.540)
Constant	-0.681*** (-2.703)	-0.500** (-2.336)	-12.623*** (-3.687)	-10.244*** (-3.920)
<i>Controls</i>	Y	Y	Y	Y
<i>Industry dummy</i>	Y	Y	Y	Y
<i>Year dummy</i>	Y	Y	Y	Y
R ²	0.287	0.287	0.224	0.224
Obs.	4274	4274	4274	4274

The table presents regression results of the channel effect of social trust on relationship between trade credit and greenwashing. The sample period is from 2002 to 2019. Estimates are based on panel data regressions with standard errors adjusted for heteroskedasticity and firm-level clustering. T-statistics, in parentheses, are based on two-sided tests. Significance at the 10%, 5%, and 1% level is indicated by*, **, and ***, respectively. The definitions of all variables are given in Appendix A.

Table 9: The channel effect of social capital (unadjusted SCI index)

	(1)	(2)	(3)	(4)
	TR	TR	TP	TP
GW_Diff	-0.005*** (-3.075)		-0.075** (-2.348)	
GW_Diff*Unadj_SCI	-0.000 (-0.803)		0.019 (1.298)	
GW_Ratio		-0.257*** (-3.049)		-4.087** (-2.448)
GW_Ratio*Unadj_SCI		-0.018 (-0.777)		0.935 (1.309)
Unadj_SCI	0.002 (0.354)	0.022 (0.810)	0.400 (1.440)	-0.516 (-1.020)
Size	0.160*** (4.080)	0.162*** (4.079)	0.998*** (3.282)	1.042*** (3.342)
Age	-0.003** (-2.326)	-0.003** (-2.241)	0.091*** (3.329)	0.093*** (3.381)
Sale_growth	-0.121* (-1.847)	-0.122* (-1.848)	-0.068 (-0.150)	-0.078 (-0.171)
PPE	-0.378*** (-3.816)	-0.369*** (-3.715)	-4.550*** (-3.028)	-4.381*** (-2.845)
MTB	-0.033** (-2.423)	-0.032** (-2.377)	-0.536** (-2.183)	-0.518** (-2.094)
Cash	0.592** (2.371)	0.591** (2.367)	1.379 (0.411)	1.365 (0.411)
Leverage	0.635** (2.169)	0.631** (2.157)	-6.983*** (-3.540)	-7.069*** (-3.570)
Capex	0.763* (1.852)	0.729* (1.760)	1.676 (0.413)	1.056 (0.255)
Constant	-0.671*** (-2.710)	-0.481** (-2.297)	-13.083*** (-3.796)	-10.298*** (-3.956)
<i>Controls</i>	Y	Y	Y	Y
<i>Industry dummy</i>	Y	Y	Y	Y
<i>Year dummy</i>	Y	Y	Y	Y
R ²	0.287	0.287	0.225	0.225
Obs.	4274	4274	4274	4274

The table presents regression results of the channel effect of social trust on relationship between trade credit and greenwashing. The sample period is from 2002 to 2019. Estimates are based on panel data regressions with standard errors adjusted for heteroskedasticity and firm-level clustering. T-statistics, in parentheses, are based on two-sided tests. Significance at the 10%, 5%, and 1% level is indicated by*, **, and ***, respectively. The definitions of all variables are given in Appendix A.

Table 10: Greenwashing and trade credit by 2SLS approach and instrument variables

	(1)	(2)	(3)	(4)
	TR	TR	TP	TP
GW_diff (Instrumented)	-0.006*** (-3.363)		-0.294*** (-4.032)	
GW_ratio (Instrumented)		-0.301*** (-3.395)		-13.556*** (-3.740)
Size	0.133*** (4.911)	0.135*** (4.941)	2.904*** (5.622)	2.887*** (5.600)
Age	-0.002** (-2.197)	-0.002** (-2.095)	0.152*** (3.736)	0.155*** (3.782)
Sale_growth	-0.170*** (-3.191)	-0.170*** (-3.183)	1.462** (2.344)	1.527** (2.457)
PPE	-0.483*** (-6.594)	-0.478*** (-6.476)	-7.012*** (-3.046)	-6.890*** (-2.959)
MTB	-0.031*** (-3.889)	-0.031*** (-3.869)	-1.077*** (-4.243)	-1.068*** (-4.151)
Cash	0.317** (2.216)	0.314** (2.195)	-5.794 (-1.300)	-6.058 (-1.363)
Leverage	0.284** (2.354)	0.280** (2.320)	-27.757*** (-10.388)	-28.015*** (-10.432)
Capex	0.698*** (2.763)	0.686*** (2.705)	-15.122** (-2.087)	-15.207** (-2.072)
Constant	-0.688*** (-3.109)	-0.417** (-2.202)	-16.491*** (-3.433)	-3.467 (-0.835)
<i>Industry dummy</i>	Y	Y	Y	Y
<i>Year dummy</i>	Y	Y	Y	Y
R ²	0.232	0.232	0.328	0.327
Obs.	11925	11925	11925	11925

The table presents regression results of 2SLS approach and instrument variables. The sample period is from 2002 to 2019. The first lagged *GW_diff* and *GW_ratio* are used as instrument variables. Estimates are based on panel data regressions with standard errors adjusted for heteroskedasticity and firm-level clustering. T-statistics, in parentheses, are based on two-sided tests. Significance at the 10%, 5%, and 1% level is indicated by*, **, and ***, respectively. The definitions of all variables are given in Appendix A.

Table 11: Greenwashing and trade credit by GMM approach and instrumental variables

	(1)	(2)	(3)	(4)
	TR	TR	TP	TP
GW_diff (Instrumented)	-0.006*** (-3.363)		-0.294*** (-4.032)	
GW_ratio (Instrumented)		-0.301*** (-3.395)		-13.556*** (-3.740)
Size	0.133*** (4.911)	0.135*** (4.941)	2.904*** (5.622)	2.887*** (5.600)
Age	-0.002** (-2.197)	-0.002** (-2.095)	0.152*** (3.736)	0.155*** (3.782)
Sale_growth	-0.170*** (-3.191)	-0.170*** (-3.183)	1.462** (2.344)	1.527** (2.457)
PPE	-0.483*** (-6.594)	-0.478*** (-6.476)	-7.012*** (-3.046)	-6.890*** (-2.959)
MTB	-0.031*** (-3.889)	-0.031*** (-3.869)	-1.077*** (-4.243)	-1.068*** (-4.151)
Cash	0.317** (2.216)	0.314** (2.195)	-5.794 (-1.300)	-6.058 (-1.363)
Leverage	0.284** (2.354)	0.280** (2.320)	-27.757*** (-10.388)	-28.015*** (-10.432)
Capex	0.698*** (2.763)	0.686*** (2.705)	-15.122** (-2.087)	-15.207** (-2.072)
Constant	-0.688*** (-3.109)	-0.417** (-2.202)	-16.491*** (-3.433)	-3.467 (-0.835)
<i>Industry dummy</i>	Y	Y	Y	Y
<i>Year dummy</i>	Y	Y	Y	Y
R ²	0.232	0.232	0.328	0.327
Obs.	11925	11925	11925	11925

The table presents regression results of GMM approach and instrument variables. The sample period is from 2002 to 2019. The first lagged *GW_diff* and *GW_ratio* are used as instrument variables. Estimates are based on panel data regressions with standard errors adjusted for heteroskedasticity and firm-level clustering. T-statistics, in parentheses, are based on two-sided tests. Significance at the 10%, 5%, and 1% level is indicated by*, **, and ***, respectively. The definitions of all variables are given in Appendix A.

Table 12: Greenwashing and trade credit by GMM approach and instrumental variables

	(1)	(2)	(3)	(4)
	TR	TR	TP	TP
GW_diff (Instrumented)	-0.007*** (-3.406)		-0.278*** (-3.222)	
GW_ratio (Instrumented)		-0.324*** (-3.401)		-12.574*** (-2.990)
Size	0.147*** (4.975)	0.148*** (4.997)	2.999*** (5.297)	2.964*** (5.272)
Age	-0.002* (-1.925)	-0.002* (-1.854)	0.185*** (4.072)	0.187*** (4.080)
Sale_growth	-0.151*** (-3.414)	-0.150*** (-3.382)	0.867 (1.211)	0.951 (1.337)
PPE	-0.459*** (-5.939)	-0.456*** (-5.839)	-7.069*** (-2.952)	-7.016*** (-2.892)
MTB	-0.033*** (-3.655)	-0.033*** (-3.635)	-1.126*** (-3.828)	-1.122*** (-3.753)
Cash	0.290* (1.761)	0.286* (1.734)	-2.664 (-0.494)	-2.944 (-0.547)
Leverage	0.270** (2.113)	0.266** (2.080)	-24.748*** (-8.875)	-24.982*** (-8.911)
Capex	0.672** (2.472)	0.663** (2.422)	-11.305 (-1.486)	-11.323 (-1.467)
Constant	-0.765*** (-3.316)	-0.463** (-2.372)	-17.996*** (-3.418)	-5.679 (-1.269)
<i>Industry dummy</i>	Y	Y	Y	Y
<i>Year dummy</i>	Y	Y	Y	Y
R ²	0.236	0.236	0.313	0.312
Obs.	10046	10046	10046	10046

The table presents regression results of GMM approach and instrument variables. The sample period is from 2002 to 2019. The second lagged *GW_diff* and *GW_ratio* are used as instrument variables. Estimates are based on panel data regressions with standard errors adjusted for heteroskedasticity and firm-level clustering. T-statistics, in parentheses, are based on two-sided tests. Significance at the 10%, 5%, and 1% level is indicated by*, **, and ***, respectively. The definitions of all variables are given in Appendix A.

Table 13: Greenwashing and trade credit by 2SLS approach and instrumental variables

	(1)	(2)	(3)	(4)
	TR	TR	TP	TP
GW_diff (Instrumented)	-0.005*** (-3.723)		-0.249*** (-4.687)	
GW_ratio (Instrumented)		-0.273*** (-3.816)		-12.075*** (-4.416)
Size	0.120*** (4.857)	0.122*** (4.922)	2.463*** (5.306)	2.505*** (5.399)
Age	-0.003** (-2.455)	-0.002** (-2.318)	0.117*** (3.162)	0.122*** (3.272)
Sale_growth	-0.120*** (-2.737)	-0.120*** (-2.745)	2.081*** (3.479)	2.106*** (3.519)
PPE	-0.494*** (-7.072)	-0.487*** (-6.949)	-7.358*** (-3.218)	-7.128*** (-3.091)
MTB	-0.030*** (-4.071)	-0.029*** (-4.038)	-1.070*** (-4.666)	-1.056*** (-4.556)
Cash	0.304** (2.420)	0.304** (2.420)	-9.544** (-2.505)	-9.641** (-2.539)
Leverage	0.279** (2.424)	0.275** (2.393)	-30.915*** (-11.639)	-31.130*** (-11.679)
Capex	0.717*** (2.939)	0.702*** (2.875)	-16.617** (-2.356)	-16.957** (-2.381)
Constant	-0.703*** (-3.274)	-0.485*** (-2.682)	-27.739*** (-5.379)	-17.013*** (-4.043)
<i>Industry dummy</i>	Y	Y	Y	Y
<i>Year dummy</i>	Y	Y	Y	Y
R ²	0.228	0.228	0.339	0.338
Obs.	13847	13847	13847	13847

The table presents regression results of 2SLS approach and instrument variables. The sample period is from 2002 to 2019. The industrial mean of greenwashing measures are used as instrument variables. Estimates are based on panel data regressions with standard errors adjusted for heteroskedasticity and firm-level clustering. T-statistics, in parentheses, are based on two-sided tests. Significance at the 10%, 5%, and 1% level is indicated by*, **, and ***, respectively. The definitions of all variables are given in Appendix A.

Appendix A: Variable Definitions

Variables	Description
<i>GW_diff</i>	The ratio of symbolic to substantive CSR scores based on Thomson Reuters Asset4 ESG ratings for year $t-1$. CSR KPI scores are separated into firms substantive CSR scores (e.g., amount of CO ₂ emissions reduced in the past year, number of injuries and fatalities at work) and the symbolic CSR scores (e.g., does the firm claim to have a policy for reducing environmental emissions? Does it claim to strive to improve its employee health and safety?).
<i>GW_ratio</i>	The difference between symbolic to substantive CSR scores based on Thomson Reuters Asset4 ESG ratings for year $t-1$. CSR KPI scores are separated into firms substantive CSR scores (e.g., amount of CO ₂ emissions reduced in the past year, number of injuries and fatalities at work) and the symbolic CSR scores (e.g., does the firm claim to have a policy for reducing environmental emissions? Does it claim to strive to improve its employee health and safety?).
<i>TR</i>	The ratio of account receivables scaled by total assets, multiply by 360.
<i>TP</i>	The ratio of account payables scaled by total assets, multiply by 360.
<i>Firm size</i>	The natural logarithm of a firm's total assets in U.S. dollars at the end of the previous year.
<i>Firm age</i>	Age is computed as the natural logarithm of one plus the difference between the year under investigation and the firm's year of birth. The year of birth is computed as the minimum value of: (a) the first year the firm appears in the COMPUSTAT database.
<i>Leverage</i>	The firm's total debt scaled by total assets.
<i>MTB</i>	Market-to-book ratio, computed as the market value divided by the book value of equity.
<i>Cash</i>	The ratio of cash and cash equivalent to the book value of total assets.
<i>Sales growth</i>	The difference between the previous and current year annual sales revenue, divided by previous annual sales revenue
<i>PPE</i>	The value of property, plant and equipment scaled by total assets.
<i>Capex</i>	Capital expenditure scaled by total assets.
<i>Total_IO</i>	Total institutional investor ownership, computed as the fraction of shares of the firm owned by all institutional investors.
<i>Analyst_FD</i>	The dispersion of earning forecasts made in year t for each firm for earnings of current year t . It is computed as the standard deviation of analyst forecasts for the year, scaled by the firm's share price at the beginning of the year.
<i>KZ_Index</i>	Measure of financial constraints, computed as the linear combination of five accounting ratios: (1) cash flow to total capital; (2) the market to book ratio; (3) debt to total capital; (4) dividends to total capital; and (5) cash holdings to capital. Higher values of the KZ index imply that the firm is more capital constrained
<i>Non_Div</i>	The dummy variable which takes a value of 1 if the firm pays dividend in fiscal year t , otherwise 0.

Variables	Description
<i>ST1</i>	Short-term debt due within one year scaled by the book value of total assets.
<i>ST3</i>	Short-term debt due within three years scaled by the book value of total assets.
<i>Adj_SCI</i>	The adjusted SCI score is determined by the sum of the differences by subtracting the standardized total concern scores from the standardized total strength scores across the community relations, diversity, environment, and human rights dimensions of KLD's ratings. A higher adjusted SCI score indicates greater social capital commitment by the firm.
<i>Unadj_SCI</i>	The unadjusted SCI score is determined by the sum of the differences by subtracting the total concern scores from the total strength scores across the community relations, diversity, environment, and human rights dimensions of KLD's ratings. A higher unadjusted SCI score indicates greater social capital commitment by the firm.
<i>YEAR</i>	Indicator dummy variables of fiscal year
<i>INDUSTRY</i>	Indicator dummy variables for industry based on SIC code