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Are Green Companies Less Risky and Getting Lower Cost Bank Loans? A Stakeholder-Management Perspective

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Abstract

In this paper, we investigate stakeholder theory by focusing on two nonshareholder stakeholder groups (creditors and environment). We find strong evidence that implementing environment-friendly practices reduces borrowing costs and limits the use of financial covenants. In addition, we document that relationship lenders incorporate the levels of and changes in environmental management in loan pricing, whereas first-time lenders only care about the levels of environmental management. We also report that firms with better environmental practices have more stable income streams, lower leverage ratios, and better future valuations. Taking a contingency perspective, we find that the effect of environmental management on

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loan costs is more pronounced when borrowing firms face higher industry competition and stronger environmental stringency. In addition, borrowers with better green management are less likely to violate covenants, default on loans, or file bankruptcy. This conclusion sheds further light to the green finance policy debate among central banks and regulators on whether they should consider incentives for green loans via policy instruments such as lower capital requirements for bank financing of green assets.

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绿色企业的融资成本是否较低？

金大卫，马骏，刘柳灵，王海之，殷德生

【摘要】本文研究企业的两组“非股东”利益相关者（即企业的债权人及自然环境）所涉及的利益相关者理论。本文发现，环境友好型的企业可以享受较低的融资成本和较少的约束性融资条款。在我们的样本中，贷款机构在给贷款定价时，已经考虑了企业环境管理的水平及其变化。我们还发现，环境友好型的企业一般现金流更稳定，杠杆率更低，且有更好的预期估值。另外，在竞争性较强且环境政策更严格的行业中，环境因素对贷款成本的影响更大。当企业更积极地参与环境风险管理后，企业违反约束性条款的概率更低，出现贷款违约及企业破产的概率也更低。本文可为正在考虑绿色金融激励政策（如降低绿色资产的风险权重等）的中央银行和金融监管机构提供参考。

> Our responsibility as a corporation goes far beyond protecting our customers' assets and helping them succeed financially. We're responsible for promoting the long-term economic prosperity and quality of life for everyone in our communities. If they prosper, so do we. There's never been a thriving bank in a struggling community.
>
> —John Stumpf, former chairman, president, and CEO, Wells Fargo

1. Introduction

Most large firms devote substantial time and resources to environmental management (green management) or, more broadly speaking, environmental social responsibility. This is important as it allows industries to contribute to ecologically sustainable development by applying environment-friendly production process or by redesigning manufacturing technologies (Shrivastava, 1995). Nonetheless, externalities and market failures exist when firm managers' objective function is to maximize shareholder value, which necessitates government intervention and regulation (Siegel, 2009).

It has often been argued that environmental regulation is instrumental to the introduction of better environmental-management practices within firms, and that more stringent regulation is necessary to improve such practices. Many firms choose to engage in green management beyond regulatory and legal requirements (Schot and Fischer, 1993). The voluntary nature of incurring extra costs to address environmental issues highlights that some firms are willing to consider a variety of factors other than government regulations in their business decisions.

Moreover, firms face growing pressure to become responsible and greener, and various key stakeholders (Hillman and Keim, 2001), including creditors,

suppliers, customers, and the government press companies to reduce their negative impacts on society and the natural environment. Managers' commitment to the environment to ensure sustainable economic success has thus become a strategic issue. Including environmental issues in corporate strategies can improve a firm's alignment with growing environmental concerns and expectations of its stakeholders (Garrod, 1997). Although society favors environmental investments by industrial firms, business managers have to identify the circumstances under which green management is appealing and beneficial to both shareholders and other stakeholder groups (Orsato, 2006).

To advance the understanding of effective and efficient environmental management, the green-business literature strives to identify the benefits of environmental management and how it creates shareholder value. A series of empirical studies investigate the linkage between environmental management and firm performance, and they document mixed results. Some works confirm a positive relationship (Judge and Douglas, 1998; King and Lenox, 2002; Melnyk et al., 2003); others are unable to identify a positive effect of environmental proactivity on financial performance (Gilley et al., 2000; Link and Naveh, 2006). Nevertheless, two important issues remain and call for more inclusive analyses of stakeholder relations. First, most research along this line focuses on the one-to-one relationship between shareholders and one particular type of nonshareholder stakeholder, which hinders our understanding of the dynamic interactions among various nonshareholder stakeholders. Second, if the greening of corporate strategies is an attempt to meet certain stakeholders' expectations, then properly identifying the salient stakeholders in the process becomes a critical step for corporate strategy formation.

In this study, we fill the void in the literature, and shed further light on environmental management in particular and stakeholder relations in general. Managerial concern for and the treatment of stakeholder groups have instrumental value in the sense that implementing related strategies and practices enables a firm to create value for its shareholders (Berman et al., 1999; Jones, 1995). Building on stakeholder theory, we focus on two important nonshareholder stakeholders—creditors (e.g., banks) and environment—to investigate empirically whether and to what extent fair environmental treatment affects efficient contracting with bank lenders.

From a stakeholder-management perspective, it is not the sole responsibility for a firm's shareholders to evaluate how the firm treats other nonshareholder stakeholder groups and related practices. As a matter of fact, it is common practice for bank lenders to conduct due diligence by reviewing various aspects of firm operations as well as related policies and practices, to paint a complete picture of a firm's risk profile before granting a loan (Focarelli, Pozzolo, and Casolaro, 2008). According to the 2015 "Environmental and Social Risk Management" report by Wells Fargo Bank, during due diligence banks also review and evaluate their customers' exposure to social risks, including environmental-management practices, and they incorporate any identified risks into the loan approval process. Adopting a stakeholder-management perspective, we argue that, for several reasons, proactive environmental-management strategies can serve as an instrument (the means) to facilitate efficient contracting with creditors (Jones, 1995) and thus create value for shareholders (the end) in terms of lower loan costs and less restrictive provisions.

First, green management can reduce costs and increase revenues, thus stabilizing income streams. A firm engaging in green management can effectively

reduce its energy and materials consumption through improved technology and reusable materials (Hart, 1997). Advanced environmental strategies can also result in greater eco-efficiency, which implies that a firm can simultaneously improve its production and reduce its ecological impact (Starik and Marcus, 2000). Moreover, environmental management can be a differentiation strategy that satisfies consumer and stakeholder interests by integrating socially responsible attributes into firm products (McWilliams and Siegel, 2001). It can also function as advertising by increasing awareness of firm products and softening consumer price sensitivity (Milgrom and Roberts, 1986; Sen and Bhattacharya, 2001). Thus, engaging in green management can create new demand or command a price premium for environmentally sensitive consumers (McWilliams and Siegel, 2001), enhance customer satisfaction and loyalty (Luo and Bhattacharya, 2009), and increase sales (Ailawadi, et al., 2014).

Second, environmental management can improve stakeholder relationships and prevent costly stakeholder conflicts (Hull and Rothenberg, 2008). Many stakeholder and institutional theories share a conceptualization of organizations being embedded within a wider social system that shapes their behavior. Effective management of stakeholder relationships can contribute to enhanced financial performance through the creation, development, or maintenance of ties that provide important resources to companies (Jones, 1995; Brammer and Millington, 2008). Moreover, firms proactively seeking organizational legitimacy engage in activities (e.g., green management) that various external stakeholder groups deem socially desirable (Basu and Palazzo, 2008), which in turn induces trust and cooperation that provide some protection from unpredictability (Godfrey, et al., 2009).

Third, we argue that environment-friendly practices convey private information about future firm valuation. Specifically, signaling theory applies when significant information asymmetry exists in a decision-making process (Spence, 1974). Nonshareholder stakeholders may use other reference points to make inferences based on information not directly observable to them. Accordingly, managers attempt to undertake certain activities to alleviate informational uncertainty and convey private information, including future prospects. A valid signal needs to satisfy two conditions (Myers, 1974): (1) it must be observed in advance, and (2) it must be costly for the firm to send the signal. In this sense, we argue that green management is a valid signal because it incurs significant costs and reflects a firm's willingness to expend resources to benefit other stakeholders. Intuitively, a firm with an unpromising future is unlikely to treat the environment well, because doing so reduces firm value (Bae et al., 2011). As such, a firm's environmental-management practices convey proprietary information about a firm's future cash flows and valuations (Agle and Caldwell, 1999), as well as influence on other stakeholders' (e.g., financiers, customers, and suppliers) perceptions and subsequent transactions with the firm (Banerjee, et al., 2008).

Moreover, our paper also sheds further light to the debate on whether central banks and regulators should provide incentives (e.g., by lower capital requirements) for bank loans to green businesses. The G20 Green Finance Study Group has successfully mainstreamed the concept of "green finance" among policy makers, with 2016 G20 Leaders' Communique stating that "in order to support environmentally sustainable growth globally, it is necessary to scale-up green financing." The 2017 G20 Green Finance Synthesis Report further recommended that financial institutions should consider conducting environmental risk analysis,

which includes the credit risk arising from environmental risk exposures.[2] In the book edited by Ma Jun (2015 and 2017), Chairman of China's Green Finance Committee, it was proposed that regulators should consider lowering risk weights and capital requirement for green loans financed by green bonds as well as for green bonds held by banks. European Banking Federation (2017) stated that "While green assets seem to imply a lower risk than non-green assets, the cost of financing the energy transition remains a major challenge.[3] To support and accelerate the financing of these [green] assets in an economy where more than 70% of finance comes from banks, [regulators should consider] lower capital requirements for direct financing of these assets and investment in them". At the end of 2017, eight central banks and financial regulators (including Bank of France, the People's Bank of China, and others) launched the Central Banks and Supervisors' Network on Greening the Financial System. The joint statement from the founding members of the network says "the Network will help to strengthen the global response required to meet the goals of the Paris agreement and to enhance the role of the financial system to manage risks and to mobilize capital for green and low-carbon investments in the broader context of environmentally sustainable development." Given the importance for banks to extend credits to green businesses, it is crucial for academics, practitioners and policy makers to understand how green companies fared in transactions with banks. In particular, if granting loans to green businesses helps reduce the credit risks faced by the banking system, then policy incentives for green loans would be both beneficial to the environment and consistent with the stability goal of financial regulation. In this regard, our empirical investigation on green companies and bank loan contracts can offer new insights into this important issue.

[2] http://unepinquiry.org/wp-content/uploads/2017/07/2017_GFSG_Synthesis_Report_EN.pdf.
[3] https://www.ebf.eu/wp-content/uploads/2017/09/Geen-finance-complete.pdf.

In this study, we construct our sample based on the MSCI ESG KLD STATS (KLD) database and the Thomson Reuters DealScan database (DealScan). Using a sample of 5,612 loan facilities from 1992 to 2013, we find strong evidence that borrowing firms with higher environmental management scores on the environmental-management indexes enjoy lower borrowing costs and fewer restrictive financial covenants. We employ an instrumental variable approach and a propensity score matching approach to ensure that our results are not driven by endogeneity issues. Our findings indicate that a group of nonshareholder stakeholders (i.e., banks) may respond to how a firm treats another group of nonshareholder stakeholders (i.e., environment) in a positive way. We make a distinction between first-time loans and relationship loans, and we include both levels of and changes in environmental management in the regression analyses. Our results reveal that relationship banks monitor borrowers' performance in green management over time, and they price both the levels of and changes in environmental-management indexes, but only the environmental-management index levels matter to first-time lenders.

We further investigate the underlying mechanisms through which lending banks evaluate borrowing firms' environmental-management policies. Our evidence reveals that borrowing firms engaging in green management tend to have lower income-stream uncertainties and lower leverage ratios in the years after loan originations. Moreover, conditional on the current Tobin's Q, environmental-management scores have additional explanatory power for borrowing firms' forward-looking Tobin's Q. We also examine when environmental management matters more in terms of reducing firms' cost of debt. Specifically, we find that when borrowing firms experience higher levels of industry competition and stronger environmental stringency, the negative relation between environmental

management and the cost of bank loans is stronger. In addition, if better environmental management is an *ex ante* predictor of borrowing firms' risk profiles, valuation, and performance, we should observe *ex post* loan performance consistent with this conjecture. Therefore, we investigate whether firms with better environmental management have a lower likelihood of covenant violation, loan default, or bankruptcy filing. Our evidence reveals a consistent relationship between *ex ante* bank expectation and *ex post* loan performance of borrowing firms.

The paper is organized as follows. In section 2, we detail our sampling procedure and measures, and we provide summary statistics. In section 3, we explain our identification strategies and report regression results. Section 4 summarizes and concludes the paper.

2. Data, Sample, and Measures

2.1Data

We rely on Thomson Reuters DealScan database (Strahan, 1999) to collect bank loan data. The DealScan database provides detailed price and nonprice information on individual loan facilities such as loan spreads, maturity, collateral, covenants, loan types, and loan purposes. Using the link table provided by Chava and Roberts (2008), we match the borrowing firms in the DealScan database with the Compustat database to retrieve financial information for our sample borrowers. Following the convention, we eliminate firms in the financial services (SIC codes 6000–6900) and utilities (SIC codes 4900–4999) industries because firms in these industry segments are highly regulated. We further match our sample firms with the MSCI ESG KLD STATS (KLD) database to obtain information about firm performance in environmental management.

Following the convention in banking literature (Bharath, et al., 2007; Bharath, et al., 2011), we use loan facilities as our unit of observation. Because borrowing firms may obtain loans from various lenders with different loan contracts, we are thus able to link a firm's environmental management to its loan prices and control various borrower characteristics and loan features. In particular, KLD reports that its ratings reflect a firm's environmental profile at the end of a calendar year. Therefore, we use the environmental-management indexes in year *t*-1 for loans made in year *t* to ensure that such information is available for the loan originations and to mitigate the potential causality issue. As a result, our sampling procedure yields 5,612 loan facilities made between 1992 and 2013 with environmental-management indexes between 1991 and 2012.

2.2Measures

We use information from the DealScan database to construct two dependent measures. Specifically, loan price is all-in spread drawn (AISD), which is the annual spread over the London Interbank Offered Rate (LIBOR). We take the natural logarithm of AISD to normalize the distribution and to facilitate interpretation of our results (Chava and Roberts, 2008). In addition, we obtain information on various financial covenants from the DealScan database.

It is very common for banks to impose restrictive provisions in loan contracts to protect debtholders' claims (Drucker and Puri, 2009). Loan covenants limit firm opportunistic behaviors to protect lenders' debt claims, and the number of covenants is generally an increasing function of the likelihood of *ex post* monitoring and intervening. Typically, financial covenants are thresholds on different accounting variables that borrowers must maintain. Five ratios, namely coverage, assets to liabilities, debt to cash flow, leverage, and net worth, are

frequently used in financial covenants. Using information from DealScan, we thus sum the total number of financial covenants to capture the restrictive provisions in loan contracts (Drucker and Puri, 2009).

Using multiple information sources, KLD and its analysts evaluate and rate covered firms in seven major qualitative areas: environment, community, corporate governance, diversity, employee relations, human rights, and product quality and safety (Hillman and Keim, 2001). The KLD database covers a large cross-section of firms for a rather long time span, and it is widely used by academics and practitioners as a source of information on various aspects of corporate social responsibility (Berman, et al., 1999; Fisher-Vanden and Thorburn, 2011; Ghoul, et al., 2011; Hong and Kacperczyk, 2009).

We are particularly interested in the environmental profiles of our sample borrowing firms. KLD considers the performance of a firm's environmental management, which includes environmental opportunities, waste management, climate change, water stress, biodiversity and land use, among other things. KLD divides the firm environmental profiles into two categories: strengths and concerns. A firm gains one point for doing a good deed in each of the strength categories. For example, if a firm makes the efforts to develop innovative remediation products, provide environmental services, or promote efficient energy use (Chava, 2014), the firm is rated as "having strength" in the category of "environmental opportunities." Following the existing literature (Bae, et al., 2011; Deng, et al., 2013), we construct an index of environmental management, *EM_index_pos*, by summing the strengths across different categories in the KLD database. In addition, to incorporate a firm's exposure to possible concerns about its environmental management and to ensure the robustness of our estimations, we include an

additional variable, *EM_index_net*, by subtracting the total number of concerns from *EM_index_pos*(Goss and Roberts, 2011).

We posit that the relationship between a borrowing firm's environmental-management practices and loan price is contingent on two things: industry competition and industry environment stringency. In particular, we measure industry competition using a sales-based Herfindahl index (HHI). For a given industry in a particular year, the HHI is the sum of squared market share (firm sales divided by industry-level total sales) for all firms in that industry. We then follow the convention to ease interpretation (Aggarwal and Samwick, 1999; Garvey and Mibourn, 2006) and convert the HHI measure into its empirical cumulative density function (cdf) according to its empirical distribution so that higher industry competition is associated with a higher cdf value (Fee and Thomas, 2004).

We measure industry environmental stringency using data from the Pollution Abatement Costs and Expenditures (PACE) survey published by the U.S. Department of Commerce, Bureau of the Census (Shadbegian and Gray, 2005). The pollution abatement costs and expenditures reflect environment stringency and industry-wide efforts to address environmental issues. Focusing on two-digit SIC codes, we collect information about industry-level pollution abatement costs and expenditures across all media types for 1990, 1991, 1992, 1993, 1994, 1999, and 2005, and we scale the gross annual PACE by industry total shipments (Keller and Levinson, 2002). Because PACE surveys in our sample period are not continuous, we use 1994 information for the years 1995 to 1998, we use 1999 information for the years 1999 to 2004, and we use 2005 information for the year 2005 and onward. Similar to our measure of industry competition, we convert the raw measure into its empirical cumulative-distribution function.

In our regression analysis, we enter two sets of control variables capturing various aspects of firm characteristics and loan characteristics that are important determinants in loan contracts (Bharath, et al., 2011). *Firm size* is the natural logarithm of book value of firm assets. *Profitability* is net income divided by total sales. *Book leverage* is total debt divided by the book value of firm assets. *Sales growth rate* is the percentage change of firm sales from year *t*-1 to year *t*. We also calculate the modified Altman's (1968)*Z-score* to reflect the likelihood of default for our sample borrowing firms. The higher the score, the less likely a borrowing firm will default on a particular loan. *Cash flow volatility* is the standard deviation of a borrower's quarterly cash flows in the previous three years, scaled by the average book assets. In addition, managerial ability may affect a firm's environment-friendly practices as well as its loan price (Custódio, et al., 2013). Therefore, following Demerjian et al. (2012), we include a measure of managerial ability derived from firm managers' efficiency in generating revenues.[4]

The second set of control variables involves various loan features collected from the DealScan database (Bharath, et al., 2011). *Loan maturity* is the natural logarithm of debt maturity in months. *Loan size* is the natural logarithm of a loan facility's amount in millions of dollars. *Performance pricing* is an indicator that equals 1 if a loan facility has performance-pricing provisions that impose requirements on borrowers' performance. *Relationship lending* equals 1 if the borrowing firm and the lead bank(s) in a syndicated loan have a prior lending relationship. We also enter a set of indicators capturing different loan types and loan purposes, as well as the presence of S&P 500 long-term debt ratings (Drucker and Puri, 2009).

[4] The data is generously made available at http://faculty.washington.edu/smcvay/abilitydata.html by the authors (Demerjian, et al., 2012).

2.3 Summary Statistics

Table 1 reports summary statistics and the pairwise correlation matrix of variables in the regression analysis for the entire sample of 5,612 loan facilities. We cautiously examine the correlations among the variables and calculate the variance inflation factors in the regression analysis to alleviate the concern of multicollinearity.

[Insert Table 1 about here]

3. Empirical Results

3.1Identification Strategies

In the regression analysis, we model the price and nonprice terms in loan contracts as a function of firm performance of environmental management along with previously mentioned control variables, and we employ OLS estimators to perform the estimations. However, a major concern in the model specifications is the endogeneity issue arising from two strategic decisions: the firm's decision to obtain bank financing and the decision to engage in environment-friendly practices. Put another way, our sampling procedure and estimating methods are subject to a double-selection problem, which may yield biased estimations. Following existing studies (Massa and Žaldokas, 2014; Popov and Udell, 2012), we adopt a two-step procedure to deal with the double-selection issue.

In the first step, we obtain information on bank loans (from the DealScan database) and bond and equity issuances (from the Thomson Financial SDC Platinum Global New Issues database-SDC) for a comprehensive list of firms in the Compustat database. We then implement a procedure proposed by Heckman (1979) to recover the error structure to eliminate bias by using information for different groups of firms seeking different sources of financing. Specifically, we

estimate a probit model to gauge the likelihood that a particular firm will choose bank loans versus other arm's length (i.e., bond and equity issuances) financing (Denis and Mihov, 2003). We include a set of variables such as firm size, profitability, leverage, Z-score, sales growth rate, cash flow volatility, and credit rating, which are important determinants of firm financing decisions (Bolton and Freixas, 2000; Popov and Udell, 2012). From the estimated probit model, we calculate the inverse Mills ratio, and we enter it into all regression models as an additional control variable (Heckman, 1979). According to Hamilton and Nickerson (2003), inclusion of the inverse Mills ratio allows us to control for selection bias, and, more important, reveals the direction of self-selection.

In the second step, we adopt two different approaches to address firms' endogenous decisions to engage in environment-friendly practices. First, we use an instrumental variable (IV) estimator to obtain consistent estimates (Cheng, et al., 2014; Deng, et al., 2013; Ghoul, et al., 2011). Specifically, following Cheng et al. (2014), we use the industry average of environmental-management indexes as the instruments. The logic is that the environmental-management performance of industry peers probably influences a focal firm's environment-friendly practices. However, the industry's average environmental-management performance should not have a direct effect on a focal firm's loan pricing. Accordingly, we calculate the averages of *EM_index_pos* and *EM_index_net* for each four-digit SIC industry segment and for each calendar year as our instruments.

We also use the propensity-score matching (PSM) method as an alternative approach in the second step to address the selection bias. Similar studies (e.g., Bharath et al., 2011) implement the PSM approach (Dehejia and Wahba, 2002) to pair treatment and nontreatment groups on a set of observable characteristics. The matching method can largely remove relevant differences and allow for unbiased

estimates of the treatment effect (Rosenbaum and Rubin, 1983). We estimate a probit model on a set of observables to gauge the conditional probability (i.e., propensity score) of having strengths (i.e., better performance) in environmental management (Leuven and Sianesi, 2014). To have a parsimonious model with sufficient explanatory power, we cautiously choose variables used in the probit model. For example, existing research argues that firms with slack resources tend to engage in socially desirable activities (Waddock and Graves, 1997). We thereby control for firm profitability and cash flow volatility. We enter firm leverage and Z-score (Bae, et al., 2011; Maksimovic and Titman, 1991) to capture the likelihood that a firm can credibly honor its environment-friendly practices. Moreover, it is plausible that firms with better managerial ability and growth potential are more likely to care about their performance in environmental management (Demerjian, et al., 2012). We thus include measures of firm sales growth rate and managerial ability.

$$prob(Y = 1) = 4.231^{***} - 0.311^{***} \times Firm\ size + 0.067^{**} \times Profitability + 0.007^{*} \times Cash\ flow\ volatility - 0.001^{*} \times Book\ leverage + 0.066^{***} \times Zscore - 0.056 \times Sales\ growth + 0.123^{**} \times Managerial\ ability \quad \text{.....(1)}$$

The first-stage probit model has a log-likelihood of -6,212.4 and a McFadden's pseudo R-squared of 0.08. Moreover, the model has an 67% prediction accuracy, which is a 31% improvement over blind guessing (Hoetker, 2007).[5] These statistics indicate the appropriateness of the choice of independent variables and the overall fit of the probit model. Using the propensity score from the estimated probit model, we perform a one-to-one match without replacement to

[5] We report the fraction correctly predicted is 67%. As Hoetker (2007) indicates, this percentage can be misleading because it does not account for the fact that around 52% of sample firms do not have strengths in environmental management. Therefore, the percentage needs to be adjusted. Following Veall (1996), we calculate λ' = (0.67 – 0.52)/(1 – 0.52) = 0.31 and compare the performance of our model (0.67) with a blind guess (0.52), which reveals a significant 31% improvement.

form a sample with two groups of loan facilities that are borrowed by firms identical in almost all aspects except for their environmental-management profiles (i.e., with strengths versus without strengths). Our PSM-procedure yields a sample of 1,972 observations, including both the treatment group and control group.[6]

3.2 Regression Relating Environmental Management to Loan Costs

Table 2 presents our regression analyses relating the performance of firm environmental management to loan price. To control for industrial heterogeneity in environmental management, we add industry dummies at the two-digit SIC level. We include year dummies to control for economy-wide shocks and timely trends. Because a borrowing firm may initiate multiple deals with different banks, ordinary least square (OLS) estimates of standard errors can be inefficient when the residuals are correlated for the same borrowing firm over time. Therefore, for all regression models, we cluster standard errors by firm to account for the residual dependence across loans for the same firm.

First of all, we indeed document significant coefficients of the inverse Mills ratio for all models in table 2, confirming self-selection among our sample borrowing firms in the decision to seek external financing. More important, the positive signs of estimated coefficients of the inverse Mills ratio indicate that our sample firms negatively self-select into the strategy of bank borrowing (Hamilton and Nickerson, 2003; Li and Prabhala, 2007). In other words, our sample firms have comparative advantages of obtaining cheaper loans, and those firms choosing arm's length financing (i.e., public debts or equity issuances) would have above-average loan costs had they chosen bank financing.

[6] Following Lemmon and Roberts (2010), we perform group mean tests for firm characteristics and loan characteristics of treatment group and control groups. In line with our expectation, most variables are not statistically different for the two subgroups.

Columns 1 and 2 of table 2 report regression results based on OLS estimator. Columns 3 and 4 present regression results based on IV estimator. Across models 1-4, the empirical results reveal a significantly negative correlation between the performance of environmental management and loan price, and the findings are consistent for both the strengths of environmental management (columns 1 and 3) and the overall performance of environmental management incorporating the concerns (columns 2 and 4). In particular, for IV estimations, we conduct several postestimation diagnostic tests to ensure the appropriateness of our choice of IVs. The significant Durbin–Wu–Hausman test statistics indicates that it is appropriate to treat the performance of environmental management as endogenous. The Kleibergen–Paaprk Lagrange multiplier (LM) statistics suggest that our regression models are well specified and not subject to the underidentification problem (Kleibergen and Paap, 2006). In addition, we report the coefficients for the IVs in the first-stage regression and Kleibergen–Paaprk Wald F-statistics for the weak identification test. The significant coefficients of our IVs and large F-values indicate that the instruments are strongly relevant.

Columns 5 and 6 of table 2 report regression results based on a PSM sample, and we document consistent results that good performance of environmental management reduces loan price significantly. The economic significance of our findings is quite obvious. We find that, *ceteris paribus*, a one-point change in environmental management indexes reduces loan cost by 10% in column 5 (15 basis points) and 6% in column 6 (9 basis points), respectively.

In the ideal situation, the first-stage probit model of PSM-procedure should include all observable variables to calculate the propensity score (Li and Prabhala, 2007). Even by doing so, we recognize that unobservable variables (hidden bias) exist and tend to bias the qualitative and quantitative inferences regarding the

treatment effects (Bharath, et al., 2011). Therefore, we conduct a Rosenbaum bounds-sensitivity analysis (Rosenbaum, 2002) to determine econometrically the magnitude of unobserved factors and its effect on our causal inferences. Specifically, we examine the confidence interval of estimated coefficients of environmental management indexes by experimenting with a factor capturing the magnitude of hidden bias.[7] At a given factor, if the effect of the hidden bias is sufficiently large such that the confidence interval of the estimated coefficients contain nonnegative values, the negative relationship between good environmental management and loan price is challenged. To facilitate the interpretation of hidden bias, we convert the factor to the corresponding change of each variable in the first-stage probit model, which should be equivalent to the same magnitude of hidden bias. Starting with a factor of 1 (i.e., no hidden bias), we experiment by increasing the factor by 0.5. In our case, a factor of 1.4 results in the confidence interval containing nonnegative values, which also reflects the magnitude of hidden bias. According to our calculation, the hidden bias at a factor of 1.4 is equivalent to a 132% change in firm leverage. Given that such a dramatic change in firm capital structure rarely happens in real-world practice, we thereby conclude that it is unlikely an unobserved factor can lead to the rejection of the causal effect of environment-friendly practices on loan spreads.

[Insert Table 2 about here]

Banks are delegated monitors (Diamond, 1984) that make significant investments in costly information production to screen borrowers *ex ante* and monitor them *ex post*(Hauswald and Marquez, 2006). Banks develop lending relationships with borrowers through a series of transactions. The investigation of

[7]Bharath*et al.* (2011) and Rosenbaum (2002) provide the technical details. We do not report the results of our Rosenbaum bounds sensitivity analysis, but they are available upon request. Using firm size as another example, the hidden bias has to be equivalent to 7.6 standard deviations in order to challenge our findings.

how banks, as key stakeholders, incorporate not only cross-sectional variation but also time-series variation of firms' treatment of another stakeholder group (e.g., employees, environment, and community) into loan contracts offers informative insights into stakeholder theory. To achieve this, we make a distinction between first-time loans and relationship loans, and we partition our sample loan facilities accordingly. We define a first-time loan as one for which the borrowing firm has not previously obtained any loans from the lead bank(s). A relationship loan is one for which the borrowing firm has previously obtained a loan from the same lead bank(s). We measure changes in environmental-management performance of a particular borrowing firm by calculating the difference in its environmental-management indexes between its most recent loan transaction and the current loan origination.[8]

We include both the levels and the changes of *EM_index_pos* and *EM_index_net* in the regression analysis along with other controls. For first-time loans (columns 1 and 2 of table 3), we report that only the environmental-management indexes are significant and negative, whereas, for relationship loans (columns 3 and 4 of table 3), both the levels of and changes in the environmental-management indexes significantly and negatively affect loan prices. Thus, we provide strong evidence that relationship banks, as inside lenders and stakeholders with vested interests in the borrowing firms, incorporate both contemporary environment-friendly practices and improvements in environmental management into loan pricing. Outside banks focus more on borrowing firms' status quo rather than their historical performance in environmental-management practices. Moreover, our findings in columns 3 and 4 of table 3 reveal that the magnitude of improvement of environment-friendly practices is larger than the level of

[8] We also try a one-year window and a three-year window to calculate changes in environmental-management indexes. These alternative measures do not materially alter our findings.

environmental-management indexes in terms of loan price. It is plausible that existing debtholders give more weight to improvements in how firms treat other stakeholders, given that they have existing stakeholder relationships with the borrowing firm.

[Insert Table 3 about here]

We further explore other fees in loan contracts to see whether these fees are sensitive to borrowing firms' environmental management (Berg, et al., 2016). Specifically, we examine all-in-spread-undrawn (AISU), facility fees, commitment fees, upfront fees, and total fees. In general, we document a significant negative relationship between borrowers' environmental-management index and various fees (except for upfront fees). Taken as a whole, our findings documented in table 2, table 3, and table 4 lend strong support for our predication that, all else being equal, borrowing firms with good environmental-management practices have less expensive bank loans. Note that in the balance of this paper, all regression analyses are based on a PSM sample with inclusion of the inverse Mills ratio to address the double-selection issue.

[Insert Table 4 about here]

3.3 Testing Channeling Effects

In this section, we empirically investigate three possible underlying channels linking firm performance in environmental management to loan price, and we report our results in table 5. Specifically, we propose that borrowing firms with environment-friendly practices have lower income-stream volatility and cost of financial distress, and good environmental management can signal superior future valuation. In columns 1 and 2 of table 5, we define firm *Income stream*

volatility(Palmer and Wiseman, 1999) as the standard deviation of return on assets (ROA) over a three-year window from year *t*+1 to year *t*+3. We document that both *EM_index_pos* and *EM_index_net* have significantly negative coefficients, which reveals that engaging in environment-friendly practices can significantly stabilize firm income streams. In columns 3 and 4, we find that environmental-management indexes are significantly negatively correlated with firm leverageat year *t*+1. This evidence is consistent with the notion (Bae, et al., 2011) that firms reduce leverage to show their commitment to environment-friendly practices, which, in turn reduces their cost of financial distress due to lower likelihood of bankruptcy.

In columns 5 and 6 of table 5, we examine whether firms' engagement in environment-friendly practices contains private information about superior future valuation. The null hypothesis posits that, conditional on a firm's current valuation, an insignificant relationship exists between environmental-management indexes and the *ex post* future valuation of that firm. Accordingly, we model a firm's three-year-ahead valuation, calculated as Tobin's Q at year *t+3*, as a function of its current Tobin's Q and environmental-management indexes, along with other controls. If all public information including a firm's environmental-management performance is factored into the price-formation process, we expect that, given the firm's current Tobin's Q, the environmental-management indexes should have no explanatory power on the firm's future Tobin's Q unless they contain private information not incorporated in the current stock market. Our findings of significant and positive coefficients of environmental-management indexes thus reject the null hypothesis.

[Insert Table 5 about here]

3.4 Exploring Boundary Conditions

We take a contingency perspective to investigate possible boundary conditions of the negative relationship between environmental management and loan price. In particularly, we focus on two moderating variables, namely industry competition and environmental stringency, and report our results in table 6. In columns 1 and 2, we then interact the cdf measure of industry competition with environmental-management indexes. We report significantly positive coefficients for industry competition, which indicates that a competitive environment increases firm operational risk profiles. More important, the significantly negative coefficients of the interaction terms are in line with our expectation that, in a highly competitive environment, strategic and proactive investment in good environment-friendly practices becomes more valuable (Datta, et al., 2005), and other stakeholders such as banks recognize and factor the associated instrumental value into subsequent transactions.

In columns 3 and 4 of table 6, we examine environmental stringency as another contingent variable. As detailed in the data section, we measure environmental stringency as the cdf of the empirical distribution of the ratio of PACE over industry total shipments. We interact the cdf measure of environmental stringency with environmental-management indexes and include the interaction term in the regression analysis, along with the first-order effect of environmental stringency. The significantly negative coefficients of the interaction term reveal that better environmental management is associated with a larger decrease in loan price for firms in industries with higher levels of environmental stringency. For all models in table 6, the first-order effect of environmental management on loan price remains negative and significant.

[Insert Table 6 about here]

3.5 Environmental Management and Nonprice Terms

In addition to pricing borrowers' riskiness, lenders include various restrictive provisions (i.e., covenants) in debt contracts to mitigate the negative consequences of firm actions resulting from inherent conflicts between debtholders and shareholders. Loan contracts commonly deploy financial covenants, such as maintaining a minimum net worth, a minimum current ratio, a minimum interest coverage, or a maximum leverage ratio (Bradley and Roberts, 2015). Covenants have an *ex ante* role on constraining borrowers from taking opportunistic actions, and they allow lenders to intervene *ex post* through loan renegotiation or termination if the borrower violates any prespecified terms (Dichev and Skinner, 2002; Drucker and Puri, 2009).

Existing literature documents that, because of their voluntary nature, socially desirable activities such as environment-friendly practices can be a powerful commitment device to show that firms engaging in such activities are less likely to behave opportunistically (Godfrey, et al., 2009). With stakeholders recognizing such commitment (Mackey, et al., 2007), firms can enhance their social conditions and further work toward trust-based relationships with other important stakeholders. In this sense, better environmental management may generate moral capital that provides insurance-like protection to alleviate stakeholders' concerns significantly in unfavorable events (Minor and Morgan, 2011). We therefore predict that because of the reduced need for bank intervention and the reduced likelihood of opportunistic behavior, firms engaging in green management will have fewer financial covenants in their loan contracts.

In table 7, we report regression results relating the adoption of financial covenants in bank loan contracts to the performance of the borrowing firms'

environmental management. We use a Poisson regression to test our hypothesis because the dependent variable is a nonnegative count. We document significant and negative coefficients of environmental-management indexes in columns 1 and 2. Our findings reveal that banks do impose fewer restrictive financial provisions in loan contracts for borrowing firms engaging in environment-friendly practices.

[Insert Table 7 about here]

3.6 Postloan Performance of Borrowing Firms

We posit that firms engaging in better environmental management have lower risk and consequently experience lower loan costs and fewer covenants. If that is the case, then the ex-post loan performance should be consistent with our conjecture. In the section, we explore the ex-post loan performance of borrowing firms through different angles, and we report our results in table 8. In columns 1 and 2, we focus on the likelihood of covenant violations, and we find that borrowing firms with better environmental management are less likely to trigger covenant violations. In columns 3 and 4, we investigate the likelihood of default for borrowing firms, and we document that environmental-management indexes are negatively correlated with the likelihood of default. In columns 5 and 6, we examine the likelihood of filing bankruptcy for borrowing firms, and our results reveal a negative relationship between environmental management and bankruptcy likelihood. Overall, our evidence from ex-post loan performance indicates that, in line with ex-ante lender expectations, borrowing firms with better environmental-management practices indeed are less risky.

[Insert Table 8 about here]

4. Summary and Conclusion

In different contexts, existing literature confirms that a firm's nonshareholder stakeholder groups, such as creditors, customers, suppliers, employees, government and environment, can have a significant influence on firm operation and financing decisions and outcomes (Bae, et al., 2011; Banerjee, et al., 2008; Kale and Shahrur, 2007; Maksimovic and Titman, 1991). Nonetheless, most studies focus on the relation between shareholders and stakeholders. To advance stakeholder theory, we focus on two groups of nonshareholder stakeholders (i.e., banks and environment) to investigate the dynamic interactions among them and uncover how stakeholder management creates shareholder value via lower costs of debt.

We document strong evidence that borrowing firms engaging in environmental management have lower spreads and other fees in their loan contracts, and lending banks impose fewer restrictive financial provisions on them. Interestingly, relationship banks track borrowing firms' performance in environmental management and price loans accordingly. We also find that firms implementing environment-friendly practices have more stable income streams and lower leverage ratios. In addition, our results reveal that green management conveys information not completely incorporated into borrowing firms' current valuations. In addition, our evidence indicates that the negative relation between green management and loan costs is stronger for borrowing firms facing higher industry competition and stronger environmental stringency. Additionally, we find that, *ex post*, borrowers with higher environmental-management scores are less likely to violate covenants, default on loans, or file bankruptcy.

Our paper contributes to the literature and sheds further light on environmental management as well as sustainable growth in several important

ways. First, although empirical studies generally confirm that active and strategic stakeholder management adds shareholder value (Berman et al., 1999), the underlying mechanisms remain unclear (Bridoux and Stoelhorst, 2014). Our paper thus adds to the literature by presenting robust evidence that banks do respond to proactive environmental strategies and provide favorable price and nonprice terms in loan contracts. Second, we uncover the economic importance of stakeholder management as an intangible. In other words, how firms treat one group of stakeholder influences the perceptions of other nonshareholder stakeholders and affects subsequent transactions. Thus, the necessity of valuing such intangibles is not limited to shareholders (Edmans, 2011) but presents challenges and opportunities for other critical nonshareholder stakeholders. Managers often wonder whether and when it pays to be green, because "going green" incurs substantial costs for industrial firms. The identification of such circumstances is extremely valuable for firm managers in order to make informed decisions and ground their corporate environmental policies on economic fundamentals.

Third, our paper also provides strong policy implications for regulators and governments. To mobilize capital to address the environmental and climate challenges around the world, international organizations and governments strive to introduce policies to promote green and sustainable investments. For example, the G20 proposes various options to scale up green finance, and recommends that financial institutions should consider conducting environmental risk analysis including the credit risk arising from environmental risk exposures.[9] Some financial associations have proposed various policy changes including lowering capital requirement to encourage lending to and investment in green assets.[10] However, some are concerned that such policy proposals may not be fully

[9] http://www.g20-insights.org/policy_briefs/fostering-sustainable-global-growth-green-finance-role-g20/
[10] http://unepinquiry.org/g20greenfinancerepositoryeng/

consistent with the objective of financial regulation to maintain the stability and resilience of the banking system if investments in green projects are environmentally beneficial but financially risky. Our paper offers empirical evidence that may legitimize some of these proposed regulatory changes on a sound economic ground.

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Table 1. Summary statistics and pairwise correlation matrix

	Variable name	N	Mean	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	Loan spreads	5612	145.53	140.76	1.00														
2	Covenants	5612	1.34	1.81	0.49***	1.00													
3	Env_pos	5612	0.52	0.49	-0.09***	-0.10***	1.00												
4	Env_net	5612	0.62	0.58	-0.07***	-0.04***	0.60***	1.00											
5	Firm size	5612	8.92	1.17	-0.32***	-0.29***	0.22***	0.12***	1.00										
6	Profitability	5612	0.04	0.19	-0.21***	-0.18***	0.04***	0.03*	0.10***	1.00									
7	Book leverage	5612	0.33	0.21	0.36***	0.23***	-0.07***	0.01	-0.08***	-0.23***	1.00								
8	Z-score	5612	1.54	1.57	-0.28***	-0.13***	-0.02	0.00	0.00	0.19***	-0.34***	1.00							
9	Sales growth rate	5612	0.13	0.53	0.02	0.04**	-0.02	0.01	-0.02	-0.07***	0.03**	-0.03*	1.00						
10	Cash flow volatility	5612	0.02	0.03	0.22***	0.12***	-0.02	0.01	-0.20***	-0.25***	0.13***	-0.27***	0.00	1.00					
11	Managerial ability	5612	0.00	0.13	-0.01	0.00	-0.03***	0.01	-0.07***	0.23***	-0.05***	0.12***	0.11***	-0.05***	1.00				
12	Logged loan maturity	5612	3.57	0.78	0.21***	0.23***	-0.04***	-0.01	-0.19***	-0.02	0.13***	-0.04***	0.01	0.04***	0.03**	1.00			
13	Logged loan size	5612	6.21	1.22	-0.34***	-0.11***	0.14***	0.13***	0.51***	0.12***	-0.13***	0.07***	0.00	-0.11***	0.01	-0.03**	1.00		
14	Performance pricing	5612	0.45	0.50	-0.02	0.22***	-0.04***	0.01	-0.07***	0.02	-0.09***	-0.01	0.02	-0.03**	0.07***	0.14***	0.13***	1.00	
15	Relationship lending	5612	0.60	0.48	-0.14***	-0.05***	0.02	0.02	0.08***	0.05***	-0.04***	0.05***	0.02	-0.03**	0.00	-0.02	0.17***	0.02	1.00

* indicates p<0.10, two-tailed
** indicates p<0.05, two-tailed
*** indicates p<0.01, two-tailed

Table 2. Baseline regression relating environmental management to loan prices

Independent variables	Dependent variable: Loan spread (logged)					
	OLS		IV(2S)		PSM	
	(1)	(2)	(3)	(4)	(5)	(6)
Environmental-Management Index						
EM_index_pos	-0.031**		-0.123**		-0.097***	
	[-2.278]		[0.048]		[-3.321]	
EM_index_net		-0.028***		-0.129***		-0.060***
		[-3.156]		[0.014]		[-5.134]
Firm Characteristics						
Firm size	0.074***	0.067***	0.138***	0.108***	-0.057***	-0.068***
	[4.001]	[3.658]	[0.019]	[0.018]	[-2.636]	[-3.210]
Profitability	0.032	0.029	0.044**	0.045**	-0.675***	-0.653***
	[1.402]	[1.301]	[0.022]	[0.022]	[-7.080]	[-6.874]
Leverage	1.233***	1.229***	1.255***	1.241***	0.709***	0.721***
	[19.098]	[19.044]	[0.063]	[0.063]	[8.237]	[8.404]
Z-score	-0.039***	-0.039***	-0.024***	-0.024***	-0.045***	-0.046***
	[-5.290]	[-5.252]	[0.007]	[0.007]	[-4.112]	[-4.207]
Sales growth rate	-0.003	-0.002	-0.002	0.001	-0.055	-0.038
	[-0.262]	[-0.223]	[0.011]	[0.011]	[-0.979]	[-0.681]
Cash flow volatility	0.656***	0.641***	1.165***	1.167***	0.352	0.430
	[2.986]	[2.918]	[0.224]	[0.225]	[0.798]	[0.979]
Managerial ability	-0.174***	-0.171***	-0.245***	-0.234***	-0.059	-0.062
	[-2.665]	[-2.631]	[0.062]	[0.062]	[-0.447]	[-0.472]
Loan Characteristics						
Loan maturity	0.089***	0.088***	0.094***	0.091***	0.042*	0.041*
	[6.962]	[6.917]	[0.013]	[0.013]	[1.953]	[1.915]
Loan size	-0.116***	-0.116***	-0.127***	-0.126***	-0.161***	-0.158***
	[-13.811]	[-13.720]	[0.009]	[0.009]	[-10.511]	[-10.314]
Performance pricing	-0.058***	-0.058***	-0.066***	-0.062***	-0.028	-0.032
	[-3.603]	[-3.555]	[0.017]	[0.017]	[-0.904]	[-1.026]
Relationship lending	-0.019	-0.020	-0.022	-0.026	-0.019	-0.020
	[-1.251]	[-1.282]	[0.016]	[0.016]	[-0.636]	[-0.677]
Inverse mills ratio	1.603***	1.593***	1.821***	1.762***	0.202**	0.170*
	[12.095]	[12.025]	[0.130]	[0.131]	[2.091]	[1.767]
Constant	1.718***	1.769***	1.543***	1.867***	5.285***	5.201***
	[2.595]	[2.674]	[0.391]	[0.391]	[7.574]	[7.483]
Loan type fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Loan purpose fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Borrower rating fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Clustered standard errors	Firm	Firm	Firm	Firm	Firm	Firm
Observations	5,612	5,612	5,612	5,612	1,972	1,972
Adjusted(second-stage) R-squared	0.694	0.694	0.658	0.655	0.668	0.670
Durbin-Wu-Hausman (endogeneity test)			4.36 (p<0.05)	62.95 (p<0.01)		
Kleibergen-Paaprk LM statistic (underidentification test)			41.41 (p<0.01)	50.40 (p<0.01)		
First-stage coefficient of instrument			0.52 (p<0.01)	1.03 (p<0.01)		
Kleibergen-Paaprk Wald F statistic (Weak identification test)			79.31 (p<0.01)	374.98 (p<0.01)		

* indicates p<0.10, two-tailed
** indicates p<0.05, two-tailed
*** indicates p<0.01, two-tailed

Table 3. Do bank relationships matter?

Independent variables	Dependent variable: Loan spread (logged)			
	First-time loan		Relationship loan	
	(1)	(2)	(3)	(4)
Environmental-Management Index				
EM_index_pos	-0.142**		-0.074**	
	[-1.985]		[-2.062]	
EM_index_pos change	0.012		-0.099**	
	[0.119]		[-1.976]	
EM_index_net		-0.062***		-0.038**
		[-2.645]		[-2.311]
EM_index_net change		-0.007		-0.060*
		[-0.118]		[-1.836]
Firm Characteristics				
Firm size	-0.120***	-0.105***	-0.117***	-0.054*
	[-2.884]	[-3.129]	[-3.934]	[-1.754]
Profitability	-0.589**	-0.815***	-2.924***	-0.540***
	[-2.333]	[-4.007]	[-11.528]	[-4.606]
Leverage	0.239	0.512***	0.044	0.482***
	[1.253]	[3.853]	[0.291]	[3.638]
Z-score	-0.198***	-0.020	-0.248***	-0.278***
	[-4.062]	[-1.490]	[-7.744]	[-9.541]
Sales growth rate	-0.159*	-0.298***	0.070	-0.028
	[-1.666]	[-2.996]	[1.013]	[-0.393]
Cash flow volatility	3.324***	1.993*	-1.090*	-2.100***
	[2.787]	[1.889]	[-1.785]	[-3.533]
Managerial ability	0.221	-0.063	0.265	0.133
	[0.905]	[-0.281]	[1.437]	[0.697]
Loan Characteristics				
Loan maturity	0.031	0.073*	0.009	-0.020
	[0.889]	[1.888]	[0.342]	[-0.739]
Loan size	-0.123***	-0.189***	-0.103***	-0.143***
	[-5.417]	[-8.374]	[-4.744]	[-6.330]
Performance pricing	-0.077	-0.028	-0.000	0.015
	[-1.466]	[-0.524]	[-0.001]	[0.373]
Inverse Mills ratio	-0.090	-0.169	0.084	0.257*
	[-0.469]	[-1.142]	[0.606]	[1.800]
Constant	7.081***	5.738***	7.229***	5.827***
	[8.329]	[11.592]	[16.598]	[13.772]
Loan type fixed effects	Yes	Yes	Yes	Yes
Loan purpose fixed effects	Yes	Yes	Yes	Yes
Borrower rating fixed effects	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Clustered standard errors	Firm	Firm	Firm	Firm
Observations	840	840	1,132	1,132
Adjusted R-squared	0.759	0.605	0.688	0.601

* indicates p<0.10, two-tailed
** indicates p<0.05, two-tailed
*** indicates p<0.01, two-tailed

Table 4. Other fees in loan contracts

Independent variables	Dependent variables									
	Log(AISU)		Log(Facility fee)		Log(Commitment fee)		Log(Upfront fee)		Log(Total fees of borrowing)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Environmental-Management Index)										
Env_pos	-0.140***		-0.106***		-0.126**		-0.043		-0.095***	
	[-4.997]		[-3.936]		[-2.314]		[-0.273]		[-3.189]	
Env_net		-0.076***		-0.073***		-0.070***		0.017		-0.055***
		[-6.708]		[-6.829]		[-3.001]		[0.291]		[-4.689]
Firm Characteristics										
Firm size	-0.059**	-0.077***	-0.107***	-0.128***	-0.071*	-0.080**	-0.177*	-0.186**	-0.032	-0.043**
	[-2.523]	[-3.329]	[-4.075]	[-4.966]	[-1.792]	[-2.091]	[-1.854]	[-1.988]	[-1.492]	[-2.029]
Profitability	-0.694***	-0.649***	-1.239***	-1.018***	-0.412***	-0.412***	-0.621	-0.625	-0.646***	-0.626***
	[-6.281]	[-5.916]	[-6.108]	[-5.104]	[-2.903]	[-2.915]	[-1.172]	[-1.178]	[-6.943]	[-6.745]
Leverage	0.958***	0.979***	0.599***	0.585***	0.647***	0.668***	0.487	0.485	0.755***	0.769***
	[9.656]	[9.940]	[4.135]	[4.115]	[4.347]	[4.493]	[1.192]	[1.188]	[8.866]	[9.052]
Z-score	-0.036***	-0.035***	-0.178***	-0.189***	-0.020	-0.020	-0.255**	-0.256**	-0.036***	-0.037***
	[-3.545]	[-3.549]	[-6.648]	[-7.140]	[-1.628]	[-1.637]	[-2.360]	[-2.363]	[-3.381]	[-3.463]
Sale growth rate	-0.029	-0.007	0.017	0.039	-0.065	-0.051	-0.419***	-0.426***	-0.036	-0.020
	[-0.470]	[-0.109]	[0.216]	[0.506]	[-0.701]	[-0.554]	[-2.621]	[-2.635]	[-0.647]	[-0.357]
Cash flow volatility	1.649***	1.798***	1.062	1.460	1.032	1.073	2.281	2.350	0.058	0.122
	[2.581]	[2.834]	[1.016]	[1.418]	[1.235]	[1.290]	[0.646]	[0.668]	[0.135]	[0.284]
Managerial ability	-0.220	-0.233*	0.056	0.002	-0.354	-0.325	0.515	0.497	-0.079	-0.084
	[-1.576]	[-1.685]	[0.399]	[0.014]	[-1.434]	[-1.323]	[0.794]	[0.761]	[-0.593]	[-0.637]
Loan Characteristics										
Log(Loan maturity)	0.184***	0.183***	0.117***	0.113***	0.265***	0.269***	0.214**	0.213**	0.084***	0.083***
	[8.169]	[8.172]	[5.764]	[5.633]	[5.559]	[5.669]	[2.085]	[2.076]	[3.710]	[3.677]
Log(Loan size)	-0.143***	-0.138***	-0.123***	-0.115***	-0.087***	-0.081***	0.036	0.036	-0.161***	-0.158***
	[-7.869]	[-7.625]	[-5.473]	[-5.210]	[-3.063]	[-2.835]	[0.616]	[0.627]	[-10.287]	[-10.085]
Performance pricing	0.076**	0.076**	0.114***	0.112***	-0.023	-0.023	0.093	0.086	0.028	0.026
	[2.350]	[2.385]	[3.592]	[3.600]	[-0.374]	[-0.375]	[0.709]	[0.661]	[0.915]	[0.837]
Relationship lending	0.032	0.030	0.025	0.020	0.080	0.077	-0.002	0.005	0.002	0.001
	[1.000]	[0.948]	[0.788]	[0.655]	[1.440]	[1.381]	[-0.018]	[0.043]	[0.058]	[0.019]
Inverse mills ratio	0.347***	0.319***	-0.069	-0.100	0.169	0.184	-0.073	-0.076	0.317***	0.291***
	[3.270]	[3.034]	[-0.618]	[-0.911]	[0.881]	[0.960]	[-0.188]	[-0.194]	[3.284]	[3.020]
Constant	2.859***	2.965***	6.604***	6.750***	1.854**	1.668*	4.259**	4.359**	4.789***	4.726***
	[6.839]	[7.161]	[10.800]	[11.255]	[2.033]	[1.826]	[2.408]	[2.459]	[6.954]	[6.883]
Observations	1,363	1,363	913	913	522	522	302	302	1,972	1,972
Adjusted R-squared	0.652	0.657	0.550	0.565	0.546	0.550	0.448	0.448	0.730	0.731

* indicates p<0.10, two-tailed
** indicates p<0.05, two-tailed
*** indicates p<0.01, two-tailed

Table 5. Testing channeling effects

Independent variables	Dependent variables					
	Income stream volatility	Income stream volatility	Leverage	Leverage	Tobin's Q (t+3)	Tobin's Q (t+3)
	(1)	(2)	(3)	(4)	(5)	(6)
Environmental-Management Index						
EM_index_pos	-0.224**		-0.017***		0.119***	
	[0.110]		[0.006]		[0.036]	
EM_index_net		-0.170***		-0.012***		0.071***
		[0.051]		[0.002]		[0.016]
Firm Characteristics						
Tobin's Q (t)					0.659***	0.643***
					[0.022]	[0.022]
Firm size	-0.196**	-0.283***	-0.065***	-0.031***	-0.084*	-0.074*
	[0.078]	[0.076]	[0.006]	[0.004]	[0.044]	[0.043]
Profitability	-0.069	-0.150	-0.192***	-0.424***	-0.293	-0.357*
	[0.369]	[0.361]	[0.019]	[0.032]	[0.192]	[0.191]
Leverage	0.463	-0.591*			-0.052	-0.048
	[0.326]	[0.331]			[0.147]	[0.146]
Z-score	-0.037	-0.010	-0.030***	-0.025***	0.040	0.050
	[0.042]	[0.042]	[0.002]	[0.002]	[0.036]	[0.035]
Sales growth rate	0.229	0.260	0.013	0.037***	0.135*	0.112
	[0.213]	[0.208]	[0.011]	[0.011]	[0.075]	[0.075]
Cash flow volatility	-0.895	-1.207	-0.286***	-0.564***	-0.536	-0.444
	[1.691]	[1.646]	[0.089]	[0.148]	[1.047]	[1.044]
Managerial ability	-2.006***	-2.651***	-0.040	-0.053**	-0.079	-0.106
	[0.545]	[0.545]	[0.028]	[0.027]	[0.175]	[0.175]
Inverse Mills ratio	0.435	0.320	0.405***	-0.212***	0.246	0.283
	[0.419]	[0.407]	[0.039]	[0.020]	[0.299]	[0.299]
Constant	0.401	1.663	0.568***	0.755***	0.679**	0.687**
	[1.217]	[1.192]	[0.043]	[0.055]	[0.326]	[0.324]
Borrower rating	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Clustered standard errors	Firm	Firm	Firm	Firm	Firm	Firm
Observations	1,972	1,972	1,972	1,972	1,321	1,321
Adjusted R-squared	0.304	0.354	0.383	0.378	0.610	0.613

* indicates p<0.10, two-tailed
** indicates p<0.05, two-tailed
*** indicates p<0.01, two-tailed

Table 6. Exploring two contingences: Industry competition and environmental dependence

Independent variable	Dependent variable: Loan spread (logged)			
	(1)	(2)	(3)	(4)
Environmental-Management Index				
EM_index_pos	-0.108***		-0.078**	
	[-3.665]		[-1.981]	
EM_index_net		-0.038***		-0.048**
		[-2.747]		[-2.095]
Industry competition (cdf)	0.101***	0.042		
	[3.027]	[1.090]		
EM_index × Industry competition (cdf)	-0.123**	-0.061**		
	[-2.260]	[-2.475]		
Environmental stringency (cdf)			0.240***	0.329***
			[5.264]	[3.872]
EM_index ×Environmental stringency (cdf)			-0.152**	-0.056*
			[-2.207]	[-1.781]
Firm Characteristics				
Firm size	-0.060***	-0.081***	0.029	-0.027
	[-2.773]	[-3.792]	[0.922]	[-0.857]
Profitability	-0.674***	-0.601***	-1.814***	-1.803***
	[-7.087]	[-6.412]	[-7.687]	[-7.444]
Leverage	0.727***	0.824***	0.909***	0.962***
	[8.374]	[9.354]	[7.617]	[7.888]
Z-score	-0.047***	-0.042***	-0.016	-0.014
	[-4.237]	[-3.936]	[-1.428]	[-1.221]
Sales growth rate	-0.071	-0.041	0.093	0.101
	[-1.246]	[-0.738]	[1.077]	[1.178]
Cash flow volatility	0.231	0.155	-0.524	-0.554
	[0.524]	[0.356]	[-0.835]	[-0.890]
Managerial ability	-0.091	0.077	-0.033	0.242
	[-0.685]	[0.559]	[-0.199]	[1.375]
Loan Characteristics				
Loan maturity	0.043**	0.045**	0.050*	0.051*
	[1.971]	[2.119]	[1.762]	[1.847]
Loan size	-0.162***	-0.150***	-0.133***	-0.118***
	[-10.609]	[-9.960]	[-6.601]	[-5.857]
Performance pricing	-0.029	-0.049	0.014	-0.012
	[-0.952]	[-1.612]	[0.346]	[-0.297]
Relationship lending	-0.014	-0.018	-0.047	-0.047
	[-0.449]	[-0.621]	[-1.229]	[-1.241]
Inverse Mills ratio	0.187*	0.230**	0.889***	0.884***
	[1.941]	[2.414]	[4.883]	[4.932]
Constant	5.235***	5.936***	2.479***	4.376***
	[7.517]	[8.375]	[3.147]	[5.680]
Loan type fixed effects	Yes	Yes	Yes	Yes
Loan purpose fixed effects	Yes	Yes	Yes	Yes
Borrower rating fixed effects	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Clustered standard errors	Firm	Firm	Firm	Firm
Observations	1,972	1,972	1,146	1,146
Adjusted R-squared	0.669	0.689	0.704	0.716

* indicates p<0.10, two-tailed
** indicates p<0.05, two-tailed
*** indicates p<0.01, two-tailed

Table 7. Environmental megamenu and nonprice loan term

Independent variables	Dependent variable: financial covenants	
	(1)	(2)
Environmental-Management Index		
EM_index_pos	-0.115**	
	[-2.089]	
EM_index_net		-0.043**
		[-2.250]
Firm Characteristics		
Firm size	-0.295***	-0.287***
	[-10.234]	[-10.317]
Profitability	-0.461***	-0.511***
	[-6.215]	[-6.973]
Leverage	0.266***	0.391***
	[3.045]	[4.556]
Z-score	-0.040***	-0.034***
	[-4.563]	[-4.532]
Sales growth rate	-0.470***	-0.440***
	[-5.594]	[-5.173]
Cash flow volatility	-0.619	-0.548
	[-1.366]	[-1.196]
Managerial ability	-0.018	0.076
	[-0.099]	[0.393]
Loan Characteristics		
Loan maturity	0.103***	0.100***
	[2.990]	[2.920]
Loan size	0.052**	0.046**
	[2.557]	[2.275]
Performance pricing	0.524***	0.545***
	[12.350]	[12.846]
Relationship lending	-0.077*	-0.076*
	[-1.874]	[-1.856]
Inverse Mills ratio	-0.473***	-0.420***
	[-4.128]	[-3.466]
Constant	2.270***	2.204***
	[5.411]	[5.915]
Loan type fixed effects	Yes	Yes
Loan purpose fixed effects	Yes	Yes
Borrower rating fixed effects	Yes	Yes
Industry fixed effects	Yes	Yes
Year fixed effects	Yes	Yes
Clustered standard errors	Firm	Firm
Observations	1,972	1,972
Pseudo R-squared	0.267	0.270

* indicates p<0.10, two-tailed
** indicates p<0.05, two-tailed
*** indicates p<0.01, two-tailed

Table 8. Postloan performance of borrowing firms

Independent variables	Dependent variables					
	Covenant violation		Default likelihood		Bankruptcy likelihood	
	(1)	(2)	(3)	(4)	(5)	(6)
Environmental-Management Index						
Env_pos	-0.294***		-1.206**		-1.507***	
	[-4.381]		[-2.395]		[-2.758]	
Env_net		-0.085***		-0.347***		-0.246***
		[-2.817]		[-3.474]		[-3.108]
Firm Characteristics						
Firm size	-0.035	-0.082	0.387*	0.272	0.463**	0.121
	[-0.586]	[-1.387]	[1.729]	[1.218]	[2.420]	[0.804]
Profitability	-0.700**	-0.584*	0.260	0.403	0.005	0.325
	[-2.086]	[-1.876]	[0.493]	[0.735]	[0.009]	[0.345]
Leverage	0.632**	0.642**	-0.002	0.130	0.461	0.083
	[2.492]	[2.531]	[-0.003]	[0.188]	[0.670]	[0.148]
Z-score	-0.051	-0.061	0.166	0.238	0.306	-0.131
	[-0.861]	[-1.029]	[0.944]	[1.404]	[1.631]	[-0.885]
Sale growth rate	0.268*	0.283**	-1.412**	-1.503**	-0.008	-0.158
	[1.902]	[2.015]	[-2.511]	[-2.422]	[-0.021]	[-0.638]
Cash flow volatility	-3.066***	-3.065***	-11.378**	-10.001*	-21.473***	-16.739***
	[-2.900]	[-2.886]	[-1.970]	[-1.684]	[-3.212]	[-3.106]
Managerial ability	-0.484	-0.505	1.783	1.616	0.496	0.010
	[-1.439]	[-1.507]	[1.555]	[1.366]	[0.450]	[0.010]
Loan Characteristics						
Log(Loan maturity)	0.288***	0.286***	1.476***	1.519***	0.727***	0.987***
	[5.613]	[5.604]	[3.687]	[3.671]	[2.855]	[4.564]
Log(Loan size)	-0.054	-0.054	0.149	0.145	0.089	0.090
	[-1.431]	[-1.454]	[1.453]	[1.345]	[0.868]	[1.033]
Performance pricing	0.037	0.042	0.238	0.266	0.280	-0.049
	[0.482]	[0.541]	[1.012]	[1.067]	[1.207]	[-0.269]
Relationship lending	0.148**	0.144*	-0.342	-0.385*	0.248	0.111
	[2.011]	[1.952]	[-1.624]	[-1.748]	[1.142]	[0.608]
Inverse mills ratio	-0.815***	-0.889***	-0.424	-0.700	-2.772***	-2.760***
	[-2.599]	[-2.829]	[-0.344]	[-0.574]	[-4.438]	[-5.006]
Constant	1.670*	2.146**	-18.364***	-17.833***	-16.351***	-9.528***
	[1.789]	[2.320]	[-4.655]	[-4.422]	[-5.881]	[-4.537]
Loan type fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Loan purpose fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Borrower rating fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Clustered standard errors	Firm	Firm	Firm	Firm	Firm	Firm
Observations	1,746	1,746	1,334	1,334	1,358	1,358
Pseudo R-squared	0.135	0.129	0.52	0.533	0.585	0.50

* indicates p<0.10, two-tailed
** indicates p<0.05, two-tailed
*** indicates p<0.01, two-tailed