Does it Pay to Be Green? The Impact of Equator Principles on Project Loans

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Abstract

Borrowers can signal ex post ESG-related risk by approaching banks that adopt Equator Principles, requiring them to monitor their projects' environmental and social impacts. We investigate the effects of using "green banks" on corporate borrower loan spreads. Using detailed international loan data and addressing potential biases due to endogeneity, we find that borrowers dealing with prestigious "green banks" benefit from lower loan spreads. We provide empirical evidence for a certification mechanism to explain the effect. Therefore yes, it pays to be green but only when dealing with prestigious "green banks". Moreover, borrowers dealing with "green banks" benefit from participation of investment and commercial banks, and the support of Multilateral Development Banks. Counterfactual analysis shows that regulatory changes that would increase the likelihood of dealing with green banks would not lower loan spreads for firms that would only borrow from them as a result of the new regulation.

Keywords: Environmental and social risk, socially responsible investment, Equator principles, cost of debt, project finance

JEL codes: G20; G30; M14; K32

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1 Introduction

The demand for socially responsible investments (SRI) is on a strong upward trend (Chowdhry et al., 2019).[1] Indeed, *large-scale* investment projects are under particular scrutiny, as they have a highly visible physical footprint (Esty, 2004). The ESG burden is often placed on banks because they are perceived, due to their lending activities, as facilitators of environmental and social damages (Sarokin and Schulkin, 1991; Smith, 1993). Yet no bank wishes to be associated with destroying rainforests, employing child labor, or contaminating groundwater. In response to this perception problem, increasingly many financial institutions (henceforth, "banks"[2]) have voluntarily adopted the *Equator Principles (EPs)*. The number of such "green banks" has increased more than tenfold since 2003 (Lazarus, 2012).[3] EPs provide adherents with guidelines to assess the ESG impacts of capital investment projects valued at more than US$10M.[4] Banks that adopt these principles pledge only to fund large projects that meet specific environmental and social standards.

To finance their project using such bank loans, firms must show that their project will satisfy EPs. Thus, lenders require staff with the expertise to assess, manage, and monitor the ESG risks associated with the projects they are financing. This implies that to implement EPs is *prima facie* costly for lenders and borrowers, and in fact Andonov et al. (2021) find that ESG preferences help explain why large-scale infrastructure investments underperform. Since it is costly to implement ESG restrictions, corporate borrowers must see benefits to approaching financial institutions that adopt EPs (henceforth, EPFIs). One reason suggested by research is that the firm can credibly signal its environmental commitments to capital markets (Flammer, 2013, 2021; Klassen and McLaughlin,

[1] With public pressure to ensure that corporate projects are eco-friendly (Capital Partners, 2019; Uzsoki, 2020), it is no surprise that a record amount of capital was raised in 2020 for ESG bonds ($490 Bn) and equity funds ($347 Bn), while more growth is expected in 2021. Bloomberg, 10 Feb. 2021, "The Boom in ESG Shows No Signs of Slowing" by Tim Quinson. https://www.bloomberg.com/news/articles/2021-02-10/the-490-billion-boom-in-esg-shows-no-signs-of-slowing-green-insight. Environmental and social governance (ESG) research in finance often concerns SRI investments (Camilleri, 2017; Inderst et al., 2012), leaving other topics under-studied, such as the role of financial institutions to enable "green finance"

[2] For simplicity, we refer to "banks", but this includes other types of depository institutions, e.g., credit unions.

[3] See also the Equator Principles website, at https://equator-principles.com/about/.

[4] This specific figure defines at what point a project is "large". This choice is explained by a concession made to smaller local or regional banks so as not to deter them from adopting EPs. Indeed, smaller banks or credit unions may not have the same resources as larger ones to implement EPs. The financial threshold of US$10M or greater applies to most project finance deals (Watchman et al., 2007). In our sample, all but two projects are "large".

1996; Krueger et al., 2021). If true, one would expect to see (i) a significant improvement in the project's (or firm's) environmental performance (e.g., lower CO_2 emissions), and (ii) a positive impact on the firm's stock returns following EPFI loan announcements. Second, firms may try to mislead capital markets through "greenwashing" (Flammer, 2021), in which case we would expect to see no improvement in ESG performance. Unfortunately, these two hypotheses cannot be directly tested, as there is (to our knowledge) no data set documenting the ESG performance of large-scale investment projects.

Third, firms may parlay ESG commitments into favorable credit agreements (i.e., lower loan spreads), as the ESG-related covenants may inform other market participants about the bank's expectations concerning the ex post ESG performance of the firm. By implementing EPs, firms (borrowers) accept stricter covenants linked to social and environmental risks (ESG-related covenants). Indeed, banks may discontinue financing the project if at any time they are not met.[5] Since the violation of ESG-related covenants is impactful for firms[6], we argue that firms with high ESG risk (who choose to be subject of EPs) will also improve their covenant variables (Chava and Roberts, 2008; Demiroglu and James, 2010). The use of stricter ESG-related covenants should thus convey to capital markets credible information about the equityholders' willingness to work hard to improve the project' environmental profile. Stricter covenants make it also easier for MLAs to monitor, and thus certify, ESG-related risks. Theoretical models predict and empirical evidence show that borrowers use stricter covenants to convey credible private information concerning their future outcomes (Demiroglu and James, 2010; Gârleanu and Zwiebel, 2009). Thus, Equator Principles and stricter ESG-related covenants help arrangers reassure markets about the borrower' ex post ESG risks, thereby helping firms to reduce their loan's default risk and lower loan spreads.[7] Detailed data exist allowing us to test this third hypothesis. This issue also relates to the Porter hypothesis,

[5] Banks commit to monitor the project and its risks, and to discontinue financing the project if at any time standards are not met. This can be implemented through covenants linked to social and environmental risks (ESG-related covenants), such that the project sponsors would need to pay back the debt faster if a covenant were triggered.

[6] Chava and Roberts (2008) show that the violation of covenants is costly, as it decreases firms' capital investment.

[7] It is not likely that firms electing to be subject to greater EP-related scrutiny are a self-selected sample with knowledge that their projects will not violate the ESG-related loan covenants. Although the model in Gârleanu and Zwiebel (2009) predicts that only "good" borrowers will accept stricter covenants, empirical evidence in Demiroglu and James (2010) shows that they are also used by riskier firms. Unfortunately, conclusive evidence is hard to obtain as such a dataset is not available to our knowledge.

according to which firms may be stimulated by environmental regulation (e.g., via adoption of green technology) (Porter and Van der Linde, 1995).[8]

Our paper has two objectives: First, we fill a research gap concerning the impact of EPs on corporate borrowers. We provide a direct empirical test of the selection effect of using EPFIs ("green banks") on the characteristics of the loans used to finance these projects, allowing us to assess economic tradeoffs to borrowers. Our arguments that adopting EPs can lower loan spreads relies on selection effect (as opposed to a treatment effect). Therefore, our empirical test is intended to identify a selection effect. So far the literature's focus has been on banks rather than borrowers; e.g., what variables motivate them to adopt EPs, or the effect of EPs on bank characteristics.[9]

As the borrower's decision to work with EPFIs is likely to be endogenous, we use the *Heckman selection model (HSM)*. This framework allows us to deal more adequately with potential endogeneity linked to self-selection bias (selection on levels). Estimating the HSM requires a valid instrument. That is, this variable should affect directly the decision to approach (top-20) EPFIs, but its should not affect *directly* the financing outcomes (e.g. loan spreads). We use the *Number of MLAs* variable as our exclusion restriction (instrument). We argue that the likelihood to have (top-20) EPFIs in a deal increases as the number of MLAs grows. This is intuitive because there is a limited number of banks with expertise in syndicating large-scale project loans. Additionally, the existing literature shows that the number of MLAs in a deal is uncorrelated with loan pricing (Carey and Nini, 2007; Demiroglu and James, 2010; Esty and Megginson, 2003).

Second, we provide a counterfactual analysis of working with green banks. Suppose that a change in banking regulation increases the probability that the deal is funded by EPFIs. How would this affect loan spreads for project sponsors that would not otherwise deal with EPFIs? The *Marginal Policy Relevant Treatment Effect* (MPRTE) framework (Carneiro et al., 2010) is well suited for our research question. It was developed to identify causal effects in policy evaluation, while traditional models only help us to estimate the causal effects of policies or regulations that are already in place.[10]

[8] Theory suggests that private benefits to firms may be explained by a decrease in agency costs (Ambec and Barla, 2002).

[9] We do not investigate, however, how using EPs affects the environmental performance (e.g., CO_2 emissions) of large scale projects once loans are obtained.

[10] The MPRTE model has quickly gained acceptance in applied microeconomics (e.g. Carneiro et al., 2011), but is still fairly new to finance.

We generate our main research hypothesis, *Cost-saving*, in section 2.2. To empirically test this hypothesis, we build a rich database covering the details of 5,031 loans in the project finance (PF) market over the period 2001-2015. These loans are provided to fund diverse large-scale investment projects worldwide. To summarize our main results, we find that the evidence supports the *Cost-saving* hypothesis when firms involve prestigious (top-20) EPFIs. Indeed, firms pay lower loan spreads when dealing with top-20 EPFIs and as a result, firms and consortiums that lead large-scale investment projects capture some of the economic benefits (lower loan spreads) linked to prestigious arrangers adhering to EPs. As our methodology specifically addresses endogeneity, we argue that the positive effects to borrowers are due to EPs. Our empirical design rules out that the benefits could be driven by other, non-EP characteristics of top-20 EPFIs that differentiate them from other lenders. We argue that our results are consistent with covenant-based explanations (signaling arguments). Thus, by dealing with prestigious EPFIs, firms credibly signal their commitment toward the environment. This result suggest that the ESG-related covenants are credible signaling devices, since prestigious arrangers (top-20 EPFIs) are especially trusted certifying agents.[11] Indeed, they will ensure that ex post ESG performance will be revealed to capital markets. Furthermore, we find that dealing with (top-20) EPFIs helps attract multilateral development banks (MDBs, such as the World Bank Group) to lender syndicates. Their participation helps mitigate political risk in projects (e.g., expropriation).[12] Moreover, sponsors dealing with (prestigious) EPFIs benefit from the participation of investment and commercial banks, making it easier to gather the required capital. Therefore, yes, it pays to be green.

We also provide counterfactual policy implications using our MPRTE results. A hypothetical regulatory change that would increase the sponsor firm's probability of dealing with an (top-20) EPFIs would not affect the project's cost of debt. Overall, it seems that fostering "green finance" may not be beneficial to borrowers (at least in terms of loan spreads). For those firms that would only deal with (top-20) EPFIs as a result of the new policy, there are two offsetting effects. First, spreads are lower according to the signaling arguments. Second, spreads are higher due to the

[11] The existing literature show that prestigious arrangers are especially trusted certifying agents (Gatti et al., 2013).

[12] Indeed, Hainz and Kleimeier (2012) show that the participation of multilateral development banks helps to mitigate political risk, as they have strong bargaining power.

implementation costs of EPs (e.g., due diligence and monitoring costs to manage ESG risks). While theory does not provide a clear prediction for the combined effect, our empirical results suggest they cancel out. Lastly, we find that the borrower's likelihood of dealing with (top-20) EPFIs increases in project construction risk, during financial crisis periods, and with the number of MLAs, and also decreases with the host country's openness to Corporate Social Responsibility (CSR).

To summarize, first, we contribute to the emerging literature on the impact of climate risks on firm financing outcomes. This literature shows that firms with poor environmental profiles that operate under stricter environmental regulations face higher interest rates in syndicated loans (Antoniou et al., 2020; Chava, 2014; Delis et al., 2021), pay higher yields on corporate bonds and receive lower credit ratings (Seltzer et al., 2021), face shorter loan maturities, higher interest rates, and a greater participation of shadow banks in their lending syndicates (Ivanov et al., 2021), and receive subsequently less bank credit (Kacperczyk and Peydro, 2021). This literature focuses on how loans to "dirty" firms are priced. We contribute by showing that the certification role of EPFIs has economic value. Moreover, we show that policy reforms that would increase the probability of borrowers to agree to stricter ESG-related covenants would not benefit (in terms of loan spreads) borrowers that would only accept these covenants as a result of the new regulation. Second, we contribute to the literature on covenants in corporate loans[13]. This line of research focuses on financial covenants based on firm net worth, working capital, leverage, interest coverage, and cash flow. Our paper is the first (to our knowledge) to provide empirical evidence showing that accepting stricter ESG-related covenants will help borrowers. As such, we contribute to this literature by showing that firms would be willing to agree to more stringent ESG covenants as it could lower loan spreads. Third, we contribute to the literature analyzing the motivation of financial institutions to adopt Equator Principles[14]. To our knowledge, our paper is the first to study the economic benefits to borrowers from dealing with EPFIs. The paper also contributes to research on pricing project finance loans. Previous work shows that institutional quality, lead arranger reputation and nonfinancial contracts affect

[13]This literature includes Bradley and Roberts (see e.g., 2015); Chava and Roberts (see e.g., 2008); Demiroglu and James (see e.g., 2010); Smith (see e.g., 1993); Smith and Warner (see e.g., 1997)

[14]This literature includes Chen et al. (e.g. 2018); Chih et al. (e.g. 2010); Conley and Williams (e.g. 2011); Cowton and Thompson (e.g. 2000); Jeucken (e.g. 2001); Missimer (e.g. 1996); Scholtens and Dam (e.g. 2007); Wright and Rwabizambuga (e.g. 2006)

the financing outcomes[15]. We contribute by showing that borrowers' ESG commitments (shown by means of stricter ESG covenants) help explain loan spreads.

2 Related literature, research hypotheses and empirical predictions

2.1 Related literature

Equator Principles can be seen as a credit risk management framework that is voluntarily adopted by financial institutions. These principles help identify, assess and manage environmental and social risk in project finance deals[16] when capital costs are over US $10M (Gatti, 2018, p.76). Financial institutions that adopt EPs must follow specific rules concerning environmental and social risks in the projects they finance. Equator Principles aim to give incentives to financial institutions to prioritize investment projects that make a positive contribution to the environment and to society.

A large literature in law, economics and finance has examined the motivation of financial institutions to adopt Equator Principles. Research[17] finds that financial institutions adopt EPs to address their reputational risks and to signal the market that they are eco-friendly and socially responsible.[18] They also use EPs to help manage financial risks associated to environmental and social issues (Conley and Williams, 2011; Jeucken, 2001).[19] Another strand of the literature studies the

[15]Some significant papers include Corielli et al. (e.g. 2010); Esty (e.g. 2003); Hainz and Kleimeier (e.g. 2012); Gatti et al. (e.g. 2013); Girardone and Snaith (e.g. 2011); Subramanian and Tung (e.g. 2016)

[16]The term 'Project finance' has a precise meaning and does not imply the financing of any project. It involves raising funds to finance a single, indivisible capital investment (Shah and Thakor, 1987), and involves creating an off-balance sheet entity (e.g., a Special Purpose Company) to hold the project's assets and liabilities. Thus, the project debt is typically nonrecourse (or limited recourse). Project finance has been used in particular to finance large-scale projects in various economic sectors, both productive and social (e.g., energy, oil & gas, telecom, mining, hospitals, schools, government buildings, prisons). Since the project debt is usually off-balance sheet, lenders are repaid from the project's cash flows. What remains after covering debt service and project expenses can be paid to the sponsor firms as dividends. The equity returns to sponsors are highly levered, as project finance deals often involve over 80% debt financing. This figure is considerably greater than proportion of debt in the typical corporate capital structure.

[17]Closely related research includes Chen et al. (2018); Chih et al. (2010); Conley and Williams (2011); Cowton and Thompson (2000); Missimer (1996); Scholtens and Dam (2007); Wright and Rwabizambuga (2006)

[18]If financial institutions are perceived as not being environmentally and socially responsible, they could suffer from reputational risk. This risk can take the form of negative media coverage (Case, 1999; Cowton and Thompson, 2000), or the loss of clients, talented employees and market share (Jeucken, 2001). Reputational risk is also linked to NGO activism (Conley and Williams, 2011). This is because project finance deals are attractive targets for NGOs, since they are large and highly visible (e.g., dams, power plants or airports).

[19]EPs give financial institutions a framework which helps them to assess accurately environmental and social risks in the projects they finance (Wright, 2007). For example, regulations or costs associated with environmental issues can affect the borrower's ability to repay the loans (Jeucken, 2001). Such risks can include lawsuits, the loss of permits or licenses, compensation payments, production delays, loss of firm value (through share prices falling), the inability to repay loans, and business failure.

impact of adopting EPs on the financial outcomes of financial institutions. Gatti (2018, p.78) argues that adopting EPs increases the market share of financial institutions as well as the likelihood of financing a project finance deal. Chen et al. (2018) show that EPFIs are more liquid than are non-EPFIs, and that bank regulation accentuates the positive effects of EPFIs for banks. Related to our study, Goss and Roberts (2011) study the impact of the borrower's CSR ranking on the cost of bank loans. In contrast to this literature, this paper is the first (to our knowledge) to study the economic benefits to borrowers (i.e., firms that sponsor large-scale investment projects) from dealing with EPFIs rather than non-EPFIs. Our paper therefore documents indirect benefits from financial institutions adopting Equator Principles.

2.2 Cost-saving hypothesis and empirical predictions

This hypothesis predicts that EPFIs charge lower loan spreads than do non-EPFIs. This effect is compounded when the financial institution is prestigious (e.g., a bulge-bracket bank), given the certification effect documented by Gatti et al. (2013). Motivation for this prediction comes from the literature's findings on covenants, on Equator Principles and risk, and cross-monitoring and certification (signaling) theories. By helping to manage certain types of risk, EPs lower spreads. Indeed, EPFIs commit to measure and monitor environmental and social risks in the projects they finance. To this end, they hire an EP manager as well as qualified staff, who ensure that relevant, adverse private information regarding environmental and social risks is revealed before and after the loan is syndicated. Although it is costly to implement EPs, cross-monitoring theory predicts that the spread charged by the lender will be lower if the project is monitored by outside capital markets (Booth, 1992; Fama and Jensen, 1983). In our setting of large-scale projects, several groups perform monitoring: local environmental agencies, public authorities, NGOs and the media. Furthermore, EPFIs can attract deposits at a lower cost, since depositors have a preference for banks perceived as socially and environmentally responsible. Moreover, EPFIs benefit from economies of scope as they can fund a greater number and variety of deals. Loan covenant theory (signaling arguments) suggests that spreads will be lower if loan covenants are stricter. Thus, by accepting stricter ESG-related covenants, borrowers convey credible private information concerning their future ESG performance. This help them to lower their loan default risk, leading to lower loan spreads (Chava and Roberts,

2008; Demiroglu and James, 2010; Gârleanu and Zwiebel, 2009). Overall, the net effect of being a (prestigious) EPFI is to lower spreads.

3 Econometric approach

3.1 Overview of the empirical approach

We follow the prior literature on syndicated loan markets[20] and model the loan spread as:

$$S_{ij} = X_{ij}^{'}\beta + \gamma \times D_{ij} + \alpha \times (\text{top-20})\text{EPFIs}_{ij} + \epsilon_{ij} \tag{1}$$

where S_i is the loan spread for deal i (in basis points) funding the project j, X_{ij} is a vector of exogenous control variables identified by the literature as contributing to explain loan spreads[21], β represents coefficients for control variables for deal i funding the project j, D is a continuous variable representing the debt-to-equity ratio of the project j related to deal i, γ the coefficient capturing the effect of project leverage on the loan spreads, $(top-20)EPFIs_{ij}$ is a dummy endogenous variable that takes the value of one if at least one (top-20) MLA in the loan syndicate has adopted the Equator Principles, α is the coefficient capturing the effect of the use of (top-20) EPFIs on the loan spreads for deal i funding the project j and ϵ_{ij} the error term for deal i funding the project j.

Our main objective is to determine the causal effect, if any, of the presence of (top-20) EPFIs on the loan spreads. OLS regression estimates may be inconsistent because using (top-20) EFPIs is not exogenously determined. In the early stages of the project, the sponsors decide, on the basis of observable and unobservable sponsor and project-specific characteristics, whether to approach a bank syndicate led by (top-20) EPFIs or not (among other concerns). The endogenous determination of working with (top-20) EPFIs is a problem of possibly omitted variables (i.e., sponsors' unobservable private information). (Top-20) EPFIs may be used by sponsors of *ex ante* safer (or riskier) projects, which would bias the OLS estimates. This problem is well-known as "self-selection bias".

To address these concerns, we could use a two-stage least squares (2SLS) regression. The 2SLS setting has the advantage of allowing for a number of test statistics to determine instrument validity

[20] Research that is closest to our paper includes Corielli et al. (see e.g., 2010); Esty and Megginson (see e.g., 2003); Esty (see e.g., 2004); Gatti et al. (see e.g., 2013); Girardone and Snaith (see e.g., 2011); Hainz and Kleimeier (see e.g., 2012); Kleimeier and Megginson (see e.g., 2000); Schwert (see e.g., 2018); Subramanian and Tung (see e.g., 2016); Vaaler et al. (see e.g., 2008).

[21] There is a constant in the model (1) included in the X_{ij} vector.

and strength (see Heckman and Singer, 1985, p. 185). But since the 2SLS model does not account for private information (unobserved sponsors and/or project-specific characteristics) that may drive self-selection, the 2SLS results may be inconsistent due to omitted variables (i.e., unobservable private information). Thus, to account for potential selection bias (including the omitted self-selection variable controls) and to test for the significance of private information to explain why (top-20) EPFIs are used, we use the two-stage procedure for self-selection (Heckman selection model or HSM) (Heckman, 1979).

However, HSM may be inconsistent due to simultaneity biais. Indeed, Corielli et al. (2010, pp.1304-1305) show that the loan spreads and the debt-to-equity ratios (D/E ratios) of the project are determined simultaneously by the arrangers once negotiations for the financial package begin. To account for the potential simultaneity biais, Simultaneous Equation Models (SEM) (for instance, three stage least squares (3SLS)) could be used. The loan spreads, the D/E ratios and (top-20) EPFIs could be our dependent variables for each equation in our system, respectively. Contrary to Corielli et al. (2010), we argue that SEM is not suitable in our setting. Indeed, SEM could only be used if the autonomy condition is reached.[22] In our setting, nor the pricing equation neither the leverage equation are self-contained. Indeed, the loan spreads and D/E ratio variables are all choice variables of the same lender. As a result, it would be difficult to interpret what would be estimated. Moreover, the decision to use (top-20) EPFIs is not determined simultaneously with the level of loan spreads and D/E ratios. The negotiation on the final version of financing terms (loan spreads and D/E ratios) begin at a later stage (Corielli et al., 2010, p. 1305). Moreover, SEM may be inconsistent due to omitted variables (i.e., unobservable private information). Therefore, we conclude that SEM should not be used in our setting. To the best of our knowledge, with our cross sectional data, there is no estimation model allowing to control simultaneously for the self-selection bias and the simultaneity bias. The best we can do is to show that removing th D/E variable from the estimation equation does not affect our conclusion. Therefore, the findings we present are based on our results from using the

[22]The requirement to reach the autonomy condition is given by Wooldridge (2010, chap. 9, p. 239), as follows: "In fact any of simultaneity, omitted variables and measurement error can be solve with SEM. However, each equation must have an economic meaning in isolation from the other equation in the system." (see also Haavelmo, 1943; Kiefer, 1989). Although applications of SEM are prevalent in finance and economics, many of them fail the autonomy requirement (Wooldridge, 2010, chap. 9, p.239).

Heckman selection model.

3.2 Estimation strategy: The HSM model

3.2.1 First stage: Explaining the decision to use (top-20) EPFIs

The HSM method has two stages. The first stage consists of estimating the generalized residual called the "Inverse Mills ratio", which is the estimated value of the private information. The Heckman first-stage is as follows:

$$\begin{aligned}\text{(top-20) EPFIs} = \alpha &+ \beta_1 \times \text{Nb. of MLAs} + \beta_2 \times \text{Nb. of SPE} + \beta_3 \times \text{Ranking CSR-Friendly} \\ &+ \beta_4 \times \text{Project Complexity} + \beta_5 \times \text{Project risk proxy} + \beta_6 \times \text{Financial crisis dummy} \\ &+ \sum_i^{2} \rho_i \times \text{Institutional and legal risk proxies} + \sum_i^{15} \gamma_i \times \text{Country dummies} \\ &+ \sum_i^{7} \phi_i \times \text{Industry risk dummies} + \sum_i^{12} \delta_i \times \text{Year dummies} + \varepsilon.\end{aligned} \tag{2}$$

where ε is the error term. Given the binary nature of the dependent variable in equation (2), we estimate the first-stage regression model using a probit model with bootstrapped standard errors corrected for project deal clustering. The control variables are described in Appendix A. Estimating the Heckman treatment-effects model requires a valid instrument, Z, that is: (i) full independence between ϵ_{ij} and Z (assumption 1); (ii) higher correlation between the variable (top-20) EPFIs and Z (assumption 2); and (iii) properly excluded from the model, so that it affects the loan spread (S_{ij}) only indirectly (assumption 3). The variable *Nb. of MLAs* is our exclusion restriction (instrument). That is, it affects the decision to use (top-20) EPFIs, but it does not affect loan spreads. Specifically, we use the number of MLAs in a deal as an instrument for the presence of (top-20) EPFIs.

We argue that the presence of (top-20) EPFIs and the number of MLAs in a syndicate are highly correlated. That is, the likelihood there are (top-20) EPFIs in a deal increases as the number of MLAs grows. Thus, we expect a positive coefficient for the variable *Nb. of MLAs*. This is intuitive because there is a limited number of banks with the expertise to syndicate project finance loans. Additionally, the existing literature shows that the number of MLAs in a deal is uncorrelated with loan pricing. Indeed, Carey and Nini (2007) and Esty and Megginson (2003) find that there is no relationship

between the number of lenders and loan spreads. Moreover, Demiroglu and James (2010) find that the number of lenders is not correlated with using loan covenants or their "tightness". Since we control for sponsor (in)experience, project, institutional and legal, country and industry risks, it is difficult to see what omitted variable might drive both our instrumental variable (Nb. of MLAs) and the error terms (ϵ,ε). We therefore conclude that the variable *Nb. of MLAs* is a valid instrument, as it satisfies the above assumptions 1 to 3. There exists no test of exogeneity for the HTE model that would be comparable to the Hansen J-test. We test the validity of our instrument in the sense of Staiger and Stock (1997), who argues that a strong instrument should be highly significant.

3.2.2 Second stage: Explaining loan spreads

The inverse Mills ratio is computed and added to the second-stage equation (3) to control for endogeneity (self-selection bias). The Heckman second-stage approach is as follows:

$$\begin{aligned}\text{Loan Spread (bps)} = {} & \alpha + \beta_1(\text{top-20) EPFIs} + \beta_2 \times \text{Nb. of SPE} + \beta_3 \times \text{Ranking CSR-Friendly} \\ & + \beta_4 \times \text{Project Complexity} + \beta_5 \times \text{Project risk proxy} + \beta_6 \times \text{Financial crisis dummy} \\ & + \sum_i^{2} \rho_i \times \text{Institutional and legal risk proxies} + \sum_i^{15} \gamma_i \times \text{Country dummies} \\ & + \sum_i^{7} \phi_i \times \text{Industry risk dummies} + \sum_i^{12} \delta_i \times \text{Year dummies} + \upsilon \times \text{Mills} + \epsilon.\end{aligned} \tag{3}$$

where υ indicates whether unobserved sponsors/project specific characteristics that increase the likelihood of using (top-20) EPFIs further increase the loan spread. β_1 indicates the effect of the integration model controlling for endogeneity (self-selection bias). Given the continuous nature of the dependent variable in equation (3), we estimate the second-stage equation using the OLS regression with bootstrapped standard errors corrected for project deal clustering. We use bootstrapped standard errors to account for the generated regressor (the "Mills ratio" variable). This model appears in Gatti et al. (2013), Fang (2005), Gande et al. (1999), Gobulov et al. (2012), and Puri (1996).

4 Data, variables, and descriptive statistics

4.1 Sample construction

The data consist of a large sample of project finance loans granted to large-scale projects in different countries over the period 3/2000 to 10/2016. The data are obtained from the ProjectWare database, provided by Dealogic. The sample includes all deals that are closed, financed, pre-financed or cancelled. Prior to applying filters, we have a sample of 17,236 project loans with a total value of US$9,617 billion. Data cleaning involves the following steps. First, given the focus of this paper, we extract project finance loans granted to specific projects, and not standard corporate loans. Second, we extract all loans for which loan maturity, tranche value, and spread details are available. The latter are defined over different reference rates. The resulting sample contains 5,031 loan tranches closing between 2001 and 2015, with a total value of $2,092 billion. These tranches are used to fund a total of 1,102 projects. Next, to identify the financial institutions (specifically, the Mandated Lead Arrangers (MLA)) that adopt Equator Principles, we use the Equator Principles Financial Institutions list reported by *The Equator Principles Association*.[23] We manually check all loan tranches in the database and compute a variable named *EPFI* which equals 1 if at least one MLA in the loan syndicate has adopted the Equator Principles, and equals 0 otherwise. Specifically, we consider a lender to be an EPFI if, in the year in question, it was reported in the EP list. ProjectWare reports the role of different lenders in each loan syndicate. There is no instance in the data of a financial institution adopting, and subsequently rejecting, EPs.[24]

4.2 Measure of bank reputation

We measure the reputation of banks that adopt EPs by computing their market shares (Gobulov et al., 2012), based on MLA "League Tables" from the ProjectWare database. Table 1 presents aggregated market shares for the period 1997-2017. 11 banks ranked in the top 20 have adopted EPs. We compute a top-20 EPFI dummy variable, taking the value of 1 when at least one of the MLAs in the deal is ranked top-20 and has adopted EPs, and 0 otherwise. This variable specification is consistent

[23] See the website of the *The Equator Principles Association* for the full sample of financial institutions adopting these principles: https://equator-principles.com/members-reporting/.

[24] Naturally, if in a given year a financial institution arranges a large-scale project but has not yet adopted EPs, the variable takes the value 0.

with the literature, as in Fang (2005), Gatti et al. (2013), Gobulov et al. (2012) and Rau (2000).[25]

4.3 Explanatory variables

Our main independent variable of interest is *(top-20) EPFIs*. We also include a broad set of non-redundant, exogenous control variables to capture differences in project characteristics. Following the literature on lending relationships, we collect information on borrower, lender, loan, and project characteristics and on legal and institutional risks.[26] Appendix A presents variable definitions. We include the *Nb. of SPE* variable to control for sponsor characteristics (i.e., prior experience in PF markets). This variable gives the number of sponsors in a deal i with experience in PF markets. We also include the variable *Ranking CSR-Friendly* which gives the rank of a country according to its openness to corporate social responsibility (CSR). A smaller value (i.e., higher ranking) indicates that the country is more concerned about the environmental and social impacts of projects carried out by firms.[27] Sponsor firms are more likely to approach EPFIs when they plan a project in a high-CSR-rank country. Since this variables is highly correlated with the Governance Index, we do not include the Governance index in our equations. To control for project complexity, we specify a dummy variable which equals 1 for multiple-tranche deals. Loan spreads should be decreasing in project complexity. This is because if there are multiple tranches, each bank's share of the project debt is limited, implying lower bank exposure through diversification.[28]

To control for loan, lender and project characteristics, we include the following variables. First, we add (log) loan maturity and (log) tranche size, as prior research finds that spreads are higher when loan maturity is longer, but they are lower when tranche size is greater (Blanc-Brude and

[25] While it might seem more intuitive to use a continuous variable to capture reputation, this literature finds that the econometric properties are better when the variable is defined this way.

[26] These control variables are widely used in related literature. See for example Corielli et al. (2010) , Esty and Megginson (2003), Esty (2004), Gatti et al. (2013), Girardone and Snaith (2011), Hainz and Kleimeier (2012), Kleimeier and Megginson (2000), Schwert (2018), Subramanian and Tung (2016), and Vaaler et al. (2008).

[27] To construct this variable, we download the global ranking of countries (based on their openness to CSR) that is published by the Research and Resource Centre of the World Forum for a Responsible Economy and available at the following link: `https://www.responsible-economy.org/images/CP_classement_RSE.pdf`. This ranking uses data pertaining to the environment, inequality and discrimination, labor and social legislation, corruption and information. Full details on the method of calculation, weighting and ranking are presented on the following website: `https://www.responsible-economy.org/fr/`.

[28] With such loans, a project can be financed with multiple tranches. In general, different banks participate in each tranche. Thus, if the loan is financed by multiple tranches, each tranche size is smaller and so is each bank's share of the project debt. Then, each bank's risk is lower than if the project were financed with only one tranche for example.

Strange, 2007). Second, we include controls for the type of loan.[29] Third, we include a variable to account for whether the loan is for "Refinancing." Indeed, construction risk is much lower for such loans, so spreads should be lower, other things equal.[30]

Fourth, we include variables for "non-bank lenders" (e.g., insurance companies, export credit agencies, government agencies, infrastructure funds and private companies) and "passive lenders" (participants). Loans are costlier when non-bank lenders or passive lenders are included (Lim et al., 2014). Passive lenders, in particular, are at an informational disadvantage relative to loan syndicate "insiders" (arrangers), and may demand extra compensation in the form of higher spreads. Fifth, we include the project host country's institutional quality (creditor rights), project risk (capex), and the 2008-2010 financial crisis period[31]. Lastly, we add year and industry dummies as well as country fixed effects.[32]

4.4 Descriptive statistics

Tables 2 and 3 present descriptive statistics for our sample of loans closed between March 2001 and December 2015 (5,031 observations). Table 2 presents the number of projects financed each year in our sample. Out of 1,102 projects funded under a PF arrangement, 435 (39%) involved at least one MLA that adhered to EPs. This table shows that the participation of EPFIs in PF loans has increased over time, from 20% in 2003 (i.e., 19 out of 95 projects) to 60% in 2015. We also analyze cancelled deals to assess a hypothesis in Gatti (2018, p.78), who argues that adopting EPs increases the probability that financial institutions will fund projects.[33] The full sample contains 344 cancelled project deals (over the period 2004-2016). We find that only 29 cancelled projects (8%) involved EPFIs. Therefore, most cancelled deals did not involve EPFIs. Table 3 presents statistics

[29] Following prior research (Kleimeier and Megginson, 2000; Gatti et al., 2013), we generate dummy variables to capture effects linked to each of the following loan types: term, "A", Stand-by-Facility, Mezzanine, Guaranteed, Revolver, Bridge Facility, Credit Facility, Debt Service Reserve, Islamic, Letter of Credit, VAT Facility, and Working Capital.

[30] This variable differentiates Brownfield (existing projects) from Greenfield loans (new projects). The sign might be positive, however, if refinancing loans are used for projects that experience difficulty repaying the original debt.

[31] These or similar controls are standard in the literature, such as Gatti et al. (2013); Girardone and Snaith (2011); Kleimeier and Megginson (2000)

[32] We control for the top 15 countries (see table 3 in the web appendix), which represent 75.5% of the total loan value over the sample period (i.e., US$1,580.4Bn out of $2,092.84Bn) , and 72% of the loan tranches (i.e., 3,623 out of 5,031 loan tranches).

[33] The table of full results is not presented here, but is available upon request.

on loan and project characteristics as well as country institutional quality. The average loan tranche size is $412.99M, with a median of $161.38M. Loan tranches range from $0.39M to $4,956M. Loan spreads have a mean (median) of 218.2 (194) basis points (bp). The mean (median) of loan maturities is 11 years (10 years), ranging from 1 to 39 years. Most projects closed in 2008, as a decade of growth ended with the credit freeze crisis. The debt-to-total financing ratio has a mean (median) of 84.44% (86.51%). Only 29 loan tranches are guaranteed by a third party (0.57% of all tranches). Only 51 loan tranches (1.01%) are financed using passive lenders. The governance index results show that PF deals are more likely to occur in countries where institutional risk is lower. However, the PF structure is used more often in countries where creditor protection is weaker (see Subramanian and Tung, 2016; Hainz and Kleimeier, 2012).

5 Empirical Analysis

5.1 What explains the decision to use (top-20) EPFIs?

We present our main findings in Panels A and B of Table 4. The estimated coefficients for the selection model are presented in column 1 and 4 of panels A and B, respectively. The first stage results suggest that the number of MLA in a deal increase the likelihood to approach (top-20) EPFIs. Our instrument is valid based on the Staiger and Stock (1997) approach. We find a negative and significant (1% level) sign for the *Ranking CSR-Friendly* variable (in column 1 of Panel A), which confirms that EPFIs are less likely to be used if the project host country ranks lower in CSR preoccupations. The first-stage results also show that use of (top-20) EPFIs is increasing in project construction risk (capex) and during financial crisis period. Columns 1 and 4 in tables 4 further shows that firms seeking Guaranteed debt are likely to use (top-20) EPFIs. Moreover, results in these columns also suggest that sponsor seeking the participation of Non-bank lenders are less likely to use (top-20) EPFIs. Results also suggest that use of EPFIs increase in the Creditor Rights.

5.2 Selection effects of EPFIs

The second-stage results are presented in panel A (columns 2 and 3) of Table 4. As expected, spreads are decreasing in project complexity, when loan is guaranteed, for revolver loans, with the participa-

tion of non-bank lenders and increasing during the financial crisis period. Column 3 provides results when the variables D/E ratios and ln(tranche maturity) are considered in the analyses.

The second-stage results in panel A (Column 2) show that, when we control for self-selection bias, dealing with EPFIs increases loan spreads ($p < 0.05$). The inverse Mills ratio is negative but not significant (at the 10% level), suggesting that private information that may affect the decision of dealing with EPFIs do not affect loan spreads. The second-stage results in panel A (column 3) show that even when we include leverage and tranche maturity, our results remain unchanged. Overall, this result confirms our *Cost saving hypothesis*. It seems that there are two offsetting effects. First, spreads are lower following the arguments of cross-monitoring, signaling and economies of scope theories. Second, spreads are higher due to the costs of EPs (e.g., due diligence and monitoring costs to manage environmental and social risks). While theory does not provide a clear prediction for the combined effect, our empirical results suggest that the net effect is negative (higher loan spreads for sponsors). It seems that costs of implementing EPs (e.g., due diligence and monitoring) have outweighed the advantage of dealing with EPFIs. Moreover, the economic magnitude of the effect is sizable. Loans using EPFIs cost 38 bps more, implying an increase in annual interest rate of $3.48 M for the sample average loan.[34]

5.3 Selection effects of prestigious EPFIs

As the prior literature finds that prestigious, or "bulge bracket", banks differ in significant ways from other banks (see e.g. Gatti et al., 2013), we examine whether selection effects differ for projects financed by EPFIs ranked top-20. Results are in panel B of table 4. As expected, spreads increase during the financial crisis period, with construction risk and decrease with project complexity. Spreads are lower for guaranteed loans and revolver loans.

The second-stage results in panel B (Column 5) show that, when we control for self-selection bias, dealing with top-20 EPFIs decreases loan spreads ($p < 0.05$). The inverse Mills ratio is positive and significant (at the 5% level), suggesting that private information that may affect the decision of dealing with top-20 EPFIs do affect loan spreads. The second-stage results in panel B (column 6) show also that even when we include leverage and tranche maturity, our results remain unchanged.

[34]This is calculated as the sample average project debt level, $920.55 M × 0.38% in higher loan spreads.

Overall, this result confirms our *Cost saving hypothesis*. It seems that the advantage of dealing with a prestigious EPFIs (benefits related to signaling arguments (Chava and Roberts, 2008; Demiroglu and James, 2010; Gârleanu and Zwiebel, 2009) and benefits related to a treatment effect Gatti et al. (2013)), is much more higher than the costs of implementing. The economic magnitude of the effect is sizable. Indeed, loans using top-20 EPFIs pay 35 bps less, implying an decrease in annual interest rate of \$3.22 M for the sample average loan.[35] Overall, sponsors derive economic benefits from dealing with prestigious EPFIs than with all EPFIs.

5.4 Policy implications: Marginal Policy Relevant Treatment Effects (MPRTE)

Our results above show that for project sponsors dealing with prestigious EPFIs, yes, it "pays to be green." A policymaker, however, would like to predict the effect of regulatory changes that increase the likelihood of dealing with top-20 EPFIs. To answer this question, we need to examine the treatment effect on deals that would involve lending from top-20 EPFIs due to policy reforms–but not otherwise. A well-suited approach is the "Marginal Policy Relevant Treatment Effect (MPRTE)" model of Carneiro et al. (2010). The derivations of the MTE and MPRTE are presented in appendix B. In our setting, the MPRTE corresponds to the mean effect of moving from a baseline policy, per project shifted into treatment. Therefore, it is the average treatment effect on a sub-population of projects that would involve top-20 EPFIs *only* as a result of policy reforms.[36]

We recover the MPRTE from the estimation of the Marginal Treatment Effect (MTE) model[37] and report the results for three different MPRTEs in Table 5. The first, MPRTE_1, reports the average treatment effect (ATE) for projects shifted to the treated group when the policy changes increase *equally* each project's probability of dealing with top-20 EPFIs. MPRTE_2 is the ATE for projects shifted to the treated group when the change in policy favors projects that appear *more likely* to deal with top-20 EPFIs. MPRTE_3 is the ATE when the change in policy favors projects that appear *less likely* to deal with top-20 EPFIs.

[35] This is calculated as the sample average project debt level, \$920.55 M × 0.35% in higher loan spreads.

[36] The model's essential requirements are similar to those for the MTE. First, a continuous instrument must be available. Second, the policy reform should change the conditional distribution of the probability of receiving the treatment given control variables X, but should not affect potential outcomes or the unobservables related to the selection process. We argue that these two conditions are met in our setting.

[37] We use the mtefe package implemented in Stata (Andresen, 2018) and the procedure described in section B.

In Table 5, the estimated coefficients for $MPRTE_1$ $MPRTE_2$ and $MPRTE_3$ for loan spreads are not significant. Thus, a policy change that affects the likelihood of dealing with top-20 EPFIs would have no significant effect on loan spreads for projects that are shifted to the "treated" group". This result suggest that, fostering "green finance" should not be beneficial (in terms of cost of debt) for borrowers. This is coherent with Andonov et al. (2021) who find that ESG preferences help explain why large-scale infrastructure investments underperform.

5.5 The involvement of Multilateral Development Banks

Up to this point we have shown that the certification role (signaling effect) of prestigious (top-20) EPFIs help firms to lower loan spreads. To distinguish our certification hypothesis from other potential explanations, we would ideally like to provide direct support for the mechanism in our model. The engagement of a top-20 EPFIs by the firms should be correlated with ex-post observable project's (or firm's) environmental performance (e.g., CO_2 emissions). Unfortunately, there is (to our knowledge) no data set documenting the ESG performance of large-scale investment projects. However, we provide a close to ideal test to validate the mechanism in our model by exploiting the fact that the Equator Principles are based on the environmental and social guidelines of the International Finance Corporate (IFC, World Bank group). In our empirical test, we examine whether firms dealing with top-20 EPFIs are more likely to attract the multilateral development banks (MDBs) in lender syndicate.

Table 6 presents our results. Our dependent variable, *Multilateral Development Bank*, equals 1 if either a development bank, export credit agency, international financial institution or other similar multilateral institution is involved in the lender syndicate. To separate the effect of top-20 EPFIs, we control for the same exogenous variables as in section 3.2.[38] We also control for the sponsor's experience in the project host country by using as a proxy the log of all projects undertaken in the past by all sponsors in the consortium in the host country. We use the ProjectWare database to construct this variable. Our results suggest that MDBs are more likely to participate in PF deals when the project host country has a lower concern for a project's social and environmental impact.

[38]That is, we control for time fixed-effects (excluding the years 2008 to 2010), year and industry fixed effects, as well as individual sponsor, loan and project characteristics. Also, standard errors are clustered by project.

Moreover, the participation of MDBs increases with construction risk (capex) and when the loan syndicate includes passive lenders. Also, the coefficient for *top-20 EPFIs* is positive and significant (at 5% level), so MDBs are more likely to get involved when prestigious (top-20) EPFIs are used. Thus, working with prestigious (top-20) EPFIs appears to help attract MDBs, which is beneficial for project sponsors as MDBs help to mitigate political risks (Hainz and Kleimeier, 2012). Our conclusions remain unchanged when we control for debt-to-equity ratios, loan spreads and loan maturities.

5.6 Involvement of investment and commercial banks and non-bank lenders

Additionally, to further validate the mechanism of certification, we exploit the fact that the presence of top-20 EPFIs should make the project more attractive for other banks, so the MLA should have an easier time obtaining the necessary capital from banks. Lim et al. (2014) show that loan spreads are higher with the participation of "non-bank lenders" in a loan syndicate. They argue that MLAs invite non-bank lenders to join the syndicate only if it is difficult to obtain the necessary capital (e.g., if economic conditions are challenging). Thus, the presence of top-20 EPFIs should increase the number of investment and commercial banks (hereafter, "banks") participating in the loan syndicate. To test this hypothesis, we use the Nearest Neighbor Matching (NNM) technique.

This estimation technique helps us to address the question "what would have been the number of banks in a loan syndicate for a deal involving top-20 EPFIs if the same deal *did not* have top-20 EPFIs". Econometrically, this is known as the Average Treatment Effect on the Treated (ATET). Thus, we compare the number of banks in a loan syndicate that includes (top-20) EPFIs to the potential number of banks in the syndicate if it did not include (top-20) EPFIs. The difference corresponds to the average gain (here, in terms of the number of banks) of using (top-20) EPFIs. Since we only observe a given loan syndicate either with or without (top-20) EPFIs, and not its counterfactual, the NNM technique allows us to estimate the missing potential number of banks by using an average of the number of banks in loan syndicates for similar deals that do not involve (top-20) EPFIs. The ATET is computed as the average of the difference between the observed and estimated number of banks in syndicates for each deal. The NNM has the advantage of being a nonparametric model, as no explicit functional form is specified for the outcome model (number of banks) or the treatment model (presence of (top-20) EPFIs). As a result, the NNM technique does not depend on the quality

of the instruments, as they are not needed.

Table 12 presents our results for the NNM analysis. Panel A shows that the presence of EPFIs increases the number of participating banks by 26, while Panel B suggests that the presence of top-20 EPFIs increases the number of banks participating by 25. These results support our hypothesis that the presence of (top-20) EPFIs attracts more banks to participate in the loan syndicate, which has the benefit of increasing diversification for each participating bank. These result suggest that firms also benefit from dealing with EPFIs as their presence make easier to obtain the necessary capital from banks.

5.7 Lender syndicate size

To further validate the mechanism of certification, we exploit the fact that the presence of top-20 EPFIs should make it easier to structure large syndicate size. As Chowdhry (1991) and Esty and Megginson (2003) show, MLAs create large syndicates as a way to deter strategic default. We use the NNM technique to estimate the causal effect of (top-20) EPFIs on lender syndicate size. Table 8 presents our results for the NNM analysis. Panel A shows that the presence of EPFIs increases the number of lenders in syndicate by 32, while Panel B suggests that the presence of top-20 EPFIs increases the number of lenders in syndicate by 34. These results support our hypothesis that the presence of (top-20) EPFIs makes it easier to obtain the necessary capital.

5.8 Alternative estimation techniques

In this section, we address the robustness of our evidence by using alternative estimation techniques, namely the Ordinary least squares (OLS) regression, two-stage least squares (2SLS), and Nearest Neighbor Matching models. As mentioned, these alternative models do not account for unobservable private information. Here, this means unobserved sponsor- and/or project-specific characteristics, which could be responsible for self-selection. Results in Table 4 show that unobservable private information play a role only when firms select prestigious (top-20) EPFIs. As a results, these alternative models could be used only to estimate the selection effect of EPFIs. We provide in the appendix C results for these alternative estimation techniques. The results from OLS, 2SLS and NNM suggest that loan spreads increase with the involvement of EPFIs, which is coherent with our

findings in section 5.2. These results also suggest that there is no effect of prestigious EPFIs on loan spreads. We argue that the results for selection effects of top-20 EPFIs using these alternatives techniques are less reliable due to omitted variables. Therefore, results using alternative estimation techniques provide partial confirmation of our main HSM findings. Lastly, they cannot help us draw policy implications, unlike what the MPRTE offers.

6 Conclusion

Environmental and social considerations are increasingly important in business, as evidenced by how commonplace sustainable business practices or socially responsible investing have become. A recent literature investigates why financial institutions voluntarily adopt Equator Principles (EPs), which require them to identify and monitor environmental and social risks and impacts in the projects they finance. There is a research gap when it comes to how corporate borrowers are affected by a bank's adoption of EPs. What do firms gain or lose by dealing with EPFIs to finance large-scale projects? To investigate the effects of (top-20) EPFIs on loan outcomes, we estimate the Heckman selection model (HSM) using a large database of international project loans over the period 2001-2015. We also run a counterfactual analysis using the Marginal Policy-Relevant Treatment Effect (MPRTE) to assess hypothetical regulatory changes that would encourage "greener banking". We make the following novel contributions to the literature. First, we provide empirical evidence showing that corporate borrowers (i.e., project sponsors) benefit from dealing with (top-20) EPFIs. Therefore, yes, it pays to be green. Specifically, sponsors dealing with prestigious EPFIs benefit from lower loan spreads and the mitigation of political risks. We provide empirical evidence for the certification mechanism. Moreover, sponsors dealing with (prestigious) EPFIs benefit from participation of investment and commercial banks which easier time obtaining the necessary capital from banks.

Second, regarding policy implications, changes in regulation that would encourage sponsor firms to deal with (top-20) EPFIs would not be beneficial to these firms, as their loan spreads will not be affected. For those firms that will deal with (top-20) EPFIs as a results of the new policy, it seems that, there are two offsetting effects. First, spreads are lower following the arguments certification theory. Second, spreads are higher due to the costs of EPs (e.g., due diligence and monitoring costs

to manage environmental and social risks). While theory does not provide a clear prediction for the combined effect, our empirical results suggest they cancel out.

Lastly, we document how (top-20) EPFIs effects relate to the involvement of Multilateral Development Banks, to loan syndicate composition and to syndicate size. Future research should investigate whether the EP help to improve the environmental performance (e.g., CO_2 emissions) of large scale projects once loans are obtained. Of course, this requires overcoming the lack of data on ESG performance of large scale projects.

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Table 1: League table of Mandated Lead Arrangers (MLAs) in PF Loans signed between 1997 and 2017. EPFIs: Equator Principles Members

This table is obtained from the Dealogic ProjectWare database predefined league tables for all PF loan tranches. We report only the top 20 financial institutions that were active as MLAs in the global PF loan market from 1997 to 2017. "EPFIs" indicates Equator Principles Financial Institutions, using data from the Equator Principles Association.

Rank	**Mandated Lead Arranger**	**Sum of split deal value plus inflation ($m)**	**EPFI**
1	BNP Paribas	169,618	Y
2	Mitsubishi UFJ Financial Group	139,658	N
3	Royal Bank of Scotland	135,643	N
4	Credit Agricole	127,187	Y
5	Sumitomo Mitsui Financial Group	120,111	Y
6	Mizuho Financial Group	103,151	N
7	Societe Generale	94,813	N
8	ING Group	88,946	N
9	Citigroup	72,377	Y
10	WestLB	67,925	N
	Non-top-10 (shown from 11th to 20th)		
11	Banco Santander	67,437	Y
12	HSBC	60,241	Y
13	Barclays	58,657	Y
14	BBVA	55,732	Y
15	Commerzbank	54,008	N
16	Australia and New Zealand Banking Group	50,050	Y
17	Intesa Sanpaolo	47,497	Y
18	JPMorgan	47,359	Y
19	Deutsche Bank	46,289	N
20	BayernLB	46,150	N

Table 2: Number of financed projects each year

The following table presents the number of projects each year with or without participation of EPFIs (Equator Principles Financial Institutions.) Data sources: Projectware (Dealogic) and Equator Principles Association.

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	**Total**
Nbers of projects	13	64	95	120	76	95	129	120	107	99	33	27	46	68	10	**1,102**
Nbers with EPFIs	0	0	19	30	20	32	45	44	66	63	23	10	33	44	6	**435**
% with EPFIs	0	0	20	25	26	34	35	36	62	64	70	37	72	65	60	**39**
Nber of projects from New Players	13	56	75	90	54	57	68	60	43	38	14	13	18	29	3	**631**
% with EPFIs	0	0	19	21	26	25	34	32	56	63	79	31	72	66	67	**32**
Nber of PPP projects	3	27	30	31	22	23	41	35	41	41	9	4	6	12	3	**328**
% with EPFIs	0	0	27	19	32	22	27	26	59	63	78	25	67	58	67	**36**

Table 3: Descriptive statistics for sample of project finance loans, 2001-2015

This table presents descriptive statistics for projects arranged using project finance in our sample of data. We use loan tranches where spread, maturity of debt, and tranche size are available. For a definition of the variables, see appendix A.

	Mean	Median	Std	Min	Max	Nb. of tranches
Loan characteristics						
tranche size (US$m)	412.99	161.38	650.22	0.39	4,956	5,031
tranche spread (in bps)	218.2	194	158.3	2	3,560	5,031
tranche maturity (in years)	10.94	10	7.99	1	39	5,031
year of loan signing	2008	2008	3.135	2001	2015	5,031
tranche size for refinancing	332.91	185	437.13	0.8	3,500	1,139
tranche size with guarantee	111.37	64.19	130.04	3.26	392.17	29
tranche size with participants	670.98	1,109.88	496.59	13.37	1,109.88	51
Project characteristics						
project value ($m)	1196.51	447	2,270.33	4.6	18,200	5,031
leverage (debt ratio)	84.44%	86.51%	15.77%	12.8%	100%	5,031
Country/institutional quality indicators						
creditor rights	1.864	2	1.30	0	4	4,535
governance index	71.775	79.142	18.738	6.283	98.377	4,982

Table 4: Effect of (Top-20) EPFIs on loan spreads — Heckman regression.

This table presents Heckman (1979) treatment-effect regression results of the effect of the (top-20) EPFIs on loan spreads and other deal characteristics. Panels A and B show, respectively, results for the effects of EPFIs and top-20 EPFIs. The dependent variables are loan spreads. Standard errors are clustered by project. The exclusion variables are *Nb. of MLA*. Outliers are dropped based on the DFBETA (influence measure). In brackets are z-statistics. *, **, *** indicate 10%, 5% and 1% levels of significance. D: dummy. Nb. of SPE: Number of sponsor with experience in PF markets

	Panel A			Panel B		
	(1)	(2)	(3)	(4)	(5)	(6)
	First stage	Second stage	Second stage	First stage	Second stage	Second stage
Intercept	−2.447***	43.341***	67.316***	−1.444***	43.430***	68.819***
	(−8.29)	(3.32)	(4.13)	(−5.0)	(3.90)	(4.01)
Nb. of MLA	0.0236***			0.0165***		
	(9.59)			(11.18)		
Ranking CSR-Friendly	−0.00637***	0.153**	0.156	−0.000146	0.0304	0.0262
	(−5.0)	(2.33)	(1.60)	(−0.12)	(0.38)	(0.29)
Nb. of SPE	0.00261	4.894**	4.612***	−0.0375	4.225***	3.816**
	(0.08)	(3.01)	(2.75)	(−1.21)	(2.60)	(2.15)
Project complexity	−0.0977	−15.434***	−14.821***	0.0752	−14.757**	−14.294***
	(−0.86)	(−3.26)	(3.20)	(0.71)	(−2.49)	(−2.81)
Financial crisis D	1.206***	82.903***	80.108***	0.233**	97.667***	95.694***
	(10.64)	(11.27)	(11.11)	(2.03)	(16.68)	(15.39)
Debt-to-equity ratio			−0.014			−0.0203**
			(−1.51)			(−2.43)
ln(tranche maturity)			−6.462			−7.036*
			(−1.64)			(−1.79)
Project risk						
Capex	0.0002***	0.0024	0.0025*	0.000267***	0.00314*	0.00296**
	(4.19)	(1.45)	(1.85)	(5.99)	(1.89)	(2.38)
Institutional risk						
Creditor Rights	0.253***	20.624***	20.129***	−0.0127	21.617***	21.746***
	(3.78)	(6.65)	(6.84)	(−0.23)	(8.14)	(8.28)
Lender variables						
Passive lenders	−0.101	10.867	10.926	−7.438***	−0.645	0.849
	(−0.45)	(0.93)	(1.13)	(−7.93)	(−0.05)	(0.06)
Non-bank lenders	−0.277***	17.971**	18.592***	−0.549***	15.745***	16.865**
	(−2.77)	(2.28)	(2.94)	(−3.96)	(2.61)	(2.40)
Loan variables						
Refinancing loan D	−0.146	11.636*	18.531**	0.0845	15.457**	25.178***
	(−0.95)	(1.75)	(2.42)	(0.62)	(2.08)	(2.92)
Guaranteed D	1.108***	−71.751***	−72.94***	0.891**	−48.75***	−49.307***
	(3.24)	(−3.66)	(−4.19)	(2.11)	(−3.64)	(−3.17)
Revolver loans D	0.699***	−56.733***	−63.79***	0.0112	−42.177***	−49.190***
	(3.58)	(−4.57)	(−5.15)	(0.05)	(−3.61)	(−5.42)
Currency risk D	0.878***	−11.670	−13.205*	0.464***	−1.126	−2.239
	(5.37)	(−1.42)	(−1.77)	(3.33)	(−0.18)	(−0.29)
ln(tranche size)	0.140***	−1.194	−1.682	0.0239	4.507*	4.141**
	(2.92)	(−0.39)	(−0.63)	(0.5)	(1.84)	(1.98)
EPFIs		38.382**	44.809***			
		(2.30)	(2.89)			
(Top-20) EPFIs					−35.049**	−27.686*
					(−2.01)	(−1.93)
Mills' ratio		−6.204	−12.079		20.195**	15.833**
		(−0.65)	(−1.28)		(2.07)	(2.07)
Loan type	yes	yes	yes	yes	yes	yes
Year and Industry dummies	yes	yes	yes	yes	yes	yes
Country fixed effects (Top 15)	yes	yes	yes	yes	yes	yes
Sample size	2,255	2,255	2,255	2,294	2,294	2,294

Table 5: Marginal Policy Relevant Treatment Effects (MPRTE) of Top-20 EPFIs on loan spreads.

Semiparametric estimation of the MPRTE of prestigious (i.e., top-20) financial institutions that adopt Equator Principles (EPFIs), with bootstrapped standard errors corrected for project deal clustering (500 replications). Panel A column (1) is the selection model (probit) for the presence of top-20 EPFIs in the deal. The exclusion variables are *Nb. of MLA*. Columns (2) and (3) show the 2nd-stage equation results, estimated by Local IV. The dependent variable is loan spreads. Outliers are dropped based on the DFBETA (influence measure). In brackets are t-statistics (z-statistics for probit). $*$, $**$ and $***$ indicate 10%, 5% and 1% levels of significance. D: dummy, het: heterogeneity, β_0: Untreated group and $\beta_1 - \beta_0$: difference between Treated and Untreated group.

	Panel A: Loan spreads		
	(1) Selection	(2): β_0	(3): $\beta_1 - \beta_0$
Intercept	-3.137^{***}		
	(−2.88)		
Nb. of MLA	0.0163^{***}		
	(3.12)		
Ranking CSR-Friendly	0.000994	0.408^{***}	-2.155^{**}
	(0.32)	(3.19)	(−4.24)
Nb. of SPE	−0.589	8.426^{**}	-20.075^{**}
	(−0.64)	(2.42)	(−2.15)
Project complexity	0.0418	11.241	−16.538
	(0.14)	(1.11)	(−0.52
Financial crisis D	0.229	84.695^{***}	-71.615^{**}
	(0.73)	(7.89)	(−2.11)
ln(tranche maturity)	0.498^{**}	−2.989	−12.490
	(2.03)	(−0.48)	(−0.37)
Project risk			
Capex	0.000228^{**}	0.0308^{***}	-0.0250^{**}
	(2.35)	(2.53)	(−1.96)
Institutional risk			
Creditor Rights	0.0179	5.059	29.319^{*}
	(0.13)	(0.86)	(1.70)
Lender variables			
Non-bank lenders	-0.497^{*}	−12.835	54.194
	(−1.62)	(−1.16)	(1.44)
Loan variables			
Refinancing loan D	0.217	27.361^{*}	-125.747^{***}
	(0.60)	(1.92)	(−3.12)
Guarantee D	1.132^{*}	−66.799	122.697
	(1.90)	(−1.26)	(1.03)
Revolver loans D	0.371	-53.045^{**}	7.61
	(0.8)	(−3.09)	(0.07)
Currency risk D	0.524	-34.780^{**}	125.70^{***}
	(1.40)	(−2.5)	(2.70)
ln(tranche size)	0.0379	-10.069^{***}	56.580^{***}
	(0.42)	(−2.57)	(3.53)
Treatment effects			
MPRTE1		−35.134	
		(−0.48)	
MPRTE2		27.222	
		(0.32)	
MPRTE3		11.769	
		(0.08)	
Tests of heterogeneity			
observable het., p-value		0.000	
essential het., p-value		0.880	
Loan type	yes	yes	yes
Year & industry dummies	yes	yes	yes
Country fixed effects (Top 15)	yes	yes	yes
Sample size	1,993	1,993	1,993
Pseudo R^2	0.4317		

Table 6: Effect of (Top-20) EPFIs on multilateral development bank participation—2SLS regression.

This table presents 2SLS regression results of the effect of (top-20) EPFIs on multilateral development bank participation. The dependent variable in the second stage is the dummy *multilateral development bank* that takes one if development bank, export credit agency, international financial institution or multilateral is involved in lender syndicate. Panel A and B present results for the effect of EPFIs and top-20 EPFIs, respectively. Our results remain unchanged even when standard errors are clustered by project. Outliers are dropped based on the DFBETA (influence measure). In brackets are z-statistics. *, **, *** indicate 10%, 5% and 1% levels of significance. D: dummy.

	Panel A			Panel B		
	(1)	(2)	(3)	(4)	(5)	(6)
	First stage	Second stage	Second stage	First stage	Second stage	Second stage
Intercept	−0.159	0.290	0.1222	0.111	0.130	−0.0376
	(−1.20)	(1.59)	(0.49)	(0.66)	(0.95)	(−0.22)
Nb. of MLA	0.0256***			0.00282**		
	(2.81)			(2.06)		
Ranking CSR-Friendly	−0.00124**	0.00435***	0.00454***	−0.000244	0.00345***	0.00352***
	(−2.14)	(4.41)	(4.40)	(−0.40)	(4.88)	(5.12)
Nb. of SPE	−0.00438	−0.0254	−0.020	−0.01	−0.0258	−0.0272
	(−0.24)	(−1.05)	(−0.79)	(−0.46)	(−1.19)	(−1.24)
Project complexity	−0.0272	−0.0206	−0.0290	0.0194	−0.0467	−0.0439
	(−0.61)	(−0.37)	(−0.53)	(0.32)	(−0.77)	(−0.71)
Financial crisis D	0.293***	−0.0904	−0.0806	0.0503	0.0785	0.075
	(4.89)	(−0.61)	(−0.55)	(0.75)	(1.18)	(1.11)
Loan spreads			−0.000255			0.0000494
			(−0.86)			(0.26)
Debt-to-equity ratio			0.000162***			0.0000198
			(1.04)			(0.26)
ln(tranche maturity)			0.0525			0.052
			(1.17)			(1.36)
Project risk						
Capex	$-8.18e-06$	0.0000687***	0.0000679***	0.000361**	0.0000419**	0.0000429**
	(−0.61)	(4.08)	(3.94)	(1.98)	(2.01)	(2.02)
Institutional risk						
Creditor Rights	0.0512*	−0.0864*	−0.0851*	−0.0170	−0.0445	−0.0414
	(1.58)	(−1.83)	(−1.62)	(−0.40)	(−1.46)	(−1.131)
Lender variables						
Passive lenders	−0.0177	0.369***	0.374***	−0.214*	0.510***	0.495***
	(−0.13)	(3.17)	(3.10)	(−1.94)	(3.15)	(2.96)
Non-bank lenders	−0.473	0.0136	0.0168	−0.071	0.0224	0.0202
	(−0.92)	(0.23)	(0.28)	(−1.20)	(0.43)	(0.39)
Loan variables						
Refinancing loan D	0.00253	0.0337	−0.456	0.0375	0.0196	0.0139
	(0.04)	(0.29)	(−0.34)	(0.45)	(0.22)	(0.15)
Guaranteed D	0.212	−0.357**	−0.397**	0.178	−0.317***	−0.299***
	(1.43)	(−2.09)	(−2.08)	(1.20)	(−2.56)	(−2.64)
Revolver loans D	0.201***	−0.183	−0.161	0.0603	−0.0872	−0.0495
	(2.63)	(−1.35)	(−1.03)	(0.78)	(−1.58)	(−0.81)
Currency risk D	0.162***	−0.233**	−0.244*	0.0658	−0.141	−0.129
	(2.58)	(−1.99)	(−1.90)	(0.76)	(−1.42)	(−1.37)
ln(tranche size)	0.0670***	−0.0291	−0.0344	0.0196	0.00418	0.00287
	(4.07)	(−0.74)	(−0.82)	(1.12)	(0.23)	(0.16)
EPFIs		0.733	0.813			
		(1.61)	(1.51)			
Top-20 EPFIs					0.70**	0.667**
					(2.25)	(2.04)
Loan type	yes	yes	yes	yes	yes	yes
Year and Industry dummies	yes	yes	yes	yes	yes	yes
Country fixed effects (Top 15)	yes	yes	yes	yes	yes	yes
Sample size	2,255	2,255	2,255	2,294	2,294	2,294

Table 7: Average treatment effect — Nearest Neighbor Matching — Bank participation in syndicate

The table presents results of the ATE (Average Treatment Effect) and ATET (Average Treatment Effect on the Treated) from the matching model using Nearest Neighbor Matching. The reported effect is that of having (Top-20) EPFIs in a deal on the number of investment and commercial banks participating in the deal. The dependent variable of interest is *Number of banks in a deal*. The z-statistics are in parentheses. The symbols $*$, $**$ and $***$ denote statistical significance at the 10%, 5% and 1% levels, respectively.

Variable	Panel A: EPFI effect	Panel B: Top-20 EPFI
ATE	13.874^{***}	8.664^{***}
	(15.41)	(9.22)
ATET	26.619^{***}	24.695^{***}
	(22.57)	(12.94)

Table 8: Average treatment effect — Nearest Neighbor Matching — Lender syndicate size

The table presents results of the ATE (Average Treatment Effect) and ATET (Average Treatment Effect on the Treated) from the matching model using Nearest Neighbor Matching. The reported effect is that of having (Top-20) EPFIs in a deal on the number of lenders participating in the deal. The dependent variable of interest is *Number of lenders in a deal*. The z-statistics are in parentheses. The symbols $*$, $**$ and $***$ denote statistical significance at the 10%, 5% and 1% levels, respectively.

Variable	Panel A: EPFI effect	Panel B: Top-20 EPFI
ATE	17.396^{***}	11.720^{*}
	(17.57)	(11.46)
ATET	32.904^{***}	34.287^{***}
	(25.26)	(16.21)

Appendix A Definitions of variables

Variable	Description
Spread	Spread over the reference rate (e.g., LIBOR, EURIBOR, etc.)
Debt-to-equity ratio	Weight of the total debt against total equity
Dummy financial crisis	Dummy equal to one if the loan tranche deal is closed during the period 2008 to 2010 or zero otherwise.
Borrower characteristics	
New player	Dummy equal to one if none of the sponsors was active in the global PF loan market in the past and zero otherwise.
SEC	Sponsor experience in project host countries (SEC) is the logarithm of the number of project undertaken by the consortium of sponsors in the past in the project host country.
Lender characteristics	
MLA is FA	Dummy equal to one if the same bank play the dual role of FA and MLA and zero otherwise.
Top-20 EPFIs	Dummy equal to one if there at least a top-20 EPFI in lender syndicate and zero otherwise.
Passive lender	Dummy equal to one if at least one of the lenders is passive and zero otherwise.
Non-bank lender	Dummy equal to one if at least one of the lenders is non-bank lender and zero otherwise.
Syndicate home bias	An index that takes the following values: -1 times the number of lead arrangers if the syndicate consists only of domestic lead arrangers, zero for a syndicate consisting of domestic and foreign lead arrangers, and the number of lead arrangers if the syndicate consists only of foreign lead arrangers only.
Loan characteristics	
tranche maturity	Life of the tranche in years
tranche size	Size of the loan tranche in US$.
Refinancing loan	Dummy equal to one if the loan is used to refinance a existing project loan and zero otherwise
'A' loan	Dummy is equal to one if the loan is a 'A' loan and zero otherwise.
Standby Facility loan	Dummy is equal to one if the loan is a Standby Facility loan and zero otherwise.
Bridge Facility loan	Dummy is equal to one if the loan is a Bridge Facility loan and zero otherwise.

Variable	Description
Credit Facility loan	Dummy is equal to one if the loan is a Credit Facility loan and zero otherwise.
VAT Facility loan	Dummy is equal to one if the loan is a VAT Facility loan and zero otherwise.
Islamic loan	Dummy is equal to one if the loan is a Islamic loan and zero otherwise.
Letter of credit	Dummy is equal to one if the loan is a letter of credit and zero otherwise.
Working Capital loan	Dummy is equal to one if the loan is a Working Capital loan and zero otherwise.
Mezzanine loan	Dummy is equal to one if the loan is a Mezzanine loan and zero otherwise
Guaranteed loan	Dummy is equal to one if the loan is guaranteed and 0 otherwise. Loan is considered guranteed when ProjectWare listed "Guaranteed loan".
Revolver loan	Dummy is equal to one if the loan is revolver loan and 0 otherwise. Loans is considered as a revolver loan when ProjectWare listed "Revolver loan".
Currency risk	Dummy is equal to one if the currency of loan is different from the currency of the host government.
Project complexity	Dummy is equal to one for multiple-tranche deals.
Project risk	
Capex	Size of the capital expenditure for each project in US$.
Industry dummies	
Social & Defence	Convention centres, street lighting, urban regeneration, facilities and contracts related to culture, defence, education, fire & rescue, government, healthcare, housing, justice, sports & leisure and waste & recycling.
Oil & Gas	Coal-to-liquids, downstream, drilling platforms & rigs, exploration, gas-to-liquids, LNG (Liquefied Natural Gas), natural gas, offshore drilling, oil, oil sands, petrochemicals, pipelines, refineries, re-gas, shipping, storage and upstream activities.
Water & Sewage	Aquifers, desalination, flood defences, pipe networks, reservoirs & dams, sewage treatment, storage, waste water and water treatment facilities.
Telecoms	Base stations, broadcasting, operators and networks for 3G, 4G, broadband,cable, fibre-optic, fixed-line, GPRS, GPS, GSM, satellite, VoIP, WiFi and WiMax.
Renewables	Biofuels, biomass, geothermal, hydrogen, offshore wind, onshore wind, photovoltaic solar, small hydro (<100MW), thermal solar, tidal, waste-to-energy, and wave power.
Mining & Metals	Extraction, facilities and operations for the mining, smelting and processing of aluminium, cement, copper, coal, diamonds, gold, iron, lead, nickel, steel, uranium, zinc andother precious metals.
Transport	Airports, bridges, canals, car parks, heavy & light rail, subways, ports, terminals, roads, rolling stock, service stations, tolling and tunnels
Power	Transmission, distribution and generation from coal-fired, dual-fuel, gas-fired, oil-fired, IWPP (Independent Water and Power Production), large hydro (>100MW), and nuclearsources
Governance index	
Voice and Accountability	Reflects perceptions of the extent to which a country's citizens are able to participate in selecting their government, as well as freedom of expression, freedom of association, and a free media.
Political Stability and Absence of Violence/Terrorism	Political Stability and Absence of Violence/Terrorism measures perceptions of the likelihood of political instability and/or politically-motivated violence, including terrorism.
Government Effectiveness	Reflects perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies.
Regulatory Quality	Reflects perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development.
Rule of Law	Reflects perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence.
Control of Corruption	Reflects perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as "capture" of the state by elites and private interests.
Legal risk	
Creditor Rights	Reflects different legal protections of lenders. The index is formed by adding 1 when (1) the country imposes restrictions, such as creditors' consent or minimum dividends to file for reorganization; (2) secured creditors are able to gain possession of their security once the reorganization petition has been approved (no automatic stay); (3) secured creditors are ranked first in the distribution of the proceeds that result from the disposition of the assets of a bankrupt firm; and (4) the debtor does not retain the administration of its property pending the resolution of the reorganization. The index ranges from zero to four.

Appendix B Derivation of the MTE and Marginal Policy Relevant Treatment Effect

Here we present the MTE and MPRTE following Heckman and Vytlacil (2001, 2005), but adapted to our problem. In our market setting, there are two potential load spreads (Y_1 and Y_0) for each project i. Y_1 denotes the potential spread when the loan syndicate includes at least one (top-20) bank that adopts Equator Principles. This represents the EPFI "treatment" (i.e., $D = 1$). Y_0 denotes the potential spread without EPFIs (i.e,. $D = 0$) . The observed spread Y_D relates to the two potential outcomes as follows (omitting the index i to alleviate notation):

$$Y_D = (1-D)Y_0 + DY_1 \tag{4}$$

$$Y_1 = X'\beta_1 + U_1 \tag{5}$$

$$Y_0 = X'\beta_0 + U_0 \tag{6}$$

$$I = Z'\delta - V \tag{7}$$

$$D = 1 \text{ iff } Z'\delta > V; \text{ and } D = 0 \text{ iff } Z'\delta \leq V \tag{8}$$

where $D \in \{0,1\}$, and U_1 and U_0 are unobservables. Variables (X,Z) are observed, while (V) are unobserved. Eq. (7) captures the latent propensity to seek out an EPFI for financing and represents the net economic gain from using an EPFI. Project sponsors will deal with an EPFI if it is beneficial for them: $D = \mathbf{1}_{\{I>0\}}$. One or more instrumental variables (Z) must affect the decision to choose an EPFI, but cannot affect the outcome (i.e., spread). Thus, $Cov(Z,U_0) = 0$, $Cov(Z,U_1) = 0$ and $\delta \neq 0$. The treatment effect for an individual project is $(Y_1 - Y_0)$. We can estimate the probability $P(Z)$ of receiving a "treatment " given Z using eq. (7) as $P(Z) = P(D = 1|Z) = F_V(\mu(Z))$, where $F_V(\ldots)$ is the distribution function of V. Now, consider a class of policies (e.g., ESG banking regulations) that affect the probability of dealing with an EPFI, but do not affect potential outcomes (e.g., spreads) or unobservables in the selection process (Y_1, Y_0, V). Let D^* be the treatment choice made following the policy change and P^* the corresponding probability of working with an EPFI ($D^* = 1$). Under the alternative policy, the outcomes are $Y^* = (1-D^*)Y_0 + D^*Y_1$. The policy-relevant treatment effect (PRTE) is the average effect of switching from the original to the new policy, for projects that are EPFI-financed only due to the policy change (Heckman and Vytlacil, 2001, 2005, 2007),

$$\text{PRTE} = \frac{E(Y|\text{alternative policy}) - E(Y|\text{baseline policy})}{E(D|\text{alternative policy}) - E(D|\text{baseline policy})} = \frac{E(Y^*) - E(Y)}{E(D^*) - E(D)} = \int_0^1 \text{MTE}(u)\, \omega_{\text{PRTE}}(u)\, du$$

$$\text{where} \quad \omega_{\text{PRTE}}(u) = \frac{F_P(u) - F_{P^*}(u)}{E_{F_{P^*}}(P) - E_{F_P}(P)}$$

and where F_{P*} and F_P are the distributions of P^* and P, respectively. We interpret the marginal treatment effect (MTE) as the marginal economic gain for sponsors from dealing with EPFIs, conditional on observed characteristics $X = x$ and conditional on unobservables

$U_D = u$, which is the propensity to *not* seek out an EPFI for financing. That is, suppose a small increase in the expected value of being financed by an EPFI. Then, MTE tells us how much the spread changes.

The MTE is a function providing the average treatment effect for various levels of observed and unobserved characteristics ($X = x, U_D = u$). If the MTE function increases in u, projects that are more likely to deal with EPFIs have *lower* spreads. Heckman et al. (2006) derive the MTE as

$$\text{MTE}(X = x, U_D = u) = x(\beta_1 - \beta_0) + \mathbb{E}(U_1 - U_0 | U_D = u) \tag{9}$$

with the two components $x(\beta_1 - \beta_0)$ and $k(u) = \mathbb{E}(U_1 - U_0 | U_D = u)$ capturing the net gains due to working with EPFIs that are explained by, respectively, observed characteristics (heterogeneity in observables) and unobserved characteristics (heterogeneity in unobservables). The MTE is estimated using Local Instrumental Variables (LIV) (see e.g. Carneiro and Lee, 2009; Carneiro et al., 2011; Maestas et al., 2013). Specifically, the procedure to obtain the MTE and subsequently the MPRTE is as follows (Andresen, 2018, p.123). First, the selection equation is estimated by probit. This equation captures the latent propensity to get financing from an EPFI, and allows us to estimate $P(Z)$, the propensity score. Then we make the distributional assumption that unobserved variables in the potential outcomes and decision equations, $(U_{0i}, U_{1i}, V_i) \sim \mathcal{N}(0, \sum)$. Therefore, the unknown function $K(p) = p\mathbb{E}(U_1 - U_0 | U_D \leq p)$ has the functional form $-(\rho_1 - \rho_0)\varphi\Phi^{-1}(u)$. Next, the conditional expectation of Y_D given X and p is estimated[39] as

$$Y_D = X^\top \beta_0 + X^\top (\beta_1 - \beta_0) p + K(p) + \varepsilon_i.$$

This allows us to recover $k(u) = K'(u)$, where K' is the first derivative of K. Lastly, we generate the MTE by taking the derivative of the conditional expectation with respect to p,

$$\widehat{MTE}(x, u) = x(\widehat{\beta_1 - \beta_0}) + \widehat{k(u)}$$

The MTE lets us recover the MPRTE as the limit case of the PRTE (Carneiro et al., 2010).In theory, we could use the estimated MTE to obtain the PRTE. However, it is difficult to estimate because it often is necessary for the support of $P(Z)$ to be the full unit interval (Heckman and Vytlacil, 2005; Carneiro et al., 2010). This requirement is seldom met (Carneiro et al., 2011). An alternative approach that does not require the full support is to estimate the marginal PRTE (Carneiro et al., 2010), $\text{MPRTE} = \lim_{\alpha \to 0} \text{PRTE}(F_\alpha)$, where $F(\ldots)$ is the CDF of $P(Z)$, $\alpha \in \mathbb{R}$ is a class of policies and F_0 is the baseline policy. Then, Carneiro et al. (2010) prove that

$\text{MPRTE}(\{F_\alpha\}) = \int_0^1 \text{MTE}(u)\, \omega_{\text{MPRTE}}(u; F_\alpha)\, du$ where $\omega_{\text{MPRTE}}(u; F_\alpha) = \frac{\frac{\partial}{\partial \alpha} F_0(u)}{\int_0^1 \left(\frac{\partial}{\partial \alpha} F_0(t) \right) dt}$

[39] The propensity score and the means of X are generated variables. To address this issue, standard errors are bootstrapped and clustered by deal.

Appendix C Alternative techniques: OLS, 2SLS and NNM

Table 10: Effect of (Top-20) EPFIs on loan spreads — OLS regression.

This table presents OLS regression results of the effect of the (top-20) EPFIs on loan spreads and other deal characteristics. Panel A and B show, respectively, results for loan effects of EPFIs and top-20 EPFIs. The dependent variables are loan spreads. Standard errors are clustered by project. Outliers are dropped based on the DFBETA (influence measure). In brackets are z-statistics. *, **, *** indicate 10%, 5% and 1% levels of significance. D: dummy. Nb. of SPE: Number of sponsor with experience in PF markets

	Panel A		Panel B	
	(1)	(2)	(4)	(5)
EPFIs	29.337***	27.566**		
	(2.86)	(2.67)		
Top-20 EPFIs			−4.727	−4.632
			(−0.31)	(−0.30)
Intercept	41.598	62.185**	41.046	71.173**
	(1.46)	(2.07)	(1.42)	(2.20)
Ranking CSR-Friendly	0.14	0.133	0.0452	0.034
	(1.03)	(0.96)	(0.32)	(0.24)
Nb. of SPE	4.88	4.406	4.457	4.140
	(1.21)	(1.06)	(1.09)	(1.01)
Project complexity	−15.662	−14.971	−15.389	−14.972
	(−1.36)	(−1.30)	(−1.31)	(−1.29)
Financial crisis D	85.753***	85.059***	95.471***	94.384***
	(7.21)	(7.14)	(7.62)	(7.52)
Debt-to-equity ratio		−0.0186		−0.0174
		(−1.36)		(−1.23)
ln(tranche maturity)		−5.658		−8.527
		(−0.95)		(−1.33)
Project risk				
Capex	0.00238	0.00255	0.00171	0.00186
	(0.60)	(0.65)	(0.4)	(0.44)
Institutional risk				
Creditor Rights	21.079***	21.263***	22.152***	21.885**
	(3.19)	(3.22)	(3.37)	(3.33)
Lender variables				
Passive lenders	10.956	10.583	4.874	5.526
	(0.38)	(0.38)	(0.16)	(0.19)
Non-bank lenders	17.528	18.018	17.991	18.393
	(1.14)	(1.18)	(1.15)	(1.18)
Loan variables				
Refinancing loan D	11.719	21.141	14.086	22.507
	(0.78)	(1.33)	(0.89)	(1.37)
Guaranteed D	−69.774***	−68.530***	−54.108***	−54.041***
	(−3.14)	(−3.0)	(−2.56)	(−2.57)
Revolver loans D	−54.668***	−60.079***	−44.809***	−51.733***
	(−3.54)	(−3.76)	(−2.82)	(−3.11)
Currency risk D	−10.334	−10.330	−2.711	−3.807
	(−0.63)	(−0.63)	(−0.16)	(−0.23)
ln(tranche size)	−0.443	−0.407	3.404	3.453
	(−0.1)	(−0.09)	(0.73)	(0.73)
Loan type	yes	yes	yes	yes
Year and Industry dummies	yes	yes	yes	yes
Country fixed effects (Top 15)	yes	yes	yes	yes
Sample size	2,255	2,255	2,294	2,294
Adjusted R^2	0.351	0.353	0.327	0.329
Variance Inflation Factor > 4?	no	no	no	no

Table 11: Effect of (Top-20) EPFIs on loan spreads — 2SLS regression.

This table presents 2SLS regression results of the effect of the (top-20) EPFIs on loan spreads and other deal characteristics. Panels A and B show, respectively, results for the effects of EPFIs and top-20 EPFIs. The dependent variables are loan spreads. Standard errors are clustered by project. The exclusion variables are *Nb. of MLA*. Outliers are dropped based on the DFBETA (influence measure). In brackets are z-statistics. *, **, *** indicate 10%, 5% and 1% levels of significance. D: dummy. Nb. of SPE: Number of sponsor with experience in PF markets

	Panel A			Panel B		
	(1)	(2)	(3)	(4)	(5)	(6)
	First stage	Second stage	Second stage	First stage	Second stage	Second stage
Nb. of MLA	0.0256***			0.00282**		
	(2.81)			(2.06)		
Ranking CSR-Friendly	−0.00124***	0.486*	0.0477	−0.00244	0.154	0.0129
	(−2.14)	(1.90)	(1.08)	(−0.40)	(0.81)	(0.45)
Nb. of SPE	−0.00438	5.253	7.442	6.164	6.164	7.485
	(−0.24)	(0.92)	(1.20)	(1.08)	(2.60)	(1.20)
Project complexity	−0.0272	−9.768	−12.757	−20.029	−14757**	−21.984
	(−0.61)	(−0.69)	(−0.88)	(−1.07)	(−2.49)	(−1.10)
Financial crisis D	0.293***	12.005	12.289	79.342***	97.667***	80.838***
	(4.89)	(0.25)	(0.26)	(3.71)	(16.68)	(3.90)
Debt-to-equity ratio			0.0477			0.0129
			(1.08)			(0.45)
ln(tranche maturity)			−17.477			−23.940
			(−1.35)			(−1.51)
Project risk						
Capex	$-8.18e-06$	0.0024	0.00213	0.0000361**	−0.00886	−0.00950
	(−0.61)	(0.45)	(0.4)	(1.98)	(−0.8)	(−0.80)
Institutional risk						
Creditor Rights	0.0512	9.292	4.601	−0.0170	26.081**	23.311*
	(1.58)	(0.94)	(0.40)	(−0.40)	(2.06)	(1.91)
Lender variables						
Passive lenders	−0.0177	8.645	15.624	−0.214*	45.483	53.889
	(−0.13)	(0.29)	(0.49)	(−1.94)	(0.93)	(1.03)
Non-bank lenders	−0.0473	28.993	26.454	−0.0706	34.492	34.201
	(−0.92)	(1.58)	(1.46)	(−1.20)	(1.32)	(1.03)
Loan variables						
Refinancing loan D	0.00253	9.583	−17.238	0.0375	4.014	−5.117
	(0.04)	(0.43)	(−0.5)	(0.45)	(0.17)	(−0.16)
Guaranteed D	0.220	−120.94**	−133.359**	0.178	−93.464*	−102.990*
	(1.43)	(−2.13)	(−2.12)	(1.20)	(−1.80)	(−1.68)
Revolver loans D	0.201***	−108.117***	−114.631***	0.0603	−64.148**	−78.0248**
	(2.63)	(−2.79)	(−2.83)	(0.78)	(−2.15)	(−2.31)
Currency risk D	0.162***	−44.888	−52.596	0.0658	−14.358	−20.025
	(2.58)	(−1.52)	(−1.59)	(0.76)	(−0.50)	(−0.63)
ln(tranche size)	0.0670***	−19.871	−19.160	0.196	−4.704	−3.658
	(4.07)	(−1.56)	(−1.54)	(1.12)	(−0.63)	(−0.51)
EPFIs		263.41*	281.028*			
		(1.92)	(1.90)			
(Top-20) EPFIs					217.996	233.783
					(1.27)	(1.25)
Loan type	yes	yes	yes	yes	yes	yes
Year and Industry dummies	yes	yes	yes	yes	yes	yes
Country fixed effects (Top 15)	yes	yes	yes	yes	yes	yes
Sample size	2,255	2,255	2,255	2,294	2,294	2,294
Kleibergen-Paap rk LM χ^2 P-val		0.0048	0.0052		0.0597	0.0686
Kleibergen-Paap rk F statistic		53.77	47.802		71.890	64.322

Table 12: Average treatment effect — Nearest Neighbor Matching — Loan spreads

The table presents results of the ATE (Average Treatment Effect) and ATET (Average Treatment Effect on the Treated) from the matching model using Nearest Neighbor Matching. The reported effect is that of having (Top-20) EPFIs in a deal on loan spreads. The dependent variable of interest is *Loan spreads*. The z-statistics are in parentheses. The symbols $*$, $**$ and $***$ denote statistical significance at the 10%, 5% and 1% levels, respectively.

Variable	Panel A: EPFI effect	Panel B: Top-20 EPFI
ATE	47.282^{***}	4.699
	(9.47)	(0.89)
ATET	56.356^{***}	3.499
	(8.88)	(0.27)

Appendix D Descriptive statistics

Table 13: Number of projects with and without EPFIs, organized by institutional quality. Main data sources: Projectware (Dealogic) and Equator Principles Association.

Governance Index	[0-25]	]25-50]	]50-75]	]75-100]	**Total**	
Nbers of projects	22	179	234	667	**1,102**	
% without EPFIs	59	58	62	61		
% with EPFIs	41	42	38	39		
Creditor Rights	0	1	2	3	4	**Total**
Nber of projects	116	341	237	94	226	**1,014**
% without EPFIs	51	60	62	84	58	
% with EPFIs	49	40	38	16	42	

Table 14: Descriptive statistics for sample of project finance loans, 2001-2015 (ct'd)

This table presents the distribution, across industrie,s of tranche size for projects arranged using project finance. We use loan tranches where spread, maturity of debt, and tranche size are available. In the last column, the number of tranches (of projects) with EPFIs is reported in parentheses. For a definition of the variables, see appendix A.

Industrial distribution of tranche size (US$m).								
	Mean	Median	Std	Min	Max	Total value	Nb. tranches	Nb. projects
Oil & Gas	736.16	463	806.22	2.57	4,399.98	659,601.1	896 (607)	173 (86)
Transport	442.55	201.23	632.27	3.1	4,956	401,390.3	907 (470)	170 (72)
Power	347.3	228.47	399.61	2.47	2,800	372,652.2	1,073 (669)	205 (89)
Water	959.85	93.57	1,330.99	1.57	3,085.29	211,166.8	220 (33)	45 (9)
Renewables	148.41	75.45	179.83	0.56	1,023	149,302.7	1,006 (448)	243 (89)
Social & Defense	234.93	56.68	526.35	0.39	2,685.97	120,987.6	515 (198)	160 (54)
Mining	501.42	127.5	740.02	3	2,250.1	120,843.1	241 (116)	66 (22)
Telecoms	328.89	146.47	603.32	4.85	3,500	56,897.97	173 (96)	40 (14)
Total	415.99	161.38	650.22	0.39	4,956	2,092,842	5,031 (2,637)	1,102 (435)

Table 15: Geographical distribution of loans in the sample, sorted by loan dollar value, 2001-2015. "Total" indicates total value in US$m. The number of loan tranches with EPFIs are in parentheses. "% tr." indicates the percentage of loan tranches with EPFIs.

Panel A: Project loan tranches where spread, debt maturity, and tranche size are available.

Country and regional distribution of tranche size (US$m).

No.	Country	Mean	Med	Std	Min	Max	Total	Nb tran.	% tr.
1	USA	468.48	250	805.63	0.8	4,400	288,116	615 (369)	60
2	Australia	991.85	207.8	1,265.96	2.47	3,085.3	280,693	283 (90)	31.80
3	Spain	272.05	112.52	388.26	1	1,419.7	159,147	585 (304)	51.96
4	UK	266.26	93.25	430.34	0.39	3,797.5	142,184	534 (347)	64.98
5	Saudi Arabia	1,101.22	1,160	643.82	38	2,500	140,956	128 (112)	87.5
6	Qatar	831.37	620	794.63	18	2,800	117,223	141 (103)	73.05
7	Mexico	498.47	197	864.90	6.38	2,838.5	101,688	204 (119)	58.33
8	Portugal	242.44	74.10	350.97	1.34	1,109.9	70,551	291 (90)	30.93
9	UAE	913.63	796	613.11	7.9	1,804	68,522	75 (44)	58.67
10	India	420.36	222.66	420.04	16.5	1,980	65,996	157 (40)	25.48
11	Papua N.G.	1,900.47	1,950	288.80	266	1,950	64,616	34 (33)	97.06
12	France	654.18	147.1	873.02	3.4	2,164.5	60,838	93 (65)	69.89
13	Oman	613.79	240	606.43	17.1	1,420	60,151	98 (34)	34.69
14	Brazil	399.31	332	336.56	2.57	1,248.8	49,514	124 (74)	59.68
15	Turkey	535.64	306.29	848.87	62.5	4,956	40,173	75 (8)	10.67
	Full Sample	415.98	161.38	650.22	0.39	4,956	2,092,842	5,031 (2,637)	52.41

Panel B: Regional distribution of tranche spreads (bp).

No.	Region	Mean	Med	Std	Min	Max	Total	Nb tran.	% tr.
1	Europe	304.19	114.19	398.31	0.39	4,956	633,928	2,084 (1,127)	54.08
2	Asia Pacific	469.65	117.41	828.82	0.44	3,085	510,045	1,086 (324)	29.83
3	MENA	822.26	668.5	680.21	7.9	2,800	416,064	506 (344)	67.98
4	North America	436.51	223.7	753.18	0.56	4,400	314,723	721 (453)	62.83
5	Latin America	372.66	233.5	575.95	2.57	2,838	204,591	549 (345)	62.84
6	Africa (Sub-Saharan)	158.72	80	216.3	3.13	850	13,492	85 (44)	51.76

Table 16: Median difference tests on loan characteristics, with and without Equator Principles-adopting Financial Institutions (EPFIs) before, during and after the financial crisis

This table presents credit spread medians and results of the Wilcoxon z-test for the differences between loans arranged with and without EPFIs. "Yes" indicates EPFI, and "No" indicates no EPFI. Because the credit spread variable is not normally distributed, we compute the Wilcoxon nonparametric equality test. In parentheses are the number of tranches.

	Yes	No	Median differ.	Wilcoxon z-test	Number of tranches
Before crisis					
Project value (US$m)	665.33 (657)	211.35 (1,503)	453.98	-17.86^{***}	2,160
Tranche size (US$m)	273 (657)	80 (1,503)	193	-16.68^{***}	2,160
Capex (US$m)	507.61 (344)	259.1 (891)	248.51	-10.04^{***}	1,235
Debt ratio	0.88 (657)	0.91 (1,503)	−0.03	3.63^{***}	2,160
Debt maturity (yrs)	8 (607)	12 (1,416)	−4	2.77^{***}	2,023
Credit spread (bp)					
Presence EPFIs	145 (657)	130 (1,503)	15	-2.26^{**}	2,160
Top-20 EPFIs	145 (339)	135 (1,821)	10	−0.88	2,160
During crisis					
Project value (US$m)	720 (1,467)	451.9 (731)	268.1	-11.43^{***}	2198
Tranche size (US$m)	260.3 (1,467)	101.9 (731)	158.4	-8.92^{***}	2198
Capex (US$m)	1,108.2 (1,081)	451.9 (536)	656.3	-9.72^{***}	1,617
Debt ratio	0.83 (1,467)	0.92 (731)	−0.09	14.47^{***}	2,198
Debt maturity (yrs)	15 (1,174)	14 (581)	1	-2.34^{**}	1,755
Credit spread (bp)					
Presence EPFIs	275 (1,467)	240 (731)	30	-6.34^{***}	2,198
Top-20 EPFIs	275 (712)	250 (1,486)	25	-2.42^{**}	2,198
After crisis					
Project value (US$m)	640 (513)	171.32 (160)	468.68	-10.27^{***}	673
Tranche size (US$m)	265.1 (513)	112.16 (160)	152.94	-5.67^{***}	673
Capex (US$m)	700 (260)	157.03 (83)	542.97	-6.91^{***}	343
Debt ratio	0.84 (513)	0.93 (160)	−0.09	1.21	673
Debt maturity (yrs)	7 (422)	11 (134)	−4	2.55^{***}	556
Credit spread (bp)					
Presence EPFIs	250 (513)	241.5 (160)	8.5	−0.35	673
Top-20 EPFIs	225 (238)	250 (435)	−25	4.24^{***}	673

*, **, and *** indicate significant at the .10, .05 and .01 level, respectively

0_a indicates there are no observations.