Why Do Firms Adopt ESG-linked Pay? The Role of Bank Financing

Abstract

We study how debtholders transmit non-financial preferences into borrowing firms' executive compensation. We exploit ESG disclosure mandates imposed on non-U.S. banks as exogenous shocks to debtholders' ESG preferences and study whether U.S. firms with pre-existing lending relationships to these banks incorporate ESG performance metrics into executive compensation (i.e., ESG-linked pay). Following the disclosure mandates, exposed firms are more likely to adopt ESG-linked pay as a commitment device to debtholders' ESG objectives. The effect is stronger for firms with poorer ESG performance, higher switching costs to alternative lenders, and weaker bargaining power. We further demonstrate that the disclosure regulations in the banking sector lead to more frequent loan renegotiations and negative stock market reactions. Firms that adopt ESG-linked pay experience subsequent improvements in ESG performance and firm value. Overall, we establish that debtholders' non-financial preference influence executive compensation through lending channels and that compensation design serves as a commitment mechanism that alleviates contracting frictions induced by regulatory shocks.

Keywords: ESG, Executive Compensation, Corporate Governance, Debt Contracts

JEL Codes: G21, G38, J33

1 Introduction

Although executive compensation is typically viewed as a governance mechanism that aligns managers' incentives with shareholder interests (Frydman and Jenter, 2010; Edmans et al., 2017), debtholders can also discipline and redirect compensation design because they price downside risk and influence managerial actions through loan contracts and monitoring (John and John, 1993; Ortiz-Molina, 2007; Balsam et al., 2018; Hong et al., 2021). However, prior literature primarily examines how debtholders' financial objectives shape equity incentives in executive compensation; in contrast, whether creditors transmit non-financial preferences into firms' executive compensation remains understudied.[1] This question has become increasingly salient as mandatory ESG disclosure regulations have intensified ESG demands among corporate debtholders (Krueger et al., 2024). In this paper, we find that debtholders transmit ESG regulatory pressures to borrowing firms and influence their decision to incorporate ESG performance metrics into executive compensation (i.e., ESG-linked pay). Our findings provide new insight into how debtholders influence the executive compensation structures of borrowing firms and indicate that shareholders adopt ESG-linked pay to credibly commit to debtholders' non-financial ESG preferences.

Mandatory ESG disclosure regulations in the banking sector can generate a wedge between the ESG preferences of shareholders and debtholders. Disclosure and transparency requirements subject banks to heightened public and market discipline (Flannery, 1998). Mandatory disclosure regarding banks' ESG performances can similarly heighten public scrutiny and reputational concerns, thereby increasing the sensitivity of debt capital providers to ESG performance of borrowers (Houston and Shan, 2022; Chen et al., 2023b). When borrowing firms are not subject to comparable ESG regulations, differences in regulatory exposure generate a divergence between shareholder and debtholder preferences over ESG-related corporate policies. In the absence of credible commitment

[1] Non-financial preferences and financial incentives are fundamentally different. Financial incentives are typically unidimensional, contractible, and relatively easy to calibrate, which allows firms to align managerial actions with corporate stakeholder objectives through explicit contractual terms. For example, John and John (1993) argue that shareholders can design pay for performance in executive compensation to address debtholder concerns about excessive executive risk taking. In contrast to these relatively straightforward financial incentives, non-financial preferences related to ESG activities are multidimensional, difficult to quantify, and costly to verify, which makes them harder to incorporate into formal contracts. We will discuss this issue more in Section 2.2.

mechanisms, banks anticipate underinvestment in ESG by borrowers and respond by tightening lending terms or restricting credit supply even when firm cash flow risk remains unchanged, thereby transmitting regulatory pressure through the lending channel. Hence, mandatory ESG disclosure requirements for banks induce a misalignment between shareholder and debtholder incentives, which raises the cost of debt capital, and, in turn, reduces shareholder value. This regulatory-induced divergence raises a central issue for borrowing firms in how they can credibly reassure debtholders about their ESG commitments to restore shareholder value.

One potential mechanism through which firms can address this divergence between shareholder and debtholder ESG preferences is executive compensation design. Firms operate as a nexus of contractual relationships, and executive compensation plays a central role in shaping managerial incentives that internalize the interests of both equity and debt claimants. Because debtholders rationally price, *ex post*, the divergence between shareholder and debtholder incentives inferred from managerial incentives embedded in compensation contracts, compensation design can affect debt financing outcomes (Jensen and Meckling, 1976; John and John, 1993; Brockman et al., 2010). In the presence of ESG regulations imposed on banks, the incorporation of ESG performance metrics into executive compensation can serve as a contractual commitment that mitigates debtholder concerns and attenuates losses in shareholder value associated with divergent shareholder and debtholder objectives. ESG-linked pay can be effective because performance measures and payoff structures are publicly observable to debtholders and thus communicate strategic priorities and signal commitment to ESG objectives (Bloomfield, 2021; Bushman, 2021).

However, ESG-linked pay is not necessarily the first-best or universally optimal response to regulatory-induced divergence in ESG objectives between shareholders and debtholders. Embedding ESG performance metrics into executive compensation may not be feasible when managers are unwilling to adopt those metrics. Firms may also have lower-cost alternatives for responding to ESG-related regulatory pressures on their lenders, including marginal operational adjustments to improve ESG performance, switching to lenders not subject to ESG constraints, or maintaining existing practices without change. Accordingly, firms' optimal responses to mandatory ESG disclosure in

the banking sector depend on the severity of the regulatory-induced divergence between shareholder and debtholder ESG objectives and on the relative costs of compensation-based commitment versus alternative adjustment mechanisms.

Testing our theoretical predictions faces one major empirical challenge: firm–bank lending relationships are endogenously determined equilibrium outcomes. Borrowing firms form rational expectations about regulatory-induced divergence in ESG objectives and select debt capital providers accordingly. Prior studies show that firms obtain bank loans from lenders with similar ESG performance (Houston and Shan, 2022). As a result, observed firm–bank matches reflect firms' strategic selection, precluding direct inference about whether debtholders' non-financial ESG preferences incentivize the use of ESG-linked compensation as a commitment device. We address this challenge in two ways. First, we examine U.S. firms that borrow from non-U.S. banks subject to mandatory ESG disclosure requirements (e.g., Wang, 2023; Krueger et al., 2024), given that the U.S. does not implement mandatory ESG disclosures until 2024.[2] Second, following Frydman and Hilt (2017), we rely on pre-existing firm–bank lending relationships and use the introduction of ESG regulations on banks as an exogenous shock, since firms are unlikely to have anticipated these regulations at loan initiation.

We employ stacked difference-in-differences (DiD) identification to investigate how the borrowing firms adopt ESG-linked pay as a response to debtholders' non-financial preference induced mandatory ESG disclosure regulations (e.g., Gormley and Matsa, 2011). First, we identify the initial year of mandatory ESG disclosure regulations for each non-U.S. lead arranger in DealScan based on the countries where they operate. We label loans as "*ESG-shock Loans*" if they are issued before at least one lead arranger becomes subject to ESG regulations and remain outstanding after the regulations take effect. Second, we measure firm-level exposure to ESG regulation shocks from the banking sector as the proportion of ESG-shock loans relative to total outstanding loans from

[2]The SEC issues a request for public input on climate-related disclosures in March 2021. The SEC adopts a final climate-related disclosure rule in March 2024 that requires public companies to report certain climate-related risks and greenhouse gas emissions. Prior studies document that such disclosure requirements have real effects on regulated firms (Carter et al., 2025b). However, as of early 2026, the SEC does not enforce the federal ESG climate disclosure rule, as the Commission pauses implementation and ceases its defense of the rule in ongoing litigation, leaving its future uncertain.

foreign banks. Firms that rely more heavily on banks later subject to ESG regulations face greater impact (Frydman and Hilt, 2017). We classify firms as treated when their exposure fraction exceeds 50% for the first time. Third, a cohort in our stacked DiD framework consists of firms treated for the first time in the same year and control firms that never meet the treatment threshold (Gormley and Matsa, 2011; Callaway and Sant'Anna, 2021). Finally, for each cohort, we construct a [-3, +3] year window around the cohort year to form a cohort-firm-year panel with 9,912 observations. This panel includes 220 treated firms and 331 control firms, all of which are non-financial companies in the S&P 1500 index. Our research focuses on S&P 1500 firms because ISS and ExecuComp provide comprehensive data coverage for this sample.

Our empirical evidence indicates that when debtholders are affected by mandatory ESG disclosure regulations, they pass the regulatory pressure on to borrowing firms. Borrowing firms, in turn, adopt ESG-linked pay as a commitment device to accommodate debtholders' non-financial ESG preferences. We find that U.S. firms with a larger share of existing loans from foreign banks that later become subject to mandatory ESG disclosure requirements are more likely to incorporate ESG metrics into executive compensation contracts. Our identification satisfies the parallel trends assumption because treated and control U.S. firms exhibit similar trends in adopting ESG-linked pay before the mandatory ESG disclosure regulations in the banking sector. Moreover, the effect is stronger when borrowing firms have more negative ESG incidents, when borrowing firms face higher costs of switching to new lenders, when borrowing firms have lower implementation costs for compensation changes, when lenders possess greater bargaining power in the lending relationship.

We reinforce our economic analysis with evidence that debtholders pass on regulatory pressure to borrowing firms: debtholders' non-financial preferences induced by mandatory ESG regulations negatively affect firm value. First, U.S. borrowing firms whose lenders become subject to ESG disclosure mandates experience more restrictive loan amendments. These mandates increase lenders' regulatory and reputational exposure to borrowers' ESG performances and render existing loan contracts suboptimal once lenders place weight on non-financial objectives. As a result, lenders renegotiate loan terms more frequently. Second, we examine stock market reactions to the

introduction of the EU Non-Financial Reporting Directive and find negative three-day abnormal returns for firms whose lending banks are subject to this regulation around the policy announcement on October 22, 2014.[3] The stock market rationally anticipates that loan renegotiation reduces shareholder value through both the direct costs of contract amendments and tighter contractual terms.

Moreover, we provide evidence that ESG-linked pay can improve corporate ESG performance and firm value when used as a credible commitment device. Critics note that ESG-linked schemes often lack the strength, objectivity, or monitoring needed to change behavior and therefore can be symbolic rather than substantive incentives (Walker, 2022; Efing et al., 2024). In our sample, when debtholders have non-financial ESG preferences, the adoption of ESG-linked pay is associated with subsequent improvements in ESG performance and a recovery in shareholder value. Our findings provide evidence that ESG-linked pay serves as a credible commitment device to mitigate regulatory-induced divergence between shareholders and debtholders. However, it should be noted that our findings do not address other potential motivations behind the adoption of ESG-linked pay; rather, we provide one specific explanation related to its efficiency in the context of compensation as a commitment device.

This research makes several contributions to the literature. First, we broaden the literature on how debtholders affect executive compensation. Prior work indicates that debtholders influence compensation by shaping equity-based incentives to mitigate risk shifting and agency conflicts (Ortiz-Molina, 2007; Balsam et al., 2018; Hong et al., 2021; Bens et al., 2023). In contrast, we show that when debtholder preferences extend beyond financial risk to ESG-related concerns, shareholders do not simply adjust incentive intensity but redesign the performance metrics embedded in compensation contracts, especially for cash compensation. This shift is economically meaningful because cash-based contracts allow firms to specify explicit and verifiable ESG targets more directly than equity-based incentives, which makes them a natural vehicle for credible commitment (Bloomfield,

[3]The EU Non-Financial Reporting Directive was issued on October 22, 2014, and changed the regulatory environment for corporate disclosure across many European Union member states, which constitute the majority of countries in our sample. The directive requires large firms to disclose information on non-financial matters, including environmental performance, social and employee-related issues, human rights, and anti-corruption practices.

2021; Bushman et al., 2004). Moreover, rather than reflecting creditor-imposed constraints (e.g., Balsam et al., 2018; Hong et al., 2021), compensation changes arise because shareholders internalize debtholders' ESG preferences and redesign contracts to signal commitment. The lending channel therefore transmits not only financial objectives but also non-financial preferences that reshape compensation design even in the absence of direct debtholder intervention.

Second, our findings deepen our understanding of the prevalence of compensation contracts that incorporate ESG performance metrics. Many firms have adopted ESG-linked pay (Cohen et al., 2023; Hazarika et al., 2023), yet the economic mechanisms behind this shift remain unclear. Prior studies emphasize shareholder *values* as key drivers of ESG-linked compensation adoption (e.g., Carter et al., 2023; Homroy et al., 2023; Chaigneau and Sahuguet, 2025). In this study, we provide evidence that shareholder *value* considerations also play an important role (Starks, 2023). Specifically, a larger divergence between shareholder and debtholder preferences reduces shareholder value, and ESG-linked pay mitigates this divergence by realigning incentives. Our findings also speak to the increasing complexity of executive compensation by clarifying why firms incorporate ESG performance metrics into pay contracts (Albuquerque et al., 2025). Relatedly, recent studies suggest that executive compensation can be used strategically to manage relationships with key corporate stakeholders, including product market peers (Ha et al., 2024), competitors (Bloomfield, 2021), supply chain partners (Carter et al., 2025a; Guo et al., 2025), and debtholders (Gong et al., 2024). We contribute to this literature by providing evidence that firms use ESG-linked pay as a commitment device to accommodate debtholders' non-financial preferences.

Finally, we make beneficial additions to the literature on the real effects of disclosure regulations (Ball, 2024). Our framework implies that ESG disclosure mandates in the banking sector transmit regulatory pressure to the unregulated corporate sector and alter borrowing firms' economic tradeoffs in executive compensation design (e.g., ESG-linked pay). Consistent with the real effects hypothesis, our evidence indicates that such disclosure requirements affect firms' real decisions by shaping how economic activities are measured and disclosed, even when borrowing firms do not face direct regulation. At the same time, our analysis highlights the role of the banking sector as a channel

through which regulatory shocks propagate to the broader corporate economy (Bernanke et al., 1999). Within a partial equilibrium framework, our findings carry policy implications by indicating that ESG regulations imposed on banks redistribute welfare between shareholders and debtholders, as shareholders incur costs to address debtholders' non-financial preferences.

2 Institutional Setting and Hypothesis Development

2.1 ESG Disclosure Regulations and Banks' Non-financial Preferences

Mandatory ESG disclosure regulations require firms to report on the environmental and social impacts of their corporate activities to enhance transparency and promote improved performance (Global Reporting Initiative, 2015). In recent decades, these regulations have increasingly applied to both financial and non-financial firms (KPMG, 2013). For example, the EU Directive 2014/95/EU mandates certain large companies, including banks, to disclose non-financial and diversity-related information. This paper focuses on mandatory ESG disclosure regulations affecting banks. Banks are subject to these regulations in two ways. First, certain ESG disclosure requirements specifically target banks and require them to report on their own ESG practices. Second, broader ESG disclosure requirements apply to firms that meet specific criteria such as listing status, asset size, or number of employees, and banks can fall within this scope.

Mandatory ESG disclosure regulations also matter significantly to borrowing firms that have lending relationships with affected banks. When banks subject to ESG disclosure regulation, their pressure on ESG will transmit to the borrowing firms. According to the Sustainability Accounting Standards Board (SASB), responsible financing is one of the most material aspects of a bank's ESG profile. Banks incorporate ESG considerations into their lending practices by increasing monitor and assess their borrowers' fulfillment of agree-upon environmental and social objectives, such as those specified in loan covenants, or by linking interest rates to ESG performance metrics. For instance, Dutch bank ABN AMRO stated that "*if the sustainability assessment indicates that a client does not meet the bank's sustainability standards, we explore possibilities for improvement.*"

Similarly, Singaporean bank DBS promotes responsible financing by linking interest rates to ESG performance metrics of their borrowers. These examples highlight how banks actively engage with borrowers to enhance ESG outcomes under ESG disclosure regulations.

Appendix B presents an anecdote that illustrates how mandatory ESG disclosure rules for banks widen the wedge between shareholders' and debtholders' ESG preferences and raise the incidence of loan renegotiation. Ford Motor Company's syndicated credit facility, an $11.485 billion revolving facility with eleven lead arrangers, records an eighteenth amendment on 29 September 2021 that first inserts ESG metrics. Four lead arrangers, Deutsche Bank AG (Germany, 2005), Royal Bank of Scotland PLC (United Kingdom, 2013), Barclays Capital (United Kingdom, 2013), and BNP Paribas (France, 2014), are subject to mandatory ESG disclosure rules. This example demonstrates that mandatory ESG disclosure regulation in the banking sector creates a wedge between the preferences of shareholders and debtholders, and leads to loan renegotiation and the addition of ESG covenants.

2.2 Executive Compensation as a Commitment Device to Debtholders

Executive compensation contracts align managerial actions with shareholder interests (Frydman and Jenter, 2010; Edmans et al., 2017), but they also shape firms' interactions with a broad set of corporate stakeholders, including supply chain partners (Carter et al., 2025a; Guo et al., 2025), product market peers (Bloomfield et al., 2023; Ha et al., 2024), and competitors (Bloomfield, 2021). In particular, debtholders exert significant influence over executive compensation because they rationally price shareholder-debtholder conflicts and incorporate these concerns into loan contract terms (John and John, 1993; Brockman et al., 2010). Leveraging their bargaining power in lending relationships, debtholders can influence equity-based compensation design (Balsam et al., 2018) and affect compensation effectiveness (Hong et al., 2021).

However, prior studies focus on how incentive contracts respond to debtholders' financial objectives. Much less is known about whether executive compensation reflects debtholder preferences when those objectives include non-financial concerns. This gap matters because financial incentives and non-financial preferences differ fundamentally. Financial incentives are typically unidimensional,

observable, and contractible over short to medium horizons, allowing firms to align managerial actions with stakeholder objectives through explicit contractual terms. In contrast, non-financial preferences such as ESG activities are multidimensional, difficult to quantify, costly to verify, and often reflect long-horizon concerns that do not map cleanly into cash flows.

Although Cohen et al. (2023) document that firms with ESG-linked pay are more likely to issue ESG-linked loans and interpret this empirical pattern as evidence that ESG-linked pay aligns managerial incentives with debtholders, whether ESG-linked pay constitutes a credible commitment to debtholders with non-financial ESG preferences remains conceptually ambiguous. Following Hart and Moore (1994), contractual commitment to outside stakeholders becomes limited when relevant objectives or states are difficult to verify. When debtholders' ESG preferences are multidimensional and hard to measure, firms cannot contract directly on these preferences, and executive compensation may not provide credible external commitment. Moreover, the effectiveness of ESG-linked pay is further called into question by Holmstrom and Milgrom (1991), who indicate that when performance dimensions differ in measurability, optimal incentive contracts place greater weight on contractible outcomes and less weight on hard-to-measure objectives. To the extent that ESG objectives are more difficult to measure than other components of executive compensation, incentive contracts may induce managers to prioritize financial or easily observable metrics at the expense of ESG-related goals. Taken together, these theoretical considerations suggest limits to the use of ESG-linked pay as a commitment device for debtholders with non-financial preferences. It is possible that debtholder non-financial preferences limit the effectiveness of executive compensation as a tool for managing lending relationships.

In this research, we test whether shareholders strategically use ESG-linked compensation to commit to debtholders' ESG objectives when debtholders transmit regulatory pressure to borrowing firms. In recent decades, many firms have incorporate ESG metrics into management compensation contracts for their C-suite executives (Cohen et al., 2023; Hazarika et al., 2023). The proportion of firms adopting ESG-linked pay significantly increases from 3% in 2011 to 38% in 2021 worldwide. In 2021, of the $6.96 billion paid to S&P 500 CEOs, nearly $600 million is linked to Environmental

and Social performance metrics (Shostal and Shah, 2022). Geographically, more than 60% of firms in the European Union include ESG metrics in the executive compensation, compared to just 16.5% in the United States. Industry-wise, firms in sectors with significant environmental impact, such as petroleum, natural gas, utilities, and metal mining, are more likely to adopt ESG-linked pay due to heightened public and regulatory scrutiny. However, the reasons why firms adopt ESG-linked pay remain debated among academics and industry practitioners (Carter et al., 2023; Homroy et al., 2023; Chaigneau and Sahuguet, 2025), and we contribute to this debate by highlighting the strategic use of ESG-linked pay as a commitment device for debtholders with non-financial preferences.

2.3 Hypothesis Development

Absent ESG disclosure mandates in the banking sector, executive compensation functions as an *ex ante* mechanism to attenuate shareholder–debtholder conflicts based on financial incentives, with loan contracts internalizing residual conflicts through equilibrium pricing. Shareholders effectively hold a call option on the firm's assets and benefit from any increase in asset value, whereas debtholders are primarily concerned with downside risks, as their losses are limited to the value of the debt. These asymmetric payoff structures give rise to the divergence between shareholder and debtholder financial incentives (Jensen and Meckling, 1976).

Executive compensation can signal shareholder incentives because such contracts are designed to align managerial interests with those of shareholders. Rational debtholders can interpret the structure of these contracts to infer whether shareholder objectives diverge from their own. For example, debtholders can infer shareholder-debtholder conflicts from pay for performance in executive compensation contract. If the perceived conflicts of financial interest are substantial, debtholders respond by demanding higher interest rates or imposing more restrictive covenants, thereby increasing the cost of debt. Hence, shareholders anticipate the *ex post* reactions of debtholders to executive compensation and design those contracts as an *ex ante* commitment device to mitigate the divergence between shareholder and debtholder preferences (John and John, 1993).

However, mandatory ESG disclosure in the banking sector introduces non-financial preferences

to banks. Disclosure and transparency requirements subject banks to heightened public and market discipline (Flannery, 1998). Mandatory disclosure regarding banks' ESG performances can similarly heighten public scrutiny and reputational concerns, thereby increasing the sensitivity of debt capital providers to ESG performance of borrowers (Chen et al., 2023b; Houston and Shan, 2022). When banks are mandated to disclose ESG information, banks face potential losses of social and reputation capital if firms in their lending portfolios do not meet ESG performance standards (Chen et al., 2023b). Our anecdotal evidence in Appendix B shows that banks incorporate ESG-related covenants into loan contracts after encountering ESG regulatory pressures.

Therefore, mandatory ESG disclosure regulations in the banking sector generate a wedge between the ESG preferences of shareholders and debtholders. When borrowing firms are not subject to comparable ESG regulations, differences in regulatory exposure generate a divergence between shareholder and debtholder preferences over ESG-related corporate policies. In the absence of credible commitment mechanisms, banks anticipate underinvestment in ESG by borrowers and respond by tightening lending terms or restricting credit supply even when firm cash flow risk is unchanged (Houston and Shan, 2022; Wang, 2023). Hence, mandatory ESG disclosure requirements for banks induce a misalignment between shareholder and debtholder incentives, which raises the cost of debt capital, and, in turn, reduces shareholder value.

We argue that ESG-linked pay is a credible commitment device to accommodate debtholders' non-financial preferences. In the presence of ESG regulations imposed on banks, incorporating ESG performance metrics into executive compensation can serve as a contractual commitment that mitigates debtholder concerns and attenuates shareholder value losses arising from divergent shareholder and debtholder objectives. ESG-linked pay can be effective because performance measures and payoff structures are publicly observable to debtholders and therefore communicate strategic priorities and signal commitment to ESG objectives (Bloomfield, 2021; Bushman, 2021). Moreover, ESG-linked pay is less easily undone than one-off ESG actions, and this resistance to reversal strengthens its credibility as a commitment device.

However, ESG-linked pay does not necessarily represent a first-best or universally optimal

response to regulatory-induced divergence in ESG objectives. The inclusion of ESG performance metrics in executive compensation may prove infeasible when managers resist the adoption of such metrics. Firms may also face lower-cost alternatives to address ESG-related regulatory pressures on their lenders, such as limited operational adjustments that improve ESG performance, a shift toward lenders not subject to ESG constraints, or the continuation of existing practices. Accordingly, firms' optimal responses to mandatory ESG disclosure in the banking sector depend on the severity of the regulatory-induced divergence between shareholder and debtholder ESG objectives and on the relative costs of compensation-based commitment compared with alternative adjustment mechanisms.

Ultimately, it is an empirical question whether shareholders adopt ESG-linked pay when debtholders have non-financial preferences under mandatory ESG disclosure regulations. The main hypothesis for this empirical question is that:

Hypothesis: *When banks have non-financial preferences for ESG activities, firms that already have established lending relationships with these banks are more likely to adopt ESG-linked pay.*

3 Research Design and Sample Construction

3.1 Setting: Mandatory ESG Disclosure Regulation in the Banking Sector

We manually compile mandatory ESG disclosure regulations from different sources: the *Carrots & Sticks Report*, the Sustainable Stock Exchange (SSE) initiative, the Initiative for Responsible Investment (IRI) at Harvard University, and the Global Reporting Initiative. Appendix C provides a summary of the mandatory ESG disclosure regulations for each economy in our sample with policy year, issuer, and firm coverage. Some of these regulations impose ESG disclosure mandates directly on banks, while others require disclosure from a subset of firms that meet certain criteria (e.g., listed

status, firm size based on number of employees, net turnover, or total asset, etc.).[4]

Moreover, we identify banks affected by the ESG disclosure regulation based on their countries of operation. For countries where the regulation applies only to a subset of banks, we further determine whether each bank is subject to the regulation by evaluating the relevant regulatory criteria. To collect bank information (e.g., listed status and fundamentals), we match the lenders in our sample with the BankFocus database from Bureau van Dijk. The primary challenge in this process is the lack of a unique identifier to directly link the two databases. We begin by performing a fuzzy match of bank names using `LinkTransformer`.[5] For each unique lender in DealScan, we retain up to five potential matches with the highest match scores. Subsequently, we manually verify the matches by comparing the bank names and their countries of operation from DealScan and BankFocus.

Furthermore, we use bank ESG disclosure mandates as exogenous variation in debtholders' non-financial preferences with respect to pre-existing lending relationships. We exploit pre-existing firm–bank lending relationships to identify exogenous shocks induced by ESG disclosure regulations (Frydman and Hilt, 2017). Specifically, for firms that already have outstanding loans with foreign banks, the introduction of ESG disclosure regulations in the foreign country directly affects these banks. This mandatory ESG regulation for the bank therefore serves as an exogenous shock to the borrowing firms, as it is unlikely that firms could anticipate or influence the timing of such foreign regulations. Moreover, to ensure comparability, we focus only on firms that have borrowed from non-U.S. banks, thereby avoiding unobservable factors that may affect firms' choice between domestic and foreign financing sources. This setting allows us to isolate the effect of ESG pressure from debtholders on borrowing firms' adoption of ESG-linked pay.

[4]For example, Australia government introduced mandatory disclosure regulation for all firms from their fiscal year 2005. The regulation introduced by Finland government in 2016 sets criteria on a subset of firms: 1) large firms with over 500 employees, net turnover over EUR 40 million, or Balance sheet total over EUR 20 million, 2) public interest entities: listed companies, credit institutions, insurance providers, etc.

[5]`LinkTransformer` is a Python library for merging and deduplicating data frames using language model embeddings. In our matching process, we set the matching score threshold as 0.6 when retaining the potential matches, and then manually screen the correct matches to ensure the matching accuracy.

3.2 Variable Construction

3.2.1 Borrowing Firms' ESG-linked Pay

We obtain ESG-linked pay data from ISS Incentive Lab and ISS Executive Compensation Analytics Database. We create an indicator variable, *ESG-linked Pay*, which takes the value of one if any executives have any grants linked to at least one ESG-related metric and zero otherwise. Appendix D describes the procedure for identifying ESG-related metrics. Figure 1 presents the time series trend of firms that use ESG-linked pay for our combined dataset of S&P 1500 firms. The percentage of firms using ESG-linked pay increased from 3.0% in 2009 to 33.2% in 2022. In our baseline sample, an average of 13.4% of firm-year observations include ESG-linked metrics in executive compensation.

3.2.2 Firm-Bank Lending Relationship

Furthermore, we extract firm-bank lending relationships from the DealScan database with a focus on the lead arrangers in each tranche. Lead arrangers are pivotal in forming and maintaining borrower relationships and are responsible for monitoring their performance (Sufi, 2007). Firm-bank relationships are identified based on active and maturity dates of each tranche. To determine whether the banks are subject to regulation, we gather data such as their listed status and total assets from the BankFocus Database by Bureau van Dijk.

3.2.3 Differentiating Treated and Control Firms

Following prior studies (e.g., Frydman and Hilt, 2017; Costello, 2020), we classify firms as treated or control based on their exposure to debtholder non-financial preferences induced by ESG regulatory shocks in the banking sector. We measure this exposure as the ratio of a firm's outstanding loans from foreign banks subject to ESG disclosure regulations, conditional on pre-existing lending relationships, to the firm's total outstanding loans from foreign banks.

We first identify the initial year of ESG disclosure regulation for each non-U.S. lead arranger in

DealScan based on its country of operation. We define a loan as an ESG shock loan if one of its lead arrangers becomes subject to an ESG disclosure mandate during the loan's active period. We then calculate each firm's exposure to ESG regulatory shocks as the share of ESG shock loans in its total foreign bank borrowing. A firm enters the treatment group in the first year in which this exposure exceeds 50 percent. Our results remain robust to alternative thresholds and to specifications that use continuous measures of exposure.

3.3 Empirical Specification

To examine whether shareholders use ESG-linked pay as a response to debtholders non-financial preferences, we employ a stacked difference in differences estimation strategy. Under this framework, a cohort consists of firms that first receive treatment in the same year and firms that never receive treatment (Gormley and Matsa, 2011). For example, the 2013 cohort includes firms that first experience ESG regulatory shocks in 2013 as the treatment group and firms that never experience such shocks as the control group. For each cohort, we select a three year window before and after the cohort year and construct a cohort firm year panel. This approach controls for time varying unobserved heterogeneity and permits an examination of the dynamic response of firms ESG compensation policies to ESG regulatory shocks originating from their banks.

The baseline regression equation is as follows:

$$\textit{ESG-linked Pay}_{c,i,t} = \alpha + \beta Treat_{c,i} \times Post_{c,t} + X_{c,i,t-1} + \lambda_{c,i} + \tau_{c,t} + \epsilon_{c,i,t} \tag{1}$$

where c, i, and t represent cohort, firm, and year, respectively. $Treat_{c,i}$ equals one if firm i in cohort c belongs to the treatment group. $Post_{c,t}$ equals one for years after the shock year for treated firms. $\textit{ESG-linked Pay}_{c,i,t}$ is an indicator variable that equals one if firm i in cohort c adopts ESG-linked pay in year t. $X_{c,i,t-1}$ denotes a vector of control variables related to borrowing firms fundamentals and compensation structures.

Specifically, we control for institutional ownership (*IOR*), as institutional investors increasingly

incorporate ESG considerations into investment decisions and exert pressure on firms to adopt sustainable practices. We also include the number of analysts following the firm (*Log(Analysts)*) to capture monitoring by financial intermediaries. We control for the natural logarithm of total compensation for the top five executives (*Log(Compensation)*), since compensation levels relate to compensation design. In addition, we include firm fundamental variables, such as the natural logarithm of total assets (*Size*) to capture firm scale, the leverage ratio (*Leverage*), return on assets (*ROA*), and the current asset ratio (*Current Asset*) to reflect firms debt reliance, operating performance, and financial flexibility. Finally, we include the number of outstanding loans (*Log(Number of Loans)*) to account for the size of firms loan obligations.

In addition to these control variables, we include *Cohort* × *Firm* fixed effect $\lambda_{c,i}$ and *Cohort* × *Year* fixed effect $\tau_{c,t}$ to capture the time-invariant heterogeneity across firms and time-variant macroeconomic factors (Baker et al., 2022). Within the Stacked DiD framework, we cluster standard errors at the firm level (Petersen, 2009; Wing et al., 2024).

3.4 Sample Construction and Descriptive Statistics

Due to data coverage in the ISS and Execucomp databases, we begin with U.S. publicly traded firms in the S&P 1500 Index that borrow from non U.S. banks at least once. This selection yields 831 unique U.S. firms. Approximately 55 percent of S&P 1500 firms obtain loans from foreign banks, which indicates that cross border borrowing represents a common financing practice among U.S. firms. We focus on these firms to address concerns about systematic differences between U.S. firms that borrow from non U.S. banks and those that do not. We exclude financial firms because they serve as capital providers and are not comparable to non financial borrowers. To limit the influence of the global financial crisis, we set the sample period from 2009 to 2019. This period also captures substantial variation in ESG disclosure regulations, most of which occurs before 2016. We retain only firm year observations with complete information on all firm level control variables used in the main analyses. After applying these criteria, the final sample consists of 551 U.S. firms.

We construct a cohort firm year panel for the stacked difference in differences estimation (Gormley

and Matsa, 2011). We first identify the initial year of mandatory ESG disclosure regulations for each non U.S. lead arranger in DealScan based on the arranger operating country. We classify a loan as an "*ESG-shock loan*" if a bank issues the loan before the regulation takes effect and the loan remains outstanding after the regulation becomes effective. Next, we measure firm level exposure to ESG regulatory shocks from banks as the fraction of ESG shock loans relative to the total outstanding loans provided by foreign banks. We classify a firm as treated in the first year in which this exposure exceeds 50 percent.

Under the stacked difference in differences framework, a cohort consists of firms that first receive treatment in the same year and firms that never receive treatment. The main regression sample includes four cohorts, corresponding to firms first treated in 2012, 2013, 2014, and 2016. The number of treated firms equals 50 in 2012, 151 in 2013, 12 in 2014, and 7 in 2016. The same set of control firms appears in all cohorts. For each cohort, we select a three year window before and after the cohort year and construct a cohort firm year panel. The final main sample contains 9,912 cohort firm year observations, which include 220 treated firms and 331 control firms from the S&P 1500 Index.

Appendix E presents the distribution of operating countries (or regions) of the banks covered in the main sample and the number and fraction of firms that have lending relationships with the banks in that country or region. The top three countries with the largest share of banks are the United Kingdom (11.3%), Japan (10.3%), and Canada (8.2%). Panel A in Table 1 presents the industry distribution of the sample of U.S. borrowing firms. The top three industries with the largest number of companies are Manufacturing (47.7%), Services (17.1%), and Transportation, Communications, and Utility (16.7%). Panel B in Table 1 presents summary statistics of all variables (defined in Appendix A) used in the main test. We winsorize all continuous variables at top and bottom 1% of the distribution to minimize the effect of outliers. The average value of *ESG-linked Pay* is 0.107 in our cohort-firm-year panel. However, this figure underestimates the sample mean at the firm-year level because control firms are repeatedly included across different cohorts in the cohort-firm-year regression panel. The firm-year level sample mean of *ESG-linked Pay* is 13.4% for the period 2009

to 2019, and 16.1% for the period 2009 to 2021.

4 Empirical Results

4.1 Baseline Results

To study whether corporate shareholders adopt ESG-linked pay as a commitment device to accommodate debtholders non-financial preferences, we estimate Equation (1) and report the regression results in Table 2. In the regression results with *Cohort* × *Firm* and *Cohort* × *Year* fixed effects and without control variables shown in column (1), the estimated coefficient on *Treated* × *Post* is 0.0554 and significantly positive at 5% level. Column (2) reports similar results after we further control for time-varying borrowing firm characteristics. This evidence suggests that when banks face ESG disclosure regulations and consequently demand stronger ESG performance from borrowing firms, those firms are more likely to adopt ESG-linked pay to realign incentives.

Moreover, we examine the dynamic effects of the stacked DiD estimation. Our identification strategy assumes that, absent changes in debtholders non-financial preferences induced by mandatory ESG disclosure regulations, U.S. borrowers with different levels of reliance on foreign banks would follow similar trends in the adoption of ESG-linked pay. We estimate a dynamic DiD specification that captures treatment effects in each period relative to the treatment year, defined as the first year in which a firm becomes exposed to ESG regulations imposed on its non U.S. banks. Figure 2, which uses the regulatory shock year as the benchmark period, supports the parallel trends assumption. The estimated coefficients in the pre-treatment periods are statistically indistinguishable from zero. In contrast, the results indicate a significant increase in the likelihood that treated firms adopt ESG linked pay during the three years following the disclosure mandate.

We further decompose our dependent variable, *ESG-linked Pay*, into three components: *E-linked Pay*, *S-linked Pay*, and *G-linked Pay*. Table 3 shows that the estimated coefficient on *Treated* × *Post* is statistically significant for *E-linked Pay* and *S-linked Pay* at the 5% level, whereas the corresponding estimate for *G-linked Pay* is close to zero and statistically insignificant. These findings indicate

that shareholders adopt ESG-linked pay as a commitment device to cater to specific debtholders' non-financial preferences, rather than as a generic expansion of ESG-related performance metrics in compensation contracts.

An intuitive interpretation is that environmental and social targets map more directly into lenders' potential costs from ESG disclosures, including environmental liabilities, workplace safety incidents, and labor or supply-chain disruptions. Public scrutiny and regulatory interventions over these issues becomes more salient when banks face mandatory disclosure requirements. By contrast, G-linked pay often overlaps with standard governance and monitoring mechanisms already embedded in compensation design. Consistent with this view, we find no comparable response in G-linked pay, which suggests limited incremental demand for governance targets in our setting.

Taken together, consistent with our hypothesis, we find that firms with pre-existing lending relationships with banks that later become subject to ESG disclosure regulations are more likely to adopt ESG-linked pay. Our findings underscore that borrowing firms adopt ESG-linked pay as a commitment device to accommodate debtholders non-financial ESG preferences.

4.2 Costs of Debtholder Non-Financial Preference for Borrowing Firms

4.2.1 Debt Contracting Effects of Bank ESG Disclosure Mandates

In this section, we investigate whether debtholder non-financial preference for ESG activities, induced by ESG disclosure mandates in the banking sector, increases the frequency of renegotiations and the tightness of loan contracts. Debt contracts are inherently incomplete, and when banks face ESG disclosure regulations that require them to report on ESG performance, they have incentives to include requirements for borrowing firms' ESG performance and to renegotiate contracts to align terms with these considerations. Loan contract amendments provide a mechanism for banks to influence firm behavior and reflect the divergence between shareholder and debtholder preferences regarding ESG activities. Such renegotiations impose additional costs on borrowing firms, both through resources devoted to negotiations and potentially more restrictive loan terms.

We test this prediction using the stacked DiD framework specified in Equation (1) to identify

the causal effect of ESG disclosure regulation on loan covenant renegotiation. We operationalize renegotiation using two empirical measures. The first, *Amendment*, is an indicator equal to one if a firm experiences at least one loan contract amendment in a given year. The second, *Log(Amendment)*, is defined as the natural logarithm of one plus the total number of amendments. Table 4 shows that banks amend loan covenants more frequently following ESG disclosure shocks. Column (1) reports results using the indicator variable *Amendment*, while Column (2) uses the continuous measure *Log(Amendment)*. Across both specifications, the coefficient on the treatment indicator is positive and statistically significant at the 5% level, both with and without control variables. These results indicate that ESG disclosure mandates lead banks to initiate more loan renegotiations, affecting both the likelihood and the intensity of covenant amendments.

Moreover, we examine whether loan contract amendments result in more stringent contractual terms. To do so, we compare the number of covenants in amended loan contracts with those in the original contracts and identify whether an amendment increases the total number of covenants. We aggregate these measures to the firm–year level and construct two variables. *Restrictive Amendment* is an indicator equal to one if a firm experiences at least one loan contract amendment in a given year that increases the number of covenants. *Log(Restrictive Amendment)* is defined as the natural logarithm of one plus the number of such amendments. We then estimate Equation (1) to examine how debtholders' non-financial preferences affect both the extensive and intensive margins of amendments that increase covenant stringency. Columns (3) and (4) of Table 4 show that loan contract amendments associated with greater misalignment between shareholder and debtholder ESG preferences lead to more stringent contractual terms.

Taken together, these results suggest that, due to mandatory ESG disclosure regulations in the banking sector, banks develop additional non-financial preferences regarding borrowers' ESG activities, and the resulting misalignment of interests leads to more loan renegotiations and contract amendments.

4.2.2 Capital Market Effects of Bank ESG Disclosure Mandates

In this section, we provide supporting evidence of shareholder value loss that arises from debtholder non-financial preferences for ESG activities by examining stock market reactions of borrowing firms to ESG regulations that target lending banks. In the previous section, we provide evidence that, when lenders are subject to ESG disclosure regulations and hold non-financial preferences, they engage more frequently in loan renegotiations with borrowing firms and impose additional covenants on existing loan contracts. When shareholders hold rational expectations about the widening divergence between shareholder and debtholder objectives reflected in subsequent loan renegotiations, they anticipate the associated value loss. They therefore react negatively to announcements of ESG disclosure mandates in the banking sector.

Empirically, we focus on the European Union Non-Financial Reporting (EU NFR) Directive as the event of interest. The EU NFR Directive requires all member states to incorporate its disclosure requirements into national laws and implement them within their jurisdictions. These countries make up the majority of those issuing ESG regulations in our sample. Empirically, we compare the three-day cumulative abnormal returns (CAR) of firms with lending relationships to European banks versus those without, around the regulation announcement date. Our event study model is shown in Equation (2).

$$CAR_{[-1,+1]} = \alpha + \beta \times Regulation\ Exposure_i + X_i + \lambda_s + \epsilon_i \tag{2}$$

Subscript i represents the firm. The dependent variable CAR_i is the 3-day cumulative abnormal return earned by the shareholders. The time window runs from one day before to one day after the regulation announcement date. We estimate the three-day CAR using CAPM, FF 3-factor model, and Cahart model. The independent variable $Regulation\ Exposure_i$ is an indicator, which equals to 1 if firm i has a lending relationship with banks subject to EU NFR Directive when this regulation was announced. We control for a set of firm fundamental variables X_i that are related to stock market return, including firm size (*Size*), Market to Book ratio (*MTB*), current asset ratio (*Current Asset*), Leverage (*Leverage*), return on assets (*ROA*), R&D intensity (*R&D*), and institutional ownership

(*IOR*). λ_s is two-digit SIC-code industry fixed effect.

Table 5 presents the results of different abnormal return estimation models, including CAPM (Column (1) and Column (2)), FF 3-factor model (Column (3) and Column (4)), and Cahart model (Column (5) and Column (6)). We add a standard set of firm-level control variables for each model. The estimated coefficients in Columns (2), (4), and (6) indicate that firms that are affected by the ESG disclosure regulation through the lending relationship with their lenders experience a significant negative abnormal return compared to the unaffected firms.

Collectively, this result reveals that ESG disclosure mandates in the banking sector impose considerable costs on borrowing firms, as shareholders anticipate future loan renegotiations that involve more restrictive contractual terms. Hence, we provide evidence for the foundation of our economic analysis that shareholders incur losses when debtholders develop non-financial preferences for ESG activities and seek to minimize shareholder value loss, which leads to the strategic use of ESG-linked pay as a commitment device.

4.3 Cross-Sectional Analyses

In response to shareholder value loss caused by debtholder non-financial preferences, our theoretical analysis suggests that a firm's optimal decision depends on two key factors: the severity of the regulatory-induced divergence between shareholder and debtholder ESG objectives and the relative costs of compensation-based commitment compared to alternative adjustment mechanisms. In this section, we study the cross-sectional variations of the main effects to further validate our economic analyses. We expect that our findings will be more pronounced when firms have greater severity of regulatory-induced divergence in ESG preferences arising from lending banks' regulatory pressures, higher costs of switching to new banks, lower implementation cost for compensation changes, and greater banks' bargaining power in lending relationships.

Empirically, we divide treated firms into subgroups based on the cohort median in the shock year and interact the resulting group indicators with the treatment and post indicators.[6] This specification

[6]Specifically, for *Reputable Bank Share*, defined as the fraction of banks experiencing ESG disclosure mandates

estimates the treatment effects for the high and low groups within a single regression framework. We then test formally whether the effects differ across groups by comparing the coefficients on the high and low group interaction terms.

4.3.1 Severity of Regulatory-Induced Divergence in ESG Preferences

We examine how the wedge between shareholder and debtholder ESG preferences, induced by ESG disclosure mandates in the banking sector, affects firm decisions to adopt ESG-linked pay. Our cross-sectional framework relies on the idea that a borrower's ex ante ESG risk profile determines the magnitude of misalignment between shareholder and debtholder ESG priorities: firms with weaker ESG performance deviate more from debtholder non-financial ESG objectives, generating a larger wedge and greater expected value loss. Firms with greater divergence from debtholder priorities face stronger incentives to adopt ESG-linked pay to signal alignment, particularly when weak ESG practices require credible commitment to meet debtholder non-financial ESG expectations.

We capture firm ESG risk at the time of treatment using ESG incident intensity, defined as the average number of RepRisk-reported incidents over the three years preceding the treatment year. We measure exposure using total ESG incidents and separately by environmental (E) and social (S) categories. Incidents reflect realized ESG controversies or adverse events and provide salient signals of ESG risk for lender assessment and regulatory compliance. Table 6 confirms the theoretical prediction: the treatment effect is substantially stronger for firms with higher incident intensity. Those findings support the view that firms with greater ESG misalignment have stronger incentives to adopt ESG-linked pay as a commitment device to mitigate the wedge between shareholder and debtholder ESG preferences.

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that are reputable banks. Reputable banks are defined as those with an average market share of at least 2% over the five years prior to loan origination, following Bushman and Wittenberg-Moerman (2012), and *ESG-Shock Loan Intensity*, measured as the ratio of loans from banks subject to ESG disclosure mandates to a firm's market equity at the time the regulation is introduced, we partition treated firms into high and low subgroups, since many control firms do not face ESG regulatory pressure from banks. For *Business Segment*, we separate the treated group into firms operating in a single segment and firms operating in multiple segments.

4.3.2 Relative Cost of ESG-linked Pay

Another economic trade-off for borrowing firms that adopt ESG-linked pay concerns the relative cost of compensation adjustments compared with alternative mechanisms that realign shareholder and debtholder ESG preferences. This section examines this trade-off through lender switching costs in the private debt market, the implementation cost of compensation changes, and banks' bargaining power in lending relationships. Borrowing firms are more likely to adopt ESG-linked pay to accommodate debtholders' non-financial ESG preferences when compensation-based adjustments are less costly than alternative methods that mitigate the value loss arising from differences between shareholder and debtholder ESG preferences.

Cost of Switching to New Banks

We expect firms' adoption of ESG-linked pay as a commitment device to realign incentives with debtholders to be more pronounced when firms face higher costs of switching to new banks. When existing lenders hold non-financial preferences over ESG activities, borrowing firms can switch to alternative debt capital providers that share similar ESG profiles in order to avoid value losses arising from preference divergence (Houston and Shan, 2022). However, switching to new banks entails costs, including financial, operational, and strategic expenses associated with the termination of existing lending relationships and the search for new lenders in an effort to escape ESG pressure from affected banks. Firms that rely heavily on their current lenders have stronger incentives to maintain these relationships and to limit the costs imposed by debtholders' non-financial preferences. As a result, firms with higher switching costs have a more limited ability to avoid ESG demands, which amplifies the role of ESG-linked pay as a commitment device for incentive realignment.

We employ three partitioning variables that proxy for firms' costs of switching to new banks. These variables include credit ratings (*Credit Ratings*), financial distress risk measured by the Altman Z-score (*Altman Z-score*), and business complexity captured by business segments (*Business Segment*). First, firms with lower credit ratings face greater difficulty in obtaining debt financing, which increases the cost of lender substitution. Second, firms with weaker financial health, as

reflected in lower *Altman Z-scores*, lie closer to financial distress and confront higher external financing frictions as well as weaker bargaining positions with prospective lenders. As a result, financially weaker firms incur higher costs when they attempt to switch away from incumbent banks. Third, business segment diversification captures organizational complexity (Bushman et al., 2004). Firms that operate across multiple business segments, relative to single segment firms, confront higher switching costs because of greater informational opacity and more complex lending relationships.

Panel A of Table 7 reports the first set of cross-sectional analyses. Across all specifications, the estimated treatment effect is significantly larger for firms with high switching costs than for those with low switching costs, and the difference between the two coefficients is statistically significant. These findings support our prediction that when borrowers have limited outside options for debt financing, the relative cost of adopting ESG-linked pay is lower. As a result, such firms are more likely to use ESG-linked pay as a credible commitment mechanism to realign incentives with debtholders' interests.

Implementation Cost for Compensation Changes

Incorporating ESG metrics into executive compensation imposes nontrivial implementation costs because it requires redesign of established pay contracts and renegotiation of managerial incentives. In particular, CEOs may resist a new compensation structure that tightens performance evaluation and constrains managerial discretion, which makes adoption of ESG-linked pay a bilateral negotiation rather than a unilateral board decision. We therefore conjecture that firms face heterogeneous implementation costs and that firms with lower costs are more likely to adopt ESG linked pay. Accordingly, firms adopt ESG linked pay more frequently when implementation frictions measured by CEOs' willingness to accept compensation redesign are lower.

To assess this mechanism, we conduct cross sectional tests using three proxies for the implementation cost of compensation changes. These proxies include whether the CEO is Republican-leaning or Democratic-leaning (*Political Ideology*), the length of the CEO's service at the firm (*CEO Tenure*),

and the CEO's general managerial ability (*General Ability Index*).

First, we proxy executive ideology using a donation based measure of political ideology that maps individuals' political donation behavior into a continuous index ranging from zero for the most Republican-leaning to one for the most Democratic-leaning (Mannor and Busenbark, 2025). Conceptually, CEOs with more conservative political views may exhibit lower receptiveness to ESG related initiatives, which increases the cost of implementing ESG-linked pay. Consistent with this prediction, the treatment effect is more pronounced among firms whose CEOs are more democratic-leaning, and the difference in coefficients across groups is statistically significant, as shown in Panel B of Table 7.

Second, *CEO Tenure* captures the length of a CEO's service at the firm. CEOs with shorter tenure are more likely to emphasize ESG initiatives to build reputational capital, whereas CEOs with longer tenure may resist compensation changes due to entrenched pay arrangements (Chen et al., 2023a). Shorter CEO tenure therefore implies lower implementation costs of ESG linked pay. Panel B of Table 7 shows that the treatment effect is stronger among firms led by shorter-tenure CEOs.

Third, we use the CEO's *General Ability Index*, which measures broad and transferable managerial human capital based on career experience across firms, industries, and functional roles (Custódio et al., 2013). CEOs with higher general ability possess greater capacity to coordinate complex organizational changes, communicate new performance criteria, and implement compensation redesign, which reduces implementation frictions associated with ESG-linked pay. Consistent with this interpretation, as shown in Panel B of Table 7, the treatment effect concentrates among firms led by CEOs with higher general ability.

Banks' Bargaining Power in Lending Relationships

Our economic analysis hinges on the idea that, when debtholders have non-financial preferences, they can exert influence over borrower firms through debt contracts. With greater negotiation power, debtholders can require ESG performance through contractual terms (see Appendix B for an example). To mitigate the negative impact of preference divergence between shareholders

and debtholders, borrower firms can use ESG-linked pay as a commitment device to realign incentives. Consequently, the likelihood of adoption of ESG-linked pay should be higher when banks have greater negotiation power, as banks can incorporate ESG considerations into contractual arrangements and impose control over the operations of borrower firms.

We proxy bank bargaining power using three partitioning variables. The first proxy is *Reputable Bank Share*, defined as the fraction of banks subject to ESG disclosure mandates that qualify as reputable banks. Reputable banks are defined as banks with an average market share of at least 2% during the five years prior to loan origination (Bushman and Wittenberg-Moerman, 2012). Such banks are typically more difficult to replace in lending relationships and therefore exhibit greater bargaining power in loan contract negotiations.

The second measure is *Non-U.S. Bank Share*, defined as the number of non-U.S. banks divided by the total number of lending banks from which the firm has obtained bank loans. A higher *Non-U.S. Bank Share* indicates greater reliance on non-U.S. banks that are more likely to be subject to mandatory ESG disclosure regulations. This reliance can amplify the influence of debtholder non-financial preferences, as these banks can collectively impose contractual changes during loan renegotiations.

The third measure is *ESG-Shock Loan Intensity*, defined as the ratio of loans obtained from banks subject to ESG disclosure mandates to firm market equity at the time of regulatory introduction. A higher *ESG-Shock Loan Intensity* captures greater economic exposure to affected banks and implies stronger scope for influence through debt contract terms.

Panel C of Table 7 reports the cross-sectional analyses. Across all columns, the effect of banks' ESG regulatory pressure on firm adoption of ESG-linked pay is significantly stronger in the high bargaining power group than in the low bargaining power group. The coefficient difference between the two groups is statistically significant. These findings are consistent with the theoretical prediction that, when banks possess greater bargaining power to transmit non-financial preferences for ESG activities through loan renegotiations, the marginal benefit of a credible commitment device (i.e., ESG-linked pay) increases, making firms more likely to adopt such pay arrangements.

4.4 Economic Consequences of ESG-linked Pay as a Commitment Device

A related issue concerns whether ESG-linked pay functions as a greenwashing mechanism that masks divergence in ESG preferences between shareholders and debtholders. We argue that this interpretation is unlikely in our setting. When banks are subject to mandatory ESG disclosure requirements, weak ESG outcomes in lending portfolios expose banks to reputational costs and regulatory scrutiny. As a result, banks have incentives to ensure that contractual ESG provisions in executive compensation correspond to actual improvements in ESG performance rather than symbolic commitments. In this environment, ESG-linked pay is less likely to serve as a greenwashing tool and instead reflects firms' efforts to align managerial actions with debtholders' ESG objectives.

We further empirically examine the economic consequences of ESG-linked pay adoption using a difference-in-difference-in-differences (DDD) approach, where the third difference captures whether firms adopt ESG-linked pay following ESG regulatory pressure. Specifically, we define *ESG-linked Pay Adoption* as an indicator variable that equals to one if a firm has no ESG-linked pay prior to treatment but adopts it afterward, and zero otherwise.

First, we find that ESG-linked pay contributes to improvements in firm ESG performance. We conjecture that, because lending banks are required to disclose borrower ESG performance, banks demand tangible ESG improvements rather than symbolic actions. In this setting, ESG-linked pay operates as an incentive mechanism that strengthens managerial incentives to improve ESG outcomes. Panel B of Table 8 provides evidence consistent with this conjecture. ESG scores increase for treated firms that adopt ESG-linked pay following ESG regulatory pressure.

Second, we present evidence that ESG-linked pay contributes to the recovery of shareholder value. Shareholders respond negatively to ESG regulations imposed on lending banks, as such regulations intensify divergence between shareholder and debtholder ESG preferences and are associated with anticipated firm value losses. We argue that the marginal benefit of ESG-linked pay increases in this context because it aligns shareholder and debtholder interests through executive compensation, thereby mitigating these conflicts. Consistent with this argument, Panel A of Table 8 shows that the triple-interaction term *Treat* $\times$ *Post* $\times$ *ESG-linked Pay Adoption* is significantly

positive in year $t+2$, year $t+3$, and in the average of years $t+1$ to $t+3$. These estimates capture the incremental increase in firm value attributable to the adoption of ESG-linked pay in response to ESG regulation for treated firms, relative to control firms and the pre-regulation period.

Overall, we find that ESG-linked pay is associated with shareholder value recovery following the emergence of a wedge between shareholder and debtholder ESG preferences and contributes to meaningful improvements in ESG performance. Our evidence challenges the view that ESG-linked pay relies on easily attainable ESG targets and serves merely as a greenwashing device (e.g., Walker, 2022; Efing et al., 2024).

4.5 Sensitivity Analyses

4.5.1 Falsification Test: Banks' Voluntary ESG Initiatives

To further validate that government initiated ESG regulations in the banking sector effectively travel through the corporate economy, we study whether banks' voluntary ESG initiatives affect their borrowing firms' decisions to adopt ESG linked pay. The key to our theoretical analysis is that shareholders restructure executive compensation only when they form rational expectations that debtholders hold non-financial ESG preferences. Unlike government mandated regulations, which impose costs on banks when their loan portfolios fail to deliver expected ESG performance, banks' voluntary ESG initiatives are heterogeneous and nonbinding. Absent public enforcement mechanisms, such voluntary proclamations are unlikely to induce banks to monitor or to demand changes in borrowing firms' ESG practices and performance. Because shareholders restructure executive compensation only when this reduces divergence between shareholder and debtholder preferences over ESG, voluntary bank initiatives that do not alter debtholder payoffs should not motivate borrowing firms to adopt ESG-linked pay as a commitment device.

Empirically, we use the Equator Principles (EPs) to examine how banks' voluntary ESG initiatives affect borrowing firms' compensation scheme. Introduced in 2003 by leading international banks, EPs are a voluntary risk management framework designed to ensure that the projects they finance are not detrimental to society or the environment. This voluntary initiative by the financial institutions

aims to promote environmental responsibility globally by uniting efforts to manage social and environmental risks in project financing. The EPs align with international standards (e.g., World Bank Environmental, Health, and Safety Guidelines) and provide a structured approach for assessing and managing these risks. Banks that adopt the EPs commit to granting loans only to projects that comply with ten defined social and environmental principles.

In this analysis, we employ the same approach as in the mandatory ESG disclosure regulation setting to identify treated and control firms and to construct the cohort-firm-year panel for the stacked DiD estimation. However, unlike the previous setting, we do not require firms to have ever borrowed from non-U.S. banks, because the participants in the EPs include both U.S. and non-U.S. banks. We begin by identifying banks that voluntarily signed the EPs for each lead arranger in DealScan, based on their operating country. Loans are labeled as "*ESG-shock loans*" if the firm has a lending relationship when the banks are involved in EPs. Next, we calculate firm-level exposure to EPs by determining the proportion of ESG-shock loans relative to total outstanding loans. The key difference in the denominator in this context is that we use the amount of all outstanding loans instead of foreign loans, as the firms in this testing sample are not required to have borrowed from non-U.S. banks.[7] Firms are classified as part of the treatment group when their exposure fraction exceeds 40%, 50%, or 60% for the first time (Costello, 2020).

Table 9 presents the regression results analyzing whether banks' voluntary ESG initiatives influence borrowing firms' adoption of ESG-linked pay. Columns (1) and (2) display the results using an exposure threshold of 40%, while columns (3) and (4) for 50%, columns (5) and (6) for 60%.[8] Across all models, both with and without control variables, the coefficients of the main variable of interest are consistently insignificant. These results support the hypothesis that banks' voluntary ESG initiatives do not have a significant impact on the likelihood of borrowing firms adopting ESG-linked pay.

[7]The banks signing the EPs cover regions worldwide, including those headquartered in North America, the Middle East & Africa, Latin America, Asia-Oceania, and Europe.

[8]In the robustness tests, we use thresholds of 10%, 20%, and 30%, all of which result in estimated coefficients that are close to zero and not statistically significant.

4.5.2 Alternative Explanation: ESG-linked Pay as Information Revelation?

A potential alternative interpretation of our findings is that firms adopt ESG-linked pay to reveal information, rather than to commit to debtholders. Under this view, ESG-linked pay serves as a signal: insiders (managers and shareholders) use it to convey favorable private information about the firm's future ESG trajectory. For example, insiders may expect subsequent ESG improvements because key ESG risks already fall under internal control, yet debtholders may not observe this information. In this sense, ESG-linked pay communicates insiders' expectations about future ESG performance, rather than a commitment to undertake ESG performance-improving actions.

To rule out this alternative explanations, we conduct cross-sectional tests using market-based proxies for information asymmetry. Specifically, we measure insider–outsider information asymmetry using *Amihud illiquidity* (Amihud, 2002) and the *Bid–Ask Spread* based on the percent realized spread (Holden and Jacobsen, 2014). For both proxies, higher values indicate greater information asymmetry between corporate insiders (e.g., shareholders and managers) and outsiders (e.g., debtholders). A key implication of this alternative explanation is that our findings should be stronger among firms with greater insider–outsider information asymmetry, where informational frictions are more severe and the signal is more valuable.

Table 10 reports the results of our cross-sectional tests based on information asymmetry. The estimated effect remains positive and statistically significant in both subsamples, and the difference between the high- and low-information asymmetry groups is not statistically significant. These patterns indicate that the main effect does not concentrate among firms with greater insider–outsider information asymmetry, as the alternative explanation would predict. Overall, these results are inconsistent with the view that our findings primarily reflect ESG-linked pay as a signaling mechanism that conveys favorable private information about future ESG performance to debtholders.

4.5.3 Robustness Tests

In this section, we conduct several robustness tests. First, we use 40% and 60% as exposure thresholds to examine whether the results remain robust under different thresholds. In Table 11

Panel A, Columns (1) and (2) present the results for the 40% threshold, while Columns (3) and (4) correspond to the 60% threshold. The coefficients on *Treated* × *Post* are statistically significant at least at the 5% level when using threshold values of 40% and 60%, both with and without the inclusion of control variables.

Second, we extend the sample period to test the robustness of the main results. In the baseline analysis, the sample period spans from 2009 to 2019. The starting year of 2009 is chosen to avoid the effects of the financial crisis, while the endpoint of 2019 ensures the inclusion of significant variations in ESG disclosure regulations, most of which occurred before 2016. For the robustness test, we first extend the sample period forward to 2021 to capture the effects in the most recent years. Then, we further extend the sample period backward to cover 2000–2021, providing a more comprehensive view of long-term trends. In Table 11, Panel B, Columns (1) and (2) present the results for the extended period from 2009 to 2021, while Columns (3) and (4) show the results for the full period from 2000 to 2021. The coefficients for the main variable of interest remain significant at the 5% level in both cases.

Third, we replace the treatment dummy with a continuous measure of firms' exposure to banks' ESG regulatory shocks to further assess the robustness of our results. Specifically, we construct a continuous treatment variable defined as the proportion of "*ESG-shock loans*" relative to a firm's total outstanding loans from foreign banks. This specification allows us to exploit cross-firm heterogeneity in the intensity of regulatory exposure, rather than relying on discrete threshold cutoffs. As shown in Table 11, Panel C, the interaction term *Continuous Treated* × *Post* remains positive and statistically significant at the 5% level, both with and without control variables. Overall, these results confirm that our main findings are not driven by the choice of exposure thresholds and remain robust when regulatory exposure is modeled as a continuous variable.

5 Conclusion

Executive compensation contracts align managers with shareholders, but they also shape firm relationships with key corporate stakeholders, particularly debtholders. Prior studies show that compensation can mitigate agency costs of debt when debtholders care primarily about financial incentives. Much less is known about whether compensation adjusts to stakeholders' non-financial preferences, such as ESG activities. Non-financial preferences differ fundamentally from traditional financial incentives because they are multidimensional and lack clear, contractible performance measures that can credibly reassure debtholders. In contrast, when debtholders have purely financial incentives, they focus on financial distress risk, and borrowing firms can signal alignment through leverage, payout, or cash flow policies (John and John, 1993).

In this paper, we provide new empirical evidence on whether executive compensation contracts serve as a credible commitment device when debtholders hold non-financial ESG preferences. Exogenous variation in debtholder non-financial preferences arises from mandatory ESG disclosure regulations in the banking sector because disclosure of unsatisfactory ESG performance of lending portfolios impose reputation costs on banks. We demonstrate that these regulations induce divergence between shareholder and debtholder ESG preferences. Consistent with this divergence, debtholders initiate more renegotiations of existing loan contracts, and shareholders of borrowing firms respond negatively to the announcement of disclosure mandates.

To mitigate the associated loss in shareholder value, borrowing firms can use ESG-linked pay as a commitment device to reassure debtholders of ESG commitment. We find that U.S. firms with pre-existing lending relationships with ESG-regulated banks are more likely to adopt ESG-linked pay. Moreover, consistent with ESG-linked pay as a commitment device, we provide evidence that such compensation schemes contribute to improvements in ESG performance and to the recovery of firm value. Overall, our findings suggest that ESG-linked pay can serve as a credible commitment device that mitigates divergence between shareholder and debtholder preferences over ESG objectives.

Our paper makes several contributions to the literature. First, we extend the literature on the strategic use of executive compensation. Prior studies show that executive compensation can signal

corporate incentives to key stakeholders with financial incentives (Bushman, 2021), including supply chain partners (Carter et al., 2025a; Guo et al., 2025), product market competitors (Bloomfield, 2021), industry peers (Ha et al., 2024), and debtholders (John and John, 1993). Much less is known about whether compensation can serve a similar role when stakeholders hold non-financial preferences, such as demands for ESG activities. We address this gap by demonstrating the strategic use of ESG-linked pay as a commitment device when debtholders hold non-financial ESG preferences. Second, we contribute to the growing literature on the determinants of ESG-linked pay adoption (Cohen et al., 2023) by highlighting the role of debtholders, complementing existing work that focuses primarily on shareholder considerations (Carter et al., 2023; Chaigneau and Sahuguet, 2025). Finally, our findings relate to the literature on the real effects of disclosure regulations and the role of the banking sector in transmitting regulatory pressure to the corporate sector (Bernanke et al., 1999), particularly in the context of ESG regulation (Wang, 2023). Our results should be of interest to academics, industry practitioners, and policymakers.

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Appendix

Appendix A: Variable Definitions

Variable	Definition Explained	Source
Dependent Variable		
ESG-linked Pay	Indicator variable, equals 1 if the firm adopts ESG-linked pay scheme in that year.	ISS ECA & ISS Incentive Lab
E-linked Pay	Indicator variable equal to 1 if the firm adopts an executive compensation scheme linked to environmental performance metrics in that year.	ISS ECA & ISS Incentive Lab
S-linked Pay	Indicator variable equal to 1 if the firm adopts an executive compensation scheme linked to social performance metrics in that year.	ISS ECA & ISS Incentive Lab
G-linked Pay	Indicator variable equal to 1 if the firm adopts an executive compensation scheme linked to governance performance metrics in that year.	ISS ECA & ISS Incentive Lab
Independent Variable		
Treated	Indicator variable for firms in the treatment group based on the exposure threshold.	
Post	Indicator variable for years that are after the initial treatment year.	
Control Variables		
Size	Natural logarithm of total assets.	Compustat
Leverage	Total debt scaled by total assets.	Compustat
ROA	Return on assets.	Compustat
Current Asset	Current assets scaled by total assets.	Compustat
R&D	Research and development expense scaled by total sales. Missing values are set to 0.	Compustat
MTB	Market to Book ratio.	CRSP/Compustat
IOR	Fraction of outstanding shares owned by institutional investors.	Thomson Reuters
Log(Analyst)	Natural logarithm of one plus the number of analysts following.	I/B/E/S
Log(Compensation)	Natural logarithm of one plus the total compensation of top five executives.	Execucomp
Log(Number of Loans)	Natural logarithm of one plus the number of loans outstanding in the year.	DealScan
Variables used in Table 4		
Amendment	Indicator equal to one if the firm has at least one loan contract amended in a given year, and zero otherwise.	DealScan
Log(Amendment)	Natural logarithm of one plus the total number of a firm's loan contract amendments in a given year.	DealScan
Restrictive Amendment	Indicator equal to one if the firm has at least one loan contract amended in a given year and the amended contract contains more covenants than the original contract, and zero otherwise.	DealScan
Log(Restrictive Amendment)	Natural logarithm of one plus the total number of a firm's loan contract amendments in a given year where the amended contract contains more covenants than the original contract.	DealScan

Variable	Definition Explained	Source
Variables used in Table 5		
$CAR^{CAPM}_{[-1,1]}$	Cumulative abnormal return based on CAPM model within [-1,1] window in percentage. The estimation window consists of 250 trading days with a gap of 20 trading days before the ruling announcement.	CRSP
$CAR^{FF3}_{[-1,1]}$	Cumulative abnormal return based on Fama-French 3 factor model within [-1,1] window in percentage. The estimation window consists of 250 trading days with a gap of 20 trading days before the ruling announcement.	CRSP
$CAR^{Carhart}_{[-1,1]}$	Cumulative abnormal return based on Carhart (1997) within [-1,1] window in percentage. The estimation window consists of 250 trading days with a gap of 20 trading days before the ruling announcement.	CRSP
Regulation Exposure	Indicator variable, equals 1 if the firm has a lending relationship with banks subject to EU NFR Directive when this regulation was announced.	DealScan & EU NFR Directive
Variables used in Table 6		
ESG Incidents	Total number of firm-level ESG-related incidents recorded by RepRisk during a given year.	RepRisk
E Incidents	Number of firm-level environmental-related incidents recorded by RepRisk during a given year.	RepRisk
S Incidents	Number of firm-level social-related incidents recorded by RepRisk during a given year.	RepRisk
Variables used in Table 7		
Credit Rating	S&P's long-term issuer credit ratings include AAA, AA+, AA, AA, A+, A, A, BBB+, BBB, BBB, BB+, BB, BB, B+, B, B, CCC+, CCC, CCC, CC, C, and D. These ratings are numerically translated onto a scale from 1 to 22, where 22 represents AAA, 1 represents default, and 0 represents not rated.	Compustat
Altman Z-score	Measure of firm bankruptcy risk and financial distress, following Altman (1968).	Compustat
Business Segment	Number of business segments reported by the firm.	Compustat
Political Ideology	CEO political ideology inferred from political donation behavior and mapped to a continuous measure ranging from 0 (most Republican-leaning) to 1 (most Democratic-leaning).	Mannor and Busenbark (2025)
CEO Tenure	Length of time the executive has served as the firm's CEO.	Execucomp
General Ability Index	Index capturing a CEO's general managerial ability, reflecting the breadth of prior experience across firms, industries, and roles.	Custódio et al. (2013)

Variable	Definition Explained	Source
Reputable Bank Share	Fraction of banks experiencing ESG disclosure mandates that are reputable banks. Reputable banks are defined as those with an average market share of at least 2% over the five years prior to loan origination, following Bushman and Wittenberg-Moerman (2012).	DealScan
Non-U.S. Bank Share	Fraction of non-U.S. banks in the firm's lending relationship, defined as the number of non-U.S. banks divided by the total number of lending banks from which the firm has obtained bank loans.	DealScan
ESG-Shock Loan Intensity	Ratio of loans obtained from banks subject to mandatory ESG disclosure regulation to the firm's market equity at the time the regulation is introduced.	DealScan & CRSP
Variables used in Table 8		
Tobin's Q	Ratio of the market value of assets to book assets, where market assets equal book assets plus market equity minus book equity (common equity plus deferred taxes, truncated at zero).	Compustat
ESG Score	ESG Combined Score, which is an overall company score based on the reported information in the environmental, social and corporate governance pillars (ESG Score) with an ESG Controversies overlay.	Refinitiv ESG
Variables used in Table 10		
Amihud Illiquidity	We construct the Amihud (2002) illiquidity measure at the firm–day level as the absolute daily close-to-close return scaled by dollar trading volume. Specifically, for firm i on day d: $$Amihud_{i,d} = 10^6 \frac{\lvert Ret_{i,d} \rvert}{Price_{i,d} \times Volume_{i,d}}.$$ We then take the yearly verage of $Amihud_{i,d}$ within each firm. Prior to aggregation, we winsorize the firm–day observations at the 1st and 99th percentiles within each calendar year (Amihud, 2002).	CRSP
Bid-Ask Spread	We calculate bid-ask spread using the following formula: $$Percent\ Realized\ Spread_{i,k} = \frac{2D_{i,k}\,(P_k - M_{k+5})}{M_k}$$ where $D_{i,k} = 1$ (-1) if trade k for stock i is buyer- (seller-) initiated, P_k denotes the price of trade k, and M_k is the prevailing bid–ask midpoint at the time of trade k. M_{k+5} is the bid–ask midpoint measured five minutes after trade k. We winsorize firm-day observations at the 1st and 99th percentiles within each calendar year, and then aggregate them to the firm-year level (Holden and Jacobsen, 2014).	TAQ

Appendix B: Debtholder Non-financial Preference and Loan Renegotiation

We use an example from Ford Motor Company's (Ford) to demonstrate that banks will enhance monitoring over borrowers and include ESG-related covenants in loan contracts when they are subject to ESG regulatory pressures.[9]

On December 15, 2006, Ford entered into a credit agreement that included a seven-year, $7 billion term loan facility and a five-year revolving credit facility of $11.485 billion. This revolving facility also included a $2 billion letter of credit and bank guarantee sub-facility. Although Ford did not publicly disclose the details of the initial agreement, the second agreement shows the lead arrangers involved. Among the 11 lead arrangers in this loan contract, four foreign banks were affected by ESG disclosure regulations in their respective operating countries for the first time in 2005, 2013, and 2014. These include Deutsche Bank AG (2005, Germany), Royal Bank of Scotland PLC (2013, United Kingdom), Barclays Capital (2013, United Kingdom), and BNP Paribas (2014, France).

AMENDED AND RESTATED CREDIT AGREEMENT

Among

FORD MOTOR COMPANY,

The Subsidiary Borrowers from Time to Time Parties Hereto,

The Several Lenders from Time to Time Parties Hereto,

and

JPMORGAN CHASE BANK, N.A.

as Administrative Agent

Dated as of December 15, 2006

and Amended and Restated as of November 24, 2009

J.P. Morgan Securities Inc. | Banc of America Securities LLC | Barclays capital

Citigroup Global Markets Inc. | Deutsche Bank Securities Inc. | Goldman Sachs Credit Partners L.P.

Morgan Stanley Senior funding, Inc. | Royal Bank of Scotland PLC

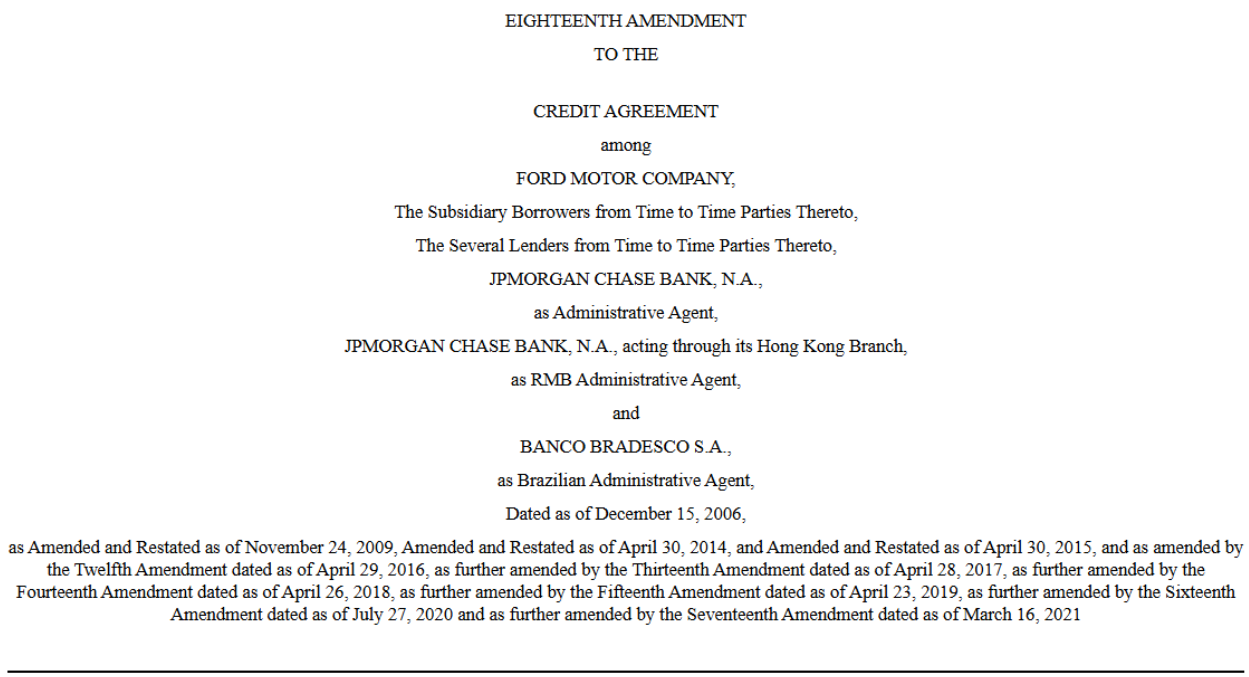
BNP Paribas | HSBC Bank USA, National Association | Sumitomo Mitsui Banking Corporation

as Bookrunners and Lead Arrangers

This loan agreement underwent eighteen amendments, with the eighteenth amendment on

[9]The initial 8-K announcement of this credit agreement can be found at https://www.sec.gov/Archives/edgar/data/37996/000095012406007582/k10791e8vk.htm. The second amendment can found at https://www.sec.gov/Archives/edgar/data/37996/000114036109027491/ex99_2.htm. The eighteenth amendment can be found at https://www.sec.gov/Archives/edgar/data/37996/000003799621000079/exhibit101toseptember29202.htm.

September 29, 2021 that marked the first inclusion of ESG terms in the credit agreement. Prior to this amendment, the agreement did not include any ESG-related covenants. The following figure shows the lead arrangers involved in the eighteenth arrangement.



EIGHTEENTH AMENDMENT
TO THE

CREDIT AGREEMENT
among
FORD MOTOR COMPANY,
The Subsidiary Borrowers from Time to Time Parties Thereto,
The Several Lenders from Time to Time Parties Thereto,
JPMORGAN CHASE BANK, N.A.,
as Administrative Agent,
JPMORGAN CHASE BANK, N.A., acting through its Hong Kong Branch,
as RMB Administrative Agent,
and
BANCO BRADESCO S.A.,
as Brazilian Administrative Agent,
Dated as of December 15, 2006,
as Amended and Restated as of November 24, 2009, Amended and Restated as of April 30, 2014, and Amended and Restated as of April 30, 2015, and as amended by the Twelfth Amendment dated as of April 29, 2016, as further amended by the Thirteenth Amendment dated as of April 28, 2017, as further amended by the Fourteenth Amendment dated as of April 26, 2018, as further amended by the Fifteenth Amendment dated as of April 23, 2019, as further amended by the Sixteenth Amendment dated as of July 27, 2020 and as further amended by the Seventeenth Amendment dated as of March 16, 2021

JPMorgan Chase Bank, N.A.,
as Bookrunner and Lead Arranger

Banco Bradesco S.A., Barclays Bank PLC, BNP Paribas Securities Corp., BOFA Securities, Inc., Citibank, N.A., Commerzbank AG, New York Branch, Credit Agricole Corporate and Investment Bank, Deutsche Bank Securities Inc., Goldman Sachs Bank USA, Lloyds Bank Corporate Markets plc, Mizuho Bank, Ltd., Morgan Stanley MUFG Loan Partners LLC, RBC Capital Markets, Societe Generale, Sumitomo Mitsui Banking Corporation,
as Bookrunners and Lead Arrangers

The ESG-related covenants are excerpted from Ford's eighteenth amendment to its credit agreement. Specifically, the amendment introduces an ESG performance-based interest rate adjustment covenant. The amended provisions focused on ESG are outlined as follows:

*"**KPI Metrics Report**": (a) with respect to the KPI Metrics regarding GHG Emissions and Renewable Electricity, an annual report audited by the KPI Metrics Auditor that sets forth the calculations for each KPI Metric for the applicable calendar year (except, for the avoidance of doubt, the calendar year ended December 31, 2020) which may take the form of the Company's publicly available Integrated Sustainability and Financial Report (and any successor report thereof) on environmental, social and governance matters ("ESG Report"); provided, that if the KPI Metrics Report is not the ESG Report, all relevant and material data and information set forth in such KPI Metrics Report*

shall also be set forth in the ESG Report, beginning with the ESG Report covering calendar year ending December 31, 2021 and (b) with respect to the KPI Metric regarding Ford Europe CO2 Tailpipe Emissions, the manufacturer error notification from the Company or its relevant Subsidiary to the European Environmental Agency pursuant to Article 7(5) of EU Regulation 2019/631 for the applicable calendar year.

*"**Sustainability Pricing Certificate**": a certificate signed by a duly elected Responsible Officer of the Company that is delivered by the Company to the Lead Sustainability Structuring Agent and the Administrative Agent pursuant to Section 6.2 substantially in the form of Exhibit X (or such other form as is acceptable to the Company, the Lead Sustainability Structuring Agent and the Administrative Agent) attaching (a) true and correct copies of the KPI Metrics Report for the immediately preceding calendar year and setting forth each of the Sustainability Facility Fee Adjustment and the Sustainability Margin Adjustment and (b) a review report of the KPI Metrics Auditor confirming that the KPI Metrics Auditor is not aware of any material modifications that should be made to such computations in order for them to be presented in all material respects in conformity with the applicable reporting criteria.*

Appendix C: Mandatory ESG Disclosure Regulation Worldwide

Economy	Policy Year	Issuer	Coverage
Australia	2005	Government	All firms
Australia	2010	Stock Exchange	All listed firms
Australia	2010	Government	Financial institutions
Austria	2016	Ministry of Justice	Large firms, listed firms, and financial institutions
Bahrain	2010	Government, Central Bank	Listed firms
Belgium	2009	Corporate Governance Committee	Listed firms
Belgium	2017	Government	Large firms, listed firms, and financial institutions
Brazil	2012	Central Bank	Financial institutions
Canada	2012	Government	Financial institutions with equity of over one billion
Chile	2015	Securities and Insurance Superintendence	Listed firms
China	2008	Stock Exchange	All listed firms on the Shanghai Stock Exchange
China	2008	Stock Exchange	All listed firms on the Shenzhen Stock Exchange
Denmark	2009	Government	Large firms based on accounting class.
Denmark	2016	Government	Large private firms and public firms
Finland	2011	Government	State-owned firms
Finland	2016	Government	Large firms, listed firms, and financial institutions
France	2003	Government	All listed firms
France	2012	Government	All listed firms from 2012 and all firms from 2014
France	2014	Government	All firms
France	2016	Government	Large firms, listed firms, and financial institutions
Germany	2005	Government	All listed firms
Germany	2016	Government	Large firms, listed firms, and financial institutions
Hong Kong	2016	Stock Exchange	All listed firms
Hong Kong	2020	Stock Exchange	All listed firms
Hungary	2016	Government	Large firms, listed firms, and financial institutions
Iceland	2016	Government	Large firms, listed firms, and financial institutions
India	2012	Stock Exchange	All listed firms
India	2016	Stock Exchange	All listed firms
Indonesia	2012	Capital Market and Financial Institutions Supervisory Agency	All listed firms
Ireland	2008	Government	Financial institutions
Ireland	2016	Government	Large firms, listed firms, and financial institutions
Israel	2011	Bank Regulator	Financial institutions
Italy	2007	Government	All listed firms
Italy	2016	Government	Large firms, listed firms, and financial institutions
Japan	2005	Government	Partial listed firms
Luxembourg	2016	Government	Large firms, listed firms, and financial institutions
Luxembourg	2017	Stock Exchange	All listed firms

Economy	Policy Year	Issuer	Coverage
Netherlands	1999	Government	All listed firms
Netherlands	2006	Government	All listed firms
Netherlands	2016	Government	Large firms, listed firms, and financial institutions
Norway	2013	Government	Large firms and financial institutions
Norway	2016	Government	Large firms, listed firms, and financial institutions
Portugal	2006	Government	All listed firms
Portugal	2010	Government	All firms
Portugal	2016	Government	Large firms, listed firms, and financial institutions
Romania	2016	Government	Large firms, listed firms, national/state owned firms, and financial institutions
Russia	2012	Government	State-owned firms
Singapore	2017	Stock Exchange	All listed firms
South Africa	2010	Stock Exchange	All listed firms
Spain	2012	Government	Government-sponsored commercial companies and state-owned firms
Spain	2014	Government	All firms
Spain	2016	Government	Large firms, listed firms, and financial institutions
Sri Lanka	2019	Stock Exchange	all listed firms
Sweden	2009	Government	State-owned firms
Sweden	2016	Government	Large firms
Taiwan	2008	Stock Exchange	All listed firms
Taiwan	2015	Stock Exchange	All listed firms
Taiwan	2019	Stock Exchange	listed firms
Thailand	2006	Stock Exchange	listed firms
United Kingdom	2006	Government	All listed firms
United Kingdom	2013	Government	All firms
United Kingdom	2016	Government	Large firms, listed firms, and financial institutions

Appendix D: Identifying ESG-linked Pay Using Keyword-based Filters

This appendix documents how we construct a firm-year indicator for ESG-linked pay using the keyword searching and category filtering method. The data on executive compensation metrics are sourced from ISS Executive Compensation Analytics (ECA) Database and ISS Incentive Lab Database. Our sample covers the S&P 1500 firms. We adopt a hierarchical approach to identify ESG-linked pay. We first identify ESG-linked pay using the ISS ECA database; for firm-years not covered or missing in the ISS ECA dataset, we supplement the data using records from the ISS Incentive Lab.

Methodology For ISS Executive Compensation Analytics (ECA)

For data sourced from ISS ECA, we identify ESG metrics at the firm-year-metric level and then aggregate them to the firm-year level. The identification strategy relies on a textual analysis of three fields provided in the dataset: "overall metric type" (broad category), "metric type itemized" (granular itemized category), and "disclosed metric name" (more detailed metric description). A compensation metric is classified as ESG-linked if it satisfied specific criteria for Environmental (E), Social (S), or Governance (G) categories. The classification algorithm uses a combination of category filtering and keyword searching. The firm-year-metric level indicator is defined as 1 if the metric satisfies either the category filtering criteria or the keyword searching criteria.

- Category Filtering: We flag a metric if its standardized "overall metric type" or "metric type itemized"matches a pre-defined list of ESG-related categories.
  - Category list: ESG, CSR, corporate social responsibility, environment, climate change and energy use, environmental protection, resource use, social, staff health and safety, staff relations/engagement/training, diversity, customer and product responsibility, society and human rights, labor conditions in supply, governance.
- Keyword Searching: We search the raw text of the "disclosed metric name" field. A metric is flagged if its description contains specific keywords associated with ESG dimensions.

- Keyword list: ESG, CSR, corporate social responsibility, climate, emission, fossil, carbon, waste, energy, environment, environmental, greenhouse, sustainability, social, society, inclusion, satisfaction, security, employee, safety, governance.

After flagging individual metrics, we aggregate the firm-year-metric level data to firm-year level. The indicator *ESG-linked Pay* is set to equal one if firm *i* includes at least one ESG-linked performance metrics in its compensation plan during fiscal year *t*.

Methodology For ISS Incentive Lab

For data sourced from ISS Incentive Lab, we identify ESG-linked metrics by filtering the standardized "metric" (broad category) and "metric type" (subcategory) fields. An compensation metric is classified as ESG-linked if the standardized metric or metric type matches the pre-defined list of ESG-related categories.

- Category list: CSR, environmental, society, climate change and energy use, customer and product responsibility, customer satisfaction, diversity, environmental protection, labor conditions in supply chain, society and human rights, staff health and safety, staff relations, engagement and training.

Similar to the methodology for ISS ECA database, we aggregate the firm-year-metric level data to firm-year level. The final binary variable *ESG-linked Pay* indicates whether a firm had any compensation metric linked to the ESG defined in a given fiscal year. Consistent with our hierarchical approach, this variable is utilized specifically to supplement the primary ISS ECA dataset, filling in gaps for firm-years where the record from ISS ECA is unavailable.

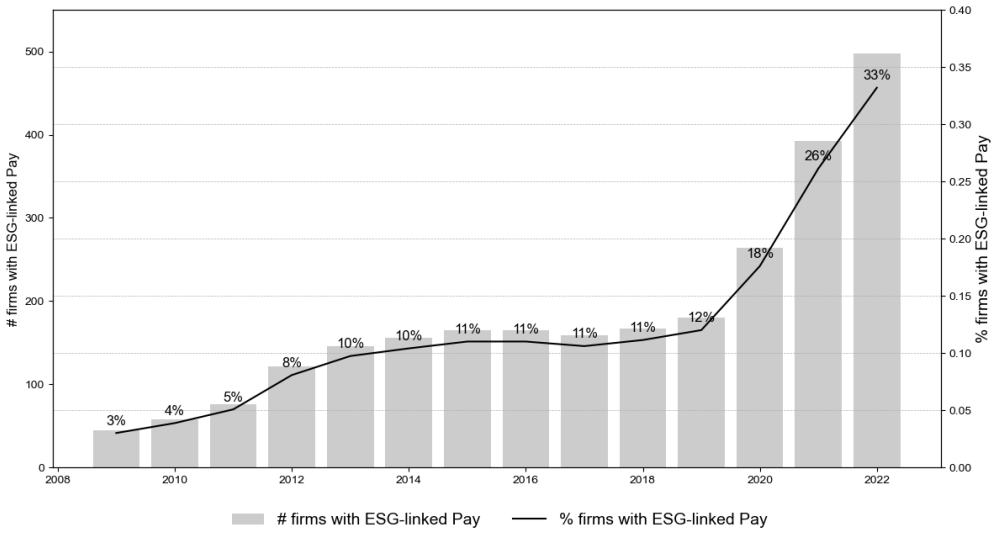
Appendix E: Distribution of Banks' Operating Countries (or Regions)

Economy	Number of Banks		Number of Borrowing Firms	
	N	Percent	N	Percent
United Kingdom	87	11.3%	327	59.3%
Japan	79	10.3%	292	53.0%
Canada	63	8.2%	293	53.2%
Germany	56	7.3%	176	31.9%
Hong Kong	48	6.2%	176	31.9%
France	41	5.3%	210	38.1%
Australia	37	4.8%	36	6.5%
Netherlands	34	4.4%	99	18.0%
China	29	3.8%	28	5.1%
Taiwan	23	3.0%	10	1.8%
Singapore	21	2.7%	13	2.4%
Norway	18	2.3%	21	3.8%
Italy	17	2.2%	22	4.0%
Switzerland	15	2.0%	223	40.5%
South Korea	14	1.8%	5	0.9%
Luxembourg	14	1.8%	6	1.1%
Spain	12	1.6%	31	5.6%
Belgium	11	1.4%	12	2.2%
Ireland	10	1.3%	6	1.1%
Philippines	10	1.3%	2	0.4%
Sweden	9	1.2%	5	0.9%
South Africa	9	1.2%	1	0.2%
Brazil	9	1.2%	3	0.5%
Thailand	7	0.9%	2	0.4%
India	7	0.9%	5	0.9%
Austria	6	0.8%	4	0.7%
Denmark	6	0.8%	4	0.7%
Mexico	6	0.8%	1	0.2%
Other	71	9.2%	26	4.7%
Total	769	100.0%	551	100.0%

Notes: This table presents the distribution of operating countries (or regions) of the banks covered in the main sample and the number and fraction of firms that have lending relationships with the banks in that country or region.

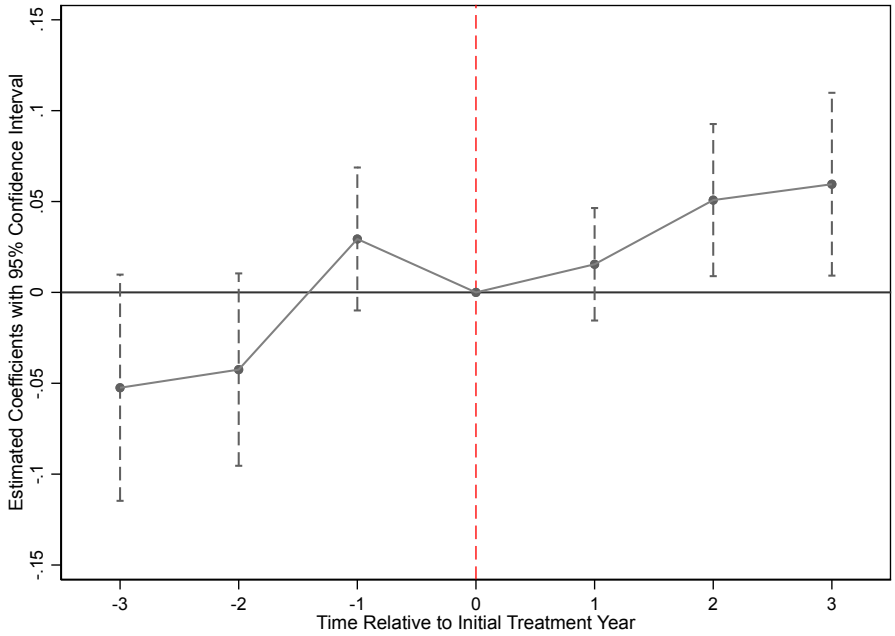
Figures

Figure 1: Percentage of S&P 1500 Firms with ESG-linked Pay



Notes: This figure presents the time trend of the adoption of ESG-linked pay among S&P 1500 firms from 2009 to 2022. The bar displays the number of firms that implement ESG-linked pay in each year, while the line indicates the proportion of S&P 1500 firms that use such compensation schemes. For the data sources, we combine data from ISS Executive Compensation Analytics and ISS Incentive Lab to identify ESG-linked pay adoption.

Figure 2: Dynamic Treatment Effects



Notes: This figure illustrates the difference in the adoption of ESG-linked pay between the treated and control groups before and after exposure to ESG regulatory shocks in the banking sector. We include *Cohort* × *Firm* and *Cohort* × *Year* fixed effects, as well as the full set of control variables in Equation (1). The 95 percent confidence intervals are based on standard errors clustered at the firm level (e.g., Wing et al., 2024).

Tables

Table 1: Sample Distribution and Summary Statistics

Panel A: Industry Distribution

Description	All Firms		Treated Firms		Control Firms	
	N	**Percent**	**N**	**Percent**	**N**	**Percent**
Mining, Construction	43	7.8%	22	10.0%	21	6.3%
Manufacturing	263	47.7%	92	41.8%	171	51.7%
Transportation, Communications, and Utility	92	16.7%	50	22.7%	42	12.7%
Wholesale Trade & Retail Trade	56	10.2%	26	11.8%	30	9.1%
Services	94	17.1%	28	12.7%	66	19.9%
Public Administration	3	0.5%	2	0.9%	1	0.3%
Total	551	100.0%	220	100.0%	331	100.0%

Panel B: Summary Statistics

Variable	**N**	**Mean**	**SD**	**P10**	**P25**	**P50**	**P75**	**P90**
Dependent Variable								
ESG-linked Pay	9,912	0.107	0.310	0	0	0	0	1
Independent Variable								
Treat	9,912	0.155	0.362	0	0	0	0	1
Post	9,912	0.571	0.495	0	0	1	1	1
Control Variable								
Size	9,912	8.633	1.275	7.098	7.786	8.542	9.478	10.41
Leverage	9,912	0.285	0.193	0.051	0.157	0.261	0.372	0.542
ROA	9,912	0.054	0.076	-0.016	0.026	0.056	0.091	0.134
Current Asset	9,912	0.378	0.204	0.104	0.209	0.383	0.519	0.657
R&D	9,912	0.039	0.072	0	0	0.004	0.0420	0.135
MTB	9,912	3.526	6.370	1.014	1.600	2.567	4.146	7.376
IOR	9,912	0.783	0.233	0.524	0.709	0.845	0.929	0.989
Log(Analyst)	9,912	2.740	0.665	1.946	2.398	2.833	3.219	3.466
Log(Compensation)	9,912	9.844	0.793	8.850	9.337	9.836	10.33	10.90
Log(Number of Loans)	9,912	1.382	0.666	0.693	1.099	1.386	1.792	2.197

Notes: Panel A reports the industry distribution for both the treated and control groups within our main sample. Panel B provides summary statistics for all variables used in Equation (1). To mitigate the influence of extreme values, we winsorize all continuous variables at the 1st and 99th percentiles of their respective distributions.

Table 2: Debtholder Non-financial Preference and Corporate ESG-linked Pay

	(1)	(2)
Dependent Variable	*ESG-linked Pay*	
Treated* × *Post	**0.0554****	**0.0532****
	(2.51)	**(2.44)**
Size		-0.0014
		(-0.08)
Leverage		-0.0342
		(-0.56)
ROA		-0.0899*
		(-1.79)
Current Asset		0.0359
		(0.48)
R&D		-0.5616***
		(-2.62)
MTB		-0.0011**
		(-2.45)
IOR		0.0497
		(1.61)
Log(Analyst)		0.0280
		(1.30)
Log(Compensation)		-0.0128
		(-1.46)
Log(Number of Loans)		0.0105
		(0.94)
Observations	9,912	9,912
Adjusted R-squared	0.5991	0.6012
Cohort × Firm FE	Yes	Yes
Cohort × Year FE	Yes	Yes

Notes: This table reports the estimated effect of ESG disclosure regulations targeting banks on the adoption of ESG-linked compensation by their borrowing firms. The dependent variable, *ESG-linked Pay*, is an indicator equal to one if a firm adopts an ESG-linked compensation scheme in a given year. *Treated* is an indicator for firms in the treatment group, defined based on their exposure to ESG regulations in the banking sector. *Post* is an indicator for years following the initial treatment year. The specification includes *Cohort* × *Firm* and *Cohort* × *Year* fixed effects. Standard errors are clustered at the firm level, and *t*-statistics are reported in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively. Appendix A provides detailed definitions of all variables.

Table 3: Debtholder Non-financial Preference and Corporate E-, S-, and G-linked pay

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent Variable	*E-linked Pay*		*S-linked Pay*		*G-linked Pay*	
Treat* × *Post	**0.0318****	**0.0311****	**0.0520****	**0.0497****	**0.0001**	**0.0002**
	(2.21)	**(2.17)**	**(2.31)**	**(2.23)**	**(0.05)**	**(0.11)**
Size		0.0147		-0.0011		-0.0011
		(1.37)		(-0.06)		(-0.28)
Leverage		-0.0413*		-0.0289		-0.0030
		(-1.67)		(-0.48)		(-0.46)
ROA		-0.0059		-0.0874*		0.0066
		(-0.21)		(-1.74)		(0.73)
Current Asset		0.0572		0.0321		-0.0020
		(1.62)		(0.43)		(-0.25)
R&D		-0.0306		-0.5544**		-0.0099
		(-0.37)		(-2.58)		(-0.38)
Market to Book		-0.0003		-0.0011**		0.0000
		(-1.12)		(-2.43)		(0.50)
IOR		0.0202		0.0557*		-0.0040
		(1.54)		(1.82)		(-1.18)
ln(Analyst)		0.0170*		0.0284		0.0014
		(1.78)		(1.31)		(0.71)
ln(Compensation)		-0.0011		-0.0153*		0.0028
		(-0.32)		(-1.75)		(1.00)
ln(Number of Loans)		0.0137*		0.0116		-0.0046
		(1.76)		(1.04)		(-1.40)
Observations	9,912	9,912	9,912	9,912	9,912	9,912
Adjusted R-squared	0.5217	0.5239	0.5974	0.5998	0.0813	0.0818
Cohort × Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Cohort × Year FE	Yes	Yes	Yes	Yes	Yes	Yes

Notes: This table reports the estimated effect of ESG disclosure regulations targeting banks on the adoption of executive compensation linked separately to environmental (E), social (S), and governance (G) performance by their borrowing firms. Columns (1)–(2), (3)–(4), and (5)–(6) report estimates separately for E-, S-, and G-linked pay, respectively. *Treated* is an indicator for firms in the treatment group, defined based on their exposure to ESG regulations in the banking sector. *Post* is an indicator for years following the initial treatment year. The specification includes *Cohort* × *Firm* and *Cohort* × *Year* fixed effects. Standard errors are clustered at the firm level, and *t*-statistics are reported in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively. Appendix A provides detailed definitions of all variables.

Table 4: Debtholder Non-financial Preference and Loan Renegotiation

	(1)	(2)	(3)	(4)
Dependent Variable	*Amendment*	*Log(Amendment)*	*Restrictive Amendment*	*Log(Restrictive Amendment)*
Treat* × *Post	**0.0657****	**0.0575****	**0.0387*****	**0.0269*****
	(2.28)	**(1.98)**	**(2.82)**	**(2.82)**
Size	0.0006	0.0267	-0.0110	-0.0076
	(0.02)	(0.90)	(-1.15)	(-1.15)
Leverage	-0.0596	0.0239	0.0036	0.0025
	(-0.67)	(0.27)	(0.11)	(0.11)
ROA	0.0293	-0.0029	-0.0128	-0.0089
	(0.23)	(-0.02)	(-0.26)	(-0.26)
Current Asset	0.0063	-0.0072	-0.0035	-0.0025
	(0.06)	(-0.07)	(-0.06)	(-0.06)
R&D	0.0205	-0.0034	-0.1048	-0.0726
	(0.05)	(-0.01)	(-0.57)	(-0.57)
Market to Book	-0.0022*	-0.0018	-0.0005	-0.0003
	(-1.66)	(-1.49)	(-0.98)	(-0.98)
IOR	-0.0264	0.0040	-0.0096	-0.0066
	(-0.48)	(0.08)	(-0.76)	(-0.76)
Log(Analyst)	0.0366	0.0417	-0.0021	-0.0014
	(1.30)	(1.58)	(-0.17)	(-0.17)
Log(Compensation)	-0.0047	-0.0037	0.0046	0.0032
	(-0.30)	(-0.25)	(0.76)	(0.76)
Log(Number of Loans)	0.2942***	0.2912***	0.0397***	0.0275***
	(14.32)	(14.07)	(4.58)	(4.58)
Observations	9,912	9,912	9,912	9,912
Adjusted R-squared	0.1602	0.2105	0.2571	0.2571
Cohort × Firm FE	Yes	Yes	Yes	Yes
Cohort × Year FE	Yes	Yes	Yes	Yes

Notes: This table reports the regression results of how ESG pressure from banks affects loan covenant amendments. The dependent variable in Column (1) is *Amendment*, an indicator equal to one if at least one loan contract is amended in a given year, and zero otherwise. The dependent variable in Column (2) is *Log(Amendment)*, defined as the natural logarithm of one plus the total number of a firm's loan contract amendments in a given year. The dependent variable in Column (3), *Restrictive Amendment*, is an indicator equal to one if the firm has at least one loan contract amended in a given year and the amended contract contains more covenants than the original contract, and zero otherwise. The dependent variable in Column (4), *Log(Restrictive Amendment)*, is defined as the natural logarithm of one plus the number of such amendments. *Treat* is the indicator variable for firms in the treatment group based on exposure threshold. *Post* is the indicator variable for years that after initial treatment year. We include *Cohort* × *Firm* and *Cohort* × *Year* fixed effects. Standard errors are clustered at the firm level, and *t*-statistics are reported in parentheses. *, **, *** indicate significance at the 10%, 5%, and 1% levels, respectively. Appendix A provides detailed variable definitions.

Table 5: Stock Market Response of Borrowing Firms to Mandatory ESG Disclosure Regulation for Banks

Panel A: Summary Statistics

Variable	**N**	**Mean**	**SD**	**P10**	**P25**	**P50**	**P75**	**P90**
Dependent Variable								
$CAR^{CAPM}_{[-1,1]}$	1,161	-0.363	3.194	-3.522	-1.741	-0.172	1.144	2.813
$CAR^{FF3}_{[-1,1]}$	1,161	0.166	3.105	-2.752	-1.168	0.178	1.584	3.296
$CAR^{Carhart}_{[-1,1]}$	1,161	0.170	3.101	-2.764	-1.186	0.182	1.584	3.324
Independent Variable								
Regulation Exposure	1,161	0.042	0.201	0	0	0	0	0
Control Variable								
Size	1,161	7.935	1.590	5.871	6.855	7.938	8.946	10.11
Leverage	1,161	0.307	0.214	0.027	0.155	0.288	0.416	0.577
ROA	1,161	0.035	0.074	-0.042	0.011	0.040	0.070	0.114
Current Asset	1,161	0.369	0.214	0.097	0.195	0.359	0.515	0.668
R&D	1,161	0.028	0.060	0	0	0	0.023	0.104
MTB	1,161	3.489	5.432	0.985	1.533	2.442	4.071	7.769
IOR	1,161	0.728	0.296	0.163	0.630	0.830	0.929	0.990

Panel B: Regression Results

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent Variable	$CAR^{CAPM}_{[-1,1]}$		$CAR^{FF3}_{[-1,1]}$		$CAR^{Carhart}_{[-1,1]}$	
Regulation Exposure	**-0.7822***	**-0.8684****	**-0.7599***	**-0.8051****	**-0.7660***	**-0.8164****
	(-1.71)	**(-2.22)**	**(-1.81)**	**(-2.03)**	**(-1.80)**	**(-2.03)**
Size		0.3472***		0.1104*		0.1072*
		(5.71)		(1.75)		(1.69)
Leverage		0.7930*		0.7548		0.7018
		(1.79)		(1.59)		(1.44)
ROA		3.9194***		2.1849		2.1424
		(2.89)		(1.65)		(1.64)
Current Asset		0.1537		0.1028		0.0460
		(0.27)		(0.19)		(0.08)
R&D		2.7117		2.5276		2.2174
		(1.06)		(1.04)		(0.93)
MTB		-0.0340*		-0.0355*		-0.0382**
		(-1.93)		(-1.98)		(-2.14)
IOR		0.8196**		0.9849***		0.9597***
		(2.48)		(3.07)		(3.01)
Observations	1,161	1,161	1,161	1,161	1,161	1,161
Adjusted R-squared	0.0671	0.1172	0.0728	0.0895	0.0709	0.0870

Notes: This table reports the summary statistics (Panel A) and the regression results (Panel B) of stock market reaction on the regulation announcement date. The dependent variable is the three-day *CAR* surrounding the announcement date. The independent variable is *Regulation Exposure*, an indicator variable for firms with lending relationships to banks subject to the EU NFR Directive at the time of the announcement. We winsorize all continuous variables at the top and bottom 1% of the distribution to minimize the effect of outliers. We include two-digit SIC-code industry fixed effects. Standard errors are clustered at the SIC 2-digit level, with *t*-statistics reported in parentheses. *, **, *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Table 6: Debtholder Non-financial Preference and Corporate ESG-linked Pay: ESG Preference Misalignment

	(1)	(2)	(3)
Partition Variable	*ESG Incidents*	*E Incidents*	*S Incidents*
Treated* × *Post* × *High ESG Incidents	**0.0782*** **		
	(2.81)		
Treated × *Post* × *Low ESG Incidents*	0.0172		
	(0.60)		
Treated* × *Post* × *High E Incidents		**0.0993*** **	
		(3.09)	
Treated × *Post* × *Low E Incidents*		0.0142	
		(0.56)	
Treated* × *Post* × *High S Incidents			**0.0799*** **
			(2.74)
Treated × *Post* × *Low S Incidents*			0.0206
			(0.75)
Difference	0.0610	0.0851	0.0593
p-value	0.0479	0.0118	0.0528
Observations	9,912	9,912	9,912
Adjusted R-squared	0.6015	0.6019	0.6015
Cohort × Firm FE	Yes	Yes	Yes
Cohort × Year FE	Yes	Yes	Yes

Notes: This table presents how ESG incidents affect shareholders' adoption of ESG-linked pay as a commitment device to debtholders' non-financial preferences. The dependent variable, *ESG-linked Pay*, is an indicator variable that equals one if the firm adopts an ESG-linked compensation scheme in a given year. In Panel D, the partition variables are *total ESG incidents* and separately for *environmental (E)* and *social (S)*. We include *Cohort* × *Firm* and *Cohort* × *Year* fixed effects. Standard errors are clustered at the firm level, and *t*-statistics are reported in parentheses. *, **, *** indicate significance at the 10%, 5%, and 1% levels, respectively. Appendix A provides detailed variable definitions.

Table 7: Debtholder Non-financial Preference and Corporate ESG-linked Pay: Relative Cost of ESG-linked Pay

Panel A: Cost of Switching Banks

	(1)	(2)	(3)
Partition Variable	*Credit Rating*	*Altman Z-score*	*Business Segment*
Treated* × *Post* × *Low Credit Rating	**0.0936*** **		
	(3.14)		
Treated × *Post* × *High Credit Rating*	0.0183		
	(0.67)		
Treated* × *Post* × *Low Altman Z-score		**0.0882*** **	
		(3.06)	
Treated × *Post* × *High Altman Z-score*		-0.0060	
		(-0.25)	
Treated* × *Post* × *Multi-segment Firm			**0.0675*** **
			(2.82)
Treated × *Post* × *Single-segment Firm*			0.0062
			(0.16)
Difference	0.0753	0.0942	0.0613
p-value	0.0221	0.0028	0.0782
Observations	9,912	9,912	9,912
Adjusted R-squared	0.6018	0.6021	0.6014
Controls	Yes	Yes	Yes
Cohort × Firm FE	Yes	Yes	Yes
Cohort × Year FE	Yes	Yes	Yes

Panel B: Implementation Cost of Compensation Changes

	(1)	(2)	(3)
Partition Variable	*Political Ideology*	*CEO Tenure*	*General Ability Index*
Treated* × *Post* × *Democratic-leaning CEO	**0.1177** **		
	(2.20)		
Treated × *Post* × *Republican-leaning CEO*	0.0377*		
	(1.70)		
Treated* × *Post* × *Short-tenure CEO		**0.0798*** **	
		(2.99)	
Treated × *Post* × *Long-tenure CEO*		0.0078	
		(0.26)	
Treated* × *Post* × *High-ability CEO			**0.0868*** **
			(2.72)
Treated × *Post* × *Low-ability CEO*			0.0206
			(0.82)
Difference	0.0800	0.0720	0.0662
p-value	0.0748	0.0261	0.0387
Observations	9,912	9,912	9,912
Adjusted R-squared	0.6016	0.6017	0.6016
Controls	Yes	Yes	Yes
Cohort × Firm FE	Yes	Yes	Yes
Cohort × Year FE	Yes	Yes	Yes

Table 7: Debtholder Non-financial Preference and Corporate ESG-linked Pay: Relative Cost of ESG-linked Pay

Panel C: Banks' Bargaining Power

	(1)	(2)	(3)
Partition Variable	*Reputable Bank Share*	*Non-US Bank Share*	*ESG-shock Loan Intensity*
Treated* × *Post* × *High Reliance on Reputable Banks	**0.0959*** **		
	(2.61)		
Treated × *Post* × *Low Reliance on Reputable Banks*	0.0342		
	(1.39)		
Treated* × *Post* × *High Reliance on Non-U.S. Bank		**0.0651*** **	
		(2.77)	
Treated × *Post* × *Low Reliance on Non-U.S. Bank*		-0.0137	
		(-0.34)	
Treated* × *Post* × *High ESG-shock Loan Intensity			**0.0881*** **
			(2.94)
Treated × *Post* × *Low ESG-shock Loan Intensity*			0.0175
			(0.65)
Difference	0.0617	0.0788	0.0706
p-value	0.0674	0.0348	0.0286
Observations	9,912	9,912	9,912
Adjusted R-squared	0.6015	0.6015	0.6017
Controls	Yes	Yes	Yes
Cohort × Firm FE	Yes	Yes	Yes
Cohort × Year FE	Yes	Yes	Yes

Notes: This table presents cross-sectional analysis on shareholders' adoption of ESG-linked pay as a commitment device to debtholders' non-financial preferences. The dependent variable, *ESG-linked Pay*, is an indicator variable that equals one if the firm adopts an ESG-linked compensation scheme in a given year. In Panel A, the partition variables are *Credit Ratings*, *Altman Z Score*, and *Business Segment*, which are proxies for cost of switching banks. In Panel B, the partition variables are *Political Ideology*, *CEO Tenure*, and *General Ability Index*, which are proxies for implementation cost for compensation changes. In Panel C, the partition variables are *Reputable Bank Share*, *Non-U.S. Bank Share*, and *ESG-Shock Loan Intensity*, which serve as proxies for banks' bargaining power in lending relationships. We include *Cohort* × *Firm* and *Cohort* × *Year* fixed effects. Standard errors are clustered at the firm level, and *t*-statistics are reported in parentheses. *, **, *** indicate significance at the 10%, 5%, and 1% levels, respectively. Appendix A provides detailed variable definitions.

Table 8: Economic Consequences of ESG-link Pay Adoption

Panel A: ESG Performance Improvement

	(1)	(2)	(3)	(4)
Dependent Variable	*ESG Score*$_{t+1}$	*ESG Score*$_{t+2}$	*ESG Score*$_{t+3}$	*Avg. ESG Score*$_{t+1\ to\ t+3}$
Treated* × *Post* × *ESG-linked Pay Adoption	**0.0765****	**0.0646***	**0.0432**	**0.0614***
	(2.19)	**(1.70)**	**(1.29)**	**(1.82)**
Observations	4,725	4,725	4,725	4,725
Adjusted R-squared	0.9046	0.9009	0.8915	0.9353
Controls	Yes	Yes	Yes	Yes
Cohort × Firm FE	Yes	Yes	Yes	Yes
Cohort × Year FE	Yes	Yes	Yes	Yes

Panel B: Shareholder Value Recovery

	(1)	(2)	(3)	(4)
Dependent Variable	*Tobin's* Q_{t+1}	*Tobin's* Q_{t+2}	*Tobin's* Q_{t+3}	*Avg. Tobin's* $Q_{t+1\ to\ t+3}$
Treated* × *Post* × *ESG-linked Pay Adoption	**0.1684**	**0.3122****	**0.3606****	**0.2476****
	(1.49)	**(2.43)**	**(2.34)**	**(2.07)**
Observations	7,042	7,042	7,042	7,042
Adjusted R-squared	0.8080	0.8021	0.8039	0.8602
Controls	Yes	Yes	Yes	Yes
Cohort × Firm FE	Yes	Yes	Yes	Yes
Cohort × Year FE	Yes	Yes	Yes	Yes

Notes: This table reports the economic consequences of ESG-linked pay adoption after the ESG regulations on lending banks. The triple-interaction term *Treated* × *Post* × *ESG-linked Pay Adoption* captures the differential change in outcome vairbales for treated firms that newly adopted ESG-linked pay after the regulation shock, relative to control firms and the pre-regulation period. The indicator *ESG-linked Pay Adoption* equals one if a firm has no ESG-linked pay before treatment but adopts it afterward, and zero otherwise. In Panel A, we present evidence on the adoption of ESG-linked pay that could help contribute to the firm value recovery caused by intensified shareholder-debtholder conflicts. Firm value is measured by Tobin's Q over the three years after the regulation year. Columns (1) to (3) report the effects on Tobin's Q in years $t+1$, $t+2$, and $t+3$, respectively. Column (4) presents the effect on average Tobin's Q over the three-year period. In Panel B, we report evidence on whether firms experience improvements in ESG performance. The dependent variable is ESG score over the three years after the regulation year. Columns (1) to (3) report the effects on ESG Score in years $t+1$, $t+2$, and $t+3$, respectively. Column (4) presents the effect on average ESG score over the three-year period. We include *Cohort* × *Firm* and *Cohort* × *Year* fixed effects. Standard errors are clustered at the firm level, and t-statistics are reported in parentheses. *, **, *** indicate significance at the 10%, 5%, and 1% levels, respectively. Appendix A provides detailed variable definitions.

Table 9: Debtholder Non-financial Preference and Corporate ESG-linked Pay: Falsification Test

Dependent Variable	(1)	(2)	(3)	(4)	(5)	(6)
	ESG-linked Pay					
	Threshold = 40%		Threshold = 50%		Threshold = 60%	
Treated* × *Post	**-0.0141**	**-0.0169**	**-0.0147**	**-0.0164**	**-0.0288**	**-0.0306**
	(-0.38)	**(-0.46)**	**(-0.38)**	**(-0.43)**	**(-0.72)**	**(-0.77)**
Size		-0.0288***		-0.0269***		-0.0275***
		(-3.19)		(-2.98)		(-3.10)
Leverage		-0.0190		-0.0183		-0.0216
		(-0.56)		(-0.55)		(-0.65)
ROA		-0.0805**		-0.0751**		-0.0784**
		(-2.31)		(-2.16)		(-2.30)
Current Asset		-0.0508		-0.0434		-0.0362
		(-1.34)		(-1.17)		(-0.98)
R&D		0.0463		0.0477		0.0446
		(1.00)		(1.05)		(1.02)
MTB		-0.0002		-0.0003		-0.0003
		(-0.49)		(-0.59)		(-0.62)
IOR		-0.0306		-0.0262		-0.0233
		(-1.26)		(-1.07)		(-0.97)
Log(Analyst)		0.0055		0.0039		0.0034
		(0.58)		(0.41)		(0.36)
Log(Compensation)		0.0067		0.0061		0.0060
		(1.63)		(1.50)		(1.47)
Log(Number of Loans)		0.0020		0.0015		0.0015
		(0.25)		(0.19)		(0.20)
Observations	11,977	11,977	12,152	12,152	12,369	12,369
Adjusted R-squared	0.5682	0.5689	0.5674	0.5680	0.5685	0.5691
Cohort × Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Cohort × Year FE	Yes	Yes	Yes	Yes	Yes	Yes

Notes: This table reports the regression result of how banks' voluntary ESG initiatives affect their borrowers' ESG pay adoption. The dependent variable is *ESG-linked Pay*, an indicator variable, which equals to 1 if the firm has ESG pay scheme in a given year. *Treat* is the indicator variable for firms in the treatment group based on different exposure thresholds (40% for column (1) & column (2), 50% for column (3) & column (4), 60% for column (5) & column (6). *Post* is the indicator variable for years that after the initial treatment year. We include *Cohort* × *Firm* and *Cohort* × *Year* fixed effects. Standard errors are clustered at the firm level, and *t*-statistics are reported in parentheses. *, **, *** indicate significance at the 10%, 5%, and 1% levels, respectively. Appendix A provides detailed variable definitions.

Table 10: Debtholder Non-financial Preference and Corporate ESG-linked Pay: Testing Alternative Explanation

	(1)	(2)
Partition Variable	*Amihud Illiquidity*	*Bid-Ask Spread*
Treated* × *Post* × *High Amihud Illiquidity	**0.0605****	
	(2.02)	
Treated × *Post* × *Low Amihud Illiquidity*	0.0479*	
	(1.75)	
Treated* × *Post* × *High Bid-Ask Spread		**0.0611***
		(1.93)
Treated × *Post* × *Low Bid-Ask Spread*		0.0526*
		(1.90)
Difference	0.0126	0.0085
p-value	0.3674	0.4134
Observations	9,912	9,912
Adjusted R-squared	0.6011	0.6046
Cohort × Firm FE	Yes	Yes
Cohort × Year FE	Yes	Yes

Notes: This table presents how information advantage of corporate insiders affect the adopt of ESG-linked pay. The dependent variable, *ESG-linked Pay*, is an indicator variable that equals one if the firm adopts an ESG-linked compensation scheme in a given year. The partition variables are *Amihud Illiquidity* and *Bid-Ask Spread*, which serve as proxies for insider-outsider information asymmetry. We include *Cohort* × *Firm* and *Cohort* × *Year* fixed effects. Standard errors are clustered at the firm level, and *t*-statistics are reported in parentheses. *, **, *** indicate significance at the 10%, 5%, and 1% levels, respectively. Appendix A provides detailed variable definitions.

Table 11: Debtholder Non-financial Preference and Corporate ESG-linked Pay: Robustness Tests

Panel A: Alternative Thresholds for Treated and Control Firms

	(1)	(2)	(3)	(4)
Dependent Variable	*ESG-linked Pay*			
	Threshold = 40%		Threshold = 60%	
Treated* × *Post	**0.0513****	**0.0493****	**0.0590*****	**0.0571*****
	(2.31)	**(2.24)**	**(2.65)**	**(2.59)**
Observations	9,772	9,772	10,108	10,108
Adjusted R-squared	0.6012	0.6032	0.6010	0.6030
Control Variables		Yes		Yes
Cohort × Firm FE	Yes	Yes	Yes	Yes
Cohort × Year FE	Yes	Yes	Yes	Yes

Panel B: Alternative Sample Periods

	(1)	(2)	(3)	(4)
Dependent Variable	*ESG-linked Pay*			
Sample Period	2009-2021		2000-2021	
Treated* × *Post	**0.0539****	**0.0516****	**0.0492****	**0.0475****
	(2.47)	**(2.38)**	**(2.54)**	**(2.45)**
Observations	15,806	15,806	27,069	27,069
Adjusted R-squared	0.6351	0.6368	0.5842	0.5849
Control Variables		Yes		Yes
Cohort × Firm FE	Yes	Yes	Yes	Yes
Cohort × Year FE	Yes	Yes	Yes	Yes

Panel C: Continuous Treatment Variable

	(1)	(2)
Dependent Variable	*ESG-linked Pay*	
Continuous Treated* × *Post	**0.0549****	**0.0530****
	(2.32)	**(2.27)**
Observations	9,912	9,912
Adjusted R-squared	0.5990	0.6011
Controls		Yes
Cohort × Firm FE	Yes	Yes
Cohort × Year FE	Yes	Yes

Notes: Panel A in Table 11 reports the robustness test regression result of the effect of ESG disclosure regulations targeting banks on their borrowers' ESG-linked Pay adoption. Columns (1) and (2) show the result for threshold 40%, while Columns (3) and (4) for 60%. Panel B in Table 11 reports the robustness test regression result of the effect of ESG disclosure regulations targeting banks on their borrowers' ESG-linked Pay adoption. Columns (1) and (2) show the results of sample period from 2009 to 2021, while Columns (3) and (4) for sample period from 2000 to 2021. Panel C in Table 11 reports regression results using a continuous treated variables of firms' exposure to ESG regulatory shocks, defined as the proportion of ESG-shock loans relative to the total amount of outstanding loans from foreign banks. We include *Cohort* × *Firm* and *Cohort* × *Year* fixed effects. Standard errors are clustered at the firm level, and *t*-statistics are reported in parentheses. *, **, *** indicate significance at the 10%, 5%, and 1% levels, respectively. Appendix A provides detailed variable definitions.