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The Disconnect between Syndicated Lending Activities and ESG Determinants in Banks' Executive Compensation

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Abstract

Using banks' implementation of ESG metrics in variable executive compensation and data on syndicated lending, this paper provides first evidence that banks who implement ESG KPIs in variable executive compensation do not alter their lending activities towards brown or fossil companies. I additionally find, that banks which implement such incentive structures lend more to privately held brown firms and less to highly-emitting public firms. These findings question the effectiveness of ESG metrics in banks' variable executive compensation.

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1. Introduction

The imperative for sustainable development has positioned Environmental, Social and Governance (ESG) criteria at the heart of corporate strategies globally. Investors are perceived to exercise market discipline and thus contribute to the transition to net-zero carbon emissions at the firm level (for an overview see Steuer and Tröger (2022)). A more granular view needs to focus on the transmission mechanisms that help translate investors' preferences into changes in firms' operations. Which measures of corporate governance align firms' economic activities with sustainability objectives?

Traditional corporate governance scholarship has identified executive compensation as a powerful tool to incentivize corporate directors to act in the interest of shareholders and other stakeholders, (Ross 1973; Mirrlees 1976; Holmstrom 1979; Shavell 1979; Holmstrom 1982; Grossman and Hart 1983; Jensen and Murphy 1990). More skeptical contributions highlight perverse effects if managers control the design of compensation contracts,
(Bebchuk, Fried, and Walker 2002; Bebchuk and Fried 2003; Bebchuk and Fried 2005; Bratton 2005; Levitt 2005). Variable compensation is particularly vulnerable to agency problems as their determination is subject to much discretion which cannot always be meaningfully assessed and reviewed by shareholders or other outside observers.

As part of the broader effort to align corporate practices with ESG goals, the integration of ESG in variable executive compensation (henceforth referred to as ESG-linked ExecComp) has been championed as a measure to further signal firms' commitment to sustainability and to shape their executives' actions towards achieving tangible outcomes that foster the net-zero transition. There are no clear laws determining whether firms have to implement such metrics nor is the standard to do so regulated. This leaves a high level of discretion to firms and ultimately makes these compensation structures highly idiosyncratic. Despite the opaqueness of the laws, the implementation of ESG-linked ExecComp has increased massively over the past years from only 6% in 2013 to more than 60% in 2021.

The effectiveness of these contracts and whether they genuinely improve firms' ESG output is barely understood. On one hand, ESG-linked ExecComp could represent credible incentives to encourage managers to successfully pursue ESG activities that align with a firm's sustainability strategy to foster a sound transition to more sustainable pathways and which creates duties of managers not only towards shareholders but also towards other stakeholders and the society as a whole. On the other hand, due to the lack of regulation, high discretion and structural inconsistency, ESG-linked ExecComp could be used by firms to superficially be perceived as more ESG-cautious by investors and the public without any significant operational changes which could ultimately be interpreted as a form of greenwashing. Due to the materiality of ESG risks, these concerns could adversely affect financial risks raising concerns on investor protection.

Moreover, ESG-based incentives have a narrow scope and only serve a few core

groups and focus by construction on a limited number of aspects of welfare. According to the economics of multitasking, tying executive variable compensation to narrow quantifiable measures, such as ESG metrics, can create structural problems and ultimately distorted incentives which might result in neglecting other significant hard-to-quantifiable dimensions (Bebchuk and Tallarita 2022). Yet, some argue that the extensive implementation and expansion of ESG-linked ExecComp should be strongly supported at this time.

While in particular emission-intensive sectors such as energy or utilities have used this as an additional tool to actively incentivize the net-zero transition, lower emitting sectors such as the financial sector and in particular banks have also started to tie their executive compensation to certain ESG measures. Even though banks do not belong to large emitters themselves, they are of key importance in allocating resources to non-financial firms which tend to have significant environmental impacts and are therefore under much public pressure to transition to more sustainable pathways. In particular large banks are under great pressure to become involved in the process of decarbonization as these often provide funding to the largest global fossil companies. Thus, banks can also be highly exposed to climate change by providing capital to firms with high physical or transition risks. In contrast to capital markets, banks reach a broader scope of firms including public and private firms which highlights the importance of banks' involvement in the decarbonization process.

Pressure towards the involvement of banks in the global decarbonization process is increasing at a high pace. As ESG risks are found to have a direct effect on traditional risks such as credit, market and operational risks, these developments are aimed to further support the transition towards a more sustainable economy, while ensuring that the banking sector remains resilient.

Yet banks still fund high-emitting firms at a large scale (Kacperczyk and Peydró 2022). The Fossil Fuel Finance Report 2023[2] identifies a group of large banks as the main financiers of major emitting companies and even suggests an immediate end to financing new oil, gas and coal supply or infrastructure. Thus, public voices regarding the engagement of banks in the net-zero transition are very high. Climate-conscious institutional investors are pressuring banks to reduce their financing to brown industries and to align their lending activities with the goals of the Paris Climate Agreement (IIGCC 2021). Banks have therefore started to get involved in various, thus far voluntary, climate actions such as the Net-Zero Banking Alliance launched in 2021[3] or committing to the Science Bases target initiative (SBTi).

At the same time, regulators and supervisors are currently discussing and drafting guidelines on how to handle and include ESG and in particular climate-related risks into banks' capital requirements. The EBA has conducted climate stress tests for the first time in 2022. Moreover, the EBA has published a list of policy

[2] See Banking on Climate Chaos Fossil Fuel Finance Report 2023.

[3] The Alliance was launched only in 2021 and its effects on banks' lending decisions after their implementation of ESG-linked ExecComp cannot be taken into account.

recommendations which aims to incorporate environmental risks across all pillars of the regulatory framework and is currently consulting on guidelines on the management of ESG risks[4].

There is an intensifying interest in the outcomes of integrating ESG KPIs into variable executive compensation structures of the general industry (Cohen et al. 2023; Bebchuk and Tallarita 2022; Maas 2018; Flammer, Hong, and Minor 2019; Ikram, Li, and Minor 2019). However, there is no paper to date which studies the implications of ESG metrics in variable executive compensation of banks. Preliminary evidence suggests a lack of significant impact of ESG-linked and Environmental-linked ExecComp on improving the environmental footprints of non-financial firms, alongside a market-neutral stock market response to the approval of such compensation schemes during annual shareholder meetings. Thus, the implementation of ESG-linked and Environmental-linked ExecComp does not necessarily create the theoretically indented mechanism and outcomes but creates rather distorted incentives as likewise pointed out by Bebchuk and Tallarita (2022). This empirical study aims to extend this analysis to the banking sector, evaluating whether ESG-oriented compensation frameworks offer tangible incentives that could steer banks towards more sustainable lending practices which could ultimately foster the overall corporate net-zero transition due to banks' pivotal ability to facilitate funding. This paper provides an exploratory study on the allocation of corporate lending in response to the introduction of ESG-linked and Environmental-linked ExecComp of banks. It is of pivotal importance to study whether banks' role in the decarbonization process is meaningful. Specifically, this study aims to provide first evidence for the following research questions: Do banks enforce more sustainable operations by actively cutting credit to brown or fossil firms and (possibly) channeling credit towards green(er) firms and does incentivizing a bank's management by implementing ESG-linked or Environmental-linked ExecComp foster this transition?

Moreover, as the environment regarding lending to brown and fossil companies becomes increasingly hostile (Laeven and Popov 2023), banks may prefer to shift brown lending towards privately held companies to avoid the increased inevitable public scrutiny that is associated with it. Thus, as a further refinement of the empirical analysis I further distinguish between lending to public and private brown firms. This paper is an additional extension of existing literature on the role of bank lending in the net-zero transition (Delis, Greiff, Iosifidi, et al. 2024; Meisenzahl 2023; Kacperczyk and Peydró 2022; Mueller and Sfrappini 2022; Giannetti et al. 2023) and its intersection with ESG-linked ExecComp.

The findings in this analysis reveal an unsettling picture which contributes to the rising concern of banks' role in the net-zero transition. First, this paper does not find

[4] The EBA in accordance with Article 87a(5) of Directive 2013/36/EU is mandated to issue Guidelines on minimum standards and reference methodologies for the identification, measurement, management and monitoring of ESG risks. The EBA is planning on finalizing the guidelines by end-2024.

that banks who implement ESG-linked or Environmental-linked ExecComp alter their overall syndicated lending towards brown or fossil companies. Second, also overall lending to privately held companies does not significantly change as a response to the implementation. However, when examining the lending dynamics in more detail, this analysis finds that lending to privately held firms which operate in brown industries significantly increases after the introduction of ESG-linked ExecComp while overall lending to private firms remains unchanged. Moreover, when separately examining banks' lending towards higher emitting firms measured by their scope 1 emissions, which are essential for large public firms, this analysis finds that banks who have implemented ESG-linked ExecComp lend less to high-emitting public firms and more towards privately held brown firms.

This study therefore questions the effectiveness of ESG metrics in variable executive compensation as I provide explorative evidence of a reallocation of brown lending to privately held companies as a response to the introduction of ESG-linked ExecComp. ESG-linked ExecComp can create distorted incentives and does not necessarily foster the net-zero transition.

It is crucial to mention that reducing or even fully hindering the financing of large emitters can have adverse effects. On one hand, this could force such firms to become more green in order to receive financing more easily. On the other hand, firms are in need of much capital to finance their net-zero transition. Banks decreasing their lending or even stopping their lending to such firms altogether, could even be a backstop against the net-zero transition. Some banks argue that fossil fuel companies need financing in order to transition to more sustainable energy sources. Very few banks adopted exclusion policies for lending to brown or fossil companies. Additionally, sustainability-linked loans as well as green loans have experienced a surge in global lending markets as their key objective is to facilitate and support environmentally sustainable economic activity as the loan contract terms depend on the borrower's sustainability performance. In the case of green loans, the borrower must even use the proceeds of the loan for green projects. As a result of data availability, this paper cannot make any inferences on the loan proceeds[5].

2. Related Literature

This work contributes to several strands of literature. First, it contributes to the traditional corporate governance literature that has identified executive compensation as a powerful tool to incentivize corporate directors to act in the interest of shareholders (Holmstrom 1982; Ross 1973; Jensen and Murphy 1990). The introduction of ESG-linked ExecComp is consistent with earlier corporate governance literature as well as agency theory findings that the reliance on operational metrics or non-financial metrics can make managerial compensation contracts more efficient (Ittner, Larcker, and Rajan 1997; Holmstrom 1979; Dikolli

[5] The Refinitiv LoanConnector database does not cover the loan proceeds. Data on sustainability-linked loans and green loans are only available for 2021 with very few observations.

2001; Jensen 2002). The real effects of corporate governance practices have been studied intensively in the literature. However, evidence about the measurement and meaning of good corporate governance and whether such practices enhance firms' real performance is disputed.

Cohen et al. (2023) identify several macro- and firm-level characteristics that are associated to make firms more prone to adopt ESG-linked ExecComp. They take a more detailed look at the impact of institutional investors and find that funds tend to tilt their portfolios towards firms that have implemented ESG-linked ExecComp. Additionally, they suggest that ESG-linked ExecComp is consistent with efficient incentive contracting.

Bebchuk and Tallarita (2022) hand-collect data of ESG metrics in variable executive compensation from S&P 100 companies and conclude that their effectiveness is rather limited due to structural problems. The narrow scope of ESG metrics does not necessarily aggregate stakeholder welfare. Moreover, the implementation of ESG-linked ExecComp can even increase present concerns of agency problems as their public disclosure does rarely help outsiders to assess whether their use provides true valuable incentives or solely serves the interests of executives' pay arrangements.

Numerous studies exist that analyze whether the incorporation of ESG issues in a firm's business strategy has any real effects in terms of affecting financial or non-financial performance. Many studies point out the potential that increased ESG disclosure or increased ESG performance can enhance financial performance (Brogi and Lagasio 2019; Li et al. 2018; Krueger et al. 2021). ESG commitments in firms' strategies can only be considered as credible if such firms' related ESG data improve ex-post. As a detailed look on firms' environmental outcomes is taken, and in particular on carbon emissions, this work also contributes to the connection between carbon disclosure, commitments and performance (Bolton and Kacperczyk 2020; Bolton and Kacperczyk 2021a). Bolton and Kacperczyk (2021b) find that firms who commit to the carbon disclosure project or Science-based Target Initiative subsequently further reduce their emissions. However, the effects of these commitment initiatives on overall emissions of publicly traded companies are rather small. The companies that agree to commit and those that make the most ambitious commitments, tend to be companies with lower carbon emissions to begin with. This setting studies whether ESG-linked ExecComp are effective commitment in improving ESG performance.

This paper adds an additional layer to existing research as it specifically studies the effects of ESG-linked ExecComp on bank's lending decisions. As this analysis uses syndicated loan data, inference on lending to privately held brown companies can also be provided.

The integration of ESG factors into financial decision-making has emerged as a pivotal theme in contemporary finance research as financial institutions and capital markets involvement is of key importance in the global net-zero transition. This surge of interest is particularly evident in studies examining the financial market's responsiveness to climate change risks, with considerable emphasis placed on stock

market dynamics (Bolton and Kacperczyk 2021a; Görgen et al. 2020). Other strands study the issuance of ESG-linked and sustainability-linked loans (Kim et al. 2022; Du, Harford, and Shin 2023). Research surrounding the influence of ESG and climate-related risks on the bank credit market and the role of banks in the net-zero transition, though less voluminous, is rapidly expanding. This analysis contributes to the burgeoning exploration of banking institutions' pivotal roles in facilitating the transition to a net-zero economy, focusing specifically on the nuances of their lending decisions.

Recent scholarly endeavors, such as that by Giannetti et al. (2023), delve into the impact of banks' environmental disclosure on their lending patterns to both green and brown firms. Their findings reveal a paradox where banks, despite projecting an environmentally friendly image through their disclosures, tend to extend increased credit to brown borrowers as banks are hesitant to cut ties with existing brown borrowers. This trend underscores a disconnect between banks' environmental rhetoric and their actual financial practices.

In a similar vein, Kacperczyk and Peydró (2022) use bank-level commitments to the Science Based Target Initiative as a proxy for changes in banks' green preferences and find that firms with a higher carbon footprint who previously borrowed from committed banks subsequently receive less credit. The work of Meisenzahl (2023) uses flood and wildfire risk as proxies for climate risk and finds a significant reduction in credit provision to areas with higher climate risks starting from 2015. Martini et al. (2024) proxy bank's exposure to climate transition risks in their syndicated loan portfolio and find that bank's risk exposures declined in particular after the Paris Agreement. Yet the rebalancing of bank's loan portfolio stems from more lending to low-emission borrowers and not less lending to high-emission borrowers.

Laeven and Popov (2023) study the effects of syndicated lending with regards to the introduction of a carbon tax. They find an increase in domestic banks' lending to coal, oil and gas companies in foreign countries, in particular for banks with larger pre-existing fossil-lending exposures. This strategic realignment involves reallocating large shares of fossil loan exposures to jurisdictions with more lenient environmental regulations as well as more lenient bank supervision.

Ehlers, Packer, and Greiff (2022) find a significant carbon premium, i.e. a difference in risk premia due to CO2 emission intensity, in the syndicated loan market after the Paris Agreement. Delis, Greiff, and Ongena (2019) assess syndicated loan data for fossil fuel firms to examine whether banks price the risk of stranded assets. They find that banks only began to price in these risks after the Paris Agreement. Kleimeier and Viehs (2016) find that firms who voluntarily disclose their carbon emissions to the Carbon Disclosure Project (CDP) receive more favorable lending conditions as they find a significant negative relationship between voluntary disclosure and loan spreads.

Additionally, past studies have found evidence that banks value repeated relationships and prefer to give credit to existing clients, also during phases of credit downturns and negative wealth shocks (Beck et al. 2018; Bolton, Freixas, et al. 2016;

Rajan 1992; Petersen and Rajan 1994; Berger and Udell 1995). This aspect of banking underscores the potential for banks to maintain, if not deepen, their pre-existing lending engagements with firms within polluting industries, leveraging historical lending relationships and informational advantages. Thus, banks might be hesitant to cut ties with a firm in a brown industry which has previously borrowed from that bank.

3. Data and Methodology

3.1 Data and Summary Statistics

The sample is based on the banks covered in the executive compensation analytics database provided by Institutional Shareholder Services (ISS). The database provides information on variable KPIs that determine firms' variable executive compensation from which it can infer whether a bank has introduced ESG-linked of Environmental-linked ExecComp in a given year or not[6]. Next, the universe of banks covered in the ISS database is matched with syndicated loan data from the Refinitiv LoanConnector database[7]. Banks covered in the ISS database are hand-matched with lenders on the parent level from the LoanConnector database. This enables me to identify banks that have incorporated ESG-linked or Environmental-linked ExecComp in a given year or not. Refinitiv revamped the database in August 2021 and included a Refinitiv universal identifier variable (PermID) for borrowing firms. Thus, instead of merging the dataset with Compustat data to include information on borrower characteristics, the dataset is merged with Refinitiv data using the PermID for borrowers.

The unit of observation is a syndicated loan tranche issued from an individual bank to an individual firm in a given quarter. Thus, each loan is split into the portions provided by the different syndicate members. Data on the ultimate parent level is used for both banks and firms. A series of empirical adjustments are made. Not all exact loan allocations among the syndicate members are provided. If the loan share of a bank is not disclosed, the total loan amount is divided evenly amongst all syndicate members. Second, loans to financial firms, defined by firms operating in industries with SIC codes between 6,000 and 6,999, are excluded as emission data and ESG metrics are unlikely to properly reflect the related risk exposures of these companies due to its difficulties in accounting. Furthermore, only loans with a maturity of at least 1 year are included as short-term loans are likely not subject to environmental risks. Regardless of the original currency of the loan, all loans are converted to EUR. Deals of less than 1 million EUR are excluded from the database. The study covers loans issued from 2011-2021 as the ISS dataset only starts in 2011. This study differentiates between loans extended to brown or fossil firms and their

[6] Due to the findings of misclassifications in the ISS database, all banks remuneration systems are double checked. Only very few instances are uncovered in which ISS wrongfully classified a bank to have or not have ESG-linked or Environmental-linked ExecComp implemented. The used dataset is updated accordingly.

[7] Formally known as Dealscan database.

non-brown or non-fossil counterparts. Fossil firms are classified as firms who operate in an industry which starts with a primary SIC code of 12 or 13. A broader classification of brown firms includes firms in the energy, transportation, and manufacturing sectors, recognizing their key role in the transition to a net-zero economy.

The distribution of banks who provide fossil lending is dominated by few banks and is therefore highly concentrated. 10 banks provide almost half of total fossil lending[8]. Four of these banks are headquartered in the US.

The sample has 315,368 observations on the tranche level, 57,975 unique loan tranches (based on LPCTrancheId), 240 distinct lenders on the parent level which could be matched with data on performance metrics in variable executive compensation provided by ISS (based on LenderParentId), 17,185 unique borrowers (based on PermId) and 76,198 unique bank-firm relationships.

Table 1 reports summary statistics of the sample on the bank, loan and borrower level. 81 out of the 240 banks introduced at least one ESG metric into their executive compensation structure during the study period. 21 out of the 240 banks implemented Environmental-linked executive compensation during the time of the study. The US continues to be a dominant player in the syndicated lending universe, with 67% of the sampled banks being headquartered in the US, reflecting the country's preeminent role in global syndicated lending. The remaining banks are headquartered in Canada, Western Europe, Australia, South Korea and South Africa. The average exposure of a bank in loans to firms in fossil industries is 7% of a banks' total loans while the average share of loans to the broader category of brown firms is 24%. Exposures are calculated as the total loan amount of a bank to fossil firms divided by a banks' total loan amount in a respective year. 6% of all loan tranches are to fossil firms. The average fossil and brown tranche amount is somewhat larger compared to the overall average tranche amount. The average maturity of all tranches is 54.76 months. 69% of all loan tranches are issued to private firms which highlights the benefit of using the LoanConnector data. 85% of borrowers are private firms and 95% of firms in our dataset are repeated borrowers.

[8] Citigroup, Well Fargo, Barclays, Scotiabank, JP Morgan, HSBC, Toronto Dominion Bank, Morgan Stanley, Royal Bank of Scotland, Deutsche Bank.

Table 1: Summary statistics

	mean	sd	min	max	count
Bank characteristics					
ESG-linked ExecComp	0.34				81
Environmental-linked ExecComp	0.11				27
US Share	0.67				161
Log(Total_Lending)	12.96	1.38	0.82	14.58	315,368
Log(Fossil_Lending)	10.29	1.31	1.94	11.98	304,509
Log(Brown_Lending)	11.49	1.38	1.94	13.04	312,503
Fossil_Exposure	0.07	0.06	0.00	1.00	315,368
Brown_Exposure	0.24	0.10	0.00	1.00	315,368
Loan characteristics					
FossilLending	0.06	0.23	0.00	1.00	315,368
BrownLending	0.18	0.39	0.00	1.00	315,368
Log(Trancheamount)	5.33	1.65	-4.61	10.53	315,368
Log(Fossilamount)	5.81	1.43	0.10	9.52	18,203
Log(Brownamount)	5.70	1.59	-1.14	9.90	57,681
maturity	54.76	25.99	0.00	480.00	310,961
Margin	255.68	154.75	0.00	2500.00	218,851
PrivateLending	0.69	0.46	0.00	1.00	315,368
Borrower characteristics					
Private	0.85				17,185
Repeated	0.94	0.24	0.00	1.00	315,368
Log(Emissions)	12.11	2.60	0.69	19.04	73,863

Notes: Log(Total_Lending) is the natural logarithm of the total loan amount, in EUR, of a bank each year. Log(Fossil_Lending) is the natural logarithm of the total loan amount, in EUR, of a bank each year to firms in fossil industries. Log(Brown_Lending) is the natural logarithm of the total loan amount, in EUR, of a bank each year to firms in brown industries. Fossil_Exposure the total loan amount of a bank to firms in fossil industries divided by a firms total loan amount, in EUR, in a year. Brown_Exposure the total loan amount of a bank to firms in brown industries divided by a firms total loan amount, in EUR, in a year. FossilLending is a dummy variable equal to one if the loan is to a company in an industry which starts with a primary SIC code of 12 or 13. BrownLending is a dummy variable equal to one if the loan is to a company in an industry which starts with a primary SIC code of 12 or 13 or operates in the energy and transportation or manufacturing sector. Log(Trancheamount) is the natural logarithm of the loan amount, in EUR. Log(Fossilamount) is the natural logarithm of the loan amount, in EUR, to a firm operating in a fossil industry. Log(Brownamount) is the natural logarithm of the loan amount, in EUR, to a firm operating in a brown industry. maturity is the maturity of the loan in months. Margin is the margin of the loan in basis points. PrivateLending is a dummy variable equal to one if the loan is to a private company. Private is a dummy variable equal to one if a firm is private and equal to zero if it is listed. Repeated is a dummy variable equal to one if a firm in our dataset has previously borrowed from the same bank. Log(Emission) are firms' average scope 1 emissions.

3.2 Methodology

This paper studies whether banks with ESG- or Environmental-linked ExecComp issue fewer loans to firms in brown or fossil industries. The analysis focuses on the relationship of a bank to issue loans to firms in brown or fossil industries after the bank has implemented ESG-linked or Environmental-linked ExecComp.

The main empirical model is based on the merged loan-level sample of the ISS and LoanConnector data on the borrower-lender-year-quarter level where the depended variable is $Log(Loans_{b,f,t})$ which is the logarithm of the total outstanding amount of loans by bank *b* to firm *f* in a given quarter *t*:

$$Log(Loans_{b,f,t}) = \beta_1 ESG_{b,t} + \beta_2 ESG_{b,t} \times BrownLending_{f,i,t} + \gamma_{b,t} + \delta_{f,t} + \epsilon_{b,f,i,t} \quad (1)$$

$ESG_{b,t}$ is a dummy variable equal to one if a bank has introduced ESG-linked ExecComp in a respective year and zero otherwise. $BrownLending_{f,i,t}$ is a dummy variable equal to one if a loan is provided to a company which operates in an industry which starts with a primary SIC code of 12 or 13 or operates in the energy and transportation or manufacturing sector, and equal to zero otherwise. Due to the data structure provided by the LoanConnector database, it is possible to incorporate a rich set of fixed effects. $\gamma_{b,t}$ denotes the interaction between bank and time fixed effects to control for time-varying bank characteristics and shocks that affect banks' supply of credit. In an alternative specification, I also include interactions of firm and time fixed effects, $\delta_{f,t}$, to identify the supply of credit from firms with multiple relationships and control for loan demand in the spirit of Khwaja and Mian (2008). This specification controls for firm-level timevarying unobserved shocks, including factors at the firm level that affect credit demand such as firm-specific creditworthiness, borrower quality and other factors that influence credit demand decisions. Thus, the coefficient β_2 of the interaction term captures brown lending from banks with ESG-linked ExecComp and without ESG-linked ExecComp to the same firm at the same time after controlling for the borrowers' demand for credit. Standard errors are clustered at the bank level. If $\beta_2 < 0$ ($\beta_2 > 0$), then banks who have implemented ESG-linked ExecComp engage less (more) in brown lending

4. Empirical Results

4.1 Bank Lending to brown Firms

The main results of empirical model (1) are displayed in Table 2. Panel A considers banks' lending decisions to firms operating in brown industries which is defined as the broader spectrum of (highly-) polluting firms and Panel B considers lending decisions to fossil firms only. Columns (1) - (3) in panels A and B display the effect on lending decisions for banks which have implemented ESG-linked ExecComp while columns (4) - (6) exhibit results for banks who have specifically introduced

Environmental-linked ExecComp. It is particularly important to study the effects of banks which have implemented Environmental-linked ExecComp as such banks might exhibit more significant shifts in their lending pattern away from high-emitting firms due to managers' direct commitment to environmental objectives. Due to the data structure of syndicated lending, I am able to include a rich set for fixed effects to establish whether changes in lending are driven by credit supply or credit demand. In columns (2) and (5) of each panel in Table 2, firm-time fixed effects are included to ensure that the observed lending decisions are reflective of the bank's decisions rather than external demand fluctuations. The relevant interaction terms in panels A and B of Table 2 are not statistically different from zero. Thus, there is no evidence that banks who have implemented ESG-linked or Environmental-linked ExecComp significantly decrease their lending towards brown or fossil firms. Importantly, the specifications control for banks' credit demand. Thus, banks with ESG-linked or Environmental-linked ExecComp do not supply significantly more or less credit to brown or fossil firms compared to banks without such compensation structures in place.

As a further robustness check, this analysis additionally includes bank-time fixed effects to the main empirical model (1) which are displayed in columns (3) and (6) of panels A and B to control for the supply of credit. Column (3) in panel B shows a borderline negative statistically significant coefficient which provides an indication that banks which have implemented ESG-linked ExecComp lend less to fossil firms compared to banks without ESG-linked ExecComp. Yet, even though banks which have Environmental-linked ExecComp implemented should ideally have stronger incentives to reduce lending to fossil firms, this observation does not apply to banks with Environmental-linked ExecComp as the interaction term in column (6) of panel B is not statistically different from zero. The coefficients in panel A which examine changes in brown lending as a response to the introduction of ESG-linked or Environmental-linked ExecComp are insignificant.

Thus, the results in Table 2 so far do not suggest that the implementation of ESG-linked or Environmental-linked ExecComp of banks is associated with a change in banks' fossil or brown lending practices while controlling for credit demand and credit supply.

Table 2: Loans to brown and fossil firms

Panel A: Brown lending Dep var: Loan amount	ESG-linked			Environmental-linked		
	(1)	(2)	(3)	(4)	(5)	(6)
ESG	-0.003	-0.005***				
	(0.008)	(0.002)				
BrownLending	-0.081	-2.582***	-2.586***	-0.098	-2.585***	-2.589***
	(0.239)	(0.108)	(0.107)	(0.243)	(0.109)	(0.108)
ESG x BrownLending	-0.087***	-0.001	-0.000			
	(0.014)	(0.006)	(0.006)			
Environment				0.024	0.001	
				(0.015)	(0.004)	
Environment x BrownLending				-0.097***	0.006	0.009
				(0.018)	(0.007)	(0.007)
Bank FE	yes	yes	no	yes	yes	no
Firm FE	yes	no	no	yes	no	no
Time FE	yes	no	no	yes	no	no
Firm x Time FE	no	yes	yes	no	yes	yes
Bank x Time FE	no	no	yes	no	no	yes
R-squared	0.760	0.821	0.821	0.760	0.821	0.821
N.Obs	313,733	309,671	309,190	313,733	309,671	309,190

Panel B: Fossil lending Dep var: Loan amount	ESG-linked			Environmental-linked		
	(1)	(2)	(3)	(4)	(5)	(6)
ESG	-0.011	-0.005**				
	(0.007)	(0.002)				
FossilLending	0.362***	0.937***	0.937***	0.353***	0.934***	0.935***
	(0.100)	(0.004)	(0.004)	(0.100)	(0.004)	(0.004)
ESG x FossilLending	-0.145***	-0.019	-0.020*			
	(0.020)	(0.012)	(0.011)			
Environment				0.014	0.003	
				(0.014)	(0.004)	
Environment x FossilLending				-0.176***	-0.010	-0.012
				(0.031)	(0.009)	(0.009)
Bank FE	yes	yes	no	yes	yes	no
Firm FE	yes	no	no	yes	no	no
Time FE	yes	no	no	yes	no	no
Firm x Time FE	no	yes	yes	no	yes	yes
Bank x Time FE	no	no	yes	no	no	yes
R-squared	0.760	0.821	0.821	0.760	0.821	0.821
N.Obs	313,733	309,671	309,190	313,733	309,671	309,190

Notes: The dependent variable is the natural logarithm of the total outstanding amount of loans by a bank to a given borrower during a quarter. Panel A, *BrownLending* is a dummy variable equal to one if the loan is to a company in an industry which starts with a primary SIC code of 12 or 13 or operates in the energy and transportation or manufacturing sector. In Panel B, *FossilLending* is a dummy variable indicating whether the borrower is in an industry in an industry which starts with a primary SIC code of 12 or 13. Columns (1)-(3) show regression results for banks which have implemented ESG-linked ExecComp. Columns (4)-(6) show results for banks which have implemented Environmental-linked ExecComp. Standard errors are clustered at the bank level and displayed in parenthesis. The stars indicate standard significance levels: *p<0.1; **p<0.05; ***p<0.01.

4.2 Bank Lending to private Firms

Studying bank lending and in particular syndicated lending has the advantage that I am able to study lending activities of public as well as private firms which account for the majority of the syndicated lending sample. A non-trivial fraction of global emissions can be traced back to private firms and private firms are subject to less regulation and disclosure requirements compared to publicly held firms. Additionally, private firms are under way less public scrutiny which could not only be beneficial for these firms themselves but also for banks as in particular lending to the largest public brown firms is subject to much public attention. As banks are under much public pressure to reduce lending to brown firms, banks could have an incentive to divest from lending to public brown firms but ultimately lend more to privately held brown firms. It is therefore crucial to test whether banks who implement ESG-linked or Environmental-linked ExecComp allocate more or less loans to privately held firms.

As a next step, I investigate whether banks who have introduce ESG-linked or Environmental-linked ExecComp shift their lending towards private firms. Empirical model (1) is modified by introducing the interaction term $\beta_2 ESG_{b,t} \times Private_{f,t}$. $Private_{f,t}$ is a dummy variable which is equal to one if a bank *b* issues a loan in quarter *t* to a firm *f* which is private and zero if it is public.

$$Log(Loans_{b,f,t}) = \beta_1 ESG_{b,t} + \beta_2 ESG_{b,t} \times Private_{f,t} + \gamma_{b,t} + \delta_{f,t} + \epsilon_{b,f,t} \quad (2)$$

The main results are displayed in Table 3. Columns (1) - (3) present results for banks who have implemented ESG-linked ExecComp and columns (4) - (6) exhibit the relevant interaction terms of banks who have implemented Environmental-linked ExecComp. The estimated coefficients do not indicate that banks who have implemented ESG-linked or Environmental-linked ExecComp issue more or less loans to privately held firms as the coefficients in columns (2), (3), (5) and (6) are statistically insignificant. The inclusion of high-dimensional fixed effects ensure that the results are not driven by firms' credit demand or shocks on the bank-level and therefore ensure that the estimates capture a bank's lending decision towards private firms.

Table 3: Loans to private firms

Dep var: Loan amount	ESG-linked			Environmental-linked		
	(1)	(2)	(3)	(4)	(5)	(6)
ESG	-0.043***	-0.005*				
	(0.008)	(0.003)				
ESG x Private	0.037***	-0.000	-0.002			
	(0.011)	(0.003)	(0.003)			
Environment				-0.025*	-0.002	
				(0.013)	(0.005)	
Environment x Private				0.050***	0.006	0.003
				(0.014)	(0.004)	(0.004)
Bank FE	yes	yes	no	yes	yes	no
Firm FE	yes	no	no	yes	no	no
Time FE	yes	no	no	yes	no	no
Firm x Time FE	no	yes	yes	no	yes	yes
Bank x Time FE	no	no	yes	no	no	yes
R-squared	0.760	0.821	0.821	0.760	0.821	0.821
N.Obs	313,733	309,671	309,190	313,733	309,671	309,190

Notes: The dependent variable is the natural logarithm of the total outstanding amount of loans by a bank to a given borrower during a quarter. *Private* is a dummy variable equal to one if the borrowing firm is private and equal to zero otherwise. Columns (1)-(3) show regression results for banks which have implemented ESG-linked ExecComp. Columns (4)-(6) show results for banks which have implemented Environmental-linked ExecComp. Standard errors are clustered at the bank level and displayed in parenthesis. The stars indicate standard significance levels: *p<0.1; **p<0.05; ***p<0.01.

As some of the largest global polluting firms are held privately, several triple interaction terms are included between whether a bank b has implemented ESG-linked or Environmental-linked ExecComp in a respective year, whether the loan is issued to a firm f which operates in a brown or fossil industry and whether the firm is held privately. These additional interaction terms further refine the analysis and evaluate whether banks with ESG or in particular environmental targets alter their lending behaviour towards privately held brown or fossil firms.

The main results are displayed in Table 4. The analysis finds borderline positive and statistically significant results for bank-lending to firms who operate in brown industries as the triple interaction $ESG_{b,t} \times Private_{f,t} \times BrownLending_{f,i,t}$ and $Environment_{b,t} \times Private_{f,t} \times BrownLending_{f,i,t}$, in columns (1) and (3) are positive and statistically significant. In terms of economic magnitude, the estimate in column (3) indicates that banks who have implemented Environmental-linked ExecComp issue 1.9% more loans to firms in brown industries compared to other banks. This gives an indication that banks with ESG-linked ExecComp shift more of their lending to brown firms into the private sector which could indicate that these banks might even hinder the effective netzero transition as privately held fossil firms are responsible for a large fraction of global emissions and therefore essential for the net-zero transition.

When examining the more narrow definition of fossil lending, in columns (2) and (4), the estimate is statistically insignificant which indicates no differentiation of lending decisions to private-fossil firms of banks who have implemented ESG-linked or Environmental-linked ExecComp.

Table 4: Loans to private and fossil firms

Dep var: Loan amount	ESG-linked		Environmental-linked	
	(1)	(2)	(3)	(4)
ESG x Private x BrownLending	0.015*			
	(0.009)			
ESG x Private x FossilLending		0.019		
		(0.022)		
Environment x Private x BrownLending			0.019*	
			(0.011)	
Environment x Private x FossilLending				0.031
				(0.022)
Firm x Time FE	yes	yes	yes	yes
Bank x Time FE	yes	yes	yes	yes
R-squared	0.821	0.821	0.821	0.821
N.Obs	309,190	309,190	309,190	309,190

Notes: The dependent variable is the natural logarithm of the total outstanding amount of loans by a bank to a given borrower during a quarter. *Private* is a dummy variable equal to one if the borrowing firm is private and equal to zero otherwise. *BrownLending* is a dummy variable equal to one if the loan is to a company in an industry which starts with a primary SIC code of 12 or 13 or operates in the energy and transportation or manufacturing sector. *FossilLending* is a dummy variable indicating whether the borrower is in an industry in an industry which starts with a primary SIC code of 12 or 13. Columns (1)-(2) show regression results for banks which have implemented ESG-linked ExecComp. Columns (3)-(4) show results for banks which have implemented Environmental-linked ExecComp. Lower level interaction terms are not displayed in the Table. Standard errors are clustered at the bank level and displayed in parenthesis. The stars indicate standard significance levels: *p<0.1; **p<0.05; ***p<0.01.

4.3 Alternative Measures for brown Borrowers

As an alternative measure to proxy bank lending to brown or fossil borrowers, following Kacperczyk and Peydró (2022), interaction terms of the intensity of a borrower's annual scope 1 emissions and whether a bank has implemented ESG-linked or Environmental-linked ExecComp are included into the analysis as displayed in empirical model (3). Intensities are defined as a firm's total annual scope 1 emissions, standardized by the firm's total revenue in the respective year. As granular firm-level emission data by Trucost is only provided for large public firms, the sample size decreases substantially.

$$Log(Loans_{b,f,t}) = \beta_1 ESG_{b,t} + \beta_2 ESG_{b,t} \times Scope1_{f,t} + \gamma_{b,t} + \delta_{f,t} + \epsilon_{b,f,t} \quad (3)$$

$Scope1_{f,t}$ is the log of a firm's f scope 1 emissions in year t. Table 5 summarizes the results. Column (6) of Table 5 displays no statistically significant difference in

lending to firms with higher scope 1 emissions of banks with Environmental-linked ExecComp, controlling for credit demand and credit supply. Thus, Environmental-linked ExecComp in banks is not associated with more or less lending to firms with higher scope 1 emissions.

Table 5: Borrower level emissions

Dep var: Loan amount	ESG-linked			Environmental-linked		
	(1)	(2)	(3)	(4)	(5)	(6)
ESG	0.048***	0.004				
	(0.015)	(0.005)				
Scope 1	-0.001			-0.003		
	(0.009)			(0.009)		
ESG x Scope 1	-0.015***	-0.003*	-0.003**			
	(0.004)	(0.001)	(0.002)			
Environment				0.081***	0.004	
				(0.024)	(0.009)	
Environment x Scope 1				-0.019**	0.001	-0.000
				(0.009)	(0.002)	(0.002)
Bank FE	yes	yes	no	yes	yes	no
Firm FE	yes	no	no	yes	no	no
Time FE	yes	no	no	yes	no	no
Firm x Time FE	no	yes	yes	no	yes	yes
Bank x Time FE	no	no	yes	no	no	yes
R-squared	0.685	0.797	0.797	0.686	0.797	0.797
N.Obs	73,778	73,254	72,937	73,778	73,254	72,937

Notes: The dependent variable is the natural logarithm of the total outstanding amount of loans by a bank to a given borrower during a quarter. Scope 1 denotes the borrowers scope 1 emission intensity which is the ratio of a firms scope 1 emissions divided by total revenue of the firm in the respective year. Columns (1)-(3) show regression results for banks which have implemented ESG-linked ExecComp. Columns (4)-(6) show results for banks which have implemented Environmental-linked ExecComp. Standard errors are clustered at the bank level and displayed in parenthesis. The stars indicate standard significance levels: *p<0.1; **p<0.05; ***p<0.01.

The columns (1) - (3) of Table 5 display a statistically significant negative interaction term of $\beta_2 ESG_{b,t} \times Scope1_{f,t}$. Column (2) controls for banks' demand of credit and column (3) additionally controls for the supply of credit. Notable, the coefficients in columns (2) and (3) are very similar in magnitude. The negative statistically significant interaction terms indicate a reallocation of lending of banks with ESG-linked ExecComp away from firms with higher scope 1 emissions compared to banks who have not implemented ESG-linked ExecComp. However, scope 1 emissions, provided by Trucost, are mostly provided for large public firms. Thus, this is an additional indication that banks with ESG-linked ExecComp tend to lend less to highly-polluting public firms. This observation in combination with the results in Table 4 that banks with ESG-linked or Environmental-linked ExecComp shift their syndicated lending towards privately held brown companies

further reassures the implication that ESG-linked ExecComp of banks is associated with a shift away from lending towards highly polluting public firms towards smaller privately held firms who operate in brown industries. It is important to mention that these results are not driven by credit demand or credit supply as the high-dimensional fixed effects control for these.

When examining lending of banks who have specifically implemented Environmental-linked ExecComp as analyzed in columns (5) and (6) of Table 5, I do not observe a change in lending behaviour to high-emitting firms as the interaction terms are statistically insignificant. These results are contrary to the initially intended incentive that banks with Environmental-linked ExecComp should have stronger incentives to lend less to high-emitting firms.

Overall lending to brown or fossil firms does not significantly change after the implementation of Environmental-linked ExecComp and this analysis finds significantly less lending to public brown firms. Thus, this could give an indication that banks who have introduced Environmental-linked ExecComp shift their brown lending more towards privately held companies and away from public brown companies to be less exposed to public scrutiny which is often associated with lending to large public brown firms. Thus, in line with the paper in the previous section, Environmental-linked ExecComp at banks can
create distorted incentives.

It must be noted that a limitation of this study is that the exact use of the loan cannot be observed. Thus, even though, this analysis largely observes that banks with Environmental-linked ExecComp do not show a statistically significant drift in their lending behaviour away from public or brown firms, it could be the case that highly emitting firms are using the proceeds of the loans to finance their net-zero transition.

5. Conclusion

In response to the rising pressure of banks to find their role in the transition to a net-zero economy, many banks have implemented ESG or even environmental KPIs in variable executive compensation to further align bank's net-zero ambitions with their executives' actions. In line with the paper in the previous section on ESG-linked and Environmental-linked ExecComp for non-banks, this analysis does not find statistically significant changes in such banks' overall lending behaviour towards fossil firms. However, this analysis reveals that lending to public brown firms decreases after the implementation of Environmental-linked ExecComp. Large public brown firms are under much scrutiny and banks who implemented Environmental-linked ExecComp might have the incentive to shift brown lending from large public firms to private brown firms. These findings can be interpreted such that banks do not foster and to some extend even impede the effective net-zero transition.

It is essential to recognize that curtailing or entirely ceasing financing to major polluters might produce unintended consequences. While on one hand, reduced financing could incentivize these firms to adopt greener practices to secure needed

funds, on the other, these firms require substantial capital to finance their transition towards sustainability. A reduction in funding could paradoxically act as a barrier to achieving net-zero objectives. Some banks maintain that fossil fuel entities need ongoing financial support to shift towards sustainable energy alternatives. Only a minority of banks have implemented policies that explicitly exclude financing to brown or fossil-fueled firms.

Due to limitations in data availability, this study does not delve into the specific uses of loan proceeds. Thus, I cannot for instance study whether banks who implement ESG-linked or Environmental-linked ExecComp issue more sustainability-linked loans or green loans. This aspect remains a critical area for future research, as understanding the direct application of loaned funds could provide deeper insights into the actual environmental impact of these financial instruments and whether incentivizing managers in their compensation contracts additionally fosters this.

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