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Are sustainability-linked loans designed to effectively incentivize corporate sustainability? A framework for review

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Are sustainability-linked loans designed to effectively incentivize corporate sustainability? A framework for review

Alix Auzepy[†] Christina E. Bannier[‡] Fabio Martin[§]

Abstract

The issuance of sustainability-linked loans (SLLs) has grown exponentially in recent years. Using a scoring methodology, we examine the underlying key performance indicators of a large sample of SLLs and analyze whether their design creates effective incentives for improving corporate sustainability performance. We demonstrate that the majority of loans fails to meet key requirements that would make them credible instruments for generating effective sustainability incentives. These findings call into question the actual sustainability impact that may be achieved through the issuance of ESG-linked debt.

Keywords: Sustainability-Linked Loans, sustainability KPIs, ESG lending, ESG loans, sustainable finance

JEL codes: G21, G32, M14

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1 Introduction

A recent development in corporate finance is the emergence of debt instruments that incorporate environmental, social, and governance (ESG) considerations. Driven by investor demand as well as regulatory and technological changes, such financial instruments intend to link companies' business strategies and financing mechanisms more strongly with sustainability objectives (Loan Market Association 2022*a*). While much of the literature so far has focused on the equity and bond side, i.e. the public capital market perspective, of this development (Kim et al. (2021), Flammer (2021)), very little is known about the growing role of sustainability-linked loans (SLLs), i.e. the bank lending side.*

Even within the narrower group of sustainable finance debt instruments, SLLs are truly distinct: In contrast to green bonds, social bonds and green loans, whose proceeds have to be used to finance environmentally- or socially-friendly projects, SLLs are general corporate purpose loans (Kim et al. 2021). The issuance of SLLs is therefore not characterized by the use of proceeds. Rather, the terms of these loans are linked to the borrower's performance against predefined ESG targets. The achievement of these targets is measured using key performance indicators (KPIs), which typically impact loan pricing in the form of an interest rate discount or premium. The Loan Market Association (LMA), which published the Sustainability-Linked Loan Principles (SLLP) as a set of recommended guidelines to be voluntarily applied by market participants, defines SLLs as "any types of loan instruments and/or contingent facilities (such as bonding lines, guarantee lines or letters of credit) which incentivize the borrower's achievement of ambitious, predetermined sustainability performance objectives" (Loan Market Association (2022*b*), p.2).

To the extent that general purpose loans are the primary source of debt financing for companies around the world (Kim et al. 2021), it is surprising to find that only very few scholars, to the best of our knowledge, have investigated this new form of loan contract. The nascent literature on SLLs has so far primarily focused on stock market reactions to the issuance of SLLs (Kim et al. (2021), Carrizosa & Ghosh (2022)), on the development of borrowers' subsequent ESG performance (Özlem Dursun-de Neef et al. 2022) and on the benefits that these private debt instruments may have for lenders (Du et al. 2022). However, the earlier studies have left a detailed analysis of loan characteristics, particularly of the underlying sustainability KPIs, largely untouched. Such an analysis is, however, crucial as only a rigorous and ambitious design of KPIs can effectively support the achievement of corporate sustainability objectives (Loan Market Association 2022*b*). We try to fill this gap

*SLLs are also sometimes called "ESG-linked loans". We use the terms interchangeably throughout the paper.

by shedding light on the characteristics and quality of KPIs defined in existing ESG-linked loan agreements. In particular, we analyze whether the KPI design of the SLLs gives rise to effective incentives in order to improve corporate sustainability performance. Further, by analyzing the underlying KPIs, we follow the research advice of Edmans (2022) to gather and assess qualitative ESG assessments.

To examine the KPI design, we develop a scoring methodology based on the SLLP (Loan Market Association 2022*b*) and the recent guidance issued by the LMA Loan Market Association (2022*a*). More precisely, we evaluate the KPIs of a large sample of 291 SLLs issued globally between 2017 and 2021 along 6 main dimensions: (1) strategic relevance, (2) financial materiality, (3) measurability, (4) benchmarking ability, (5) pricing mechanism, and (6) external review. This scoring methodology delivers a KPI score per loan on a scale of 0 to 6, where a high score represents a more effective incentivization of corporate sustainability through KPIs.

Our sample of SLLs is extracted from the Refinitiv DealScan database, where the sample period ranges from 2017 and 2021. While SLLs were essentially nonexistent before 2017, their total issuance volume grew from 109.8 billion euro in 2018 to 738.1 billion euro in 2021. SLLs grew mainly across Europe in the early years of our sampling period and have then spread to other parts of the world, especially to the United States (Kim et al. 2021). As transparency is particularly valued by key corporate stakeholders such as investors (see e.g., Liesen et al. (2016), Krueger et al. (2020)), we expect borrowers to publicly report information relating to their KPIs. In addition, the LMA explicitly recommends borrowers to include this information in integrated annual reports or sustainability reports (Loan Market Association 2022*b*). Thus, after retrieving data on the borrowers and issuance volumes of SLLs from DealScan, we manually search for loan disclosures in company reports and media releases in order to extract data on each loan's sustainability KPIs. We then assess the characteristics these KPIs based on our scoring methodology. To the best of our knowledge, this is the first study to offer such a granular evaluation of sustainability KPIs in ESG-linked loan contracts.

Our analysis yields three main sets of findings. Our first set of results suggests that firms are not designing SLLs in a way that generate sufficiently effective sustainability incentives. Rather, the majority of SLLs in our sample score fully on only 2 out of 6 KPI dimensions examined in our analysis. Most of the SLLs contain KPIs that are deemed strategically relevant, i.e. they often comprise an integral part of the borrower's existing sustainability strategy. Most SLLs can also be shown to include KPIs that are based on specific and quantifiable performance metrics. At the same time, however, the KPIs are often not financially material to the company's industry and very rarely subject to regular external verification.

In addition, we find that KPIs are only infrequently developed against a specific benchmark. Furthermore, the failure of meeting KPIs rarely leads to a financial penalty (i.e. an interest rate increase), as a large number of SLLs only entail an interest rate reduction. Altogether, the SLLs in our sample achieve a total average KPI score of only 3.15 on a scale from 0 to 6.

The second set of findings pertains to the cross-sectional characteristics of the KPI score distribution. We find that SLLs with a higher KPI score tend to be issued by borrowers in industries where the environment is key to companies' operations and financial performance. SLLs are in this regard similar to green bonds, which are also known to be more often issued in industries where environmental concerns are strongly financially material (e.g. utilities, energy, transportation) (Flammer 2021). In contrast, borrowers in industries where the environment plays less of a role (e.g. technology and financial sector) issue SLLs with KPIs of much lower quality as measured according to our score. Turning to the geographical distribution, our results provide evidence that SLLs with the highest KPIs scores are typically issued by borrowers in countries where general awareness for sustainability is high and where stakeholders are more likely to ask firms to incorporate ESG considerations into their corporate policies. With regard to the content focus of KPIs, we find that companies are more likely to include environmental KPIs in their SLLs than social or governance-related KPIs. Finally, although choosing multiple KPIs per SLL could be expected to signal an even higher sustainability commitment of a borrower, we show that a higher KPI score tends to be associated with a low number of KPIs per loan.

Our final set of results concerns the relationship between the KPI score and the sustainability performance of borrowers, as measured by their MSCI ratings, at the time of loan issuance. As SLLs do not refer to a use-of-proceeds-based approach, it may be expected that these sustainable finance instruments are particularly attractive to borrowers that are not yet very advanced in their sustainability transformation. In this sense, they could be employed more "democratically" than green labelled bonds (or loans) that tend to be frowned upon when used by issuers with only weak sustainability credentials (Kim et al. 2021). Surprisingly, however, we find this not to be the case. Rather, SLLs still appear to be predominantly issued by large companies with above-average ESG performance at issuance. Specifically, we show that firms with a higher sustainability performance at the time of loan issuance also tend to set higher quality KPIs. Combined with our first set of findings, this suggests that borrowers issue SLLs for signaling purposes rather than to achieve substantial sustainability improvements: Companies with comparatively higher ESG performance at the time of issuance (i.e., even before meeting the sustainability targets in the loan agreement) design comparatively more stringent KPIs. Firms with weak sustainability performance, in contrast, tend to issue SLLs that fail to meet key requirements, such as, e.g., external ver-

ification or clear penalties for the failure to reach sustainability objectives. These criteria, however, would have been necessary to turn the SLLs into truly credible tools to generate positive sustainability incentives.

Our findings contribute to the burgeoning literature on ESG-linked finance. In particular, we provide an explanation why the earlier literature has so far produced mixed results regarding the ability of SLLs to improve corporate sustainability performance. Notably, Kim et al. (2021) find that the ESG scores of borrowers often deteriorate after the issuance of SLLs. We contribute to this discussion by highlighting the poor design of KPIs (e.g. absence of external verification and of tangible financial penalty), which might in turn result in a lack of effective incentives for borrowers to achieve their ESG targets. By pointing out the weaknesses in the current design of many SLLs, our results also help financial managers to construct more effective design structures for this particular debt instrument in the future. At the same time, our findings may offer important guidance also to investors who need to assess the level of ambition and credibility of companies' sustainability strategies. Evaluating the KPI design of SLLs according to our score could, among other things such as an evaluation of a companies' integration of sustainability KPIs into the executive compensation scheme, represent a relevant step towards such an assessment.

The remainder of this paper is organized as follows. Section 2 presents the conceptual framework. Section 3 describes the data on SLLs. Section 4 describes the methodology. Section 5 presents our findings. Section 6 discusses the implications, limitations and potential for future research. Finally, section 7 concludes.

2 Conceptual framework

Intuitively, it may seem surprising that companies choose to issue SLLs instead of conventional loans, as such loans may not only result in higher interest rates if the specified sustainability targets are not met, but also carry additional administrative and compliance constraints. In the following, we therefore discuss the potential motivations for the issuance of SLLs.

In general, the issuance of sustainable finance instruments, including of SLLs, can be interpreted through the lens of signaling theory (see e.g., Flammer (2021)). Although investors have a strong demand for transparency on ESG considerations (Ilhan et al. 2019, Krueger et al. 2020), they often lack sufficient information to evaluate a company's commitment toward sustainability. This creates a need for investors to distinguish between those companies that have a sustainability strategy from the ones that do not (Flammer 2021). Therefore, firms seek to reduce information asymmetry by sending signals, conveying key information

in a credible way. By including ESG considerations into their loan agreements, firms explicitly commit to targets for which they are held accountable and financially liable (Kim et al. 2021). Furthermore, as SLLs are often reported in media press releases and since borrowers are also encouraged to report about their progress (Loan Market Association 2022*b*), these instruments allow companies to make their commitments to sustainability objectives more visible to external stakeholders.

In addition, SLLs allow borrowers to enhance their reputation and gain additional credibility in the sustainable finance space. Since the sustainability targets to be included in loan contracts have to be signed off by the banks (Loan Market Association 2022*b*), SLLs may be considered by companies as a validation of their sustainability strategies. Notably, Kim et al. (2021) show that SLLs are often structured by global lenders with past ESG lending experience. Thus, such instruments may also signal lender confidence regarding the borrowers' commitment to ESG-related issues (Kim et al. 2021). In addition, borrowers are encouraged to seek input from an external party on the choice of targets and KPIs prior to signing, which may also add credibility to the company's overall sustainability strategy.

Since ESG-linked contracts must be monitored by lenders not only at issuance but also during the life of the loans (Loan Market Association 2022*b*), borrowers may seek to leverage the expertise of such lenders to achieve sustainability improvements. More generally, many companies may use SLLs to take their first step in sustainable finance as they are less costly than green bonds (Özlem Dursun-de Neef et al. 2022). In particular, the absence of requirements regarding the use of proceeds makes these instruments particularly advantageous for companies that were previously excluded from sustainable lending due to the nature of their core business activities (Kim et al. 2021).

Another motivation for the issuance of SLLs may be the financial incentives to address sustainability. In the case of traditional bank loans, borrowers usually pay a spread in addition to benchmark, such as the Euro Interbank Offered Rate (Euribor), depending on various factors such as credit ratings. In the case of SLLs, the same logic applies, except that the spread is adjusted by a predefined amount to reflect changes in a borrower's progress against one or several sustainability KPIs. For example, a loan could be priced at 175 basis points (bps) over the Euribor, and this spread may be reduced by 5 bps if the borrower meets its sustainability target. Kim et al. (2021) provide evidence that the initial spreads at issuance of SLLs do not differ from those of conventional loans, suggesting that SLL borrowers who meet their targets could benefit from lower spreads in the future. More generally, prior literature has shown that the sustainability profile of companies has an effect on lending decisions and cost of debt. Jung et al. (2018) document that firms with higher carbon risk also face a higher cost of borrowing. Further, they show that firms demonstrating

a higher awareness for their exposure to sustainability risks are able to mitigate the negative impact on cost of borrowing. Herbohn et al. (2019) report that banks incorporate carbon risk considerations into their lending decisions.

Finally, the issuance of SLLs can also be seen through the lens of the growing literature on impact investing (e.g., Heeb et al. (2021), Riedl & Smeets (2017)). Impact investing refers to a relatively new set of financial instruments that aim to generate social and environmental impact alongside financial return. As an illustration, the Chief Financial Officer of Hewlett-Packard (HP) declared in a press release after the closing of 5 billion dollars credit facility structured as a SLL: "HP has set an ambitious agenda to become the most sustainable and just company in the industry. Issuing our first-ever sustainability-linked loan significantly demonstrates our commitment to making a positive environmental and social impact." (Hewlett-Packard 2021). This is also illustrated by the fact that a number of borrowers do not reinvest the financial gains from their SLL margin reduction into their own sustainability strategy but rather donate the amount to charities (Financial Times 2020).

Nevertheless, scholars and practitioners have also increasingly raised concerns about greenwashing and a lack of effective sustainability incentives, particularly with regard to lax practices observed in recent SLL transactions (e.g. Carrizosa & Ghosh (2022), Kim et al. (2021)). For example, the oilfield services company Schlumberger signed a SLL in 2021 before it had even set official sustainability targets (International Financing Review 2021). Such deals may indicate that companies might also issue SLLs only to "showcase" an empty ESG strategy (Kim et al. 2021). In the long run, such practices could result in the absence of tangible sustainability improvements, both at corporate level and in terms of positive societal impact upon issuance of SLLs.

3 Data

3.1 SLL data

We obtain our data from the Refinitiv DealScan database by extracting loans that are flagged as "sustainability-linked loan". Refinitiv DealScan assigns this specific flag after identifying SLL characteristics based on information from loan agreements, public media releases and conversations with borrowers as well as lenders (Kim et al. 2021). To facilitate comparison, our analysis is based on SLLs issued by borrowers headquartered in the European Union (EU). As large EU companies are subject to the Non-Financial Reporting Directive (NFRD), which introduced mandatory reporting requirements in 2018, they are more likely to disclose detailed information on SLLs and their underlying KPIs.

Further, we exclude all sovereign and government issued loans and analyze only loans from listed companies. As listed companies are facing increased investor demand for climate-related disclosures, as well as regulatory and reputational risks (see e.g., Matsumura et al. (2013), Krueger et al. (2020), Bolton & Kacperczyk (2021)), they are more likely to publish loan-related information, which is indispensable for our analysis of the KPIs. In sum, we identify 291 ESG-linked loans issued by borrowers in the EU over the sample period from 2017 to 2021, which is close to the number of loans analyzed by Özlem Dursun-de Neef et al. (2022).

Figure 1 displays the volume and number of SLLs in our sample issued in the years between 2017 and 2021. In 2017, the total issuance of sustainability-linked loans in our sample amounted to 2.4 billion euros. In 2021, the amount already totalled to 120 billion euros which reflects a 4900% increase. The number of SLLs issued grew at a lower but still exponential pace with an increase of 3725% between 2017 and 2021. This is consistent with the results of Carrizosa & Ghosh (2022), Özlem Dursun-de Neef et al. (2022)) and Kim et al. (2021), who also document a considerable growth of SLLs in terms of number and volume. Even the COVID-19 pandemic did not lead to a collapse in SLL issuance, which underlines the resistant growth of this sustainable debt instrument (Kim et al. 2021).

Insert Figure 1 here.

One of the reasons for the particular popularity of SLLs in recent years may be linked to the flexibility of such instruments. Table 1 reports the breakdown of use of proceeds of the SLLs. According to the data, 84% of SLLs in our sample are general corporate purpose loans, which is consistent with the fact that these loans can be extended for a wide range of corporate purposes rather than for specific projects. The reported statistics on use of proceeds correspond to prior literature on ESG lending (Özlem Dursun-de Neef et al. 2022).

In terms of their application, SLLs therefore can be tailored to different organizational needs and strategies. This flexibility, in turn, can also provide positive incentives for corporate sustainability efforts. In contrast, green loans and green bonds are much more restrictive, as they can only applied to finance green projects(Flammer 2021).

Insert Table 1 here.

In a next step, we examine the distribution of SLLs across borrowers' industries over the sample period. Since SLLs are particularly flexible debt instruments, as mentioned earlier, we expect them to be issued in a wide range of industries, including in so-called "brown" industries.

Table 2 provides an overview of the SLLs by industry defined according to the Thomson Reuters Business Classification (TRBC). We find that most SLLs are issued by companies operating in the Industrials sector (20.96%), while companies in the Technology (4.81%) and Financials (2.75%) sectors issued the fewest SLLs. In addition, we also note the Utilities (15.81%), Consumer Cyclical (14.78%) and basic materials (14.09%) sectors also make up a large share of our sample. These observations are aligned with prior literature on ESG lending (e.g., Özlem Dursun-de Neef et al. (2022) and Schmittmann & Chua (2021)).

Insert Table 2 here.

Overall, we see a broader diversification of SLLs across sectors, unlike green loans or green bonds, which are much more concentrated in sectors where environment-related activities are a leading factor Flammer (2021). As a result, SLLs can be particularly effective sustainable financing tools for companies that do not operate in close proximity to green projects, but still seek to diversify their operations toward greater sustainability. As such, SLLs are an opportunity for these companies to enter the market for sustainable financing (Schmittmann & Chua 2021).

Turning to the country distribution, we report in Table 3 that most SLLs are issued by Spanish (23.02%) and French (20.62%) companies, which is similar to what has been documented by Kim et al. (2021) and Özlem Dursun-de Neef et al. (2022). Notably, 10 out of 15 countries in the sample are among the 20 most sustainable countries in the world according to Sustainalytics' Country Risk Rating (Sustainalytics 2022). This observation suggests that SLLs are primarily issued in countries that have high ESG performance due to their ability to utilize and manage their natural and produced capital in line with sustainability considerations. In these countries, stakeholder demands and expectations for sustainable business practices may also be higher than in other countries, providing a greater incentive for companies to participate in the SLL market.

Insert Table 3 here.

3.2 KPI data

By nature, SLLs are flexible sustainable finance instruments, which can be applied to finance a wide range of corporate purposes and can be issued by borrowers across a broad spectrum of industries. However, the main sustainability incentives associated with SLLs arise from their underlying sustainability targets and KPIs. As highlighted earlier, research on this

specific topic is very scarce. One potential explanation could be that since most databases (such as Refinitiv DealScan) do not contain specific data related to KPI characteristics, extracting this information on a large scale and for each SLL involves a considerable amount of manual work.

In the context of this study, we collected KPI data from company websites, annual reports, sustainability reports, integrated reports, general registration documents, company presentations and press releases of both borrowers and lenders. In rarer cases, the information is derived from other public sources of information, such as financial news outlets. In the next part of this study, we focus on the SLLs for which we were able to manually collect KPI data. In sum, we are left with 216 of the original 291 SLLs for the period from 2017 to 2021.

To first establish a basis for examining the characteristics of KPIs, we analyze the number of KPIs per SLL. Table 4 shows that the total number of KPIs per SLL ranges from 1 to 5, although most SLLs in our sample contain between 1 and 3 KPIs. Specifically, 42.13% of SLLs have only 1 KPI, while 22.22% and 25.93% of SLLs have 2 or 3 KPIs, respectively. Only 9.73% of SLLs in the sample have 4 or more KPIs. The mean (median) value of the KPIs used is 2.04 (2.00) KPIs.

Insert Table 4 here.

Regarding the thematic focus of the underlying KPIs in our sample, we observe a large heterogeneity across SLLs. This observation is consistent with the SLLP, which recommend that borrowers and lenders establish individual and tailored KPIs for each transaction (Loan Market Association 2022*b*). To ensure a granular analysis of the KPIs, we divide the KPIs into a total of 17 different categories based on four main thematic pillars: Environmental, Social, Governance and ESG. An overview of the pillars, including a summary description of the KPIs included in each category, can be found in Table 8 in the Appendix.

The Environmental pillar includes the 9 categories, including biodiversity, energy consumption and energy efficiency, renewable energy, circular economy, sustainable resources and responsible procurement, environmentally sustainable investments, reduction and elimination of waste, greenhouse gas emissions and water consumption. The social pillar includes 5 categories, broken down into employee health and safety, employee diversity and gender equality, customer benefits, employee training, social responsibility and community engagement. The governance pillar mainly consists of the category business ethics. Finally, the last pillar comprises all KPIs that are tied to ESG rating or standard ESG certifications.

Table 5 provides an overview of the distribution of the KPIs within the clusters. In total, we identified 441 KPIs in our sample of 216 SLLs. It is worth noting that a SLL can consist of multiple KPIs (up to 5), each of which can cover different ESG dimensions.

Looking at the overarching pillars, we report that more than half of the KPIs in our loan sample (59.64%) belong to the environmental pillar. This observation is in line with Kim et al. (2021), who also show that the vast majority of SLLs are linked to environmental KPIs. In contrast, the social pillar comprises 19.73% of all KPIs set in the SLLs in our sample and the governance pillar represents only 1% of KPIs our sample. Lastly, we observe that ESG ratings and similar certifications are a rather common form of KPIs, as they amount to 19.73% of the KPIs in our sample.

Overall, this shows that borrowers focus significantly more on the environmental pillar than on social or governance aspects when setting their KPIs. A potential explanation for this could be that regulators, investors and society usually focus more on environmental than on social or governance issues (see e.g., Ilhan et al. (2019), Krueger et al. (2020), Bolton & Kacperczyk (2021)). Hence, companies might have more external incentives to include environmental KPIs as they will may also improve their public image reputation more strongly. This also illustrates the fact that the social dimension, so far, has been neglected by practitioners.

If we then analyze the individual categories within the 4 pillars, a clear trend also emerges. About one third of all KPIs belong the category of greenhouse gas emissions, suggesting that a significant proportion of the KPIs seek to reduce such emissions. This observation is aligned with the analysis by Carrizosa & Ghosh (2022) who find that the most common KPI type relates to greenhouse gas emissions. One possible reason for this observation could be that the importance of lenders attached to carbon risk when making lending decisions (Jung et al. (2018), Herbohn et al. (2019). Chava (2014) reports that bank lending is influenced by the environmental profile of companies, both for social responsibility reasons and to avoid potential liability and reputational risks. In particular, the author shows that firms that derive substantial revenues from environmentally friendly products or services are faced with lower interest rates on their bank loans. In addition, companies may also seek to mitigate regulatory risks, as companies with higher GHG emissions are also likely to be more exposed to regulatory risks from government policies such as trading schemes and carbon taxes (Sullivan & Gouldson 2012, Jung et al. 2018, Trinks et al. 2020).

Another larger proportion of the KPIs fall into the category of ESG ratings. We find that SLLs can be tied to up to three ESG ratings from three different rating agencies, although most SLLs entail only one ESG rating as main KPI. However, if we look at the development of the use of ESG ratings as KPIs, we observe clear a steady decline over our

sample period. One potential explanation for this market trend could be the criticism around ESG ratings and their lack of transparent methodology (Berg et al. 2022). In addition, the SLLP Guidance, revised in March 2022, now includes a requirement that when using an ESG rating as a KPI, borrowers must explain why that ESG rating best reflects the ESG challenges of their core business (Loan Market Association 2022a), which is also likely to encourage the use of individual and company-specific KPIs in the future.

In summary, greenhouse gas emissions (30.84%), ESG ratings (14.29%) and renewable energy (7.71%) are the 3 categories out of a total of 17 that are the most frequent in our sample. In contrast, the fewest KPIs in the sample relate to employee training (2.27%), social responsibility and community engagement (2.27%), biodiversity (1.36%), business ethics (0.91%) and environmentally sustainable investments (0.91%).

Insert Table 5 here.

Lastly, table 6 provides an overview of the distribution of the KPI within the industries in our sample. Looking first at the KPIs under the environmental pillar, we find that most of the environment-related KPIs are found in the Basic Materials sector (22.81%). This sector is followed by the Utilities and Industrials sectors, which account for 18.63% and 14.07% of all environment-related KPIs, respectively. Accordingly, more than half of the environment-related KPIs are found in only three sectors. The fact that the Utilities sector accounts for a large portion of these KPIs may be attributed to the fact that the environment tends to play a central role in the business activities of companies in this sector (Flammer 2021).

The analysis of the KPIs under the social pillar provides evidence that such KPIs to be found in the Consumer Cyclical sector (20.69%), closely followed by the Industrials (19.54%) and Utilities (16.09%) sectors. Thus, analogous to the distribution of the environment-related KPIs, more than half of the social KPIs are located in only three sectors. In contrast, the energy sector is the only sector in which no social KPIs can be found. KPIs tied to corporate governance factors are found in the Energy (25.00%), Financials (25.00%) and Utilities (50.00%) sectors. However, this can be also attributed to the fact that the entire sample contains 4 governance-related KPIs. Finally, most of the KPIs tied to ESG ratings or similar certifications are to be found in the Industrials (18.39%), Real Estate (18.39%) and Basic Materials (16.09%) sectors.

Insert Table 6 here.

4 Scoring Methodology

Academics and practitioners have expressed concerns about greenwashing practices, particularly with regard to lax sustainability metrics and practices observed in recent SLL deals. Due to their crucial role in incentivizing corporate sustainability efforts, the objective of this study is to shed light on the characteristics and quality of KPIs used in existing SLLs.

Thus, we evaluate each of the SLL on an individual basis by examining their underlying KPIs. In order to measure the KPI quality, we developed a score primarily based on the SLLP (Loan Market Association 2022*b*). The SLLP indicate which characteristics SLLs and their associated KPIs should fulfill in order to be credible and thus of high quality. In line with the SLLs, six score dimensions were developed to evaluate the quality of KPIs and are summarized in Table 7.

In order to be able to calculate a score for each SLL based on the dimensions described, the KPIs are assigned a value of 0, 0.5 or 1 for each dimension, depending on their degree of fulfillment. Thus, the maximum score per SLL is 6 points if all dimensions are fully met. Since KPIs can complement each other, we consider the KPIs of an SLL as a whole for each dimension.

Insert Table 7 here.

The first dimension verifies whether the KPIs are relevant to the borrower's strategy (Loan Market Association 2022*b*). Thus, to satisfy the first dimension, a KPI must either be an integral part of a clearly defined sustainability strategy, or complement key sustainability objectives set by the company at latest in the year in which the SLL was issued. This dimension can take the value 0, 0.5 or 1 depending on the degree of fulfillment. KPIs are assigned a value of 0 if they do not correspond to official corporate strategy goals. In addition, they may also take the value 0 if no information about the borrower's sustainability targets is publicly available, as this represents a lack of transparency and prevents a sound strategy review. Hence, firms without a preexisting core sustainability and business strategy cannot score well here. However, this does not bias the results by neglecting improvement among low ESG firms as those firms can still have a business and sustainability strategy and thus possibly increase their ESG performance through impactful KPIs. In contrast, the KPIs are assigned a value of 0.5 if they only partially correspond to the borrower's sustainability strategy. Finally, the KPIs take on the value of 1 if they fully correspond to the key strategy sustainability goals made publicly available by the borrower. An overview of KPI examples that scored 1 point is provided in the Appendix C.

Although a target may be part of a company's sustainability strategy, this does not necessarily imply that the target is also financially material and key from an industry perspective. For example, a company might decide to reduce its Scope 1 emissions as part of its SLL, even though it operates in an industry that mainly produces Scope 3 emissions and Scope 1 emissions do not represent a significant proportion of its total emissions.

Thus, the second dimension of the score verifies whether the KPIs are material to the company's core business and address relevant sustainability challenges of the company's industry (Loan Market Association 2022*b*). Khan et al. (2016) claim that sustainability factors are only linked to long-term returns if they are material for a company's industry. In order to verify whether the KPIs represent material issues in the industry in question, we follow the approach in Grewal et al. (2016) and employ the materiality map of the Sustainability Accounting Standards Board (SASB). As the materiality of different sustainability issues varies systematically across industries, the SASB developed 77 industry-specific standards to assist companies in determining their material ESG issues. By taking the shareholder perspective, the materiality map classifies sustainability issues according to evidence of interest, such as the number of mentions in media reports and 10-KS, and evidence of economic impact, and assesses whether management (or potential mismanagement) of the issue will affect valuation parameters such as revenue growth and return on capital (Grewal et al. 2016). The KPIs take on the value of 0 if they do not represent material sustainability issues according to the SASB materiality map. If the KPIs only partially correspond to material issues, they are assigned the value of 0,5. Finally, if the KPIs receive a score of 1 when they represent material issues according to the SASB materiality map.

A special case in the allocation of points are the KPIs that fall into the category of ESG ratings. If KPIs in the form of ESG ratings occur individually within an SLL and not in combination with other individual and company-specific KPIs, they can only score 0 points in the first two dimensions. The reason for this is that it is not possible to verify the consistency of an ESG rating with these dimensions.

The third dimension examines whether the KPIs are measurable or quantifiable, i.e. expressed by a target with a clear numerical value. This dimension takes on the value of 0 when the KPIs lack a specific numerical value or when they are simply not quantifiable. For example, auditing the human and labor rights in natural rubber processing plants is a target that is hardly quantifiable. In addition, the LMA recommends providing an applicable scope, e.g. the percentage of the borrower's total emissions to which the target is applicable, as well as a calculation methodology, e.g. a clear definition of the denominator of intensity-based KPIs (Loan Market Association 2022*a*). In contrast, we assign a value of 0.5 if the KPIs are only partially measurable. This would be the case, for example, if only one of two KPIs

underlying an SLL is provided with a concrete metric. Finally, this dimension takes the value 1 if all underlying KPIs correspond to clear and precise metrics. For instance, the KPI by the Spanish utility company Endesa SA fulfills this dimension by explicitly mentioning that its net installed mainland capacity from renewable sources should be 55% of the total net installed capacity at 31 December 2022 (Endesa S.A. 2021). In comparison, a KPI that would simply state that the company needs to increase its net installed mainland capacity from renewable sources, without specifying a clear target percentage would not meet this criterion, and would also likely result in a lack of effective incentives for the borrower.

The fourth dimension involves verifying whether a KPI can be benchmarked, i.e. as much as possible using an external definitions, regulatory standards or taxonomies (Loan Market Association 2022a). A benchmark may also consist in objectives set in international agreements, such as the Paris Agreement or relevant industry averages (Loan Market Association 2022a). The reason for this is that the benchmarking ability of KPIs makes it possible to compare them within industries and to better evaluate the level of ambition. For this dimension, a KPI receives a score of 0 when it is not benchmarked and of 0.5 when the KPIs are only partially benchmarked. This would be the case, for example, if only one of two KPIs underlying an SLL is provided with a specific reference. In contrast, this dimension takes on the value of 1 when the KPI refers to a benchmark. For example, KPIs that are based on an established industry metric are also given a score of 1. It is crucial to note that each benchmarked KPI in our sample is also measurable. However, being measurable does not imply a benchmarking-ability. For instance, as shown in the appendix X, AP Moller-Maersk A/S specifically set a target for reducing its CO₂ emissions which is more ambitious than the target of the international maritime organization (IMO).

The pricing mechanism, and more specifically, the existence of a malus system in relation to interest rate adjustments is assessed in the fifth dimension. A key feature of SLLs is that the margin can be reduced if the borrower meets its sustainability targets measured against predefined KPIs. However, SLLs may also be designed in such way that the borrower has to pay higher interest rates if it fails to meet its sustainability targets. Thus, to satisfy this fifth dimension, the SLL margin adjustment should include not only a bonus (i.e., a margin reduction) but also a malus system (i.e., a margin premium). With a malus system in place, the borrower shows an even more credible commitment to its sustainability targets as it runs the risk of having to pay a penalty in the form of higher interest rates if such target isn't met. More generally, prior literature has shown that punishments set more effective incentives than rewards (Andreoni et al. 2003).

The KPIs take on the value of 0 when neither a bonus nor a malus system is explicitly mentioned or clearly defined. If the borrower (or the lender) explicitly mentions that only a

bonus is foreseen, the KPIs take on the value of 0.5. An example of a KPI with a score of 0.5 is "The terms of the refinanced credit facilities include an interest discount when the Sustainability score improves to 74 (currently at 73)." (Arcadis (2019), p.91). By contrast, the KPIs take the value of 1 if in addition to the bonus adjustment, a malus system is explicitly foreseen by the loan agreement, as in the following example: "Based on the achievement of this objective by the target date, the credit line provides for a step-up/step-down mechanism that will impact the interest spread applied to drawings on the line and the commitment fee for any unused portion of the credit facility." (Enel 2019).

We examine the pricing design, but did not consider the actual amount of interest rate adjustments in basis points (bps), as this information is often kept confidential by borrowers and lenders. We assume that the higher the adjustment in basis points, the greater the incentive for the borrower to meet its sustainability targets. However, only in very rare cases did the borrowers disclose by how much the loan spread would decrease (or increase). Most of the available data in our sample suggested that such an adjustment was limited to 5 bps (or 0.05%). Only in one case did it reach 10 bps (or 0.1%). This is in accordance with the International Accounting Standards Board (IASB) who find that the rate adjustments is relatively small at present ranging between 2.5bps to 10bps but is likely to grow in the future (International Accounting Standards Board 2021). Du et al. (2022) find that potential discounts for improved sustainability performance do not seem to provide sufficient economic incentives for borrowers to engage in meaningful changes in their ESG profiles.

The last dimension evaluates whether the KPIs are subject to an independent third-party verification or certification (Loan Market Association 2022b). According to the SLLP, borrowers should obtain independent and external verification of the borrower's performance level against each SPT for each KPI (for example, limited or reasonable assurance or audit by a qualified external reviewer with relevant expertise, such as an auditor, environmental consultant and/or independent ratings agency), at least once a year.

The KPIs receive a score of 0 when there is no mention of a third-party verification of the borrower's progress towards the KPIs. On the contrary, the KPIs are assigned a value of one when such an external review is explicitly mentioned. Examples of KPIs that received a score of 1 in this dimension are the following: "Sodexo's food waste reduction performance will be assessed, using the data collected through the program, and third-party audited against a global benchmark set in collaboration with Leanpath." (Sodexo 2019), "Voltalia's performance will be measured annually to define the adjustment of the credit conditions." (Voltalia 2019). KPIs that are tied to ESG ratings also receive a score of 1 as ESG ratings are measured annually by an external rating agency, which also constitutes an annual external review and monitoring of whether the sustainability performance of the borrower has improved or

deteriorated. Finally, this score takes on the value of 0.5 when only a one-time progress certification is foreseen, as compared to a certification on an annual basis, or when only one of the underlying KPIs is subject to an explicit external review.

5 Findings

5.1 Score results

Figure 2 reports the average KPI score for each dimension of our scoring methodology. In general, we find significant differences between the dimension results. The first dimension of our score assesses whether the KPIs underpin the borrowers' sustainability strategy and whether they are included in their sustainability priorities. Here, we find that 137 out of 216 SLLs (63% of our sample) in our sample are structured around KPIs that are relevant to the borrowers' sustainability strategy. A majority of borrowers make explicit reference to these targets in their reference documents, such as the annual reports, sustainability reports or integrated reports. In addition, several companies explicitly mention their SLLs as part of their strategic plan. In contrast, 53 of 216 SLLs (25%) contain KPIs that are not aligned with the borrowers' stated sustainability targets or priorities, either because the KPIs differ from the official sustainability strategy or because the borrowers do not explicitly mention such strategy in their reference documents.

Overall, these results support the signaling theory discussed in section 2. In most cases, companies appear to set sustainability targets in their strategic plan and to anchor such targets in their loan agreements. The disclosure of such targets in annual reports or similar reference documents signals a high commitment toward sustainability to external stakeholders. In particular, anchoring sustainability KPIs in SLLs and disclosing them signals an intention to commit and achieve such goals.

In contrast, we find that 98 out of 216 SLLs (45%) in our sample do not fulfill the second dimension of our assessment, which relates to the materiality of the selected KPIs in accordance with the SASB materiality map. Furthermore, 68 out of 216 SLLs (31%) contain only partially material KPIs, while only 50 SLLs (23%) are fully tied to material KPIs. This finding suggests that while the majority of companies set KPIs that are consistent with their sustainability strategy, these targets are often of little relevance from a financial and industry perspective. Since the aim of the SASB Materiality Map is to highlight the sustainability issues that are most likely to impact the financial performance of companies in these industries (Grewal et al. 2016), this could also suggest that the KPIs identified in the SLLs are not targeting improvements in the sustainability areas that matter most

to investors. Thus, even though companies may seek to send a credible signal to external stakeholders, this signal may not always have the expected effect.

Insert Table 2 here.

Turning to the third dimension of our score, which assesses the measurability of the KPIs, our results suggest that 176 out of 216 (82%) SLLs fully comply with this criterion. Perhaps unsurprisingly, this result shows that most SLLs in our sample are based on targets that involve a concrete metric or an amount that can easily be quantified. On the other hand, 38 out of 216 SLL (18%) include KPIs that only partially fulfill this dimension, while only 2 SLLs scored 0. Because numerical targets can be more easily and objectively verified, they may also be more frequently required by lenders and external auditors. As such, these KPIs also help to set clear incentives for sustainability performance.

However, it can also be observed from the results of the fourth dimension that 104 out of 216 SLLs (48%) do not rely on KPIs make a clear reference to a baseline or science-based reference point. In particular, most of the SLLs do not use an established external reference or standard, which makes it difficult to compare and objectively assess the level of ambition of these loans. However, this result may also be linked to a possible lack of benchmarks. Specifically, most science-based scenarios, reference points (e.g. carbon budgets) or other proxies mentioned in the SLLP (Loan Market Association 2022*b*) apply to the environmental dimension, but do not serve as benchmarks for social and governance KPIs. 66 out of 216 SLLs (30%) only partially fulfill this dimension, and most of these loans are tied to ESG ratings. Although ESG ratings can be considered as a kind of benchmark, as they are based on a standard scale, such ratings usually differ from each other and are therefore comparable only to a limited extent (Berg et al. 2022).

The results of the fifth dimension show that only 72 of 216 SLLs (33%) include a specific malus system that forces borrowers to pay higher interest rates if they do not meet their sustainability targets. On the contrary, 29 SLL contracts mention that they only entail a bonus provision, suggesting that borrowers can benefit from a lower interest rate if they meet their goals, but do not have to incur a financial penalty if they do not. Although a bonus system provides incentives for borrowers to improve their sustainability performance, these incentives are more effective when coupled with a potential increase in interest rates through a malus system. In addition, 115 out of 216 SLLs (53%) mention that the loan spread is tied to sustainability goals, but do not provide any further concrete information. While the exact adjustment in terms of basis points may be confidential information, it is surprising that SLLs are rather silent on the nature of the bonus and/or malus. This finding

supports concerns raised in the literature about greenwashing in the context of ESG-related lending (e.g. Kim et al. (2021)), as it suggests that borrowers place more emphasis on overarching goals in their disclosures than on other key levers that may otherwise provide credible support for their commitment to achieving those goals.

Finally, we find that 123 out of 216 (57%) do not explicitly mention that the performance against the targets are subject to an external and independent verification at least once a year. Particularly for SLLs issued in 2017, 2018, 2019, and 2020, we note that in most cases the reference documents (e.g., annual reports and sustainability reports) published in the years post-issuance do not include information about a performance review that was conducted. Not only is this lack of information inconsistent with the SLLP, which specifically recommend that borrowers obtain independent and external verification of their level of performance for each KPI (Loan Market Association 2022*b*), but it may also prevent lenders and key corporate stakeholders from performing an adequate assessment of such performance. This results also shows that public disclosures are not sufficient to verify performance for the purposes of the loan agreement. Thus, lenders should explicitly require proof of verification. Only 78 out of 216 SLLs (36%) fully fulfill this dimension. In these cases, borrowers refer to an annual review by independent third parties. In addition, it should be noted that several of these SLLs are also linked to ESG ratings from external rating agencies, which also represent an assessment of past performance and are updated annually.

5.2 Score distribution

In a next step, we identify further patterns by examining the distribution of the KPI score across all SLLs in our sample as well as across industries and countries. The objective is to assess the extent to which borrowers in our sample as a whole have established KPIs that effectively incentivize sustainable corporate behavior. In addition, some countries and industries may be more successful than others in establishing such KPIs. Lastly, we also investigate whether setting more than one KPI per SLL generally leads to a higher score and, hence, greater incentives, and we also plot the development of the KPI score to assess whether it has deteriorated or improved over our sample period. An improvement of our KPI score over time would indeed indicate that SLLs are increasingly structured in a way that effectively incentivizes the achievement of ESG objectives.

Figure 3 displays the distribution of the overall KPI scores among the loans in our sample. This figure shows that no loan in the sample obtained the lowest possible score, 0, while 5 loans fully satisfy all 6 dimensions and achieved a maximum score of 6 points. 188 of 216 loans have a score between 2 and 4, with 3.5 being the modal value. The average score

in our sample is 3.15 and the median score 3.00. The distribution exhibits a Gaussian-like bell curve, which validates our methodology, as we expect data near the mean to be more frequent than data far from the mean. Given that more than 50 % of all SLLs only scored half of all possible points, it appears that many loans as of today are not structured in a way that significantly increases borrowers' sustainability efforts.

Insert Figure 3 here.

Panel A of figure 4 shows the evolution of the overall KPI score for our total sample over time. As can be seen, the score appears to improve over time, starting with an average of 2.88 in 2017 and increasing to 3.22 in 2021. One reason for this could be that SLLs are becoming more tailored and stringent in terms of their ESG objectives due to increasing regulation and investor demands (Krueger et al. 2020). In particular, we observe a sharp increase in dimensions 1 and 2 over time, while the averages in dimensions 3, 4 and 6 experience a significant decline. This indicates that companies increasingly structure the loans in a way that the KPIs are relevant for their business strategy and material to their industry. Yet it also seems that less and less companies apply benchmarks to their KPIs and also abstain from undergoing annual external reviews. However, it is also important to note that the number of SLLs constantly increased over time such that the higher overall score average at the end of our sample period might also stem from a larger sample size.

Further, we observe in panel B in figure 4 that the number of KPIs per SLL does not necessarily lead to a higher KPI score. As mentioned, we considered the KPIs per SLL as a whole, i.e. we did not create a score for each KPI but for each loan. Therefore, one might expect that a higher number of KPIs would also lead to a higher score. Nevertheless, we find that this is not the case. A potential explanation for this could be that since more KPIs are associated with more effort for the company, focusing on fewer KPIs within a SLL may instead lead to a higher level of fulfillment. This result indicates that companies might intentionally chose a higher number of KPIs to signal a stronger sustainability commitment. Yet, their actual efforts to fulfill the KPIs are much lower showing that KPIs are primarily used for improving a firms' reputation and not enhancing their sustainability performance.

Insert Figure 4 here.

Figure 5 presents the average KPI score by industry and country of the borrowers. The results suggest that the highest average KPI quality is recorded in the Energy sector (3.55) and the Utilities sector (3.50). This is consistent with the literature on green loans and green

bonds, which shows that such debt instruments are more common in industries where the environment is core to the firms' operations (see e.g., Flammer (2021), Kim et al. (2021)). Thus, the greater focus of these industries on environmental issues also appears to result in a higher KPI score. In contrast, the lowest average KPI score can be found in the Technology (2.45) and Financial sector (2.38). In a next step, we examine the average KPI score by country of borrowers (based on their headquarters) in Panel B.

As can be seen, the highest average KPI score is achieved by borrowers headquartered in Denmark (3.83), followed by Belgium (3.56). The lowest KPI score are observed for SLL borrowers in Ireland (2.63) and Luxembourg (2.50). A possible explanation might be that SLLs are prevalent in countries where awareness for sustainability is generally high and where stakeholders require firms to incorporate ESG considerations into their corporate policies (Kim et al. 2021). Hence, borrowers and lenders might structure the sustainability-linked loans in way that the defined KPIs are more ambitious and transparent.

Insert Figure 5 here.

5.3 KPI Score & ESG performance

Previous research has produced mixed results as to whether the issuance of ESG-linked loans leads to subsequent improvements in a firm's overall ESG performance. Özlem Dursun-de Neef et al. (2022) find that SLLs incentivize firms to improve their sustainability performance by increasing their environmental and governance scores. Houston & Shan (2021) show that banks are more likely to grant loans to borrowers with ESG profiles similar to their own and positively influence the borrower's subsequent ESG performance. However, Kim et al. (2021) find that the ESG scores of borrowers deteriorate after the issuance of low disclosure quality SLLs.

Yet, no study so far has considered the quality of KPIs in their analyses. The relationship between ESG score and KPI quality is certainly endogenous. On the one hand, we expect borrowers with better ESG performance to be likely to set higher quality KPIs. On the other hand, KPI quality may also have a positive impact on corporate ESG performance. Nevertheless, we examine the relationship between KPI quality and sustainability performance by analyzing corresponding patterns in our sample.

To this end, we retrieve data on the ESG performance of the borrowers in our sample from the MSCI database. MSCI uses a scale from 0 to 10, with 10 representing the highest level of sustainability performance and 0 the lowest. With regard to the methodology, MSCI ESG ratings capture a granular breakdown of company characteristics, including its core product

or business segments, the location of its assets or revenues, and other relevant measures such as outsourced production. The ratings then take into account the extent to which a company has developed robust strategies and demonstrated a strong track record of performance in managing its specific level of risks or opportunities. Our sample consists of 181 SLLs for which we were able to match the ESG ratings of the borrowers with the KPI data of the respective loans.

In figure 6, we plot the average KPI Score of the SLLs against the ESG score of the corresponding borrowers at the time of issuance. The results display a clear trend suggesting that a higher KPI score also goes along with a higher average ESG score of the borrowing firm. Thus, firms with a higher sustainability performance also tend to structure their loans with higher quality KPIs. Further, the plot also shows that the lowest average ESG score is about 7.0 which is distinctly above average, indicating that SLLs are in general issued by companies which already have a stronger sustainability performance. This finding is aligned with prior literature on bank lending and ESG performance (e.g., Houston & Shan (2021)).

Insert Figure 6 here.

While we find that more sustainable firms issue loans with higher quality KPIs, we are also interested in whether we observe a trend between a borrower's average sustainability performance and the number of environmental KPIs specified in its ESG-linked loan contracts. We consider only environmental KPIs as they represent the predominant sustainability dimension and borrowers have particularly strong external incentives to demonstrate commitment in this area, as discussed earlier.

There are two reasons why companies might want to set more than one KPI in their SLLs. First, they may want to incentivize their sustainability performance by increasing the number of ESG commitments in their loan agreements. Second, they may seek to signal a higher sustainability commitment by multiplying the number of KPIs. Therefore, if SLLs are used primarily for signaling purposes rather than as an incentive for corporate sustainability efforts, we expect borrowers with a lower (higher) environmental performance to include a higher (lower) number of environmentally-related KPIs, as they most strongly convey a company's commitment towards sustainability. However, environmentally- and socially-related KPIs are not mutually exclusive, as loans can have KPIs from different sustainability dimensions.

Figure 7 plots the average environmental score of a borrower against the number of environmental KPIs per loan. The results show that companies that do not include any environmental KPIs in their SLLs have an average environmental score of around 6.1. In

addition, a significant amount of loans (61) only have one environmental KPI and an average environmental score slightly above 6.2, which represents the highest score in the sample. Above the turning point of 1 KPI per loan, the results show a negative relationship between the number of environmental KPIs and the average environmental score. These results support the signaling theory, as companies with a lower environmental rating seem to include a higher number of environmental KPIs in their loans. One possible interpretation could be that companies use such loans and KPIs to improve their image and reputation. This result is aligned with figure 5, where we show that a higher number of KPIs goes along with a lower overall KPI score. Nevertheless, it is also worth noting that only 20 firms in our sample have 3 to 4 KPIs in their loans, which represents a small sample.

6 Discussion

Our study proposes a new framework for evaluating ESG-linked loans based on the granular analysis of their underlying KPIs along 6 main dimensions: strategic relevance, materiality, measurability, benchmarking ability, pricing and external review. This analysis provides us with a KPI score for each loan, capturing the extent to which these KPIs are incentivizing ESG corporate practices. In the following, we discuss the main implications of our findings, their limitations and the opportunities for future research.

We examine the score results from different perspectives: First, we report the results achieved by SLLs in our sample in each of the 6 dimensions. This allows us to draw conclusions about the strengths and weaknesses of the current design of ESG-linked lending in providing effective incentives for corporate ESG practices. In a next step, we examine the overall distribution of the KPI score across industries, countries, and relative to the ESG scores of borrowing companies. Overall, our results suggest that firms who are more capable of high ESG standards and are faced with higher ESG pressure in their home countries are more likely to enter ESG-linked loan agreements. However, the fact that our analysis yields an average KPI score of just over 3 indicates that these companies are more likely to enter into such agreements in order to showcase their sustainability practices, rather than to incentivize further ESG improvements through stringent KPIs.

In terms of practical implications, our findings indicate that borrowers and lenders should be mindful of the potential risks associated with setting too lax on KPIs in their ESG-linked loan agreements. From both the borrower's and lender's perspective, issuing SLLs without credible KPIs can damage reputations and raise greenwashing concerns. This observation applies not only to the sustainability targets associated with the KPIs, but also to their implementation and independent verification during the life of the loan. Recent ESG con-

troveries, have shown that greenwashing concerns should not be taken lightly. For example, the oilfield services company Schlumberger signed a SLL in 2021 without publicly disclosing its underlying KPIs and even before it had set official sustainability metrics (International Financing Review 2021). Such deals may indicate that the SLL targets are not material to the borrower's business activities and, more importantly, that they are not ambitious enough to challenge the borrower's status quo. In addition, we also find some evidence consistent with concerns about the transparency and impact of such contracts. As highlighted in our KPI analysis, most of the KPIs set so far in SLLs do not appear to be financially material. Ultimately, this means that issuing SLLs could have little to no significant positive impact on investors' perception or the ESG performance of the borrowers. To this end, our findings might explain why recent studies did not find a positive impact of SLLs on sustainability performance (Du et al. (2022), Kim et al. (2021)). To avoid that SLLs become an empty ESG showcase, stakeholders involved in the future development of sustainable debt instruments should therefore consider the insights of this study. This is also important because urgent action is needed to advance company practices that promote real and positive impact in the sustainability arena.

Furthermore, the present research sheds light on the ESG performance of the borrowers at the time of SLL issuance. Even though the existing literature has often argued that the departure from use-of-proceeds-based debt instruments contributes to the democratization of sustainable finance (e.g., Kim et al. (2021)), the market for SLLs is currently still dominated by large companies with above-average ESG performance. This observation may suggest that hurdles remain for firms with lower ESG profiles and for small and medium-sized companies, although they may be precisely the ones with an even greater need for new forms of sustainability incentives. To the extent that SLLs are also associated with important administrative and compliance costs, companies with a lack of specific sustainability resources or expertise may therefore remain absent from the SLL market. A more inclusive approach to sustainable finance instruments that does not sacrifice stringency in their design may therefore be needed to enable all market actors to contribute to solving societal challenges such as climate change.

Our study certainly entails some limitations, which warrant careful consideration but also may highlight the potential for further research. The limitations of our study are common to this type of qualitative research. First, our analysis is based on a limited number of observations, which might affect the generalization of our findings. However, it is also worth noting that due to the novelty of these debt instruments (Schmittmann & Chua 2021), current studies on SLLs typically suffer from small sample size biases (see e.g., Carrizosa & Ghosh (2022)). Thus, future studies could extend the analysis of KPIs to include other

countries as additional data becomes available.

In addition, our study focuses primarily on the design of KPIs in ESG loan agreements, rather than on their causal impact on borrowers' ESG performance. While Kim et al. (2021) and Özlem Dursun-de Neef et al. (2022) analyze the impact of SLL issuance on ESG performance at an aggregate level, it is still unclear whether companies significantly improve their performance in the ESG areas targeted by the specific KPIs. More specifically, to demonstrate impact, further research would need to show that certain ESG targets would not have been achieved in the absence of such SLLs Modigliani & Miller (1958). If rigorously designed and implemented, we expect SLLs to have the potential to deliver positive impact, which should also be reflected in higher ESG performance at the time of target achievement. In this context, the analysis of sound design and rigorous implementation of KPIs in SLL contracting is an important contribution to the burgeoning body of research on the extent to which sustainable finance instruments can deliver impact-oriented solutions to the grand challenges of our time.

7 Conclusion

SLLs aim to improve a borrower's sustainability profile by aligning loan conditions to the borrower's achievement of ESG targets. Although companies often emphasize their intention to take a more holistic approach to sustainability and incorporate ESG considerations into all major aspects of their operations, including financing, our study shows that SLLs remain an empty showcase for sustainability targets to date. In particular, our results question the ability of SLLs to effectively incentivize corporate sustainability efforts due to their low quality KPIs. Although SLLs are a promising tool for sustainable finance, their future success will depend on an appropriate design of KPIs and rigorous implementation of the corresponding targets. Overall, our granular analysis contributes to a more holistic understanding of the opportunities and challenges of sustainable finance instruments.

References

- Andreoni, J., Harbaugh, W. & Vesterlund, L. (2003), 'The carrot or the stick: Rewards, punishments, and cooperation', *American Economic Review* **93**(3), 893–902.
- Arcadis (2019), 'Integrated Annual Report 2019'. Last accessed Sep. 16, 2022.
URL: <https://www.arcadis.com/-/media/project/arcadiscom/com/investors/annual-report/arcadis-integrated-annual-report-2019.pdf>
- Berg, F., Kölbel, J. F. & Rigobon, R. (2022), 'Aggregate confusion: The divergence of ESG ratings', *Review of Finance* **26**(6), 1315–1344.
- Bolton, P. & Kacperczyk, M. (2021), 'Do investors care about carbon risk?', *Journal of Financial Economics* **142**(2), 517–549.
- Carrizosa, R. & Ghosh, A. A. (2022), 'Sustainability-linked loan contracting', *SSRN Electronic Journal* .
- Chava, S. (2014), 'Environmental externalities and cost of capital', *Management Science* **60**, 2223–2247.
- Du, K., Harford, J. & Shin, D. D. (2022), 'Who benefits from sustainability-linked loans?', *SSRN Electronic Journal* .
- Edmans, A. (2022), 'The end of ESG', *Financial Management* .
- Endesa S.A. (2021), 'Individual Annual Financial Report for the year ended 31 December 2021'. Last accessed Oct. 10, 2022.
URL: <https://www.endesa.com/content/dam/enel-es/endesa-en/home/investors/financialinformation/annualreports/documents/2022/annual-report-2021-ca-eng-v-cnmv.pdf>
- Enel (2019), 'Enel signs first credit line linked to united nations sustainable development goals'. Last accessed Oct. 31, 2022.
URL: <https://www.enel.com/media/explore/search-press-releases/press/2019/10/enel-signs-first-credit-line-linked-to-united-nations-sustainable-development-goals>
- Financial Times (2020), 'Food businesses bank on sustainability-linked loans'. Last accessed Sep. 15, 2022.
URL: <https://www.ft.com/content/d0c721fc-2eae-4501-b95b-1660c81b05ed>

- Flammer, C. (2021), ‘Corporate green bonds’, *Journal of Financial Economics* **142**(2), 499–516.
- Grewal, J., Serafeim, G. & Yoon, A. S. (2016), ‘Shareholder activism on sustainability issues’, *SSRN Electronic Journal* .
- Heeb, F., Kölbel, J., Paetzold, F. & Zeisberger, S. (2021), ‘Do investors care about impact?’, *SSRN Electronic Journal* .
- Herbohn, K., Gao, R. & Clarkson, P. (2019), ‘Evidence on whether banks consider carbon risk in their lending decisions’, *Journal of Business Ethics* **158**, 155–175.
- Hewlett-Packard (2021), ‘Hp inc. announces closing of its inaugural \$1 billion sustainability notes offering’. Last accessed Oct. 25, 2022.
URL: <https://press.hp.com/us/en/press-releases/2021/hp-announces-closing-of-its-inaugural-sustainability-notes-offering.html>
- Houston, J. F. & Shan, H. (2021), ‘Corporate ESG profiles and banking relationships’, *The Review of Financial Studies* **35**(7), 3373–3417.
- Ilhan, E., Krueger, P., Sautner, Z. & Starks, L. T. (2019), ‘Institutional investors’ views and preferences on climate risk disclosure’, *SSRN Electronic Journal* .
- International Accounting Standards Board (2021), ‘Feedback on financial assets with sustainability linked features’. Last accessed Jan. 09, 2023.
URL: <https://www.ifrs.org/content/dam/ifrs/meetings/2021/july/iasb/ap3b-pir-ifrs-9-cm-feedback-on-financial-assets-with-sustainability-linked-features.pdf>
- International Financing Review (2021), ‘Lenders agree KPIs for Schlumberger SLL – without seeing them’. Last accessed Oct. 31, 2022.
URL: <https://www.ifre.com/story/2955709/lenders-agree-kpis-for-schlumberger-sll-without-seeing-them-mq3ygm1thc>
- Jung, J., Herbohn, K. & Clarkson, P. (2018), ‘Carbon risk, carbon risk awareness and the cost of debt’, *Journal of Business Ethics* (150), 1151–1171.
- Khan, M., Serafeim, G. & Yoon, A. (2016), ‘Corporate sustainability: First evidence on materiality’, *The Accounting Review* **91**(6), 1697–1724.
- Kim, S., Kumar, N., Lee, J. & Oh, J. (2021), ‘ESG lending’, *SSRN Electronic Journal* .

- Krueger, P., Sautner, Z. & Starks, L. T. (2020), ‘The importance of climate risks for institutional investors’, *The Review of Financial Studies* **33**(3), 1067–1111.
- Liesen, A., Figge, F., Hoepner, A. & Patten, D. M. (2016), ‘Climate change and asset prices: Are corporate carbon disclosure and performance priced appropriately?’, *Journal of Business Finance & Accounting* **44**(1-2), 35–62.
- Loan Market Association (2022a), *Guidance on Sustainability-linked Loans Principles*.
- Loan Market Association (2022b), *Sustainability-linked Loans Principles*.
- Matsumura, E. M., Prakash, R. & Vera-Muñoz, S. C. (2013), ‘Firm-value effects of carbon emissions and carbon disclosures’, *The Accounting Review* **89**(2), 695–724.
- Modigliani, F. & Miller, M. H. (1958), ‘The cost of capital, corporation finance and the theory of investment’, *The American Economic Review* **48**(3), 261–297.
- Riedl, A. & Smeets, P. (2017), ‘Why do investors hold socially responsible mutual funds?’, *The Journal of Finance* **72**(6), 2505–2550.
- Schmittmann, J. M. & Chua, H. T. (2021), ‘How green are green debt issuers?’, *SSRN Electronic Journal*.
- Sodexo (2019), ‘Sodexo: first global food services company to connect its financing to action to prevent food waste’. Last accessed Sep. 10, 2022.
URL: <https://ml-eu.globenewswire.com/Resource/Download/b76bc3d2-2f6e-415f-8c3f-0bc35a942375>
- Sullivan, R. & Gouldson, A. (2012), ‘Does voluntary carbon reporting meet investors’ needs?’, *Journal of Cleaner Production* **36**, 60–67.
- Sustainalytics (2022), ‘Country Research and Ratings: Top 20 Countries’. Last accessed Oct. 31, 2022.
URL: <https://www.sustainalytics.com/investor-solutions/esg-research/country-risktop>
- Trinks, A., Mulder, M. & Scholtens, B. (2020), ‘An efficiency perspective on carbon emissions and financial performance’, *Ecological Economics* **175**, 106632.
- Voltaia (2019), ‘Voltaia, Natixis and EthiFinance support sustainable finance and the energy transition with the first green and sustainable syndicated loan for a European independent power producer’. Last accessed Sep. 10, 2022.
URL: <https://www.voltaia.com/static-files/aac6b9d4-b200-4dc0-89f7-9f44321f9f25>

Özlem Dursun-de Neef, H., Ongena, S. R. G. & Tsonkova, G. (2022), 'Green versus sustainable loans: The impact on firms' ESG performance', *SSRN Electronic Journal* .

Appendices

A First Appendix

Table 1: ESG-linked loans by use of proceeds. This table reports the number of SLLs and the total issuance amount by use of proceeds. Percentage of SLLs is the ratio of the number of SLLs by each use of proceeds to the total number of SLLs in our sample. The sample consists of 291 loans issued between 2017 and 2021.

Use of proceeds	Number of SLLs	Percentage of SLLs	SLL Volume (in Mio. €)
General corporate purposes	244	83.85%	248,067.66
Refinancing / Repayment of bank liabilities	18	6.19%	12,979.25
Acquisition Finance	10	3.44%	3,515.34
Working Capital	8	2.75%	6,807.00
Real Estate/Property acquisition	5	1.72%	591.15
Capital expenditures	3	1.03%	1,247.00
Ship financing	1	0.34%	300.00
Leveraged Buyout	1	0.34%	1,320.00
Management Buyout	1	0.34%	1,298.51
Total	291	100.00%	276,125.91

Table 2: ESG-linked loans by industry. This table reports the number of SLLs and total issuance amount by industry of the borrowers. Industries are defined using Thomson Reuters Business Classification (TRBC). Percentage of SLLs is the ratio of the number of SLLs in each industry to the total number of SLLs in our sample. The sample consists of 291 loans issued between 2017 and 2021.

Industry	Number of SLLs	Percentage of SLLs	SLL Volume (in Mio. €)
Industrials	61	20.96%	66,642.94
Utilities	46	15.81%	60,354.55
Consumer Cyclical	43	14.78%	28,542.54
Basic Materials	41	14.09%	26,033.47
Real Estate	25	8.59%	11,311.25
Consumer Non-Cyclical	23	7.90%	21,841.06
Energy	15	5.15%	19,117.55
Health Care	15	5.15%	17,370.00
Technology	14	4.81%	14,167.33
Financials	8	2.75%	10,745.22
Total	291	100.00%	276,125.91

Table 3: ESG-linked loans by country. This table reports the total issuance amount and the number of SLLs issued by borrowers' country of incorporation. The sample consists of 291 loans issued between 2017 and 2021.

Country	Number of SLLs	Percentage of SLLs	SLL Volume (in Mio. €)
Spain	67	23.02%	38,931.21
France	60	20.62%	79,406.08
Italy	39	13.40%	46,025.00
Germany	31	10.65%	48,621.64
Finland	25	8.59%	9,990.00
Netherlands	20	6.87%	15,227.12
Belgium	10	3.44%	4,846.94
Ireland	10	3.44%	8,480.48
Sweden	10	3.44%	9,870.74
Austria	5	1.72%	2,138.89
Portugal	5	1.72%	300.00
Denmark	3	1.03%	6,797.77
Luxembourg	3	1.03%	5,005.54
Greece	2	0.69%	374.96
Poland	1	0.34%	109.55
Total	291	100.00%	276,125.91

Table 4: Number of KPIs per loan. This table reports the distribution of SLLs (in absolute and percentage terms) by number of KPIs per loan. The sample consists of 216 SLLs for which we were able to collect KPI data between 2017 and 2021.

Number of KPIs	Number of SLLs	Percentage of SLLs
1	91	42.13%
2	48	22.22%
3	56	25.93%
4	19	8.80%
5	2	0.93%
	\sum 216	\sum 100.00%

Table 5: Distribution of KPIs within sustainability pillars. This table shows the distribution of KPIs (in absolute and percentage terms) within the environmental, social, governance and ESG pillars. The sample considered consists of 216 SLLs with a total of 441 KPIs. The sample period covers the years 2017 to 2021.

Category	Number of KPIs	% of KPIs
Environmental	263	59.64%
Biodiversity	6	1.36%
Energy consumption and energy efficiency	23	5.22%
Renewable energy	34	7.71%
Circular economy	18	4.08%
Sustainable resources and responsible procurement	13	2.95%
Environmentally sustainable investments	4	0.91%
Reduction and elimination of waste	16	3.63%
Greenhouse gas emissions	136	30.84%
Water consumption	13	2.95%
Social	87	19.73%
Employee health and safety	28	6.35%
Employee diversity and gender equality	22	4.99%
Sustainable products and customer benefits	17	3.85%
Employee training	10	2.27%
Social responsibility and community engagement	10	2.27%
Governance	4	0.91%
Business ethics	4	0.91%
ESG	87	19.73%
ESG rating	63	14.29%
Other ESG assessments or certifications	24	5.44%
	Σ 441	Σ 100.00%

Table 6: Distribution of KPIs within industries. This table shows the distribution of KPIs (absolute and percentage terms) within industries. The sample considered consists of 441 KPIs in 216 SLLs issued between 2017 and 2021.

Industry	Environment	Social	Governance	ESG
Basic Materials	22.81%	10.34%	0.00%	16.09%
Consumer Cyclical	11.03%	20.69%	0.00%	13.79%
Consumer Non-Cyclical	12.93%	12.64%	0.00%	9.20%
Energy	2.66%	0.00%	25.00%	4.60%
Financials	1.52%	2.30%	25.00%	3.45%
Healthcare	3.04%	5.75%	0.00%	2.30%
Industrials	14.07%	19.54%	0.00%	18.39%
Real Estate	8.37%	4.60%	0.00%	18.39%
Technology	4.94%	8.05%	0.00%	4.60%
Utilities	18.63%	16.09%	50.00%	9.20%
	Σ 100.00%	Σ 100.00%	Σ 100.00%	Σ 100.00%

Table 7: Score dimensions. This table shows the six main dimensions on which our score for measuring the quality of SLL KPIs relies. Strategic relevance refers to the relevance of the KPIs to the borrower’s sustainability strategies and/or policies. Materiality refers to the relevance of the KPIs to the borrower’s industry based on the SASB Materiality Map. Measurability assesses whether the KPIs are measurable and expressed with a clear numerical value. Benchmarking ability examines whether the KPIs are benchmarked by reference to relevant standards or taxonomies. Pricing mechanism refers to the existence of a bonus and malus system in relation to interest rate adjustments. External review refers to an external independent audit of the borrowers’ performance against the KPIs.

Score dimensions	
1	Strategic relevance
2	Materiality
3	Measurability
4	Benchmarking ability
5	Pricing mechanism
6	External review

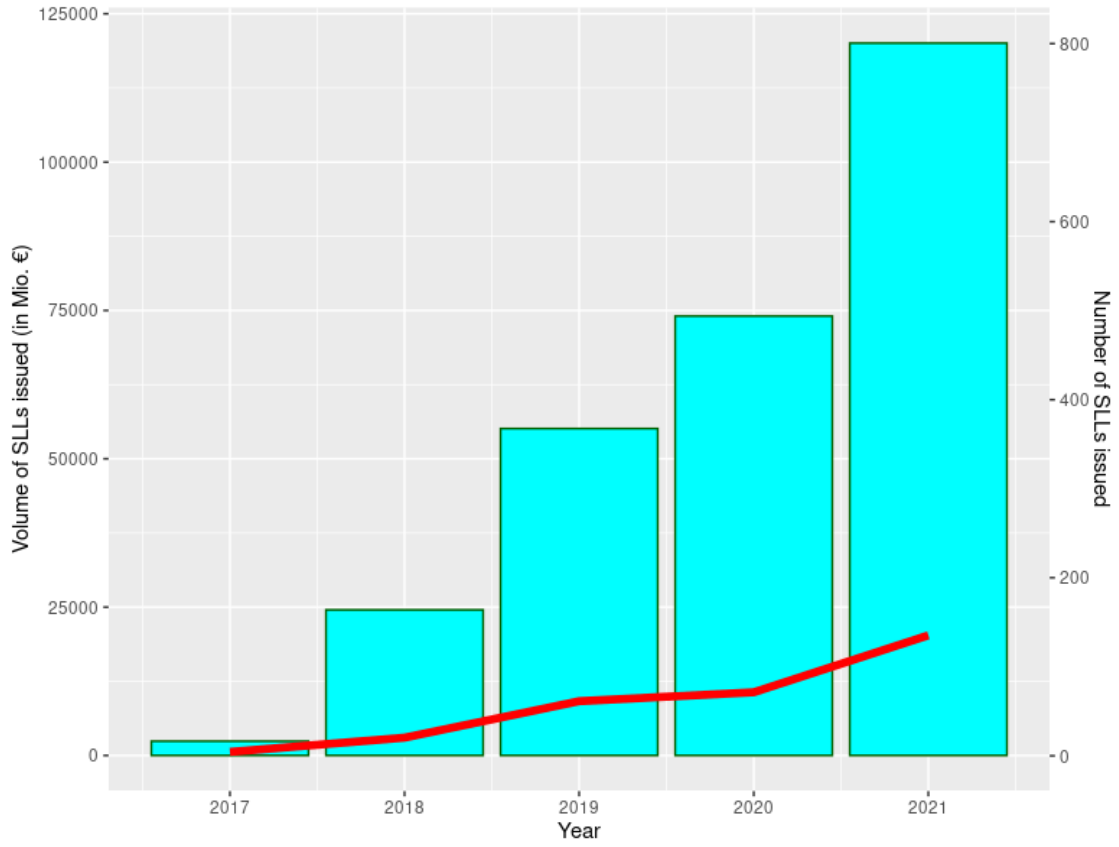


Figure 1: Number and volume of sustainability-linked loans issued

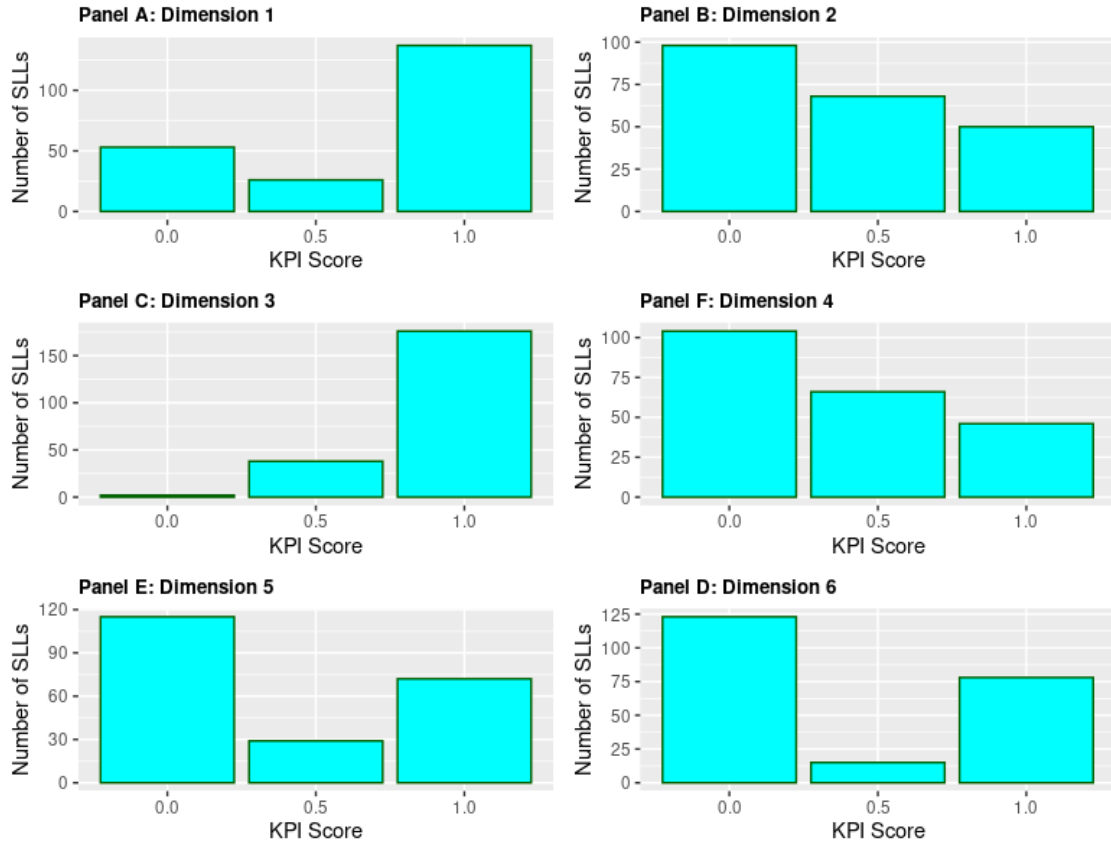


Figure 2: Average KPI Score per dimension

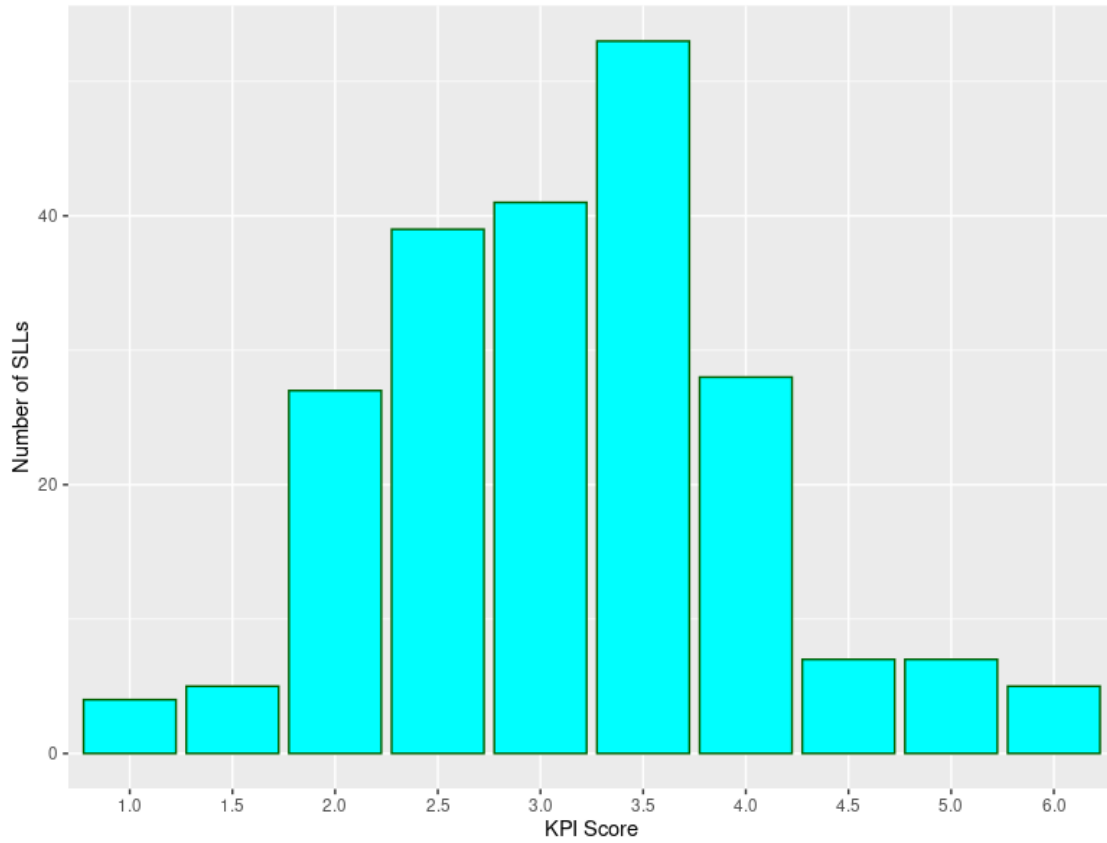


Figure 3: Number of SLLs for each KPI score

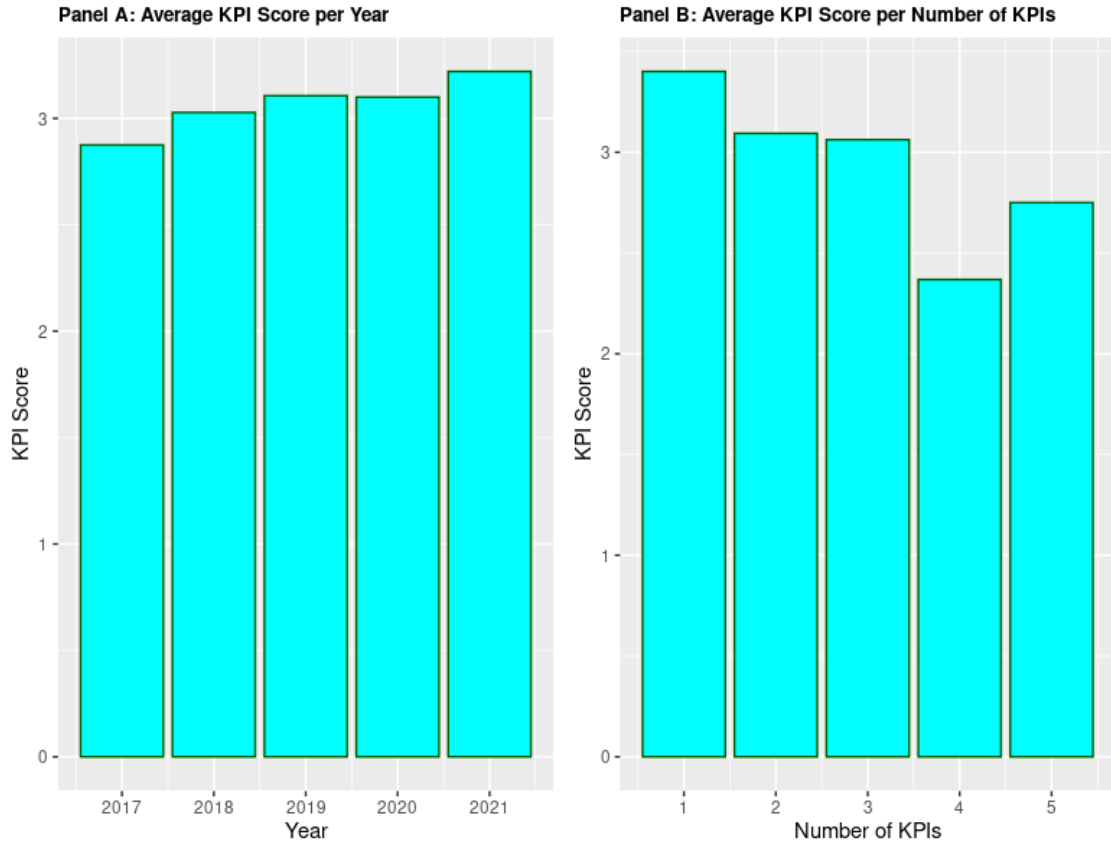


Figure 4: Average KPI Score by year and by number of KPIs

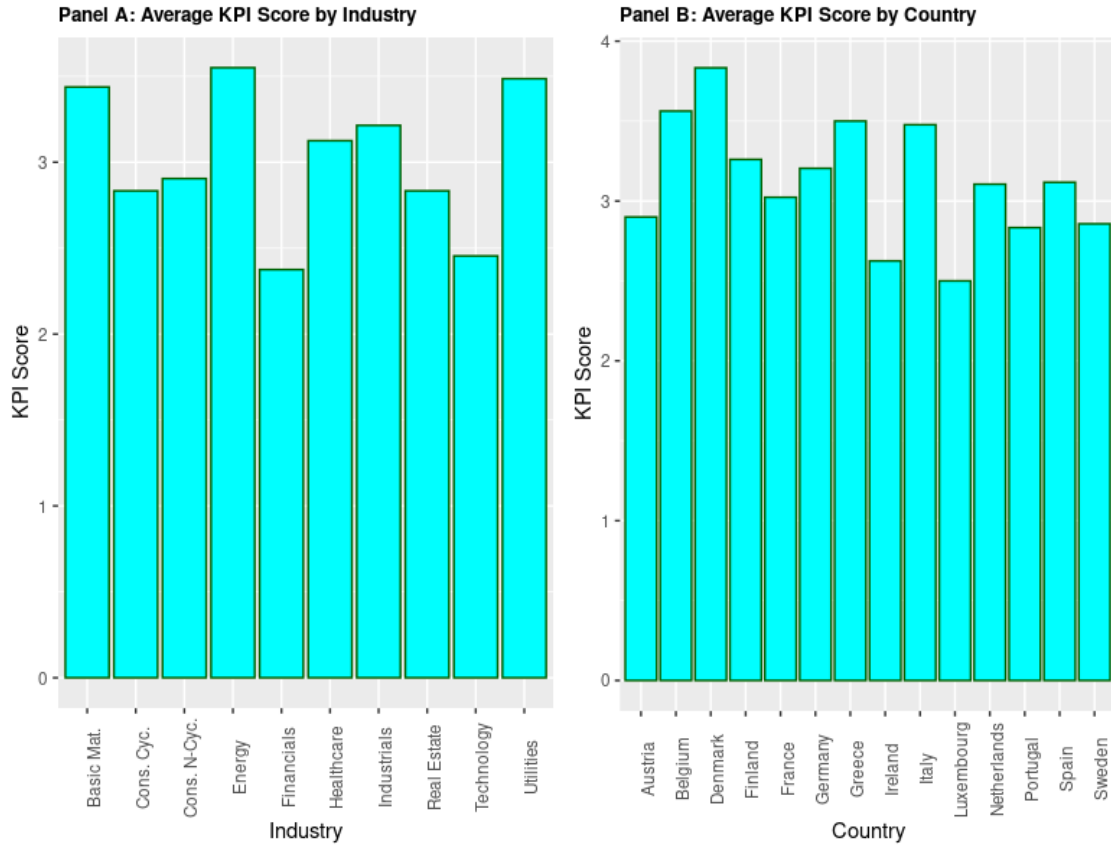


Figure 5: Average KPI Score by industry and country

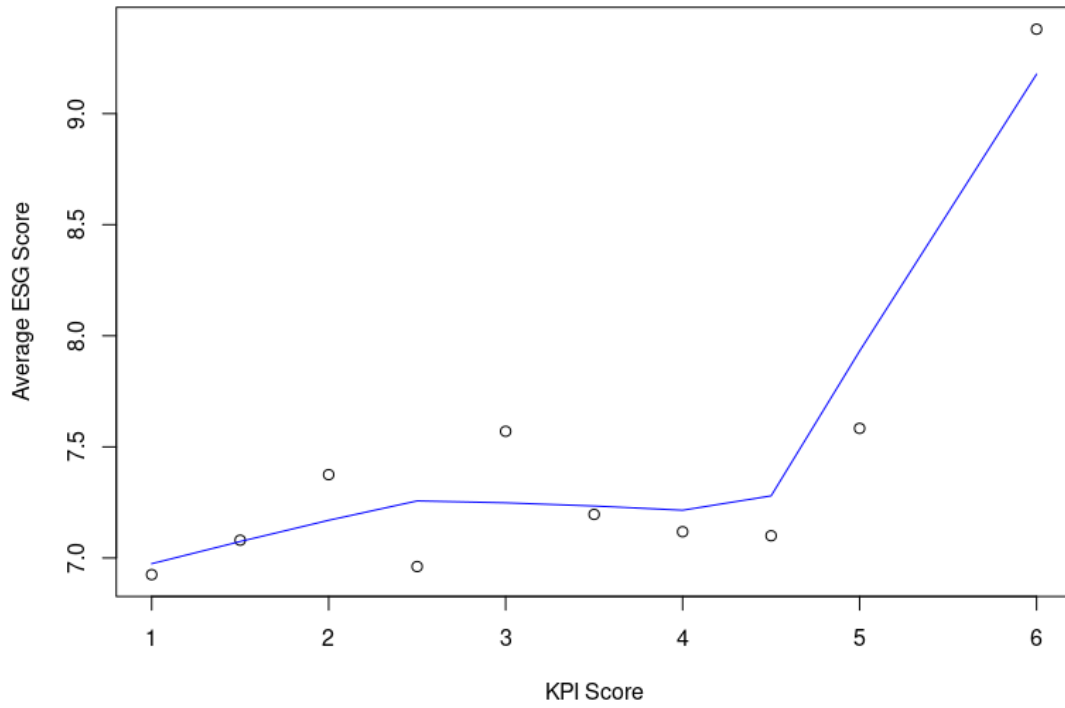


Figure 6: Average ESG Score per KPI score

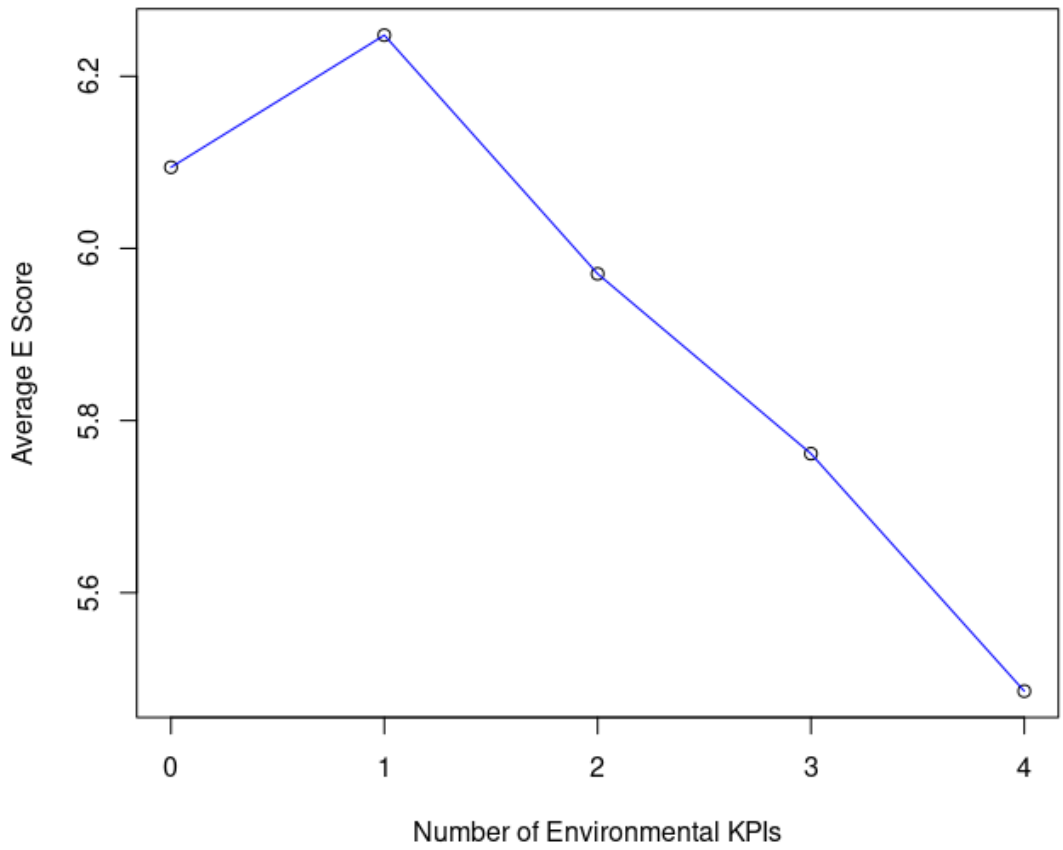


Figure 7: Average ESG Score per number of environment-related KPIs

B Second Appendix

Table 8: KPI Classification. The table shows the main topics and objectives of the sustainability KPIs in our sample. The KPI topics consist of 17 different categories clustered around 4 pillars: Environment, Social, Governance and ESG. The left side of the figure shows the main KPI categories. The right side of the figure contains KPI examples.

Category	Example
Environmental	
Biodiversity	Conservation, promotion and protection of biodiversity and ecosystems.
Energy consumption and energy efficiency	Reduce energy consumption, improve energy efficiency.
Renewable energy	Increase the share of renewable energy produced or installed, increase the share of renewable energy used or sold, increase the share of electric vehicles in the total vehicle fleet.
Circular economy	Increase recycling rates, increase recovered materials from production waste, reduce waste of resources using recycled and/or reusable raw materials, reuse and repair equipment.
Sustainable resources and responsible procurement	Increase the use of sustainable raw materials in production, procurement and use of products from responsible sources, sustainable and transparent supply chains.
Environmentally sustainable investments	Increase the share of sustainable investments to total investments that contribute to environmental sustainability.
Reduction and elimination of waste	Reduce & avoid waste, reduce & avoid landfilling of waste, improve waste separation & collection.
Greenhouse gas emissions	Reduction of Scope 1, 2 and/or 3 greenhouse gas emissions, climate neutrality in own operations, emission-free machinery and vehicle fleets.
Water consumption	Sustainable use of water, water savings, reduction of water consumption in operations and production.
Social	
Employee health and safety	Reduce the incidence of accidents at work, injuries and illnesses, implement health and safety measures, promote employee well-being and satisfaction at work, ensure human and labour rights.
Employee diversity and gender equality	Increase the proportion of women in leadership positions, promote gender equality in all areas of the company, diversity in leadership positions.
Sustainable products and customer benefits	Provide sustainable, safe and reliable products and solutions for customers, expand the offerings of sustainable products, increase the sale of sustainable products & the turnover from products that improve the sustainability and safety of customers.
Employee training	Increase the number of training hours for employees, participation in sustainability-related training, development of employee skills.
Social responsibility and community engagement	Improve the relationship and dialogue between companies and communities in which they operate, provide (financial) support to non-profit organisations, foundations, and local initiatives, support disadvantaged groups, reduce social inequalities, implement social responsibility and social engagement programs.
Governance	
Business ethics	Ensure compliance with business ethics, code of conduct and code of ethics of the company; stakeholders engagement; prevention of breaches of business ethics including corruption, bribery, fraud or insider trading; training of employees on business ethics; ESG due diligence.
ESG	
ESG rating	Improve ESG rating performance.
Other ESG assessment, certification and sustainability initiatives	Other (corporate) ESG assessments, attainment of recognized ESG certifications, and progress on sustainability initiatives.

C Third Appendix

Examples of KPIs

Below are examples of KPIs that received a value of 1 for each score dimension. The name of the borrower is indicated in parentheses.

Dimension #1: Strategic relevance

- **KPI:** "The margin of the new credit facility is in fact linked to two strategic targets in the field of energy transitioning and the circular economy which A2A has defined in its 2021-2030 Business Plan and which are included in the recently published Sustainable Finance Framework. The first goal is related to the growth of installed capacity from renewable sources while the second is represented by the increase of recovered materials from treated waste." (A2A SpA)
- **KPI:** "The indicators are linked to Corbion's key sustainability initiatives from its Creating Sustainable Growth strategy: Responsible sourcing, Responsible operations and Sustainable ingredient solutions." (Corbion NV)

Dimension #2: Materiality

- **KPI:** "The pricing mechanism of the RCF is linked to Stora Enso's science-based climate targets. Stora Enso commits to reducing absolute scope 1 and 2 greenhouse gas (GHG) emissions from its own operations, as well as scope 3 GHG emissions from its value chain, by 50% by 2030 from the 2019 base-year." (Stora Enso Oyj). The company belongs to the Basic Materials sector. Comparing this KPI with the SASB standards for this company (see "pulp and paper products"), we find that reduction of gross global Scope 1 emissions is listed as a material issue for this company by SASB.
- **KPI:** "Sodexo, world leader in Quality of Life services, has renewed its €1.3 billion revolving credit facility (RCF) which now incorporates a pricing adjustment based on Sodexo's performance towards its goal to prevent 50% of the food waste and food losses from its operations by 2025." (Sodexo SA). Comparing this KPI with the SASB standards for this company (see "restaurants" sector), we find that the reduction of total amount of waste is a material issue according to SASB.

Dimension #3: Measurability

- **KPI:** "Endesa has committed to increasing the percentage of renewable sources in its total installed power generation capacity in the Iberian Peninsula from 45% at the start of the year to 50% by end December 2021" (Endesa SA)
- **KPI:** "The Sustainability-Linked financing is linked to the achievement of Enel's sustainability target to reduce Direct greenhouse gas emissions (Scope 1), measured in grams of CO₂eq per kWh, to equal or less than 148 gCO₂eq/kWh by 31 December 2023, thereby contributing to the United Nations Sustainable Development Goal (SDG) 13 (Climate Action)." (Enel SpA)

Dimension #4: Benchmarking ability

- **KPI:** "The credit margin under the facility will be adjusted based on Maersk's progress to meet its target of reducing CO₂ emissions per cargo moved by 60% by 2030, which is significantly more ambitious than the IMO target of 40% by 2030 (all 2008 baseline)." (AP Moller-Maersk A/S)
- **KPI:** "The first target is Ørsted's science-based target of reducing the carbon emissions from its energy generation and operations (scopes 1-2) to 10 g CO₂e/kWh by 2025, which is the main lever for achieving carbon neutrality in 2025, and which is aligned with a 1.5 °C climate scenario. The second target is Ørsted's taxonomy-aligned green investments linked to its announced approx. DKK 350 billion investment programme for 2020-2027, which constitute a significant step in achieving Ørsted's strategic ambition of reaching approx. 50 GW of installed renewable capacity by 2030." (Ørsted A/S)

Dimension #5: Pricing mechanism

- **KPI:** "The €2bn Positive Incentive Loan facility with discounts and premiums assessed on a 12 month basis allows Danone to leverage its efforts in ESG." (Danone SA)
- **KPI:** "Under this loan, the margin amount that we are required to pay can be either increased or decreased, by up to 10 basis points per year, to the extent that we are able to meet certain sustainability metrics for any fiscal year beginning with the fiscal year ended December 31, 2021." (Diana Shipping Inc)

Dimension #6: External review

- **KPI:** "This financing is sustainable since the cost of the loan is linked to the evolution of two indicators established, which will be reviewed annually: relative emissions intensity (direct and indirect) per tonne of steel produced and the frequency of occupational accidents." (Acerinox SA)
- **KPI:** "Kinnevik will seek independent and external verification of our actual KPI performance relative to the SPT(s), on an annual basis and in relation to the Target Observation Date(s). The verification will be conducted by a reviewer with relevant expertise with limited assurance by the reviewer. The verification will be made public on our website by the dates outlined in the transaction specific documentation." (Kinnevik AB)

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