Does Sustainable Investing Deprive Unsustainable Firms from Fresh Capital?

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December 2020

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Abstract

This paper examines the sustainability characteristics of listed firms that raise fresh capital by issuing stocks or bonds. Issuance, i.e. the primary market, should be of paramount importance to sustainable investors since this is where the demand for and supply of capital meet, contrary to the secondary market where ownership of existing stocks and bonds is merely exchanged between investors. We find no evidence that fresh capital is flowing more towards sustainable than to unsustainable firms. The sustainability profile of equity issuers is generally similar to the broad market, while debt issuers even tend to have a below-average sustainability profile. Thus, unsustainable firms appear to have no problems in obtaining funding in public markets. Our results suggest that sustainable investing has not been able to deprive unsustainable firms from fresh capital. However, they do not disprove that sustainable investing may have prevented such firms from raising even more capital, nor that further mainstreaming of sustainable investing may lead to more noticeable impact on capital flows.

Keywords: sustainable investing; Socially Responsible Investing (SRI); Environmental, Social, and Governance (ESG); Sustainable Development Goals (SDGs); exclusion; divestment; issuance; capital flows

JEL Classification: G11; G12; G14

1. Introduction

Investors increasingly care not only about their financial performance, but also about the sustainability characteristics of their investments. More than 3,000 asset managers and owners – representing US$ 103.4 trillion in assets under management – have now subscribed to the Principles for Responsible Investment, a global initiative that aims to create a "more sustainable global financial system."[2] Investors also increasingly work to align their investment portfolios with global agreements such as the Sustainable Development Goals (SDGs) of the United Nations (UN) and the Paris Agreement on climate change. For instance, last year, 477 investors with US$ 34 trillion in assets called upon governments to limit average global temperature rise to no more than 1.5 degrees Celsius.[3] Hence, sustainable investing is quickly coming of age.

Sustainable investing, or Socially Responsible Investing (SRI) as it used to be called, can be put into practice in various ways. A key distinction can be made between active ownership and capital allocation.[4] With active ownership investors try to realize their sustainability objectives by voting at shareholder meetings, and by engaging in a constructive dialogue with firms aimed at improving their corporate behavior. Although voting and engagement can be effective[5], progress may be slow, especially if there is no majority support among shareholders for the desired changes. Sustainable investors therefore often vote with their feet, by simply divesting from the least sustainable firms. Classic candidates for exclusion are firms active in the tobacco, alcohol, gambling, and weapons industries, known in the literature as the 'sin stocks'. In recent years the scope of exclusions has broadened to other ethical issues, such as human rights violations (e.g. child labor), labor rights violations (e.g. labor union opposition), narcotics (e.g. cannabis), environmental damage (e.g. deforestation), and climate change (e.g. high carbon emissions). However, sustainable investing is not limited to negative screening, but also entails taking larger positions in sustainability leaders. We can distinguish between various ways to go about such capital (re-)allocation.

A first style is to integrate Environmental, Social, and Governance (ESG) indicators into the investment process, alongside financial factors, in order to obtain a more complete perspective on an investment's potential performance. Investors use such ESG scores to shift capital towards companies that perform well on a wide variety of topics like governance, gender equality, water use, or waste management, with the expectation that this will translate into better performance. A second approach, which has gained traction following the 2015 Paris climate agreement, is to reduce the carbon footprint of investment portfolios.[6] Typical examples of climate-based exclusions are firms involved in thermal coal or tar sands. Such exclusion can be explicit, in the

[2] Retrieved 28 September 2020 online from: https://www.unpri.org/pri.

[3] Retrieved 29 September 2020 online from https://unfccc.int/news/investors-with-34-trillion-urge-policies-for-paris-15degc-goal.

[4] For a discussion on which of these two approaches is more effective we refer to Gorman (2017), Brest, Gilson, and Wolfson (2019), Atta-Darkua et al. (2020), and Blitz and Swinkels (2020a).

[5] For instance, Dimson, Karakaş, and Li (2015) and Barko, Cremers, and Renneboog (2017) find significant improvements in the average ESG ratings of firms following shareholder engagement efforts.

[6] See, e.g., Braungardt, van den Bergh, and Dunlop (2019), Boermans and Galema (2019), and Focardi and Fabozzi (2020).

form of a blacklist specifying exactly which firms or industries are banned from investment, but also implicit. An example of implicit exclusion is the application of a carbon footprint reduction target, which does not rule out positions in any particular firm, but effectively forces certain firms with a high carbon footprint out of the portfolio. A third style is to align investment portfolios with the UN SDGs. This means that investors focus on firms which have a measurable beneficial impact on the environment or society, alongside earning a healthy financial return. An example of such an approach is impact investing, where one concentrates on specific sustainable themes, such as renewable energy. Because these three styles overlap and lack exact definitions[7], we will use sustainable investing as the overarching term for all such investment approaches.

Many studies have examined the impact of sustainability integration on investment performance. One line of theorizing posits that sustainable investing – through excluding potential investments from the universe - should lead to lower expected returns, because it is effectively a constraint that reduces the opportunity set for investors. Sustainable investing should also lead to lower returns if it is effective at increasing the cost of capital of unsustainable firms, since the cost of capital should equal the long-term expected return of investors.[8] This position appears to find empirical support, as it has been thoroughly established that sin stocks have significantly outperformed the market in the long run.[9] This was initially interpreted as a reward for the reputational risk that is involved with holding these stocks. More recently, however, it has been established that the sin stock premium is fully explained when accounting for the quality and low-risk factor exposures of sin stocks.[10] Another line of reasoning purports that sustainability integration can deliver a higher return if ESG information is not properly incorporated in stock prices. An example of this is the notion that fossil fuel reserves of firms may turn out to be 'stranded assets', that can never be extracted because climate change will lead to an energy transition and new regulation.[11] Many studies have investigated the empirical relationship between ESG integration and financial performance. Reviews of these studies reveal that the majority finds a positive relation.[12] Although this supports the business case for sustainable investing, it should not be ignored that various studies find mixed results or a lack of evidence for the existence of an ESG premium.[13]

[7] See e.g., Van Duuren, Plantinga, and Scholtens (2016) and Berry and Junkus (2013).
[8] See, e.g., Heinkel, Kraus, and Zechner (2001), Hong and Kacperczyk (2009), Asness (2017), and Pastor, Stambaugh, and Taylor (2020).
[9] See, e.g., Fabozzi, Ma, and Oliphant (2008), Hong and Kacperczyk (2009), and Statman and Glushkov (2009).
[10] See Blitz and Fabozzi (2017).
[11] See, e.g., Byrd and Cooperman (2018), Van der Ploeg and Rezai (2019), Delis, De Greiff, and Ongena (2020), and Atanasova and Schwartz (2020).
[12] For instance, Friede, Busch, and Bassen (2015) review nearly 2,200 articles and conclude: "The results show that the business case for ESG investing is empirically very well founded. Roughly 90% of studies find a nonnegative relation between ESG and corporate financial performance. More importantly, the large majority of studies reports positive findings." Relatedly, Clark, Feiner, and Viehs (2014) conduct a meta-study of 190 sources, finding that 88% report a positive link between solid ESG practices and the operational performance of firms.
[13] See, e.g., Hsu et al (2018).

This paper does not examine the relation between sustainability integration and investment performance, but considers how sustainable investing affects capital flows and the financing needs of firms. In order to explain the purpose of our research, the motives for divesting from unsustainable firms and shifting capital towards more sustainable companies need to be understood first. Some investors are content with simply disassociating themselves from certain businesses, such as the tobacco industry, regardless of whether this will have any effect on the actual production and consumption of tobacco products. Other investors acknowledge that their choice to divest from an unsustainable firm may not have any direct impact on the firm in question, but see it as a signaling tool. This signaling can be targeted at the firm itself, its clients, policy-makers, or, in the case of a professional investment manager, the clients of the investment manager. The third and most ambitious objective is to use sustainable investing as a way to support sustainable companies and hurt unsustainable firms, thereby giving the latter an incentive to improve their corporate behavior. It may sound obvious that divestment negatively affects the target firm, but this mechanism is actually not so clear-cut. The issue here is that divesting comes down to selling one's position in a stock or bond to another investor, who ends up holding the position instead. Thus, divestment is merely a transfer of ownership from one investor to another, which has no direct impact on the firm. However, divestment may hurt firms indirectly, by increasing their cost of capital.[14] As a result, new projects will have a lower net present value, making it less attractive for a firm to expand its business operations. Divestment on a sufficiently large scale may even come down to a boycott that effectively blocks a firm's access to capital markets, thereby severely limiting its funding opportunities and hence future growth.

With this in mind, we argue that the ultimate impact of sustainable investing on listed firms is best evaluated by studying the primary market, i.e. new stock and bond issuance. Most research focuses on the secondary market, where the ownership of stocks and bonds that are already listed is exchanged between investors. The challenge here is that the aggregate effects of sustainable investing add up to zero, because if one investor has a portfolio with a better ESG score or a lower carbon footprint, then, by definition, another investor will have a portfolio with a worse ESG score or a higher carbon footprint. The effects that secondary market activity have on the firms in question may be better observable in the primary market, when firms want to raise fresh capital. If sustainable investing is effective at significantly increasing the cost of capital of unsustainable firms, or even blocking their access to capital markets entirely, then one would expect to see this

[14] The relationship between sustainable investing and companies' access to capital is well-researched. Overall, scholars find that companies with better ESG performance tend to face lower capital constraints; see, e.g., Cheng, Ioannou, and Serafeim (2014), El Ghoul et al. (2011), Giese et al. (2019), and Ng and Rezaee (2015). Such findings suggest that sustainable investing impedes unsustainable firms' access to capital through increasing costs. However, these studies do not examine whether this effect is sufficiently large to have a major impact on capital flows.

reflected in capital flows in the primary market.[15] In this study we therefore examine whether fresh capital is flowing more towards sustainable than towards unsustainable firms.[16]

Based on our empirical analysis of stock and bond issuance over the 2010 to 2019 period we find no evidence that unsustainable firms are attracting less fresh capital than sustainable firms. The sustainability profile of equity issuers is generally similar to the broad market, while debt issuers even tend to have a below-average sustainability profile. Thus, unsustainable firms appear to have had no problems in obtaining funding in public markets. These results suggest that sustainable investing has not been effective at depriving unsustainable firms from fresh capital. Our results are stable over time, i.e. we do not find that capital is flowing more towards sustainable firms in recent years than before. However, we acknowledge that it cannot be disproved that unsustainable firms would perhaps have been able to raise even more capital in the absence of sustainable investing. We also acknowledge that if sustainable investing continues to grow, it may become harder for unsustainable firms to obtain fresh funding in the capital market.[17] However, it is an open question how much more sustainable investing would be needed for that, and if such a scale is realistically attainable.

2. Data

Our sample covers the period from 2010 to 2019. At the end of every year, we consider all stocks in the MSCI All Country index at that point in time. Throughout most of the sample period this gives us a universe consisting of about 2,500 stocks, but in the final years of the sample this number grows to about 3,000 due to the inclusion of local Chinese (A-share) stocks in the index. To assess which firms raise fresh capital, we classify a firm as an equity issuer if its number of shares outstanding increased by at least 10% over the year. Similarly, we classify a firm as a debt issuer if the book value of its debt increased by at least 10% over the year. The typical number of equity issuers is between 100 and 150 per annum, while the typical number of debt issuers is in the 200 to 300 range. Our primary source for shares outstanding data and book value of debt data is the Compustat database for US firms, and the Worldscope database for international firms. We impose the 10% threshold in order to prevent that our results get distorted by small changes in the number of shares and the amount of debt that are not economically relevant, such as stock dividends. Although IPOs are also a form of share issuance, we do not include them in our analysis, because there can be many reasons for a firm to go public other than raising money for new business activities, such as enhancing firm visibility and publicity, motivating management

[15] Kölbel et al. (2020) also argue that investors who seek impact should allocate capital to sustainable firms whose growth is limited by external financing conditions, and screen out firms based on the absence of specific environmental, social, and governance practices that can be adopted at reasonable costs.
[16] We condition capital supply and demand only on the firms' sustainability scores, and not on other firm characteristics that may be related to share or debt issuance.
[17] Anecdotal evidence of this relationship is emerging in the banking sector. For instance, in a 21 November 2020 Financial Times article, local politicians suggest that the Alaskan economy is adversely impacted by banks' decisions to stop lending to new oil and gas projects in the Arctic. See: https://www.ft.com/content/42f795e8-00e5-43ac-9f55-e2197e1337b4.

and employees, exploiting mispricing, tax avoidance in some jurisdictions, and cashing in by owners of the private firm.[18] We also do not include the refinancing of existing debt, because it does not result in a capital flow from investors to firms.[19]

In our empirical analysis we examine the sustainability characteristics of the firms that raise fresh money by issuing equity or debt. Ideally, we would restrict our sample to issuance that is used to expand a firm's current business activities, such as a tobacco firm that raises cash in order to build another factory for producing cigarettes. Unfortunately, however, that information is not readily available, and the sheer number of issuance events in our sample (thousands) makes it infeasible to trace the motivation for each issuance and assess the sustainability aspects on a case by case basis. We acknowledge that general issuance is an imperfect measure, because there can be other reasons for issuance that are less relevant from a sustainability perspective. In particular, issuance can be related to M&A activity (one firm issuing shares or debt to buy up the existing shares of another firm)[20], or to optimizing the capital structure (e.g. a firm issuing debt to buy back some of its own shares). We also acknowledge that unsustainable firms might actually raise capital for improving their sustainability, e.g. a fossil fuel firm that wants to invest in renewable energy, for example through the issuance of green bonds[21] or transition bonds.[22] In spite of these caveats, our premise is that studying the sustainability characteristics of issuance in general gives a good impression of whether fresh capital is flowing more towards sustainable or unsustainable firms. Also, it provides clear insights into the access to capital markets of firms with different levels of sustainability. If sustainable investing causes unsustainable firms to experience a significantly higher cost of capital, or is perhaps even effective at blocking firms from capital markets altogether, then one would expect this to be reflected in issuance being dominated by the more sustainable firms.

We use a broad range of metrics to capture the various styles of sustainable investing. First, for the ESG dimension we use the ESG scores from S&P Global (formerly RobecoSAM) and Refinitiv (formerly Asset4). It is important to consider ESG scores from multiple providers since the correlation between the scores of different providers are known to be low.[23] Because Refinitiv (then Thomson Reuters) made a significant change to its methodology in 2018 we consider both

[18] See Röell (1996).

[19] From an engagement perspective, debt refinancing moments can be used by investors to encourage companies to act more sustainably. Since shares do not have a fixed maturity, shareholders cannot benefit from such refinancing moments.

[20] A concrete illustration is the finding of Blitz and Swinkels (2020b) that most share and debt issuance in the tobacco industry is due to intra-industry takeovers.

[21] See Flammer (2020). The green corporate bond market is growing rapidly, but is still only a fraction of the general global corporate bond market. To put both in perspective: the amount outstanding of corporate bonds in the Bloomberg Barclays-MSCI Global Green Bond Index has increased from USD 11 billion at the end of 2014 to USD 130 billion at the end of 2019. For the conventional global corporate bond market (proxied by the Bloomberg Barclays Global Aggregates Corporate Index), the amount outstanding has increased from USD 6,893 billion to USD 9,884 billion over the same period.

[22] See Sidak (2019).

[23] See, e.g., Berg, Kölbel, and Rigobon (2019) and Dimson, Marsh, and Staunton (2020).

the new and legacy Asset4 ESG scores.[24] The ESG scores of firms in different industries can usually not be compared directly, because the weight that is given to the E, S, and G dimensions of the scores tends to vary across industries. Thus, ESG scores are best interpreted as metrics that indicate the sustainability of a firm compared to its industry peers. Next to the standard version of the S&P Global ESG scores we also consider the RobecoSAM smart ESG score, which gives more weight to financially material ESG factors, and neutralizes the strong geographic and size biases that can be present in standard ESG scores.

Second, for the carbon footprint dimension we consider the carbon intensity of firms, which can be used as a screen to align portfolios with climate change mitigation objectives. We use carbon intensity data from RobecoSAM (scope 1+2) and TruCost (scope 1 and 2, separately and combined).[25] Again, it is important to use multiple providers, because for firms which do not provide carbon footprint data themselves the third-party estimates can differ significantly.[26]

Finally, for the SDG dimension we use the SDG classification from RobecoSAM. This classification is based on a proprietary framework for analyzing each firm's contribution to realizing the SDGs. The framework asks three questions: (1) how do the goods/services that a firm produces impact specific SDGs?; (2) how do the firm's operations impact specific SDGs?; and (3) is the firm involved in any controversies that negatively impact societies and/or the environment?[27] The resulting score ranges from -3 (highly negative) to +3 (highly positive), where a score of 0 indicates that the firm has a neutral impact on sustainable development.[28]

An important feature of these sustainability metrics is that they can contain large structural biases. For instance, European and large-cap firms tend to have much higher than average ESG scores, while local Chinese and small-cap firms tend to have much lower than average ESG scores. By design, these biases are largely removed in the RobecoSAM smart ESG scores. The biggest biases in the carbon footprint data are towards sectors, with utilities firms having very high scope 1 emissions, and materials firms having very high scope 2 emissions, compared to other sectors. Similar sector biases are found in the SDG scores, underscoring that companies in different

[24] The main differences are a weighting scheme depending on materiality, and ESG controversy overlay, and industry and country relative scoring. See http://zeerovery.nl/blogfiles/esg-scores-methodology.pdf for more details (retrieved 29 October 2020).

[25] TruCost also offers scope 3 data, but this only takes the upstream perspective. The scope 3 emissions are heavily skewed, with the highest emission firms being concentrated in the food and beverage industry (e.g. firms such as Nestle). Scope 3 data including the downstream perspective is not available unfortunately. In this case firms in the energy sector would dominate the high scope 3 emissions.

[26] See, e.g., Busch, Johnson, and Pioch (2020).

[27] See https://www.robecosam.com/media/2/8/f/28fe233f5aefad12e9d758c2a17489ae_201910-sdg-impact-framework-ch_tcm1011-21128.pdf for more details on the methodology.

[28] Unlike the other metrics, this SDG classification is not available historically, but only as of today (2020). In fact, the SDGs were adopted by the UN in 2015, so formally the concept did not even exist yet at the beginning our sample in 2010. However, the SDG scores of stocks are fairly persistent, so we believe that it is not unreasonable to apply today's SDG classification retrospectively to the past 10 years. We acknowledge that this is not perfect, because especially the controversies dimension of the RobecoSAM SDG score can vary over time. However, the product and operations dimensions are more stable, and these are the main drivers of the SDG scores.

sectors vary widely in their positive and negative impacts on sustainable development objectives.[29] These biases imply that if a strong or poor sustainability profile is observed for issuers, this may be related to differences in issuance activity across regions, sectors, or size groups.

3. Results

We assess the sustainability profile of equity and debt issuing firms versus the market in two ways. First, we compare their average scores on the various sustainability metrics. Second, we investigate whether firms with relatively poor sustainability scores are more likely to obtain financing than firms with average or good sustainability scores. For the latter analysis we divide the universe in three equal parts based on a given sustainability metric. If issuance were unrelated to sustainability, we would expect the same fraction of issuing firms to be present in each of the three sustainability-based groups. If unsustainable firms have difficulty in obtaining fresh financing we would expect that to show up both in the form of better average sustainability scores of issuers, and low issuance for the low-sustainability group compared to the other two groups. Our two approaches can lead to different outcomes if, for instance, issuance is concentrated among stocks with average sustainability features, because then the average sustainability scores of issuers may not differ much from the market, even though unsustainable firms are not attracting much fresh capital.

Figure 1 depicts the average sustainability characteristics of equity issuers versus the universe for each of the last ten calendar years. In order to assess the statistical significance, we also conduct formal tests for differences in means. Table 1 contains the p-values of these t-tests.[30] We observe that equity issuers have structurally lower than average standard ESG scores than the universe. For both the Asset4 scores, these differences are even statistically significant in most years, which follows from the p-values that are below 5 percent. In other words, fresh money that is raised with equity issuance goes more towards firms with poor ESG characteristics than to firms with good ESG characteristics. However, this effect disappears if we consider the RobecoSAM smart ESG scores instead. This suggests that the poor standard ESG scores of equity issuers are driven by the known biases in this data. In particular, if relatively few European and/or large-cap firms are present among the equity issuers then this may explain their apparently weak ESG scores. For the various carbon footprint metrics we observe a mixed picture. In some years the equity issuers exhibit higher carbon emissions than the universe, but in other years they have lower emissions. Only in a few years, the differences are statistically significant, and in some years positive while in others negative. Over the full sample the equity issuers stand out neither positively nor

[29] See e.g., van Zanten and van Tulder (2020) for a mapping of the positive and negative impacts of company activities on SDG targets.

[30] This test assumes normally distributed data, but this assumption is clearly violated for the carbon footprint metrics, which are heavily skewed. We address this issue by log-transforming the carbon intensity data for the statistical test, as this brings the data very close to normally distributed. A consequence of this transformation is that less weight is given to positive outliers (i.e., very high carbon emissions), which may lead to some differences between the figures and statistical tests. We note that performing statistical tests on the raw, not log-transformed, carbon intensity measures does not alter our conclusions.

negatively on carbon footprint. Turning to the SDG score we observe that the equity issuers typically score a bit lower than the universe, although the differences are relatively small and not statistically significant. Altogether, the equity issuers clearly do not exhibit a better sustainability profile than the full universe, but a similar or perhaps even slightly worse profile.

INSERT FIGURE 1 HERE

INSERT TABLE 1 HERE

The relative equity issuance intensity for three different sustainability groups is displayed in Figure 2. The three lines should be horizontal at 33.3% if there were no difference in issuance intensity based on a firm's sustainability score. This is the null hypothesis for the χ^2-tests that we perform and for which p-values are displayed in Table 2. If firms with low sustainability scores would be less likely to obtain financing than firms with average and high sustainability scores, the red line would be below the grey line, and the green line would be highest. We see that based on the S&P Global ESG score, firms with poor ESG scores are more likely to issue shares than firms with a good ESG score. Again, these differences disappear when looking at the RobecoSAM smart ESG scores in which adjustments are made for known biases. For both the old and new Asset4 scores, equity issuance is more prevalent for low scores than for average or high scores. In most years, these differences are also statistically significant. For groupings based on carbon intensities, there is not a clearly different equity issuance pattern, and only in a few years differences are statistically significant. Sometimes rejection is attributed to low carbon emission firms having significantly more issuance, and sometimes because they have significantly less. Since the SDG score is not a continuous variable, the number of stocks in each group is not the same. Typically, the low (SDG score -3, -2, and -1) and high (SDG score +2 and +3) are somewhat smaller than the middle group (SDG score 0 and +1). The split is roughly 25% for the low and high groups, and 50% for the middle group. For the statistical test in Table 2, we use the actual percentage of each sustainability group in each year as the null hypothesis. Statistical significance is observed in the three years 2011, 2014, and 2019, but this was mainly due to unexpectedly high equity issuance for the group with the middle SDG scores – containing companies with a neutral (score 0) or low-positive (score 1) impact on the SDGs.

INSERT FIGURE 2 HERE

INSERT TABLE 2 HERE

The average sustainability characteristics of debt issuers are shown in Figure 3. Here we observe more pronounced differences. For starters, the debt issuers exhibit structurally lower ESG scores than the universe. Table 3 shows that these differences are highly significant for the S&P Global

and Asset4 ESG scores. The differences are smaller and no longer significant in most calendar years (except 2014) for the RobecoSAM smart ESG score, indicating that the known biases in standard ESG scores play an important role. Still, there is not a single year in which the point estimate for the RobecoSAM smart ESG score of the debt issuers exceeds that of the universe. The debt issuers also tend to have a relatively high carbon footprint, although this seems to be mainly concentrated in the first half of the sample. In the second half of the sample the average carbon emissions of the debt issuers are more in line with the universe, but in most years the differences are still statistically significant. The debt issuers also do not score particularly well on the SDG factor, with lower scores than the universe in most years, but only significant differences earlier in the sample. Altogether, it seems fair to conclude that the debt issuers have a below-average sustainability profile.

INSERT FIGURE 3 HERE

INSERT TABLE 3 HERE

Next, we examine debt issuance patterns among groups formed on sustainability scores in Figure 4 and Table 4. A similar pattern emerges in the sense that it seems that the firms with high ESG scores obtain less debt financing than firms with average or low ESG scores, and in many years the difference is statistically significant. Again, using 'smart' ESG scores to eliminate known biases in standard ESG scores makes the lines move closer to one third, but the firms with a high ESG score are still the least frequent debt issuers. The graphs for carbon emitting firms are striking. New debt issuance takes place mostly in firms with high or average carbon intensity, and to a much smaller extent to firms with low carbon intensity. These differences are also statistically significant in almost all years. The last column of Table 4 shows that issuance seems to be equally distributed among different groups of SDG scores for most of the years in our sample.

INSERT FIGURE 4 HERE

INSERT TABLE 4 HERE

Altogether, our empirical analyses of stock and bond issuance over the 2010 to 2019 period shows no evidence that fresh capital is flowing more towards sustainable than to unsustainable firms. The sustainability profile of equity issuers is generally similar to the broad market, while debt issuers even tend to have a below-average sustainability profile. These results are stable over time, i.e. we do not observe that sustainable firms have started to dominate issuance in recent years or since the adoption of the SDGs and the signing of the Paris climate agreement in 2015.

4. Conclusion

The rapid growth of sustainable investing has been hailed as a potential way investors can "help save the world". However, our empirical analysis of equity and bond issuance over the 2010-2019 period shows no evidence that fresh capital is flowing more towards sustainable than to unsustainable firms. More specifically, unsustainable firms appear to have had no problems in securing funding in public markets. This suggests that if the objective of sustainable investing is to deprive unsustainable firms from fresh capital, it was not effective over our sample period. These findings hold when looking at three broad styles of sustainable investing: ESG integration, SRI, and impact investing.

However, we acknowledge that our results do not disprove the possibility that unsustainable firms would have been able to raise even more capital in the absence of sustainable investing. We also acknowledge that if sustainable investing continues to grow, it may become increasingly hard for unsustainable firms to obtain fresh funding in the capital market. However, it is an open question how much sustainable investing would be needed for that, and if such a scale is realistically attainable. In order to deprive unsustainable firms from fresh capital, sustainable investing probably needs to become "business as usual" in the investment community, rather than a niche adopted only by some.

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Figure 1: Sustainability characteristics equity issuers

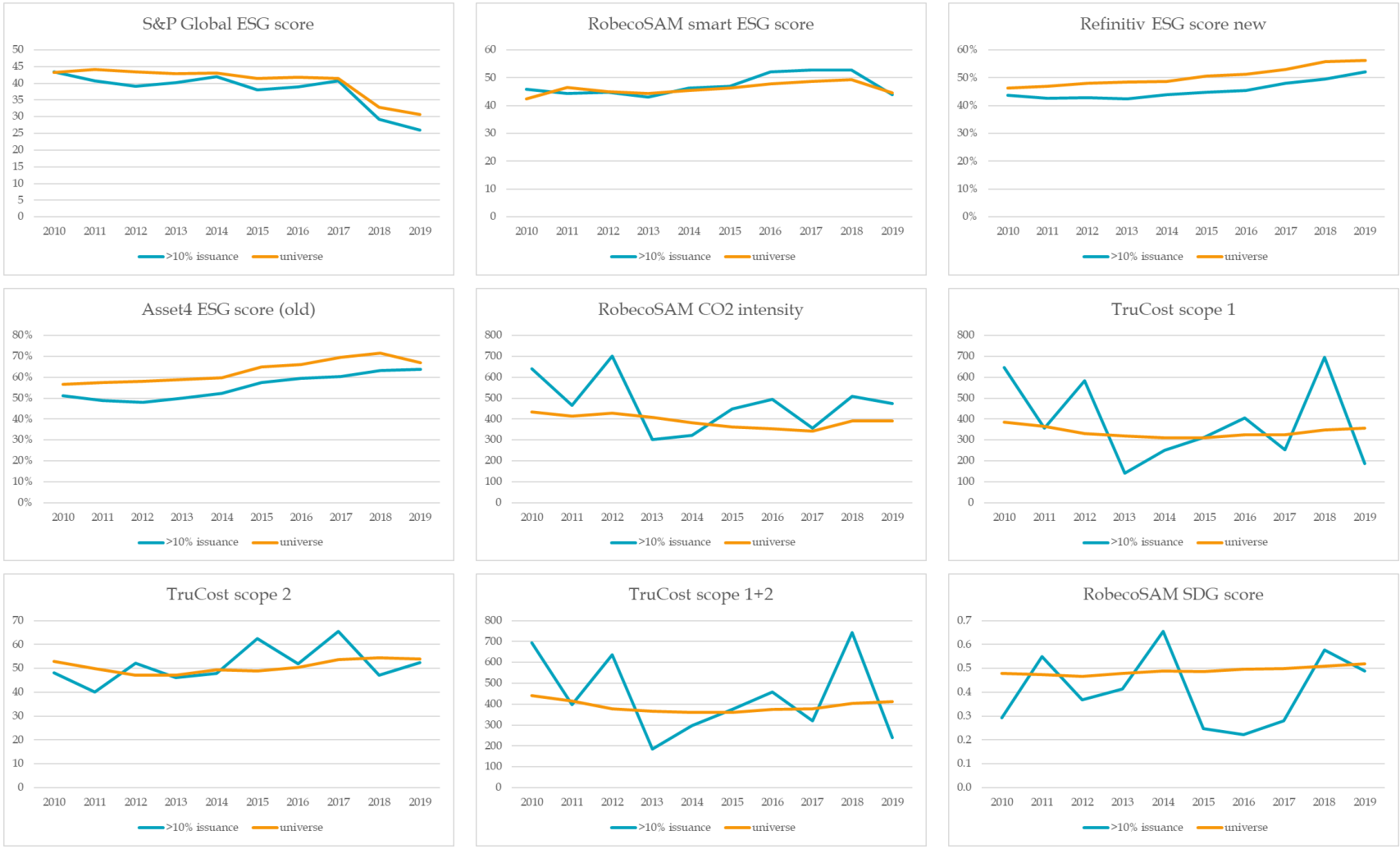

Figure 2: Relative equity issuance intensity by sustainability groups

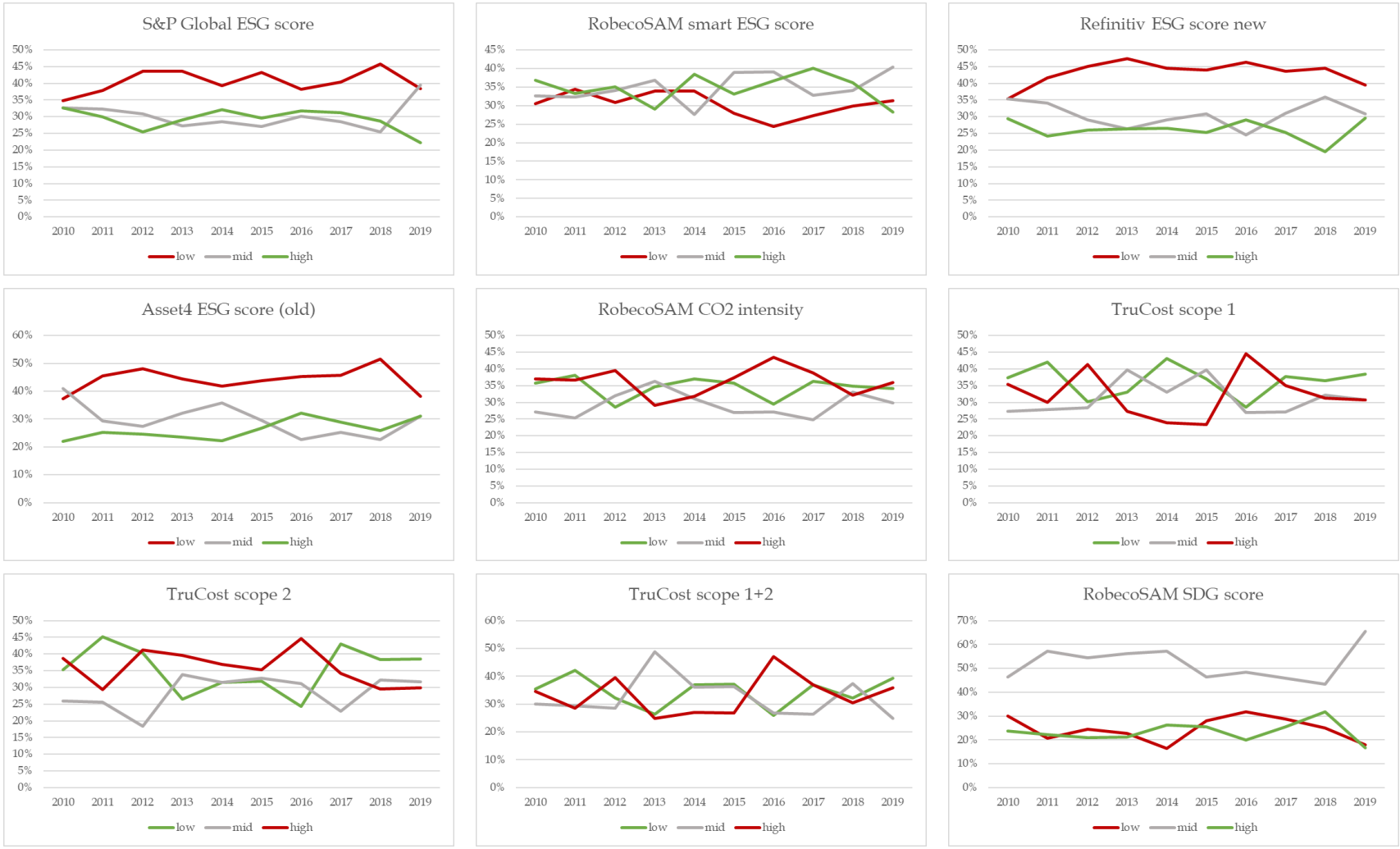

Figure 3: Sustainability characteristics debt issuers

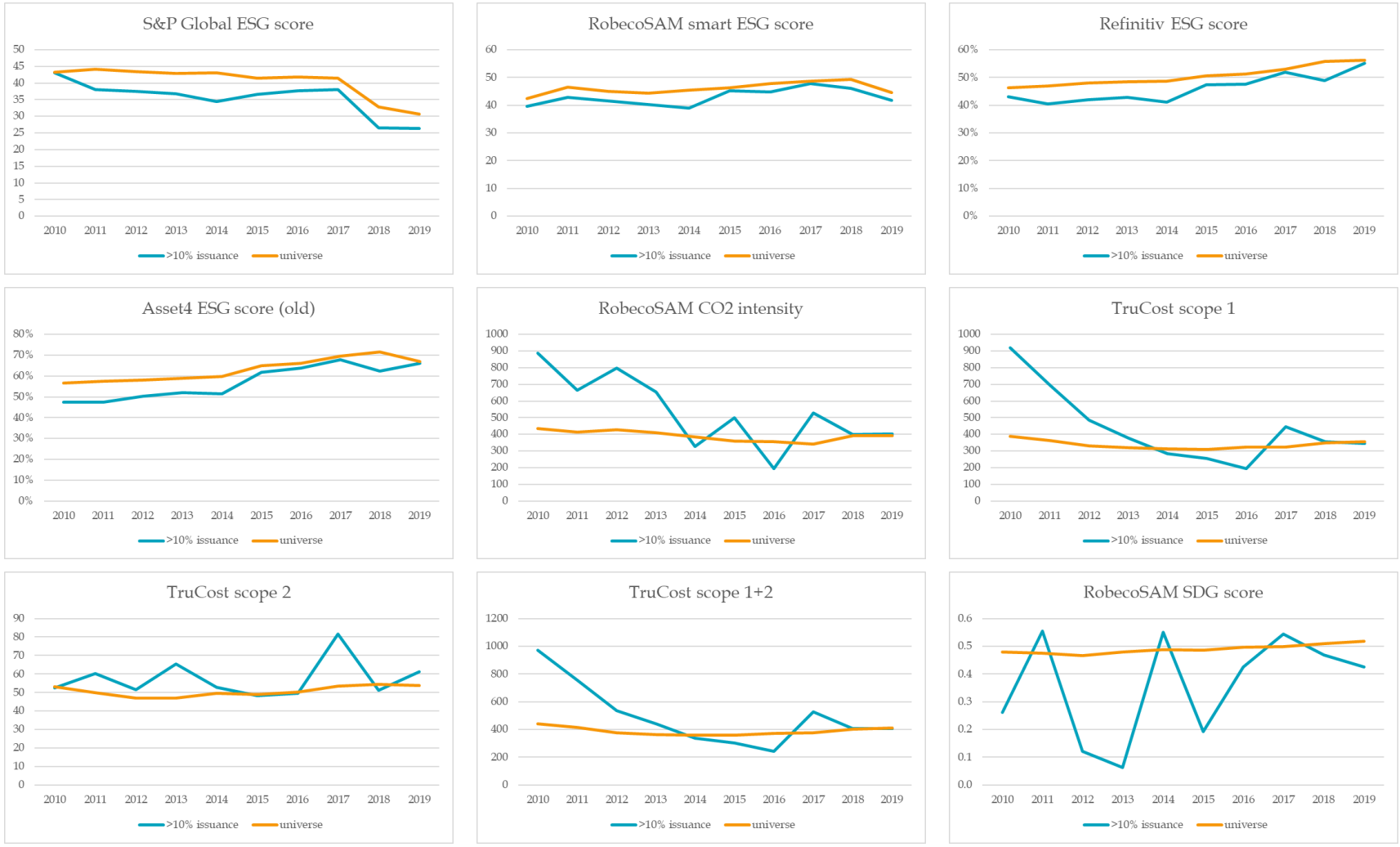

Figure 4: Relative debt issuance intensity by sustainability groups

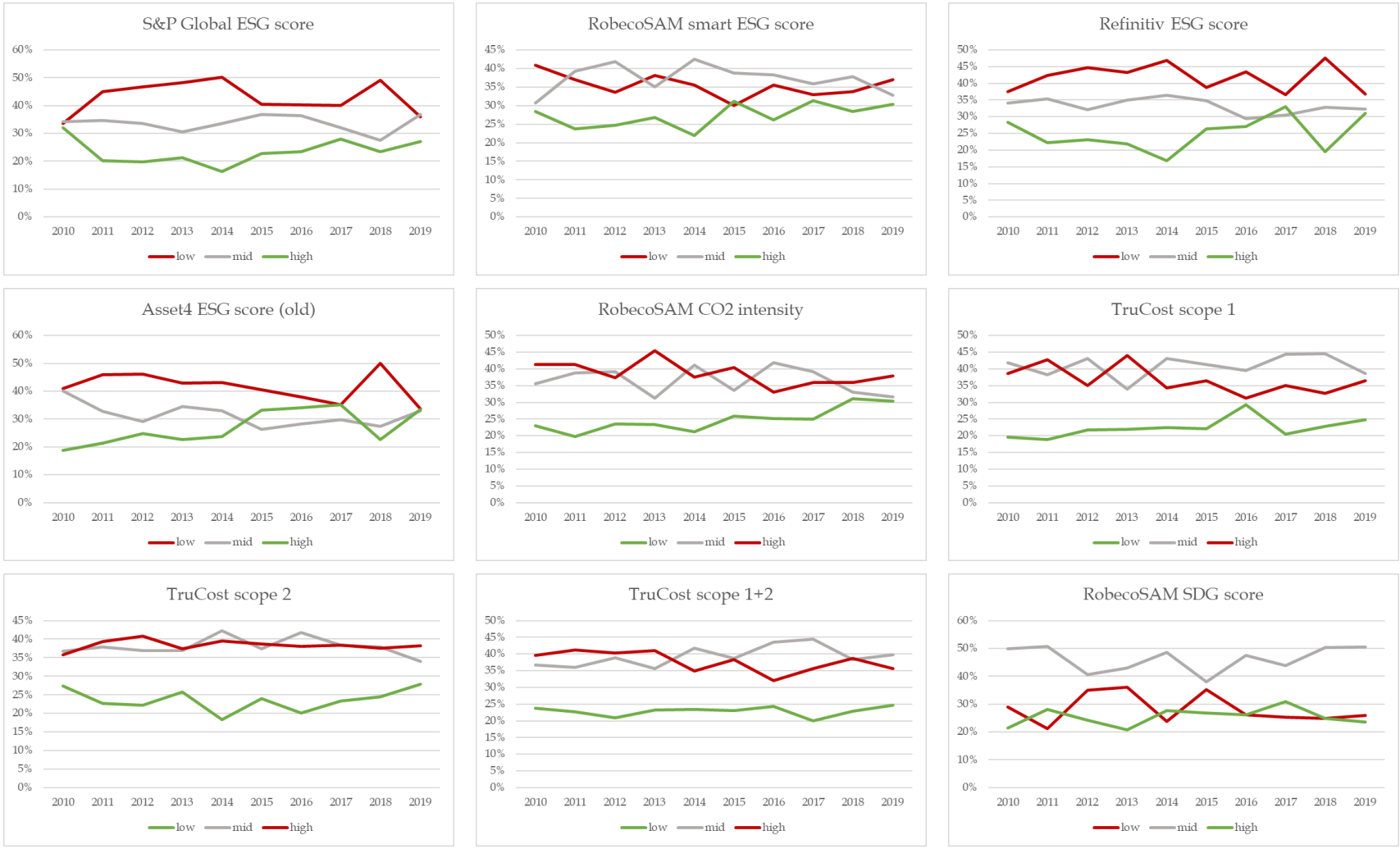

Table 1: P-values for tests for difference in mean sustainability scores of equity issuers versus universe

P-values based on t-tests; numbers in red indicate that the equity issuers are significantly 'less sustainable', while numbers in green indicate that the equity issuers are significantly 'more sustainable'. Significance level is 5%.

	ESG scores				Carbon footprint				SDG
	S&P Global standard	RobecoSAM smart	Refinitiv new	Asset4 old	RobecoSAM CO2 intensity	TruCost Scope 1	TruCost Scope 1	TruCost Scope 1+2	RobecoSAM SDG score
2010	0.985	0.288	0.166	0.045	0.583	0.980	0.496	0.699	0.164
2011	0.075	0.492	0.028	0.003	0.944	0.065	0.011	0.062	0.535
2012	0.050	0.938	0.017	0.001	0.225	0.168	0.288	0.293	0.483
2013	0.194	0.654	0.005	0.004	0.258	0.280	0.081	0.801	0.632
2014	0.569	0.776	0.017	0.009	0.303	0.046	0.896	0.212	0.155
2015	0.056	0.771	0.005	0.012	0.437	0.408	0.876	0.351	0.104
2016	0.123	0.088	0.010	0.031	0.007	0.010	0.013	0.001	0.067
2017	0.702	0.160	0.025	0.002	0.547	0.741	0.616	0.997	0.164
2018	0.144	0.247	0.004	0.004	0.976	0.947	0.358	0.608	0.647
2019	0.046	0.832	0.078	0.323	0.716	0.618	0.642	0.847	0.824

Table 2: P-values for tests for difference in equity issuance of three groups of sustainability scores

P-values based on χ^2-tests with null hypothesis that all proportions are one third. P-values below 5% colored orange.

	ESG scores				Carbon footprint				SDG
	S&P Global standard	RobecoSAM smart	Refinitiv new	Asset4 old	RobecoSAM CO2 intensity	TruCost Scope 1	TruCost Scope 2	TruCost Scope 1+2	RobecoSAM SDG score
2010	0.959	0.745	0.625	0.015	0.245	0.284	0.106	0.684	0.366
2011	0.648	0.967	0.062	0.014	0.128	0.095	0.014	0.099	0.050
2012	0.087	0.871	0.044	0.007	0.327	0.206	0.005	0.358	0.194
2013	0.081	0.621	0.006	0.023	0.590	0.294	0.203	0.001	0.127
2014	0.368	0.378	0.037	0.028	0.656	0.035	0.686	0.299	0.040
2015	0.070	0.341	0.052	0.061	0.311	0.078	0.894	0.318	0.755
2016	0.505	0.103	0.013	0.012	0.050	0.034	0.023	0.006	0.092
2017	0.279	0.260	0.064	0.021	0.130	0.358	0.030	0.283	0.511
2018	0.036	0.742	0.012	0.001	0.941	0.764	0.503	0.636	0.462
2019	0.063	0.307	0.495	0.651	0.717	0.500	0.488	0.132	0.011

Table 3: P-values for tests for difference in mean sustainability scores of debt issuers versus universe

P-values based on t-tests; numbers in red indicate that the debt issuers are significantly 'less sustainable', while numbers in green indicate that the debt issuers are significantly 'more sustainable'. Significance level is 5%.

	ESG scores				Carbon footprint				SDG
	S&P Global standard	RobecoSAM smart	Refinitiv new	Asset4 old	RobecoSAM CO2 intensity	TruCost Scope 1	TruCost Scope 1	TruCost Scope 1+2	RobecoSAM SDG score
2010	0.857	0.275	0.032	0.000	0.000	0.000	0.070	0.000	0.042
2011	0.000	0.085	0.000	0.000	0.000	0.000	0.003	0.000	0.397
2012	0.000	0.098	0.000	0.001	0.000	0.000	0.002	0.000	0.005
2013	0.000	0.051	0.000	0.001	0.000	0.000	0.003	0.000	0.000
2014	0.000	0.001	0.000	0.000	0.007	0.004	0.000	0.002	0.575
2015	0.000	0.598	0.025	0.135	0.000	0.000	0.003	0.005	0.011
2016	0.003	0.140	0.019	0.274	0.398	0.676	0.001	0.284	0.528
2017	0.029	0.701	0.542	0.472	0.008	0.017	0.010	0.008	0.716
2018	0.000	0.111	0.000	0.000	0.363	0.012	0.014	0.017	0.676
2019	0.001	0.068	0.344	0.558	0.007	0.000	0.001	0.001	0.233

Table 4: P-values for tests for difference in debt issuance of three groups of sustainability scores

P-values based on χ^2-tests with null hypothesis that all proportions are one third. P-values below 5% colored orange.

	ESG scores				Carbon footprint				SDG
	S&P Global standard	RobecoSAM smart	Refinitiv new	Asset4 old	RobecoSAM CO2 intensity	TruCost Scope 1	TruCost Scope 1	TruCost Scope 1+2	RobecoSAM SDG score
2010	0.950	0.165	0.259	0.000	0.002	0.000	0.240	0.010	0.116
2011	0.000	0.025	0.001	0.000	0.000	0.000	0.001	0.001	0.198
2012	0.000	0.019	0.001	0.000	0.007	0.001	0.002	0.001	0.012
2013	0.000	0.104	0.000	0.001	0.000	0.000	0.034	0.002	0.000
2014	0.000	0.002	0.000	0.003	0.001	0.001	0.000	0.004	0.890
2015	0.002	0.195	0.065	0.030	0.019	0.001	0.010	0.004	0.001
2016	0.007	0.074	0.009	0.229	0.008	0.202	0.000	0.002	0.877
2017	0.141	0.757	0.624	0.612	0.049	0.000	0.017	0.000	0.287
2018	0.000	0.262	0.000	0.000	0.641	0.000	0.013	0.002	0.698
2019	0.029	0.237	0.407	0.991	0.096	0.000	0.021	0.000	0.175