Is the stock return premium green or brown?

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ABSTRACT

The question of whether green assets outperform brown assets interests both investors and policy-makers. The theoretical academic research suggests that green stocks should have lower expected returns than brown stocks when investors have preferences for Environmental, Social, and Governance (ESG) characteristics. However, the empirical evidence is inconclusive. In sum, carbon transition risk is not fully priced in financial markets. Hence, there is a need for carbon pricing mechanisms to achieve emission reduction targets. Moreover, as investors become more aware of responsible investment practices and ESG data quality improves, any outperformance of green assets should weaken.

1. Introduction

Governments have agreed to limit the increase in the global average temperature to well below 2°C above pre-industrial levels. However, current projections show that emission reductions should be accelerated to achieve that target and limit catastrophic consequences for the planet (UN, 2023).

The world needs massive investments in green energy systems and phasing out of fossil fuels. Apart from developing new green financial instruments (e.g., green bonds and loans) and directing capital towards more sustainable activities, the financial sector can provide a price for carbon transition risk that will incentivize firms to reduce their emissions, and investors to decarbonize their portfolios.

A carbon premium refers to the excess return of stocks of high-emission (brown) firms as compared to low-emission (green) firms. The carbon premium compensates investors for holding assets highly exposed to carbon transition risk. An alternative explanation for the relative underperformance of green stocks is investors' dislike for brown stocks. Responsible investors may divest from these stocks to such an extent that they present higher stock returns, with a mechanism similar to what has been documented for *sin stocks* – stocks of companies involved in or associated with an unethical or immoral activity (Hong and Kacperczyk, 2009). On the contrary, greenium is a term used to denote the higher returns of green stocks compared to brown stocks. The academic literature argues that a greenium can be observed because of sudden shifts in investors' preferences for green stocks (Pastor et al., 2021), or mispricing of carbon transition risk.

The question of whether brown or green stocks provide better financial performance has attracted the attention of both institutional and retail investors. Furthermore, this question is relevant for policy-makers as market forces can be an alternative to a global carbon tax if financial markets can price carbon transition risk correctly.

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This article aims to reconcile the theoretical and empirical literature on the existence of a carbon risk premium or greenium. Despite a growing body of academic literature, there is still no consensus on the relative financial performance of green and brown assets.

2. Investors and sustainability

The European Union (EU) aims to become the first climate-neutral continent by 2050, for this purpose, it has recently introduced new regulations such as the green taxonomy, the sustainable finance disclosure regulation, and the corporate sustainability reporting directive.

Sustainable investments have experienced important growth in the last few years. In Belgium, the capital invested in sustainable investment products reached € 136.3 billion in 2022 which is more than 50% of the total volume of investment funds registered in Belgium (that percentage was 10% in 2017) (Fantoli et al., 2023).

However, institutional and retail investors are still not fully pricing climate risks and opportunities in their portfolios (Krueger et al., 2020). Moreover, irrational factors such as climate sentiment impact the stock pricing of green and brown firms (Santi, 2023).

2.1 Institutional investors

A growing number of institutional investors endorse the Principles for Responsible Investments (PRI) developed by the United Nations (see Figure 1), and a large proportion of these institutional investors are in Europe (see Figure 2).

Institutional investors may cater to responsible investors for several reasons. First, sustainable investments attract fund flows, and fund managers are generally rewarded for increasing fund inflows and the value of assets under management (Bialkowski and Starks, 2016). Second, sustainability compliance can be seen as a risk management tool as it decreases the probability of holding stranded assets in the portfolio (Chen et al., 2020; Hoepner et al., 2020; Krueger et al., 2020; Brandon et al., 2021). Third, institutional investors may have a long-term investment horizon that is in line with the horizon of sustainable investments. Financial benefits of environmental, social, and governance (ESG) practices are only incorporated into firm value over the long run (e.g., Dyck et al., 2019; Starks et al., 2020).

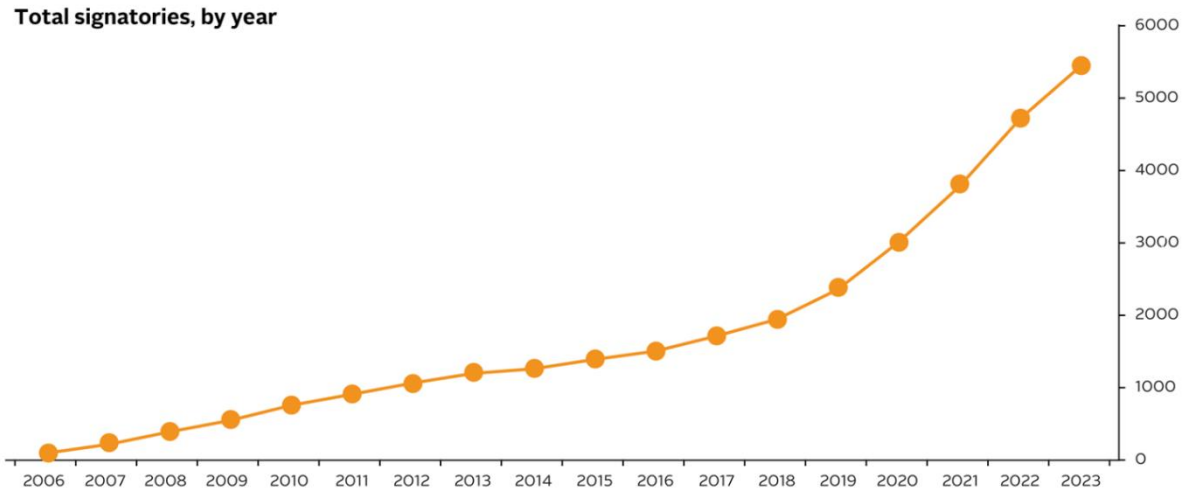


Figure 1 - PRI signatories by year. *Source*: PRI website.

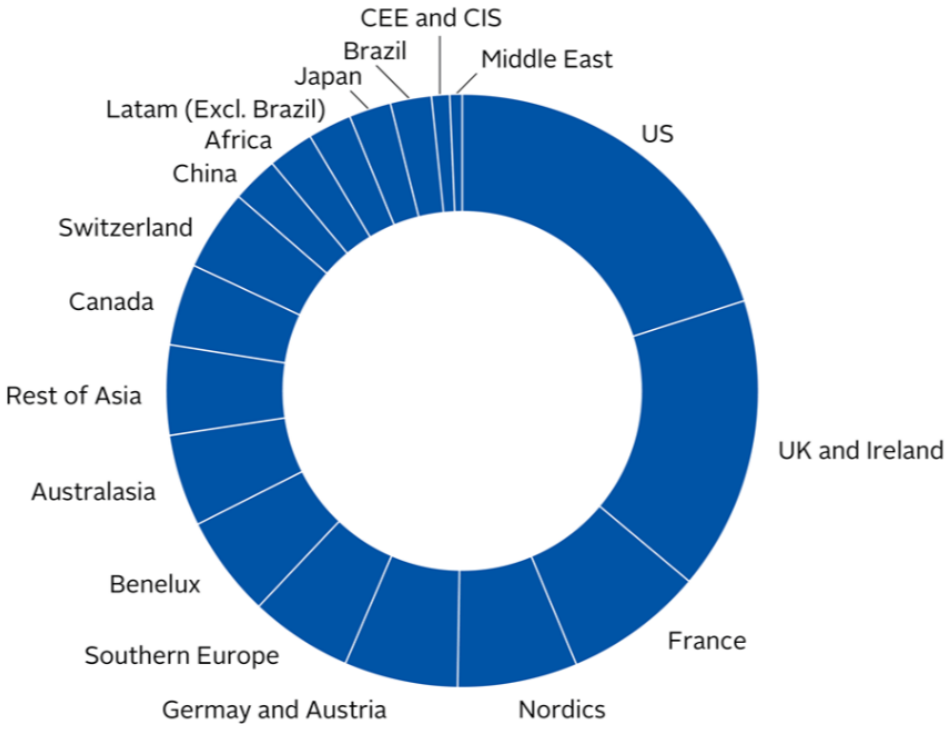


Figure 2 - PRI signatories by region. *Source*: PRI website.

2.2 Retail investors

The NORC at the University of Chicago and the FINRA Investor Education Foundation conducted a study in 2021 with 1,228 US retail investors holding taxable accounts to better understand their perceptions and preferences related to ESG investing.

Figure 3 shows that slightly more than half (57%) of respondents strongly or somewhat agree that investing can be a way to make a positive change in the world, and the great majority (77%) of investors state that companies held in an ESG fund align with their values. Moreover, only about 37% of respondents agree or strongly agree that a company's role should be to maximize earnings and not pursue social or environmental goals.

These answers can be seen as an important step forward to Milton Friedman's view that the social responsibility of a company is to increase profits. However, the findings indicate also that familiarity with ESG is low among retail investors. Only 28% of study participants are at all familiar with ESG investing, 24% of respondents can correctly define ESG investing, and only 21% know what ESG stands for (see Figure 4).

Furthermore, all investors care about the financial performance of their investment but ESG investors are often motivated by ESG considerations (Figure 5).

Another important takeaway from the survey is that many investors believe that ESG investments can yield returns in line with the rest of the market (Figure 6). This belief is even stronger among respondents who report holding ESG investments.

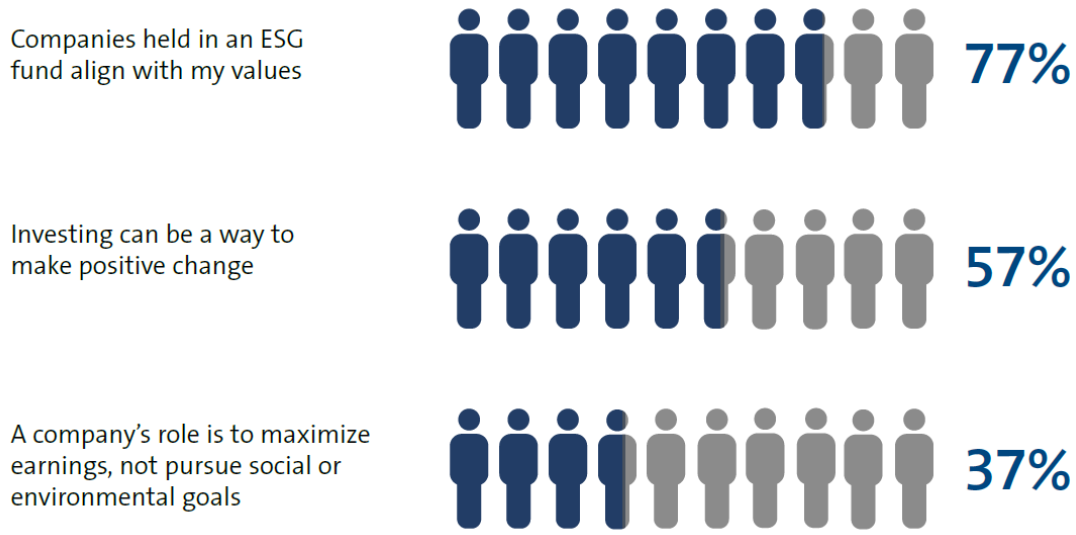
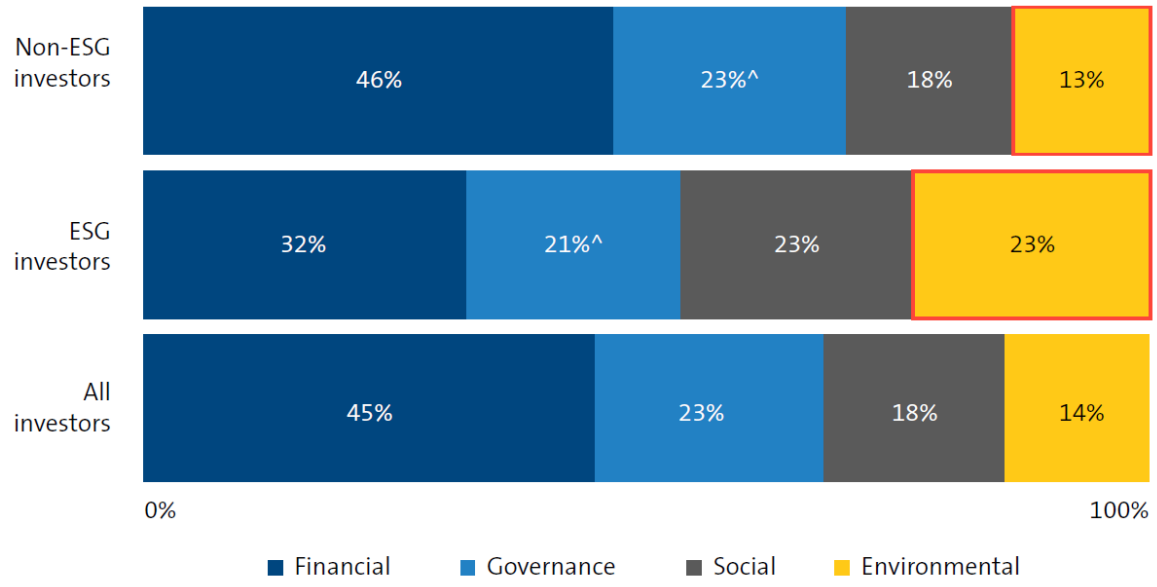


Figure 3 - Beliefs about investing as a mechanism for change. *Source*: Mottola, G. and Angela Fontes (2022). Investors say they can change the world, if they only knew how: Six things to know about ESG and retail investors. *Consumer Insights: Money & Investing.*

Figure 4 - Familiarity and knowledge about ESG investing. *Source*: Mottola, G. and Angela Fontes (2022). Investors say they can change the world, if they only knew how: Six things to know about ESG and retail investors. *Consumer Insights: Money & Investing.*

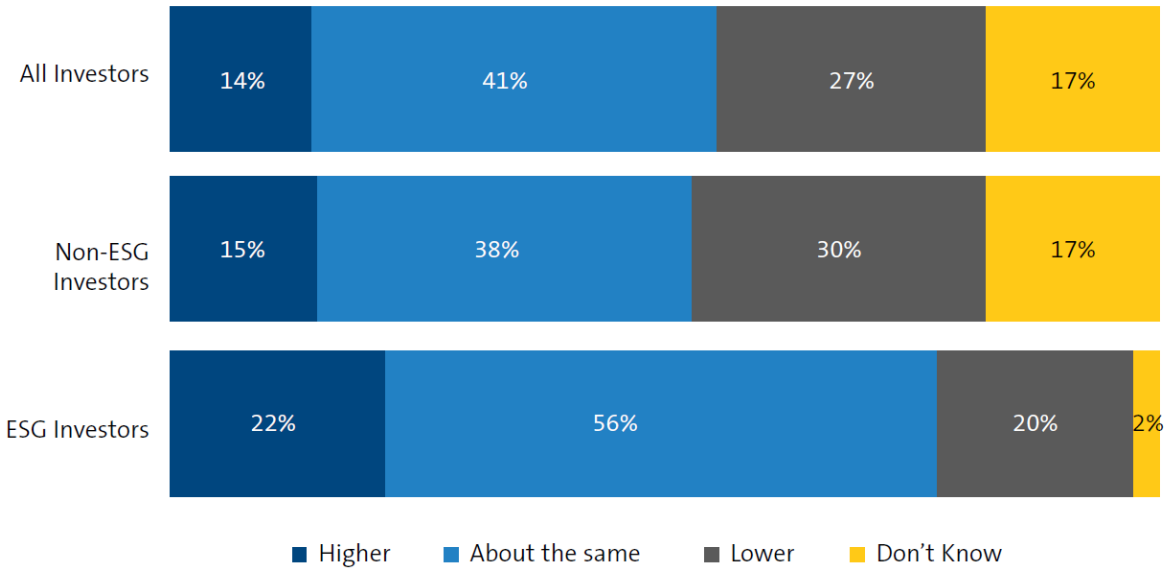
Summing up, investors are more and more aware that investments can have an impact on the environment and society at large, however, retail investors do not show an understanding of responsible investment practices. Moreover, both institutional and retail investors are moved by pecuniary motives. The lack of familiarity with ESG investments, and the expectations that returns of responsible investments could be in line with market-expected returns can be a barrier to the development of ESG investments.



Note: The "All investors" category contains responses from those who do not know whether they hold ESG investments.

^ Not significantly different at $p<.05$.

Figure 5 - Relative importance of Financial, Environmental, Social and Governance items. *Source:* Mottola, G. and Angela Fontes (2022). Investors say they can change the world, if they only knew how: Six things to know about ESG and retail investors. *Consumer Insights: Money & Investing*.



Note: The "All investors" category contains responses from those who do not know whether they hold ESG investments.

Figure 6 - Expected returns of "sustainable" investments relative to the market. *Source:* Mottola, G. and Angela Fontes (2022). Investors say they can change the world, if they only knew how: Six things to know about ESG and retail investors. *Consumer Insights: Money & Investing.*

3. Theoretical models

Since Harry Markowitz pioneered the Modern Portfolio Theory in 1952 (Markowitz, 1952), its basic concepts have guided investment decisions. However, new theories have emerged that consider investors with not only preferences for risk-adjusted returns but also ESG characteristics. These investors derive utility from holding greener assets. Hence, they are willing to pay more, thereby lowering the firm's expected returns (Pastor et al., 2021). Green assets nevertheless can outperform brown assets when there are sudden and sufficiently large shifts in customers' tastes for green products and investors' tastes for green holdings (Pastor et al., 2021).

Pedersen et al. (2021) propose another theory in which the market is populated by three types of investors: 1) investors that are unaware of ESG scores; 2) investors that use ESG information to update their view on risk and expected returns; 3) investors that use ESG information in valuation and that have preferences for ESG characteristics. According to this theory, the relative performance of green and brown assets depends on the type of investors that populate the economy. When there are many ESG-unaware investors and when high ESG predicts high future profits, high-ESG stocks deliver high expected returns. When the market has many investors that use ESG information for valuation without having ESG preferences, expected returns are not associated with ESG characteristics. Moreover, if many investors include ESG information in valuation and have ESG preferences, high-ESG stocks deliver low expected returns. Thus, as investors develop preferences for ESG characteristics, green stocks should start having lower expected returns.

More recently, Avramov et al. (2022) have included in their theory the uncertainty in ESG ratings. Indeed, ESG ratings of different data providers tend to be poorly correlated (Berg et al., 2022). The researchers find that ESG rating uncertainty weakens the underperformance of green assets.

4. Empirical evidence

The empirical academic literature on the relative performance of green and brown assets provides mixed evidence.

Some studies document that US brown stocks earn higher returns than green stocks (Bolton and Kacperczyk, 2021; Hsu et al., 2023). This difference in returns cannot be explained by common risk factors and it has been attributed to carbon risk. In line with these studies, Bolton and Kacperczyk (2023) find a widespread carbon premium in all sectors over three continents, Asia, Europe, and North America. They show that short-term transition risk is greater for firms located in countries with lower economic development, greater reliance on fossil energy, and less inclusive political systems. Differently, long-term transition risk is higher in countries with stricter domestic, but not international, climate policies.

However, recent studies have challenged the above evidence (Aswani et al., 2023; Atilgan et al., 2023; Zhang, 2023). Aswani et al. (2023) argue that stock returns are correlated only with unscaled emissions estimated by the data vendor, but not with unscaled emissions disclosed by firms or emission intensity (emissions scaled by firm size). Furthermore, estimated emissions tend to be correlated to firms' fundamentals, hence the association with returns may be attributed to fundamentals. Another issue with carbon emission data is that they are available to investors with a considerable lag. Hence, Zhang (2023) argues that the positive contemporaneous relationship between emissions and returns documented in previous studies (see e.g., Bolton and Kacperczyk, 2021) arises from the forward-looking firm performance information contained in emissions rather than risk premium. Using lagged emissions, the carbon premium is negative in the US and zero on average globally (Zhang, 2023). Atilgan et al. (2023) find that emission data are correlated with

earnings surprises and earnings announcement returns suggesting that the carbon premium partially represents unexpected returns and thus mispricing. Further, Moretti and Santi (2021) show that the carbon risk premium is significant in Europe only in regions where investors are worried about climate change, thus non-worried investors are not demanding compensation for their exposure to carbon transition risk.

In contrast to the above studies, some researchers documented the existence of the so-called greenium. Pastor et al. (2022) show that US green stocks outperformed brown stocks as climate concerns strengthened in recent years. Moreover, Karolyi et al. (2023) find reliable evidence that green stocks earned higher returns than brown stocks around the world. This outperformance is associated with lower stock returns of energy firms but not higher returns of technology stocks. The equity greenium effect mostly occurs in North America and during the period before 2016. After 2016, green stocks have started to deliver lower returns than brown stocks in Asia, Emerging markets, and Europe.

5. Conclusions

Although both institutional and retail investors are increasingly aware of the environmental and social impact of their investment decisions, there is still a limited understanding of responsible investment practices.

The emerging theoretical literature suggests that green stocks should have lower expected returns than brown stocks when investors have preferences for ESG characteristics (Pastor et al., 2021; Pedersen et al., 2021). However, the empirical evidence is inconclusive.

The poor quality of sustainability data limits the development of responsible investment practices, and it may explain the mixed empirical evidence. Berg et al. (2022) show that ESG ratings of different data providers tend to be poorly correlated. Further, the increased availability of emission data is mainly a result of data providers estimating emission figures for these firms which researchers have shown to be associated with firms' fundamentals (Aswani et al., 2023). Moreover, emission data are made available with a considerable delay. Thus, investors do not have access to timely and reliable data on firms' ESG attributes to inform their investment decisions.

All in all, the academic research suggests that carbon transition risk is at least not fully priced in financial markets. Hence, market forces alone are not enough to support the transition. Governments need to introduce carbon pricing mechanisms to achieve emission reduction targets. Further, investors should not see green investments as a tool to achieve higher returns than the market. As the economy will be populated by more and more ESG-aware investors and data quality will improve, any outperformance of green assets will weaken.

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