



# China - The Next Frontier for Environmental and Social Investing

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## Executive Summary

China occupies a pivotal position in the global campaign against climate change and social inequality. Sustainable investment plays a key role in this campaign. While the US and European markets have experienced explosive growth in sustainable investment, China's environmental and social (E-S) investments have just begun. We construct a novel China E-S index by employing a wide range of non-standard public data and modern machine-learning algorithms. We find that Chinese firms with high E-S scores exhibit significant outperformance in recent years.

### Highlights:

- Our new China E-S Index considers over 100 E-S issues and attributes specific to China.
- Using our China E-S Index, buying the top 20 percent most environmentally and socially responsible firms earns a cumulative return of 198 percent over 5 years.
- China's national campaign to reduce air pollution and improve social equality, which began in 2019, could be the catalyst for persistent outperformance of E-S efficient firms.

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## 1. The Social Responsibility Debate

In the 1930s, Adolf A. Berle, Jr. and E. Merrick Dodd, Jr., famously debated a fundamental question: to whom are corporations accountable? Berle argued that corporations are accountable only to their profit-maximizing shareholders, while Dodd argued that corporations are accountable to both society and shareholders. The classic view in finance on corporations (e.g., Berle and Means, 1932, Friedman, 1970; Benabou and Tirole, 2010) has long embraced the paradigm that corporations' sole purpose is to maximize shareholder value and that they bear no responsibility to serve other stakeholders' interests or to promote social welfare and equality.

A more recent school of thought challenges this classic view of corporations by highlighting various forms of market failures and frictions. First, corporations do not internalize their negative impacts on society (e.g., by polluting the environment and producing goods that may cause ill-health). Second, in pursuit of profit maximization, corporations are often pressured by shareholders to focus on short-term profits at the expense of long-term growth (e.g., by under-paying their employees and suppliers and under-investing in the local community).

## 2. Environmental and Social Concerns

A key driver of the renewed interest in Dodd's social-welfare view of corporations is global climate risk. Climate change is accelerating. Since recordkeeping began in 1880, the six warmest years have all occurred in the last decade.<sup>1</sup> The rising ocean temperature, the climbing sea levels, the retreat of ice sheets and glaciers, and the increasing frequencies of droughts and floods all reflect a changing climate and increasing atmospheric carbon emissions. The European Commission estimates that energy and infrastructure investments would have to rise to 2.8% of the European Union's gross domestic product (GDP) from 2% today (or an additional \$376 billion annually) to reduce EU net greenhouse gas emissions to zero by midcentury.<sup>2</sup> Estimates for the cost of decarbonization in the US are comparable. Absent mitigation and adaptation, a major scientific report jointly issued by thirteen US federal agencies in November 2018 predicted that the potential

1 <https://www.noaa.gov/news/noaa-2017-was-3rd-warmest-year-on-record-for-globe>.

2 See "EU's 2050 Climate Plan Sees Benefits of Up to 2% of GDP," Euractiv, November 28, 2018.

damage from the consequences of climate change would destroy as much as 10% of the US economy (or more than \$2 trillion) by century's end.<sup>3</sup>

In response to this urgent global challenge, 197 nations signed the Paris COP 21 climate agreement in December 2015 with a pledge to limit global warming to below 2°C relative to pre-industrial levels. Since then, an increasing number of investors—both institutional and retail—have answered the call to join the fight against climate change. Based on estimates by Bloomberg Intelligence, global ESG assets under management are at \$38 trillion as of 2021, and are on track to reach \$53 trillion by 2025.<sup>4</sup>

The second main driver of the popularity of Dodd's social-welfare view is the rising social inequality in both developed and developing countries. Piketty (2014), in his New York Times best-seller, provides compelling evidence of a worldwide surge in wealth inequality and wealth concentration in the last fifty years: the wealth share of the top 1% of US households has grown from less than 20% to nearly 40% in the last five decades, while the real income of the median US household today is lower than that fifty years ago. Many argue that the division of the economic pie needs to be fairer in order to sustain long-term growth. That is, everyone who contributes to the economy's success (including employees and stakeholders) should benefit from the growing pie, not just shareholders and top managers.

## 2.1. China—A Crucial Player in the Global Campaign

In 2019, China's greenhouse gas emissions reached 14 gigatons, or 27% of the global emission.<sup>5</sup> The US was a distant second, accounting for 11% of the total emission (although the US has a much higher per-capital emission). Indeed, China's total emissions exceeded those of all developed countries combined in that year. In 2020, China surprised the world at a UN General Assembly meeting by announcing its plan to reach the carbon-peak by 2030 and carbon-neutrality by 2060. President Xi said at the time, "This major strategic decision is made based on our sense of responsibility to build a community with a shared future for mankind and our own need to secure sustainable development." Without a shred of doubt, China's voluntary and full participation in the global effort to fight climate change

3 See "U.S. Climate Report Warns of Damaged Environment and Shrinking Economy," New York Times, November 23, 2018.

4 <https://www.bloomberg.com/professional/blog/esg-assets-may-hit-53-trillion-by-2025-a-third-of-global-aum/>.  
Meanwhile, institutional investors are increasingly tracking greenhouse gas emissions by publicly-traded companies and are forming coalitions such as Climate Action 100+ to engage with companies to reduce their carbon emissions.

5 <https://rhg.com/research/chinas-emissions-surpass-developed-countries/>.

is crucial to its success. Now that the Chinese government has made its pledge, it is time for Chinese firms and investors to take up their responsibilities.

China also plays a crucial role in the global movement against social inequality and social injustice. On the one hand, China has successfully lifted nearly 800 million people out of extreme poverty in the last four decades of reform and opening-up.<sup>6</sup> On the other hand, just like western countries, China has seen in recent decades a surge in income inequality and wealth concentration (see, e.g., Piketty, Yang, and Zucman, 2019). How China deals with the issue of widening social gaps will have profound impact on the long-term growth of the global economy.

### 3. An Environmental and Social Impact Index

A key step in tackling climate change and social inequality is to have a transparent and objective index of each company's environmental and social impact. First, such an index allows social planners to tax and regulate companies directly for the harm they create, instead of taxing everyone to remedy negative outcomes such as pollution, abusive labor practices, and products that may cause obesity. Social planners will also be able to provide incentives—reduced taxes, subsidies or preferential procurement treatment—for companies to deliver positive impact through their products, operations and employment practices.

Second, with such an index, investors will be able to incorporate the environmental and social impact of corporations into their investment decisions. Nearly \$40 trillion, or about a third of the world's professionally managed assets, are in ESG and impact investments today. Despite the absence of high-quality data, investors are already integrating climate change, employee diversity, and customer health into their portfolio choice. Firms with greater negative impact generate less investor interest, which reduces their stock market valuation and raises the cost of capital. The environmental and social impact index will therefore motivate management to improve their company's impact, in order to increase stock market valuation and their own compensation.

Third and relatedly, an impact index allows other stakeholders, such as customers, suppliers, and employees to align their purchase, sale, and

<sup>6</sup> [http://www.xinhuanet.com/english/2021-04/06/c\\_139862741.htm](http://www.xinhuanet.com/english/2021-04/06/c_139862741.htm).

career choices with their social values. All in all, a transparent and objective environmental and social impact index will help hold companies accountable for the harm they create and reward companies for the positive impact they deliver, lead investors and stakeholders away from negative-impact companies to positive-impact ones, and catalyze changes in corporate behavior.

### 3.1. Constructing the China E-S Index

The first ESG rating agency, Vigeo Eiris, was established in 1983 in France. Five years later, Kinder, Lydenberg & Domini (KLD) was established in the US. There are currently a dozen prominent ESG rating providers in the US and Europe (including S&P TruCost, LSEG Refinitive, MSCI KLD, Sustainalytics, etc.). Most of these rating providers collect and compile their ESG data from individual firms' public corporate-social-responsibility (CSR) reports as well as through proprietary surveys.

Despite nearly four decades of development of ESG investment, there remain significant issues with ESG ratings. As shown by Berg, Kolbel, and Rigobon (2020), ESG ratings from different providers disagree substantially: the correlations across different ratings range from 0.3 to 0.7, with an average value of 0.5. The main source of disagreement stems from scope divergence, where different ESG rating providers focus on different sets of attributes or issues. For example, within the realm of social responsibility, one rating provider may rank employee training as the single most important issue; another rating provider may view employee health benefits as a more important attribute. After all, ESG ratings reflect a social ideal that speaks to a broad and fundamental question—how to make the world a better place by a company being here. Not surprisingly, different rating providers have different interpretations of the question.

To construct a China-specific E-S index, researchers need to overcome two obstacles. First, the related data are much less readily available in China than in developed countries. Most Chinese companies do not file corporate social-responsibility reports; for the subset of firms that do, there is no standard format, so firms have all the discretion to pick their own issues to report and discuss. Second, some of the issues that are crucial to Chinese firms, investors, and regulators may be irrelevant in

developed countries (and vice versa). For example, Particulate Matter (PM) 2.5 is the most harmful air pollutant in China, which is not a concern in western countries. State ownership, on the other hand, is often viewed negatively in western countries but is a common feature of Chinese firms. Such factors render the forty years of US and European experience in ESG ratings and investment less applicable to the Chinese setting.

We overcome these obstacles by taking two steps. First, we design from scratch a set of over 100 environmental and social issues/attributes that are important, and in many cases specific, to the Chinese market.<sup>7</sup> In this design phase, we elicit help from top environmental scientists, economists, and sociologists with deep understanding of the Chinese economy and society. Second, we utilize, in creative ways, a wide array of non-standard public data, including government, regulatory, and NGO datasets, company disclosures and communications, and media reports. We then use state-of-the-art machine learning and natural language processing algorithms to clean up the raw data, process and analyze the data, and extract useful information from the data.

To give a specific example, we construct a novel index of Chinese firms' carbon emission efficiency from municipal governments' annual energy consumption reports. On the one hand, local government data are complete and granular, which allows us to estimate carbon emissions for virtually all publicly listed Chinese firms. On the other hand, municipal government data are non-standardized: different municipalities report their local firms' energy consumptions in different formats and following different methodologies. This problem requires extra care and creative methods to infer useful and comparable information across municipalities. A simple validity check indicates that, for the small subset of Chinese firms that report carbon emissions, the correlation between our index and the self-reported carbon emission is over 0.8.

## 4. Investors' Response to Environmental and Social Responsibility

Morningstar Research reports that assets in dedicated sustainable funds reached \$1.65 trillion by December 2020.<sup>8</sup> Bloomberg

<sup>7</sup> Refer to our E-S methodology document for detailed information on these environmental and social issues/attributes.

<sup>8</sup> [https://www.morningstar.com/content/dam/marketing/shared/pdfs/Research/Global\\_ESG\\_Q4\\_2020\\_Flows.pdf](https://www.morningstar.com/content/dam/marketing/shared/pdfs/Research/Global_ESG_Q4_2020_Flows.pdf)

Intelligence estimates that up to \$53 trillion of professionally managed funds will be tied in some way to ESG metrics by the end of 2025. Given the substantial amount of capital that is already in (or is expected to flow into) ESG investments, a natural question is to what extent are environmental and social issues reflected in stock prices? There are several ways in which environmental and social issues affect stock returns, as outlined by Pastor, Stambaugh and Taylor (2021a).

First, firms that are environmentally efficient and socially responsible can experience better operating performance, as customers' demands for goods and services are increasingly affected by environmental and social concerns (*a positive cashflow effect*). This effect can explain high past returns on firms with high E-S scores. Moreover, to the extent that investors underestimate this effect on future cash flows, firms with higher E and S scores have higher expected returns

Second, there has been a large amount of capital flows—on the order of tens of trillions of dollars—into sustainable investments in recent decades, which is likely to push up the valuation of environmentally and socially responsible firms (*a positive capital-flow effect*). To the extent that investors underestimate how much more capital will flow into sustainable investments in the next decade or two, higher E and S scores again translate to higher expected returns. Otherwise, the ex-ante effect of greater investor demand for firms with higher E and S scores is to raise those firms' stock prices and thus lower their expected returns.

The third effect on returns stems from the possibility that firms with negative environmental and social impact are subject to risks of regulatory interventions and shifts in demand by socially responsible investors. To the extent that regulatory and investor-based risks are systematic risk factors, the remaining investors in these firms demand a risk premium (*a negative risk-premium effect*).

#### 4.1. Mixed Evidence in the US and Europe

Bolton and Kacperczyk (2020), using Trucost carbon emission data for the period 2005-2017, report that US firms with higher total CO<sub>2</sub> emissions (as well as changes in emissions) earn higher average returns, after controlling for size, book-to-market, momentum, and other firm characteristics. This result is consistent with the ex-ante investor-demand effect as well as the risk-premium effect. In contrast, In, Park,



and Monk (2020) construct a measure of carbon efficiency using data from both Trucost and MSCI KLD for the period 2005-2015 and show that an investment strategy that goes long carbon-efficient firms and short inefficient firms generates abnormal returns of 5% a year. Similarly, Pastor, Stambaugh, and Taylor (2021b) find that the return difference between US firms with high versus low MSCI environmental ratings averages about 4% per year over the 2013–2020 period. These latter results are more in line with cashflow and capital flow effects that were unanticipated by the market. Edmans (2011) analyzes the relationship between employee satisfaction and long-run stock returns and documents that a value-weighted portfolio of the “100 Best Companies to Work for in America” earns an annual four-factor alpha of 3.5% between 1984 and 2009, again consistent with the cashflow channel. Edmans, Li, and Zhang (2020) extend this finding to international markets.

Lioui and Tarelli (2021), employing a range of ESG ratings, conclude that the US and European markets are already at an inflection point for ESG outperformance: investors hoping to gain an ESG premium from investing in companies with high environmental and social rankings seem to have lost that opportunity more than two years ago. The key takeaways from all these existing studies are that a) different ESG ratings and sample periods may generate different performance results, and b) the US and European ESG market is potentially reaching a level of maturity and could become a victim of its own success.

#### 4.2 Novel Evidence from China

We examine the relation between Chinese firms’ environmental and social responsibility and their future stock returns using our novel environmental and social (E-S) indexes for the period 2016 to 2020. Figure 1 shows the relation between our carbon efficiency index (defined as firm revenues divided by carbon emissions) and future stocks returns. The blue curve reports the cumulative return of a portfolio that goes long the top 20% of the most carbon efficient firms ranked in the previous year. For the first three years of our sample, 2016 to 2018, there is a statistically insignificant correlation between carbon efficiency and stock returns. In contrast, there has been a strong uptick in the relation since the beginning of 2019. The three-factor alpha (controlling for the Chinese market, size and value factors of Liu,

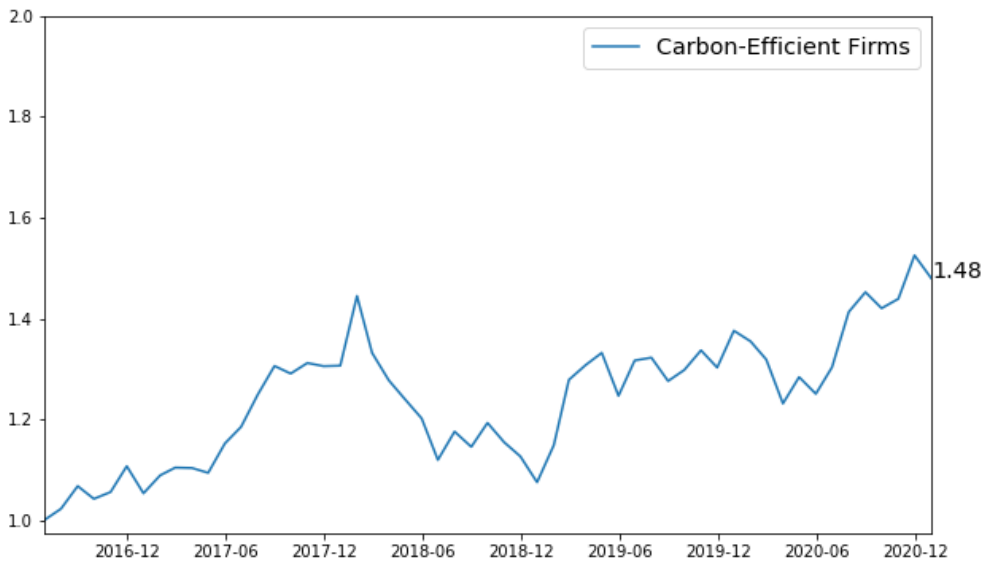


Figure 1: Relation between carbon efficiency and future stock returns.

Stambaugh, and Yuan, 2019) of a self-financed portfolio that goes long the top 20% and short the bottom 20% of firms sorted by carbon efficiency yields a monthly return of 69bps (t-statistic = 2.02) in our sample period.

We then repeat the same exercise for our social responsibility index in Figure 2. The blue curve reports the cumulative return of a portfolio that goes long the top 20% most socially responsible firms ranked in the previous year. Interestingly, we observe a very similar return pattern to the one in Figure 1. There is a weak correlation between social responsibility and stock returns in 2016 to 2018, yet a much stronger relation in 2019 and 2020. A self-financed portfolio that goes long the top 20% and short the bottom 20% of firms sorted by our social responsibility index produces a monthly three-factor alpha of 1.55% (t-statistic = 4.67).

In Figure 3, we construct an E-S index that equally weights our environmental and social indexes. The blue curve reports the cumulative return of a portfolio that goes long the top 20% most environmentally and socially responsible firms, and the yellow curve shows the cumulative value-weighted market return for the same period. We again observe a similar return pattern, with the most responsible firms significantly outperforming in the last two years.

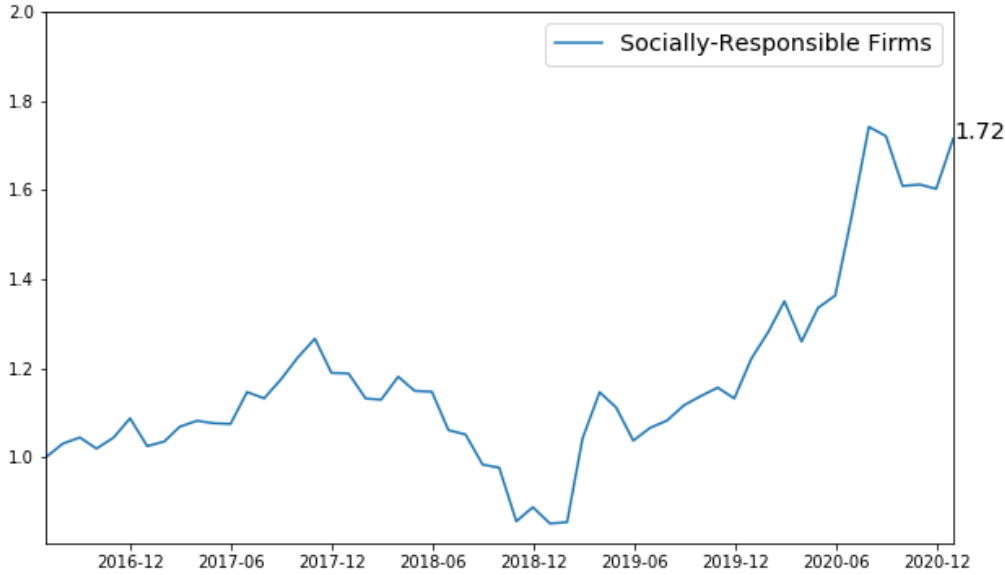


Figure 2: Relation between social responsibility and future stock returns.

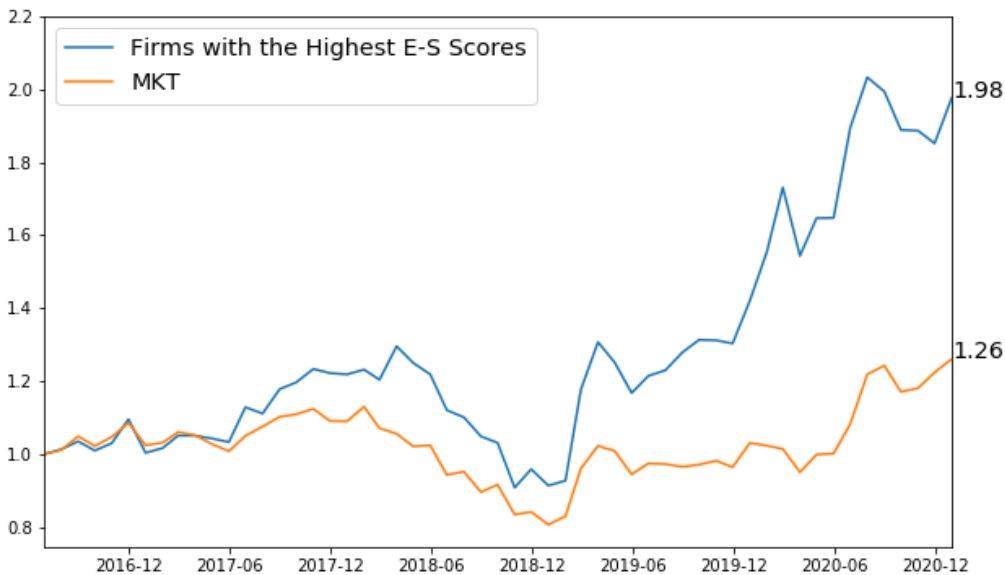


Figure 3: Relation between the E-S score and future stock returns.

Taken together, our results suggest the following scenario. Prior to 2019, Chinese investors and consumers were not paying much attention to environmental or social issues in their investment and purchasing decisions; thus we see little correlation between the E-S index and stock returns during those earlier years. The investment landscape changed drastically in 2019, coinciding with the national campaign to reduce air pollution and to improve social equality. Since then, firms with more positive environmental and social impact have been outperforming their less efficient peers by a visible margin. Given that the E-S movement started almost two decades later in China than in developed countries, there is good reason to believe that the Chinese

market has not fully priced future E-S investment flows and consumer demands and thus that the positive return effects on E-S responsible firms will persist over the next decade.

## 5. Conclusion

Given its size and importance in the global value chain, China plays a crucial role in the global campaign against climate change and social inequality. It is now time for Chinese firms and investors—including foreign firms that operate in China as well as foreign investors that invest in China—to take up their responsibilities to save our planet and civilization. For this purpose, we have constructed a transparent and objective environmental and social impact index with more than 100 attributes to help guide regulators and investors in the effort to hold Chinese companies accountable for the harm they create and reward companies for the positive impact they deliver, and ultimately to catalyze positive changes in corporate behavior in China.

Moreover, existing evidence suggests that after years of large capital flows into ESG investments, the US and European markets have reached an inflection point for ESG performance. While environmentally and socially responsible firms in the US and Europe have historically had higher returns than their peers, we are likely to see the opposite pattern for future ESG investment in these countries (in many samples we are already seeing lower returns for firms with higher ESG scores). Our novel data and analyses suggest that China ESG investment is more than a decade behind that in the US and Europe. There was a clear structural break in the Chinese investment landscape in 2019, which was followed by significant outperformance by E-S efficient firms in the last two years. We believe that this positive association between environmental-social impact and stock returns is likely to persist in the Chinese market for the decade to come.

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