Earnings-Driven Green Returns in China

September 2021

Executive Summary

Prof. Jianan Liu
Director
Head of Factor Investing

Prof. Robert F. Stambaugh
Founder
Chief Advisor

Prof. Yu Yuan
Founder
CEO, Head of Strategy

Shunzhuang Huang
Analyst
Factor Investing

During the recent half decade in China, stocks of green firms significantly outperformed stocks in the least environmentally friendly industries. Earnings play a key role in this performance. The average difference between announced annual earnings and the consensus forecast is positive for green stocks but negative for the dirtiest stocks. Moreover, evidence suggests that analysts failed to anticipate the positive effect of greenness on firms' earnings. These earnings surprises account for a substantial fraction of green stocks' outperformance.

Highlights:

- Green stocks outperform the dirtiest stocks by 16% annually on average from 2016 through 2020.
- Earnings surprises—reported earnings versus consensus forecasts—are on average positive for green firms but negative for the dirtiest firms.
- Financial analysts overlooked the earnings implications of greenness: the forecasts of earnings per share for the dirtiest firms were slightly higher than even the green firms.
- These earnings surprises account for nearly 40% of the superior performance of green stocks.

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1. Dissecting Green Outperformance

In recent years, stocks of firms that are environmentally friendly, or "green," experienced superior performance in China. For example, using environmental ratings developed by Mingshi, Lou et al. (2021) report that a portfolio of the greenest stocks strongly outperformed a portfolio of the least environmentally friendly stocks during the last half decade.

What accounts for the superior performance of green firms' stocks? One source of the performance can simply be a greater desire by investors to hold stocks of green firms and to avoid stocks of polluting ("dirty") firms, independent of the earnings potential of either group. Such desires can reflect a heightened sense of social responsibility, with investors believing they are simply doing a good thing by shifting their stock holdings toward green. Another source of superior stock performance, however, is long familiar to investors—better-than-expected earnings performance. Does the superior performance of green stocks simply reflect a shift in investors' tastes for holding green stocks, or does it reflect, at least in part, superior earnings by green firms? In this study we further explore the relation between greenness and returns, focusing on the role of earnings.

Our analysis proceeds in three steps. First, we separate green firms from dirty firms, subdividing the latter into levels of dirtiness using the more informative data available for such firms. We next examine earnings surprises for each group, finding that green firms' earnings exceed expectations, while earnings of the dirtiest firms fall short. Finally, we show that these earnings surprises account for a significant fraction of the superior performance of green stocks. The sample period for our analysis is from January 2016 through December 2020.

2. Green versus Dirty Firms

We sort stocks on their Mingshi environmental ratings, or "E-scores," and separate them into three groups: green, neutral, and dirty. The group cutoffs are selected to give the divisions economic sense. We find that much of the cross-sectional variation in stocks' E- scores occurs at the industry level. Therefore, we choose the cutoffs to make the green,

neutral, and dirty categorizations largely coincide with industry groupings. The green group comprises stocks in the supply chains of green products, which are defined as middle- or end-products critical to the production of renewable energy, recyclable and biodegradable materials, sustainable building, waste processing, waste recycling, and water recycling. The dirty group comprises the industries that China's regulatory body identifies as requiring special emission supervision. The neutral group includes all the other stocks.

The dirty group is then divided further. The regulatory body supervises the dirty industries closely, producing monthly updates of various waste emission indicators. The Mingshi E-scores of firms in these industries, which incorporate this level of detail, allow us to distinguish among varying levels of dirtiness within the dirty industries. We thus subdivide stocks in the dirty industries into four categories, from least dirty to most dirty. Within the green and neutral groups, the available data provide less ability to distinguish levels of environmental friendliness, so we do not subdivide those groups. Therefore, we ultimately form six categories of stocks: green, neutral, and four levels of dirtiness.

3. Greenness and Earnings

Heightened environmental concerns are likely to have favorable effects on the earnings of green firms and unfavorable effects on earnings of dirty firms. For green firms, as consumers become more environmentally conscious, demand for green-firm products is likely to increase, positively impacting earnings. For dirty firms, stronger environmental regulations are likely to lower product demands or raise production costs, negatively impacting earnings. These effects may not be fully anticipated by market participants, especially those who rely on analysts using traditional valuation approaches that do not account sufficiently for the greening of the economy. The results of such a scenario are then positive earnings surprises for green firms and negative surprises for dirty firms. We next investigate whether that pattern of earnings surprises occurs during our sample period.

For a given announcement of a firm's annual earnings, we measure the earnings surprise as

$$\text{SUE}= \frac{EPS-FEPS}{P},$$

The difference between realized earnings-per-share (EPS) and the consensus analyst forecast (FEPS), divided by the price (P). We denote the surprise as SUE—Standardized Unexpected Earnings. Figure 1 plots the average SUE for the green category and the four dirty categories, all relative to the SUE for the neutral category. We also control for firm size. The green stocks have a positive SUE, the highest of all the categories, while the dirtiest stocks have a negative SUE, the lowest of all the categories.

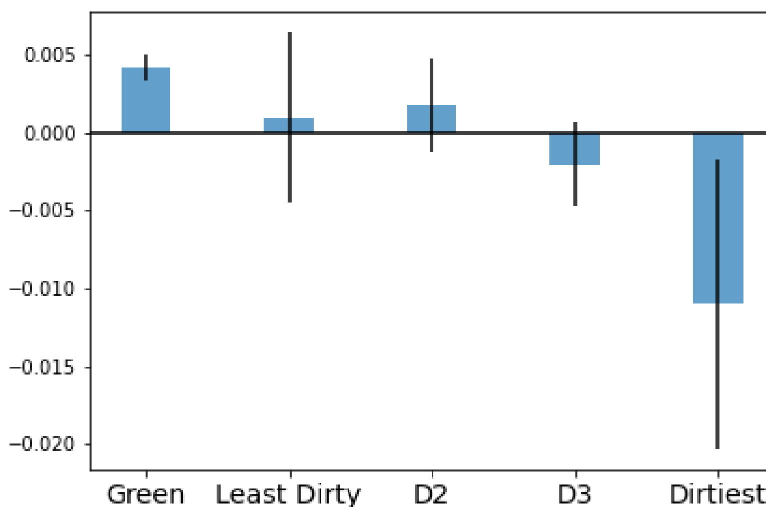

Figure 1: Earnings surprises (relative to neutral firms).

The results in Figure 1 are consistent with the scenario described earlier, in which market participants do not fully anticipate how the greening of the economy affects firms' earnings. In principle such greening effects could be at least somewhat anticipated by analysts, but the results in Figure 2 suggest otherwise. That figure displays the average EPS consensus forecasts for the green stocks and the four dirty groups, minus the average EPS forecast of the neutral stocks. If analysts at least partially anticipate an effect of greenness on firms' earnings, we might expect the bars in Figure 2 to exhibit a downward sloping pattern from left to right. We see no such pattern. In fact, analysts' forecasts of earnings per share for the dirtiest group are higher on average than for the neutral stocks and even slightly higher than those for the green stocks. Overall, the results in both Figures 1 and 2 are consistent with a scenario in which the earnings implications of greenness are largely overlooked.

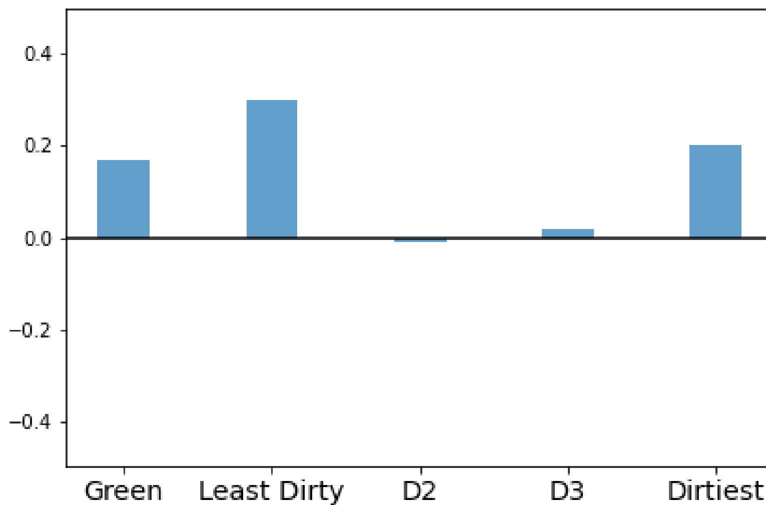

Figure 2: Consensus earnings-per-share forecasts (relative to neutral firms).

4. Earnings Surprises and Green Returns

Given that greenness relates to earnings surprises, our final step is to ask how much those earnings surprises contribute to the superior performance of green stocks. We focus on the return spread between green stocks and the dirtiest stocks. When computing returns, we control for a stock's market value of equity (ME) and earnings-price ratio (EP), given that Liu, Stambaugh, and Yuan (2018)[1] find these metrics for size and value to be important determinants of expected stock returns in China. On average over our sample period, the green stocks outperform the dirtiest stocks by 16% per year (t-statistic: 1.99).

Information relevant to a firm's earnings arrives in many forms throughout a year, but much of that information is difficult to identify and thereby observe its effect on the stock price. To gauge the extent to which earnings surprises account for stock performance, we focus on that performance within just the 60 trading days on and after each stock's annual earnings announcement. We first compare the cumulative returns in that window for the green versus the dirtiest stocks, and then we ask how much of that difference can be explained by differences in the stocks' SUEs, analyzed earlier.

The results of our analysis are displayed in Figure 3[2]. We first see from the figure's left- hand bar that the green group outperforms the dirtiest group on average by an annualized 18.7% over the 60-day window, a difference only modestly higher than the 16% average difference across

[1] See Liu, Jianan, Robert F. Stambaugh, and Yu Yuan, "Size and value in China", *Journal of Financial Economics*, 2019, 134, 48-69.

[2] The coefficients and *t*-statistics in the underlying panel regressions are reported in the Appendix.

the entire year, noted above. The 60-day window therefore seems reasonably representative of green stocks' overall superior performance. The right-hand bar in Figure 3 reveals that differences in SUEs across stocks account for a 7% return difference between the green stocks and the dirtiest stocks. Of the total return spread between those stocks, we thus see that the surprises in annual earnings announcements explain a substantial fraction, nearly 40%.

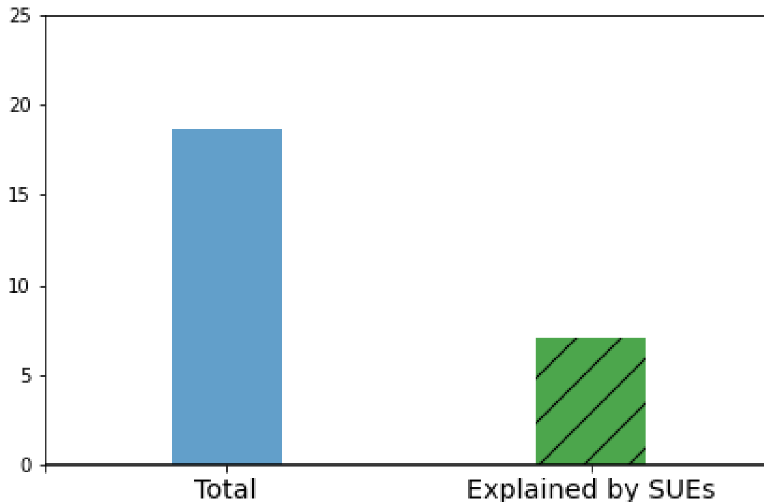

Figure 3: Green-minus-dirtiest return spreads.

The remaining 11.7% of the total 18.7% spread is left unexplained. Of course, as noted at the outset, another potential source of the return spread is a shift in desires by investors to hold green stocks and avoid dirty stocks, independent of earnings prospects. Some of the unexplained 11.7%, however, could also reflect the impact of other earnings information not captured by the surprise in announced earnings. For example, investors can revise forecasts of long-term earnings based on new information beyond what the current year's announced earnings convey. In this respect, it seems reasonable to view what we account for with earnings surprises as a lower bound on the extent to which all earnings information could account for the return spread between green and dirty stocks.

The importance of earnings surprises for green returns in China contrasts with US evidence. For example, Pastor, Stambaugh, and Taylor (2021)[3] find that, although green stocks strongly outperformed

[3] Pastor, Lubos, Robert F. Stambaugh, and Lucian A. Taylor, Dissecting green returns, University of Chicago and University of Pennsylvania.

brown (dirty) stocks in the US during the most recent decade, earnings news accounts for a relatively small part of the average return difference.

5. Conclusion

Green stocks significantly outperformed dirty stocks during the recent half decade in China. Earnings play a key role in this performance. The average difference between announced annual earnings and the consensus forecast is positive for green stocks but negative for dirty stocks. These earnings surprises account for nearly 40% of the superior performance of green stocks.

Appendix

Table 1

Explaining return differences between the green and the dirtiest stocks

Dependent variable: $Ret_{i,t,t+60}$ (in %)

	(1)	(2)
$I_t(i \in Dirtiest)$	-4.67	-2.90
	(-1.98)	(-2.27)
$I_t(i \notin Dirtiest\ and \notin Green)$	-2.10	0.93
	(-1.19)	(1.19)
$SUE_{i,t}$		33.21
		(3.46)
$EP_{i,t-3}$	1.24	0.58
	(1.50)	(0.99)
$ME_{i,t-3}$	-0.30	-0.20
	(-0.80)	(-0.56)

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