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# *ESG Rating, Investor Attention, and Stock Returns in China December 2022*

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***Abstract:*** We study whether ESG ratings can predict stock returns in China. We find marginal evidence that stocks with higher ESG ratings have lower future returns. In addition, we explore the cross-sectional and timeseries heterogeneities of the relationship between ESG and stock returns. We find the predictability of ESG rating is stronger for stocks in the industries that are important to climate change, and the relationship is only significant after 2018 when climate change is evident to investors in China. Overall, our findings show that investors' attention is crucial for the stock return predictability of ESG ratings in China.

***Keywords:*** ESG ratings, investors' attention, stock returns

## 1. Introduction

Climate change has been an issue of great international importance in recent years. According to a survey report on ESG investment in China's fund industry [1], nearly 90% of institutions are concerned about ESG or green investment, and 16% have implemented relevant practices. And UBS indicated in 2021 that ESG had become at the top of the agenda for global institutional investors. In China's public funds markets, according to CITICS, there are 314 ESG funds by the end of October 2022, the total size reaching 440.76 billion yuan. The number will keep growing.

However, the influence of ESG investment on the stock return is still a mixed result. Some findings provide evidence that climate-friendly stocks of which firm has a high ESG rating have lower expected returns than polluting stocks as climate concerns strengthen [2], but would not have outperformed unclean stocks without strengthened climate concerns [3]. Hong and Kacperczyk point out that ESG considerations must necessarily lower future stock returns [4]. While, Garvey et al. and In et al. reveal that generating positive alpha can be achieved by sorting portfolios of stocks based on their emission intensity, and Financial Times states that outperformance of ESG strategies is beyond doubt [5-7]. However, some argue that ESG performance only impacts some stocks, such as best-in-class and worst-in-class stocks [8], and the relationship between ESG and stock expected returns depends on the investor types [9]. Other prior studies show weak return predictability of the ESG rating [10].

Therefore, to find out whether ESG rating will affect the share price in China's stock market, we utilize the most popular ESG rating in China-Wind ESG rating, to help us explore the truth in China's stock market. Benefiting from advanced information technology and manual and machine

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double checks, the Wind database can provide with more accurate ESG rating. We collected the ESG ratings of all A-share listed companies in the Wind database, and use these data to verify whether ESG scores are related to stock returns.

We find suggestive evidence that ESG rating can weekly predict the stock return in China's A-share market. The results indicate that the difference on monthly excess return between the two groups is 62 bps (t-statistics = 2.23), but results become marginal insignificant with regression factors increasing, Fama and French four-factor alpha is 0.40 (t-statistics = 1.49) for instance, which is marginal insignificant.

Next, we explore whether there is cross-sectional difference between ESG scores and stock return. We first conduct research based on industry as a classification standard. According to the classification of national economic industries, we categorize all A-shares into corresponding industry groups. Existing literature and media reports that environmental issues are closely related to these industries, including manufacturing [12], energy [13], mining [14], transportation [15], etc. It means that managing the relationship between business operations and nature is crucial for these sectors. Therefore, we conjecture that ESG ratings have a greater impact on stock returns in these industries. Consistent with our previous conjecture, we indeed find that ESG rating is effective to predict the stock return in these industries.

In order to compare the extent to which ESG ratings affect stock returns across different industries more clearly, we choose five industries least affected by climate change for further investigation. We repeat our previous method and find as expected that ESG ratings do not affect stock returns in these sectors at all.

We also explore the time series differences in the relationship between ESG scores and future stock returns. We repeat the previous empirical analysis by dividing the data into two groups before and after 2018. ESG rating is not at all predictable for stock returns for the overall market before 2018, but it turns out to be a useful predictor of equity returns after 2018.

As for the empirical analysis by industry, the results of the groups before and after 2018, are consistent with our previous results as well. For the top five sectors, the difference of excess return of clean and unclean firms is not significant before 2018 but become statistically significant after. When it comes to the last five sectors, by contrast, results in both groups before and after 2018 are not statistically significant, meaning ESG ratings have no material impact on stock returns in these industries.

Our paper contributes to the literature in several aspects. First, our paper contributes to the literature about ESG and returns. Some existing literature suggests that stocks with good ESG ratings have a higher price but lower expected returns than unclean stocks [2,16-18]. Some point out that ESG tends to impact some particular stocks [8]. Markets seem now to largely price ESG performance into equity [19]. In addition, Bolton, Kacperczyk and Plagge, Grim refer that there is no significant effect of ESG proxy on stock returns and the majority of ESG equity funds in any of the tested categories do not produce a statistically significant excess return [10][20]. We find that ESG score can predict stock return, but only for the industries and at the time that investors care about. For those firms in the industries including Manufacturing, Electricity, heat, gas and water production and supply industry, Mining industry, Transportation, warehousing and postal Industry, and Water conservancy, environment and public facilities management industry, the relationship between their ESG ratings and equity returns is very strong. In addition, ESG ratings are not effective in predicting stock return until after 2018.

Second, our paper contributes to the literature on the performance of stock return predictors across the industry. Zhang and Zhao reveal that in the capital market in China [21], the effect of ESG on future stock returns varies by pillar and sector, with higher ESG scores predict lower (higher) returns in the secondary (tertiary) sector. Deng and Cheng point out that the stock market

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performance of the secondary industry is much more affected by ESG indices than that of the tertiary industry in China [17]. The impact of ESG is positively significant in the energy sector, manufacturing sector, retail sector, and tourism sector, but a negative relationship between market performance and ESG reporting manifests in the banks and financial services, and telecommunication and information technology sectors [22]. And institutional investors mainly make exclusionary screening for Industries with the highest carbon emissions such as oil and gas, utilities, and motor industries [10]. The evidence we find is consistent with existing literature that the predictability of ESG rating performs well in industries of manufacturing, energy supply, mining, transportation, and environ- mental facilities, but not in scientific research and technology service, education, media, information transmission, and finance [10]. This fact has to do with investors' opinions on the importance of ESG performance for industries.

## 2. Main Results

In this paper, all the primary indicators and data are derived from Wind, including A- share stock return, ESG ratings, etc.

### 2.1 Excess Return in the Overall Market

We calculate the value-weight average excess return of clean and unclean firms and their difference. We use value-weighted returns to avoid the influences of tiny stocks. The size of each firm's size of outstanding shares is regarded as a weighting coefficient. The value-weighted average returns are respectively regressed to factors in- volved in CAPM, Fama and French three-factor model, Fama-French four-factor model, and results are reported in Table 1 (See appendix) .

From Table 1, the mean excess return of clean firms and unclean ones and their difference of excess return is 1.74% (t-statistics = 2.33), 2.36% (t-statistics = 3.17), and 62 basis points (t-statistics = 2.23), respectively. Then we regress the excess re- turn of both the clean and unclean firms group to the factors in the CAPM. The excess returns of the two firms groups are both at 1% statistical significance, indicating there is still part of stock returns beyond the explanation of existing factors involved in the CAPM. Additionally, the difference of the excess return of the two groups is 60 basis points (t-statistics = 2.09) per month, equivalent to 7.20% for one year. It is still statistically significant. Next, we use Fama and French three-factor model and the four-factor model to make regression separately [39]. Fama and French three-factor model includes RmRf, SML, and HML, and the four-factor model includes MKT, SMB, HML, and UMD, taking the momentum factor into account. The three-factor alpha for unclean firms is 1.46% (t-statistics = 6.98) and that for clean firms becomes 0.95% (t- statistics = 4.82). The four-adjusted excess returns of clean and unclean firms are 1.07% and 1.47%, both at 1% significance, but their difference is down to only 40 basis points (t-statistics = 1.49) per month.

It provides evidence that unclean firms have higher stock return relative to clean firms, because investors' preference for stocks with high ESG scores lead to more investment in clean firms, and unclean firms' future return are more than clean firms'. However, this result is only suggestive. With regression factors increasing, the difference of excess return of clean and unclean firms group decreases and becomes less statistically significant, and the difference between the two groups is of no statistical significance when the number of alphas reaches four. It indicates that the difference between clean and unclean firms' excess return can be explained by existing risk fac- tors. Therefore, it provides marginal evidence that ESG ratings have strong predictability of stock returns in the overall A-share market.

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## 2.2 The Cross-Sectional Heterogeneity of ESG rating and Stock Returns

According to the above, the ESG score seems weak or even useless to predict the stock return. Whether ESG rating is an available reference for investors to forecast a firm's future profits and make investments or not is answered differently in the cross- section. The industry firms are in is one of the determinants of the effectiveness of ESG scores, to verify our assumption, we grouped all listed companies by their be- longing industry on the previous basis.

We first rank all the CSRC industries according to the predicted influence of ESG ratings on industry development, with a total of 19 industries. Firms in our sample are entered into their corresponding industry groups. The first five and the last five industries are assigned to two groups in respect. The first group includes the top five industries, Manufacturing, Electricity, heat, gas and water production and supply industry, Mining, Transportation, storage and postal services, and Water, environment and public facilities management. The last five are Finance, Information transmission, software and information technology services, Culture, Sports and Entertainment, Education, and Scientific research and technical services, and they belong to the second group. Firms in each group are sorted by ESG scores and divided into quartiles, the first one and the last are named clean and unclean firms group separately.

We compute the value-weighted average excess return of both firms' groups and present the value-average weighted difference in an excess return of the two groups in the last column. We respectively regressed each group's ESG rating on factors in- volved in CAPM, Fama and French three-factor model, Fama and French four-factor model, results are reported in Table 2 and Table 3 (See appendix).

The results presented in Table 2 are strongly persuasive. In the Top 5 group, clean firms and unclean firms respectively earn an average monthly excess return of 2.22% (t-statistics = 2.69) and 3.43% (t-statistics = 3.50), and their difference is 1.21%, an equivalent of 14.52% more annual return in a year, which is at 1% significance (t-statistics = 2.58). When regressed to the factor in the CAPM, the excess monthly re- turn of clean firms is 1.17% (t-statistics = 3.97), and that of unclean firms is 2.19% (t- statistics = 5.93), their difference reaches 1.02%, at 5% significance, meaning the excess return of clean and unclean firms could not be simply explained by the market factor in the CAPM. In the last two rows of this table, the excess stock return of two firm groups are separately regressed to Fama and French three-factors and four- factors model, derived alphas are all at 1% significance. In addition, the difference is also statistically significant.

It indicates that the excess return of both clean and unclean firms is beyond the ex- planation of factors such as market factor, size factor, value factor, and momentum factor, involved in Fama and French model. Therefore, the ESG rating is an important tool to reveal the excess return of firms in the top five industries and can be used to predict these firms' stock returns.

In the contrast, we make an inconsistent conclusion from Table 3 (See appendix). Clean and unclean firms in the last five industries obtain an average excess return of 1.02% (t-statistics = 1.33) and 1.11% (t-statistics = 1.67) per month, and their difference is 0.08 (t-statistics = 0.23). Obviously, the data is much less significant than that in Table 3. Regressed to the CAPM, the excess monthly return that clean firms get is 23 basis points (t-statistics = 0.44), and unclean firms earn 49 basis points (t-statistics

= 0.98), their difference is 25 basis points (t-statistics = 0.72). In the regression with Fama and French three factors, clean firms earn an excess return of 20 basis points less than unclean firms (t-statistics = 0.55), but at little significance. The conclusion is similar when regressed with Fama and French four factors, the d-value of the excess stock return of two groups is even down to zero.

It illustrates that excess stock return of clean and unclean firms in the last 5 industries can be revealed and decomposed by the CAPM and Fama French three factors and four factors model.

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Investors mainly focus on market, size, value, and momentum factors when investing in the last five industries, and ESG scores are barely considered in their security selection.

Comparing Table 2 and Table 3, the future excess stock return of clean firms is al- ways lower than that of unclean firms, and their difference is kept above zero. This is because investors prefer clean firms and are more willing to invest in them than pol- luting ones, regardless of industry. However, there is still an obvious difference be- tween the data of the two tables in terms of both magnitude and significance. The derived d-value of the excess return of two firms groups is larger in Table 3, which is around 1%, significant to varying degrees. While in Table 4 (See appendix), each difference is much below 1% and even close to 0%, with little significance.

The results verify our previous conjecture. Investors do pay attention to the ESG ratings in the Chinese A-share market, but only for those firms in important industries. The important industry mentioned here refers to whose sustainable development and market potential are in considerably close relation to environmental protection, low-carbon, and energy conservation. Overall, it shows that people mainly care about the cleanliness of production and operation of companies in which industry is important to climate change.

## 2.3 The Time Series Heterogeneity of ESG rating and Stock Returns

At the 13th G20 Leaders Summit on November 30, 2018, Present Xi Jinping delivered the speech that climate change is a major challenge to the future and destiny of mankind, and all parties should fulfill their commitments in the United Nations Framework Convention on Climate Change and the Paris Agreement without com- promise, intensify their actions by 2020, and promote a global green and low-carbon transition. Therefore we use the Year 2018 as the research time point in this table, to find out how different investment behavior in the domestic stock market was before and after 2018. According to Fama and French [11], it is required to match the ESG scores of listed firms for all fiscal year-ends in calendar year t-1 with their returns for July of fiscal year t to June of fiscal year t+1. Therefore, the group before 2018 (including the Year 2018) contains information on stock returns recorded before June 2020, so that ESG ratings in 2017 and 2018 can be covered. And in the group after 2018, the relevant information on stock return here is from July 2020 to June 2022, covering firms' ESG ratings in 2019 and 2020. This table still reports the value- weighted average excess return of clean and unclean firms and alphas to portfolios sorted on ESG scores. The data in the first two rows come from all listed firms in Wind, showing the excess return of overall stocks as well as that of clean and unclean firms grouped from the whole A-share market, before and after 2018. The third row and the fourth present excess return of clean and unclean firms in the top five industries, and the last two rows are about firms in the Last five industries, also divided into data before 2018 and after 2018. The t-statistics is reported in parenthesis below each data, *, **, and *** indicate the significance at 10%, 5%, and 1%, respectively.

In the group of overall A-share, before 2018, all clean firms earn the average monthly excess return of -1.44% (t-statistics = -0.80), unclean firms earn -1.99% (t- statistics = -0.57), the loss is 52 basis points (t-statistics = -0.87) less than clean firms. After 2018, the excess return of the clean firms group reaches 2.28% (t-statistics = 2.88) and that of unclean firms is 2.93% (t-statistics = 3.66), both are at 1% significance, and their difference is 64 basis points, at 5% significance. ESG rating becomes an effective factor to interpret the excess return of overall A-share after 2018.

In the top five industries before 2018, clean firms earn an excess return of -2.29% (t-statistics = -1.03), 2 basis points (t-statistics = 0.03) less than unclean firms, -2.27% (t-statistics = -1.13). After 2018, however, the excess return of clean and unclean firms in this group are 2.99% (t-statistics = 3.59) and 4.41% (t-statistics = 4.43) respectively, and the difference of excess return is up to 1.41%, at 1% significance. And thus the conclusion is similar to the group overall, ESG rating can be used to explain the excess return of top five industries in the A-share market after 2018.

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Nevertheless, results present differently in the group of the last 5 industries. Although unclean firms still earn more excess returns than clean firms do before and after 2018, the data is not as much as significant. The d-value of the excess return of clean and unclean firms are 38 basis points (t-statistics = 0.52) and 3 basis points (t- statistics = 0.08) separately. It shows that ESG rating is not a useful tool to reveal and explain the excess return of firms in this group, people pay more attention to other information instead of ESG scores when investing in the last five industries.

President Xi given at the G20 Leaders Summit and other statements that fully demonstrated China's emphasis on environmental protection and low carbon emissions in 2018 do arise investors' attention to green investment. After 2018, People became more aware of the importance of sustainability and environmental friendliness for market competitiveness and the future of businesses, and ESG rating seems to be an effective reference in predicting stock return. But the magnitude of this effect on investment behaviors and options in the specific industry depends on whether the profit and success of this industry are tightly related to adopting green production and operation strategy.

## 3. Conclusion

In this paper, we use portfolio sorting to study whether ESG ratings can predict stock returns in the overall A-share market. We find suggestive evidence that stocks with higher ESG ratings have lower future returns. In addition, we explore the cross- sectional and time-series heterogeneities of the relationship between ESG and stock returns. The predictability of ESG rating is stronger for stocks in the industries that are important to climate change, including Manufacturing, Electricity, heat, gas and water production and supply industry, Mining, Transportation, storage and postal services, etc. However, this relation is only significant after 2018 when the issue of climate change is further emphasized and become evident to investors in China.

Overall, our findings show the fact that investors have realized the importance of environmental friendliness to the sustainable operation and profitability of companies in specific industries, and have taken ESG performance into consideration when selecting securities. And investors' attention is crucial for the effectiveness of ESG ratings to predict the stock return in China.

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## Appendix

Quartile portfolio value-weighted returns: 2018-2021 This table reports the value- weighted average excess return of clean and unclean firms and alphas to portfolios sorted on ESG scores. This sample contains all traded stocks in the A-share market with ESG ratings from Wind. T-statistics is written in parenthesis below each data. Our sample period is 2018 - 2021, *, ** and *** indicate the significance at 10%, 5% and 1%, respectively.

Table 1: Impact of ESG rating on overall A-share market.

| | Clean | Not Clean | Dif |
|---|---|---|---|
| Excess Return | 1.74** | 2.36*** | 0.62** |
| | (2.33) | (3.17) | (2.23) |
| CAPM Alpha | 0.80*** | 1.40*** | 0.60** |
| | (2.76) | (5.93) | (2.09) |
| FF 3 Alpha | 0.95*** | 1.46*** | 0.50* |
| | (4.82) | (6.98) | (1.92) |
| FF 4 Alpha | 1.07*** | 1.47*** | 0.40 |
| | (5.46) | (6.69) | (1.49) |

Top 5 industry quartile portfolio value-weighted returns: 2018-2021 This table re- ports the value-weighted average excess return of clean and unclean firms in the Top five industries as well as alphas to portfolios sorted on ESG scores. This sample co- vers all traded stocks of top five industries from Wind, and thus, stock returns of these firms are much more sensitive to ESG ratings compared to that of firms in other in- dustries. T-statistics is written in parenthesis below each data.

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Our sample period is 2018 - 2021, *, ** and *** indicate the significance at 10%,5% and 1%, respectively.

Table 2: Impact of ESG rating on stock returns in top five industries.

| | Clean | Not Clean | Dif |
|---|---|---|---|
| Excess Return | 2.22*** | 3.43*** | 1.21*** |
| | (2.69) | (3.50) | (2.58) |
| CAPM Alpha | 1.17*** | 2.19*** | 1.02** |
| | (3.97) | (5.93) | (2.20) |
| FF 3 Alpha | 1.30*** | 2.15*** | 0.85** |
| | (6.40) | (6.61) | (2.07) |
| FF 4 Alpha | 1.26*** | 2.02*** | 0.77* |
| | (5.92) | (6.08) | (1.79) |

Last 5 industry quartile portfolio value-weighted returns: 2018-2021This table re- ports the value-weighted average excess return of clean and unclean firms in the last five industries as well as alphas to portfolios sorted on ESG scores. We still use port- folio sorting method following Fama and French [11], and the first and the last quar- tile separately constitute clean and unclean firms groups. But this sample covers all traded stocks of the last five industries from Wind, meaning stock returns of these firms are regarded by investors as less sensitive to or unaffected by ESG ratings rela- tive to firms in other industries. The t-statistics is reported in parenthesis below each data, *, ** and *** indicate the significance at 10%, 5% and 1%, respectively.

Table 3: Impact of ESG rating on stock returns in last five sectors.

| | Clean | Not Clean | Dif |
|---|---|---|---|
| Excess Return | 1.02 | 1.11 | 0.08 |
| | (1.33) | (1.67) | (0.23) |
| CAPM Alpha | 0.23 | 0.49 | 0.25 |
| | (0.44) | (0.98) | (0.72) |
| FF 3 Alpha | 0.42 | 0.62 | 0.20 |
| | (0.90) | (1.30) | (0.55) |
| FF 4 Alpha | 0.78* | 0.78 | 0.00 |
| | (1.75) | (1.57) | (0.00) |

In this table, we use the Year 2018 as the research time point to find out how dif- ferent investment behavior in the Chinese A-share market before and after 2018. Ac- cording to Fama and French [11], it is required to match ESG scores of listed firms for all fiscal year-ends in calendar year t-1 with their returns for July of fiscal year t to June of fiscal year t+1. T-statistics is reported in parenthesis below each data, *, ** and *** indicate the significance at 10%, 5% and 1%, respectively.

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Table 4: Importance of Year 2018 in Public ESG awareness.

| Excess Return | Clean | Not Clean | Dif |
|---|---|---|---|
| Overall Before 2018 | -1.44 | -0.91 | 0.52 |
| | (-0.80) | (-0.57) | (0.87) |
| Overall After 2018 | 2.28*** | 2.93*** | 0.64** |
| | (2.88) | (3.66) | (2.04) |
| TOP 5 Before 2018 | -2.29 | -2.27 | 0.02 |
| | (-1.03) | (-1.13) | (0.03) |
| TOP 5 After 2018 | 2.99*** | 4.41*** | 1.41*** |
| | (3.59) | (4.34) | (2.66) |
| LAST 5 Before 2018 | -0.10 | 0.28 | 0.38 |
| | (-0.06) | (0.15) | (0.52) |
| LAST 5 After 2018 | 1.22 | 1.25* | 0.03 |
| | (1.41) | (1.73) | (0.08) |