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ESG Ratings and Annual Stock Returns: Industry Sector Heterogeneity in Chinese Market

Tian Qiu[1†], Zihan Gao[2†], Zehao Lou[3†], Jesse Ng[4*†]

[1]Kang Chiao International School East China Campus, Kunshan, China
[2]HD SHANGHAI SCHOOL, Shanghai, China
[3]Shanghai United International School (Gubei Campus), Shanghai, China
[4]Department of Economics, University College London, London, United Kingdom
**Corresponding Author. Email: jesse.ng.24@ucl.ac.uk*
[†]These authors contributed equally to this work and should be considered as co-first author.

Abstract. In recent years, Environmental, Social, and Governance (ESG) factors have played an increasingly important role in how companies are evaluated and how investment decisions are made. While much of the existing research has focused on developed markets and broad, market-level data, this study looks more closely at industry differences within China's A-share market—a setting where ESG practices are still evolving. Using firm-level time series regressions on data from around 3,000 listed companies between 2010 and 2020, this study identifies 198 firms where ESG ratings are significantly linked to annual stock returns. The results show a clear positive relationship in infrastructure and resource industries, where ESG activities often align with long-term growth. In contrast, companies in the consumer services sector tend to show negative correlations, likely due to higher costs, price sensitivity, and brand-related risks. Manufacturing firms show mixed outcomes, pointing to uneven ESG adoption. These findings add new insight to the ESG debate in China and offer useful guidance for investors, regulators, and company leaders.

Keywords: ESG, China A-share, stock returns, industry effects, sustainability

1. Introduction

Environmental, Social and Governance (ESG) is a comprehensive framework that enables different stakeholders to understand how an organisation manages risks and opportunities related to sustainability issues [1]. The environmental sector measures the impact of a company on its surroundings. Social criteria examine how it manages its relationship with employees and suppliers, as well as how it protects customer rights. Governance indicates a company's management transparency, internal controls, audits, and the preservation of shareholder rights [2]. In recent decades, ESG has gained increasing attention from investors, regulators, and corporations worldwide and is viewed as a key indicator of long-term value creation [3] This transformation results from the growing global awareness of issues such as climate change [4], ethical business behaviour, and social inequality. Nowadays, rather than treating ESG as an additional reference, investors are already using it as a strategic imperative when investing across multiple industries [5].

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Numerous studies have pointed to a potential positive relationship between strong ESG performance and the financial performance of enterprises, as well as their stock returns. First, engagement with ESG issues reduces downside risk. Firms with poor ESG profiles have been shown to have higher tail risks. On the other hand, highly sustainable firms are resilient during turbulent times because they manage risk better and can gain consumer trust, ultimately leading to better enterprise performance [6]. Moreover, companies that place a large amount of focus on sustainable development will project a positive image of responsibility to potential customers or investors, improving the competitiveness of the enterprise. Finally, evidence from an article studying China's major power generation companies also suggests that good ESG performance can indeed improve financial performance, based on the panel regression model used in their investigation [7].

Despite the growing global emphasis on sustainable development, developing countries generally show a less proactive attitude towards ESG practices. For instance, emerging countries tend to pay little attention to corporate social responsibility, which corresponds to the social sector in ESG. In other words, firms in developing countries often have low ESG ratings because of their irresponsibility for their actions. The management methods that these firms adopt often neglect employers' mental well-being and fail to address societal issues [8,9]. Additionally, external pressures from international investor expectations and global regulatory policies are the primary motivators for ESG engagement in firms from developing countries [10], while internal governance mechanisms within companies are less influential compared to those in developed countries. This supports the claim that developing countries have a more passive attitude towards implementing ESG practices, which ultimately leads to poorer ESG performance [11].

However, China represents a notable difference from the general trend of developing countries. In recent decades, Chinese retail investors have shifted their attitudes towards the ESG index and have started to perceive it as a valuable factor in investment decisions [12]. Investors are particularly sensitive to environmental sustainability, which is likely due to the increasing national focus on green development and pollution control as indicated by China's "dual carbon goals" [13]. The Theory of Planned Behaviour (TPB) also demonstrates that attitude plays a significant role in ESG perception and investment intention, which means that the positive attitude of Chinese investors is an essential psychological driver of ESG investing behaviour in China [14]. Thus, China offers a unique context among all developing countries, as it is transitioning from externally influenced ESG engagement to a more mature market.

Although existing literature has extensively explored the relationship between environmental, social, and governance (ESG) performance and corporate stock returns, these studies have primarily focused on macro-level correlation tests and lack analysis involving other factors. For example, industry heterogeneity, as a core moderating variable in the ESG value transmission mechanism [15], has not been fully analysed. This study chooses to focus on industry distribution rather than geographical distribution, based mainly on three considerations:

First, industry attributes are consistent with ESG materiality. There are systematic differences in the operating characteristics, resource dependence, and externalities of different industries, which result in ESG risks and opportunities being highly industry specific. For example, the core issues in the manufacturing industry include emission reduction technology and supply chain ethics (E&S dimension) [16]. In contrast, the financial industry focuses on governance structure and portfolio carbon footprint (G&E dimension). These material differences determine that the path of converting ESG investment into financial returns must vary across industries.

Second, industry is also the core dimension of capital allocation decisions. When building an ESG portfolio, investors first consider sector exposure rather than geographic labels. In addition, the

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study of geographical distribution lacks rationality. Most Chinese listed companies are in economically developed regions such as Beijing, Shanghai, and Guangzhou. This is mainly due to factors such as policy and the level of regional economic development and has little to do with ESG [17].

Finally, the analysis of geographical distribution is susceptible to confounding factors. The ESG effect at the national or regional level is often closely linked with local policy intensity, cultural preferences, or the development stage, making it difficult to isolate the pure ESG mechanism. Industry classification can surpass geographical boundaries and more clearly identify ESG performance. Therefore, this study focuses on the issue of industry distribution characteristics of companies with significant ESG–stock return correlations.

In investigating ESG, there are multiple approaches available. Based on the analysis, there are approximately 3,000 enterprises in China's A-share market. From these firms, 200 were selected whose stock returns have a significant correlation with ESG ratings. According to regression analysis, infrastructure is the only industry that exhibits a positive correlation between ESG rating and stock return, possibly since the essence of this industry is to benefit the public through multiple means [18]. Additionally, in the consumer and service industries (such as retail, catering, tourism, financial services, etc.), companies often need to invest a lot of resources in supply chain management, employee training, and customer experience to meet ESG standards. These actions include sustainable development awareness training for employees, improving welfare benefits, and incorporating sustainable and ethical elements into products and services [19]. Although these measures do not directly increase revenue in the short term, they increase operating costs and reduce profit margins, which compresses the company's return on investment.

The result of this study can greatly contribute to the investigation of relationship between sustainable development and financial return. First, most current studies on ESG focus on the relationship between ESG ratings and financial performance or stock prices of enterprises [20], with very few addressing the impact of ESG ratings on stock returns [21]. This study fills the gap by examining the relationship between ESG ratings and the stock returns of Chinese enterprises through our own regression model. Second, the mixed results from previous studies focusing on the Chinese market motivates us to dig deeper into the topic of ESG rating and stock return. Some conclude that ESG factors influence firm performance greatly by examining firm value [22] while others argue that ESG has no significant effect, indicated by the weak correlation between ESG ratings and investor decisions [23]. These conflicting results demonstrate the necessity of conducting further research using different models.

By focusing on China, this study provides new empirical evidence to this ongoing debate. Aside from contributing to the theoretical understanding of ESG's influence on stock returns, it also offers valuable insights for investors, regulators, and corporate managers in emerging markets. Although ESG has become a mainstream tool for evaluating corporate sustainability, its effectiveness varies across industries. In some cases, enhanced ESG performance is associated with weaker financial outcomes, indicating that ESG ratings may not fully capture the strategic value of every firm. Furthermore, ESG rating systems are highly subjective, and different rating agencies often disagree on how to evaluate the same factors. Given these limitations, the paper advocates a shift in investor focus from ESG towards a more comprehensive framework such as the United Nations Sustainable Development Goals, which provide a more universally applicable standard for evaluating long-term impact and value creation across industries.

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2. Literature review

In the last few years, Environmental, Social, and Governance criteria have been receiving great interest from the academia and are increasingly recognized as drivers of long-term corporate value, not as issues isolated from reality or the concern of a niche market [24].

Over the last two decades, ESG has been a common theme in corporate governance, management practice, and investment decision-making worldwide. While ESG has been gaining prominence in recent years, the ambiguity regarding its proper definition and the purpose for which it was developed continues unabated [25]. Such conceptual confusion becomes apparent in the multidimensional nature of ESG and in the difficulties associated with its standardization in metrics or benchmarking.

Firms outperforming on ESG dimensions create sustainable economic value through several channels, including revenue enhancement, operational cost reduction, regulatory risk mitigation, employee productivity improvement, and asset utilization optimization [26]. However, the bulk of the research on ESG has been centered on developed economies, mainly European and American; little attention has been paid to emerging markets, such as China [27].

Of course, the intersection of ESG with finance and economics was an under-researched area that could be considered an emerging area of study because it reflects the extent to which signals of ESG performance are beginning to influence investor behavior. For example, evidence shows that ESG information is often perceived from a financial-economics perspective rather than merely a moral-ethical view [28]. From the corporate perspective, therefore, maintaining the social license to operate, which implies the way companies manage social externalities-such as those associated with carbon emissions and labor rights -is increasingly becoming a strategic imperative for long-term survival, much more important than superficial improvements in ESG scores [29].

A significant literature strand considers ESG ratings a crucial signal to financial markets, although a perennial challenge remains the practice of heterogeneous methodologies in issuing ratings. ESG rating agencies employ distinctive criteria and frameworks that result in inconsistencies and make scores not comparable. As demonstrated by [30], such variance in methodologies leads to the evaluation differences of corporate responsibility and risk, which may strongly affect several stakeholders depending on such ratings. The latter variance was discussed in more detail by Berg et al. [31] and Dimson et al. [32] who point out that the source of such variance in scope and measurement is vital for making investment decisions and asset pricing. In fact, the approaches toward assessments have been increasingly refined and developed by the ESG rating agencies over the past ten years or so, incorporating more and more principles of sustainability, reflecting the growing legitimacy of integrating ESG into corporate development strategies [33].

Regarding the financial impact of ESG, much literature has linked ESG to corporate valuation and stock returns. According to Giese et al. [34], ESG attributes influence valuation by means of firm value adjustments to risk-neutral discounting cash flows because the characteristic means may enhance cash flow stability and reduce firm-specific risk. In this respect, companies with strong ESG ratings have been capable of delivering higher excess returns with lower volatility, confirming the interpretation of ESG performance as a financial soundness measure. However, this relationship is not only complex but also varies across sectors and contexts, while some findings hint at possible trade-offs, such as cost increases associated with ESG-related activities dampening financial benefits [35].

One important dimension is the cross-industrial heterogeneity in how ESG factors represent stock returns. For instance, in an Australian context, Limkriangkrai et al. [36] show that firms with

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different environmental and governance ratings adjust financial policy differently, such as leveraging, thus impacting performance. Similarly, work on China by Liang et al. [37] illustrates that high ESG scores relate to liquid stock liquidity risk, which suggests that ESG may shape market dynamics beyond simple return metrics.

Over the past few years, scholars have enhanced the standard asset pricing model by integrating the ESG factors with advanced empirical approaches, thereby equipping it with the ability to grasp the depth of dynamic interactions that drive stock returns. For instance, Giglio, Kelly, & Xiu, 2022 [38] applies the Fama-French three-factor model to firms in China, whereby ESG screening improves the additional return of a portfolio, which is necessary to time the ESG quality of the portfolio. It is very subtle but significant to factor asset pricing in emerging markets.

Of these important developments, however, an equally important set of issues remains. The majority of the ESG literature investigates large publicly-listed firms in developed economies, mainly due to data availability. In comparison, micro and macro-sized firms have been relatively neglected in the corpus of literature. Because of their resource constraints and lack of institutional support, SMEs face particular challenges regarding ESG adoption. For example, Wickert et al. [39] maintain that the internal mechanisms of these firms are typically much less formalized. Nevertheless, to further fill this gap, this paper utilizes a sample of medium-sized enterprises in the Chinese market to explore the relationship between ESG ratings and annual stock returns across different industries in this significant but under-researched segmentation.

3. Hypothesis development

Existing evidence shows that Chinese stock buyers, specifically individual and institutional investors, primarily rely on financial indicators and policy guidance when making decisions [40], and that 89% of individual investors are unfamiliar with ESG concepts [41] A similar view is supported by Huang, Zhang, and Liu [42], who find that although ESG signals exhibit predictive power for stock performance, most Chinese investors particularly retail investors who tend to focus on historical returns and traditional ratings, often failing to actively interpret ESG information and instead passively following dominant signals. This may result in ESG rating changes not being effectively transmitted to investment behavior, particularly in a retail-dominated investment environment. leading to the following underlying hypothesis:

Hypothesis 0 (H0):

The ESG ratings of listed companies do not have a significant impact on their annual stock returns.

However, psychological research indicates that self-regulatory investors prefer assets with long-term potential [43]. Institutional investors accounted for approximately 25.26% of the A-share market, and ESG, as a tool for reflecting long-term value [5], may be identified. When institutions increase their holdings due to ESG advantages, this can drive up the current stock price through the demand-price transmission mechanism [44] Although individual investors may have a lag in their understanding, institutional behavior is sufficient to drive market effects. Therefore, ESG ratings may still exert a positive impact on stock returns via institutional channels, leading to the following hypothesis:

Hypothesis 1 (H1):

The ESG ratings of listed companies have a significantly positive impact on their annual stock returns.

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4. Research methodology

This study investigates the relationship between corporate ESG performance and stock returns among all A-share listed companies in China. The sample includes firms listed on the Shanghai and Shenzhen Stock Exchanges, with data spanning a ten-year period from 2010 to 2020. Stock return data were retrieved from the CSMAR database, specifically using annually adjusted return series for each firm. ESG ratings were sourced from Hexun, which provides a consistent ESG score for all A-share firms based on a multidimensional framework covering environmental, social, and governance dimensions. Firms with missing values in either ESG scores or return data for any year during the 2010–2020 period were excluded. After applying this filter, a total of 3,036 firms remained for analysis.

To ensure comparability across firms and years, ESG scores were standardised annually using the following procedure for each year i (2010–2020):

1. Compute cross-sectional statistics across all A-share firms:

$$\bar{ESG}_t = \frac{1}{N_t} \sum_{i=1}^{N_t} ESG_{it} \tag{1}$$

$$s_{ESG_t} = \sqrt{\frac{1}{N_t - 1} \sum_{i=1}^{N_t} \left(ESG_{it} - \bar{ESG}_t \right)^2} \tag{2}$$

2. Standardise each firm's ESG score:

$$ESG_{it}^{std} = \frac{ESG_{it} - \bar{ESG}_t}{s_{ESG_t}} \tag{3}$$

These steps calculate the cross-sectional average ESG score and its standard deviation for each year t, across all A-share firms. Equation (1) computes the mean ESG score, while Equation (2) calculates the standard deviation of ESG scores in that year. Then, Equation (3) standardises each firm’s ESG score to have a mean of zero and unit variance. This allows for consistent comparison across firms and years by removing scale and level differences, in line with standard asset pricing practices.

This transforms ESG scores to have mean zero and unit variance in every year, neutralizing annual shifts or scale distortions, which is consistent with practices in asset pricing research. Annual stock returns were directly obtained from CSMAR's adjusted return series, which incorporates dividends and price adjustments to reflect total shareholder return. Rather than pooling firms into a panel model, regressions were estimated separately at the firm level. This approach allows us to capture firm-specific sensitivities to ESG performance and avoids imposing a constant ESG effect across all firms. It is particularly suited for testing whether ESG is priced heterogeneously across firms and sectors.

$$R_{it} = \alpha_i + \beta_i ESG_{it}^{std} + \delta_i R_{mt} + \epsilon_{it} \tag{4}$$

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R_{it} represents the annual stock return of firm i in year t, is the standardised ESG score, and R_{it} denotes annual market return sourced from the CSMAR database. Coefficients α_i and β_i capture the intercept and the effect of ESG on returns, respectively, while δ_i controls for market-wide influences, and ϵ_{it} denotes for the error term.

Ordinary least squares regressions were conducted separately for each firm across the 10-year period. Standard errors were clustered at the firm level to account for serial correlation. Firms with insufficient variation or non-convergent regressions were omitted, leaving 3,036 valid estimates. Among these, 198 firms exhibited ESG coefficients β_i significant at the 5% level. This approach aligns with methods commonly used in cross-sectional ESG studies, where individual regression results are aggregated to assess broader trends and significance.

To investigate the characteristics of firms with statistically significant ESG–return relationships, the 198 firms were first assigned to their respective industry categories. They were then separated into two groups based on the sign of their estimated ESG coefficients: one containing firms with a positive and statistically significant association, and the other containing those with a negative and significant association. For each group, a pie chart was produced to show the industry distribution. This allows for a clear comparison across sectors and helps identify whether certain industries are more closely associated with the financial relevance of ESG performance. All statistical analysis was implemented using Microsoft Excel and Stata. Descriptive statistics, data cleaning, and visualisation (including pie charts and histograms) were conducted using Excel, while regression estimation and significance testing were performed in Stata, which allowed efficient execution of firm-level regressions and extraction of coefficient estimates. This methodological framework allows for an assessment not of the overall presence of ESG-related return effects but also their heterogeneity across industries and firms. The design is thus appropriate to identify financial relevance of ESG in a context where ESG adoption and investor sensitivity may vary substantially across sectors.

5. Data analysis

Table 1. Descriptive statistics of key variables (2010–2020)

Variable	Mean	Std. Dev.	Min.	Max.	N
Return	0.11	0.58	-0.92	15.21	29,935
ESG Score	23.65	15.84	-18.45	90.87	32,361
Standardized ESG	0.00	1.00	-3.85	6.25	32,361

Note: Return is the annual stock return obtained from the CSMAR database. ESG Score is the raw environmental, social, and governance score. Standardized ESG is calculated by year using within-year z-scores.

Table 1 presents summary statistics for the key variables used in the analysis, the average annual return is 0.11 with a standard deviation of 0.58, based on 29935 firm-year observations from the CSMAR database. Raw ESG scores range from –18.45 to 90.87, with a mean of 23.65 and a standard deviation of 15.84, indicating substantial variation in ESG performance across firms. To facilitate comparability across years, ESG scores are standardized using within-year z-scores. The resulting standardized ESG variable has a mean of zero and a standard deviation of one, as expected by construction. These statistics provide an initial overview of the distributional properties of financial and ESG-related variables in the sample.

Each stock was analysed using a firm-level time-series regression, where its ten-year return series was regressed on its standardized ESG scores. Observations with missing or unmatched ESG or

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return data were removed to maintain a consistent sample. This process yielded 3,036 valid regressions based on Equation (3). The estimated coefficients on the standardized ESG variable indicate both the direction and magnitude of the ESG–return relationship for each firm. Figure 1 presents the distribution of these coefficients, illustrating how the impact of ESG performance varies across firms in the sample.

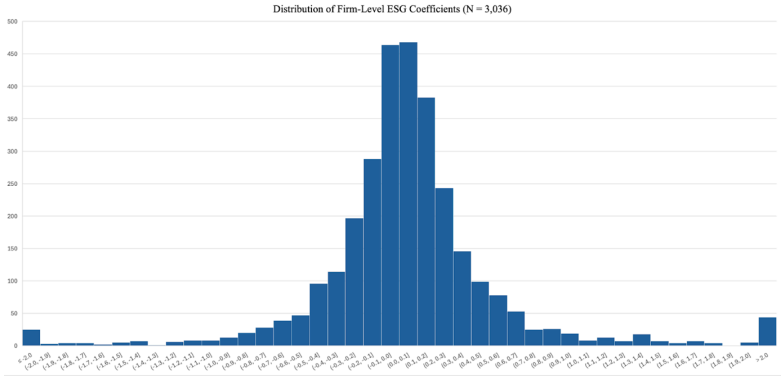

Figure 1. Distribution of firm-level standardized ESG coefficients (N = 3,036)

This histogram plots the estimated ESG coefficients from 3,036 firm-level regressions. The distribution is approximately symmetric and centred near zero, with a slight right skew revealing there may be a stronger positive ESG-return relationship.

Table 2. Frequency of statistically significant ESG coefficients (N = 3,036)

Significance Level	Expected Count	Observed Count	Binomial p-value
$p < 0.05$	151.8	198	0.000095
$p < 0.10$	303.6	344	0.0074

Note: Expected counts are based on the null hypothesis assuming no true effect of ESG on returns. The observed frequencies exceed expectations, suggesting meaningful ESG effects for a subset of firms.

To evaluate the statistical significance of firm level ESG–returns, Table 2 compares the observed number of significant coefficients with the number expected under the null hypothesis of no relationship. A binomial test confirms that the frequency of significant outcomes is unlikely to occur by random variation. At the 5% significance level, 198 out of 3,036 firms exhibit statistically significant ESG coefficients, compared with an expected count of 151.8 under the null. This discrepancy yields a p-value of 0.000095, offering strong evidence against the null hypothesis. At the 10% significance level, 344 firms exhibits significant ESG effects relative to an expected 303.6, with a corresponding p-value of 0.0074.

These findings indicate that ESG performance has a statistically significant correlation with stock returns for a non-negligible number of firms. The fact that the observed incidence of significance exceeds the level expected by change implies that ESG factors may indeed convey information relevant to future financial performances. This result provides empirical support for the hypothesis that ESG attributes influence firm-level return behaviour, potentially capturing investor preferences, differential exposure to risk, or tangible economic consequences of ESG performances.

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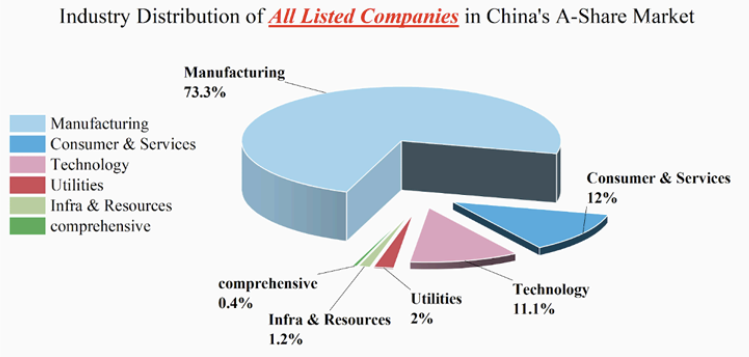

Figure 2. Industry composition of firms in the ESG–return regression sample (N = 3,036)

Figure 3 illustrates the industry breakdown of firms included in the ESG–return regression analysis. Most of the sample is concentrated in the manufacturing sector, which comprises 73.3% of all firms. This is followed by consumer & services at 12%, technology at 11.1%, and smaller representations from utilities (2%), infrastructure & resources (1.2%), and comprehensive sectors (0.4%). This distribution reflects the broader structure of China's A-share market, where manufacturing firms dominate listings. The concentration of observations in manufacturing may influence the overall distribution of ESG coefficients, and subsequent analyses may consider industry-fixed effects or sector-specific heterogeneity to account for these imbalances.

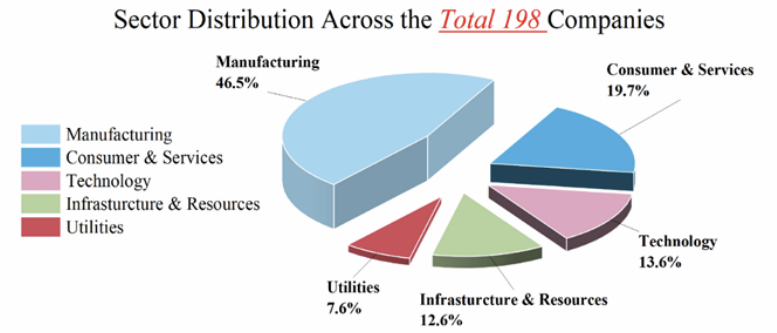

Figure 3. Sector distribution of the 198 firms with statistically significant ESG coefficients

Figure 3 then illustrates the sectoral breakdown of the 198 firms for which the ESG coefficient was statistically significant at the 5% level. Although Manufacturing continues to account for the largest share (46%) among significant firms, this represents a relative underrepresentation compared to its dominance in the overall population. In contrast, Consumer & Services (20%), Technology (14%), and Infra & Resources (12%) sectors are more prominently represented among the significant results. This suggests that ESG effects may be more noticeable in sectors characterized by consumer interaction, innovation, or environmental exposure, where ESG considerations are more visible or material to stakeholders.

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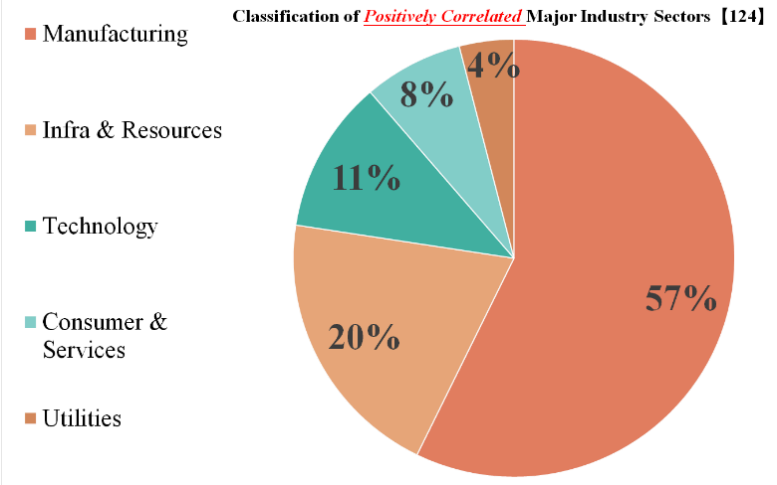

Figure 4. Sector composition of firms with positive ESG–return coefficients (N = 124)

To gain further insight, we divided the 198 significant firms into two groups based on the direction of their ESG coefficients. Among the 124 firms with positively correlated ESG coefficients (Figure 4), a substantial 57% belong to the Manufacturing sector, followed by Infra & Resources (20%), Technology (11%), Consumer & Services (8%), and Utilities (4%). Despite their low relative significance rate, this suggests that manufacturing firms that exhibit a significant ESG–return relationship tend to have a positive association.

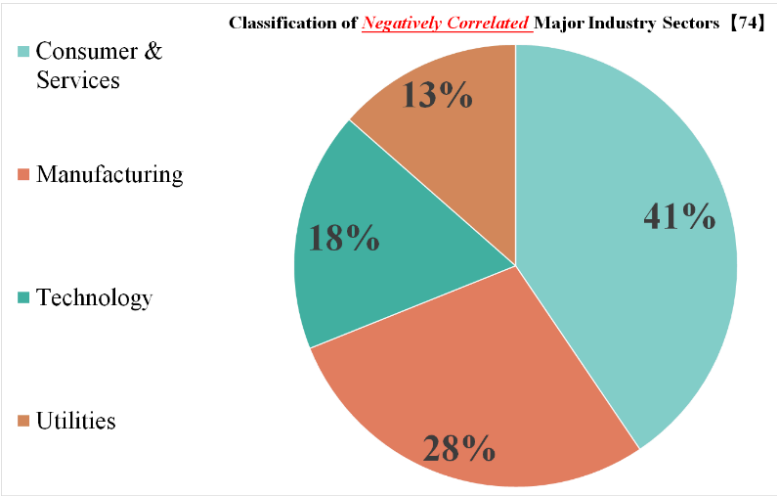

Figure 5. Sector composition of firms with negative ESG–return coefficients (N=74)

Among the 74 firms whose ESG slope is negative and significant (Figure 5), the Consumer & Services sector supplies the single largest block, accounting for 41 % of the subsample. Manufacturing follows at 28%, Technology at 18%, and Utilities at 13%. The heavy representation of consumer-oriented companies indicates that negative ESG return links are not random outliers; rather, they cluster where brands, customer interfaces, and rapid product cycles dominate. Investors in these firms may interpret this as trade-offs between ESG initiatives and short-term profitability. Overall, the sectoral concentration makes it clear that the effects of ESG is not uniform: industries whose value rests on long-term tangible assets and investment tend to reward ESG improvements, whereas industries whose value is anchored in intangibles, brand perception, or fast-cycle

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innovation often penalise them. These findings underscore the necessity of accounting for industry specific dynamics when evaluating the financial implications of ESG factors and caution against applying uniform ESG investment strategies across different sectors.

6. Discussion

The regressions show that ESG scores do move Chinese A-share prices, but only when industry context is considered. Figure 1 plots the cross-section of firm-level ESG coefficients: most concentrate around zero, yet the right skew shows a minority of firms whose returns rise with their score. Statistically, 198 companies showed statistically significant ESG coefficients, indicating that ESG factors are financially relevant to some market participants, rather than generally neutral. This provides initial support for the view that "ESG factors can influence stock performance," although the degree of influence varies by company and industry. The distribution of significant ESG-return associations further verifies the view that ESG is related to industry heterogeneity. Although manufacturing firms make up most of the full sample, they represent a smaller share of companies with statistically significant ESG coefficients. In contrast, the firms showing significant ESG and return relationships, whether positive or negative, are more heavily concentrated in sectors such as services, technology, infrastructure, and resources. This pattern suggests that ESG performance may attract more attention, or exert a stronger influence on financial outcomes, in industries where public visibility or environmental impacts are more immediate and substantial.

For firms in consumer and service industries, the ESG–return relationship is generally negative, which may stem from both financial pressures and characteristics unique to these sectors. Implementing ESG practices often requires additional operating expenses, such as compliance systems, renewable energy procurement, or expanded employee benefits, and these costs can further squeeze margins for businesses that already operate with limited profitability [45]. In addition, companies in consumer services tend to rely more heavily on operational efficiency due to their lower capital intensity; ESG-related spending can interfere with routine operations and may lead to short-term declines in firm valuation [46]. Although public expectations for sustainable business practices continue to rise, the customer base in these industries is typically price sensitive, restricting firms' ability to pass ESG-related costs on to consumers [47]. Consequently, when ESG investments fail to generate improved pricing power or higher returns, investors may respond by reducing their holdings. These firms are also more exposed to reputational risks, and failure to uphold ESG commitments can trigger accusations of greenwashing, further weakening investor confidence [48]. In contrast, ESG scores are positively associated with stock returns in infrastructure and resource-based industries. This pattern likely reflects the high public visibility of these sectors and their closer alignment with regulatory priorities and social welfare objectives. Investors often view ESG-compliant infrastructure firms as less risky and better positioned for long-term viability, particularly in sectors with significant oversight and government involvement [49]. As a result, companies with stronger ESG performance in these industries tend to attract more investor confidence and increased capital inflows [50]. Moreover, firms that meet ESG standards are more likely to qualify for government subsidies, supportive regulatory treatment, and access to green financing, all of which can improve profitability and contribute to higher stock returns [51].

The manufacturing sector produced both positive and negative correlations between ESG ratings and returns. On the positive side, ESG practices such as waste reduction, energy efficiency, and workplace safety can directly enhance operational performance [52]. For investors focused on long-term development and sustainability, these improvements offer clear benefits. However, given the environmental and safety risks related to this sector, ESG actions are often seen as a repercussion to

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their actions rather than value-generating [53] This may limit the market's recognition of ESG as a meaningful signal of future performance. Moreover, the short-term focus of China's A-share market may further contribute to weak or inconsistent ESG impacts [54]. When investors prioritise immediate earnings over long-term sustainability, improvements in ESG performance may not result in higher stock prices in the short run.

The results of this study offer several important insights for investors, companies, and policymakers. Firstly, the fact that ESG's relationship with stock returns varies so much by industry suggests that ESG performance should not be evaluated independently from a firm's sector context. For instance, ESG spending in consumer-focused industries often weighs on short-term margins and is not always appreciated by investors. However, similar efforts in infrastructure and resource sectors appear to suggest alignment with public priorities and draw investor support. This means that ESG ratings, to be useful, need to be interpreted through an industry-specific lens.

Secondly, the overall weak correlation between ESG scores and annual returns points to a gap between ESG efforts and how they're perceived in China's markets, particularly by retail investors. While ESG has shown significance globally, awareness and demand for ESG-aligned investments remain limited in China, especially outside of large institutions. This may help explain why ESG initiatives don't consistently translate into market value. Strengthening investor education around ESG, especially among individual investors, could gradually help change this.Thirdly, the mixed results in the manufacturing sector highlight the ongoing tension between long-term sustainability goals and the short-term focus of financial markets. While ESG initiatives can improve efficiency and reduce certain risks, these gains may not be fully reflected in share prices when investors prioritise immediate performance. This points to a potential role for measures that encourage longer-term investment horizons, such as policy incentives, enhanced disclosure standards, or investment products designed to support sustainable strategies.

Finally, although infrastructure and resource-oriented firms make up only a small portion of the overall sample, the strong positive association between ESG performance and returns within these sectors stands out. These firms show how ESG practices can support both public objectives and financial performance. Strengthening transparency and ESG reporting in these industries, together with initiatives that support sustainability efforts, could help build a clearer understanding of how ESG contributes to financial outcomes.

7. Conclusion

This study analysed the relationship between ESG ratings and annual stock returns for A-share firms in China over the period 2010 to 2020. Firm-level regressions showed that 198 of the 3,036 firms exhibited a statistically significant ESG–return relationship at the 5% level. Thus, ESG performance appears to be financially relevant for a subset of firms rather than across the entire market.

When we examine results by industry, firms in infrastructure and resource-related sectors generally show a positive ESG-return association. That pattern likely reflects their connection to public infrastructure, long-term planning, and regulatory sustainability initiatives, especially considering China's "dual carbon" policy introduced in 2021. By contrast, firms in consumer and service industries are more likely to exhibit a negative relationship between ESG performance and returns, possibly because ESG implementation increases costs or exposes them to reputational risk. The manufacturing sector displays mixed outcomes, which may be due to variation in how ESG practices are adopted or perceived across different sub-sectors.

Overall, these findings suggest that ESG factors are not priced uniformly in China's equity market. For investors, this means ESG metrics should be assessed regarding to industry-specific

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context, rather than treated as a universal indicator. In some sectors, ESG performance may provide valuable information; in others, its value may be limited or even adverse depending on cost structures, risk exposure, and investor sentiment.

However, the study has some limitations. Firstly, the ESG data came from a single provider, Hexun, which might not fully capture variation in ESG disclosure quality or assessment methodology. Secondly, the focus on annual returns may miss short-term market reactions to ESG-related news. Thirdly, certain control variables were not included, such as firm size, leverage, or book-to-market ratio which may influence results.

Future research could build on this by incorporating alternative ESG data sources and adding more financial controls. It would also be useful to apply event study methods to better understand short-term market reactions to ESG disclosures. Finally, sector-specific studies could help clarify how the ESG-stock return relationship differs across industries and under what conditions ESG performance is most likely to matter financially.

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