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Evaluating the Influence of ESG Ratings on the Corporate Operational Performance: Evidence from Commercial Banks in China

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Abstract: With growing global emphasis on sustainable development and social responsibility, Environmental, Social, and Governance (ESG) ratings have emerged as critical metrics to evaluate commercial banks' operating performance. The paper utilizes panel data spanning 2009 to 2022 from large state-owned and joint-stock commercial banks in China. It employs a two-way fixed effect model and robustness tests, alongside tests for heterogeneity analysis and moderating effect to conduct empirical analysis. The findings of the fixed effect model indicate that improvements in ESG performance have advantageous impacts on commercial banks' operating performance, particularly with higher growth rate for operating income Robustness tests including mixed regressions, Tobit tests, variable substitutions, and tests of endogenous bias have validated that initial regression findings still hold. Tests of heterogeneity analysis reveal that among large state-owned commercial banks, banks with higher leverage, larger major shareholder ownership, and larger banks scales, ESG performance can significantly affect the banks' operating performance, and the relationship exhibits positive. Furthermore, the paper finds that GDP growth rate, CPI and analysts' coverage can strengthen the relationship between ESG performance and commercial banks' operating performance through moderating effects. The research provides policy proposals and strategic recommendations tailored for policymakers, banks, and investors, building on these insights.

Keywords: ESG rating; commercial banks; operating performance; empirical analysis

1. Introduction

In recent years, Chinese companies significantly demonstrated a notable acceleration in the development of environmental, social, and governance (ESG) performance, in line with the 'dual carbon' goals. The Central Financial Work Conference of October 2023 emphasized the critical role that finance plays in supporting domestic economic growth and improving core competitiveness. At the same times, five major articles proposed in the conference have laid a theoretical foundation for high-quality development in finance. The five major articles consist of Fintech Finance, Green Finance, Inclusive Finance, Pension Finance and Digital Finance.

As a responsible major country, China made a solemn commitment to devote itself to the global low-carbon transformation at the 75th United Nations General Assembly in 2020 and it introduced 'dual carbon' goal, whose purposes to achieve carbon peak in 2030 and carbon neutrality in 2060. 'Dual carbon' goal aims to reduce carbon dioxide emissions, which helps create green production and operation models for businesses as well as a green transformation of the socioeconomic structure. Emergence of green finance, to a certain extent, contributes to 'dual carbon' goals and set higher standards in operations for enterprises, including business models and aspects of environmental, social and governance.

ESG concept is spreading across the entire world, emphasizing that enterprises ought to align with current trends and concentrate on green environmental protection, energy conservation and low-carbon development meanwhile pursuing high-quality development. As a component of the ESG concept, ESG performance measures an enterprise's sustainability along three dimensions:

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environment, society, and corporate governance. The dimensions are scored for their respective performance, and these scores are then calculated into an ESG score, which aims to assign comprehensive ratings for companies to evaluate their ESG performance. Incorporating ESG ratings into business operations has been evidenced to have a positive impact on mitigating misconduct, accelerating the green transformation of business models and achieving sustainable development goals for enterprises.

As a pillar of the financial industry, China's commercial banks play a crucial role in driving economic progress. This paper employs Stata to conduct regression analysis, investigating the impact of ESG ratings on operating performance of Commercial banks in China. Innovations of the paper are to explore determinants of commercial banks' operating performance, for the purpose of extending existing research and filling a gap between ESG ratings and financial institutions. Secondly, econometric methodologies deployed in the paper are statistically rigorous. It mainly adopts fixed-effect models controlling for year and individual effects, supplemented by bank-level variables. Besides, robustness tests contain mixed regressions, Tobit models, and endogeneity analysis. Meanwhile, heterogeneity analysis exists in the paper, considering different natures of commercial banks, shareholder structures, and leverage ratios. Additionally, moderating effect analysis incorporates GDP growth rates and CPI, along with analysts' coverage, to explore their moderating effects on banks' operating performance. The database involved in this paper is a panel dataset, which can reflect the real-time data and cover various banks. The research background aligns with the 'dual carbon' goals and reflects the ESG trends. The findings provide practical insights for bank managers, policymakers, and investors, offering guidance on strategic decisions and investment frameworks in line with sustainable development objectives.

2. Literature Review

2.1. Research on ESG Performance

2.1.1. The Role of ESG in Enterprises and Financial Markets

Under the guidance of the 'dual carbon' goal, ESG performance has attracted many scholars to study and explore it. A strand of literature is mainly around how the ESG performance constrain inappropriate behaviors and decision-making process within organizations, while maximizing enterprises values.

Improving ESG performance is beneficial for curbing corporate fraud as evidenced by Chinese listed A-shares from 2012 to 2022, at the same time maintaining a good ESG performance can enhance information transparency and alleviate financial restrictions under mediating effect [1]. The higher a company's ESG engagement, the more it can significantly constrain management's dereliction of duty, which is more evident in companies with fewer institutional investors and information asymmetry [2]. Thus, ESG practices enable companies to reinforce sustainability and maximize shareholders' value.

Besides, enhancement in ESG performance can significantly stabilize earnings in firms and reduce inefficient investment activities, which is help of improving investment efficiency as stated in [3]. ESG ratings can provide guidance on decision-making for managers and significantly regulate risk-taking events involved in the organizations, which is more common in environments with low information transparency, weak corporate governance, and low pressure from external regulatory environment [4].

In the context of financial crisis and COVID-19, evidence shows that ESG performance helps to improve the operating performance of listed companies. when confronted with challenges posed by the global pandemic, firms with good ESG performance appears more resilient and can exert more discernible influence on withstanding with the challenges, which is more significant in small companies, state-owned enterprises and highly competitive market environment [5].

Firms with excellent and poor ESG ratings have important spillover effects on financial market which is more pronounced in firms with excellent ESG ratings, besides ESG rating can be regarded as

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the benchmark for regulation and incorporated into systematic risk assessments, aiming to effectively stabilize companies' financial positions [6]. Besides, investment portfolios containing major stocks with good ESG performance often outperform than those with poor ESG performance during financial crisis, whereas the effect is relatively weak in the normal period [7]. The results imply that superior ESG performance significantly eliminates financial related risks and can cope with the crisis.

Overall, ESG performance plays an important role in regulating decision-making process, mitigating risk-taking, promoting effective investing practices. Besides, ESG performance can help enterprises and investors manage with the impact of the global financial crisis and the COVID-19 epidemic. A robust ESG performance indicates an enterprise has the enhanced capacity to withstand systemic shocks.

2.1.2. The Determinants of ESG Performance

A review of extant literature reveals a multitude of factors that exert a profound and pervasive influence on ESG performance. From the standpoint of financial markets, factors include consumer concentration, investor attention and analysts' coverage. At the enterprise level, factors that shape ESG performance encompass digital transformation, equity incentive plans, mergers and acquisitions, and the financial gaps. From the standpoint of government, the impact of government environmental protection expenditures on ESG performance is a crucial consideration.

Consumer concentration impairs a company's operating cash flow and innovation capacity, resulting in a notable decline in ESG performance which is particularly pronounced in large scale enterprises, non-state-owned enterprise, low competitive market environments and young executives [8]. The inhibitory effect also exists in the relation between investor attention and ESG performance. There is a mutual inhibitory effect between investor attention and a company's ESG performance, meanwhile enhanced ESG performance of the company is help of improving ESG performance of neighboring companies [9]. In details, for each additional unit increase in investor attention, the company's ESG performance will decline by 0.25 units, and vice versa.

Besides, analyst coverage is an indicator of analyst attention. Strong ESG performance can attract more analyst coverage, which is contributed by mechanism effect of diminishing information asymmetry [10]. Meanwhile, high degree of analyst attention improves information transparency between enterprises and public [11]. Media attention and analyst coverage have essential influences on improving ESG performance, meanwhile companies with high-quality ESG performance tends to attract attention of media and analysts, which in turn maximizing corporate value contributed by stakeholder pressure [12]. Analyst coverage significantly enhances corporate ESG performance and incentives enterprises to engage ESG practices, through attracting media attention and more site visits [11]. Thus, it can be reached out conclusions that it exists mutual promotion relationship between analyst coverage and ESG performance.

Against the backdrop of the accelerated development of digital technology, digitalization is playing a central role in the operations of companies, while digital transformation has the capacity to improve ESG performance, especially for state-owned enterprises and conventional companies with elevated pollution levels [13]. That means digital transformation is predicted to lead to a notable improvement in those companies' ESG performance.

Executive equity incentive plans (EEIPs) are the one of various methods that enterprises can employ to motivate and retain employees, referring that companies grant equity incentive plans to executives, who can purchase company's shares at a price lower than the market price. Executive equity incentive plans (EEIPs) have a beneficial influence on ESG performance, and the effect is evident in EEIPs with a long effective term and high vesting targets, at the same time the impact appears to be more pronounced in non-state-owned firms and in those with exemplary external governance [14].

Mergers and acquisitions (M&A) are a necessary part of business. Some studies show that M&A activity has a positive impact on ESG performance, whereas the impact is not instantaneous, and instead the company's ESG score has been upgraded in the subsequent year after the transaction's conclusion [15].

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From perspectives of government, an increase in government investment on environmental protection brings a new green innovation wave, that leads to improvements in both the ecological environment and the social landscape, which ultimately enhances country governance standards and has a positive impact on a country's ESG performance [16].

ESG controversy is another factor that affects ESG performance. Financial gaps of enterprises incentive to improve their ESG performance, which is diminished by ESG controversies [17]. ESG controversies refer that different opinions exist in firms regarding the ESG practices, which causes that the likelihood of the company engaging ESG practices is reduced, and financial gaps are less likely to be closed.

2.2. Research on Commercial Banks' Operating Performance

Commercial banks can satisfy different needs of market entities and drive domestic economies up as an important component of financial market. After reading literature of recent five years, some factors that affects operating performance of commercial banks can be found. The determinants mainly focus on green credit, internet finance, fin-tech products and corporate social responsibility (CSR).

Green credit, a part of green finance refers that financial institutions subsidize low interest rates and simplify credit approval procedures for green industries, which is related to energy conservation and low carbon emission. At the same time, they elevate the threshold of loans and impose restrictive methods on enterprises which contains high pollutant, emission and energy-consumption projects. Thus, green credit regarded as a type of financial policy effectively serves to constrain pollutants, aiming to realize 'dual carbon' goals and promote sustainable development in enterprises and society. Green credit can impact diverse facets of a commercial bank. Some evidence demonstrates that implementation of green credit can reduce various bank-related risks to a certain extent, including credit and reputation risks since green credit can enhance banks' core competencies [18]. Besides, commercial banks that implement green credit policy can effectively improve their financial performance and boost green development, which stems from green credit can improve returns on banks and attract higher economic profits [19].

CSR is another factor that influences on banks' profitability. Specifically, fulling CSR obligations brings negative impacts on banks' financial performance in a short term, whereas fulfilment of CSR improves operating performance, under moderating effect of green credit [20].

The emergence of internet finance brings people lots of conveniences and encompass various features. For instance, online payment platform simplifies payment procedures. Internet lending platform can optimize lending approval process through shortening process time and avoiding traditional lending procedures. Internet finance is beneficial to promoting enhancements in commercial banks' comprehensive performance, i.e. profitability, which is more evident in city commercial banks, whereas it does not bring impacts on state-owned commercial banks and the limitation of internet finance is that it impedes liquidity in commercial banks [21].

As the understanding of financial literacy deepens, the number of fintech products is increasing, with different implications for commercial banks as issuers. In details, perceived usefulness of fintech products can enhance consumer satisfaction, customers' expectations, in contrast perceived difficulties of the products play a vital role in improving banks services quality [22].

2.3. The Impact of ESG on the Operating Performance of Commercial Banks

Some enterprises' profits are prone to be impacted by external environments, such as Covid-19 and financial crisis. In the meantime, green finance is a part of five major articles proposed on Conference Finance Work. It suggests that enterprises should implements ESG practices while pursuing profits. ESG performance includes ESG ratings and its sub-index scores, including environment, society and governance. Extensive literature examines the relationship between ESG performance and firms value, whereas little research is related to banking sectors and some analysis reach out mixed evidence.

Enhancement in ESG performance is conducive to improving corporate performance. Enterprises implement sustainability management initiatives, which improves social sustainable

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development but also enhances their financial performance constructs [23]. ESG performance has a positive correlation between with corporate performance, which is more significant for large-scale companies and those involved with high-risk cases [24]. Moreover, improvements in listed companies' ESG performance can increase their market value and have a positive role in operation capabilities for state-owned listed companies through the mediation effect, which ultimately has impacts on market value [25].

Besides, ESG performance of enterprises can positively promote improvements in corporate financial performance, contributed by alleviating financial constraints and enhancing operation efficiencies with the organization, which is more significant in non-state-owned enterprises, medium-small enterprises and manufacturing enterprises [26]. Banks which engages in environmentally friendly activities exert the greatest influences on their value, at the same times banks that prioritize ESG initiatives can reduce the cost of equity and improve cash flows whereas cost of debt is not impacted [27]. Furthermore, a trade-off exists between bank value and risk-taking, a more stable financial system, because high ESG scores are accompanied by excessive investment of ESG practices, thereby leading to lower bank values [28].

Overall, existing literature have conducted certain research on ESG performance and the determinants of operating performance in banking sectors. However, as far as the author's research is concerned, the existing literature still has some shortcomings. The two main points are as follows: firstly, most of the literature fail to consider factors that affects operating performance of commercial banks and panel data of listed banks is not deployed for thoughtful analysis. Secondly, institution-related variables such as analyst's coverage and economic variables such as GDP as moderators, are not utilized in the most of existing literature, nor does it test the moderating effect. The deficiencies serve as an innovation and a breakthrough point for the research paper.

3. Empirical Analysis Process

3.1. Data Sources and Sample Selection

This article investigates the link between environmental, social and governance (ESG) ratings and Chinese commercial banks' operating performance from 2009 - 2022. It selects 15 Chinese commercial banks as research targets.

The China Financial Regulatory Bureau classifies the banking sector into six state-own commercial banks: Industrial and Commercial Bank of China, Agricultural Bank of China, Bank of China, China Construction Bank, Bank of Communications, and Postal Saving Bank of China. Additionally, there are nine joint-stock commercial banks, including Everbright Bank, HuaXia Bank, Minsheng Bank, Ping An Bank, Shanghai Pudong Development Bank, Industrial Bank, China Merchants Bank, China Zheshang Bank, and China CITIC Bank.

The bank-level characteristics are derived from the Wind financial database and the indicator consist of the debt-to-asset ratio (DTA), return on total assets (ROA), leverage ratio (LR), total asset turnover rate (TAT), etc. The same period of China Shanghai Huazheng ESG Rating is chosen for this research, since the rating can reflect commercial banks' comprehensive ESG performance, cover extensive banks and align with China's national conditions [29]. Then, a dynamic panel dataset is formed, together with banks' characteristics data and the sample size is 2940.

3.2. Variable Description

The study employs two explained variables, one core explanatory variable, five control variables, three threshold variables and three moderating variables. Table A1 presents the variable names (abbreviations), types, and variables constructions.

3.2.1. Explained Variables: Operating Performance of Chinese Commercial Banks

Return on assets (ROA) and return on equity (ROE) are two accounting-based indicators, which is employed to assess the operating performance of the banks in this research. ROE measures the returns generated by each unit of net capital invested by shareholders. ROA provides a

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comprehensive measure of the profit generated by the total assets of a business, i.e. the total funds invested by shareholders and creditors. Higher indicators signify that the bank is more profitable, which translates to a higher return on investment for investors. In this paper, ROA is selected to measure the operating performance of the bank.

3.2.2. Core Explanatory Variables: Shanghai Huazheng ESG Rating

The paper chooses Chinese Commercial Banks' Shanghai Huazheng ESG rating as core explanatory variable. Huazheng ESG rating system classifies companies into nine levels in accordance with their ESG performance, which is specified as AAA, AA, A, BBB, BB, B, CCC, CC, C, then transforms them into ESG rating scores from 9 – 1 [29]. For instance, if the highest level of Huazheng ESG rating is AAA, ESG score of the bank is 9. On the contrary, when the ESG score is 1, the bank's ESG ratings is correspondingly C. The better the company's ESG performance, the higher its score.

3.2.3. Control Variables

The article selects five financial indicators as control variables, consisting of DTA, TAT, OI, IA and FA. The purpose is to avoid the influences of potential exogenous factors on the regression model and to better capture the factors that affect the operating performance of commercial banks in China. Specifically, the control variables are as follows:

Debt-to-asset ratio (DTA): The ratio measures financial risks in organizations, and the ratio in the banking sector is higher than other sectors. Debt-to-asset ratio is often used as a benchmark for predicting debt crisis; Total asset turnover ratio (TAT): The ratio measures operation capacity. High indicator signifies the better liquidity and operating efficiency in the companies; Operating income growth rate (Growth): This metric depicts the growth rate of financial institutions. The higher the operating income growth rate, the more value the financial institution creates and the better its growth potential; Intangible assets ratio (ITA): This indicator is defined as the ratio of intangible assets to total assets. The typical intangible assets contain R&D, goodwill and patents, etc.; Fixed assets ratio (FA): It is defined as the ratio of fixed assets to total assets. Fixed assets are tangible items owned by companies, utilized in operations for long-term financial benefits.

3.2.4. Moderators

Three indicators are selected as moderators for the analysis, consisting of year-on-year growth rate of GDP, CPI index and analyst coverage, and their impacts on ESG ratings and operating performance of commercial banks in China are evaluated. The first two indicators are related to economic factors, while the latter is an indicator of institutional investors activity.

GDP(YoY): Gross domestic product (GDP) is the most effective indicator of a country's economy. YoY measures year-on-year growth rate of a GDP in comparison to the previous year. *Consumer price index (CPI):* CPI is a common macroeconomic indicator used for measuring inflation [30]. Analyst coverage: The number of analysts and research reports focused on the specified bank as proxy variables and the indicator is calculated by the natural logarithm of the number of analysts who paid attention to the bank during the year, plus one [11].

3.2.5. Threshold Variables

The article selects bank characteristic indicators: leverage ratio, firm size and largest shareholder's shareholding ratio as threshold variables. In terms of average means of the variables, 15 sample banks are divided into two different groups for the regression analysis.

Leverage ratio (Lev): This refers to the ratio of equity to total assets in the balance sheet. *Bank size (Size):* The ratio measures the bank scale and calculated by natural logarithm of banks' total assets. *The share of the largest shareholders (Top)*: In this paper, the number of shares held by the top 10 percent of shareholders, as a percentage of the total number of shares issued by the company, is selected.

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3.3. Basic Characteristics of the Data

This section presents the fundamental characteristics of the dataset. As evidenced in Table A2, the total number of individual variable observations is 210, while the overall sample observations amount to 2940. The average ROA of the sample banks is 0.97%, the minimum is 0.34% and the maximum is 1.47%. The mean value of the debt-asset ratio is 93.29%, which is significantly higher than the other segment ratios.

4. Modelling

This paper firstly adopts fixed effects regression as the baseline regression model for the study and considers the impact of individual and year effects on the model. The function of baseline regression model as shown below.

$$ROA_{\mathrm{it}} = \alpha_0 + \beta_i ESG_{it} + \sum \beta_i \, Controls_{it} + \mu_i + \theta_t + \varepsilon_{it} \quad (1)$$

ROA_{it} is operating performance of bank i in year t. β_i denotes the coefficients of variables, measuring sensitivities of ROA to changes in each variable. $ESG_{i,t}$ is the ESG score, transformed from Shanghai Huazheng ESG ratings. μ_i and θ_t denotes the identity effect and year effects, controlled for the model. $Controls_{it}$ denotes the bank characteristics statistics. ε_{it} is error term of the model.

Secondly, the robustness tests used to prove the robustness and validity of the conclusions, which is carried out in three statistical methodologies: the first is mixed regression, i.e., OLS regression; the second is Tobit test, which is utilized to examine the regression model under the truncated dependent variables; and the third involves variable substitution, replacing ROA with ROE to conduct new regression experiments.

Meanwhile, commercial banks in China exhibit distinctive characteristics, such as: different ownership, capital structure and so on. Therefore, it is not appropriate to apply a single regression model to the entire sample. To mitigate the influence of specific characteristics on the outcome, the paper decides to adopt tests for heterogeneity analysis to investigate the relationship. This research implements a heterogeneity analysis by grouping 15 types of commercial banks according to their distinctive characteristics. Furthermore, the analysis considers three exogenous variables, two of which pertains to macroeconomic indicators and one of which pertains to institutions indicator which aims to investigate the roles of these variables in the relationship between ESG performance and operating performance in the banks.

5. Discussions

The two-way fixed effects model represents the benchmark regression model of this paper, namely multivariate regression model implemented after controlling for individual and year effects. The two-way fixed effect model eliminates a certain extent of omitted variable bias caused by individual and year fixed effects [31]. Besides, endogenous bias is common in econometrics, referring to the fact that a single explanatory variable is correlated with an error term, or two error terms are correlated, which can lead to generate inaccurate estimates, misleading conclusions and wrong theoretical explanations [32]. Besides, the paper also noted that although the sources of endogenous bias are various, different approaches can address these issues. One approach deployed in the paper is dynamic generalized method of moments (GMM) model and Stata as statistical software can be utilized to perform GMM model tests in the panel dataset.

This paper employs a GMM model, mixed regression, Tobit test and explanatory variable replacement to assess the robustness of the results. The whole group is divided into two groups based on different characteristics and tested for heterogeneity. Moreover, three exogenous variables are considered to explore the relationship between ESG ratings and commercial banks' performance.

This section displays empirical findings of the models. Table 3 presents the outputs of the two-way fixed effects model, while Tables 4–7 illustrate findings of the robustness tests, Tables 8–11 display the results of the heterogeneity tests. Finally, Tables 12–15 present the results of the moderating effect analysis.

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5.1. Baseline Regression

This study aims to explore the relationship between ESG performance and commercial banks' operating performance (OP). Table A3 presents outcomes of the baseline regression model. The results show that there is a positive relationship between ESG ratings and ROA, which is significant at 1%, 5% and 10%. And R^2 is increasing when control variables are added incrementally in the models, which means that the model's accuracy is gradually improved after introducing five control variables. The full model's result show that the coefficient of ESG rating is 0.0242, meaning that one unit increase in ESG rating of commercial banks brings approximately 2% in the ROA. Explanatory power of ESG rating is strengthened when all control variables are included, and the relation is statistically significant at any levels as stated in the table. Therefore, ESG ratings have positive impacts on the 15 commercial banks' operating performance, which can be regarded as an essential determinant of operating performance.

The evidence is highly consistent with [33], that ESG performance measured by the combined score exhibits a positive and significant relationship with firm profitability, signifying high ESG investing brings promised returns for the firm based on value and profitability. As for investors, they are willing to focus on high ESG-scored banks and invest in the banks which can help to earn profits.

5.2. Robustness Tests

Table A4 describes the outputs of mixed regressions. Mixed regression as a part of robustness tests is used for validating whether empirical findings are consistent among the series of tests. The evidence shows that coefficients of ESG ratings are around 4%, significant at any levels. It means that ESG ratings have positive impacts on commercial banks' ROA. The results are consistent with baseline regressions. As shown in Table 4, it was noted that R2 remained around 0.5, which is lower than that of the baseline regressions, indicating that the fitness of the mixed regression model is slightly inferior to the fixed-way effect model. Standards errors in the models are relatively high as well. For instance, standard errors are 0.0063 in model 6, slightly higher than the errors in baseline regressions. Even if, explanatory power of ESG ratings still strong as reflected in the coefficients, which is 0.04. It represents that one-unit upgrade in banks' ESG rating improves their profitability measured by ROA approximately 4% consequently, with other variables constant. Control variables other than DTA, such as TAT, OI, IA, FA, can significantly explain variations in operating performance of commercial banks in China.

From perspectives of corporate governance, ESG engagement helps to normalize decision-making processes and restrict misconducts within organizations [1; 19], which improves investment efficiency and eliminates unnecessary costs. Hence, it facilitates the maximization of commercial banks' operating performance.

Tobit model, an essential method in econometrics, aims to effectively assess the relation between omitted or truncated continuous independent variables and dependent variables. The study constructed six groups for Tobit models to investigate the impacts of ESG ratings on operating performance, through including five control variables incrementally. Table A5 describes the regression outputs of Tobit models. It can be found that the banks improve ESG ratings for one unit, leading to higher ROA about 2.6%, with other variables unchanged. And some control variables hold significance for ROA.

Explained variables substitution is the third robustness test through replacing ROA with ROE. This study chooses ESG ratings as core explanatory variables and ROE as the modified dependent variable. Then, it retakes fixed-effects regression, mixed regression, and Tobit model, to validate the empirical findings of baseline regression. Table A6 presents result of the test, which reaches out R^2 values are 0.857 and 0.736. The finding demonstrates that the model's fitness is enhanced, and the outcomes are more dependable than those of the original model. ESG ratings impose positive implications on commercial banks' operating performance since the coefficients are positive and significant at the 10%, 5% and 1%.

This paper introduces the general Generalized Method of Moments (GMM) model and the Differential GMM model to address endogeneity bias in the model, which aims to achieve results that

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are close to unbiased estimation and enhance the reliability of the constructed model. Three models differing in their control variables are formed in the GMM model construction. There are six regression models were constructed to assess the impact of each variable on the operating performance of commercial banks. As shown in Table A7, it demonstrates that ESG ratings still positively influence on ROA in the two GMM models and the five variables have varying degrees of explanatory power with respect to the operating performance.

5.3. Heterogeneity Analysis

This paper examines the relationship between ESG ratings and the operating performance of Chinese commercial banks with varying characteristics. To this end, the study employs bank nature, leverage, the largest shareholder's ownership, and firm size as threshold variables for heterogeneity analysis.

Table A8 presents regression outputs based on differences in ownership nature. The sample is divided into two groups in terms of ownership nature, one is state-owned commercial banks, and another is join-stock commercial banks. The results show that the coefficient of ESG ratings in state-owned banks is 0.03, significant at 10%. That's to say, one unit upgrade in ESG rating brings around 2% higher in operating performance of state-owned banks. Whereas, in joint-stock banks group, ESG rating cannot significantly influence on operating performance of the banks.

The rationale for this is that the financial regulation of large state-owned commercial banks is more stringent than that of joint-stock commercial banks. The banks can proactively address the call of the central financial work conference through the implementation of a green finance policy. At the same time, the banks play a leading role in financial institutions and need to maintain social reputation through full engagement of ESG practices. This helps to standardize business models and decision-making process, thus thereby contribute to improve operating performance. On the other hand, as stated in the results it is not important for joint-stock commercial banks improve their operating performance by maintaining good ESG performance. The rationale is that joint-stock banks are inclined to preserve shareholders' interests and maximize their own interests, rather than fulfilling their obligations in the fields of corporate governance, environmental protection and social responsibility. The empirical results provide clear guidance for policymakers and regulators who should implement measures to strengthen the information disclosure on ESG performance of joint-stock commercial banks and encourage to participate ESG - oriented governance.

This section examines the impacts of differences in leverage ratio on the relationship between ESG ratings and operating performance of commercial banks. The threshold variable value is 6.56. Table A9 presents the outcomes of heterogeneity analysis based on leverage ratio. The evidence finds that in high leveraged banks, there is a positive relationship between ESG rating and ROA as reflected in the coefficient, indicating ESG rating can significantly explain the operating performance at 1%, 5% and 10% level. In contrast, for banks with below-average leverage, ESG ratings as an explanatory variable perform poorly and don't hold significance. Specifically, debt to asset ratio is significantly correlated to return on asset in high leveraged banks. The rationale is that leverage ratio and debt-to-asset ratio are measures of debt. Higher indicators can regulate decision-making process and limit misconducts in banks, which helps to cut off unnecessary costs and enhance investment efficiency in operations, consequently improving operating performance.

The section examines the relationship between the largest shareholders' shareholding ratio, ESG ratings and operating performance. Table A10 presents ESG ratings are positively related to commercial banks' operating performance, whose threshold variable is above sample mean. However, ESG ratings have no explanatory power for the ROA of commercial banks in the below-average sample. In addition, debt to asset ratio, total asset turnover ratio and operating income growth rate can significant and positive implications on the operating performance of Chinese commercial banks.

The phenomena can be elaborated by [34], that precise signals of efforts are required by the largest shareholder under concentrated share ownership, which can receive better monitor and bring values in the firm. It means that the largest shareholders need more accurate signals before acting. Therefore, controversies among ESG concepts are minimal in banks with concentrated share

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ownership and agency costs are reduced in a large degree. The likelihood of ESG practices thus has been maximized and it brings more bank values.

The sample banks have been classified into two groups based on their average size, to undertake the fixed effect regression. The first group consists of banks that were larger than the mean, while the second group included those that were below the mean. The threshold variable value is 12.77. Table A11 presents outcomes of the analysis based on bank size. The results indicate that there is a positive correlation between the ESG rating and operating performance of the bank, especially in banks with large size. It implies that one unit of increase in ESG rating can bring higher returns about 2.76%. But the relation is limited in small or medium - scale banks.

The main rationale is that a large scale signifies that the banks possess sufficient assets and cash flows to bear operating expenses, for the purpose of improving ESG performance, except for other costs such as: administrative expenses, costs of goods sold. Sustainability practices are positively related to enhanced social sustainability performance and better firm financial performance [23]. Thus, banks institutions which engages ESG practices are likely to receive better financial performance.

5.4. Moderation Analysis

Table A12 presents outputs of moderating analysis. This section examines the moderating effect of GDP growth rate on the relationship between ESG ratings and the operating performance of commercial banks in China. The moderator is constructed through intersection term between ESG ratings and GDP growth. The test involved variables including return on assets, ESG ratings, five control variables and one intersection term, to conduct fixed effect regression models. The results indicate that GDP growth rate, a moderator can strengthen explanatory power of ESG ratings while it has positive moderating effects on improvement in the operating performance. The coefficient of intersection term is positive, and the mean is 0.3%, which means that when GDP growth rate increases one unit, ROA will improve to the same level with other variables constant. The moderator holds statistical significance at any levels, and its standard errors are relatively small. The positive relation between ESG performance and GDP is in align with [35], that better ESG performance signifies better economic growth prospects in long term.

Table A13 presents regression outputs with CPI as a moderator. CPI measures the price of domestic products, and the growth rate of CPI determines the country's inflations. The evidence finds that it exists a positive moderating effect between CPI and operating performance because the coefficient of intersection term is positive in the six models, significant at 5% and 10%. In details, each unit increase in CPI can drive ESG performance up by 0.3 percent in the full model, which has positive impacts on the Chinese commercial banks' operating performance. However, negative constants in the model weaken the overall improvements in operating performance of commercial banks.

A rising CPI indicates that the domestic economy is performing well, and that domestic products' price are becoming more expensive, which influences on operating performance of commercial banks. When growth rate of CPI exceeds a threshold value, central bank of China introduces higher interest rates to control climbing prices. The measure is to attract more deposits from clients and banks need to pay higher interests on the deposits to them as return, which results in lower overall performance of banks in China.

Table A14 presents the regression results of a fixed effect model with analyst coverage as a moderator. To measure analyst coverage, the study employs the natural logarithm of the number of analysts' attention plus one. Except for Model 4, the results demonstrate that the coefficients of the intersection term exhibit a positive and statistically significant at the 1%, 5%, and 10% levels. This suggests that analyst coverage may serve to reinforce the correlation between ESG ratings and the operating performance of commercial banks.

It can be inferred from the evidence that there is a positive correlation between analyst coverage and ESG ratings. This indicates that the number of analysts focusing on a particular bank may, to some extent, prompt improvements in ESG performance [36]. This is attributable to the discipline effect of analyst coverage. The increased attention from financial analysts has the effect of restraining

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misconducts within organizations and enhancing awareness of ESG practices, which in turn improves banks' ESG performance. Superior banks' ESG performance can attract more attentions from analysts, who are willing to write analyst reports for the banks. High ESG performance is linked with the enhanced corporate stock price synchronicity [37]. Investors tend to focus on banks with better ESG ratings as well and purchase stocks in banking sectors with outstanding ESG performance, which incentives to upgrade banks' value. Ultimately, the overall operational performance of commercial banks is enhanced.

6. Countermeasure and Suggestions

Given that the empirical outcomes, the paper proposes corresponding countermeasures from the perspective of policy makers, banks, and investors who consists of individuals and professionals. These countermeasures address the following points:

6.1. Countermeasures and Suggestions from the Perspective of Policymakers

For policymakers, it is recommended that ESG related policies be formed to incentive banks for ESG engagement. In addition, they need to emphasize the importance of ESG practices and enhance awareness of ESG performance for enterprises. And they should guide joint-stock commercial banks to fulfil ESG practices.

For regulatory departments, it is recommended to strengthen the regulation of ESG performance disclosure and improve information transparency in financial markets, which should be considered to reduce negative impacts of systemic risk on enterprises' operating performance, particular for banks.

6.2. Countermeasures and Suggestions from the Perspective of Banks

(1) Commercial banks should maintain good ESG performance and practice all aspects of ESG, such as: social responsibility, environment protection and corporate governance for regulating operating behaviors and improving ESG scores, which significantly enhances their operating performance.

(2) Commercial banks whose shareholdings' ratio of largest shareholder is below than the industry average need to enhance awareness of ESG practices and eliminate controversies towards ESG within organization.

(3) Banks must recognize that the implementation of ESG practices are the responsibility of the banks themselves. They are recommended to implement green finance in depth from a long-term perspective, instead of simply fulfilling ESG standards.

(4) Banks are suggested enhancing information disclosure on ESG practices and scores, which can help improve information transparency on themselves, thereby reducing the degree of information asymmetric in financial markets.

(5) Banks are encouraged enhancing ESG performance, which can effectively deal with negative influences of tail risks in financial market.

(6) Bank managers are recommended to be ESG concepts oriented and regulate their conducts for strengthening sustainable development of banks.

6.3. Countermeasures and Suggestions from the Perspective of Investors

6.3.1. For Individual Investors

(1) Investors should integrate ESG considerations into their investing strategies according to investment capacity and high ESG-rated stocks can be chosen as underlying assets.

(2) Investors are encouraged practicing ESG investing, which helps to mitigate the downside risks to stock prices in a financial market recession.

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6.3.2. For Institutional Investors

(3) Investors are encouraged to undertake further research on ESG performance and develop quantitative investment models that incorporates ESG ratings.

(4) Investors can use ESG investment concepts to optimize underlying asset pool by means of strategic asset allocation.

(5) Investors are suggested investing in banks with superior ESG performance and increasing their weights in the investment portfolios, while reducing the weight of banks with poor ESG performance. This leads to improve the overall performance of the investment portfolios.

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Appendix A

Table A1. Variable Summary.

Variable Names	Symbol	Variable Construction	**Type**
Return on Assets	*ROA*	Net Income/Average Assets	Explained Variable
Returns on Equity	*ROE*	Net Income/Average Equity	
ESG Performance	*ESG*	Assign a score of 0 to 9 based on ESG ratings	Explanatory Variable
Debt to Asset Ratio	*DTA*	Total Debt/Total Asset * 100%	Control Variable
Total Asset Turnover	*TAT*	Total Sales/Average Assets	
Operating Income Growth Rate	*Growth*	[Operating Income / OI (Previous) – 1]	
Intangible Assets Ratio	*ITA*	Intangible Assets/Total Assets	
Fixed Assets Ratio	*FA*	Tangible Assets/ Total Assets	
Bank Size	Size	Natural Logarithm of Total Assets	
Leverage Ratio	Lev	Equity Capital/Total Capital	
Largest shareholders' shareholding	Top%	Number of shares held by the top ten shareholders / Total number of outstanding shares	Threshold Variable
GDP Growth Rate	GDP%	Gross domestic product/GDP (Previous Year)	
CPI	CPI	Consumer Price Index	Moderator
Analyst Coverage	Analyst	Ln (numbers of analysts tracking on a bank +1)	

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Table A2. Descriptive statistics.

	Obs.	Mean	Median	SD	Min	Max
ROE	210	15.5578	14.915	4.9613	6.0100	31.7900
ROA	210	0.9739	0.9760	0.2410	0.3400	1.4700
ESG	210	4.9762	6.0000	1.9428	0.0000	7.0000
DTA	210	93.2949	93.244	1.4740	90.5884	98.3502
TAT	210	0.0293	0.0290	0.0042	0.0201	0.041
Growth	210	13.5827	10.452	13.6645	-15.5968	64.4801
IA	210	0.0696	0.0460	0.0683	0.0025	0.4761
FA	210	0.6109	0.5600	0.3064	0.1743	1.7018
Lev	210	6.5629	6.6450	0.9618	3.6221	8.6912
Top	210	76.0414	74.865	18.0457	33.6912	100
Size	210	8.5954	8.6910	1.1920	0.0000	10.5868
YoY	210	7.1333	7.2336	2.2206	2.2386	10.6359
CPI	210	0.9976	0.9981	0.0226	0.9377	1.0403
Analyst	210	3.2277	3.2958	0.6472	0.0000	4.3944

Table A3. Regression outputs of fixed-effect model.

	(1)	(2)	(3)	(4)	(5)	(6)
ESG	0.0246**	0.0286***	0.0240***	0.0241***	0.0242***	0.0242***
	(0.0094)	(0.0086)	(0.0058)	(0.0056)	(0.0057)	(0.0056)
DTA		0.0578***	0.0401***	0.0341***	0.0341***	0.0346***
		(0.0088)	(0.0060)	(0.0062)	(0.0062)	(0.0066)
TAT			35.3398***	30.9510***	30.9926***	31.0652***
			(2.3147)	(2.4923)	(2.4957)	(2.5468)
OI				0.0024***	0.0024***	0.0021***
				(0.0007)	(0.0007)	(0.0007)
IA					0.1238	0.1938
					(0.1617)	(0.1698)
FA						-0.0591
						(0.0457)
Constant	0.8508***	-4.5634***	-3.9254***	-3.2641***	-3.2770***	-3.2888***
	(0.0487)	(0.8254)	(0.5569)	(0.5827)	(0.5836)	(0.5825)
R^2	0.034	0.211	0.645	0.669	0.670	0.674
Id FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes

*Notes: *, **, *** indicate that coefficients in the regression models are significant at 10%, 5% and 1% respectively; Values in parentheses are standard errors.

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Table A4. Regression outputs of mixed regression model

	(1)	(2)	(3)	(4)	(5)	(6)
ESG	0.0517***	0.0530***	0.0376***	0.0388***	0.0386***	0.0372***
	(0.0080)	(0.0085)	(0.0069)	(0.0069)	(0.0068)	(0.0063)
DTA		0.0052	-0.0032	-0.0083	-0.0084	0.0006
		(0.0110)	(0.0088)	(0.0095)	(0.0093)	(0.0088)
TAT			32.4879***	29.4341***	31.7364***	32.1948***
			(3.0096)	(3.2255)	(3.2332)	(2.9922)
OI				0.0023***	0.0025**	0.0040***
				(0.0010)	(0.0010)	(0.0010)
IA					-0.5815***	-0.7389***
					(0.1803)	(0.1690)
FA						0.2232***
						(0.0377)
Constant	0.7155	0.2216	0.1347	0.6607	0.6413	-0.3485
	(0.0426)	(0.1414)	(0.8337)	(0.9009)	(0.8807)	(0.8318)
R^2	0.1695	0.1704	0.4711	0.4700	0.4960	0.5707

*Notes: *, **, *** indicate that coefficients in the regression models are significant at 10%, 5% and 1% respectively; Values in parentheses are standard errors.

Table A5. Regression outputs of Tobit model

	(1)	(2)	(3)	(4)	(5)	(6)
ESG	0.0298***	0.0325***	0.0255***	0.0256***	0.0256***	0.0255***
	(0.0091)	(0.0084)	(0.0057)	(0.0055)	(0.0055)	(0.0055)
DTA		0.0537***	0.0381***	0.0322***	0.0323***	0.0326***
		(0.0088)	(0.0060)	(0.0062)	(0.0062)	(0.0062)
TAT			35.3680***	31.0520***	31.0607***	31.0885***
			(2.2722)	(2.4386)	(2.4357)	(2.4300)
OI				0.0024***	0.0024***	0.0022***
				(0.0006)	(0.0007)	(0.0007)
IA					0.0839	0.1188
					(0.5787)	(0.1663)
FA						-0.0281
						(0.0441)
Constant	0.8235***	-4.2018***	-3.7474***	-3.1046***	-3.1165***	-3.1279***
	(0.0601)	(0.8278)	(0.5555)	(0.5792)	(0.5787)	(0.5771)
R^2						

*Notes: *, **, *** indicate that coefficients in the regression models are significant at 10%, 5% and 1% respectively; Values in parentheses are standard errors.

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Table A6. Regression outputs of explained variables substitution

	(1) Baseline	(2) Mixed	(3) Tobit Model
ESG	0.1907*	0.5497***	0.2394**
	(0.1056)	(0.1030)	(0.1033)
DTA	2.9263***	2.4823***	2.8780 ***
	(0.1179)	(0.1437)	(0.1168)
TAT	346.9189***	429.9061***	351.6303***
	(47.0384)	(49.1286)	(45.7105)
OI	0.0656***	0.0755***	0.0678***
	(0.0131)	(0.0160)	(0.0128)
IA	-2.4858	-12.0753***	-3.7498
	(3.2082)	(2.7740)	(3.0929)
FA	-1.1438	3.0700***	-0.4194
	(0.8454)	(0.6197)	(0.8317)
Constant	-268.5775***	-233.4620***	-264.9642***
	(10.9986)	(13.6577)	(10.8926)
R^2	0.857	0.736	
Id FE	Yes		
Year FE	Yes		

*Notes: *, **, *** indicate that coefficients in the regression models are significant at 10%, 5% and 1% respectively; Values in parentheses are standard errors.

Table A7. Regression outputs of endogenous tests

	General GMM			Differential GMM		
ESG	0.0549***	0.0362***	0.0372***	0.0182	0.0208**	0.0206**
	(0.0078)	(0.0059)	(0.0068)	(0.0143)	(0.0090)	(0.0086)
DTA	0.0143	-0.0175**	0.0006	0.0745***	0.0419***	0.0407**
	(0.0109)	(0.0076)	(0.0087)	(0.0288)	(0.0136)	(0.0192)
TAT		38.3273***	32.1948***		28.4013***	29.9910***
		(3.8845)	(3.5403)		(5.1930)	(7.9934)
OI		0.0014*	0.0040***		0.0014	0.0009
		(0.0009)	(0.0010)		(0.0009)	(0.0010)
IA			-0.7389***			0.4477
			(0.1768)			(0.3737)
FA			0.2233***			-0.0953
			(0.0421)			(0.0696)
Constant	-0.6440	1.2992*	-0.3485	-6.0722**	-3.8775***	-3.7735**
	(1.0332)	(0.7091)	(0.8079)	(2.6759)	(1.2278)	(1.6782)

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Id FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes

* Notes: *, **, *** indicate that coefficients in the regression models are significant at 10%, 5% and 1% respectively; Values in parentheses are standard errors.

Table A8. Regression outputs based on differences in the banks' ownership nature

	State-Owned	Joint-Stock
ESG	0.0282*	0.0137
	(0.0048)	(0.0089)
DTA	0.0305***	0.0410***
	(0.0071)	(0.0093)
TAT	39.4020***	30.3006***
	(2.6480)	(3.6861)
OI	0.0000	0.0025***
	(0.0008)	(0.0010)
IA	-0.7100***	0.3226
	(0.2526)	(0.2199)
FA	-0.0321	0.0275
	(0.0311)	(0.0995)
Constant	-3.0194***	-3.9225
	(0.6417)	(0.8911)
R^2	0.902	0.612
Id FE	Yes	Yes
Year FE	Yes	Yes

*Notes: *, **, *** indicate that coefficients in the regression models are significant at 10%, 5% and 1% respectively; Values in parentheses are standard errors.

Table A9. Regression outputs based on differences in leverage ratios

	Lev > 6.56	*Lev* < 6.56
ESG	0.0351***	0.0012
	(0.007)	(0.0064)
DTA	0.0260***	-0.0241
	(0.006)	(0.0145)
TAT	44.1324***	21.8888***
	(2.687)	(4.0619)
OI	0.0001	0.0001
	(0.001)	(0.0012)
IA	-0.0997	1.5032***
	(0.154)	(0.3952)

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FA	-0.0213	-0.4174***
	(0.040)	(0.1521)
Constant	-2.8585***	2.6141*
	(0.516)	(1.3518)
R^2	0.804	0.700
Id FE	Yes	Yes
Year FE	Yes	Yes

*Notes: *, **, *** indicate that coefficients in the regression models are significant at 10%, 5% and 1% respectively; Values in parentheses are standard errors.

Table A10. Regression outputs based on differences in shareholdings of largest shareholders.

	Top% > 35.65	Top% < 35.65
ESG	0.0446***	0.0092
	(0.0073)	(0.0082)
DTA	0.0474***	0.0270***
	(0.0111)	(0.0085)
TAT	21.6224***	41.3878***
	(4.2179)	(3.7575)
OI	0.0031***	0.0002
	(0.0010)	(0.0095)
IA	0.1196	0.1104
	(0.2540)	(0.3214)
FA	0.0061	-0.0697
	(0.0817)	(0.0624)
Constant	-4.3870***	-2.7441***
	(1.0169)	(0.8078)
R^2	0.739	0.735
Id FE	YES	YES
Year FE	YES	YES

*Notes: *, **, *** indicate that coefficients in the regression models are significant at 10%, 5% and 1% respectively; Values in parentheses are standard errors.

Table A11. Regression outputs based on bank size

	Size > 12.77	Size < 12.77
ESG	0.0274***	0.0066
	(0.0061)	(0.011)
DTA	0.0169**	0.0439***
	(0.0084)	(0.013)

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TAT	40.0110***	25.7275***
	(3.4476)	(5.407)
OI	0.0006	0.0017
	(0.0011)	(0.001)
IA	-0.3758	0.5018*
	(0.3328)	(0.264)
FA	-0.0239	-0.1254
	(0.0533)	(0.130)
Constant	-1.8322**	-3.9644***
	(0.7519)	(1.317)
R^2	0.760	0.422
Id FE	YES	YES
Year FE	YES	YES

*Notes: *, **, *** indicate that coefficients in the regression models are significant at 10%, 5% and 1% respectively; Values in parentheses are standard errors.

Table A12. Regression outputs with GDP growth rate as a moderator

	(1)	(2)	(3)	(4)	(5)	(6)
ESG	-0.8349***	-0.7167***	-0.3845***	-0.2574**	-0.2490*	-0.2733**
	(0.1636)	(0.1504)	(0.1060)	(0.1256)	(0.1271)	(0.1275)
*ESG * GDP*	0.0084***	0.0073***	0.0040***	0.0028**	0.0027**	0.0029**
	(0.0016)	(0.0015)	(0.0010)	(0.0012)	(0.0012)	(0.0012)
DTA		0.0528***	0.0384***	0.0359***	0.0359***	0.0366***
		(0.0084)	(0.0058)	(0.0062)	(0.0062)	(0.0062)
TAT			33.4157***	31.1806***	31.1986***	31.3045***
			(2.2897)	(2.4683)	(2.4738)	(2.4644)
OI				0.0015*	0.0015*	0.0010
				(0.0008)	(0.0008)	(0.0081)
IA					0.0739	0.1541
					(0.1619)	(0.1688)
FA						-0.0714
						(0.0446)
Constant	0.8507***	-4.0938***	-3.7026***	-3.4230***	-3.4260***	-3.4535***
	(0.0456)	(0.7846)	(0.5408)	(0.5809)	(0.5822)	(0.5800)
R^2	0.155	0.301	0.671	0.678	0.678	0.683
Id FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes

*Notes: *, **, *** indicate that coefficients in the regression models are significant at 10%, 5% and 1% respectively; Values in parentheses are standard errors.

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Table A13. Regression outputs with CPI as a moderator.

	(1)	(2)	(3)	(4)	(5)	(6)
ESG	-0.8349***	-0.7167***	-0.3845***	-0.2574**	-0.2490*	-0.2733**
	(0.1636)	(0.1504)	(0.1060)	(0.1256)	(0.1271)	(0.1275)
*ESG*CPI*	0.0084***	0.0073***	0.0040***	0.0028**	0.0027**	0.0029**
	(0.0016)	(0.0015)	(0.0010)	(0.0012)	(0.0012)	(0.0012)
DTA		0.0528***	0.0384***	0.0359***	0.0359***	0.0366***
		(0.0084)	(0.0058)	(0.0062)	(0.0062)	(0.0062)
TAT			33.4157***	31.1806***	31.1986***	31.3045***
			(2.2897)	(2.4683)	(2.4738)	(2.4644)
OI				0.0015*	0.0015*	0.0010
				(0.0008)	(0.0008)	(0.0081)
IA					0.0739	0.1541
					(0.1619)	(0.1688)
FA						-0.0714
						(0.0446)
Constant	0.8507***	-4.0938***	-3.7026***	-3.4230***	-3.4260***	-3.4535***
	(0.0456)	(0.7846)	(0.5408)	(0.5809)	(0.5822)	(0.5800)
R^2	0.155	0.301	0.671	0.678	0.678	0.683
Id FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes

*Notes: *, **, *** indicate that coefficients in the regression models are significant at 10%, 5% and 1% respectively; Values in parentheses are standard errors.

Table A14. Regression outputs with analyst coverage as a moderator.

	(1)	(2)	(3)	(4)	(5)	(6)
ESG	-0.0349**	-0.0132	0.0165	0.0254*	0.0133	0.0133
	(0.016)	(0.018)	(0.013)	(0.013)	(0.013)	(0.013)
*ESG*Analyst*	0.0280***	0.0210***	0.0079**	0.0046	0.0095***	0.0095***
	(0.003)	(0.004)	(0.003)	(0.003)	(0.003)	(0.003)
DTA		0.0281***	0.0337***	0.0311***	0.0322***	0.0321***
		(0.011)	(0.008)	(0.007)	(0.007)	(0.0321)
TAT			30.7041***	28.4123***	24.4019***	24.3839***
			(2.349)	(2.418)	(2.408)	(2.421)
OI				0.0022***	0.0018**	0.0018**
				(0.001)	(0.001)	(0.001)
IA					0.2155	0.2119
					(0.158)	(0.162)
FA						0.0050

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						(0.044)
Constant	0.6869***	-1.9185*	-3.2767***	-2.9832***	-3.0128***	-3.0057***
	(0.061)	(0.995)	(0.711)	(0.702)	(0.699)	(0.704)
R^2	0.389	0.412	0.708	0.723	0.750	0.750
Id FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes

*Notes: *, **, *** indicate that coefficients in the regression models are significant at 10%, 5% and 1% respectively; Values in parentheses are standard errors.

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