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Resilience of private enterprises and ESG performance: Evidence from the Chinese financial industry

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Research Article

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Abstract: Environmental, Social, and Governance (ESG) factors have steadily grown in importance as measures of businesses' overall success in recent years. In order to show how ESG performance affects private firms' resilience, this research builds a signaling model. Using data from China's Shanghai and Shenzhen A-shares listed private companies from 2009 to 2022, it also looks at how ESG performance impacts the resilience of private businesses. A number of endogeneity tests and robustness analysis support the fundamental result that strong ESG performance considerably increases business resilience. According to the mechanism analysis, ESG performance may improve the resilience of private businesses by attracting investment, securing government subsidies, and easing financial restrictions. The transmission mechanism of ESG performance on the resilience of private firms is revealed in this study, which also enhances research on ESG performance and offers empirical evidence for policy makers and enterprise managers to improve the overall sustainability and resilience of private enterprises.

Keywords: Private businesses, organizational resilience, and ESG performance

Introduction

ESG (Environment-Social-Government), a common notion of sustainable development, is a key motivator for businesses to produce long-term value in the framework of sustainable and high-quality development. In the future, it is anticipated to become a popular investment trend (Albuquerque, 2019). The majority of sovereign nations and other international organizations have responded favorably to the idea of ESG since it was originally put out by the United Nations Global Compact (UNGC) in 2004. The percentage of ESG investments under management in nations and regions outside of the United States rose from 35.9% of the total management volume mentioned in the 2020 Review to 37.9%, according to the Global Sustainable Investment Review 2022 published by the Global Sustainable Investment Alliance (GSIA). Global ESG investment grew at a pace of 24.75% annually from $22.8 trillion in 2016 to $30.3 trillion in 2022. Furthermore, in 2022, 684 organizations of all kinds ratified the Principles for Responsible Investment (PRI), which is backed by the UN. 43 corporations, or 86% of the top 50 in the world for assets management, have joined the PRI. It is evident that the top asset management companies in the world place a high value on ESG investment.

This has led Chinese businesses to place a greater emphasis on ESG performance. As of the end of July 2023, the ESG information disclosure rate for A-shares in 2022 had risen to 34.85%, or around three-quarters of the entire market value of A-shares, according to the China ESG Development White Paper 2023. More significantly, we can observe that a number of top private companies, including ESG30 members like Lenovo Group and Ant Group, have thoroughly integrated ESG into enterprise governance, management, and business scenarios in addition to considering and approving ESG from a strategic standpoint. A new business model centered on multi-stakeholders and aiming for long-term win-win outcomes emerged as a consequence of the tight integration of ESG with company growth and value generation (Majoch et al., 2017; Dyck et al., 2019). However, private businesses also confront a significant obstacle when it comes to ESG practice. Private businesses prioritize social responsibility based on their own growth requirements, in contrast to state-owned businesses, which have been entrusted with considerable social duty from their

founding. Private businesses have less prospects for growth and survival than state-owned businesses, and they are also less able to withstand risk.

Therefore, whether optimizing ESG performance may increase the resilience of private firms, while encouraging their sustainable growth, is a subject deserving of further debate when contrasted to state-owned enterprises. Enterprise resilience is considered a crucial indicator to gauge an organization's ability to withstand risk (Ortiz-De-Mandojana and Bansal, 2016; Sahebjamnia et al., 2018; Desjardine et al., 2019; Sajko et al., 2020). It has also drawn more attention from academics in recent years. Resilience, according to Williams et al. (2017), is an organization's capacity to swiftly create plans for survival, adaptation, reaction, stability maintenance, and prediction in the face of environmental shocks. According to Barasa et al. (2018), enterprise resilience is an innate talent that aids businesses in maintaining high performance growth and low financial vulnerability via the development of positive social network ties during times of external environmental stress. Private businesses are becoming more and more significant in China's economy due to their growing numbers and contributions (Branicki et al., 2018). Private businesses need to be resilient for their own growth if they are to survive and grow (Abiad et al., 2015). Private businesses that are resilient can react to crises more quickly and effectively, which lowers losses and organizational vulnerability (Bevaola et al., 2010). As a result, the resilience of private businesses may be considered a micro branch of economic resilience, which is a crucial guarantee for sustainable economic growth and a key indication of a nation's economy's ability to achieve high-quality development (Pathak and Ahmad, 2018).

Research on enhancing the resilience of private businesses is now increasing. The degree of enterprise resilience, such as the cognitive level of organizational members (Howell and Brown, 2023), the richness of resource reserves (Bonfim et al., 2023), and the flexibility for strategic change (Fahlenbrach et al., 2021), is determined by the internal governance of private enterprises, according to some researchers; other scholars contend that the external environmental adaptability of private enterprises plays a significant role in actively responding to environmental changes and enhancing crisis management (Ding et al., 2021). Nevertheless, not much research has been done on how ESG performance affects private companies' resilience. This study aims to close this gap and demonstrate how ESG performance might improve private businesses' resilience.

In order to assess how ESG performance improves the resilience of private firms from a theoretical standpoint, this article first builds a signaling model. It then uses empirical research to further investigate the effect of ESG performance on the resilience of private enterprises. The following are this paper's primary marginal contributions: First, this work builds the signaling model. Currently, the majority of the literature examines how ESG performance affects an organization's resilience via empirical study, and no researchers have developed a model to show how ESG performance affects private firms' resilience. Second, this article provides a useful theoretical foundation for the viability of enhancing the resilience of private firms by analyzing the mechanism of ESG performance on resilience via in-depth research on institutional investors' investment, government subsidies, and financing limitations. Lastly, this work contributes to the relevant literature on private company resilience and ESG performance. The majority of the research now in publication examines how ESG performance affects digital transformation, innovation investment strategy, and asset disposal strategy in the capital market. This article supports the idea that optimizing ESG performance may assist private firms improve their resilience for development and further increases the function of ESG performance from the standpoint of risk resistance capability of enterprises.

1. Theoretical model

This section analyzes the relationship between ESG performance and the resilience of private enterprises by constructing a signal schematic theoretical model (Leland and Pyle, 1997). We assume that there are a large number of private enterprises in the market, each with a project that requires financing. Considering a relatively simplified situation, all private enterprises are divided into two categories: the first type, referred to as Type A, has better financial performance and is a high-quality enterprise worthy of investment; the second type, referred to as Type B, has poorer financial performance and is more risky to invest in. Both types of enterprises finance their projects by issuing shares, and the expected profits are respectively presented in Eq. (1) and (2):

$$\pi_A = P_A N_A - C_A \#(1)$$

$$\pi_B = P_B N_B - C_B \#(2)$$

In this model, π_A and π_B represent the profits of enterprises A and B, respectively, from issuing shares. P_A and P_B are the stock prices, with P_A being greater than P_B. N_A and N_B are the number of shares issued by enterprises A and B, respectively. C_A and C_B are the total costs of the issuing the stocks for enterprises A and B, respectively.

Next, considering the investor, we assume that the total expected income from dividends and capital gains obtained by the investors after purchasing the stocks is M, then the investor's expected profit from purchasing the stocks of enterprises A and B is $(M_A - P_A N_A)$ and $(M_B - P_B N_B)$, respectively. For investors, in order to maximize their own profits, they need to purchase the stocks at the lowest possible price. In the complete information market, investors would know all the information about an enterprise and could buy the shares of enterprises A and B at P_A and P_B, respectively. However, the actual capital market is not fully informed, leading to information asymmetry between investors and enterprises. Investors cannot confirm the type of enterprises and can only infer the proportions of enterprises A and B based on experience to inform their strategy. At this point, the investor infers that the proportions of enterprises A and B are ε_A and ε_B respectively, and the sum of them equals 1. The formula $(\varepsilon_A P_A + \varepsilon_B P_B)$ represents the stock price that the investor is willing to pay. Then the expected profits of enterprises A and B can be determined using the following formulas:

$$\pi_A = (\varepsilon_A P_A + \varepsilon_B P_B) N_A - C_A \#(3)$$

$$\pi_B = (\varepsilon_A P_A + \varepsilon_B P_B) N_B - C_B \#(4)$$

We subtract Eq. (1) from Eq. (3), and the result is $\varepsilon_B N_A (P_B - P_A)$, which is less than 0. At the same time, We subtract Eq. (2) from Eq. (4), and the result is $\varepsilon_A N_B (P_A$

$— P_B)$, which is greater than 0.

In other words, in the capital market with asymmetric information, the profit obtained by enterprises A is lower than expected, while the profit obtained by enterprises B is higher than expected. At this point,

enterprises A need to distinguish themselves from enterprises B through signal transmission. ESG performance can be transmitted to investors as a signal, so as to achieve the distinction between enterprises. As private enterprises are operating with the goal of maximizing profits, generally speaking, only when their own operating conditions are good, will they have excess resources and be willing to improve ESG performance. Therefore, by improving their ESG performance, enterprises A can signal to investors that they are good enterprises worthy of investment, so that they can issue shares at a price of P_A. If H represents the cost of improving ESG performance for private enterprises, the expected profit of enterprises A can be expressed as follows:

$$\pi_A = P_A N_A — C_A — H \#(5)$$

However, this measure is not always effective. Enterprises B are likely to imitate enterprises A by improving their ESG performance so that they can also issue shares at a price of P_A. At this time, enterprises B's expected profit is $(P_A N_B — C_B —H)$, while the expected profit that enterprises B does not imitate enterprises A is $(P_B N_B — C_B)$. Therefore, to prevent enterprises B from imitating enterprises A, the condition $P_B N_B — C_B > P_A N_B — C_B —H$ needs to be satisfied. After simplifying the inequality, we can conclude that is $H > N_B(P_A — P_B)$. In other words, when the cost of improving ESG performance is greater than that of $N_B(P_A — P_B)$, enterprises B will not imitate enterprises A. Moreover, when the result of Eq. (5) minus Eq. (2) is greater than 0, that is, $H < P_A N_A — C_A + C_B — P_B N_B$, enterprises A can distinguish themselves from enterprises B by improving their ESG performance, effectively solving the problem of information asymmetry. Additionally, they can also make expected profit higher than that of enterprises B.

The positive improvement of ESG performance by enterprises A not only responds to the government's call for enterprises to improve ESG performance, but also helps the government to fulfill public functions related to employment, taxation, economic development and social stability. First of all, because of this two-way interaction, it is easier for enterprises A to obtain the favor and support of the government. When enterprises A suffer from external shocks during a crisis, the government may provide more financial subsidies to them. Existing studies have shown that private enterprises face external financing constraints in innovation investment activities, while government subsidies can help alleviate these constraints and smooth innovation investment fluctuations (Bernile et al., 2017). And government subsidies can also enhance the internal resource regeneration capacity of enterprises and increase their resilience (Criscuolo and Martin, 2019). These subsidies can help enterprises A offset the impact of negative earnings and negative news, thereby stabilizing their financial position. When enterprises A receive government subsidies, they also send a positive signal to the market, indicating that the enterprise is

recognized by the government，which is one of the ways listed enterprises to enhance their investment value through ESG practice (Bonfim et al., 2023). Enterprises A will use the government subsidies obtained as certification and endorsement, leading institutional investors to perceive that these enterprises have higher status and reputation and less risk, thus giving them biased support (Nofsinger et al., 2019). The response of investors to such signals can enhance the market's confidence in enterprises and increase the stock price of enterprises**,** thus further optimizing the capital structure. According to relevant literature, government subsidies and investor investments can not only directly alleviate the financial pressure of enterprises, but also improve the long-term survival and development ability by strengthening their market competitiveness and credibility (Zhou et al., 2017; Chen et al., 2019; Sun et al., 2020). The sum of these subsidies quantified as currency is S, and the expected profit of enterprises can be expressed as follows:

$$\pi_A = P_A N_A - C_A - H + S \#(6)$$

When the cost of improving ESG performance (H) for private enterprises is less than the sum of $S + \varepsilon_B N_A (P_A - P_B)$, Eq. (6) is greater than Eq. (3), indicating that enterprises A with better ESG performance can be favored by the government and obtain more government subsidies. In addition, they can raise more funds in the stock market and alleviate external financing constraints after effectively solving the problem of information asymmetry with investors. It will enhance the ability of private enterprises to cope with crises and strengthen their resilience.

Based on theoretical model analysis, this paper proposes the following research hypotheses.

Hypothesis 1: Better ESG performance can enhance the resilience of private enterprises.

Hypothesis 2: Better ESG performance can enhance the resilience of private enterprises by facilitating access to government subsidies.

Hypothesis 3: Better ESG performance can enhance the resilience of private enterprises by attracting investment from institutional investors.

Hypothesis 4: Better ESG performance can enhance the resilience of private enterprises by alleviating financing constraints.

2. Research design

2.1. Sample selection and data source

This paper uses all China's A-share private enterprises listed on the Shanghai and the Shenzhen Stock Exchanges from 2009 to 2022 as the research sample. We follow these steps to clean the sample: Firstly, we exclude private enterprises listed after 2009.

Secondly, we remove private enterprises delisted between January 20, 2009 and December 31, 2022. In addition, we exclude samples that were ST or *ST during the period from January 20, 2009, to December 31, 2022. Moreover, we remove samples with missing financial and stock price data. Besides, Since private enterprises in the financial services industry follow different accounting standards, we also exclude samples from this industry. Additionally, all continuous variables are winsorized at the 1st and 99th percentiles to minimize the effects of outliers. In the end, we obtain 23,943 sample observations for 3,173 enterprises. All data are from the China Stock Market and Accounting Research (CSMAR) and Wind databases.

3.2 Variables

3.2.1 Predicted variable: $Resilience_{it}$

The current mainstream methods for measuring enterprise resilience include: first, constructing a long-term comprehensive index of enterprise resilience. The long-term performance of enterprises is based on long-term performance growth, sales revenue growth rate, net profit rate of total assets and survival rate (Ortiz-De-Mandojana et al., 2016; Jiang Luan et al., 2022). Second, selecting the performance of enterprise under the impact of specific external events to measure its resilience, usually by referring to the degree of loss and recovery time after the crisis, and selecting financial indicators such as return on capital and enterprise performance (Gittell et al., 2006; Desjardine et al., 2019). However, this paper focuses on the long-term impact of the resilience of private enterprises, so it is more appropriate to choose the long-term performance of enterprises as the basic index. Sales revenue, as a basic indicator of natural growth and long-term performance significance, is linked to enterprises' operational efficiency and survival rate and other indicators closely related to enterprise resilience, especially in terms of market adaptation, whether the enterprise can maintain or increase sales revenue in the changing market environment is an important criterion for evaluating its adaptability and flexibility (Martin and Kevin, 2020). Enterprise's ability to quickly adjust its products or services to meet changes in market demand and thus maintain the level of sales revenue shows its resilience. So, sales revenue is an appropriate basic measure of enterprise resilience.

The core idea of measuring enterprise resilience is to characterize the long-term development performance of individual enterprises and to measure the long-term sales revenue ratio of private enterprises by tracking changes in sales revenue from 2009 to

2022. The specific calculation method is as follows:

$$Resilience_{it} = \frac{\sum_t \Delta Sale_{it} / \sum_t Sale_{it-1}}{(\sum_t \Delta Sale_All_{pit} / \sum_t Sale_All_{pit-1})} \quad (7)$$

This paper follows the above approach (Martin and Kevin, 2020) and takes sales revenue ($Sale$) as the base index. In this model, the subscripts i, t and p represent individual enterprises, years and industry of the enterprise respectively. Where $\Delta Sale_{it}$indicates the growth amount of enterprise sales revenue in year$t$. $Sale_{it-1}$ represents the actual value of sales revenue in the previous year. $\Delta Sale_All_{pit}$ represents the increase amount of sales revenue in various industries in this year. $Sale_All_{pit-1}$ represents the actual total value of sales revenue of various industries in the previous year. In the existing literature on enterprise resilience measurement, some articles ignore the impact of industry heterogeneity on enterprise resilience measurement. Therefore, when measuring enterprise resilience, this paper will take into account the differences in economic development and government policies in different industries and regions (Cheema-Fox et al., 2021), and divide the samples by industry. When $Resilience_{it}$ is greater than 0, enterprise resilience is relatively high. When $Resilience_{it}$is less than 0, enterprise resilience is relatively low.

3.2.2 Core explanatory variable: ESG performance (ESG_{it-1})

By referring to the practice of Lin et al (2021), this paper adopts Sino-Securities Index Information Service (Huazheng) ESG rating to measure the ESG performance of listed private enterprises. A higher score indicates a better ESG performance. ESG scores are transferred from C to AAA into 1 to 9, where 1 stands for the lowest ESG performance (C) and 9 stands for the highest ESG performance (AAA). In order to alleviate the endogeneity problem as much as possible, the core explanatory variables are treated with one-stage lag.

3.2.3 Control variables

Following the approach of Azmi et al. (2021) and Mohanty et al. (2021), this article adds a lagged term for the following control variables: (i) enterprise size ($Size$). Larger enterprises have strong financial strength and better survival ability when impacted by emergencies (Tsiapa et al., 2019); (ii) cash flow ratio ($Cashflow$). Holding sufficient cash can avoid financial difficulties during the crisis and enhance the ability of enterprises to cope with the crisis; (iii) return on assets (Roa). A higher return on assets indicates that the enterprise has better performance in asset utilization

and profit, and may have stronger financial health and risk resistance; (iv) enterprise development capacity ($Growth$). A high growth rate may mean that the enterprise is going through an expansion or development stage, while a low growth rate may mean that the enterprise is in a stable or stagnant stage. Controlling this variable can consider the future development trend and long-term stability of the enterprise; (v) research and development investment (RD). Higher R&D investment may improve the innovation ability and competitiveness of the enterprise, thereby enhancing its anti-risk ability; (vi) enterprise investment ($Invest$). Higher capital intensity may mean that the enterprise has more production capacity and resource, which is conducive to coping with market fluctuations and external shocks; (vii) total asset turnover (Ato). A high turnover may mean that the enterprise can use assets more effectively, improve profitability and anti-risk capacity. The specific measurement methods of variables are shown in Table 1.

Table 1

Variable definitions and measurement.

Variables	Symbol	Definitions and measurement
Enterprise resilience	*Resilience*	Reported in Eq. (1)
ESG performance	*ESG*	Huazheng ESG Performance Rating
Enterprise size	*Size*	The natural logarithm of total assets
Cash flow ratio	*Cashflow*	Closing balance of cash and cash equivalent
Return on assets	*Roa*	Total net profit/total assets
Development capacity	*Growth*	(Total assets at the end of this period - total assets at the end of the previous period)/total assets at the end of the previous period
Research and development investment	*RD*	R&D expenses/operating income
Investment	*Invest*	Capital expenditure
Total asset turnover	*Ato*	Sales revenue

3.3 Foundation model

Based on extant research (Cheema-Fox et al., 2021), this paper aims to estimate the impact of ESG performance on the resilience of private enterprises by setting the following baseline regression model:

$$Resilience_{it} = \alpha + \beta ESG_{it-1} + \gamma Controls_{it-1} + \delta_i + \mu_t + \varepsilon_{it} \quad (8)$$

Where $Resilience_{it}$ represents enterprise resilience, including sales revenue

($Sale$). $Control_i$ refers to all control variables such as enterprise scale ($Size$), cash flow ratio ($Cashflow$), R&D investment (RD), etc. At the same time, this study controls the industry (δ_i) and year (μ_t) fixed effects. ε_i represents the random error term.

3. Empirical results and analysis

4.1 Descriptive statistics

The descriptive statistics of the variables are shown in Table 2. The mean of the enterprise resilience is 0.176, which indicates that private enterprises in the sample have a certain degree of resilience on average when dealing with external environmental shocks or challenges. However, with a standard deviation of 0.537, a maximum of 3.420, and a minimum of -0.908, there is a large difference in resilience among private enterprises. The mean of the ESG performance is 4.115, with a maximum of 6, a minimum of 1 and a standard deviation of 1.041, indicating that the ESG performance of private enterprises is relatively low on the whole, and the ESG performance of private enterprises in the sample varies greatly. In addition to the variables mentioned above, other variables are basically consistent with the existing literature (Mao Qiling and Wang Yueqing, 2023).

Table 2

Descriptive statistics.

Variable	Obs	Mean	Std. Dev.	Min	Max
Resilience	23943	0.176	0.537	-0.908	3.420
ESG	23943	4.115	1.041	1.000	6.000
Size	23943	21.837	1.071	19.863	25.255
Cashflow	23943	0.048	0.070	-0.156	0.248
Roa	22271	0.046	0.068	-0.232	0.236
Growth	22266	0.184	0.389	-0.544	2.276
RD	21624	0.056	0.054	0.000	0.316
Invest	22258	0.068	0.069	0.000	0.373
Ato	22270	0.639	0.402	0.087	2.463

Notes: This table reports the number, mean, standard deviation, median and maximum values of all variables used in our regression.

4.2 Baseline regression models

Table 3 displays the baseline regression result of the relationship between ESG performance and private business resilience. When adjusting for industry and year fixed effects, column (1) only takes into account the primary explanatory variable, ESG performance, which is significant at the 1% level. The influence of the total ESG performance on the resilience of private firms is indicated in Column (2). The ESG performance has a coefficient of 0.0041, which is still substantial at the 1% level. This suggests that firms with higher ESG performance are more resilient to external shocks, which first validates this paper's first premise.

The control variable regression findings essentially match the theoretical predictions. At the 1% level, private companies' investments in research and development (RD) significantly improve business resilience. The rationale is that increased R&D spending by private businesses boosts their capacity for innovation, product variety, and technological reserve, which increases their capacity to handle risks and adjust to changes in the market. As a result, businesses' resilience has greatly increased. Enterprise resilience is also positively correlated with private enterprise investment ($Invest$), which is still significant at the 1% level. This could be because of things like improved financial stability, support for business expansion and investment, increased production capacity and efficiency, and improved market confidence and reputation. When these elements are combined, businesses are better equipped to handle external environmental difficulties and increase their resilience. Enterprise resilience is significantly positively correlated with total asset turnover (Ato) of private businesses at the 1% level, suggesting that it increases capital use efficiency and lowers capital pressure. Additionally, it improves supply chain management and operational flexibility. When these elements are combined, businesses are better equipped to handle external problems and strengthen their resilience. At the 1% level, private enterprise size ($Size$) and the cash flow ratio ($Cashflow$) have a positive effect on enterprise resilience. This may be because larger businesses with higher cash flow ratios, richer resources, broader market coverage, and stronger brand reputation are better able to disperse, resist risks, and react to changes in the external environment. However, private businesses' regression coefficients of return on assets (Roa) and development ability ($Growth$) are significantly negative, indicating that businesses may face high financial risk, declining profitability, limited development, and poor market value, all of which lower their level of resilience (Lu and Abeysekera, 2017).

Table 3

Regression analysis of ESG performance on private enterprice resilience.

Variable	（1）	（2）
	Resilience	*Resilience*
ESG		*Cashflow* *Growth*
Roa		*RD*
Size		

Invest	0.0146***	0.0041***
	(2.91)	(4.60)
Ato		0.0087***
		（3.22）
		0.0366***
		（2.59）
		-0.1341***
		（-8.07）
		-1.1168***
		（-42.18）
		0.1203***
		（3.63）
		0.1378***
		（5.26）
		0.0313***
		（3.59）

Industry&Year fixed effect	YES	YES
Obs	23943	20047
Adj.R^2	0.9360	0.9683

Notes: This table reports the results of the effect of the ESG performance on private enterprise resilience. T values are in parentheses below the coefficient values. Significance levels at p < 10%, 5% and 1%, one-tailed, are indicated by *, ** and ***, respectively.

4.3 Endogeneity tests

In this paper, by controlling the influence of enterprise characteristics and the fixed effect of time and industry, the endogeneity issues caused by omitted variables is alleviated to a certain extent in the baseline regression. However, a series of endogeneity issues caused by omission of other unobservable variables, bidirectional causality and sample selection bias cannot be completely avoided. Therefore, Supplementary Omitted Variables Method, Propensity Score Matching Method (PSM) and Instrumental Variable Method are used to deal with the possible endogeneity problems.

4.3.1 Omitted variables method

Given that the endogenous issues may be caused by unobserved factors, which may affect both explanatory variables and explained variables, this paper further controls the enterprise development benefit index in order to estimate the impact of explanatory variables on explained variables more accurately. In addition to the fundamental performance indicators, this paper introduces management-related control variables, such as the top ten shareholders' holding ratio ($Top10$), the total managerial compensation ($Tmtpay$), and the lagged one-period items of auditing fees($Auditfee$) (Mao Qi-lin et al., 2023). These variables may influence the relationship between ESG performance advantage and the resilience of private enterprises. By incorporating these potential omitted variables into the regression model, this paper aims to mitigate the impact of the endogeneity problem and improve the accuracy and credibility of the model. This expanded control variable strategy helps to explain the impact of ESG performance of private enterprises on their resilience more comprehensively, and provides a more reliable basis for relevant policy making and business decision making.

Table 4 shows the regression results of the omitted variables and propensity score matching method. In column (1), three management variables in our model are significant at least at the 5% level and have a positive effect on enterprise resilience. Specifically, we observed that the shareholding ratio of the top ten shareholders, the total managerial compensation and the audit fees all showed a positive impact, indicating that good performance with higher management compensation and audit

supervision assistance makes management more accountable and more initiative to disclose ESG performance. The results are consistent with the main regression, which indicates the certain degree of reliability of the baseline regression result of this paper.

Table 4

Omitted variables and propensity score matching regression results.

Variable	（1）	（2）
	Resilience	*Resilience*
ESG	0.0038***	0.0029***
	(4.33)	(3.30)
Top10	0.0007***	
	（4.86）	
Tmtpay	0.0081**	
	（2.66）	
Auditfee	0.0260***	
	（5.00）	

Constant	-0.0180***	0.1463**
	（-0.23）	（3.15）
Control variable	YES	YES
Industry&Year fixed effect	YES	YES
Obs	18072	9736
Adj.R²	0.9702	0.9733

4.3.2 ropensity score matching method

Good ESG performance will draw additional investment capital, and ESG practice necessitates resource investment. Consequently, private companies that are more profitable will be more likely to enhance their ESG performance. Nonetheless, private businesses with superior ESG performance also vary significantly from one another. Propensity Score Matching (PSM) is used in this work to address sample selection bias. First, private businesses that do better than the industry average in terms of ESG are considered the treatment group ($Treat$ = 1), whereas private businesses that perform worse than the industry average are considered the control group ($Treat$ = 0). The firm size ($Size$), cash holding level ($Cashflow$), total asset growth rate ($Growth$), research and development investment (RD), capital intensity ($Inettt$), and total asset turnover ($Atooo$).Next, we build the Logit model utilizing the successfully matched data of 9736 private businesses using the 1:1 matching approach to match with the treatment group and create the control group. Lastly, the simple regression model is used to estimate the matched samples. After accounting for potential selection bias, the ESG coefficient in column (2) of Table 4 is 0.0029, which is significant at the 1% level, showing that there is still a strong positive association between ESG performance and the resilience of private firms. The findings are in line with the primary regression, suggesting that this paper's conclusion is rather trustworthy.

Instrumental variable method

5 In order to reduce endogenous concerns, this article chooses whether the auditor is an international Big Four accounting firm as an instrumental variable of ESG performance based on Doyle's (2007) methodology. The instrumental factors should be chosen with a high connection with internal information disclosure ability but a low correlation with enterprise resilience since, first of all, tiny private businesses also have inadequate internal information disclosure capabilities. Second, the Big Four accounting firms place a high value on ESG performance, and private companies' decision to audit these firms will have an impact on their ESG performance. In order to assess the sustainability and social effect of businesses, the Big Four accounting firms include environmental (E), social responsibility (S), and enterprise governance (G) considerations into their audit analysis. Consequently, using the auditor's status as an international Big Four accounting firm as an instrumental variable offers a practical approach and theoretical backing for resolving the endogenous problems. The regression results based on instrumental factors are shown in Table 5. The first stage's results are shown in Column (1), where the coefficient of $Big4$ and ESG is 0.2435, which is significantly positive at the 1% level. This suggests that private companies audited by the Big Four accounting firms have a significant positive correlation with their ESG performance advantages. Additionally, the F value of 19.35, which is higher than 10, indicates that the instruments selected are not weak. The results of the second stage regression in Table 5's column (2) demonstrate that, after adjusting for potential endogenous issues with the instrumental variables, private enterprises' resilience increases with their ESG performance. This relationship is significant at the 1% level, which is consistent with Table 3's findings and suggests that the paper's findings are somewhat reliable.

Table 5

Instrumental variable regression results.

	（1）	（2）
Variables	First stage	Second stage

ESG

Resilie

nce

Big4	0.2435***	
	（3.56）	
ESG		0.1815***
		（4.92）
Control variable	YES	YES
Industry & Year fixed effect	YES	YES
Obs	18788	18788
F-test	19.35	

5.1 Robustness tests

5.1.1 Replace the explained variable

This study substitutes return on equity (ROE), a measure of company resilience, for the explained variable in order to perform a robustness test and further investigate the stability of the primary result (Fahlenbrach et al., 2021). ROE is a widely used financial measure that completely reflects an organization's financial performance and takes into account profitability and capital operating efficiency. First of all, ROE is a crucial metric that stakeholders and investors use when assessing an organization's profitability. Its incorporation into resilience analysis facilitates a direct understanding of how firm profits affect resilience. Second, ROE can guarantee the accuracy and robustness of the analysis, minimize the impact of external influences on the findings, and represent the enterprise's level of internal operational efficiency and financial management. Table 6 displays the regression findings. At the 1% level of significance, the regression coefficient of ESG performance is 0.0382. Economically speaking, this suggests that the ESG performance advantage of businesses greatly enhances the resilience of private businesses, confirming the aforementioned findings and demonstrating the strength of this paper's conclusions.

5.1.2 Replace the explanatory variable

This study employs percentile ESG rating as a stand-in variable for ESG performance in column (2) of Table 6. The percentage rating, which covers a variety of industries, may fairly represent how well businesses do in ESG. The percentage rating is an easy-to-understand metric that makes it easier to compare businesses, sectors, or eras. Furthermore, the percentage method is increasingly widely used in the area of ESG rating and assessment. This makes it easier to interface with other ratings and indexes, increasing its visibility and credibility in the ESG investing. Table 6 displays the regression findings. At the 1% level of significance, the ESG performance coefficient is 0.0010. This further demonstrates the robustness of the conclusion in economics by demonstrating how the business ESG performance advantage greatly increases the flexibility of private firms.

5.1.3 Addition of ESG performance quadratic term

All of the regression findings in this article that look at how ESG performance affects private firms' resilience are predicated on the idea that there is a linear link between the two. However, there may be a curved or other non-linear link rather than a straightforward linear one between ESG performance and enterprise resilience (Sahebjamnia et al., 2018). In order to reflect this possible nonlinear link, the quadratic term of ESG performance is presented in this research. The quadratic regression coefficient of ESG is -0.0040, which is not significant in this regression analysis, as seen in column (3) of Table 6. This suggests that given the existing data and model conditions, the influence of ESG performance on the resilience of private firms does not exhibit significant nonlinear features. The robustness of the results is further shown by the fact that this conclusion is generally compatible with the earlier hypothesis based on the linear connection between the two.

5.2 Mechanism test

According to the above theoretical model, it can be inferred that the ESG performance of private enterprises mainly enhances the anti-risk ability of enterprises through three ways: institutional investor investment, government subsidies, and alleviating financing constraints. To verify the role of these mechanisms, this section will examine the three mechanisms.

5.2.1 Institutional investor investment

Institutional investor investment is an important issue that all private enterprises pay attention to and strive for. Based on the research results of Riedl and Smeets (2017), this paper discusses the role of fund companies as institutional investors in enterprise governance. It is found that the investment changes of fund companies have a significant positive impact on enterprise performance. In addition, the research also shows that the ownership of institutional investors is significantly positively correlated with the ESG performance of enterprises, indicating that institutional investors can promote the improvement of ESG performance of enterprises. Further analysis shows that ESG investment funds play a key role in this process, and its externality is also significant. Although fund companies independently decide the establishment and investment size of ESG investment funds and allocate their own investment portfolios, these decisions do not directly affect the employment level of enterprises (Dyck et al., 2019). Therefore, this paper chooses the level of institutional investors' shareholding as mediator to deeply explore the impact of ESG performance on the resilience of private enterprises, and puts forward the following models.

$$Inst_{it} = \pi_0 + \pi_1 ESG_{it} + \pi_2 Controls_{it} + \delta_i + \mu_t + \varepsilon_{it} \quad (9)$$

$$Resilience_{it} = \alpha + \beta_0 ESG_{it-1} + \beta_1 Inst_{it-1} + \gamma Controls_{it-1} + \delta_i + \mu_t + \varepsilon_{it} \quad (10)$$

As shown in column (1) and (2) of Table 7, the regression coefficient of ESG performance is 0.1932, which is significant at the 5% level. This indicates that there is a significant positive correlation between the improvement of ESG performance and the increase of institutional investors' shareholding level. At the same time, the influence coefficient of institutional investors' shareholding level on the resilience of private enterprises is 0.0004, which is also significant at the level of 1%, resulting that H2 is established. It shows that the improvement of ESG performance in private enterprises will attract more institutional investors to participate and increase the proportion of shares held by them. The reason for this may be that good ESG performance means that enterprises have better long-term sustainable prospects in investors' opinion, thus attracting investors' interest. Meanwhile, the shareholding level of institutional investors is also significantly positively correlated with the

resilience of private enterprises, suggesting that an increase in institutional investor's shareholding can provide a more stable and reliable source of capital and improve the market recognition and reputation of enterprises, thus enhancing the resilience of enterprises.

5.2.2 Government subsidies

Government subsidies have always been an important means of "visible hand" to support and guide the development of enterprises (Feng Ting, Zhu Zhiyong, 2024). If the positive improvement of ESG performance of private enterprises can help them enhance their resilience because of getting more government subsidies and increasing the source of capital, the increase of government subsidies can improve "the ESG performance advantages of private enterprises on resilience" to a certain extent when other conditions are similar. In order to test this channel, government subsidy ($Subsidy$) is added to model (11), and model (12) is obtained to examine this mediation mechanism. Here, $Subsidy$ denotes the logarithm of government subsidies received by private enterprises. Because there are some missing values in the government subsidies of private enterprises, to ensure the comparability of enterprise social responsibility variable coefficients obtained by regression, this paper adjusts the sample size so that there are no missing values in the three main variables of ESG performance of private enterprises, government subsidies and enterprise resilience, and proposes the following intermediary models.

$$Subsidy_{it} = \pi_0 + \pi_1 ESG_{it} + \pi_2 Controls_{it} + \delta_i + \mu_t + \varepsilon_{it} \quad (11)$$

$$Resilience_{it} = \alpha + \beta_0 ESG_{it-1} + \beta_1 Subsidy_{it-1} + \gamma Controls_{it-1} + \delta_i + \mu_t + \varepsilon_{it} \quad (12)$$

The regression results are shown in columns (3) and (4) of Table 7. The influence factor of ESG performance on receiving more government subsidies is 0.0175, which is significant at the 1% level. At the same time, the combined impact of ESG performance and government subsidies on enterprise resilience is also significant at the 1% level, which proves that hypothesis 3 is valid. It shows that there is a significant positive correlation between the improvement of ESG performance and the access of private enterprises to government subsidies. In other words, improving the enterprises' environmental, social, and governance performance can lead to more subsidy support from governments. Moreover, the improvement of ESG performance and access to government subsidies are both significantly and positively correlated with the improvement of resilience of private enterprises. Thus, both improved ESG performance and access to government subsidies can contribute to the stability and risk resistance of enterprises, thereby increasing their resilience.

5.2.3 Alleviating financing constraints

Alleviating financing constraints is one of the crucial solutions to break through

the economic dilemma of enterprises. In essence, the goal of ESG performance is to enable enterprises to maximize balanced benefits by taking social and environmental responsibilities into account while achieving economic benefits (El Ghoul et al., 2011). Improving ESG performance can help enterprises win the trust of internal and external stakeholders, and the government and institutional investors are more inclined to provide financial resources for the development of such enterprises, thus helping enterprises to overcome financing constraints.

The regression results are shown in columns (5) and (6) of Table 7. The influence coefficient of ESG on financing constraint (*SA*) is -0.0035, which is significant at the level of 1%. This indicates that there is a significant negative correlation between the improvement of ESG performance and the alleviation of financing constraints. In other words, improving enterprises' environmental, social and governance performance may help ease its financing constraints and make it easier for enterprises to access financial support, which proves that hypothesis 4 is true. The influence coefficient of ESG performance on enterprise resilience is 0.0038, while the coefficient of financing constraints on resilience is -0.0476, and the two coefficients are significant at the level of 1% and 5% respectively. This shows that the improvement of ESG performance has a significant positive impact on the resilience of enterprises, while the increase of financing constraints has a significant negative impact on the resilience of enterprises. Thus, upgrading ESG performance can help elevate stability and anti-risk capacity, nevertheless, mitigation financing can also strengthen resilience.

Table 7

Mechanism test.

Variables	（1）	（2）	（3）	（4）	（5）	（6）
	Inst	*Resilience*	*Subsidy*	*Resilience*	*SA*	*Resilience*
ESG	0.1932**	0.0035***	0.0175***	0.0046***	-0.0035***	0.0038***
	（2.04）	（4.01）	（2.62）	（5.06）	（-5.25）	（4.21）
Inst		0.0004***				
		（4.51）				
Subsidy				0.0035***		
				（3.23）		
SA						-0.0476**
						（-1.79）
Control variable	YES	YES	YES	YES	YES	YES
Industry&Year fixed effect	YES	YES	YES	YES	YES	YES

Obs	18481	18481	18362	18362	19725	19725
Adj.R²	0.1552	0.9702	0.3287	0.9612	0.9086	0.9675

Notes: This table reports the results of mechanism test. T values are in parentheses below the coefficient values. Significance levels at $p < 10\%$, 5% and 1%, one-tailed, are indicated by *, ** and ***, respectively.

4. Conclusion and policy implication

This study examines how an organization's environmental, social, and governance (ESG) performance affects its resilience and offers a more comprehensive plan for strengthening private companies' anti-risk capabilities. The majority of previous research focuses on the mutually beneficial link between ESG performance and profit maximization or business success; nevertheless, this study enhances pertinent research from the standpoint of private firms' resilience. In order to gain the favor of the government and institutional investment more readily and thereby increase the resilience of private enterprises, this paper first builds a signaling model and concludes through theoretical analysis that the ESG performance of private enterprises can be used as a positive signal to distinguish good enterprises from bad ones. The following key findings are then derived from an empirical study of a sample of private companies listed on China's A-shares between 2009 and 2022: good ESG performance greatly improves the anti-risk ability and stability of private enterprises, supporting the idea that enhancing ESG performance can strengthen enterprises' capacity to handle crises. This gives managers of private businesses actual proof that ESG practices may improve an organization's resilience in the face of uncertainty in addition to raising its visibility. The resilience of private businesses is shown to be significantly improved by pursuing investment from institutional investors, securing government subsidies, and easing financing limitations. By drawing the interest of the government and institutional investors and investigating diverse financing channels, which include not only conventional bank loans but also new forms of financing like green financial instruments and socially responsible investments to help businesses stay afloat and grow when faced with financial strain, good ESG performance can ease financing constraints and improve enterprise resilience. This study makes the following suggestion in light of the research findings: (1) To guarantee that businesses fulfill anticipated standards in environmental protection, social responsibility, and corporate governance, the government must define ESG criteria and provide comprehensive indicators. By creating special funds, granting tax breaks, and extending government subsidies, the government may ease the financial strain on private businesses and promote more investment in corporate governance, social responsibility, and environmental preservation. In order to guarantee that investors and the general public may get accurate and thorough ESG information, the government should also mandate businesses to improve ESG information disclosure. This would draw in more social investment.
(2) It is essential for businesses to have specialized ESG committees or officers and to rationally develop and carry out ESG plans in order to enhance internal governance structures. Businesses should create environmental technologies, social responsibility initiatives, and good governance practices in addition to increasing their ESG investments. Businesses should also immediately share ESG information and improve engagement with stakeholders including the government, investors, and consumers. Businesses may increase their credibility and feeling of social responsibility by engaging in proactive communication, which will increase stakeholder support and confidence. The aforementioned regulatory measures may successfully encourage private firms' passion and initiative in ESG performance, as well as strengthen their capacity for sustainable growth and resilience in an unpredictable environment.

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