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Research article

The impact of top managers' military experience on enterprises' ESG performance: Evidence from Chinese listed enterprise

Linglve Weng [a], Yani Ma [b], Zhuoxin Han [c], Peiting Dong [d,*]

[a] State Grid Jinhua Power Supply Co, Jinhua, 32100, Zhejiang, China
[b] Guodian Nanrui Technol Co Ltd, Nanjing, 211106, China
[c] Fuzhou University, Fuzhou, Fujian, 350108, China
[d] China Center for Energy Economics Research, School of Economics, Xiamen University, Xiamen, 361005, China

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ABSTRACT

Sustainable development is crucial for enterprises' long-term development and influences broader socio-economic outcomes. The ESG performance is essential for assessing enterprises' sustainable development. Executives, as crucial implementers of corporate strategy, play an indispensable role in the pursuit of sustainable development. However, the impact of executives' military background on enterprise ESG performance remains understudied and lacks consensus in the existing literature. Therefore, this study examines the logical relationship between top managers' military experience and Chinese enterprises' performance concerning environmental protection, social responsibility and corporate governance (ESG) using data from 4543 publicly traded companies between 2010 and 2021. The results demonstrate that top managers' military experience is positively correlated with enterprises' ESG performance. The promotional impact of the baseline regression indicates that the effect is primarily imparted through enterprises' governance, including profit, total revenue and net profit. Heterogeneity tests show that top managers' military experience is a more effective means to promote enterprises' ESG performance in high research and development investing enterprises, small enterprises, those with female directors and enterprises in central and western China. This study not only enriches the understanding of the economic implications of executive military experience, but also provides theoretical support for enterprises to formulate relevant policies and construct management teams to improve their ESG performance and achieve sustainable development.

1. Introduction

In recent years, advancing sustainable development has garnered increasing attention from various sectors of society, with significant importance for enterprises' long-term growth and influence on the broader socio-economic landscape. Consequently, many countries have introduced policies and regulations to guide businesses. With the opening of China's capital markets, various investors have shown greater interest concerning firms' environmental, social and corporate governance (ESG) as fundamental investment principles, which has fostered heightened awareness of ESG among Chinese investors. Enterprises' ESG performance has become a critical indicator for assessing a company's sustainability, where E stands for the impact of corporate practices on the natural

* Corresponding author.
E-mail address: dpt2023@163.com (P. Dong).

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environment, S focuses on corporate social responsibility and interactions with employees, customers and other stakeholders and G emphasises corporate governance, including rational corporate structure, procedural compliance and alignment of executive actions with shareholders' long-term interests [1]. ESG has gained the attention of the media, regulators, policymakers and academic researchers alike. Previous studies find that ESG performance of a firm can influence skill premium, bond credit spreads and labour investment efficiency [2–4]. Meanwhile, scholars have determined that companies with higher ESG ratings tend to have superior market competitiveness [5] and investments in such companies positively impact their value and profitability [6]. [7–9] found that improved ESG enhances firms' financing capacity and reduces financing costs. Furthermore, research has shown that companies with higher ESG scores demonstrated better resilience to the external shock of the COVID-19 pandemic [10–12]. These findings indicate the importance of firms' ESG score as an indicator of risk adaptation and long-term competitiveness. Therefore, investigating the factors that can influence companies' ESG has significant theoretical value and practical implications.

Top managers have a vital role in enterprises' pursuit of sustainability as key implementers of corporate strategy. Upper echelon theory emphasises the importance of senior management teams in the process of decision-making and execution [13]. The theory argues that members of the executive team have unique backgrounds, experiences and knowledge that can influence the decisions made within the organisation. Imprinting theory suggests that personal experiences and identities have a profound impact on decision makers' cognition and behaviour [14,15]. Therefore, referencing upper echelon and imprinting theories, executives' personal experiences can significantly influence organisational decision-making, manifesting as more decisive decision-making styles, emphasising teamwork and leadership capabilities, among others. Additionally, executives' innate and acquired characteristics can have an influence on corporate decision-making and strategic choices. Executives' acquired attributes can encompass military service, international exposure and academic background. Of these attributes, military experience can have a substantial influence on shaping top executives' values and cognitive frameworks. Typically, executives with military backgrounds tend to exhibit pronounced moral values and risk preferences, factors that can have a profound influence on corporate governance. However, in the contemporary environment in which sustainable corporate development has gained increasing prominence, research on the impact of top executives' military experience on enterprises' ESG performance remains notably limited. This research endeavour seizes the opportunity to address this gap.

Scholars find that environmental supervision, credit policy, sustainable behavior, Covid-19 and executive background all have an impact on corporate behavior and performance [16–22].However, the enterprise ESG level is a key index to evaluate a company's development. Existing literature has investigated various aspects of corporate ESG [23]. provided a comprehensive review of factors influencing corporate ESG performance. From an external perspective, both artificial intelligence and media coverage affect the ESG performance of firms [24,25]. From an internal perspective [26], found that female members on corporate boards positively influenced ESG performance in German and Austrian listed companies [27]. analysed European and US data, revealing an inverted U-shaped relationship between women on boards and ESG performance in the banking sector [28]. analysed listed companies in Europe and the United States, finding that companies with higher investment in research and patents exhibited better ESG performance. From an external perspective [29], found that various countries' differing institutional contexts led to varying prioritisation of ESG performance among companies. As executives serve at the helm of a company, their past experiences have significant implications. Scholars have investigated the impact of executives' military experience on various company characteristics, including innovation, shareholder rights, management decisions, financing activities and taxation [30–33]. determined that executives' military experience positively influenced companies' management decisions, external fund manager perceptions, minority shareholder protection and financial reporting. Conversely [34–36], argued that executives with military experience had negative effects on companies through influences on research and development (R&D) investment, financial reporting, taxation and financing activities. It is evident that previous research has not reached a consensus on how executives' military experience impacts companies. Therefore, this study further investigates this influence from the perspective of ESG, contributing to the existing literature.

This study examines the impact of executive military experience on corporate ESG performance using data from the publicly traded companies between 2010 and 2021. The contributions of this research are threefold. Firstly, previous studies pay more attention to the performance of enterprises in a single dimension, such as environment or society, while this study takes a comprehensive approach, integrating ESG dimensions into a single metric to evaluate the influence of executive military experience on a company's overall ESG performance to bridge a gap in existing literature that often explores these dimensions separately. Secondly, this study found that executive military experience primarily affects corporate ESG performance by influencing profitability and revenue generation. As far as we know, this angle is rarely mentioned in previous literature, so these findings enrich our understanding of the economic consequences of executive military experience and strengthen the knowledge on this topic. Thirdly, this study provides an evidence for developing countries on how the military experience of senior executives affects corporate governance. As the largest developing country in the world, China's attention to enterprise ESG is still in-depth exploration. This paper makes an in-depth analysis of how senior executives' military experience affects enterprise ESG governance, with a view to providing feasible development paths for enterprises in developing countries.

The remainder of this paper is structured as follows. In Section 2, we expound upon the theoretical framework and present our research hypotheses. Section 3 details the model construction, data selection and variable measurement processes. Section 4 presents the empirical findings, encompassing the baseline regression analysis and a comprehensive examination of robustness. In Section 5, we conduct a heterogeneity analysis and mechanism testing. Finally, Section 6 summarizes the paper with key conclusions and practical recommendations.

2. Theoretical analysis and research hypothesis

According to upper echelon theory [37], corporate managers possess bounded rationality, and the characteristics exhibited by executives with military experience can have a profound influence on firms' ESG performance through interpretations of enterprises' capabilities and external environmental pressure. From a corporate governance perspective, executives with military experience tend to have a higher tolerance for risk that is attributable to military training [38]. This predisposition is advantageous in addressing issues of insufficient innovation incentives in corporate governance. Furthermore, the strong adaptability and resilience of executives with military experience can empower them to optimize organizational structure and resource allocation within corporate governance, enhancing overall firm performance. From a societal impact perspective, executives with military experience typically adhere to higher ethical standards [39]. Consequently, such executives tend to exhibit a greater sense of moral responsibility in corporate operations, willingly assuming more social responsibilities and enhancing firms' societal influence. From an environmental perspective, with a higher risk tolerance, executives with military experience are inclined to invest in environmental innovation and R&D efforts. This subsequently contributes to improving firms' environmental performance [40–42]. Based on the above analysis, we propose the following hypothesis.

H1. Top managers' military experience promotes enterprises' ESG performance.

In this section, we analyse the mechanisms through which the influence of top managers' military experience on enterprises' ESG performance may be transmitted. A substantial body of literature has found that entrepreneurs' background significantly impacts firms' economic performance. Profit and revenue are important indicators of economic performance and can directly reflect corporate governance [30]. found that entrepreneurs with military experience exhibit relatively superior military-related personal traits. Military experience trains such executives in effective leadership and management skills, enabling them to manage companies and recognize and seize market opportunities, thereby enhancing profitability and revenue [43,44]. In addition, military experience cultivates executives' crisis management and risk control capabilities, allowing them to respond quickly to uncertainties and pressure to minimize potential losses and protect profitability and revenue. Furthermore, higher corporate profit and revenue can contribute to improving ESG performance, providing companies with more resources to invest in sustainable practices related to ESG concerns. Companies can enhance ESG performance through increased funding, workforce and technological investments to improve practices in environmental protection, employee welfare, supply chain responsibility and corporate governance [45]. In addition, growth of corporate revenue may attract greater attention and pressure from stakeholders, and increased focus on a company's ESG performance can influence its reputation and market position. Therefore, to protect the company's reputation and mitigate potential reputational risks, companies may endeavor to continuously enhance ESG levels. Therefore, we propose the following hypothesis.

H2. The positive impact of top managers' military experience on ESG performance is primarily through the mechanism of enterprise governance, including profit, total revenue and net profit.

We conjecture that the influence of top managers' military experience on ESG performance will vary among companies located in different regions of China, which may be associated with regional culture and values [46]. Generally, China's western and central regions may place greater emphasis on discipline, responsibility and teamwork, aligning more strongly with military values. In contrast, the culture in China's eastern region may prioritise business competition and pursuit of profit; therefore, the impact of top managers' military experience on companies might be less pronounced in this region. Based on the above analysis, we propose the following hypothesis.

H3-1. : Compared with companies located in China's eastern region, top managers with military experience have a more significant positive impact on ESG performance for companies situated in the central and western regions.

R&D investment is crucial for long-term business development. Increasing R&D investment enhances a company's innovation output, reduces production costs and improves its adaptability [47,48]. Companies that allocate significant resources to R&D tend to prioritise innovation and sustainable development, which are closely related to ESG practices. Top managers with military experience often possess advantages in innovation and sustainable development and can integrate these experiences and values into the company's ESG strategies and action plans [41]. Therefore, based on the above analysis, we propose the following hypothesis.

H3-2. : The positive impact of top managers with military experience on ESG performance is more pronounced in companies with higher R&D investment.

We expect the impact of top managers' military experience on ESG performance to vary among companies of different sizes. Specifically, small-scale enterprises are often established more recently, making the imprint of military culture more noticeable. Additionally, smaller companies face greater resource constraints and survival pressure [49]. Therefore, small-scale enterprises with top managers who have military experience are more motivated to improve corporate governance, fulfil social and environmental responsibilities and enhance overall company performance to secure more resources and policy support to facilitate long-term company development. Hence, based on the above analysis, we propose the following hypothesis.

H3-3. : Compared with large-scale enterprises, top managers with military experience have a more significant positive impact on the ESG performance of small-scale enterprises.

Companies face complex external environments for survival, and the decisions made by top managers are crucial. According to the theory of executive hierarchy, 'the characteristics of the top management team influence strategic choices, which in turn affect company survival'. It has been demonstrated that the gender composition of top management teams can significantly impact companies. Generally, male managers possess strong resilience, risk-taking abilities and decisiveness [50], while female managers exhibit

strong observational, interpersonal and perceptual skills. A balanced gender composition in the top management team enhances a team's vitality and decision-making capabilities, which is beneficial for company development [51]. Conversely, a gender-unbalanced top management team tends to engage in homogeneous thinking and lacks vitality, which can hinder company progress. Therefore, based on the above analysis, we propose following hypothesis.

H3-4. : In companies with female executives, top managers with military experience have a more significant positive impact on ESG performance.

And the following Fig. 1 shows our study structure.

3. Estimation strategy

In this section, we introduce the study's estimation strategy and data. We first present the regression equation and then the explanation of variable setting, followed by our data sources.

3.1. Estimation framework

To investigate the influence of top managers' military experience on enterprises' ESG performance, we follow the ordinary least squares approach and construct the following regression equation:

$$esg_{it} = \beta_0 + \beta_1 chairarmy_{it} + \gamma X_{it} + \rho C_{it} + \alpha_i + \lambda_t + \varepsilon_{it} \tag{1}$$

where i represents enterprise, and t represents year. esg_{it} is the dependent variable indicating the ESG performance of enterprise i in year t. $chairarmy_{it}$ is a dummy variable indicating whether the chairman of enterprise i has military experience in year t. We use two groups of control variables, (1) X_{it} represents control variables concerning firm characteristics, including return on assets, total leverage, state-owned holding, number of independent directors, ownership concentration1, ownership concentration2, ownership concentration3 and ownership concentration4 and (2) C_{it} denotes the control variables concerning enterprise managers' characteristics, including top managers' shareholding ratio, the number of top managers with overseas backgrounds, the number of top managers with overseas experience, the number of top managers with overseas educational backgrounds, the number of female managers among top managers, top manager's salary and the number of top managers. α_i is firm fixed effects, capturing all time-invariant differences among firms; λ_t is time fixed effect, capturing all time-varying factors that are common to firms; and ε_{it} is the error term.

In the above regression equation, our primary concern is estimating the impact of the top managers' military experience on enterprises' ESG performance; therefore, we are primarily focused on the $chairarmy_{it}$ coefficient.

3.2. Data and variables (including descriptive statistical results)

3.2.1. Sample selection and data sources

This study obtains firm level matching data from two main sources. The listed enterprise ESG performance data are from the Bloomberg ESG Disclosure Scores database, top managers' military experience and other listed firm level data are from the China Stock Market & Accounting Research Database. Considering the substantial amount of missing ESG data for companies in the year 2022 (with a sample size that is approximately half that of the previous year), and based on existing literature that focuses on the impact of top managers' military experience on companies, the sample period is largely confined to 2021 and earlier years [52,53] to ensure the reliability and comparability of the study's results; Therefore, the research period covers 2010–2021.

3.2.2. Variables setting

(1) Dependent variable: Enterprises' ESG performance

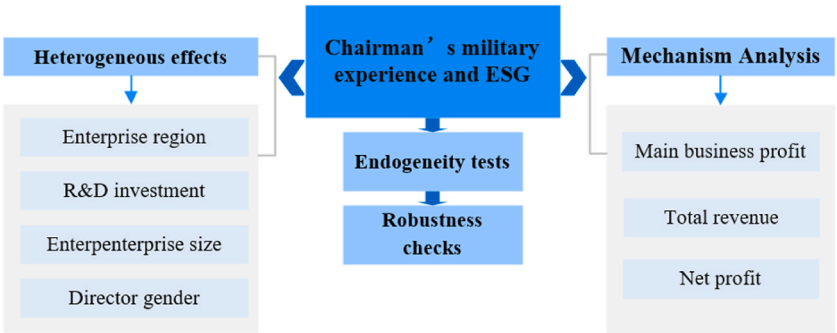

Fig. 1. Study structure.

The data of enterprises' ESG performance are obtained from Bloomberg, which provides information on enterprise disclosure quality in the areas of ESG, where a higher numerical value indicates a higher level of corporate social responsibility.

(2) Independent variable: Top managers' military experience

Considering the division of corporate ownership in Chinese enterprises, chairperson and CEO positions are taken to represent firms' senior management. Notably, the chairman of a company in China often holds the positions of legal representative and actual controller, exerting significant influence on business management and corporate governance; therefore, the chairman is more akin to that of a CEO in foreign companies. Whether the chairperson has military experience is denoted as 1 if true, otherwise as 0.

(3) Mechanism variables

A company's profitability and revenue can reflect its overall ESG performance. Environmental governance involves resource efficiency, waste emissions and energy consumption and effective environmental governance can reduce enterprises' costs and risks. Social responsibility entails caring for and supporting employees, suppliers, customers and communities and active participation in social welfare activities can establish a positive corporate image and drive sales growth. Good corporate governance improves decision-making efficiency, mitigates risks and enhances trust among stakeholders. Therefore, based on the aforementioned analysis and our hypotheses, we introduce main business profit, total revenue and net profit as the study's three mechanism variables, and expect top managers' military experience to have positive effect on these variables.

(4) Control variables

Referencing related research, this study uses two groups of control variables as introduced above, including return on assets, total leverage, state-owned holding, number of independent directors, ownership concentration1, ownership concentration2, ownership concentration3, ownership concentration4, including top managers' shareholding ratio, the number of top managers with overseas backgrounds, the number of top managers with overseas experience, the number of top managers with overseas education backgrounds, the number of female managers among top managers, top managers' salary and the number of top managers. Table 1 presents detailed variable definitions, and Table 2 details the descriptive statistics of variables.

4. Baseline results, endogeneity tests and robustness tests

In this section, we first report the baseline regression results and then conduct the endogeneity tests and robustness tests.

Table 1
Variables definition.

Variable Type	Variable Name	Variable Symbol	Variable Definition
Independent variable	Top managers' military experience	chairarmy	A chairperson with military experience is denoted as 1 if true and 0 otherwise
Dependent variable	Enterprise ESG performance	esg	Enterprises' ESG performance
Control variables	Return on assets	return_ass	Enterprises' return on assets
	Total leverage	total_lev	Enterprises' total leverage
	State-owned holding	govcon	A state-owned enterprise is denoted as 1 if true and 0 otherwise
	Number of independent directors	indep_director	Enterprises' number of independent directors
	Ownership concentration1	owner_first	Ownership proportion of the top outstanding shareholder
	Ownership concentration2	owner_three	Ownership proportion of the top three largest outstanding shareholders
	Ownership concentration3	owner_five	Ownership proportion of the top five largest outstanding shareholders
	Ownership concentration4	owner_ten	Ownership proportion of the top 10 largest outstanding shareholders
	Top managers' shareholding ratio	sharehold_chair	Chairperson's shareholding proportion
	Top managers with overseas backgrounds	overseaback_chair	The number of directors with overseas backgrounds
	Top managers with overseas experience	overseaexp_chair	The number of directors with overseas experience
	Top managers with overseas education	overseaedu_chair	The number of directors with overseas educational backgrounds
	Number of female managers among top managers	femalenum_chair	The number of female directors among all the directors in an enterprise
	Top managers' salary	salary_chair	Total annual salary of directors of an enterprise
	Number of top managers	number_chair	The number of directors of an enterprise
Mechanism variables	Main business profit	profit	Enterprises' main business profit
	Total revenue	total_revenue	Enterprises' total revenue
	Net profit	net_profit	Enterprises' net profit

Table 2
Descriptive statistics.

	Obs.	Mean	S.D.	Min	Max
esg	4543	27.304	8.517	7.851	71.180
chairarmy	4543	0.006	0.080	0	1
return_ass	4543	0.110	1.607	− 0.015	108.352
total_lev	4543	5.156	118.722	−3.393	6270.051
govcon	4543	0.066	0.249	0	1
indep_director	4543	3.157	0.544	1	6
owner_first	4543	33.261	15.602	3.390	89.409
owner_three	4543	48.547	16.135	8.432	92.203
owner_five	4543	53.820	16.087	10.646	93.982
owner_ten	4543	59.758	15.966	13.281	95.147
sharehold_chair	4543	9.495	14.169	0	69
overseaback_chair	4543	1.052	1.241	0	8
overseaexp_chair	4543	0.643	1.001	0	8
overseaedu_chair	4543	0.641	0.933	0	7
femalenum_chair	4543	1.305	1.114	0	8
salary_chair	4543	4203220.391	5081495.897	0	81813600
number_chair	4543	9.949	2.505	4	27

Table 3
Baseline regression results.

	Independent Variable: ESG			
	(1)	(2)	(3)	(4)
chairarmy	0.195	0.371	1.382**	1.920**
	(0.592)	(0.678)	(0.700)	(0.850)
return_ass		−0.179***		−0.195***
		(0.010)		(0.006)
total_lev		0.001***		0.001***
		(0.000)		(0.000)
govcon		0.114		0.065
		(0.411)		(0.474)
indep_director		0.435**		0.209
		(0.191)		(0.299)
owner_first		−0.008		0.003
		(0.019)		(0.029)
owner_three		−0.044		0.070
		(0.053)		(0.070)
owner_five		0.117*		−0.027
		(0.069)		(0.090)
owner_ten		−0.048		−0.003
		(0.032)		(0.042)
sharehold_chair			0.008	−0.005
			(0.017)	(0.018)
overseaback_chair			−0.429	−0.455
			(0.360)	(0.383)
overseaexp_chair			0.028	−0.010
			(0.295)	(0.310)
overseaedu_chair			0.367	0.341
			(0.285)	(0.294)
femalenum_chair			−0.074	−0.144
			(0.134)	(0.145)
salary_chair			0.000***	0.000***
			(0.000)	(0.000)
number_chair			−0.018	−0.045
			(0.030)	(0.029)
Constant	18.411***	15.818***	17.942***	15.978***
	(0.180)	(1.040)	(0.570)	(1.582)
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Observation	12070	10691	4882	4526
R-square	0.832	0.833	0.831	0.837
F-value	518.861***	342.034***	106.927***	1005.089***

Standard Errors are in the parentheses* $p < 0.1$, **$p < 0.05$, ***$p < 0.01$.

4.1. Baseline estimation

We now examine the estimates of the impact of the top managers' military experience on enterprises' ESG performance covering the period from 2010 to 2021 using the data from Bloomberg and CSMAR. Table 3 presents the baseline results.

Each column of Table 3 presents an estimation of the impact the top managers' military experience on enterprises' ESG performance under different sets of auxiliary controls. Column 1, with no control variables, reports the estimated influence with enterprise and year fixed effects. To control the confounding effect of the enterprise's own characteristics and conditions on the research results, Column 2 introduces enterprise characteristics variables, including return_ass (return on assets), total_lev (total leverage), govcon (whether state-owned enterprise or not), indep_director(number of independent directors), owner_first(top one outstanding shareholder), owner_three(top three outstanding shareholder), owner_five(top five outstanding shareholder), owner_ten(top ten outstanding shareholder). In order to control the interference of the relevant characteristics of senior management groups on the research results, this study focuses on Column 3 introductions enterprise manager variables, mainly including share hold_chair(top managers' shareholding ratio), overseaback_chair(the number of top managers with overseas backgrounds), overseaexp_chair(the number of top managers with overseas experience), overseaedu_chair(the number of top managers with overseas education backgrounds), femalenum_chair(the number of female managers among top managers), salary_chair(top managers' salary) and number_chair(the number of top managers). To control the possible confounding factors in the research more comprehensively and further improve the accuracy and reliability of the research results, all the control variables contained in Column 2 and Column 3 are included in Column 4.

In Table 3, column 1 reports the estimation results is 0.195. Not only the magnitude is small, but also statistically insignificant, indicating that there may have omitting variable bias. After adding enterprise characteristics controls in column 2, the coefficient of

Table 4
Endogeneity tests.

	PSM	First stage of Heckman	Second stage of Heckman
	(1)	(2)	(3)
chairarmy	1.864**		1.907**
	(0.836)		(0.874)
imr			−6.841***
			(1.609)
return_ass	−1.672	0.423	−3.527
	(2.331)	(0.381)	(2.284)
total_lev	0.001	0.002	−0.006
	(0.004)	(0.002)	(0.005)
govcon	0.083	0.201**	−0.677
	(0.487)	(0.089)	(0.514)
indep_director	0.321	−0.230***	1.254***
	(0.327)	(0.048)	(0.412)
owner_first	−0.031	−0.001	−0.020
	(0.036)	(0.003)	(0.036)
owner_three	0.117	−0.005	0.124*
	(0.073)	(0.011)	(0.072)
owner_five	−0.086	0.009	−0.118
	(0.094)	(0.016)	(0.093)
owner_ten	0.020	−0.005	0.046
	(0.045)	(0.008)	(0.044)
sharehold_chair	−0.002	−0.001	0.001
	(0.019)	(0.002)	(0.019)
overseaback_chair	−0.533	−0.204***	0.356
	(0.427)	(0.065)	(0.503)
overseaexp_chair	0.165	0.247***	−0.915**
	(0.355)	(0.057)	(0.461)
overseaedu_chair	0.262	0.132**	−0.324
	(0.351)	(0.055)	(0.392)
femalenum_chair	−0.150	0.057***	−0.365**
	(0.157)	(0.020)	(0.160)
salary_chair	0.000***	0.000***	−0.000
	(0.000)	(0.000)	(0.000)
number_chair	−0.032	−0.004	−0.014
	(0.033)	(0.010)	(0.033)
Constant	16.493***	0.347**	20.087***
	(1.712)	(0.166)	(1.739)
Year FE	Yes	No	Yes
Observation	3626	3670	3626
R-square	0.831		0.833
F-value	66.520***		67.518***

Standard Errors are in the parentheses* $p < 0.1$, **$p < 0.05$, ***$p < 0.01$.

chairarmy change to 0.371, which is larger in magnitude but still statistically insignificant. However, after adding enterprise director-related controls in column 3, the coefficient of chairarmy change to 1.382, which is approximately 6 times as large as that of column. Also the impact is significant at the 5 % level. The final column in Table 3 including all controls and the impact is 1.920, which is significant at the 1 % level.

Comparing column 1 and column 4 in Table 3, reveals that concerns of the omitted variable bias in column 1 are significantly alleviated in column 4 by adding control variables. According to the estimation results in column 4, we find that top managers with military experience are associated with a 1.920 higher ESG performance compared with managers with no military experience. This indicators that top managers with military experience can significantly promote enterprises' ESG performance by 1.92 on average, which is consistent with hypothesis 1. That is to say, top managers with military experience have stronger ability and experience in dealing with environmental, social and corporate governance issues. They often have stronger adaptability and adaptability, higher moral standards and stronger risk tolerance, which enables them to better promote the performance of enterprises in environmental, social and corporate governance and is conducive to the improvement of ESG performance of enterprises.

However, as for control variables, we find that only return_ass, total_lev and salary_chair significantly influence enterprise ESG, among which return_ass is negatively significant, indicating that when the return on assets of enterprises increases, the profit-oriented orientation may lead to insufficient consideration of long-term sustainability of enterprises in environmental protection, social responsibility and corporate governance, which will adversely affect enterprise ESG performance; Total_lev is positively significant, and the increase of total_lev means that enterprises are more active in capital investment, indicating that enterprises may invest more in environment, society and corporate governance, which is conducive to the improvement of ESG performance of enterprises; Salary_chair is positively significant, indicating that higher annual salary of directors may be related to stronger incentive mechanism and

Table 5
Robustness Checks(1).

	Winsor	Omit ST/PT/ST*	Including CEO&Manager	
	(1)	(2)	(3)	(4)
chairarmy	2.089***	2.093***		
	(0.746)	(0.743)		
CCarmy			1.558**	
			(0.652)	
PCarmy				1.564**
				(0.651)
return_ass	−0.196***	−0.196***	−0.196***	−0.196***
	(0.006)	(0.006)	(0.006)	(0.006)
total_lev	0.001***	0.003	0.001***	0.001***
	(0.000)	(0.004)	(0.000)	(0.000)
govcon	0.083	0.035	0.076	0.076
	(0.470)	(0.485)	(0.470)	(0.470)
indep_director	−0.031	−0.041	−0.035	−0.034
	(0.250)	(0.263)	(0.250)	(0.250)
owner_first	0.014	0.010	0.014	0.014
	(0.026)	(0.028)	(0.026)	(0.026)
owner_three	0.027	0.013	0.026	0.026
	(0.064)	(0.066)	(0.064)	(0.064)
owner_five	−0.010	0.022	−0.010	−0.010
	(0.086)	(0.088)	(0.086)	(0.086)
owner_ten	0.004	−0.012	0.004	0.004
	(0.041)	(0.041)	(0.041)	(0.041)
sharehold_chair	−0.005	−0.004	−0.005	−0.005
	(0.018)	(0.018)	(0.018)	(0.018)
overseaback_chair	−0.512	−0.485	−0.505	−0.505
	(0.360)	(0.367)	(0.361)	(0.361)
overseaexp_chair	0.117	0.113	0.113	0.113
	(0.289)	(0.296)	(0.290)	(0.290)
overseaedu_chair	0.340	0.327	0.333	0.333
	(0.292)	(0.295)	(0.292)	(0.292)
femalenum_chair	−0.156	−0.160	−0.158	−0.158
	(0.140)	(0.146)	(0.141)	(0.141)
salary_chair	0.000***	0.000***	0.000***	0.000***
	(0.000)	(0.000)	(0.000)	(0.000)
number_chair	−0.026	−0.026	−0.026	−0.026
	(0.028)	(0.030)	(0.028)	(0.028)
Constant	17.640***	17.733***	17.660***	17.660***
	(1.327)	(1.365)	(1.328)	(1.328)
Year FE	Yes	Yes	Yes	Yes
Observation	4444	4259	4444	4444
R-square	0.690	0.826	0.690	0.690
F-value	2411.517***	2300.039***	2463.906***	2463.861***

Standard Errors are in the parentheses* $p < 0.1$, **$p < 0.05$, ***$p < 0.01$.

performance orientation. When companies offer higher salaries to directors, they may be more motivated to achieve better performance in environmental, social and corporate governance. Other control variables have no significant influence on enterprise ESG performance.

4.2. Endogeneity tests

Considering potential endogeneity issues that could affect the results of the baseline regression, we employ two methods to do the endogeneity test. Firstly, following [54], we employ the Propensity Score Matching (PSM) method for testing. Specifically, we conduct radius matching based on whether the firm hires executives with military experience, and the results are shown in column 1 of Table 4. Secondly, we employ the Heckman two-step method for testing. In the first step, we estimate the inverse Mills ratio (IMR), and in the second stage, we include the computed IMR as a control variable in the baseline model. The regression results are presented in column 2 and column 3 of Table 4.

Overall, based on regression results of column 1 and column 3 in Table 4, we can conclude that regardless of the method used for endogeneity testing, the coefficients of the core explanatory variable are consistent in magnitude and significance to the results of the baseline regression. This suggests that potential endogeneity issue is unlikely to influence the regression results of this study.

4.3. Robustness checks

We next conduct a range of robustness tests to confirm the validity of the baseline regression results, presenting the results in Tables 5 and 6. In column 1 of Table 5, we conduct a trimming test. In column 2 of Table 5, we omitted the ST, ST* and PT sample. In columns 3 and 4 of Table 5, we take CEOs and general managers into consideration, respectively. In column 1 of Table 6, we control for the impact of policy factors that vary with events, and in columns 2 and 3 of Table 6, we cluster the standard errors at different levels.

Table 6
Robustness Checks(2).

	Adding Fixed Effects	Changing Cluster Levels	
	(1)	(2)	(3)
chairarmy	1.910*	2.089***	2.089***
	(0.980)	(0.783)	(0.585)
return_ass	−0.204***	−0.196***	−0.196***
	(0.009)	(0.006)	(0.006)
total_lev	0.001***	0.001***	0.001***
	(0.000)	(0.000)	(0.000)
govcon	−0.152	0.083	0.083
	(0.514)	(0.391)	(0.484)
indep_director	0.046	−0.031	−0.031
	(0.274)	(0.285)	(0.189)
owner_first	0.009	0.014	0.014
	(0.028)	(0.026)	(0.018)
owner_three	0.032	0.027	0.027
	(0.063)	(0.069)	(0.065)
owner_five	−0.036	−0.010	−0.010
	(0.084)	(0.084)	(0.082)
owner_ten	0.025	0.004	0.004
	(0.040)	(0.040)	(0.039)
sharehold_chair	−0.002	−0.005	−0.005
	(0.019)	(0.015)	(0.014)
overseaback_chair	−0.393	−0.512	−0.512*
	(0.380)	(0.363)	(0.296)
overseaexp_chair	−0.006	0.117	0.117
	(0.302)	(0.283)	(0.275)
overseaedu_chair	0.340	0.340	0.340
	(0.309)	(0.251)	(0.234)
femalenum_chair	−0.202	−0.156	−0.156
	(0.144)	(0.111)	(0.127)
salary_chair	0.000***	0.000***	0.000***
	(0.000)	(0.000)	(0.000)
number_chair	−0.021	−0.026	−0.026
	(0.030)	(0.027)	(0.034)
Constant	34.935***	17.640***	17.640***
	(1.318)	(1.683)	(1.340)
Year FE	Yes	Yes	Yes
Observation	4444	4444	4444
R-square	0.720	0.690	0.690
F-value	.	3066.176***	5940.828***

Standard Errors are in the parentheses* $p < 0.1$, **$p < 0.05$, ***$p < 0.01$.

First, considering the existence of extreme values, we applied tail trimming to the key variable in our analysis, implementing upper and lower tail trimming at the 1st percentile for the dependent variable ESG, and the regression result is presented in column 1 of Table 5. The coefficient of chairarmy is 2.089, which is significant at 1 % level and does not significantly differ from the result in column 4 of Table 3. Similarly, considering the presence of a small number of PT, ST and *ST companies in the sample, which could potentially affect the regression results, we conducted the regression analysis again after excluding these companies. The results are presented in column 2 of Table 5, and the coefficients and significance levels of the core explanatory variables remain virtually unchanged. This indicates that such companies do not have a significant impact on our baseline regression.

Second, since CEOs and general managers are also top enterprise managers, we introduce their military experience in our regression, changing the independent variable to whether the chairman or CEO has military experience, which is denoted as 1 if true and 0 otherwise in column 3 of Table 5 and whether the chairperson or general manager has military experience is denoted as 1 if true and 0 otherwise in column 4 of Table 5. The results reveal that the coefficients of the key independent variables in the two columns are all significant at 5 % level and do not significantly differ from the baseline result.

Third, to control for the influence of policy factors that vary over time, we introduced province–time interaction fixed effects into the regression, presenting the result in column 1 of Table 6. The results reveal that the ESG coefficient that we are concerned with is 1.910 and significant at 10 % level, with no large difference from the benchmark regression.

Finally, we cluster the standard errors at different levels. In column 2 of Table 6, we change the cluster level to city level, while the standard errors are clustered at the industry level in column 3 of Table 6. The coefficients of the core explanatory variables remain statistically significant at the 1 % level in, indicating the robustness of our baseline results.

Overall, the robustness test results in Tables 5 and 6 reveal that regardless of altering the dependent variable, core explanatory variables, or adjusting the controlled fixed effects or clustering levels, the coefficients of the core explanatory variables exhibit little change in magnitude and significance level. These comprehensive analyses serve as a strong indication of the robustness of our

Table 7
Heterogeneous Analysis(1).

	Baseline	Region			R&D	
		Eastern	Center	Western	High R&D	Low R&D
chairarmy	1.920**	1.437	6.552***	2.539***	3.522***	−2.145
	(0.850)	(1.029)	(1.210)	(0.637)	(0.888)	(1.535)
return_ass	−0.195***	−0.197***	−8.410	−1.126	−0.151***	0.811
	(0.006)	(0.007)	(9.421)	(2.982)	(0.008)	(2.708)
total_lev	0.001***	0.001***	−0.021***	−0.020	0.001**	−0.021
	(0.000)	(0.000)	(0.004)	(0.040)	(0.000)	(0.024)
govcon	0.065	0.427	−2.087*	1.109	0.542	−0.798
	(0.474)	(0.662)	(1.190)	(0.751)	(0.545)	(0.921)
indep_director	0.209	0.424	−0.199	0.112	0.317	−0.554
	(0.299)	(0.367)	(0.876)	(0.428)	(0.358)	(0.386)
owner_first	0.003	0.011	−0.067	0.041	0.016	−0.012
	(0.029)	(0.035)	(0.100)	(0.066)	(0.036)	(0.043)
owner_three	0.070	0.104	0.263	−0.319	0.002	0.085
	(0.070)	(0.077)	(0.244)	(0.205)	(0.094)	(0.082)
owner_five	−0.027	−0.093	−0.180	0.494**	0.022	−0.107
	(0.090)	(0.103)	(0.261)	(0.236)	(0.129)	(0.108)
owner_ten	−0.003	0.022	0.078	−0.204**	−0.011	0.046
	(0.042)	(0.050)	(0.107)	(0.100)	(0.058)	(0.062)
sharehold_chair	−0.005	−0.003	−0.077	0.039	0.011	−0.023
	(0.018)	(0.021)	(0.068)	(0.041)	(0.024)	(0.029)
overseaback_chair	−0.455	−0.280	−0.406	−0.716	−0.741	−0.554
	(0.383)	(0.452)	(1.577)	(0.857)	(0.477)	(0.564)
overseaexp_chair	−0.010	−0.223	0.316	0.163	0.089	0.362
	(0.310)	(0.365)	(1.195)	(0.804)	(0.396)	(0.423)
overseaedu_chair	0.341	0.267	−0.067	0.486	0.546	0.273
	(0.294)	(0.345)	(1.326)	(0.760)	(0.365)	(0.477)
femalenum_chair	−0.144	−0.222	0.048	0.222	−0.009	−0.218
	(0.145)	(0.177)	(0.520)	(0.331)	(0.193)	(0.170)
salary_chair	0.000***	0.000***	0.000*	0.000	0.000***	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
number_chair	−0.045	−0.055	−0.057	0.061	−0.041	−0.008
	(0.029)	(0.036)	(0.078)	(0.064)	(0.038)	(0.047)
Constant	15.978***	15.335***	15.516***	16.778***	16.671***	19.680***
	(1.582)	(1.902)	(4.408)	(2.274)	(1.987)	(2.388)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Observation	4526	3418	569	556	2842	1701
R-square	0.837	0.686	0.631	0.743	0.701	0.564
F-value	1005.089***	3043.163***	23.850***	40.172***	922.372***	28.854***

Standard Errors are in the parentheses* $p < 0.1$, **$p < 0.05$, ***$p < 0.01$.

benchmark regression results.

5. Further studies

In this section, we conduct heterogeneity and mechanism analyses to further examine how top managers' military experience affects enterprises' ESG performance.

5.1. Heterogeneous effects

The preceding analysis examines the effect of top managers' military experience on enterprises' ESG performance across the entire sample. To explore potential heterogeneity, we divided the overall sample into various subsamples to test whether the positive effect of top managers' military experience on ESG is present among all of them. Tables 7 and 8 present the regression results.

5.1.1. Heterogeneous of enterprise region

In this section, what we assess whether different regions' development influences our regression results. Referencing the China National Development and Reform Commission, we divide the whole sample into western, central and eastern regions, repeating our benchmark estimation of the impact of managers' military experience on ESG performance in column 1 of Table 7. Columns 2, 3 and 4 test for heterogeneity across enterprises' regional distribution, dividing the whole sample into 3 subsamples. Control variables are also included in the three subsamples. The estimated impact of top managers' military experience on enterprises' ESG performance for the western, central and eastern region are 1.437, 6.552 and 2.539, indicating that top managers with military experience impose a 1.437-unit increase in the eastern region, a 6.552-unit increase in the central region and a 2.539-unit increase in the western region; however,

Table 8
Heterogeneous Analysis(2).

	Baseline	Firm Size		Gender	
		Large	Small	have female	no female
chairarmy	1.920**	−0.015	1.740*	2.050*	1.185
	(0.850)	(0.535)	(1.022)	(1.060)	(1.391)
return_ass	−0.195***	−5.119	−0.218***	−1.749	−6.611*
	(0.006)	(4.264)	(0.007)	(2.505)	(3.968)
total_lev	0.001***	0.005	0.001***	0.001***	0.018
	(0.000)	(0.005)	(0.000)	(0.000)	(0.089)
govcon	0.065	−0.134	0.541	0.282	−0.392
	(0.474)	(1.472)	(0.483)	(0.610)	(0.665)
indep_director	0.209	0.147	−0.206	0.124	−0.389
	(0.299)	(0.475)	(0.301)	(0.373)	(0.743)
owner_first	0.003	0.012	0.007	0.011	0.072
	(0.029)	(0.048)	(0.030)	(0.035)	(0.046)
owner_three	0.070	−0.051	0.087	0.009	0.039
	(0.070)	(0.136)	(0.063)	(0.081)	(0.111)
owner_five	−0.027	0.177	−0.103	0.040	−0.110
	(0.090)	(0.181)	(0.089)	(0.108)	(0.148)
owner_ten	−0.003	−0.101	0.024	−0.022	0.049
	(0.042)	(0.083)	(0.044)	(0.048)	(0.083)
sharehold_chair	−0.005	0.006	0.012	−0.006	−0.006
	(0.018)	(0.040)	(0.020)	(0.022)	(0.033)
overseaback_chair	−0.455	−0.280	−0.837*	−0.405	0.912
	(0.383)	(0.635)	(0.446)	(0.441)	(0.649)
overseaexp_chair	−0.010	−0.307	0.362	−0.246	−0.638
	(0.310)	(0.560)	(0.326)	(0.336)	(0.611)
overseaedu_chair	0.341	0.423	0.523	0.457	−0.716
	(0.294)	(0.481)	(0.373)	(0.340)	(0.559)
femalenum_chair	−0.144	−0.009	−0.311**	−0.053	0.000
	(0.145)	(0.257)	(0.137)	(0.190)	(.)
salary_chair	0.000***	0.000**	0.000**	0.000***	0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
number_chair	−0.045	−0.046	−0.028	−0.044	−0.036
	(0.029)	(0.049)	(0.035)	(0.035)	(0.061)
Constant	15.978***	19.127***	18.300***	16.509***	19.095***
	(1.582)	(3.034)	(1.484)	(1.917)	(2.748)
Firm FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Observation	4526	1775	2768	3354	1189
R-square	0.837	0.664	0.632	0.680	0.606
F-value	1005.089***	.	1974.393***	58.877***	26.685***

Standard Errors are in the parentheses* $p < 0.1$, **$p < 0.05$, ***$p < 0.01$.

the impact in eastern region is statistically insignificant. The coefficients of the central and western regions are larger in magnitude compared with that in eastern region. This result is consistent with H3-1 and may be attributed to cultural differences among different regions. Specifically, compared to the eastern region, the western and central regions may place greater emphasis on discipline, responsibility and teamwork, aligning more closely with military culture and values. Therefore, in comparison to companies located in the eastern region, top managers with military experience have a more significant positive impact on ESG performance for companies situated in the central and western regions.

5.1.2. Heterogeneous of enterprise R&D investment

We next examine whether enterprises' R&D investment influences our regression results. In accordance with the median of corporate R&D investment, we divide the sample into two distinct categories, including high and low R&D investment groups. Columns 5 and 6 of Table 7 present the results and control variables are all included in the 2 subsamples. The estimated impact of top managers' military experience on enterprises' ESG performance for high and low R&D investment are 3.522 and −2.145, respectively. This indicates a 3.522-unit increase in the high R&D investment group, and a 2.145-unit decrease in the low R&D investment group; however, only the high R&D investment group impact is statistically significant. This result confirms hypothesis H3-2. Companies with higher R&D investment tend to prioritise innovation and sustainable development. Top managers with military experience often have advantages in innovation and sustainable development and can effectively translate these experiences and values into firms' ESG strategies and action plans. Therefore, top managers with military experience have a more significant positive impact on ESG

Table 9
Mechanism Analysis(1).

	Independent Variable: ESG		
	(1)	(2)	(3)
chairarmy	1.626*	1.699**	1.745**
	(0.849)	(0.847)	(0.853)
profit	0.039***		
	(0.006)		
total_revenue		0.007***	
		(0.002)	
net_profit			0.538***
			(0.118)
return_ass	−0.197***	−0.193***	−0.204***
	(0.006)	(0.006)	(0.007)
total_lev	0.001***	0.001***	0.001***
	(0.000)	(0.000)	(0.000)
govcon	0.071	0.114	0.192
	(0.453)	(0.457)	(0.466)
indep_director	0.203	0.158	0.164
	(0.283)	(0.289)	(0.293)
owner_first	0.012	0.010	0.006
	(0.029)	(0.029)	(0.029)
owner_three	0.086	0.091	0.089
	(0.069)	(0.071)	(0.068)
owner_five	−0.046	−0.059	−0.051
	(0.091)	(0.093)	(0.089)
owner_ten	−0.008	0.002	−0.001
	(0.043)	(0.043)	(0.041)
sharehold_chair	−0.003	0.000	−0.004
	(0.018)	(0.018)	(0.018)
overseaback_chair	−0.480	−0.497	−0.499
	(0.382)	(0.380)	(0.385)
overseaexp_chair	0.016	0.041	0.030
	(0.307)	(0.307)	(0.312)
overseaedu_chair	0.347	0.373	0.363
	(0.295)	(0.293)	(0.298)
femalenum_chair	−0.138	−0.128	−0.142
	(0.140)	(0.144)	(0.141)
salary_chair_	0.078*	0.113**	0.109**
	(0.041)	(0.044)	(0.044)
number_chair	−0.029	−0.037	−0.034
	(0.029)	(0.029)	(0.029)
Constant	15.889***	15.992***	16.013***
	(1.497)	(1.540)	(1.541)
Year FE	Yes	Yes	Yes
Observation	4541	4543	4543
R-square	0.691	0.687	0.686
F-value	386.368***	842.699***	268.580***

Standard Errors are in the parentheses* $p < 0.1$, **$p < 0.05$, ***$p < 0.01$.

performance in companies with higher R&D investment.

5.1.3. Heterogeneous of enterprise size

We next explore whether enterprises' size can influence our regression results. We divide the sample into large and small size groups. Column 1 of Table 8 repeats our benchmark estimation, and columns 2 and 3 test for heterogeneity across the enterprise size, including control variables. The estimated impact of top managers' military experience on enterprises' ESG performance for the large and small size groups are −0.015 and 1.740, respectively, indicating that top managers with military experience have a 1.740-unit increase in small size group, while in large size group has a 0.015-unit decrease; however, only the impact in large size group is statistically significant. This conclusion confirms hypothesis H3-3. Small-scale enterprises, being relatively new, tend to exhibit more pronounced characteristics influenced by military culture. Moreover, smaller companies face greater resource constraints and survival pressure; therefore, to enhance the chances of survival, small-scale enterprises with top managers who have military experience are more motivated to improve corporate governance, fulfil social and environmental responsibilities and enhance the overall company performance. This subsequently allows these enterprises to secure more resources and policy support, facilitating long-term company development.

5.1.4. Heterogeneous of director gender

We next examine whether top managers' gender can influence our regression results. If there are more than 0 female directors in the director list, an enterprise is considered to have female top managers. Based on this criterion, we divide the enterprises into female top managers and no female top managers groups and perform regressions separately, presenting the results in columns 4 and 5 of Table 8 and including control variables in the 2 subsamples. The estimated impact of top managers' military experience on enterprises' ESG performance for the top managers with and without female are 2.050 and 1.185, respectively, revealing that top manager with military

Table 10
Mechanism Analysis(2).

	Baseline	Governance		
	ESG	Profit	Total_revenue	Net_profit
chairarmy	1.920**	7.906***	32.248**	0.325**
	(0.850)	(2.465)	(12.534)	(0.130)
return_ass	−0.195***	0.055	−0.291*	0.016***
	(0.006)	(0.049)	(0.170)	(0.005)
total_lev	0.001***	−0.001	−0.002	−0.000
	(0.000)	(0.002)	(0.007)	(0.000)
govcon	0.065	−2.688	−7.112	−0.234***
	(0.474)	(1.818)	(10.440)	(0.076)
indep_director	0.209	0.508	7.587	0.085
	(0.299)	(2.566)	(9.979)	(0.112)
owner_first	0.003	−0.159	−0.987	−0.005
	(0.029)	(0.186)	(1.059)	(0.007)
owner_three	0.070	−0.437	−3.096	−0.036*
	(0.070)	(0.472)	(2.942)	(0.022)
owner_five	−0.027	0.499	4.589	0.045
	(0.090)	(0.662)	(3.717)	(0.030)
owner_ten	−0.003	0.107	−0.714	−0.005
	(0.042)	(0.324)	(1.529)	(0.013)
sharehold_chair	−0.005	−0.066	−0.805	−0.002
	(0.018)	(0.117)	(0.751)	(0.005)
overseaback_chair	−0.455	0.759	6.258	0.083
	(0.383)	(1.666)	(7.436)	(0.090)
overseaexp_chair	−0.010	−0.660	−7.441	−0.073
	(0.310)	(1.531)	(7.715)	(0.081)
overseaedu_chair	0.341	−0.207	−4.616	−0.041
	(0.294)	(1.492)	(6.297)	(0.085)
femalenum_chair	−0.144	−0.154	−2.273	−0.003
	(0.145)	(0.728)	(3.599)	(0.038)
salary_chair	0.000***	1.871***	5.596***	0.080***
	(0.000)	(0.493)	(1.515)	(0.016)
number_chair	−0.045	−0.341**	−1.084	−0.020**
	(0.029)	(0.154)	(0.678)	(0.008)
Constant	15.978***	−1.921	−3.482	−0.083
	(1.582)	(10.127)	(44.950)	(0.447)
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Observation	4526	4541	4543	4543
R-square	0.837	0.313	0.240	0.205
F-value	1005.089***	12.144***	21.715***	9.618***

Standard Errors are in the parentheses* $p < 0.1$, **$p < 0.05$, ***$p < 0.01$.

experience have a 2.050-unit increase in the female top managers group, and a 1.185-unit increase in the no female top managers group; however, only the impact in the female top managers group is statistically significant. This result confirms hypothesis H3-4, which suggests that the gender composition of the executive team has a significant impact. Male managers often possess strong resilience, risk-taking abilities and decisive decision-making skills, while female managers exhibit strong observational skills, affinity and perceptiveness. Striking a balance between male and female executives in the top management team enhances the vitality and decision-making capabilities of the team, thereby benefitting overall company development.

5.2. Mechanism analysis

The preceding analysis demonstrates a substantial and positive impact of top managers' military experience on enterprises' ESG performance. In this section, we investigate potential mechanisms through which the top managers' military experience may exert influence on enterprises' ESG performance.

To investigate the mechanisms above, we employ the following regression equation referencing [55].

$$esg_{it} = \beta_0 + \beta_1 chairarmy_{it} + \beta_2 M_{it} + \gamma X_{it} + \rho C_{it} + \alpha_i + \lambda_t + \varepsilon_{it} \tag{2}$$

$$M_{it} = \beta_0 + \beta_1 chairarmy_{it} + \gamma X_{it} + \rho C_{it} + \alpha_i + \lambda_t + \varepsilon_{it} \tag{3}$$

where M represents the mechanism variables, including main business profit, total revenue and net profit. Our primary focus here are the regression coefficients of the key explanatory variable in equation (3) and the three mechanism variables in equation (2). The remaining variables are the same as those in the baseline equation (1).

Table 9 shows the estimation results of adding profit, total_revenue and net_profit as the explained variables in the benchmark regression respectively. According to the regression results, it can be found that, on the one hand, after adding three mechanism variables respectively, coefficient of the core explanatory variables are still positive significant, and the magnitude is not much different from the benchmark; On the other hand, the coefficients of the three core explanatory variables are all significantly positive, indicating that profit, total_revenue and net_profit all have positive effects on firm ESG performance. Higher corporate profit and revenue can contribute to ESG performance improving, providing companies with more resources to invest in sustainable practices related to ESG concerns.

Table 10 presents the regression results for the mechanism analysis. Column 1 of Table 10 repeats our benchmark estimation of the baseline impact. Columns 2–4 report the corresponding results of the mechanism analysis, and control variables are all included in the 3 mechanism tests. The estimated impact of top managers' military experience on enterprises' profit, net profit and total revenue are 7.906, 32.248 and 0.325, respectively, with statistical significance of at least 5 %. The results indicate that the impact of top managers' military experience on enterprises' ESG performance is predominantly manifested through enterprises' governance (including profit, total revenue and net profit). These results are consistent with H2.

6. Conclusions and suggestions

Do enterprises with top managers that have military experience exhibit higher ESG performance? In the context of China, this study investigates the logical relationship between top managers' military experience and enterprises' ESG performance. By matching data concerning top managers' military experience and corporate ESG performance, we initially identify this impact. Subsequently, we conduct heterogeneity test and mechanism analysis to further scrutinise the mechanisms underlying this impact. Robustness tests are also performed to ensure the reliability of our findings.

Based on our findings, we can draw the following three conclusions. First, top managers' military experience is positively correlated with enterprises' ESG performance. Top managers with military experience are associated with 1.920 larger ESG performance compared with those no military experience. This conclusion remains valid after robustness tests such as tail trimming of the key variable, adding CEO's and general manager's military experience, introducing province–time interaction fixed effects and clustering standard errors at different levels. Second, we also determine that the positive impact of the baseline regression is predominantly manifested through the channel of enterprises' governance, including profit, total revenue and net profit. Third, heterogeneity tests of different enterprise regions, enterprise R&D investment, enterprise size and enterprise director gender indicate that top managers' military experience is more effective in promoting enterprises' ESG performance in high R&D investment enterprises, small enterprises, enterprises with female directors and enterprises in central and western regions of China.

Based on the above conclusions, we propose the following suggestions. First, for enterprises, meticulous selection process for top managers is paramount to facilitate the enhancement of ESG performance. Drawing from the insights derived in this study, it is evident that top managers with military experience make a significant positive contribution to elevating a company's ESG performance. This underscores the profound influence of top managers' past experience on their conduct and corporate governance ethos. Therefore, when organisations are deliberating with top management teams, they should proactively consider and implement measures such as recruiting executives with military backgrounds to improve ESG performance to align with the contemporary imperative of sustainable corporate development.

Second, concerning regulatory authorities, integrating ESG principles into enterprises' strategic development framework can elevate overall operational management proficiency. Currently, ESG disclosure among public companies predominantly remains voluntary. It is imperative for regulatory bodies to promulgate comprehensive regulatory measures and institutional standards

governing ESG disclosure, which will motivate an increasing number of companies to provide comprehensive ESG disclosures.

Finally, for the government, the heterogeneity analysis presented in this study emphasises the influence of factors like region, company size and R&D investment on the impact of executive military experience. Consequently, government entities should not solely focus on formal policy formulation but also duly consider these heterogenous effects. Government-oriented subsidies can have positive and significant impact on enterprises [56]. Therefore, governments can optimize corporate governance structures by strategically implementing location-specific policies, judicious subsidies, support for smaller-scale initiatives and rigorous oversight measures on a broader scale, which can further magnify the positive contributions of executives with military experience in the corporate governance process.

However, our research still has some limitations. For instance, regarding ESG data in China, the current ESG ratings provided by rating agencies are mostly based on voluntary ESG disclosures. The assessment results do not cover all the samples of domestic Chinese companies. Therefore, in the future, if there is more comprehensive data support, we hope to conduct further in-depth research on this issue.

Data availability statement

Data associated with our study hasn't been deposited into a publicly available repository. Data will be made available on request.

CRediT authorship contribution statement

Linglve Weng: Writing – original draft, Software, Formal analysis, Data curation, Conceptualization. **Yani Ma:** Writing – original draft, Software, Project administration, Methodology, Investigation. **Zhuoxin Han:** Writing – original draft, Validation, Supervision, Software, Investigation, Conceptualization. **Peiting Dong:** Writing – review & editing, Visualization, Supervision, Software, Methodology.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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