

Institutional Portfolio Allocation under ESG and Geopolitical Risk: Evidence from International Insurers

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Abstract:

Investor interest in defence companies has intensified after the 2022. At the same time, the growing adoption of environmental, social, and governance (ESG) investing and evolving European Union (EU) sustainable finance regulations have intensified the debate over the role of defence companies in sustainable investment portfolios. This study examines whether the current geopolitical context has altered insurers' capital allocation to defence companies in the context of ESG investing. Using manually collected data on defence investment disclosures from 59 insurance companies operating across multiple regions worldwide (2015–2024), we analyse how ESG policies and regulatory environments shape insurers' allocations to the defence sector. The results indicate that ESG incorporation into investment strategies alone does not systematically reduce insurers' exposure to defence-related assets. Instead, lower defence exposure is observed only among non-life insurers when ESG-oriented investment strategies are combined with EU domicile, highlighting the importance of the regulatory and institutional context rather than ESG integration itself. Following the Russian invasion of Ukraine, European non-life insurers became more likely to invest in conventional defence companies, whereas no comparable change is observed among life insurers. By contrast, investments in nuclear and controversial weapons increased across non-life insurers irrespective of EU domicile, while life insurers' portfolio allocation remained largely unchanged across all defence categories. Finally, neither ESG incorporation nor the geopolitical context significantly influences insurers' investments in cyber- and AI-related defence companies. Results also support the emerging view that security and defence may increasingly be interpreted as part of the “social” dimension of ESG.

Keywords: Defence, Defence-tech, ESG, Insurers, Geopolitics, Regulation, Investment

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Highlights

- Institutional context dominates ESG commitments in explaining insurers' defence-sector capital allocation.
- Lower defence exposure is observed only when ESG incorporation into investment decision-making is combined with EU domicile.
- Following the Russian invasion of Ukraine, European non-life insurers increased investments in conventional defence companies.
- Neither ESG integration nor the war in Ukraine significantly affects investments in cyber and AI defence companies.

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1. Introduction

“If you want peace, prepare for war”, wrote the Roman historian Vegetius in the 4th century AD in the prologue to his work *Epitoma Rei Militaris* (Shrader, 1979). We live in times in which these words are becoming increasingly relevant. The global geopolitical situation is driving individual states to multiply military expenditures. The production of armaments is becoming highly dependent on the latest technologies and digital platforms, and therefore extremely costly.

The rapid deterioration of the global geopolitical environment has also fundamentally reshaped institutional investment decisions. Rising defence expenditures, increasing geopolitical uncertainty, and changing security priorities have altered the relative attractiveness of defence-related assets, prompting institutional investors to reassess portfolio allocation strategies. At the same time, the widespread adoption of environmental, social, and governance (ESG) investing has introduced additional investment constraints, creating a potential tension between sustainability commitments and changing geopolitical priorities.

In the wake of escalating geopolitical tensions and rising defence expenditures across Europe, financial institutions are increasingly re-evaluating their investment policies toward the defence and nuclear sectors. A striking recent example is Allianz Global Investors, the asset management arm of Allianz Group, one of the world’s largest financial services providers. Allianz Global Investors, which manages hundreds of billions of euros in assets, announced the removal of long-standing exclusions that had previously restricted investments in companies deriving more than 10 percent of their revenues from military or defence activities, as well as those engaged in nuclear-related projects. The change marks a significant departure from earlier sustainability commitments, reflecting a broader shift in Europe toward supporting rearmament and security priorities. The rationale behind Allianz’s policy revision lies in the recognition that such exclusions had become increasingly onerous in the current geopolitical climate. By relaxing its rules, the firm aligns itself with political and investor sentiment that considers defense not only a matter of national security but also of European strategic autonomy. Nevertheless, Allianz’s adjustment is not without boundaries. Importantly, Allianz continues to prohibit investments in companies engaged in the production of chemical or biological weapons or in firms that significantly violate international law (Withers, 2025).

A few months later, the European Commission reinforced this shift by publishing a Notice on the application of the EU sustainable finance framework to the defence sector. The Notice clarifies that the EU sustainable finance framework is fully compatible with investments in the defence industry and does not impose restrictions on financing any sector, including defence. Instead, it emphasises that defence investments should be assessed on a case-by-case basis and explicitly warns against the systematic exclusion of the defence sector from sustainable investment portfolios. Furthermore, the Commission recognises that the defence industry can contribute to social sustainability by strengthening European resilience, security, and peace, while reaffirming that only investments in controversial weapons remain subject to specific sustainability-related disclosure requirements (European Commission, 2025).

Although previous studies have examined defence investing primarily in the context of mutual funds, ESG funds, asset managers, and stock market reactions to geopolitical events (Harris & Pfeifer, 2024; Merler, 2025; Pedersen et al., 2021; Singh et al., 2022; Urban & Wójcik, 2019) considerably less is known about how insurers adjust portfolio allocation under changing geopolitical and regulatory conditions. This gap is particularly important because insurers are among the world's largest institutional investors, yet their investment decisions are simultaneously shaped by long-term liabilities, prudential regulation, and increasingly stringent ESG commitments (Ang, 2014; Campbell & Viceira, 2002; Pedersen et al., 2021; Poufinas & Siopi, 2024). Whether these constraints reinforce or offset each other remains largely

unexplored. Against this background, this study examines how ESG integration, the European regulatory environment, and the geopolitical shock following Russia's invasion of Ukraine jointly shape insurers' portfolio allocation to defence-related assets. In particular, the study examines whether insurers incorporating ESG considerations into their investment decision-making exhibit lower exposure to defence-related investments when operating within the European regulatory and institutional environment than insurers operating outside the EU (H1). It further investigates whether the Russian invasion of Ukraine has increased insurers' capital allocation to conventional defence companies (H2). Finally, the article explores whether insurers incorporating ESG considerations into their investment strategies are less likely to invest in conventional defence companies than in cyber-security and AI-related defence companies, reflecting the possibility that emerging defence technologies are perceived differently from traditional defence activities (H3).

To answer these hypotheses, this study combines manually collected textual disclosures with structured quantitative coding to build a longitudinal dataset of 59 insurers' investment practices. We extract information from Solvency and Financial Condition Reports, Sustainability/ESG reports, publicly available press releases and media disclosures, and annual filings for the years 2015–2024, identifying whether insurers invest in conventional defence companies, controversial weapons, or defence-tech segments such as cybersecurity and AI. These disclosures are systematically transformed into three binary variables capturing investment activity across the respective categories, which allows us to assess patterns across insurers business lines (life vs. non-life) and jurisdictions (EU vs. non-EU). We distinguish between life and non-life insurers because their investment strategies differ structurally: life insurers manage long-term contractual liabilities and therefore prioritize stable, long-duration fixed-income instruments, whereas non-life insurers face shorter liability horizons and maintain more flexible and diversified portfolios, including a comparatively higher share of equities, alternative assets, and thematic investments such as emerging technologies. Furthermore, we separate EU and non-EU insurers to capture the influence of regulatory environments on portfolio allocation. EU-domiciled insurers operate under a comprehensive sustainable finance framework, including the (SFDR, 2019), the EU Taxonomy (Taxonomy, 2020), and the Corporate Sustainability Reporting Directive (CSRD, 2022), all of which impose stricter disclosure obligations and incentivize the integration of ESG considerations into investment policies. By contrast, non-EU insurers operate under more heterogeneous regulatory settings. This distinction enables us to examine whether the European institutional environment influences insurers' capital allocation to defence companies and whether such effects depend on ESG incorporation into investment decision-making. Financial and firm-level characteristics used as control variables are obtained from Bloomberg, ensuring consistency and comparability across insurers. Based on this combined dataset, we estimate Firth logistic regression models, which are particularly suitable for rare-event outcomes, to analyse the determinants of insurers' investments in defence-related companies. To assess the robustness of the results, we additionally estimate random-effects panel logit models.

In summary, our findings indicate that ESG incorporation into investment decision-making alone is not systematically associated with lower exposure to defence-related investments. Instead, lower defence exposure is observed only among non-life insurers when ESG incorporation is combined with EU domicile, highlighting the importance of the institutional and regulatory environment. The findings further reveal that the Russian invasion of Ukraine is associated with changes in conventional defence investments only among European non-life insurers, while life insurers' investment behavior remains largely unchanged across all defence categories. Finally, neither ESG incorporation nor the post-invasion geopolitical context is systematically associated with investments in cyber- and AI-related defence companies. Unlike conventional defence investments, which increased among

European non-life insurers following the Russian invasion of Ukraine, investments in emerging defence technologies remain unaffected by either ESG integration or recent geopolitical developments.

We contribute to three strands of literature. First, the study contributes to the literature on institutional portfolio allocation by shifting attention from investment funds and asset managers to insurers, whose defence-related investment decisions remain largely unexplored despite their role as major long-term institutional investors (e.g., Causevic et al., 2022; Merler, 2025). Second, the study moves beyond the prevailing assumption that ESG integration mechanically translates into defence-sector exclusion (Urban & Wójcik, 2019; Allcott et al., 2026) by demonstrating that the relationship depends on the interaction between insurers' internal ESG policies and the broader European regulatory and institutional environment. Third, it provides one of the first empirical assessments of how the Russian invasion of Ukraine has affected insurers' defence-sector investment decisions, complementing recent evidence on changing investor attitudes toward defence following the war (Singh et al., 2022; Martins et al., 2025; Harris & Pfeifer, 2024). Finally, the study contributes to the literature on defence investing by distinguishing between conventional defence companies and emerging cyber- and AI-related defence technologies, demonstrating that these segments should not be treated as a homogeneous investment category.

2. Literature review and hypothesis development

2.1. Institutional Portfolio Allocation under ESG Constraints and Geopolitical Risk

Institutional investors allocate capital across asset classes with the objective of achieving long-term risk-adjusted returns while operating under a range of investment constraints. Contemporary portfolio management therefore extends beyond the traditional risk-return framework by recognising that institutional portfolios are simultaneously shaped by regulatory requirements, liability structures, diversification objectives, and internal investment mandates (Ang, 2014; Campbell & Viceira, 2002). Rather than selecting assets solely according to their expected financial performance, institutional investors continuously balance return objectives against multiple constraints that define the feasible investment opportunity set. Within this framework, ESG commitments and geopolitical developments represent additional portfolio constraints that may alter optimal asset allocation without changing investors' fundamental objective of maximising long-term risk-adjusted returns.

Insurance companies represent a distinctive group of institutional investors because portfolio allocation is closely linked to the nature of their liabilities. Life insurers typically manage long-term contractual obligations and therefore favour stable, long-duration investment strategies designed to match future liabilities. In contrast, non-life insurers face shorter liability horizons and greater uncertainty regarding claim payments, allowing them to maintain relatively more flexible portfolios with higher exposure to equities, alternative assets, and thematic investments. Consequently, differences in liability structures and prudential regulation imply that life and non-life insurers may respond differently to changes in investment opportunities and external shocks. Recent evidence further suggests that insurers' portfolio composition is jointly determined by asset allocation decisions and regulatory capital requirements, particularly under the Solvency II framework (Poufinas & Siopi, 2024).

Over the past decade, ESG investing has become an additional constraint affecting institutional portfolio construction rather than a substitute for conventional portfolio optimisation. ESG integration narrows the feasible investment universe by encouraging investors to exclude or underweight selected industries, thereby potentially affecting diversification opportunities and portfolio composition. At the same time, ESG screening may

improve the management of long-term sustainability risks, creating a trade-off between portfolio diversification and non-financial investment objectives (Schlütter et al., 2023).

More recently, the rapid deterioration of the geopolitical environment has introduced a new challenge for institutional portfolio allocation (Brignone et al., 2026; Puławska et al., 2026). Geopolitical shocks alter sector-specific risk premia, expected future cash flows, and governments' strategic priorities, thereby changing the relative attractiveness of different industries (Boermans et al., 2026; IMF, 2025). For many institutional investors, defence companies illustrate this tension particularly clearly. While ESG policies have historically encouraged restrictions on defence-related investments, the Russian invasion of Ukraine fundamentally changed the strategic perception of the defence industry (Merler, 2025). Defence is increasingly viewed not only as a controversial sector but also as a contributor to economic resilience, the protection of critical infrastructure, and national security (European Commission, 2025). Consequently, institutional investors are required to balance traditional portfolio objectives with potentially conflicting ESG commitments and changing geopolitical conditions.

Despite the growing literature on ESG investing and institutional asset allocation, little is known about how insurers adjust portfolio allocation when ESG-related investment constraints interact with major geopolitical shocks (Pedersen et al., 2021). This question is particularly important because insurers combine long-term investment horizons with extensive regulatory oversight and collectively manage some of the world's largest investment portfolios. Understanding whether these institutions rebalance capital towards defence-related assets therefore contributes not only to the ESG literature but also to the broader literature on institutional portfolio allocation under changing risk environments.

2.2. ESG incorporation into investment strategies and Capital Allocation to the Defence Sector Among Insurers

The ESMA Guidelines on Funds' Names require funds using ESG- or sustainability-related terms to invest at least 80% of their assets in accordance with the characteristics implied by those terms and to apply Paris-aligned Benchmark exclusion criteria, including the exclusion of companies involved in controversial weapons. Importantly, the Guidelines do not require the exclusion of conventional defence companies (ESMA, 2024). Furthermore, the EU Taxonomy, which defines environmentally sustainable economic activities, does not automatically exclude companies operating in the defence sector. While defence-specific activities are generally not covered by the Taxonomy, defence companies may still report Taxonomy-aligned activities where they meet the applicable technical screening criteria. The European Commission further clarifies that the absence of defence activities from the Taxonomy should not be interpreted as limiting investment in the defence sector or as implying that such activities are incompatible with sustainable finance (European Commission, 2025). Under the SFDR, investors must assess relevant Principal Adverse Impact (PAI) indicators applicable to the defence sector, particularly those relating to human rights, controversial weapons, corporate governance, and environmental performance. Accordingly, financial market participants are required to identify and disclose actual or potential adverse impacts, including in relation to defence companies where their activities are substantively linked to such risks. The Commission further clarifies that PAI indicator 14 (covering investments in companies involved in the manufacture or sale of controversial weapons) refers to specific categories such as anti-personnel mines, cluster munitions, chemical weapons, and biological weapons. Exposure to such activities will necessarily constitute a negative PAI (European Commission, 2025).

The European Commission has clarified that the EU sustainable finance framework, including the SFDR, does not restrict investments in the defence sector. Instead, it requires financial market participants to disclose how sustainability risks and principal adverse impacts

are integrated into their investment decision-making, without mandating the exclusion of defence-related activities (European Commission, 2025). However, in practice, these disclosure obligations, combined with institutions' own ESG frameworks and reputational considerations, may significantly influence the assessment and treatment of defence-sector exposures (Merler, 2025). A working paper of Allcott et al. (2026) present that the SFDR has not meaningfully changed investor behavior or fund portfolios, suggesting disclosure requirements alone may be insufficient to drive real investment changes. The analysis argues that SFDR's transparency goals have not translated into capital reallocation because the necessary steps (information relevance, investor response, portfolio changes) have not fully materialized (Allcott et al., 2026).

However, Causevic et al., (2022) point to inconsistencies in sustainable investment practices, particularly with respect to weapons financing, noting that regulatory requirements alone do not produce uniform outcomes. Urban & Wójcik (2019) further shows that financial institutions may adopt paradoxical sustainability strategies, for instance, marketing ESG-labelled funds while continuing to support controversial industries, which implies that regulatory compliance does not necessarily translate into meaningful exclusion. Nevertheless, insights from commitment theory suggest that formal declarations may still exert behavioral influence over time. Kiesler's (1971) commitment theory argues that public and written commitments create psychological attachment to a course of action, increasing the likelihood of subsequent behaviour consistent with that commitment. Similarly, Cialdini & Cialdini, (2013) principle of commitment and consistency demonstrates that once organisations articulate a position publicly, reputational concerns and the desire for internal coherence strengthen pressures to align actions with prior statements. Applied to sustainable finance, this implies that although regulatory disclosure requirements may initially produce symbolic or inconsistent practices, formal ESG commitments might gradually constrain discretion and increase the probability of substantive alignment between sustainability rhetoric and portfolio allocation.

Taken together, it might be suggested that while regulatory frameworks increasingly push insurers toward integrating sustainability considerations, they primarily shape formal commitments rather than substantive investment behaviors. In turn, it is the internal ESG policies, often stricter and more value-driven than regulatory requirements, that determine whether insurers translate sustainability rhetoric into actual capital reallocation. This distinction is crucial in the context of defence-related financing: if both regulatory pressure and internal exclusion policies are present, insurers might appear more likely to move away from supporting the defence sector. Thus, consistent with the literature highlighting the gap between compliance and meaningful action, we expect that regulations may trigger declarations, but it is insurers' own ESG frameworks that drive real investment decisions, which motivates our hypothesis H1.

H1: ESG integration is associated with lower portfolio allocation to defence-related assets among EU insurers than among non-EU insurers.

2.3. Post-Invasion Shifts in Insurers' Defence-Sector Capital Allocation

Before the recent geopolitical developments, institutional investors, including insurers, had gradually reduced their exposure to the defence industry despite its strong financial performance, largely due to the widespread adoption of ESG-based investment exclusions. According to a PwC report, Russia's invasion of Ukraine in February 2022 marked a major inflection point, triggering a reassessment of the strategic role of the defence sector. As geopolitical and security concerns intensified, institutional investors renewed their interest in

defence companies. Consequently, the number of institutional investors holding positions in the world's 16 largest defence companies increased by approximately 6% in 2022, with this upward trend continuing throughout 2023 (Kutschera & Förster, 2023). Due to Morningstar's analysis, the number of European ESG funds holding more than 5 per cent in aerospace and defence companies tripled, going from 22 to 66 past 2022 (Harris & Pfeifer, 2024).

Reflecting this broader shift, a survey conducted in late 2023 found that a majority of wealth managers considered defence companies to be compatible with ESG principles, provided that certain conditions were met, indicating a significant change in investors' attitudes towards the sector (Chandler, 2024). Despite the recent shift in market sentiment, approximately one-third of European ESG-labelled funds continue to maintain either no exposure or only limited exposure to defence-related assets. (Harris & Pfeifer, 2024). Importantly, 28% of Article 9 funds and 16% of Article 8 funds under the SFDR framework in Europe apply a complete exclusion to companies engaged in any nuclear weapons activities, while an additional small share introduces revenue-based thresholds limiting exposure to such involvement (Merler, 2025).

Singh et al., (2022) found that the conflict led to a "recalibration of investor priorities", with energy and aerospace & defence sectors becoming net receivers of investment flows. Martins et al., (2025) observed a "positive and statistically significant stock price reaction" for the world's largest defence firms, consistent with expected cash flow hypotheses. Zhang et al., (2022) further confirmed a "flight-to-arms phenomenon" with significant co-movement between geopolitical risk and defence company returns. Together, these findings indicate that geopolitical shocks can override previous sustainability constraints, redirecting capital back toward traditional defence assets. Therefore, we propose hypothesis that geopolitical turmoil might encourages a renewed investor shift toward the defence sector:

H2: The Russian invasion of Ukraine is associated with higher portfolio allocation to conventional defence companies.

2.4. Differential ESG-Based Exclusions of Conventional vs. Emerging Defence Sectors

The defence sector encompasses a broad range of activities, including the production of conventional military equipment, dual-use technologies, cyber-security solutions, artificial intelligence applications and space-related capabilities. ESG-oriented investment approaches do not treat all defence-related activities equally, as investment decisions are expected to reflect the specific sustainability risks and characteristics of individual activities rather than relying on sector-wide exclusions. Companies involved in internationally prohibited or controversial weapons are subject to the greatest scrutiny because sustainable finance frameworks and responsible investment principles place particular emphasis on compliance with international humanitarian law and human rights standards (European Commission, 2025). In contrast, emerging defence activities such as cyber-security may be subject to a different ESG assessment because their primary purpose is to strengthen the security and resilience of critical infrastructure, information systems and digital services rather than to produce offensive military equipment. The growing importance of cyber security in enterprise risk management and operational resilience has been widely recognised in international governance frameworks, including the NIST Cybersecurity Framework and the EU Digital Operational Resilience Act (DORA, 2020), which position cyber resilience as a core element of organisational governance and risk management.

Alongside cyber-security, artificial intelligence has emerged as another key technological pillar of modern defence systems. Artificial intelligence strengthens defence

capabilities by supporting intelligence analysis, target recognition, surveillance, autonomous systems, predictive maintenance and military decision-making through advanced data processing and real-time operational analysis (Ertan & Christie, 2021; Hagos & Rawat, 2024). At the same time, its integration into autonomous weapons systems raises documented concerns regarding malfunction risks, accountability gaps, loss of meaningful human control, and unintended harm (Rashid et al., 2023). AI also contributes to logistics optimization, cybersecurity, medical support, and operational efficiency, functioning as a capability multiplier whose effects depend on governance and deployment choices rather than being inherently destabilizing (Williams & Evans, 2026).

Against this backdrop of expanding military applications and governance debates, the rapid growth in global investment flows into artificial intelligence underscores its strategic and economic significance beyond the defence domain. In 2025, venture capital investments in artificial intelligence-related companies accounted for more than half of total global venture capital funding, reaching approximately 61% (USD 258.7 billion). Between 2022 and 2025, global AI financing rebounded to its 2021 peak levels, representing more than a twofold increase compared to 2023. This growth was particularly pronounced in the generative AI segment, where funding expanded from USD 2.8 billion to USD 15.3 billion between 2022 and 2023 (OECD, 2026).

These developments indicate that the defence sector is not homogeneous from an ESG perspective. While companies involved in controversial or internationally prohibited weapons continue to face the strictest ESG scrutiny, emerging defence technologies such as cybersecurity and artificial intelligence perform functions that extend beyond conventional military applications, contributing to cyber resilience, operational continuity and critical infrastructure protection. At the same time, artificial intelligence has become a strategically important technology with broad civilian and commercial applications, as reflected in the rapid expansion of global investment flows into AI-related companies. Consequently, the ESG assessment of defence-related activities may differ across subsectors, particularly between conventional weapons manufacturers and firms developing cyber-security and AI-enabled technologies with dual-use characteristics. This reasoning suggests that insurers incorporating ESG considerations into their investment strategies may differentiate between conventional defence companies and emerging defence technologies rather than applying uniform exclusions across the entire defence sector. This leads to the following hypothesis:

H3: ESG integration is associated with lower portfolio allocation to conventional defence companies than to cyber-security and AI-related defence companies.

3. Methodology

3.1. Data collection

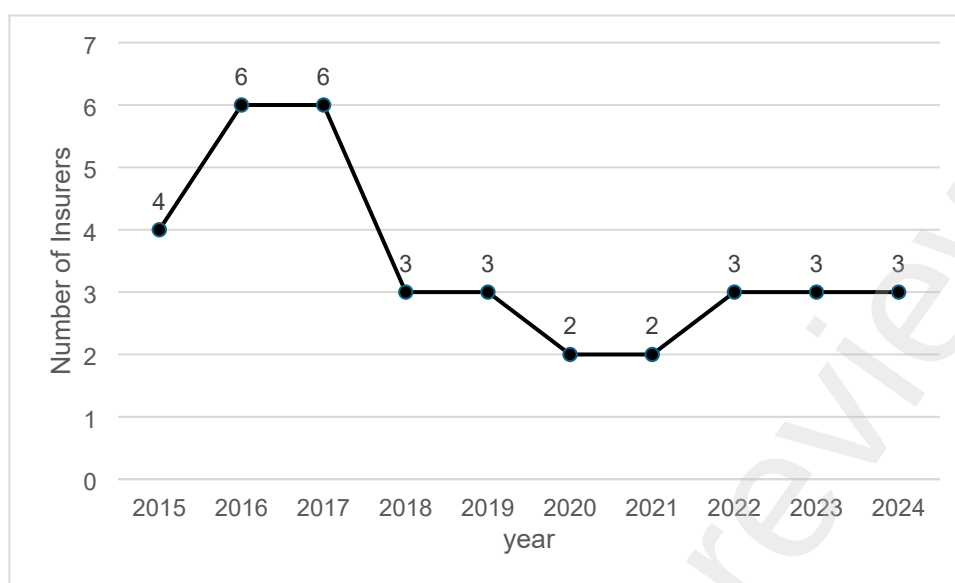
To answer hypotheses, this study combines manually collected textual disclosures with structured quantitative coding to build a longitudinal dataset of insurers' investment practices. We extract information from publicly available data compiled by PAX in its Don't Bank on the Bomb reports, Solvency and Financial Condition Reports, Sustainability/ESG reports, publicly available press releases and media disclosures, and annual filings for the years 2015–2024, identifying whether insurers invest in conventional defence companies, controversial weapons, or defence-tech segments such as cybersecurity and AI. Each document was systematically screened for references to investment policies, portfolio composition, and ESG exclusions related to defence or weapon manufacturing. The following keywords were employed to search across the reports (both in English and in the original language where applicable): “defence,”

“defence sector,” “military,” “arms,” “weapons,” “nuclear,” “controversial weapons,” “cybersecurity,” “AI,” “artificial intelligence,” “defence technology,” “ESG exclusions,” “responsible investment policy.”

Founded disclosures are systematically transformed into three binary variables capturing investment activity across the respective categories, which allows us to assess patterns across insurers business lines (life vs. non-life) and jurisdictions (EU vs. non-EU). We distinguish between life and non-life insurers because their investment strategies differ structurally: life insurers manage long-term contractual liabilities and therefore prioritize stable, long-duration fixed-income instruments, whereas non-life insurers face shorter liability horizons and maintain more flexible and diversified portfolios, including a comparatively higher share of equities, alternative assets, and thematic investments such as emerging technologies. Furthermore, we separate EU and non-EU insurers to capture the influence of regulatory environments on portfolio allocation. EU-domiciled insurers operate under a comprehensive sustainable finance framework, including the SFDR, the EU Taxonomy for Sustainable Activities, and the CSRD, all of which impose stricter disclosure obligations and incentivize the integration of ESG considerations into investment policies. Additional financial variables, control indicators, information on the integration of ESG considerations into insurers’ investment strategies, as well as headquarters locations, were obtained from the Bloomberg database.

The classification of companies as investing or not investing in nuclear weapon producers was based on publicly available data compiled by PAX in its Don’t Bank on the Bomb reports. The PAX Don’t Bank on the Bomb dataset focuses exclusively on companies involved in nuclear weapons. Firms are classified as nuclear weapon producers if they develop, test, manufacture, maintain, or modernize nuclear warheads or delivery systems specifically designed for nuclear tasks. General-purpose delivery platforms (such as conventional aircraft or submarines), state-owned nuclear industries, and other defence-related activities are excluded from the scope. Information was drawn from annual reports, company registries, financial statements, pension fund disclosures, company websites, and media archives, complemented by specialized financial databases including Refinitiv Eikon, Refinitiv EMAXX, Bloomberg, and IJGlobal. A company was classified as an investor if it (i) participated in loans or underwriting deals with one or more of the identified nuclear weapon producers during the period under review (or in earlier loans that remained active beyond the reporting cut-off date), or (ii) held at least 0.5% of the outstanding shares or bonds of such producers at the most recent filing date. Institutions that did not meet these thresholds were not considered investors.

Figure 1 Insurance companies in PAX list



Between 2015 and 2017, the list was dominated by the largest European insurance groups, such as AXA, Allianz, Zurich, Aviva, and NN Group, which consistently appeared in the Hall of Shame.

In the period 2018–2020, some of these leading firms improved their exclusion policies and were subsequently removed from the list. For example, AXA, which had been classified in the Hall of Shame from 2015 to 2019, moved to the fully compliant category in 2020. Similarly, Aviva, NN, and Zurich also disappeared from the ranking during this period. At the same time, however, new entries emerged, particularly from Southern Europe, including Intesa Sanpaolo, CNP Unicredit, and Mediolanum, signalling a geographical shift in the composition of non-compliant insurers. During 2020–2022, the overall number of firms classified as non-compliant stabilized. Large multinationals such as Prudential, Allianz, and Legal & General continued to feature on the list, while smaller regional insurers began to appear sporadically. This period is characterized more by continuity than by significant new additions. By contrast, in 2022–2024, a new wave of entries reshaped the list. Companies such as CNP Unicredit, Mediolanum, and Cincinnati Financial were consistently categorized as non-compliant, while some major groups (e.g., Aviva, M&G) no longer appeared. This indicates a dynamic shift: while several large insurers improved their policies and exited the list, new actors, often mid-sized players or financial groups from Southern Europe and North America, emerged as significant contributors to controversial investments.

3.2. Empirical Approach

To examine whether insurers restrict capital allocation and underwriting activities in the defence sector, we primarily estimate a series of Firth bias-reduced logistic regression models (Firth, 1993). As a robustness analysis, we additionally estimate random-effects panel logistic regression models, which account for unobserved insurer-specific heterogeneity while retaining time-invariant explanatory variables, such as EU membership.

3.3. Variables

Dependent Variables

For empirical purposes, the collected information was transformed into dummy variables capturing the presence or absence of investment activity within three distinct defence-related categories:

- Invest_ConvDefence – equals 1 if the insurer invested in conventional defense or military companies (e.g., arms manufacturers, aerospace defense contractors); 0 otherwise.
- Invest_Nuclear – equals 1 if the insurer invested in, or failed to exclude, issuers involved in nuclear or other controversial weapons (such as biological, chemical, or cluster munitions); 0 otherwise.
- Invest_DefTech – equals 1 if the insurer invested in defense-related technology sectors such as cybersecurity or AI-driven defense systems; 0 otherwise.
- Invest_AnyDefence – equals 1 if the insurer invested in any defence-related sector; 0 otherwise.

Each dummy variable was coded annually for the period 2015–2024, based on explicit disclosures or absence thereof in the reviewed documentation. The classification relied on companies' documented involvement in defence-related activities, irrespective of whether their products or technologies were exclusively military or also had civilian (dual-use) applications.

Main Independent Variables

- Incorporation of ESG into Investment Process (ESG_it): Dummy equal to 1 if insurer i explicitly states that ESG factors are incorporated into its investment decision-making process, and 0 otherwise.
- EU Insurer (EU_i): Dummy equal to 1 for EU-headquartered insurers. The EU Insurer dummy is relevant because insurance companies headquartered in the European Union are directly subject to the EU's sustainable finance regulatory framework, including the SFDR, the Taxonomy Regulation, and related disclosure and due-diligence requirements. These regulations impose stricter expectations regarding transparency, sustainability risks, and ESG-aligned capital allocation, which may systematically influence the portfolio allocation of EU-based insurers compared to non-EU firms.
- Interaction (ESG_it $\times$ EU_i): Captures whether the incorporation of ESG factors into investment decision-making has a differentiated effect for EU-based insurers operating under a stricter sustainable finance regulatory framework.
- PostInv – a dummy variable equal to 1 for years following the outbreak of the war in Ukraine (i.e., 2022 and after), and 0 otherwise. PostInv may affect asset-allocation decisions because the war in Ukraine reshaped geopolitical risk perceptions and increased the strategic and financial relevance of defence-related sectors, prompting insurers to reassess their investment priorities.

Control Variables

- Size (log/assets)) is included as a standard control variable capturing insurer scale. Firm size is measured as the natural logarithm of total assets, which stabilises variance and reduces skewness in the distribution. Controlling for size is essential, as larger insurers typically have broader investment capacities, more diversified portfolios, and greater ability to engage in specialised or higher-risk asset allocation strategies, potentially influencing their exposure to defence-related sectors.
- We control for insurers' solvency, measured as the ratio of net premiums written to total equity (Solvency). This indicator captures an insurer's underwriting leverage and

overall financial resilience. Since firms with weaker solvency positions may face tighter capital constraints and adopt more conservative investment strategies, controlling for solvency helps isolate the effect of the key explanatory variables from differences in risk-bearing capacity and regulatory pressure across insurers.

- Return on invested capital (ROIC) is included to account for differences in operational performance and capital efficiency. Insurers with higher ROIC may face fewer financial constraints and exhibit distinct risk preferences, potentially shaping their portfolio choices. Controlling for ROIC helps separate portfolio allocation from underlying profitability dynamics.
- We control for the insurer's reserve ratio, calculated as reserves divided by total assets (Reserves). Higher reserve levels might reflect a more conservative risk profile and reduced balance-sheet flexibility, which may limit the insurer's willingness to allocate capital to sectors perceived as sensitive or high-risk, including defence-related industries.

3.4. Empirical Model

To examine whether insurers restrict capital allocation and underwriting activities in the defence sector, we estimate a series of binary response models using Firth bias-reduced logistic regression (Firth, 1993). The dependent variables indicate whether insurer i engaged in a given defence-related activity in year t , taking the value of one when the activity is observed and zero otherwise.

The probability that insurer i engages in defence-related activities in year t is modelled as

$$Pr(Y_{it} = 1 | X_{it}) = \Lambda(X_{it}'\beta) = \exp(X_{it}'\beta) / (1 + \exp(X_{it}'\beta))$$

The linear predictor is specified as

$$X_{it}'\beta = \beta_0 + \beta_1 ESG_{it} + \beta_2 EU_i + \beta_3 (ESG_{it} \times EU_i) + \beta_4 PostWar_t + \beta_5 (EU_i \times PostWar_t) + \gamma' Controls_{it}$$

where ESG denotes insurers' ESG commitments, EU identifies insurers headquartered in the European Union, PostInv captures the period following Russia's invasion of Ukraine, and Controls represents the vector of insurer-specific control variables, including insurer size (Size), solvency (Solvency), technical reserves (Reserves), and return on invested capital (ROIC). Depending on the empirical specification, explanatory variables and interaction terms are introduced sequentially to evaluate the direct and moderating effects of ESG commitments, EU membership, and the post-war period.

The baseline models are estimated using Firth's (1993) bias-reduced logistic regression, which is particularly appropriate for the characteristics of our data. Three considerations motivate the choice of this estimator. First, the dependent variables exhibit limited within-sample variation, with positive outcomes accounting for only 1.22% to 6.11% of all observations, depending on the analysed defence-related activity. Such a highly unbalanced distribution increases the finite-sample bias of conventional maximum likelihood estimation and reduces the reliability of standard logistic regression estimates (King & Zeng, 2001). Second, several model specifications exhibit complete or quasi-complete separation, whereby one or more explanatory variables perfectly predict the binary outcome. Under these circumstances, conventional logistic regression may fail to converge or produce infinite parameter estimates, rendering statistical inference unreliable (Heinze & Schemper, 2002).

Third, the combination of sparse positive outcomes and separation substantially increases the likelihood of unstable coefficient estimates and inflated standard errors under conventional maximum likelihood estimation. Firth's estimator was specifically developed to overcome these limitations and has become the standard approach in such empirical settings.

Unlike conventional logistic regression, which maximizes the standard log-likelihood function

$$\ell(\beta) = \sum_{i=1}^N \sum_{t=1}^T [y_{it} \ln(p_{it}) + (1 - y_{it}) \ln(1 - p_{it})]$$

where

$$p_{it} = \exp(X_{it}'\beta) / (1 + \exp(X_{it}'\beta))$$

Firth's estimator maximizes the penalized log-likelihood

$$\ell_F(\beta) = \ell(\beta) + (1/2)\ln|I(\beta)|$$

where $I(\beta)$ denotes the Fisher information matrix. The additional penalty term corresponds to Jeffreys' invariant prior and removes the first-order asymptotic bias of the maximum likelihood estimator (Firth, 1993). Unlike conventional logistic regression, Firth's penalized likelihood estimator guarantees finite coefficient estimates even in the presence of complete or quasi-complete separation (Heinze & Schemper, 2002). Moreover, simulation evidence demonstrates that it provides more accurate coefficient estimates, confidence intervals, and significance tests than standard logistic regression when binary outcomes are rare or highly unbalanced (Puhr et al., 2017).

As an additional robustness check, we estimate random-effects panel logistic regression models, which account for unobserved insurer-specific heterogeneity while retaining time-invariant explanatory variables, such as EU membership. This specification is appropriate because institutional characteristics that do not vary over time constitute an important part of our empirical framework and cannot be estimated using fixed-effects binary response models. The random-effects logit models are estimated using conventional maximum likelihood with standard model-based standard errors. We do not employ cluster-robust standard errors because the principal econometric challenge in our data is not within-panel error dependence but rather the extremely low prevalence of positive outcomes and the occurrence of complete or quasi-complete separation. These characteristics primarily affect the consistency and finite-sample properties of the maximum likelihood estimator rather than the estimation of its covariance matrix (Heinze & Schemper, 2002; Puhr et al., 2017). Consequently, our main analysis relies on Firth's bias-reduced logistic regression, which directly addresses these issues through penalized likelihood estimation, while the random-effects logit models serve exclusively as a robustness analysis. The consistency of the results across both estimation approaches indicates that the main conclusions are not driven by the choice of estimator. The results are qualitatively consistent with those obtained from the Firth logistic regression models. For brevity, the robustness estimates are reported in Appendix A.

To examine H2 and isolate the impact of the geopolitical shock triggered by Russia's invasion of Ukraine, we complement the baseline panel logistic regressions with a difference-in-differences (DiD) framework. Difference-in-differences is a widely used quasi-experimental approach that allows researchers to identify the effect of an exogenous event by comparing changes in outcomes between a treatment and a control group over time (Bertrand et al., 2004; Callaway & Sant'Anna, 2021).

The treatment group consists of insurers headquartered in EU member states, while non-EU insurers serve as the control group. A binary variable, PostInv, equals one for observations recorded after the outbreak of the war in Ukraine and zero otherwise. The DiD estimator is captured by the interaction term $EU \times PostInv$, which measures whether the post-invasion change in defence-sector capital allocation among EU insurers differs from the corresponding change observed among non-EU insurers.

The estimated specification can be expressed as follows:

$$DefenceInvestment_{it} = \alpha + \beta_1 PostInv_t + \beta_2 EU_i + \beta_3 (PostInv_t \times EU_i) + \gamma X_{it} + \varepsilon_{it}$$

where DefenceInvestment denotes the alternative measures of defence-sector exposure, including investments in conventional defence companies, broader defence-sector investments, and investments associated with nuclear or controversial weapons. X represents the vector of control variables, including insurer size, solvency, technical reserves, profitability (ROIC), and ESG exclusion policies. The coefficient of primary interest is β_3 . A positive and statistically significant coefficient would indicate that, following the outbreak of the war, EU insurers increased their exposure to the defence sector more strongly than insurers outside the EU. Conversely, a negative coefficient would suggest a relatively stronger reduction in defence-sector exposure among European insurers. Given the binary nature of the dependent variables, all models are estimated using random-effects panel logistic regression. The DiD specification serves as an additional identification strategy that enables a more rigorous assessment of whether observed changes in defence-sector investment policies can be attributed to the geopolitical shock rather than to common time trends affecting all insurers. Consistent with the recommendations of Bertrand et al. (2004), the DiD framework is employed to strengthen causal interpretation by exploiting both cross-sectional and temporal variation in the data.

4. Results

4.1. Summary statistics

Table 1 Descriptive Statistics – non-life insurance companies

Variable	Obs	Mean	Std. Dev.	Min	Max
EU	392	0.2423469	0.4290507	0	1
PostInv	392	0.1989796	0.3997429	0	1
Invest_ConvDefence	392	0.0382653	0.1920812	0	1
Invest_Nuclear	392	0.0255102	0.1578702	0	1
Invest_DefTech	392	0.0153061	0.1229243	0	1
Invest_AnyDefence	392	0.0561224	0.2304522	0	1
Invest_ESG	392	0.2551020	0.4364756	0	1
Size	392	7.3559310	2.2075640	-0.3770234	12.50198
Solvency	392	1.6784480	2.6135800	-0.0029347	28.31416
Reserves	342	0.3332395	0.1737579	0	0.7708303
ROIC	350	3.4491520	8.0037760	-40.2312	63.7663

Table 2 Descriptive Statistics -life insurance companies

Variable	Obs	Mean	Std. Dev.	Min	Max
EU	318	0.7767296	0.4170945	0	1
PostInv	318	0.1194969	0.3248835	0	1
Invest_ConvDefence	318	0.1226415	0.3285422	0	1
Invest_Nuclear	318	0.0282427	0.1657521	0	1
Invest_DefTech	318	0.0943396	0.2927613	0	1

Invest_AnyDefence	318	0.2169811	0.4128393	0	1
Invest_ESG	318	0.3647799	0.4821270	0	1
Size	318	9.409895	2.911089	2.752265	13.94604
Solvency	318	0.8622984	1.227533	0	13.80935
Reserves	288	0.1434779	0.1905948	0	0.7212956
ROIC	292	6.311620	18.91904	-120.9006	127.4368

In the non-life insurance sample, defence-related exposures are generally rare at the observation level. The variable *Invest_ConvDefence* equals 1 in 3.8% of observations, indicating that investments in conventional defence companies are relatively uncommon. Exposure to nuclear or controversial weapons is even less frequent, with *Invest_Nuclear* taking the value 1 in only 2.6% of observations. Similarly, *Invest_DefTech*, capturing investments in cyber, AI, and advanced defence technologies, equals 1 in just 1.5% of observations. The composite indicator *Invest_AnyDefence*, which identifies at least one type of defence-related investment, takes the value 1 in 5.6% of observations. Overall, these figures indicate that defence-related investments represent a relatively small share of non-life insurers' investment portfolios.

The pattern differs substantially in the life insurance sample, where defence-related investments are considerably more prevalent. *Invest_ConvDefence* equals 1 in 12.3% of observations, more than three times the corresponding proportion observed among non-life insurers. Investments in nuclear or controversial weapons remain relatively uncommon, with *Invest_Nuclear* equal to 1 in 2.8% of observations, a level broadly comparable to that observed in the non-life sample. By contrast, *Invest_DefTech* equals 1 in 9.4% of observations, indicating a substantially stronger presence of investments in cyber, AI, and advanced defence technologies. The broad indicator *Invest_AnyDefence* takes the value 1 in 21.7% of observations, implying that more than one-fifth of life insurance observations are associated with at least one type of defence-related investment. Overall, the descriptive statistics suggest that life insurers exhibit markedly greater exposure to defence-related assets than non-life insurers, particularly with respect to conventional defence companies and emerging defence technologies.

4.1.1. Graphs

The following figures illustrate the investment exposures of life and non-life insurance companies to various defence-related sectors. The charts present how insurers allocate their portfolios to conventional defence companies, nuclear controversial weapons over time, and cyber and defence technology firms.

Figure 2 Average Share of non-life insurance companies Investing in Defence Companies

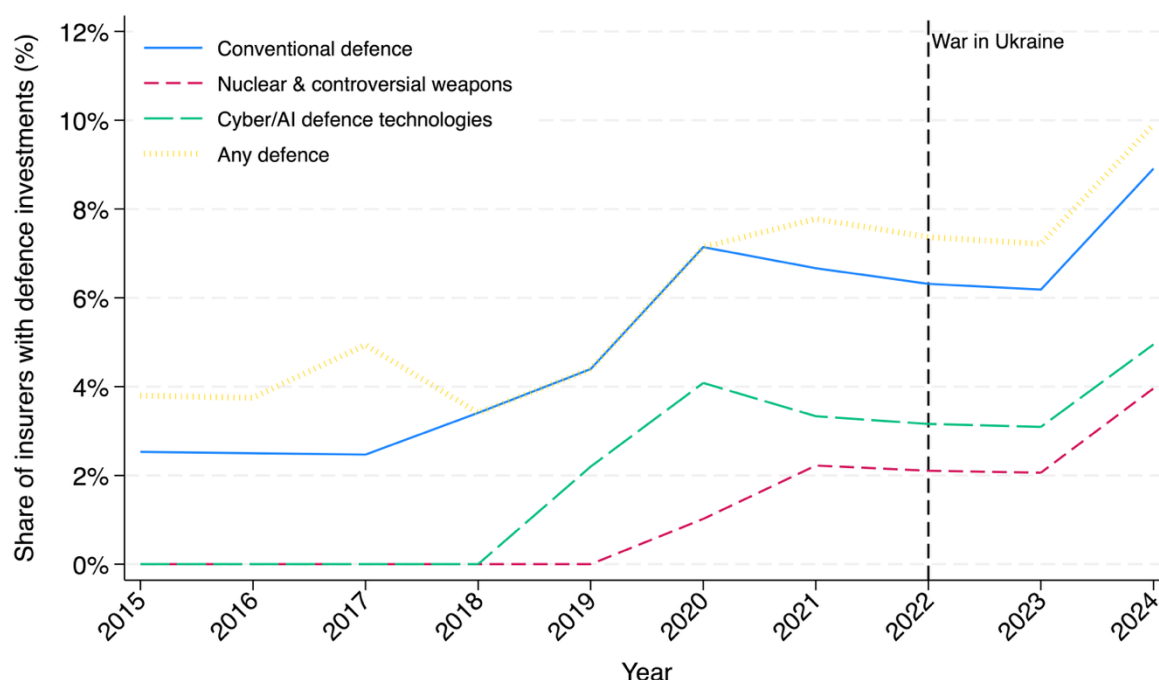


Figure 2 presents the share of non-life insurance companies investing in four defence-related asset categories between 2015 and 2024: conventional defence, nuclear and controversial weapons, cyber/AI defence technologies, and any defence-related investment. Conventional defence investments remain relatively stable at around 2.5% until 2017, increase steadily thereafter, and reach approximately 7% in 2020. Although the share declines slightly during 2021–2023, it remains well above the pre-2020 level before increasing further to nearly 9% in 2024. Investments in nuclear and controversial weapons are virtually absent until 2019, after which they gradually increase, reaching around 2% in 2021–2023 and rising to approximately 4% in 2024. Cyber and AI defence technology investments emerge in 2019, increase rapidly to about 4% in 2020, remain relatively stable over the following years, and reach their highest level of around 5% in 2024. The broadest measure, representing insurers investing in any defence-related assets, fluctuates between 4% and 8% during most of the sample period before increasing to approximately 10% in 2024, the highest level observed. The vertical dashed line indicates the outbreak of the war in Ukraine in 2022.

Figure 3 Average Share of life insurance companies Investing in Defence Companies

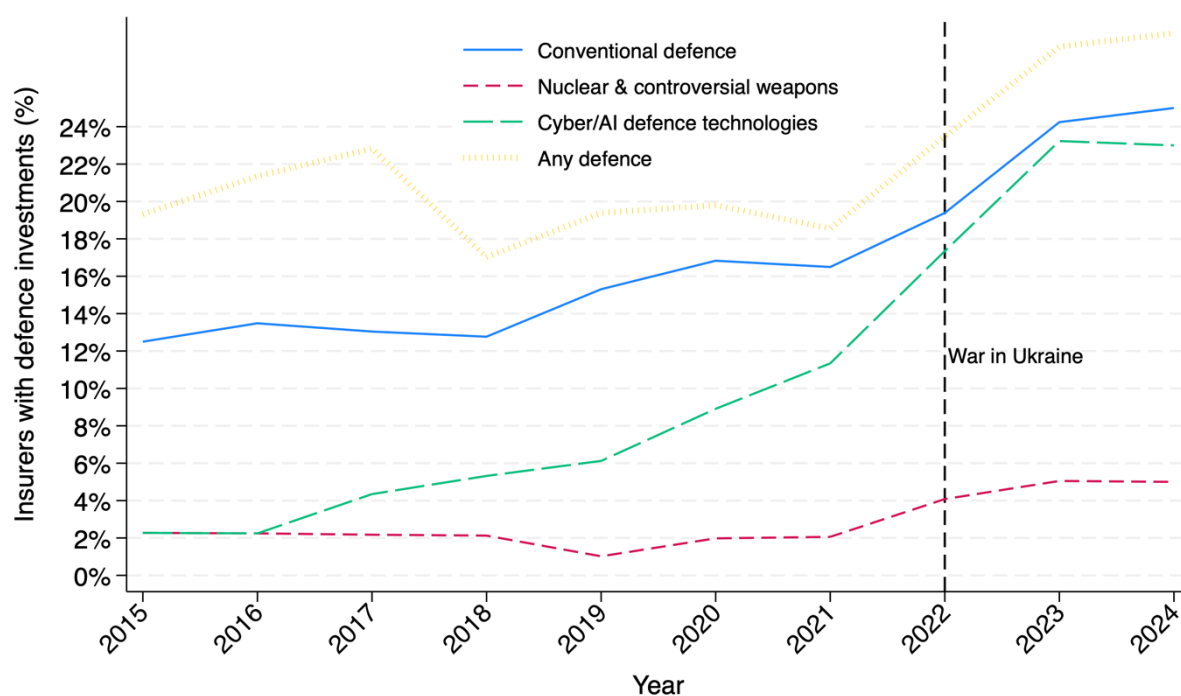


Figure 3 presents the share of life insurance companies investing in four defence-related asset categories between 2015 and 2024: conventional defence, nuclear and controversial weapons, cyber/AI defence technologies, and any defence-related investment. Conventional defence investments remain relatively stable at around 13% during 2015–2018, before increasing steadily to approximately 17% in 2020. After a slight decline in 2021, the share rises markedly following the outbreak of the war in Ukraine, reaching around 24% in 2023 and almost 25% in 2024. Investments in nuclear and controversial weapons remain limited throughout the sample period, fluctuating at around 2% before declining to approximately 1% in 2019. They subsequently increase gradually, reaching about 4% in 2022 and approximately 5% in 2023–2024. Investments in cyber and AI defence technologies show a clear upward trend over the sample period. Starting from around 2% in 2015–2016, they increase steadily to approximately 11% in 2021, followed by a pronounced rise after 2022 to around 23% in 2023, remaining broadly stable in 2024. The broadest measure, representing insurers investing in any defence-related assets, consistently exceeds the individual categories. It fluctuates between approximately 17% and 23% before 2022 and increases sharply thereafter, reaching around 28% in 2023 and remaining at a similar level in 2024. The vertical dashed line indicates the outbreak of the war in Ukraine in 2022.

4.2. Correlation Matrix

Table 3 Pairwise correlations – non-life

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
(1) EU	1.000										
(2) PostInv	-0.001 (0.985)	1.000									
(3) Invest_ConvDefence	0.048 (0.150)	0.061 (0.069)	1.000								
(4) Invest_Nuclear	-0.093 (0.005)	0.095 (0.004)	0.292 (0.000)	1.000							
(5) Invest_DefTech	0.058 (0.081)	0.072 (0.030)	0.439 (0.000)	0.326 (0.000)	1.000						
(6) Invest_AnyDefence	0.051 (0.123)	0.060 (0.070)	0.920 (0.000)	0.436 (0.000)	0.528 (0.000)	1.000					
(7) Invest_ESG	0.101 (0.003)	0.138 (0.000)	0.160 (0.000)	0.147 (0.000)	0.142 (0.000)	0.171 (0.000)	1.000				
(8) Size	0.082 (0.042)	0.113 (0.005)	0.353 (0.000)	0.149 (0.000)	0.225 (0.000)	0.357 (0.000)	0.513 (0.000)	1.000			
(9) Solvency	-0.112 (0.025)	0.047 (0.349)	-0.025 (0.618)	-0.046 (0.358)	-0.039 (0.439)	-0.045 (0.371)	-0.113 (0.024)	-0.106 (0.034)	1.000		
(10) Reserves	0.134 (0.004)	0.052 (0.258)	-0.133 (0.004)	-0.022 (0.630)	-0.026 (0.578)	-0.118 (0.011)	-0.018 (0.694)	0.085 (0.066)	0.196 (0.000)	1.000	
(11) ROIC	-0.060 (0.179)	0.023 (0.601)	0.012 (0.784)	0.007 (0.870)	0.008 (0.859)	0.014 (0.760)	0.030 (0.507)	0.162 (0.000)	-0.169 (0.001)	-0.206 (0.000)	1.000

Table 4 Pairwise correlations – life

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
(1) EU	1.000										
(2) PostInv	-0.019 (0.556)	1.000									
(3) Invest_ConvDefence	0.070 (0.031)	0.104 (0.001)	1.000								
(4) Invest_Nuclear	0.066 (0.040)	0.077 (0.018)	0.292 (0.000)	1.000							
(5) Invest_DefTech	-0.106 (0.001)	0.229 (0.000)	0.330 (0.000)	0.125 (0.000)	1.000						
(6) Invest_AnyDefence	0.110 (0.001)	0.081 (0.013)	0.855 (0.000)	0.321 (0.000)	0.324 (0.000)	1.000					
(7) Invest_ESG	-0.076 (0.019)	0.066 (0.041)	0.284 (0.000)	0.058 (0.074)	0.256 (0.000)	0.320 (0.000)	1.000				
(8) Size	0.031 (0.415)	0.153 (0.000)	0.302 (0.000)	0.119 (0.002)	0.258 (0.000)	0.352 (0.000)	0.580 (0.000)	1.000			
(9) Solvency	-0.107 (0.056)	-0.002 (0.968)	-0.110 (0.051)	0.000 (0.000)	0.008 (0.885)	-0.077 (0.169)	-0.154 (0.006)	-0.366 (0.000)	1.000		
(10) Reserves	0.110 (0.029)	0.058 (0.248)	0.075 (0.137)	0.013 (0.797)	-0.012 (0.813)	0.082 (0.103)	-0.049 (0.328)	-0.108 (0.031)	0.302 (0.000)	1.000	
(11) ROIC	-0.154 (0.000)	0.062 (0.138)	0.055 (0.193)	-0.042 (0.314)	-0.069 (0.099)	0.017 (0.687)	-0.176 (0.000)	-0.284 (0.000)	0.265 (0.000)	-0.130 (0.013)	1.000

The correlation analysis for both the non-life and life insurance sectors indicates no evidence of problematic multicollinearity. Most pairwise correlations are low or moderate, with higher values occurring only among defence-related variables, which is expected given their conceptual proximity. Financial variables such as solvency, reserves, and ROIC exhibit weak to moderate correlations with the remaining regressors. Overall, the correlation structure confirms that the set of explanatory variables is well-behaved and suitable for regression analysis, with no indications of collinearity that could bias the estimation results.

4.3. Regression Results for H1: ESG incorporation into investment strategies and Capital Allocation to the Defense Sector Among Insurers

4.3.1. Non-life Insurers

Table 5 Regression Results for H1: ESG incorporation into investment strategies and Capital Allocation to the Defense Sector Among Non-Life Insurers

	(1) Invest_Co nvDefenc e	(2) Invest_Co nvDefenc e	(3) Invest_Co nvDefenc e	(4) Invest_Co nvDefenc e	(5) Invest_An yDefence	(6) Invest_An yDefence	(7) Invest_An yDefence	(8) Invest_An yDefence	(9) Invest_Nu clear
ESG	-0.106 (0.757)		-0.413 (0.820)	-0.0431 (0.923)	-0.473 (0.614)		-0.501 (0.628)	0.209 (0.738)	-0.271 (0.764)
EU		-4.600** (2.223)	-4.597** (2.202)	0.696 (2.007)		-0.935 (0.752)	-0.971 (0.753)	1.413 (0.963)	
ESGxEU				-5.316 (3.579)				-4.265** (1.711)	
Size	1.328*** (0.302)	2.313*** (0.757)	2.283*** (0.722)	2.120*** (0.759)	1.107*** (0.231)	1.055*** (0.223)	1.131*** (0.248)	1.337*** (0.345)	0.911*** (0.264)
Solvency	0.333*** (0.106)	0.508*** (0.197)	0.474** (0.186)	0.464** (0.196)	0.225** (0.0885)	0.211** (0.097)	0.201** (0.0950)	0.282** (0.113)	0.232** (0.0976)
Reserves	-7.332** (2.849)	-19.101** (7.519)	-18.67** (7.255)	-17.13** (7.576)	-5.198** (2.220)	-6.207** (2.542)	-6.371** (2.554)	-8.819** (3.471)	-4.388 (2.711)
ROIC	0.0710 (0.0747)	-0.068 (0.096)	-0.0863 (0.103)	-0.0485 (0.103)	0.0529 (0.0541)	0.023 (0.093)	0.00950 (0.0833)	0.0326 (0.0607)	0.0812** (0.0353)
Constant	-14.04*** (3.005)	-19.95*** (6.113)	-19.29*** (5.669)	-18.51*** (5.989)	-11.46*** (2.170)	-10.57*** (2.094)	-10.85*** (2.124)	-12.91*** (2.876)	-10.80*** (2.599)
Obs.	323	323	323	323	323	323	323	323	323

Table 5 reports the regression results for H1 examining whether ESG incorporation into investment strategies are associated with capital allocation to defence-related assets among non-life insurers. Across all specifications, the ESG status of an insurer does not independently influence investment decisions, as the ESG coefficient remains statistically insignificant irrespective of the dependent variable. This finding suggests that adopting ESG incorporation into investment strategies alone is insufficient to explain insurers' defence-related portfolio allocation.

The effect of being headquartered in an EU member state is more nuanced. EU insurers exhibit significantly lower participation in conventional defence investments, with coefficients of -4.600 (Model 2) and -4.597 (Model 3), both significant at the 5% level. However, this effect disappears once the interaction between ESG status and EU domicile is introduced (Model 4), and EU membership is not statistically significant in any specification explaining investments in the broader defence category (Models 6–8). These results indicate that geographical location alone provides only limited explanatory power.

The interaction term between ESG status and EU domicile (ESG×EU) yields mixed evidence. While the coefficient is negative but statistically insignificant in the conventional defence model (-5.316, Model 4), it becomes negative and statistically significant in the broader *Any Defence* specification (-4.265**, Model 8). This finding suggests that insurers

combining ESG incorporation into investment strategies with an EU domicile are significantly less likely to invest in defence-related assets overall than either non-ESG insurers or ESG insurers headquartered outside the EU.

The random-effects logit models lead to similar conclusions, confirming the robustness of the main findings. The only notable difference is observed for investments in nuclear and controversial weapons (Model 9), where ESG incorporation into investment strategies becomes statistically significant and negative, suggesting that ESG-oriented insurers are less likely to invest in this particular segment of the defence industry.

4.3.2. Life Insurers

Table 6 Regression Results for H1: ESG incorporation into investment strategies and Capital Allocation to the Defense Sector Among Life Insurers

	(1) Invest_Co nvDefence	(2) Invest_Co nvDefence	(3) Invest_Co nvDefence	(4) Invest_Co nvDefence	(5) Invest_An yDefence	(6) Invest_An yDefence	(7) Invest_An yDefence	(8) Invest_An yDefence
ESG	1.554* (0.823)		1.600** (0.790)	1.758 (1.645)	0.042 (0.419)		0.160 (0.423)	1.278 (1.550)
EU		-0.505 (0.555)	-0.572 (0.564)	-0.395 (1.564)		0.807* (0.469)	0.830* (0.473)	1.797 (1.476)
ESGxEU				-0.270 (1.625)				-1.220 (1.562)
Size	0.660*** (0.197)	0.932*** (0.166)	0.679*** (0.194)	0.668*** (0.194)	0.660*** (0.132)	0.669*** (0.110)	0.639*** (0.131)	0.628*** (0.130)
Solvency	0.727*** (0.272)	0.849*** (0.276)	0.761*** (0.274)	0.762*** (0.265)	0.507** (0.230)	0.544** (0.213)	0.522** (0.220)	0.550*** (0.213)
Reserves	-10.114* (5.405)	-6.559* (3.868)	-12.308** (5.716)	-12.450** (5.763)	-1.850 (1.530)	-1.711 (1.450)	-1.658 (1.455)	-1.755 (1.439)
ROIC	0.011 (0.013)	0.008 (0.011)	0.011 (0.012)	0.011 (0.012)	0.005 (0.009)	0.003 (0.009)	0.004 (0.009)	0.004 (0.009)
Constant	-10.02*** (2.222)	-11.94*** (2.050)	-9.697*** (2.149)	-9.643*** (2.430)	-8.443*** (1.442)	-9.218*** (1.406)	-8.983*** (1.491)	-9.770*** (1.966)
Obs.	264	264	264	264	264	264	264	264

Table 6 reports the regression results for H1 for life insurance companies. Unlike the results for non-life insurers, ESG status exhibits a positive association with investments in conventional defence companies in the baseline specifications. Specifically, the ESG coefficient is positive and statistically significant in Model 1 (1.554*) and Model 3 (1.600**), indicating that life insurers that have incorporate the ESG into the investment practices are, if anything, more likely to invest in conventional defence firms. However, this relationship disappears once the interaction between ESG status and EU domicile is introduced (Model 4), suggesting that the initial association is not robust after accounting for institutional differences.

EU domicile alone does not significantly influence investments in conventional defence companies, as the corresponding coefficients remain statistically insignificant across Models 2–4. In contrast, for the broader *Any Defence* measure, EU membership is positively associated with defence investments, with coefficients of 0.807* (Model 6) and 0.830* (Model 7). Nevertheless, this effect also disappears after including the interaction term in Model 8.

The interaction between ESG status and EU domicile (ESG×EU) is negative but statistically insignificant in both the conventional defence (Model 4) and *Any Defence* (Model 8) specifications. Consequently, there is no evidence that ESG-classified life insurers headquartered in the European Union systematically differ in their defence portfolio allocation from either non-ESG insurers or ESG insurers operating outside the EU.

The random-effects logit models yield similar conclusions, supporting the robustness of the main findings. In particular, the positive association between ESG incorporation into investment strategies and investments in conventional defence companies is confirmed, while the interaction between ESG status and EU domicile remains statistically insignificant. Likewise, the results for the broader Any Defence measure are consistent with the baseline models, with EU domicile showing a positive association that disappears once the interaction term is introduced.

The random-effects logit models yield similar conclusions for Models 1, 4, 6, 7, and 8, confirming the robustness of the main findings. In particular, the positive association between ESG incorporation into investment strategies and investments in conventional defence companies, the insignificant ESG×EU interaction, and the positive effect of EU domicile on the broader Any Defence measure remain unchanged.

4.4. Post-Invasion Shifts in Insurers' Defence-Sector Capital Allocation

4.4.1. Non-life Insurers

Table 7 Post-Invasion Shifts in non-life Insurers' Conventional Defence-Sector Capital Allocation

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Invest_Con vDefence	Invest_Con vDefence	Invest_Con vDefence	Invest_Con vDefence	Invest_Con vDefence	Invest_Con vDefence	Invest_Con vDefence
PostInvasion	0.701 (0.636)	0.733 (0.648)	-0.273 (0.737)	-0.477 (0.748)	-0.521 (0.774)	-0.592 (0.791)	-0.144 (0.723)
Size	1.307*** (0.302)	1.266*** (0.302)	2.355*** (0.804)	2.460*** (0.830)	2.315*** (0.847)	2.320*** (0.872)	1.992*** (0.645)
Solvency	0.348*** (0.106)	0.344*** (0.108)	0.499** (0.197)	0.481*** (0.185)	0.476** (0.204)	0.457** (0.192)	0.479*** (0.177)
Reserves	-8.055*** (3.055)	-7.932*** (3.015)	-19.29** (7.740)	-19.608** (7.779)	-18.04** (8.047)	-18.14** (8.085)	-16.90** (7.161)
ROIC	0.0729 (0.0473)	0.0726 (0.0461)	-0.0888 (0.112)	-0.114 (0.078)	-0.0850 (0.115)	-0.0985 (0.0973)	0.00650 (0.0589)
ESG		0.167 (0.801)		-0.620 (0.828)		-0.352 (0.909)	0.124 (0.886)
EU			-4.818** (2.386)	-5.155** (2.494)	-5.323** (2.696)	0.258 (1.938)	0.301 (1.910)
ESGxEU						-5.618 (3.683)	-4.803* (2.837)
EUxPost					6.651* (3.890)		4.499* (2.656)
Constant	-14.05*** (3.081)	-13.76*** (3.045)	-20.06*** (6.309)	-20.301*** (6.250)	-19.87*** (6.640)	-19.46*** (6.508)	-17.58*** (4.936)
Obs.	323	323	323		323	323	323

Table 7 presents the regression results examining whether the Russian invasion of Ukraine altered conventional defence-sector investments among non-life insurers. Across all specifications, the coefficient on PostInvasion remains statistically insignificant, indicating that the Russian invasion alone did not lead to a systematic increase in insurers' investments in conventional defence companies. This finding suggests that the observed post-2022 changes cannot be attributed solely to a common time effect affecting all insurers.

The role of ESG incorporation into investment strategies remains limited throughout the analysis, as the ESG coefficient is statistically insignificant in every specification. Similarly, the interaction between ESG incorporation and EU domicile (ESG×EU) is negative, reaching statistical significance only in the fully specified model (Model 7; -4.803*), indicating that

ESG-oriented insurers headquartered in the European Union remain less likely to invest in conventional defence companies than their counterparts outside the EU.

The most notable result concerns the interaction between EU domicile and the post-invasion period (EU×PostInvasion). The coefficient is positive and statistically significant in both Model 5 (6.651*) and the fully specified Model 7 (4.499*). These estimates indicate that, although the Russian invasion of Ukraine did not increase conventional defence investments across the entire sample, insurers headquartered in the European Union became significantly more likely to invest in conventional defence companies following the invasion. This pattern is consistent with the hypothesis that the changing geopolitical and regulatory environment after the Russian invasion encouraged a reassessment of defence-related investments specifically among European insurers.

The random-effects logit models produce similar results for Models 1, 3, 4, and 7, confirming the robustness of the main findings. In particular, the post-invasion effect remains statistically insignificant, while EU insurers exhibit lower pre-invasion exposure to conventional defence investments. Moreover, the positive and statistically significant interaction between EU domicile and the post-invasion period is confirmed, indicating that European insurers became more likely to invest in conventional defence companies following the Russian invasion of Ukraine.

Table 8 Post-Invasion Shifts in non-life Insurers' Any Defence-Sector Capital Allocation

	(1) Invest_Any Defence	(2) Invest_Any Defence	(3) Invest_Any Defence	(4) Invest_Any Defence	(5) Invest_Any Defence	(6) Invest_Any Defence
PostInv	0.689 (0.522)	0.647 (0.530)	0.547 (0.535)	0.454 (0.589)	0.344 (0.572)	0.357 (0.607)
Size	0.996*** (0.216)	1.030*** (0.233)	0.999*** (0.215)	0.995*** (0.214)	1.281*** (0.338)	1.234*** (0.354)
Solvency	0.226** (0.0913)	0.220** (0.0910)	0.222** (0.0948)	0.215** (0.0933)	0.278** (0.114)	0.266** (0.113)
Reserves	-5.429** (2.253)	-5.460** (2.263)	-6.115** (2.490)	-5.882** (2.444)	-8.618** (3.354)	-8.193** (3.613)
ROIC	0.0529 (0.0392)	0.0500 (0.0407)	0.0515 (0.0467)	0.0472 (0.0442)	0.0360 (0.0418)	0.0329 (0.0482)
ESG		-0.325 (0.622)			0.290 (0.733)	0.307 (0.740)
EU			-0.688 (0.693)	-0.793 (0.802)	1.516 (0.991)	1.476 (1.023)
ESGxEU					-4.136** (1.691)	-3.944** (1.704)
EUxPost				0.640 (1.433)		0.353 (2.391)
Constant	-10.89*** (2.153)	-10.94*** (2.151)	-10.45*** (2.095)	-10.41*** (2.084)	-12.63*** (2.849)	-12.27*** (2.831)
Obs.	323	323	323	323	323	323

Table 8 presents the regression results examining whether the Russian invasion of Ukraine influenced non-life insurers' propensity to invest in any defence-related assets. Across all specifications, the coefficient on PostInvasion remains statistically insignificant, indicating that the invasion did not lead to a systematic increase in overall defence-related investments among non-life insurers. Likewise, the interaction between EU domicile and the post-invasion period (EU×PostInvasion) is positive but statistically insignificant in both Model 4 and the fully

specified Model 6. These findings suggest that, unlike the results for conventional defence investments, European insurers did not significantly increase their overall exposure to defence-related assets following the Russian invasion of Ukraine.

ESG incorporation into investment strategies remains statistically insignificant throughout the analysis, indicating that ESG orientation alone does not explain investment decisions in the broader defence sector. Similarly, EU domicile does not exhibit a statistically significant relationship with the propensity to invest in defence-related assets. However, the interaction between ESG incorporation and EU domicile (ESG×EU) remains consistently negative and statistically significant in both Model 5 (−4.136**) and Model 6 (−3.944**). This finding indicates that insurers combining ESG-oriented investment strategies with an EU domicile are significantly less likely to invest in defence-related assets than either non-ESG insurers or ESG insurers headquartered outside the European Union.

The random-effects logit models confirm all of the main findings reported in Table 8, supporting the robustness of the baseline results. Both the direction and statistical significance of the estimated coefficients remain broadly unchanged across specifications.

Table 9 Post-Invasion Shifts in non-life Insurers' Controversial Defence-Sector Capital Allocation

	(1) Invest_Nucl ear	(2) Invest_Nucl ear	(3) Invest_Nucl ear	(4) Invest_Nucl ear	(5) Invest_Nucl ear	(6) Invest_Nucl ear
PostInv	1.516** (0.697)	1.528** (0.696)	1.418* (0.735)	1.403* (0.760)	1.418* (0.730)	1.380* (0.752)
ESG		0.103 (0.762)			0.069 (0.786)	0.027 (0.766)
EU			−3.564* (1.873)	−2.816 (1.951)	−3.488* (1.844)	−0.277 (1.792)
ESGxEU						−2.459 (2.678)
EUxPost				−0.319 (2.499)		−2.695 (2.676)
Size	0.812*** (0.272)	0.788*** (0.273)	1.092*** (0.394)	1.064*** (0.388)	1.060*** (0.394)	1.036*** (0.396)
Solvency	0.230** (0.114)	0.226** (0.115)	0.348** (0.165)	0.336** (0.162)	0.340** (0.164)	0.322** (0.163)
Reserves	−5.471* (2.945)	−5.367* (2.909)	−11.816** (5.577)	−11.470** (5.448)	−11.612** (5.518)	−11.113** (5.374)
ROIC	0.062* (0.035)	0.062* (0.035)	0.102** (0.045)	0.096** (0.045)	0.100** (0.044)	0.092** (0.045)
Constant	−10.316*** (2.741)	−10.132*** (2.698)	−11.184*** (3.363)	−10.938*** (3.306)	−10.927*** (3.288)	−10.696*** (3.306)
Obs.	323	323	323	323	323	323

Table 9 reports the regression results examining whether the Russian invasion of Ukraine influenced non-life insurers' investments in nuclear and other controversial weapons. In contrast to the findings for conventional defence investments, the coefficient on PostInvasion is positive and statistically significant across all specifications, ranging from 1.380* to 1.528**. This result indicates that, following the Russian invasion of Ukraine, non-life insurers became more likely to invest in companies associated with nuclear and controversial weapons.

ESG incorporation into investment strategies does not exhibit a statistically significant relationship with these investments in any specification. Similarly, the interaction between ESG

incorporation and EU domicile (ESG×EU) remains statistically insignificant throughout the analysis, indicating that ESG-oriented insurers headquartered in the European Union do not differ systematically from other insurers in their portfolio allocation toward controversial weapons producers.

The coefficient on EU domicile is negative and statistically significant in Models 3 and 5, suggesting that European insurers were initially less likely to invest in companies associated with nuclear and controversial weapons. However, this effect disappears in the fully specified model after introducing both interaction terms. Likewise, the interaction between EU domicile and the post-invasion period (EU×PostInvasion) remains statistically insignificant, indicating that the Russian invasion did not produce a differential response among European insurers relative to insurers headquartered elsewhere.

Robustness tests were not performed for the nuclear and controversial weapons specification because the dependent variable exhibits extremely low incidence (1.22% positive observations). This results in quasi-complete separation and the omission of several regressors in the random-effects logit estimation, indicating insufficient variation to obtain stable and informative estimates. Accordingly, additional robustness analyses would not be informative and are therefore omitted.

4.4.2. Life Insurers

Table 10 Post-Invasion Shifts in Life Insurers' Conventional Defence-Sector Capital Allocation

	(1) Invest_Con vDefence	(2) Invest_Con vDefence	(3) Invest_Con vDefence	(3) Invest_Con vDefence	(4) Invest_Con vDefence	(5) Invest_Con vDefence
PostInv	-1.595 (1.530)	-1.147 (1.530)	-1.793 (1.568)	-1.512 (1.760)	-1.370 (1.532)	-1.132 (1.613)
ESG		1.393 (0.853)			1.458* (0.808)	1.841 (1.661)
EU			-0.621 (0.563)	-0.625 (0.562)	-0.692 (0.568)	-0.310 (1.562)
ESGxEU						-0.507 (1.636)
EUxPost				0.606 (2.257)		0.518 (2.148)
Size	0.881*** (0.165)	0.644*** (0.205)	0.901*** (0.168)	0.898*** (0.168)	0.662*** (0.201)	0.646*** (0.199)
Solvency	0.773*** (0.278)	0.685** (0.275)	0.797*** (0.285)	0.795*** (0.285)	0.721*** (0.276)	0.721*** (0.265)
Reserves	-5.570* (3.149)	-9.879* (5.643)	-6.750 (4.292)	-6.709 (4.290)	-12.572** (5.801)	-12.861** (5.806)
ROIC	0.000 (0.016)	0.005 (0.017)	0.001 (0.015)	0.000 (0.015)	0.005 (0.017)	0.005 (0.016)
Constant	-11.649*** (2.069)	-9.600*** (2.315)	-11.318*** (2.074)	-11.281*** (2.073)	-9.155*** (2.231)	-9.221*** (2.486)
Obs.	264	264	264	264	264	264

Table 10 reports the regression results examining whether the Russian invasion of Ukraine influenced conventional defence investments among life insurers. Across all model specifications, the coefficient on PostInvasion remains statistically insignificant, indicating that

the invasion did not lead to a systematic change in life insurers' propensity to invest in conventional defence companies. Likewise, the interaction between EU domicile and the post-invasion period (EU×PostInvasion) is consistently insignificant, suggesting that European life insurers did not respond differently from their non-European counterparts following the invasion.

ESG incorporation into investment strategies exhibits limited explanatory power. While the coefficient is positive and marginally significant in Model 4 (1.458*), this relationship disappears in the fully specified model (Model 5), indicating that the result is not robust after accounting for the interaction effects. Similarly, neither EU domicile nor the interaction between ESG incorporation and EU domicile (ESG×EU) is statistically significant in the final specification.

The random-effects logit models confirm all of the main findings reported in Table 10, supporting the robustness of the baseline results. Both the direction and statistical significance of the estimated coefficients remain broadly unchanged across specifications.

Table 11 Post-Invasion Shifts in Life Insurers' Any Defence-Sector Capital Allocation

	(1) Invest_Any Defence	(2) Invest_Any Defence	(3) Invest_Any Defence	(4) Invest_Any Defence	(5) Invest_Any Defence	(6) Invest_Any Defence
PostInv	0.253 (0.652)	0.272 (0.663)	0.412 (0.651)	-1.405 (1.618)	0.486 (0.667)	-1.341 (1.659)
ESG		0.068 (0.426)			0.221 (0.434)	1.216 (1.576)
EU			0.837* (0.473)	0.546 (0.485)	0.876* (0.480)	1.430 (1.495)
ESGxEU						-1.060 (1.588)
EUxPost				2.388 (1.728)		2.336 (1.755)
Size	0.673*** (0.112)	0.659*** (0.132)	0.679*** (0.113)	0.709*** (0.117)	0.641*** (0.131)	0.652*** (0.134)
Solvency	0.522** (0.226)	0.512** (0.231)	0.561*** (0.215)	0.577*** (0.221)	0.537** (0.221)	0.581*** (0.219)
Reserves	-1.881 (1.524)	-1.855 (1.526)	-1.706 (1.437)	-1.517 (1.443)	-1.637 (1.444)	-1.627 (1.429)
ROIC	0.006 (0.009)	0.007 (0.010)	0.005 (0.009)	0.004 (0.010)	0.006 (0.010)	0.005 (0.010)
Constant	-8.596*** (1.370)	-8.472*** (1.459)	-9.401*** (1.477)	-9.520*** (1.501)	-9.139*** (1.529)	-9.843*** (1.995)
Obs.	264	264	264	264	264	264

Table 11 presents the regression results examining whether the Russian invasion of Ukraine affected life insurers' propensity to invest in defence-related assets. Across all specifications, the coefficient on PostInvasion remains statistically insignificant, indicating that the invasion did not result in a systematic change in overall defence-related investments among life insurers. Likewise, the interaction between EU domicile and the post-invasion period (EU×PostInvasion) is consistently insignificant, providing no evidence that European life insurers adjusted their portfolio allocation differently from insurers headquartered outside the European Union following the invasion.

ESG incorporation into investment strategies does not significantly influence investment decisions in any specification. Similarly, the interaction between ESG incorporation and EU domicile (ESG×EU) remains statistically insignificant throughout the analysis, indicating that the combination of ESG-oriented investment strategies and EU domicile does not affect the likelihood of investing in defence-related assets.

Although EU domicile is positively associated with defence-related investments in Models 3 (0.837*) and 5 (0.876*), this relationship disappears once the interaction terms are introduced in the fully specified model (Model 6). Overall, the findings indicate that neither the post-invasion period nor the interaction between EU domicile and the post-invasion period significantly altered life insurers' capital allocation to the defence sector.

The random-effects logit models confirm all of the main findings reported in Table 11, supporting the robustness of the baseline results. Both the direction and statistical significance of the estimated coefficients remain broadly unchanged across specifications.

Table 12 Post-Invasion Shifts in Life Insurers' Controversial Defence-Sector Capital Allocation

	(1) (1) Nucl	(2) (2) Nucl	(3) (3) Nucl	(4) (4) Nucl	(5) (5) Nucl	(6) (6) Nucl	(7) (7) Nucl
PostInv	1.719 (1.921)	1.523 (1.985)	1.525 (1.774)	1.587 (1.948)	1.367 (1.802)	1.478 (1.991)	1.478 (1.991)
ESG		-0.677 (2.473)			-0.639 (2.452)	-0.416 (2.597)	-0.416 (2.597)
EU			-0.912 (1.619)	-1.090 (1.825)	-0.873 (1.617)	-1.043 (1.852)	-1.043 (1.852)
ESG×EU						0.267 (2.873)	0.267 (2.873)
EU×Post				0.141 (2.588)		0.010 (2.658)	0.010 (2.658)
Size	-0.060 (0.440)	0.088 (0.475)	-0.131 (0.302)	-0.124 (0.283)	0.004 (0.419)	0.001 (0.356)	0.001 (0.356)
Solvency	0.593 (0.461)	0.574 (0.415)	0.528 (0.380)	0.524 (0.369)	0.503 (0.386)	0.477 (0.371)	0.477 (0.371)
Reserves	2.227 (4.255)	1.439 (3.402)	1.525 (4.195)	1.533 (3.968)	0.950 (3.604)	0.759 (3.680)	0.759 (3.680)
ROIC	-0.024 (0.021)	-0.021 (0.020)	-0.022 (0.018)	-0.020 (0.018)	-0.020 (0.019)	-0.016 (0.018)	-0.016 (0.018)
Constant	-5.699 (5.024)	-6.331 (4.577)	-3.975 (3.355)	-3.829 (2.959)	-4.556 (4.130)	-4.245 (3.390)	-4.245 (3.390)
Obs.	264	264	264	264	264	264	264

Table 12 presents the regression results examining whether the Russian invasion of Ukraine affected life insurers' investments in companies associated with nuclear and controversial weapons. Across all specifications, the coefficient on PostInvasion remains statistically insignificant, indicating that the invasion did not lead to a systematic change in life insurers' exposure to controversial defence-related assets.

ESG incorporation into investment strategies does not exhibit a statistically significant relationship with investments in nuclear and controversial weapons. Likewise, neither EU domicile nor the interaction between ESG incorporation and EU domicile (ESG×EU) is statistically significant in any model. Furthermore, the interaction between EU domicile and the post-invasion period (EU×PostInvasion) also remains insignificant, suggesting that European life insurers did not respond differently to the Russian invasion of Ukraine than insurers

headquartered outside the European Union. Overall, the results provide no evidence that either the post-invasion period, ESG-oriented investment strategies, or the European institutional environment influenced life insurers' capital allocation to companies associated with nuclear and controversial weapons.

Robustness tests were not performed for the nuclear and controversial weapons specification because the dependent variable exhibits extremely low incidence. This results in quasi-complete separation and the omission of several regressors in the random-effects logit estimation, indicating insufficient variation to obtain stable and informative estimates. Accordingly, additional robustness analyses would not be informative and are therefore omitted.

4.5. Differential ESG-Based Exclusions of Conventional vs. Emerging Defence Sectors

4.5.1. Non-life Insurers

Table 13 Differential ESG-Based Exclusions of Conventional vs. Emerging Defence Sectors

	(1) DefTech	(2) DefTech	(3) DefTech	(4) DefTech	(5) DefTech	(6) DefTech	(7) DefTech	(8) DefTech	(9) DefTech
PostInv	0.653 (0.802)	0.799 (0.796)	0.596 (0.833)	0.468 (0.874)	0.724 (0.832)	0.541 (0.856)		0.700 (0.806)	0.542 (0.924)
ESG		0.628 (1.010)			0.597 (0.994)	0.565 (0.965)			0.684 (1.046)
EU			-3.234 (2.018)	-3.128 (2.231)	-3.176 (2.020)	-0.114 (1.971)			0.083 (2.162)
ESGxEU						-2.934 (2.970)			-1.339 (2.823)
EUxPost				0.888 (2.422)		-1.684 (2.859)			-1.544 (2.952)
Size	0.832*** (0.312)	0.756** (0.328)	1.155** (0.472)	1.134** (0.473)	1.076** (0.495)	1.046** (0.515)	0.937*** (0.334)	0.909*** (0.340)	0.391* (0.518)
Solvency	0.269** (0.112)	0.275** (0.118)	0.407** (0.192)	0.386** (0.189)	0.412** (0.199)	0.376* (0.198)	0.285** (0.111)	0.283** (0.116)	0.254* (0.186)
Reserves	-6.024* (3.519)	-6.060* (3.605)	-13.857* (7.697)	-13.203* (7.520)	-13.662* (7.750)	-12.537* (7.557)	-5.889* (3.474)	-6.488* (3.584)	-7.602 (8.632)
ROIC	0.070* (0.041)	0.070* (0.041)	0.101** (0.051)	0.088* (0.050)	0.104** (0.052)	0.085 (0.052)	0.083** (0.041)	0.072* (0.041)	0.064 (0.049)
ConvDef							-0.414 (1.076)	-0.491 (1.074)	-0.305 (0.103)
Constant	-10.44*** (3.226)	-10.14*** (3.298)	-11.41*** (3.884)	-11.18*** (3.890)	-11.12*** (4.050)	-10.838** (4.230)	-11.30*** (3.383)	-11.00*** (3.380)	-6.501* (3.788)
Obs.	323	323	323	323	323	323	323	323	323

Table 13 reports the regression results examining whether ESG-oriented investment strategies differentially affect investments in emerging defence technologies, represented by cyber and AI defence companies, among non-life insurers. Across all specifications, ESG incorporation into investment strategies does not exhibit a statistically significant relationship with investment decisions. Likewise, neither EU domicile nor the interaction between ESG incorporation and EU domicile (ESG×EU) reaches statistical significance in any model, indicating that neither ESG orientation nor the European regulatory environment systematically influences insurers' exposure to cyber and AI defence technologies.

Similarly, the coefficient on PostInvasion remains statistically insignificant throughout the analysis, suggesting that the Russian invasion of Ukraine did not trigger a significant increase in investments in emerging defence technologies. The interaction between EU domicile and the post-invasion period (EU×PostInvasion) is also insignificant, indicating that

European insurers did not adjust their investments in cyber and AI defence companies differently from insurers headquartered elsewhere following the invasion.

Conventional defence investment is not significantly associated with insurers' investments in cyber and AI defence technologies. Across all model specifications including Conventional Defence, the estimated coefficients are negative but statistically insignificant, indicating no robust evidence that insurers investing in conventional defence are more likely to allocate capital to emerging defence technologies.

The random-effects logit models confirm the main findings reported in Table 13, supporting the robustness of the results. As in the case of investments in nuclear and controversial weapons, not all robustness tests could be estimated because of the low prevalence of investments in emerging defence technologies, which resulted in insufficient variation and separation problems in some model specifications. Consequently, several logit models did not converge or omitted selected variables, a common issue when analysing rare binary outcomes.

4.5.2. Life Insurers

Table 8 Differential ESG-Based Exclusions of Conventional vs. Emerging Defence Sectors

	(1) DefTech	(2) DefTech	(3) DefTech	(4) DefTech	(5) DefTech	(6) DefTech	(7) DefTech	(8) DefTech	(9) DefTech
PostInv	0.652 (0.822)	0.779 (0.838)	0.485 (0.827)	-0.814 (1.600)	0.563 (0.840)	-0.700 (1.527)		0.846 (0.836)	-0.572 (1.534)
ESG		1.068 (0.801)			1.005 (0.747)	0.158 (1.114)			-0.034 (1.159)
EU			-0.946 (0.637)	-1.200* (0.661)	-0.921 (0.610)	-2.376** (1.034)			-2.284** (1.035)
ESGxEU						1.491 (1.134)			1.436 (1.143)
EUxPost				2.096 (1.758)		2.719 (1.831)			2.605 (1.820)
Size	0.496*** (0.147)	0.331* (0.179)	0.546*** (0.162)	0.575*** (0.168)	0.396** (0.184)	0.423** (0.181)	0.352** (0.153)	0.381** (0.157)	0.356* (0.186)
Solvency	0.620*** (0.240)	0.559** (0.241)	0.675*** (0.252)	0.705*** (0.259)	0.624** (0.250)	0.672** (0.263)	0.517** (0.238)	0.548** (0.245)	0.613** (0.271)
Reserves	-6.112 (4.264)	-10.305* (6.120)	-10.097 (6.349)	-9.589 (6.646)	- (6.536)	- (6.337)	-5.552 (4.222)	-5.280 (4.033)	-11.832* (6.534)
ROIC	0.003 (0.013)	0.006 (0.014)	0.004 (0.013)	0.003 (0.015)	0.005 (0.014)	0.010 (0.016)	-0.003 (0.015)	0.003 (0.015)	0.008 (0.018)
ConvDef							0.983* (0.513)	1.026** (0.515)	0.808 (0.529)
Constant	-7.63*** (1.836)	-6.19*** (1.987)	-7.25*** (1.833)	-7.44*** (1.901)	-5.99*** (1.921)	-5.53*** (1.840)	-6.168*** (1.774)	-6.635*** (1.895)	-4.956*** (1.871)
Obs.	264	264	264	264	264	264	264	264	264

Table 14 reports the regression results examining whether ESG-oriented investment strategies differentially affect investments in cyber and AI defence technologies among life insurers. Similar to the findings for non-life insurers, ESG incorporation into investment strategies does not exhibit a statistically significant relationship with investments in emerging defence technologies. Likewise, the interaction between ESG incorporation and EU domicile (ESG×EU) remains statistically insignificant across all specifications, providing no evidence

that ESG-oriented life insurers headquartered in the European Union allocate capital differently to cyber and AI defence companies than other insurers.

The coefficient on PostInvasion is consistently insignificant, indicating that the Russian invasion of Ukraine did not trigger a systematic increase in investments in cyber and AI defence technologies among life insurers. Similarly, the interaction between EU domicile and the post-invasion period (EU×PostInvasion) is not statistically significant, suggesting that European life insurers did not respond differently to the invasion than insurers headquartered outside the European Union.

Unlike the results for non-life insurers, EU domicile exhibits a negative and statistically significant relationship with investments in cyber and AI defence technologies in Models 4 (−1.200*), 6 (−2.376**), and 7 (−2.323**). These findings suggest that life insurers headquartered in the European Union are less likely to invest in emerging defence technologies than their non-European counterparts, irrespective of their ESG orientation.

Conventional defence investment is positively associated with investments in cyber and AI defence companies in Models 7 and 8, suggesting that life insurers already investing in the defence sector are also more likely to allocate capital to emerging defence technologies. However, this relationship loses statistical significance in the fully specified model (Model 9), indicating that the association is not robust once ESG- and geography-related factors are taken into account.

The random-effects logit models largely confirm the main findings reported in Table 14. In particular, the negative association between EU domicile and investments in cyber and AI defence technologies remains statistically significant, supporting the robustness of this result. However, the logit estimates do not confirm the statistical significance of the post-invasion effect, suggesting that the evidence for changes in portfolio allocation following the Russian invasion of Ukraine is sensitive to model specification.

5. Discussion

The results for H1 suggest that the relationship between ESG incorporation into investment strategies and defence-sector investments is more nuanced than often assumed in both the academic literature and the public debate. While ESG integration is frequently associated with reduced exposure to defence companies, our findings indicate that ESG incorporation alone does not consistently reduce insurers' investments in defence-related assets across either insurance sector. In doing so, the results provide empirical support for recent evidence suggesting that sustainable finance regulations and ESG disclosures do not automatically translate into substantive changes in portfolio allocation. In particular, they are consistent with the findings of Allcott et al. (2026), who argue that the SFDR has had only a limited impact on actual portfolio allocation, and with Causevic et al. (2022), who document substantial inconsistencies in sustainable investment practices related to defence financing. These findings challenge the common perception that integrating ESG considerations into investment strategies necessarily leads to the systematic exclusion of defence companies from investment portfolios.

Instead, the results indicate that institutional context plays a more important role than ESG incorporation itself. Among non-life insurers, the combination of ESG-oriented investment strategies and EU domicile is associated with lower overall exposure to defence-related assets, whereas neither ESG incorporation nor EU domicile independently explains portfolio allocation. This finding aligns with the argument that the European sustainable finance framework primarily establishes disclosure obligations rather than mandatory investment restrictions for defence-related investments (European Commission, 2025). Consequently, the

observed reduction appears to reflect the interaction between insurers' internal ESG policies and the broader European regulatory environment rather than the direct effect of regulation itself. This interpretation is also consistent with the broader literature arguing that regulatory disclosure requirements alone are insufficient to induce meaningful portfolio reallocation (Allcott et al., 2026).

An additional implication of these findings is that insurers appear to distinguish between incorporating ESG principles into investment decision-making and applying strict exclusionary policies. The lack of a systematic negative relationship between ESG incorporation and defence investments suggests that many insurers continue to treat defence companies as compatible with broader sustainability objectives, particularly in the context of growing geopolitical uncertainty and evolving discussions on the strategic role of the defence sector in supporting societal resilience and national security. This observation is consistent with Urban and Wójcik (2019), who argue that financial institutions may simultaneously promote ESG-oriented investment strategies while maintaining exposure to industries traditionally viewed as controversial. Our findings therefore reinforce the distinction between formal ESG commitments and actual portfolio allocation decisions. At the same time, they provide only limited support for commitment theory (Kiesler, 1971; Cialdini & Cialdini, 2013). Although public ESG commitments may create reputational incentives for consistency, they do not appear sufficient on their own to induce systematic exclusion of defence-sector investments.

Regarding H2, the results reveal a clear distinction between life and non-life insurers in their response to the Russian invasion of Ukraine. Among non-life insurers, the most pronounced change is observed for conventional defence investments. While the post-invasion period itself does not significantly affect portfolio allocation, the positive and significant interaction between EU domicile and the post-invasion period indicates that European non-life insurers became more likely to allocate capital to conventional defence companies following the Russian invasion of Ukraine. This finding suggests that the shift was driven not by a general market-wide response but by insurers operating within the European regulatory and institutional environment. These findings are consistent with the growing body of literature documenting a post-2022 reassessment of defence-sector investments. Previous studies report renewed institutional interest in defence companies following the Russian invasion of Ukraine (Kutschera & Förster, 2023; Harris & Pfeifer, 2024), while Singh et al. (2022) describe a broader reallocation of capital towards aerospace and defence industries. Our results extend this literature by demonstrating that this adjustment is concentrated among European non-life insurers rather than representing a uniform market-wide response, highlighting the importance of institutional context in shaping post-war investment decisions. In contrast, no comparable effect is observed for the broader category of defence-related investments, where neither the post-invasion period nor its interaction with EU domicile reaches statistical significance.

A different pattern emerges for investments in nuclear and controversial weapons. Here, the post-invasion period is associated with a positive and significant increase in investment propensity among non-life insurers, while the interaction with EU domicile remains insignificant. This suggests that the observed increase reflects a broader adjustment across insurers rather than a response specific to European institutions. At the same time, ESG incorporation into investment strategies continues to be associated with lower defence-sector exposure only when combined with EU domicile, confirming that ESG considerations alone do not explain investment decisions. This finding also suggests that even in the post-invasion environment, insurers continue to distinguish between conventional defence investments and activities involving controversial weapons. It is broadly consistent with evidence showing that a substantial proportion of European Article 8 and Article 9 funds continue to maintain strict exclusions relating to nuclear weapons despite the broader reassessment of defence-sector investments after the outbreak of the war (Merler, 2025).

By contrast, life insurers exhibit remarkable stability across all model specifications. Neither the post-invasion period nor the interaction between EU domicile and the post-invasion period significantly affects portfolio allocation, regardless of whether the dependent variable captures conventional defence, any defence-related investments, or nuclear and controversial weapons. Similarly, ESG incorporation into investment strategies does not systematically influence post-invasion investment decisions. These findings suggest that life insurers' investment policies remained largely unchanged despite the substantial deterioration of the European security environment.

This difference is consistent with the fundamental characteristics of their business models and investment strategies. Life insurers typically pursue long-term investment strategies aimed at matching long-duration liabilities with long-term assets, resulting in relatively stable portfolios and limited short-term portfolio reallocation. Consequently, they are generally less responsive to geopolitical shocks or abrupt changes in the external environment. In contrast, non-life insurers manage shorter-duration liabilities and therefore maintain greater flexibility in their investment portfolios, enabling them to adjust capital allocation more rapidly in response to changes in market conditions, emerging risks and geopolitical developments. This structural distinction provides a plausible explanation for why post-invasion changes are observed primarily among non-life insurers, whereas life insurers exhibit no statistically significant changes across the analysed investment categories. More broadly, our findings contribute to the emerging literature on defence finance by demonstrating that institutional investors do not respond uniformly to geopolitical shocks. Whereas previous studies primarily document aggregate increases in investor interest in defence companies (Martins et al., 2025; Zhang et al., 2022), our results indicate that these adjustments depend on insurers' underlying business models, investment horizons and institutional setting.

The results for H3 do not support the hypothesis that insurers incorporating ESG considerations into their investment strategies are less likely to invest in conventional defence companies than in cyber- and AI-related defence companies. Across both non-life and life insurers, ESG incorporation does not systematically influence investments in emerging defence technologies. Neither ESG incorporation nor its interaction with EU domicile is statistically significant in any of the estimated specifications, indicating that ESG-oriented investment strategies alone do not explain insurers' allocation of capital to cyber- and AI-related defence companies. These findings contrast with the conceptual argument developed in the literature that ESG investors may distinguish between conventional defence activities and dual-use technologies such as cyber security and artificial intelligence because of their broader contribution to societal resilience, operational resilience and critical infrastructure protection (European Commission, 2025; DORA, 2020; Hagos & Rawat, 2024).

Similarly, the Russian invasion of Ukraine does not appear to have altered insurers' portfolio allocation towards cyber- and AI-related defence companies. Neither the post-war period nor its interaction with EU domicile is statistically significant for either group of insurers, suggesting that geopolitical developments did not translate into a measurable increase in investments in this segment. This contrasts with the findings for conventional defence investments among non-life insurers, where European insurers significantly increased their exposure following the outbreak of the war. While previous literature documents the rapidly growing strategic and financial importance of artificial intelligence (OECD, 2026) and its expanding role in modern defence capabilities (Ertan & Christie, 2021; Hagos & Rawat, 2024), our findings suggest that these broader technological developments have not yet translated into measurable changes in insurers' portfolio allocation decisions.

Moreover, among non-life insurers, conventional defence investment is not significantly associated with investments in cyber- and AI-related defence companies. Among life insurers, the positive association observed in the baseline specifications disappears after controlling for

ESG, institutional and post-war factors in the fully specified model. Overall, the findings suggest that insurers' investment decisions regarding cyber- and AI-related defence companies are driven by factors other than ESG incorporation and do not support the view that ESG-oriented investors systematically favour emerging defence technologies over conventional defence companies. Although the literature increasingly portrays cyber security and artificial intelligence as dual-use technologies with substantial civilian applications and growing importance for organisational resilience (DORA, 2020; Williams & Evans, 2026), these distinctions are not reflected in insurers' observed portfolio allocation. This implies that factors such as overall portfolio strategy, investment mandates, market opportunities and firm-specific considerations are likely to play a more important role in explaining investments in cyber- and AI-related defence companies than ESG incorporation alone.

Overall, this study contributes to the literature in three important ways. First, it provides insurer-level evidence that ESG incorporation alone does not systematically reduce investments in defence companies, demonstrating that institutional context is more important than ESG commitments in explaining portfolio allocation. Second, it shows that the Russian invasion of Ukraine affected capital allocation primarily among European non-life insurers, while life insurers maintained relatively stable investment strategies despite the significant deterioration of the geopolitical environment. Third, it demonstrates that insurers do not currently differentiate between conventional defence companies and cyber- and AI-related defence firms on the basis of ESG considerations, suggesting that the distinction between traditional and emerging defence technologies observed in policy debates has not yet translated into observable differences in insurers' investment decisions.

5. Conclusions

This study examined whether ESG incorporation influences insurers' investments in the defence sector and whether the Russian invasion of Ukraine altered these investment patterns. Using panel data covering life and non-life insurers from 2015 to 2024, the analysis investigated investments in conventional defence companies, companies involved in nuclear and controversial weapons, and firms operating in emerging cyber- and AI-related defence technologies. By jointly considering ESG incorporation, institutional context and geopolitical developments, the study provides new evidence on how insurers balance sustainability objectives with rapidly changing security priorities.

Three principal findings emerge. First, ESG incorporation alone does not systematically reduce insurers' exposure to defence-related investments. Instead, institutional context plays a considerably more important role in explaining portfolio allocation. Among non-life insurers, lower defence-sector exposure is observed only when ESG-oriented investment strategies are combined with EU domicile, suggesting that internal ESG policies operate differently depending on the surrounding regulatory and institutional environment. Second, the Russian invasion of Ukraine resulted in a measurable increase in conventional defence investments only among European non-life insurers, while life insurers maintained largely unchanged investment strategies throughout the period analysed. This finding indicates that insurers' responses to geopolitical shocks are far from homogeneous and are shaped by differences in liability structures, portfolio management practices and investment horizons. Third, contrary to expectations derived from the growing policy debate surrounding dual-use technologies, insurers do not appear to distinguish between conventional defence companies and cyber- and AI-related defence firms on the basis of ESG considerations. Neither ESG incorporation nor the post-war period systematically explains investments in emerging defence technologies.

The findings also carry several important practical implications. First, they suggest that disclosure-based sustainable finance regulation alone is unlikely to substantially reshape

institutional capital allocation. Rather than being driven solely by regulatory requirements, insurers' portfolio decisions appear to depend on the interaction between formal regulatory frameworks and institutions' internal investment policies. This implies that further expansion of disclosure obligations may not, by itself, lead to meaningful changes in investment behaviour unless accompanied by clearer institutional guidance and internal governance mechanisms. Second, the results provide empirical support for the emerging European policy perspective that defence and security may increasingly be interpreted as contributing to the social dimension of ESG. In this context, sustainability objectives and strategic security priorities should not necessarily be viewed as mutually exclusive. Instead, the findings suggest that responsible investment frameworks can coexist with investments that strengthen societal resilience, critical infrastructure, and European strategic autonomy. Third, the results offer important guidance for insurers and asset managers. ESG integration does not automatically require the systematic exclusion of defence companies from investment portfolios. Instead, investment policies should adopt a more differentiated approach by distinguishing between conventional defence, controversial weapons, and emerging defence technologies, allowing institutions to balance sustainability objectives with evolving geopolitical realities and fiduciary responsibilities. More broadly, the findings indicate that geopolitical shocks may reshape institutional portfolio allocation without undermining the principles of sustainable investing. Rather than signalling a retreat from ESG, recent developments appear to reflect a gradual reinterpretation of sustainability priorities in which security considerations increasingly influence long-term capital allocation decisions. These results therefore contribute to the ongoing debate on how sustainable finance frameworks should evolve in response to a rapidly changing geopolitical environment while preserving their long-term credibility and effectiveness.

The findings should, however, be interpreted in light of several limitations. Foremost, the analysis relies on manually coded qualitative disclosures to identify insurers' ESG commitments and defence-related investment exposures. Although considerable effort was made to ensure consistent coding across annual reports, sustainability reports and regulatory disclosures, the approach inevitably depends on the quality, transparency and completeness of publicly available information. Consequently, some insurers' involvement in defence-related investments may have been under- or overestimated due to reporting ambiguity or unavoidable researcher interpretation. In addition, the sample covers the period from 2015 to 2024, capturing both the initial implementation of the European sustainable finance framework and the immediate aftermath of the Russian invasion of Ukraine. As sustainable finance regulation continues to evolve and geopolitical conditions remain dynamic, insurers' portfolio allocation may change over time, requiring continued empirical assessment.

Future research should therefore monitor how this trajectory unfolds. An important question is whether the observed relaxation of defence exclusions by ESG-conscious insurers endures. Will insurers that eased their policies amid the Ukraine conflict maintain a more permissive stance on defence investments, or will they reinstate stricter exclusions as geopolitical tensions abate? Longitudinal studies beyond 2024 could track if the initial post-invasion adjustments solidify into a lasting policy change or represent a temporary deviation. Another avenue is to assess the risk of a speculative bubble in defence stocks under prolonged geopolitical pressure. The dramatic rally in European defence shares since 2022 (with the aerospace & defence index nearly doubling over 2022–2024), driven in part by influxes of capital from investors newly willing (or allowed) to hold these names, raises concerns about overvaluation. Investigating whether defence equities become overbought due to security-driven euphoria – and how a possible correction might impact institutional portfolios – would provide valuable insight for both scholars and practitioners. Ultimately, continued research at the intersection of sustainable finance and defence is needed to understand how capital markets can support legitimate security needs without sacrificing the environmental and

social objectives at the heart of ESG investing. Such work will help ensure that the financial industry's response to geopolitical challenges is both prudent and aligned with broader societal values.

Declaration of generative AI and AI-assisted technologies in the manuscript preparation process

During the preparation of this work, the author used ChatGPT to assist with language editing, improving clarity, refining the structure of the manuscript, and enhancing the readability of the text. The AI tool was not used to generate research data, conduct analyses, interpret results, or formulate the scientific conclusions. After using this tool, the author carefully reviewed, revised, and edited all content as needed and takes full responsibility for the accuracy, originality, and integrity of the published article.

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Appendix A.

A.1. Regression Results for H1: ESG Exclusion Policies and Capital Allocation to the Defense Sector Among Insurers

A.1.1. Non-life Insurers

Table 9 Regression Results for H1: ESG Exclusion Policies and Capital Allocation to the Defense Sector Among Non-Life Insurers

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Invest_Co nvDefenc	Invest_Co nvDefenc	Invest_Co nvDefenc	Invest_Co nvDefenc	Invest_An yDefence	Invest_An yDefence	Invest_An yDefence	Invest_An yDefence	Invest_Nu clear
Invest_ESG	-0.325 (2.046)		-1.269 (4.566)	0.678 (3.125)	-1.078 (1.645)		-1.576 (3.059)	-0.0734 (1.635)	-3.836* (2.326)
EU		-15.23 (10.47)	-26.897 (17.555)	0.104 (9.135)		2.180 (1.445)	1.900 (5.012)	6.508 (4.884)	
ESGxEU				-21.02* (12.76)				-10.20** (4.737)	
Size	5.233*** (1.057)	10.17** (4.107)	17.199** (6.684)	10.53** (4.157)	3.564*** (0.802)	4.073*** (0.661)	4.948*** (1.619)	4.738** (2.067)	5.709*** (1.537)
Solvency	0.747 (0.468)	0.976 (1.620)	1.444 (3.199)	0.0445 (1.761)	0.0513 (1.032)	0.0815 (1.065)	0.403 (0.683)	0.286 (1.233)	-0.259 (1.847)
Reserves	-29.55*** (8.513)	-75.15** (32.83)	-128.3** (52.736)	-69.47** (30.18)	-4.613 (7.350)	-2.269 (5.356)	-13.408 (12.407)	-10.87 (10.96)	-4.049 (8.615)
ROIC	-0.188 (0.164)	-0.401 (0.272)	-0.730 (0.452)	-0.366 (0.275)	-0.0382 (0.0963)	-0.0248 (0.0965)	-0.068 (0.155)	-0.0425 (0.105)	-0.0398 (0.0881)
Constant	-54.13*** (11.38)	-90.40*** (32.94)	-150*** (52.789)	-94.90*** (35.49)	-40.6*** (8.938)	-49.6*** (7.556)	-54.3*** (16.437)	-52.60** (26.09)	-67.2*** (16.61)
Obs. Number of NO	326 70	326 70	323 69	326 70	326 70	326 70	323 69	326 70	326 70

Notes: The table reports coefficients from random-effects logit models estimated by maximum likelihood. Standard errors are reported in parentheses. *, ** and *** denote statistical significance at the 10%, 5% and 1% levels, respectively.

A.1.2. Life Insurers

Table 10 Regression Results for H1: ESG Exclusion Policies and Capital Allocation to the Defense Sector Among Life Insurers

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Invest_Co nvDefence	Invest_Co nvDefence	Invest_Co nvDefence	Invest_Co nvDefence	Invest_An yDefence	Invest_An yDefence	Invest_An yDefence	Invest_An yDefence
Invest_ESG	8.181** (3.341)		-1.990 (3.994)	15.45 (12.80)	-0.0708 (0.963)		1.113 (3.178)	7.618** (3.786)
EU		1.267 (2.066)	3.130 (6.153)	10.66 (11.67)		5.223*** (1.550)	10.78*** (2.931)	10.69*** (2.213)
ESGxEU				-6.471 (12.75)				-7.629** (3.502)
Size	2.200*** (0.772)	3.866*** (0.830)	7.936*** (1.085)	1.577* (0.904)	1.049*** (0.253)	1.325*** (0.347)	2.587*** (0.739)	0.901*** (0.206)
Solvency	1.908 (1.359)	2.456 (1.883)	1.177 (6.724)	0.737 (4.573)	0.686* (0.385)	1.288** (0.589)	2.071** (1.015)	0.605* (0.326)
Reserves	-56.69*** (21.58)	-28.21* (15.11)	-44.78 (41.80)	-57.71* (33.83)	-4.355 (2.848)	-7.414 (5.346)	-15.10* (7.789)	-2.389 (2.007)
ROIC	-0.957 (1.274)	-0.954 (0.962)	-0.00361 (0.0397)	-1.165 (1.212)	-0.0239 (0.169)	-0.0841 (0.226)	-0.00456 (0.0285)	-0.0436 (0.147)
Constant	-33.39*** (9.828)	-52.39*** (10.23)	-107.2*** (13.89)	-36.02 (0)	-13.43*** (2.699)	-22.75*** (4.692)	-44.70*** (9.175)	-22.09 (0)
Obs. Number of NO	266 52	266 52	266 52	266 52	266 52	266 52	266 52	266 52

Notes: The table reports coefficients from random-effects logit models estimated by maximum likelihood. Standard errors are

reported in parentheses. *, ** and *** denote statistical significance at the 10%, 5% and 1% levels, respectively.

A.2. Post-Invasion Shifts in Insurers' Defence-Sector Capital Allocation

A. 2.1. Non-life Insurers

Table 11 Post-Invasion Shifts in non-life Insurers' Conventional Defence-Sector Capital Allocation

	(1) Invest_Co nvDefence	(2) Invest_Co nvDefence	(3) Invest_Co nvDefence	(4) Invest_Co nvDefence	(5) Invest_Co nvDefence	(6) Invest_Co nvDefence	(7) Invest_Co nvDefence
Post_war	0.313 (2.320)	-0.194 (2.410)	-1.357 (2.370)	-1.731 (4.120)	-3.307 (4.688)	-1.426 (4.533)	-2.844 (4.654)
Size	5.708*** (1.719)	5.766*** (0.398)	11.75** (5.740)	15.073*** (4.640)	22.799* (13.461)	10.63*** (2.910)	22.804** (10.593)
Solvency	0.881 (0.548)	0.870* (0.493)	1.334 (1.924)	1.852 (2.265)	-0.366 (4.250)	0.890 (1.971)	-0.174 (4.058)
Reserves	-34.60** (13.61)	-31.06* (16.37)	-78.98* (42.21)	-103.4** (45.385)	-134.375 (95.007)	-66.73 (86.48)	-133.43* (73.382)
ROIC	-0.190 (0.219)	-0.173 (0.241)	-0.459 (0.281)	-0.782* (0.454)	-0.735 (0.545)	-0.339 (0.541)	-0.671 (0.553)
Invest_ESG		-0.242 (3.201)		-3.480 (6.661)		0.294 (3.802)	1.766 (6.384)
EU			-19.24 (15.94)	-20.960* (11.942)	-46.758 (38.105)	-1.031 (331.7)	-19.829 (930.364)
ESGxEU						-20.97 (311.5)	-27.041 (930.276)
PostxEU					46.021 (55.213)		31.307 (930.275)
Constant	-58.7*** (17.47)	-59.65 (0.001)	-105.1** (45.94)	-95.1* (35.944)	-204.92* (109.121)	-95.64 (0.00)	-14.58** (3.936)
Obs.	326	326	326	326	323	326	326
Number of NO	70	70	70	70		70	70

Notes: The table reports coefficients from random-effects logit models estimated by maximum likelihood. Standard errors are reported in parentheses. *, ** and *** denote statistical significance at the 10%, 5% and 1% levels, respectively.

Table 4 Post-Invasion Shifts in non-life Insurers' Any Defence-Sector Capital Allocation

	(1) Invest_An yDefence	(2) Invest_An yDefence	(3) Invest_An yDefence	(4) Invest_An yDefence	(5) Invest_An yDefence
Post_war	2.013 (1.479)	2.168 (1.656)	1.620 (1.398)	1.916 (1.498)	3.454 (3.314)
Size	2.888*** (0.975)	3.206*** (1.012)	2.880*** (1.074)	3.707*** (1.050)	7.635*** (2.636)
Solvency	-0.226 (1.527)	-0.138 (1.960)	0.221 (1.907)	-0.242 (1.318)	0.856 (1.332)
Reserves	-10.05 (7.691)	-12.89 (7.861)	-8.995 (9.196)	-14.58** (7.286)	-25.848* (13.470)
ROIC	0.0215 (0.121)	0.0184 (0.129)	0.0261 (0.134)	0.0140 (0.107)	0.069 (0.239)
Invest_ESG		-0.393 (1.940)		0.807 (1.755)	1.891 (4.174)
EU			2.282 (2.321)	6.241** (2.768)	13.100* (6.833)
ESGxEU				-10.43** (4.450)	-20.806* (10.680)
EUxPost					-5.491 (7.501)
Constant	-33.29*** (9.871)	-37.25*** (8.745)	-35.01*** (11.91)	-41.57*** (10.56)	- (86.294*** (28.626)

Obs.	326	326	326	326	323
Number of NO	70	70	70	70	3,454

Notes: The table reports coefficients from random-effects logit models estimated by maximum likelihood. Standard errors are reported in parentheses. *, ** and *** denote statistical significance at the 10%, 5% and 1% levels, respectively.

A.2.2. Life Insurers

Table 5 Post-Invasion Shifts in Life Insurers' Defence-Sector Capital Allocation

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Invest_Co nvDefence	Invest_Co nvDefence	Invest_Co nvDefence	Invest_Co nvDefence	Invest_An yDefence	Invest_An yDefence	Invest_An yDefence	Invest_An yDefence
Post_war	-0.101 (0.0636)	-0.0807 (0.0631)	-0.0996 (0.0639)	-0.0801 (0.0638)	-0.0264 (0.0765)	-0.0160 (0.0769)	-0.00952 (0.0760)	0.00200 (0.0769)
Invest_ESG		0.157*** (0.0541)		0.196* (0.104)		0.0802 (0.0660)		0.115 (0.125)
EU			0.0141 (0.0548)	0.0538 (0.0842)			0.163** (0.0652)	0.186* (0.101)
ESGxEU				-0.0470 (0.112)				-0.0272 (0.134)
Size	0.0554*** (0.00912)	0.0337*** (0.0117)	0.0558*** (0.00922)	0.0346*** (0.0118)	0.0784*** (0.0110)	0.0673*** (0.0143)	0.0822*** (0.0110)	0.0697*** (0.0143)
Solvency	0.0174 (0.0248)	0.00663 (0.0248)	0.0183 (0.0252)	0.0103 (0.0255)	0.0337 (0.0299)	0.0282 (0.0302)	0.0447 (0.0299)	0.0400 (0.0307)
Reserves	-0.00366 (0.137)	-0.0239 (0.135)	-0.00586 (0.137)	-0.0359 (0.137)	0.0429 (0.165)	0.0326 (0.165)	0.0177 (0.163)	-1.56e-05 (0.165)
ROIC	0.00487* (0.00261)	0.00324 (0.00264)	0.00511* (0.00278)	0.00415 (0.00300)	0.00533* (0.00314)	0.00450 (0.00321)	0.00812** (0.00331)	0.00755** (0.00362)
Constant	-0.416*** (0.108)	-0.257** (0.120)	-0.432*** (0.125)	-0.315** (0.151)	-0.568*** (0.130)	-0.487*** (0.146)	-0.753*** (0.149)	-0.684*** (0.181)
Obs.	266	266	266	266	266	266	266	266
R-squared	0.177	0.203	0.178	0.204	0.211	0.216	0.230	0.236

Notes: The table reports coefficients from random-effects logit models estimated by maximum likelihood. Standard errors are reported in parentheses. *, ** and *** denote statistical significance at the 10%, 5% and 1% levels, respectively.

A.3. Differential ESG-Based Exclusions of Conventional vs. Emerging Defence Sectors

A.3.1. Non-life Insurers

Table 6 Differential ESG-Based Exclusions of Conventional vs. Emerging Defence Sectors

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	DefTech	DefTech	DefTech	DefTech	DefTech	DefTech	DefTech
PostInv	3.225 (3.325)	3.959 (3.620)	5.376 (4.293)	5.375 (4.292)		3.779 (3.349)	3.518 (7.755)
esg_dummy		1.946 (4.716)	4.380 (19.225)	4.381 (19.345)			5.217 (31.016)
Size	5.661 (4.515)	6.977*** (2.363)	45.100*** (2.969)	45.125*** (2.980)	8.330*** (3.159)	5.719* (3.018)	51.684* (27.916)
Solvency	-4.666 (5.556)	-5.150 (6.393)	-34.818** (14.183)	-34.831** (14.186)	-3.589 (4.676)	-8.543 (9.276)	-47.265** (20.010)
Reserves	-34.974* (20.782)	-42.474* (23.489)	-331.658*** (56.750)	-331.870*** (56.868)	-32.684 (21.040)	-28.786 (26.002)	-383.169* (217.477)
ROIC	-0.031 (0.274)	-0.047 (0.274)	-1.381** (0.608)	-1.382** (0.609)	-0.135 (0.199)	-0.050 (0.254)	-1.743* (0.906)
ConvDef					-0.372 (6.147)	7.067 (7.592)	-0.639 (0.126)
Constant	-64.882 (43.116)	-82.772*** (26.456)	-364.887 (0.000)	-365.090 (0.000)	-92.611*** (33.957)	-67.453** (29.668)	-410.517* (222.278)
Obs.	323	323	240	240	323	323	240
Number of	69	69	46	46	69	69	46

NO

Notes: The table reports coefficients from random-effects logit models estimated by maximum likelihood. Standard errors are reported in parentheses. *, ** and *** denote statistical significance at the 10%, 5% and 1% levels, respectively.

A.3.2. Life Insurers

Table 7 Differential ESG-Based Exclusions of Conventional vs. Emerging Defence Sectors

	(1) DefTech	(2) DefTech	(3) DefTech	(4) DefTech	(5) DefTech	(6) DefTech	(7) DefTech	(8) DefTech	(9) DefTech
PostInv	3.927 (2.833)	3.593 (2.303)	4.356* (2.571)	-24.369 (0.000)	4.796* (2.756)	-23.161 (0.000)		3.862* (2.186)	-22.05*** (4.844)
esg_dummy		1.821 (3.243)			0.856 (4.092)	-4.812 (6.265)			-4.203 (6.150)
EU			-3.988 (3.645)	-6.467* (3.476)	-4.356 (4.999)	-11.713* (6.477)			-11.311* (6.033)
ESGxEU						10.560 (7.514)			10.505 (8.185)
EUxPost				30.41*** (2.979)		30.29*** (4.737)			29.170 (0.000)
Size	1.702* (0.924)	1.134 (1.411)	1.827*** (0.700)	2.428*** (0.779)	1.868** (0.933)	1.920* (1.161)	0.867 (0.698)	0.740 (0.813)	1.286 (1.356)
Solvency	0.532 (1.727)	0.873 (1.478)	-0.021 (2.113)	-0.465 (2.194)	-0.311 (2.303)	-0.927 (2.451)	0.748 (0.944)	0.593 (1.651)	-0.901 (2.831)
Reserves	-16.987 (11.927)	-18.923 (13.767)	-16.006 (13.069)	-15.973 (12.396)	-16.335 (13.300)	-12.718 (13.942)	-14.769 (10.419)	-19.319 (14.623)	-13.370 (15.915)
ROIC	-0.018 (0.035)	-0.011 (0.036)	-0.025 (0.034)	-0.042 (0.038)	-0.029 (0.036)	-0.035 (0.043)	-0.034 (0.028)	-0.013 (0.032)	-0.029 (0.041)
Defencecom panies							2.731 (2.194)	3.732 (2.592)	4.426 (4.853)
Constant	-28.448** (12.932)	-21.601 (17.347)	-27.40*** (8.683)	-34.55*** (9.958)	-29.30*** (11.061)	-26.096** (11.571)	-16.354* (8.386)	-19.121** (9.252)	-19.424 (14.268)
Obs. Number of NO	264 52	264 52	264 52	264 52	264 52	264 52	264 52	264 52	264 52

Notes: The table reports coefficients from random-effects logit models estimated by maximum likelihood. Standard errors are reported in parentheses. *, ** and *** denote statistical significance at the 10%, 5% and 1% levels, respectively.