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Niblock, S. J. (2024). ESG and the performance of energy and utility portfolios: Evidence from Australia. Studies in Economics and Finance, ahead-of-print. https://doi.org/10.1108/SEF-06-2023-0366
Document Version: Accepted

Published Version: https://doi.org/10.1108/SEF-06-2023-0366

ESG and the performance of energy and utility portfolios: Evidence from Australia

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Abstract

Purpose – This research aims to establish the effect of environmental, social, and governance (ESG) practices on Australian energy and utility investment performance.

Design/methodology/approach – Conventional and ESG-rated portfolios are constructed using monthly returns and ESG scores of S&P/ASX 300 listed energy and utility firms from 2014 to 2022. Portfolio performance is estimated using a four-factor regression model, controlling for any economic shocks associated with the COVID-19 pandemic.

Findings – The findings show that the lower the ESG score associated with the overall ESG and environmental portfolios, the greater the performance compared to the market (but not the conventional and other ESG portfolios). High ESG scores do not appear to influence the performance of the energy and utility portfolios, which contrasts expectations that the uptake of ESG should deliver superior risk-return outcomes for investors. The findings also indicate that a contrarian investment approach may be a reasonable performance indicator for high-rated ESG portfolios. ESG practices did not impact portfolio performance during the COVID-19 pandemic.

Originality/value – This research has contributed to the literature by offering ESG investment insights for policymakers, regulators, fund managers, and investors. Consistent with the agency perspective on ESG practices and efficient market hypothesis, the evidence implies that, regardless of ESG scores (either high or low), investors should consider investing passively in diversified energy and utility portfolios or low-cost index fund equivalents.

Keywords COVID-19, Energy, ESG, Investment, Performance, Risk, Utilities

Paper type Research paper

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Citation

Niblock, S.J. (2024), "ESG and the performance of energy and utility portfolios: evidence from Australia", *Studies in Economics and Finance*, Vol. ahead-of-print No. ahead-of-print. https://doi.org/10.1108/SEF-06-2023-0366

1. Introduction

Socially responsible investing has become a hot topic in recent times. Investors today are more aware of global environmental, social, and governance (ESG) issues, which are increasingly being considered when making investment decisions (Ferriani and Natoli, 2021). ESG factors are driving investment strategies, with investors being lured by the appeal of potentially higher financial returns (e.g., doing well by doing good). Consequently, the demand for sustainable investment products and customized ESG portfolios has skyrocketed. For instance, global ESG assets under management are predicted to grow from US$18.4tn in 2021 to US$33.9tn by 2026, representing 21.5% of total global assets under management (PWC, 2022).

Existing empirical evidence on ESG and investment performance at the broader market level is well documented. However, coverage of specific market sectors is limited, particularly the energy and utilities sectors. While Batten *et al.* (2017, 2019), Choudhury, Kamran *et al.* (2023), Choudhury, Kayani *et al.* (2023), Choudhury, Sarker *et al.* (2023), and Sohag *et al.* (2023) have recently explored the relationships between energy prices (both conventional and renewable), the stock market, and the broader economy, no studies empirically examine the investment performance of ESG-rated energy and utility portfolios, either in Australia or abroad. This is surprising, particularly given the environmental pollution associated with energy and utility firms' activities (e.g., emission-intensive oil, gas, or coal operations), along with the shift in thinking regarding ESG practices and the transition towards the global energy sector achieving net-zero emissions by 2050.

Therefore, this paper is motivated by the growing public scrutiny of ESG practices of Australian energy and utility firms, along with the economic fallout associated with fossil fuel investments during the COVID-19 pandemic. Given the limited research conducted in this area, a gap in the literature regarding the ESG practices of energy and utility firms and their capacity to generate above-average risk-adjusted performance within ESG-rated portfolios provides further motivation.

Building on the work of Westermann *et al*. (2022) and adopting an innovative approach, this research attempts to address the question: *Do ESG-rated energy and utility portfolios outperform?* Using monthly returns and ESG scores of S&P/ASX 300 listed energy and utility firms, this paper explores whether ESG-rated investment portfolios outperform the market, a conventional 'buy and hold' portfolio, and each other from 2014 to 2022. In constructing conventional and overall and dimension ESG portfolios, the influence of ESG practices on energy and utility portfolio performance is estimated using a four-factor regression model, controlling for any economic shocks accompanying the COVID-19 pandemic.

The findings show that the lower the ESG score associated with the overall ESG and environmental portfolios, the greater the performance compared to the market (but not the conventional and other ESG portfolios). High ESG scores do not appear to influence the performance of the energy and utility portfolios, which contrasts expectations that the uptake of ESG should deliver superior risk-return outcomes for investors. The findings also indicate that a contrarian investment approach may be a reasonable performance indicator for high-rated ESG portfolios. ESG practices did not impact portfolio performance during the COVID-19 pandemic. Consistent with the agency perspective on ESG practices and efficient market hypothesis, the study contributes to the literature by providing evidence that, regardless of ESG scores (either high or low), investors should consider investing passively in diversified energy and utility portfolios or low-cost index fund equivalents.

The remainder of this paper is organized as follows. Section 2 highlights the theoretical background and hypotheses. Section 3 defines the data and methodology. Section 4 reports the empirical results. Section 5 delivers the key discussion and conclusions.

2. Theoretical background and hypotheses

The integration of ESG factors such as climate change, societal impact, and transparency and disclosure are essential to both corporations and investors because of their perceived significance in generating long-term value (Choudhury, Kayani *et al.*, 2023; Edmans, 2023; Ling *et al.*, 2023; Zaman *et al.*, 2018). ESG investing popularity may also be explained by the attraction of potentially superior financial fundamentals. For instance, Giese *et al.* (2019) and Hassan *et al.* (2023) infer that ESG information is spread to firm performance, resulting in improved working capital, higher profitability, a lower cost of capital, a greater valuation, and lower tail risk exposure. Yet, in line with theoretical expectations, Huang (2021) only finds an economically modest positive relationship between ESG activity and firm performance.

So, do high-rated ESG investments perform better than their lower-rated ESG counterparts? Broadstock *et al.* (2021) and Giese *et al.* (2019) suggest that changes in a firm's ESG characteristics via its ESG rating (or score) may be a helpful indicator in establishing investment performance or risk mitigation. In establishing whether ESG rating changes impact stock returns, Shanaev and Ghimire (2022) show that rating downgrades result in underperformance, which is more pronounced for firms with high ESG ratings than those with low ESG ratings. Moreover, Ferriani and Natoli (2021) reveal that investors favor ESG funds (especially those with environmental themes) over conventional funds because they might produce better risk-return outcomes.

This notion is supported by Abate *et al.* (2021), Broadstock *et al.* (2021), Kaiser (2020), Lee *et al.* (2021), and Ling *et al.* (2023), who find that the uptake of ESG activities and risk-adjusted performance share a positive relationship. These studies collectively argue that ESG integration does not burden traditional investment strategies, does not impair risk-adjusted returns, and can lead to superior efficiencies when high-rated/low-rated ESG securities are included in/excluded from investment portfolios. Specifically, Lee *et al.* (2021) indicate that high-rated Australian ESG portfolios consistently outperform, provide diversification benefits, and demonstrate lower risk than the market and low-rated ESG portfolios. de Franco (2020) also proposes that high ESG controversy stock portfolios significantly underperform their benchmarks and low ESG controversy stock portfolios, making a case for the potential benefits of screening out highly controversial stocks from US and European investment portfolios.

On the other hand, Edmans (2023) believes ESG to be nothing special and should not be treated differently from other intangible assets/value drivers known to generate sustainable long-term returns. Edmans implies that ESG investing is just investing and that investors should focus on great firms, not just firms that are great at ESG. Similarly, Huang (2021) asserts that ESG should not be viewed as a standalone factor but as part of a firm's overall activities.

When it comes to highly rated ESG investments and the assumption that ESG is a risk factor, Cornell (2021) claims that investors can expect greater social benefits and less risk but not higher expected returns. However, this outcome may be acceptable for highly motivated ESG investors, as lower expected returns are likely offset by the additional utility (e.g., social benefits) gained from a sustainable investment portfolio (Blomqvista and Stradi, 2022). Nevertheless, Branch *et al*. (2019) suggest that ESG portfolios can be less transparent than conventional ones based entirely on financial considerations. Branch *et al*. also maintain that ESG investing can be complicated and entails trade-offs between risk, return, and investor preferences (e.g., peace of mind).

Critics contend that outperformance is not possible as the ESG screening process excludes investments with attractive risk-return characteristics, thus resulting in reduced financial opportunities, a lack of diversification, opportunity costs, greater risks, and lower returns (Branch *et al*., 2019; Wang *et al*., 2022). For example, using overall and dimension ESG scores, Prol and Kim (2022) and Wang *et al*. (2022) show that ESG screening is detrimental to portfolio value, with high ESG portfolios producing lower risk-adjusted returns than their lower-rated ESG and conventional peers.

Adopting a factor approach to establish performance, Naffa and Fain (2022) support the literature's neutrality argument by showing that global ESG equity portfolios do not generate significant alphas. Using a similar approach, Dorfleitner *et al*. (2020) arrive at the same conclusion for their international value-weighted ESG portfolios. Yet, when the portfolios are re-configured to be equal-weighted, they find that low-rated ESG portfolios significantly outperform. Agliardi *et al*. (2023) also reveal that environmentally low-rated firms exhibit better financial performance, while environmentally high-rated firms tend to be less risky and more resilient. Further, despite increased ESG investment activity in Italy over the past decade, Landi and Sciarelli (2019) find that socially responsible practices are not priced into the market. As such, ESG investors are not rewarded with excess returns.

Overall, when it comes to the performance of ESG-rated portfolios, the findings are mixed. It is unclear if ESG-rated portfolios outperform, particularly in the energy and utilities space. Therefore, the research hypotheses for this study are:

$\mathbf{H}_1$: Conventional energy and utility portfolios do *not* outperform the market

$\mathbf{H}_2$: ESG-rated energy and utility portfolios do *not* outperform the market

$\mathbf{H}_3$: ESG-rated energy and utility portfolios do *not* outperform conventional energy and utility portfolios or each other.

3. Data and methodology

3.1 Data

The sample comprises 108 monthly total returns of 16 S&P/ASX 300 energy and utility companies **[1]** from January 2014 to December 2022 **[2]**. For comparability with previous studies (see Westermann *et al*., 2018, 2022), stock price, dividend, market capitalization, and exchange rate data are collected from S&P Capital IQ. All returns are denominated in US dollars (USD) and ignore transaction costs. The S&P/ASX 300 Total Return index is also considered for benchmarking purposes. With a capitalization representing 83.85% of the market, the S&P/ASX 300 Total Return index is deemed an appropriate proxy for the Australian stock market (S&P Capital IQ, 2023; Westermann *et al*., 2018, 2022). The index contains major listed Australian energy and utility companies, with all companies under investigation being constituents at various stages throughout the sample period. For example, the sample covers 86.50% of Australia's combined energy and utilities sectors, as measured by market capitalization on 18 April, 2023 (S&P Capital IQ, 2023). Full sample characteristics are shown in **Table 1**.

[Insert Table 1]

A multifactor model focusing on the Asia-Pacific market is employed to establish risk-adjusted performance. As suggested by Fama and French (2012), regarding domestic investment portfolios, regional risk factors (instead of global risk factors) are known to enhance the explanatory power associated with multifactor models. Westermann *et al*. (2018, 2022) and Costa *et al*. (2014) also regard Asia-Pacific risk factors as a sufficient proxy for risk factors specific to Australia. The S&P/ASX 300 adjusted R^2 in the present study is around 89% (see **Table 4**), validating the aforementioned increased explanatory power of adopting regional risk factors in multifactor asset pricing models. Therefore, this research uses monthly Asia-Pacific risk factors, including book-to-market (*HML*), market risk premium (*RMRF*), momentum (*WML*), and size (*SMB*) (see Carhart, 1997; Fama and French, 1993) **[3]**.

Consistent with the approach taken by Westermann *et al*. (2022), investment portfolios are generated to establish the performance of ESG-rated S&P/ASX 300 energy and utility companies (see **section 3.2.1**). Historical yearly ESG scores **[4]** are gathered from S&P Global **[5]** for each company within the sample to produce the portfolios. The use of ESG scores (or ratings) is supported by numerous studies (see Broadstock *et al.*, 2021; Giese *et al*., 2019; Prol and Kim, 2022; Wang *et al*., 2022) and considered suitable for integration into financial/investment performance analyses. Each company's ESG scores are based on 1,000 underlying data points on industry-specific sustainability factors from over 130 questions obtained either through the annual S&P Global Corporate Sustainability Assessment questionnaire (participating) or a public assessment (non-participating). The same questionnaire methodology is applied to both participating and non-participating companies, with scores being determined by public and additional disclosures. Questionnaire data is based on past, current, and expected future performance on ESG issues and classified by three dimensions, namely: Environmental (E), Social (S), and Governance (G) (see **Table 1**). Overall ESG scores are ascertained by allocating relevant weights **[6]** to each ESG dimension and summing. Overall and dimension ESG scores span from 0-100, with 100 being the highest score achievable and zero being the lowest.

3.2 Methodology

3.2.1 Conventional and ESG portfolios

All portfolios constructed are value-weighted by market capitalization (see **Table 2**). To compare with conventional investment approaches and prevent any selection bias, a passive portfolio (ENETILITY) comprising up to 16 S&P/ASX 300 energy and utility constituents over the sample period is considered (Westermann *et al*., 2022). Eight passive ESG portfolios are constructed annually from various combinations of the 16 S&P/ASX 300 energy and utility constituents using overall and dimension ESG scores **[7]** from the previous year (t-1).

[Insert Table 2]

ESG portfolios are categorized annually as high or low by comparing each company's ESG score with the median sector ESG score. For instance, companies are included in a 'High ESG' portfolio if their annual ESG score is <u>greater than</u> the combined annual median energy and utilities sector ESG score or a 'Low ESG' portfolio if their annual ESG score is <u>less than or equal</u> to the combined annual median energy and utilities sector ESG score. Note: energy and utility companies in the sample that do not have ESG scores reported for any given year are not considered for portfolio inclusion. The ESG portfolios are: (1) High_ESG; (2) Low_ESG; (3) High_E; (4) Low_E; (5) High_S; (6) Low_S; (7) High_G; and (8) Low_G.

ASX300 signifies the S&P/ASX 300 index. As reported in **Table 2** and consistent with Westermann *et al*. (2022), the ESG and market capitalization measures for the ESG portfolios support slack resource theory. For instance, portfolio constituents with larger/smaller market capitalizations and financial resources appear to engage more/less in ESG-related activities, as indicated by high/low ESG scores.

3.2.2 Four-factor model

In line with prevalent asset pricing models in the finance literature, the Carhart (1997) four-factor model is utilized to examine whether the portfolios under investigation outperform or underperform on a risk-adjusted basis:

$$R_{it} - RF_{it} = \alpha_{iT} + \alpha_{iT}CVD + \beta_{iT}RMRF_t + \beta_{iT}SMB_t + \beta_{iT}HML_t + \beta_{iT}WML_t + \varepsilon_{it} \quad (1)$$

See **Appendix 1** for variable descriptions. The model is run for the S&P/ASX 300 index and all portfolios to address $\mathbf{H}_1$ and $\mathbf{H}_2$. The coefficients produced will provide evidence on whether conventional and ESG-aligned energy and utility portfolios in Australia statistically produce irregular risk-adjusted returns over time and during periods of economic uncertainty (e.g., COVID-19). In examining $\mathbf{H}_3$, the previously estimated coefficients will be statistically compared for each portfolio combination. For example, a one-tailed *t*-test is used to establish coefficient statistical significance for all portfolio combinations (Westermann *et al*., 2022).

4. Empirical results

4.1 Summary statistics

Summary statistics are presented in **Table 3**. As anticipated, *ASX300* delivered the lowest mean and standard deviation, indicating that the conventional energy and utility and ESG portfolios nominally outperformed the benchmark index but with greater risk due to a lack of diversification. Among the conventional energy and utility and ESG portfolios, *Low_ESG* was the best performer in terms of nominal return performance, while *High_S* was the worst performer. The lower ESG score portfolios nominally outperformed *ENETILITY* and higher

ESG score portfolios (except for *ENETILTY,* which nominally outperformed *Low_G*). *ENETILITY* also nominally outperformed all of the high ESG score portfolios. Concerning portfolio return volatility, *High_E* demonstrated the highest volatility, while *Low_E* produced the lowest volatility. All the low ESG score portfolios generated lower volatility than *ENETILITY* and the high ESG score portfolios (except for *Low_S*). *ENETILITY* also had lower volatility compared to the high ESG score portfolios.

[Insert Table 3]

Essentially, the findings suggest the lower/higher the portfolio ESG score, the lower/higher the portfolio return volatility. This is in contrast to Westermann *et al*. (2022), who found that higher-rated corporate social responsibility (CSR) Real Estate Investment Trust (REIT) portfolios with larger market capitalizations deliver less return volatility than their lower-rated counterparts. On the contrary, the ESG practices of highly regulated and largely capitalized energy and utility firms may not always effectively mitigate the risk associated with ESG-focused investment portfolios.

4.2 Four-factor regressions

Table 4 shows the regression coefficients for the S&P/ASX 300 index and conventional and ESG portfolios. *ASX300* and *ENETILITY* delivered positive alphas, with $\mathbf{H}_1$ being rejected at the 10% level for *ENETILITY*. This indicates that the conventional energy and utility portfolio outperformed the market after risk adjustment. The ESG portfolios produced positive alphas; however, only *Low_ESG* and *Low_E* had significant alphas at the 5% level. For instance, *Low_ESG* and *Low_E* demonstrated the highest risk-adjusted returns. This suggests that the lower the overall ESG and environmental scores for these respective portfolios, the greater the investment performance compared to the market.

Further, the low environmental score portfolio constituents appear to be the key performance drivers of *Low_ESG* and *Low_E*. These findings imply that after adjusting for risk, the low ESG score portfolios outperformed the market; therefore, $\mathbf{H}_2$ is rejected for these two portfolios. Consistent with agency theory, Cajias *et al*. (2014), and Westermann *et al*. (2022), the findings reveal that high ESG scores do not seem to influence the risk-adjusted performance of Australian energy and utility investment portfolios.

[Insert Table 4]

The *RMRF* coefficients were positive and significant at the 1% level, which indicates that the conventional and ESG portfolios were subject to similar or greater market risk than the market. *High_E* had the highest factor loading, while *Low_E* produced the lowest. As expected, *ASX300* exhibited systematic risk consistent with the broader market. Except for *High_S*, the *RMRF* coefficients infer that higher ESG score portfolios are associated with greater market risk than their lower ESG score portfolio counterparts.

The conventional and ESG portfolios had positive *SMB* coefficients, signifying that the energy and utilities sectors were more small cap-orientated than the market. *ENETILITY* and *High_E* factor loadings were significant at the 10% level, while the *Low_G* factor loading was significant at the 1% level. With only two of the eight ESG portfolios demonstrating statistical significance at the 10% level or higher, these findings suggest that size may not explain the risk-adjusted performance of ESG-rated investments. On the other hand, *ASX300* produced a negative factor loading; however, it was insignificant, implying that the S&P/ASX 300 index is neither large cap nor small cap-orientated when weighed against the broader market.

The *HML* coefficients for the conventional and ESG portfolios were mixed, implying that when compared to the market, the higher ESG score portfolios were more value-orientated (positive coefficients). The lower ESG score portfolios, on the other hand, were more growth-driven (negative coefficients). For instance, *ENETILITY*, *High_ESG*, *High_E*, *High_S*, and *High_G* had positive factor loadings, and *Low_ESG*, *Low_E*, *Low_S*, and *Low_G* had negative factor loadings. However, with none of the coefficients demonstrating statistical significance, these findings denote that the portfolios are neither value nor growth-orientated. After adjusting for risk, it appears that style may not explain the return performance of ESG-rated investments, with Australian energy and utility investors seemingly not preferring growth over value (or vice-versa). Conversely, *ASX300* delivered a negative and significant factor loading at the 1% level, indicating a greater growth focus than the wider market.

The *WML* coefficients for the conventional and ESG portfolios were negative, signifying that the energy and utilities sectors were more contrarian-orientated than the market. For instance, except for *Low_ESG*, *Low_E*, and *Low_S*, all portfolio factor loadings demonstrated statistical significance at the 10% level or higher. This suggests that a contrarian approach may help explain the risk-adjusted performance of high-rated ESG investments, with Australian energy and utility investors preferring to buy (or go long) last month's losers and sell (or short) last month's winners (Huang *et al*., 2009). *ASX300* also produced a negative factor loading; however, it was insignificant, indicating that the S&P/ASX 300 index is not influenced by momentum or contrarian investing compared to the broader market. Finally, all of the *CVD* coefficients were negative and insignificant. Unlike Westermann *et al*. (2022), these results signify that socially responsible practices do not explain the risk-adjusted performance of ESG-rated investments during economic crises or market downturns, such as the COVID-19 pandemic.

4.3 Four-factor regression coefficient comparisons

Table 5 highlights the coefficients of the S&P/ASX 300 index versus the respective coefficients of the conventional and ESG portfolios. By adopting this comparative approach, the statistical significance level of the coefficient estimates changes. All alphas remained positive but were only significant at the 10% level for *Low_ESG* and *Low_E*. Moreover, these findings confirm that investors who passively invested in low-rated ESG and environmentally-themed portfolios may have outperformed the S&P/ASX 300 index over the period investigated. Thus, compared to investing in the S&P/ASX 300 index (via an exchange-traded fund (ETF) or equivalent investment vehicle), only *Low_ESG* and *Low_E* had the potential to influence investor wealth positively.

[Insert Table 5]

The *RMRF* coefficient comparisons were all positive and significant at the 10% level for *High_ESG*, *High_E*, *High_S*, and *High G*. This confirms that the higher ESG score portfolios carried greater systematic risk than the S&P/ASX 300 index. The *SMB* coefficient comparisons were positive and significant at the 10% level or higher for *ENETILITY*, *High_ESG*, *High_E*, *High_S*, and *Low_G*. This indicates that the conventional portfolio, high-rated ESG portfolios (except for *High_G*), and low-rated governance portfolio were more small cap-orientated than the S&P/ASX 300 index. The *HML* coefficient comparisons were mixed. *ENETILITY*, *High_ESG*, *High_E*, *High_S* and *High_G* were positive, while *Low_ESG*, *Low_E*, *Low_S* and *Low_G* were negative. This infers that high-rated ESG portfolios might be more value-orientated than their lower-rated counterparts. Further, the coefficient comparisons were significant at the 10% level or higher, suggesting that the conventional and ESG portfolios were more value-focused than the S&P/ASX 300 index. The *WML* coefficient comparisons were negative and significant at the 10% level or higher for *ENETILITY*, *High_ESG*, *High_E*, *High_S*, *High_G*, and *Low_G*. This implies that conventional, high-rated ESG and low-rated governance-themed portfolios were more contrarian driven than the S&P/ASX 300 index. The *CVD* coefficient comparisons were all positive and insignificant, indicating that the conventional and ESG portfolios neither outperformed nor underperformed the S&P/ASX 300 index during the COVID-19 pandemic.

Table 6 displays the conventional portfolio's coefficients versus the ESG portfolios' respective coefficients. Again, the statistical significance level of the coefficient estimates changes. When conducting the comparative *t*-tests, only the *RMRF* coefficient for *Low_E* retained its significance, and all other coefficient comparisons were insignificant. Unlike Westermann *et al*. (2022), these findings show that, regardless of their constituents, ESG-rated portfolios (either high or low) do not outperform conventional portfolios.

[Insert Table 6]

Table 7 provides comparisons of the various ESG portfolio coefficient pairs. Yet again, the statistical significance level of the coefficient estimates changes. When running the comparative *t*-tests, only the *RMRF* and *WML* coefficients retained their significance, and all other coefficient comparisons were insignificant. The *RMRF* coefficient comparisons were negative and significant at the 10% level or higher for *Low_ESG* and *Low_E* versus *High_ESG*, and *Low_E* versus *High_E*, respectively, and positive and significant at the 10% level for *High_E* versus *Low_ESG*. This suggests that the low-rated ESG and environmentally-themed portfolios demonstrated greater systematic risk than their high-rated ESG and environmentally-themed counterparts. The *RMRF* coefficient comparisons were also positive and significant at the 10% level or higher for *High_S*, *Low_S*, *High_G*, and *Low_G* versus *Low_E*, respectively. This indicates that the high and low-rated socially and governance-themed portfolios produced greater systematic risk than the low-rated environmentally-themed portfolio.

[Insert Table 7]

The *WML* coefficient comparisons were positive and statistically significant at the 10% level for *Low_ESG*, *Low_E*, and *Low_S* versus *High_ESG*, *Low_E* and *Low_S* versus *High_E*, and *Low_S* versus *High_S*, respectively. This implies that the low-rated ESG and environmentally and socially-themed portfolios were more momentum (or less contrarian) driven than the high-rated ESG and environmentally and socially-themed portfolios. On the other hand, the *WML* coefficient comparisons were negative and statistically significant at the 10% level or higher for *High_E*, *High_S*, and *High_G* versus *Low_ESG*, and *High_S* and *High_G* versus *Low_E*, respectively. This denotes that the high-rated environmentally, socially, and governance-themed portfolios were less momentum (or more contrarian) focused than their lower-rated ESG and environmentally-themed portfolio counterparts.

Similar to testing $\mathbf{H}_1$ and $\mathbf{H}_2$, the evidence supports the agency view on ESG activities (Cajias *et al*., 2014) in the Australian energy and utilities sectors. Therefore, $\mathbf{H}_3$ is accepted.

Failing to reject **H**$_3$ for the conventional and ESG portfolio coefficient comparisons implies that there appears to be no statistical relationship between overall and dimension ESG scores and the performance of energy and utility investment portfolios in Australia.

5. Discussion and conclusions

After adjusting for risk and considering the COVID-19 pandemic, the findings reveal that the lower the ESG score associated with the overall ESG and environmental portfolios, the greater the investment performance compared to the market (but not the conventional and other ESG portfolios). This is consistent with de Franco (2020), who discovered that Asia-Pacific portfolios of highly controversial stocks outperform their benchmarks. Moreover, in line with Prol and Kim (2022) and Wang *et al.* (2022), high ESG scores do not seem to influence the risk-adjusted performance of Australian energy and utility investment portfolios, which contrasts expectations that the uptake of substantive corporate ESG practices should deliver superior risk-return outcomes for investors (Bénabou and Tirole, 2010).

The results suggest that ESG commitment does not necessarily translate into lower risk for Australian energy and utility investors. A possible explanation may be that for largely capitalized and highly regulated firms under growing public scrutiny, a greater focus on ESG leadership and ongoing compliance could be a risky (potentially costly) proposition and less so for ESG laggards. The findings also indicate that a contrarian investment approach may be a reasonable performance indicator for high-rated ESG portfolios. This resonates with Kaiser and Welters' (2019) study that found momentum strategy returns significantly lower for high ESG stocks.

Notably, ESG practices did not explain the performance of energy and utility investments during the COVID-19 crisis. This finding confirms the work of Demers *et al*. (2021) and D'Hondt *et al*. (2022). For example, Demers *et al*. (2021) showed that ESG had no impact on investment returns during the COVID-19 pandemic, while D'Hondt *et al*. (2022) claimed that during COVID-19, ESG investing was a luxury item for most investors.

This paper has contributed to the wider literature by providing ESG investment insights for policymakers, regulators, fund managers, and investors. From a regulatory and compliance perspective, the findings reveal that sound ESG investment analyses and decisions are contingent on firms positively advocating on behalf of their investors via (1) greater disclosure (i.e., reporting ESG-relevant data and performance metrics (both on a mandatory and voluntary basis)); (2) a commitment to increased benchmarking practices and transparency; and (3) prudent sustainability risk management (Singhania and Saini, 2022, Zaman *et al.* 2018). From an investment perspective, regardless of ESG scores (either high or low), investors should consider investing passively in diversified energy and utility portfolios or low-cost index fund equivalents, thus supporting the agency perspective on ESG and efficient market hypothesis. Investors must also be aware of changing ESG practices, scores, weightings, and other political, economic, technological, and legal conditions/risks that may impact the energy and utilities sectors over time (Batten *et al.*, 2017, 2019; Choudhury, Kamran *et al.*, 2023; Choudhury, Kayani *et al.*, 2023; Choudhury, Sarker *et al.*, 2023; Sohag *et al.*, 2023).

Future research could adopt a similar approach to the one taken in this study by drawing comparisons with other international energy and utility portfolios, incorporating transaction costs and trading volumes, or considering supplementary ESG dimension criteria. For instance, in addition to primary Environmental, Social, and Governance dimensions, S&P Global (2023) provides detailed criteria weights by dimension, including, but not limited to, climate strategy, environmental policy and reporting, corporate citizenship and philanthropy, human rights, occupational health and safety, codes of business conduct, cybersecurity, risk and crisis management, and sustainable finance **[8]**. Following in the footsteps of Shanaev and Ghimire (2022), future studies could also look to establish if yearly ESG rating upgrades and downgrades generate abnormal returns for ESG-focused energy and utility investment portfolios over time and whether these rating changes are more pronounced for ESG leaders or laggards. Constructing portfolios based on this proposed research may provide greater insight into the performance of ESG-focused energy and utility investments.

Notes

[1] Only S&P/ASX 300 energy and utility companies with S&P Global ESG scores are considered. While the data may indicate survivorship bias, S&P/ASX 300 index constituent movements over the sample period are not anticipated to impact the results of this study.

[2] The period under investigation coincides with the COVID-19 pandemic, which has resulted in millions of respiratory infections, severe illnesses, and deaths globally since its outset. The commencement of the COVID-19 outbreak was signified by the World Health Organization's public health emergency declaration on 30 January, 2020 (World Health Organization, 2023).

[3] Monthly Asia-Pacific risk factors are acquired from Kenneth French's website and founded on USD-denominated stock returns – see https://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html#International.

[4] Historical monthly or quarterly ESG scores are not available.

[5] S&P Global provides ESG scores at the company level, covering 90% of the global market capitalization. For more details, see – https://www.spglobal.com/esg/solutions/data-intelligence-esg-scores.

[6] ESG dimension weights are based on their current or expected significance in the company's assessment compared to its industry peers (S&P Global, 2023).

[7] D'Hondt *et al*. (2022) suggest that the three ESG dimensions (E-S-G) are different and should be evaluated independently when establishing ESG investment performance.

[8] For complete coverage of the S&P Global ESG criteria weights by dimension, see – https://www.spglobal.com/esg/documents/sp-global-esg-scores-brochure-2022.pdf.

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Table 1. S&P/ASX 300 energy and utility company sample

Company Name	Exchange: Ticker	Market Cap (USDmil)	Sector	Primary Industry	E	S	G	Overall ESG
Woodside Energy Group Ltd	ASX:WDS	$ 22,139.07	Energy	Oil and Gas Exploration and Production	68 (0.27)	80 (0.32)	77 (0.41)	76
Santos Ltd	ASX:STO	$ 9,434.23	Energy	Oil and Gas Exploration and Production	54 (0.27)	48 (0.32)	57 (0.41)	53
Origin Energy Ltd	ASX:ORG	$ 8,966.81	Utilities	Electric Utilities	43 (0.27)	45 (0.32)	46 (0.41)	45
AGL Energy Ltd	ASX:AGL	$ 7,989.07	Utilities	Multi-Utilities	46 (0.40)	66 (0.28)	59 (0.32)	56
APA Group Ltd	ASX:APA	$ 7,753.93	Utilities	Gas Utilities	28 (0.33)	27 (0.33)	34 (0.34)	30
Ampol Ltd	ASX:ALD	$ 5,721.86	Energy	Oil and Gas Refining and Marketing	23 (0.30)	26 (0.34)	48 (0.36)	33
Washington H. Soul Pattinson Ltd	ASX:SOL	$ 4,040.35	Energy	Coal and Consumable Fuels	6 (0.33)	12 (0.37)	26 (0.30)	14
Worley Ltd	ASX:WOR	$ 3,361.25	Energy	Oil and Gas Equipment and Services	32 (0.24)	31 (0.37)	49 (0.38)	38
Viva Energy Group Ltd	ASX:VEA	$ 2,612.58	Energy	Oil and Gas Refining and Marketing	17 (0.31)	25 (0.35)	40 (0.34)	28
Whitehaven Coal Ltd	ASX:WHC	$ 2,093.66	Energy	Coal and Consumable Fuels	10 (0.34)	24 (0.37)	39 (0.29)	24
Beach Energy Ltd	ASX:BPT	$ 2,032.76	Energy	Oil and Gas Exploration and Production	26 (0.27)	45 (0.32)	46 (0.41)	40
Paladin Energy Ltd	ASX:PDN	$ 470.64	Energy	Coal and Consumable Fuels	17 (0.35)	27 (0.38)	51 (0.27)	30
Karoon Energy Ltd	ASX:KAR	$ 412.13	Energy	Oil and Gas Exploration and Production	8 (0.27)	17 (0.32)	27 (0.41)	19
Cooper Energy Ltd	ASX:COE	$ 310.66	Energy	Oil and Gas Exploration and Production	9 (0.26)	16 (0.32)	32 (0.42)	21
Carnarvon Energy Ltd	ASX:CVN	$ 200.88	Energy	Oil and Gas Exploration and Production	4 (0.26)	4 (0.32)	19 (0.42)	10
Strike Energy Ltd	ASX:STX	$ 173.22	Energy	Oil and Gas Exploration and Production	3 (0.26)	0 (0.32)	20 (0.42)	9
Total		$ 77,713.10			25 (0.30)	31 (0.33)	42 (0.37)	33

Notes: S&P/ASX 300 energy and utility companies, avg. market capitalizations, sector and primary industry categories, and avg. dimension and overall ESG scores (weightings) are reported for the sample period, January 2014 to December 2022. ESG scores range from 0 to 100 (lowest to highest). Overall ESG scores are obtained by providing prescribed weights to each of the three ESG dimensions and summing the scores accordingly. E = Environmental. S = Social. G = Governance.

Source: S&P Capital IQ and S&P Global ESG Scores.

Table 2. ESG scores and market capitalization measures

	ASX300	*ENETILITY*	*High_ESG*	*Low_ESG*	*High_E*	*Low_E*	*High_S*	*Low_S*	*High_G*	*Low_G*
2014	NA	45	67	32	46	11	71	28	72	46
2015	NA	43	57	28	52	12	62	26	67	43
2016	NA	43	58	28	56	17	61	27	71	43
2017	NA	43	57	30	53	20	62	27	63	38
2018	NA	43	57	34	55	25	55	31	55	37
2019	NA	34	48	19	50	18	44	16	53	26
2020	NA	34	50	20	51	14	47	15	54	30
2021	NA	28	44	14	40	7	43	8	53	25
2022	NA	32	48	16	41	9	53	12	53	26
ESG score avg.	NA	38	54	25	49	15	55	21	60	35
Market cap avg. (USDmil)	$1,251,844.35	$76,382.62	$51,592.75	$23,337.45	$53,150.68	$21,779.51	$50,438.78	$24,491.42	$48,847.23	$26,082.97
Market cap (%)	100%	100%	67.55%	30.55%	69.58%	28.51%	66.03%	32.06%	63.95%	34.15%

Notes: This table presents avg. ESG and market capitalization measures for the S&P/ASX 300 index (*ASX300*), conventional energy and utility portfolio (*ENETILITY*), and overall and dimension ESG portfolios from 2014 to 2022. ESG scores range from 0 to 100 (lowest to highest). Overall ESG scores are obtained by providing prescribed weights to each of the three ESG dimensions and summing the scores accordingly. E = Environmental. S = Social. G = Governance.

Source: S&P Capital IQ and S&P Global ESG Scores.

Table 3. Summary statistics

	ASX300	*ENETILITY*	*High_ESG*	*Low_ESG*	*High_E*	*Low_E*	*High_S*	*Low_S*	*High_G*	*Low_G*
Mean	0.0048	0.0078	0.0062	0.0115	0.0065	0.0105	0.0056	0.0114	0.0068	0.0076
Median	0.0010	0.0126	0.0100	0.0143	0.0103	0.0101	0.0096	0.0202	0.0158	0.0143
Maximum	0.1563	0.2661	0.3159	0.2012	0.3779	0.1630	0.2458	0.3365	0.3159	0.2012
Minimum	-0.2639	-0.3181	-0.3727	-0.2340	-0.4502	-0.1829	-0.2820	-0.3944	-0.3727	-0.2340
Range	-0.4202	-0.5843	-0.6886	-0.4352	-0.8281	-0.3459	-0.5278	-0.7309	-0.6886	-0.4352
Std. Dev.	0.0586	0.0766	0.0875	0.0692	0.0945	0.0651	0.0782	0.0833	0.0870	0.0693
Skewness	-0.9077	-0.2940	-0.2986	-0.0394	-0.2614	-0.0963	-0.2913	-0.3445	-0.2694	-0.1583
Kurtosis	6.6206	6.8228	7.3922	4.0339	10.2727	2.9264	4.9902	9.5150	7.5210	4.1244
Jarque-Bera	73.8203***	67.3173***	88.4170***	4.8378*	239.2438***	0.1911	19.3514***	193.1422***	93.2862***	6.1409**
p-value	0.0000	0.0000	0.0000	0.0890	0.0000	0.9089	0.0001	0.0000	0.0000	0.0464
Obs.	108	108	108	108	108	108	108	108	108	108

Notes: This table presents summary statistics for the S&P/ASX 300 index (*ASX300*), conventional energy and utility portfolio (*ENETILITY*), and overall and dimension ESG portfolios from 2014 to 2022. Significance: * 10% level; * 5% level; *** 1% level.

Source: Authors' own work

Table 4. Four-factor regressions

	ASX300	*ENETILITY*	*High_ESG*	*Low_ESG*	*High_E*	*Low_E*	*High_S*	*Low_S*	*High_G*	*Low_G*
Alpha	0.0024	0.0061*	0.0056	0.0077**	0.0053	0.0083**	0.0052	0.0069	0.0063	0.0042
p-value	0.1229	0.0685	0.2181	0.0236	0.1812	0.0354	0.1958	0.1340	0.1232	0.3657
RMRF	1.0632***	1.2851***	1.4035***	1.1013***	1.5267***	0.9953***	1.2520***	1.3456***	1.3833***	1.1459***
p-value	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SMB	-0.0286	0.3172*	0.3319	0.1457	0.3947*	0.1876	0.3014	0.2440	0.2583	0.4096***
p-value	0.8248	0.0545	0.1094	0.3807	0.0805	0.2143	0.1105	0.3960	0.2057	0.0040
HML	-0.4554***	0.0174	0.0822	-0.1444	0.0493	-0.1153	0.0666	-0.0488	0.0930	-0.1695
p-value	0.0000	0.9431	0.7940	0.3233	0.8795	0.4998	0.7936	0.8394	0.7658	0.2702
WML	-0.0237	-0.4273***	-0.5201***	-0.1441	-0.5279**	-0.1376	-0.5587***	-0.1270	-0.4788***	-0.3081*
p-value	0.7534	0.0078	0.0076	0.4101	0.0153	0.4494	0.0007	0.5558	0.0071	0.0524
CVD	0.0008	0.0052	0.0027	0.0061	0.0043	0.0021	0.0041	0.0058	0.0010	0.0111
p-value	0.8649	0.6673	0.8701	0.4197	0.7911	0.8299	0.7957	0.5256	0.9472	0.2323
Adjusted R^2	0.8902	0.6424	0.5811	0.5929	0.5900	0.5378	0.5891	0.5933	0.5688	0.6527
Obs.	108	108	108	108	108	108	108	108	108	108

Notes: This table presents coefficients generated from the four-factor model for the S&P/ASX 300 index (*ASX300*), conventional energy and utility portfolio (*ENETILITY*), and overall and dimension ESG portfolios from 2014 to 2022. *CVD* is a dummy variable designed to control for the COVID-19 pandemic. p-values produced from Newey-West t-stats are corrected for standard errors. Significance: * 10% level; ** 5% level; *** 1% level.

Source: Authors' own work

Table 5. Four-factor regression coefficient comparisons – S&P/ASX 300 index vs. conventional and ESG portfolios

	Alpha	+/-	p-value
ASX300	0.0024	NA	NA
ENETILITY	0.0061	+	0.1571
High_ESG	0.0056	+	0.2518
Low_ESG	0.0077*	+	0.0762
High_E	0.0053	+	0.2467
Low_E	0.0083*	+	0.0809
High_S	0.0052	+	0.2565
Low_S	0.0069	+	0.1768
High_G	0.0063	+	0.1866
Low_G	0.0042	+	0.3585

	HML	+/-	p-value
ASX300	-0.4554	NA	NA
ENETILITY	0.0174**	+	0.0331
High_ESG	0.0822**	+	0.0495
Low_ESG	-0.1444**	+	0.0318
High_E	0.0493*	+	0.0663
Low_E	-0.1153**	+	0.0365
High_S	0.0666**	+	0.0259
Low_S	-0.0488*	+	0.0551
High_G	0.093**	+	0.0449
Low_G	-0.1695*	+	0.0501

	RMRF	+/-	p-value
ASX300	1.0632	NA	NA
ENETILITY	1.2851	+	0.1064
High_ESG	1.4035*	+	0.0631
Low_ESG	1.1013	+	0.3760
High_E	1.5267*	+	0.0601
Low_E	0.9953	-	0.2501
High_S	1.2520*	+	0.0988
Low_S	1.3456	+	0.1402
High_G	1.3833*	+	0.0825
Low_G	1.1459	+	0.2259

	WML	+/-	p-value
ASX300	-0.0237	NA	NA
ENETILITY	-0.4273**	-	0.0108
High_ESG	-0.5201***	-	0.0082
Low_ESG	-0.1441	-	0.2632
High_E	-0.5279**	-	0.0136
Low_E	-0.1376	-	0.2811
High_S	-0.5587***	-	0.0013
Low_S	-0.1270	-	0.3252
High_G	-0.4788***	-	0.0087
Low_G	-0.3081*	-	0.0519

	SMB	+/-	p-value
ASX300	-0.0286	NA	NA
ENETILITY	0.3172**	+	0.0489
High_ESG	0.3319*	+	0.0694
Low_ESG	0.1457	+	0.2035
High_E	0.3947*	+	0.0513
Low_E	0.1876	+	0.1380
High_S	0.3014*	+	0.0741
Low_S	0.2440	+	0.1931
High_G	0.2583	+	0.1170
Low_G	0.4096**	+	0.0109

	CVD	+/-	p-value
ASX300	0.0008	NA	NA
ENETILITY	0.0052	+	0.3669
High_ESG	0.0027	+	0.4560
Low_ESG	0.0061	+	0.2744
High_E	0.0043	+	0.4176
Low_E	0.0021	+	0.4524
High_S	0.0041	+	0.4203
Low_S	0.0058	+	0.3128
High_G	0.0010	+	0.4958
Low_G	0.0111	+	0.1601

Notes: This table presents the direction and significance of the S&P/ASX 300 index (*ASX300*) coefficients versus the coefficients of the conventional energy and utility portfolio (*ENETILITY*) and overall and dimension ESG portfolios from 2014 to 2022. Plus symbol (+) equals 'Greater than'. Minus symbol (-) equals 'Less than'. Coefficients are compared using a one-tailed t-test. *CVD* is a dummy variable designed to control for the COVID-19 pandemic. Significance: * 10% level; ** 5% level; *** 1% level.

Source: Authors' own work

Table 6. Four-factor regression coefficient comparisons – Conventional portfolio vs. ESG portfolios

	Alpha	+/-	p-value
ENETILITY	0.0061	NA	NA
High_ESG	0.0056	-	0.4660
Low_ESG	0.0077	+	0.3654
High_E	0.0053	-	0.4401
Low_E	0.0083	+	0.3346
High_S	0.0052	-	0.4340
Low_S	0.0069	+	0.4447
High_G	0.0063	+	0.4877
Low_G	0.0042	-	0.3663

	HML	+/-	p-value
ENETILITY	0.0174	NA	NA
High_ESG	0.0822	+	0.4352
Low_ESG	-0.1444	-	0.2841
High_E	0.0493	+	0.4686
Low_E	-0.1153	-	0.3275
High_S	0.0666	+	0.4443
Low_S	-0.0488	-	0.4233
High_G	0.0930	+	0.4241
Low_G	-0.1695	-	0.2578

	RMRF	+/-	p-value
ENETILITY	1.2851	NA	NA
High_ESG	1.4035	+	0.3277
Low_ESG	1.1013	-	0.1654
High_E	1.5267	+	0.2328
Low_E	0.9953*	-	0.0510
High_S	1.2520	-	0.4362
Low_S	1.3456	+	0.4198
High_G	1.3833	+	0.3591
Low_G	1.1459	-	0.2225

	WML	+/-	p-value
ENETILITY	-0.4273	NA	NA
High_ESG	-0.5201	-	0.3541
Low_ESG	-0.1441	+	0.1146
High_E	-0.5279	-	0.3527
Low_E	-0.1376	+	0.1143
High_S	-0.5587	-	0.2789
Low_S	-0.1270	+	0.1305
High_G	-0.4788	-	0.4134
Low_G	-0.3081	+	0.2962

	SMB	+/-	p-value
ENETILITY	0.3172	NA	NA
High_ESG	0.3319	+	0.4777
Low_ESG	0.1457	-	0.2307
High_E	0.3947	+	0.3898
Low_E	0.1876	-	0.2796
High_S	0.3014	-	0.4746
Low_S	0.2440	-	0.4122
High_G	0.2583	-	0.4105
Low_G	0.4096	+	0.3333

	CVD	+/-	p-value
ENETILITY	0.0052	NA	NA
High_ESG	0.0027	-	0.4504
Low_ESG	0.0061	+	0.4736
High_E	0.0043	-	0.4828
Low_E	0.0021	-	0.4201
High_S	0.0041	-	0.4789
Low_S	0.0058	+	0.4846
High_G	0.0010	-	0.4107
Low_G	0.0111	+	0.3483

Notes: This table presents the direction and significance of the conventional energy and utility portfolio (*ENETILITY*) coefficients versus the coefficients of the overall and dimension ESG portfolios from 2014 to 2022. Plus symbol (+) equals 'Greater than'. Minus symbol (-) equals 'Less than'. Coefficients are compared using a one-tailed t-test. *CVD* is a dummy variable designed to control for the COVID-19 pandemic. Significance: * 10% level; ** 5% level; *** 1% level.

Source: Authors' own work

Table 7. Four-factor regression coefficient comparisons – ESG portfolios vs. each other

Alpha

	High_ESG	*Low_ESG*	*High_E*	*Low_E*	*High_S*	*Low_S*	*High_G*	*Low_G*
High_ESG	NA							
Low_ESG	0.3547 (+)	NA						
High_E	0.4802 (-)	0.3217 (-)	NA					
Low_E	0.3280 (+)	0.4568 (+)	0.2967 (+)	NA				
High_S	0.4745 (-)	0.3173 (-)	0.4937 (-)	0.2928 (-)	NA			
Low_S	0.4222 (+)	0.4409 (-)	0.3979 (+)	0.4077 (-)	0.3930 (+)	NA		
High_G	0.4580 (+)	0.3901 (-)	0.4340 (+)	0.3590 (-)	0.4284 (-)	0.4592 (-)	NA	
Low_G	0.4108 (-)	0.2658 (-)	0.4243 (-)	0.2469 (-)	0.4306 (-)	0.3372 (-)	0.3658 (-)	NA

RMRF

	High_ESG	*Low_ESG*	*High_E*	*Low_E*	*High_S*	*Low_S*	*High_G*	*Low_G*
High_ESG	NA							
Low_ESG	0.0957* (-)	NA						
High_E	0.3648 (+)	0.0814* (+)	NA					
Low_E	0.0329** (-)	0.1867 (-)	0.0372** (-)	NA				
High_S	0.2684 (-)	0.1726 (+)	0.1919 (-)	0.0387** (+)	NA			
Low_S	0.4297 (-)	0.1820 (+)	0.3179 (-)	0.0898* (+)	0.3697 (+)	NA		
High_G	0.4734 (-)	0.1190 (+)	0.3458 (-)	0.0457** (+)	0.3016 (+)	0.4549 (+)	NA	
Low_G	0.1269 (-)	0.3627 (+)	0.1026 (-)	0.0821* (+)	0.2419 (-)	0.2250 (-)	0.1548 (-)	NA

SMB

	High_ESG	*Low_ESG*	*High_E*	*Low_E*	*High_S*	*Low_S*	*High_G*	*Low_G*
High_ESG	NA							
Low_ESG	0.2407 (-)	NA						
High_E	0.4182 (+)	0.1859 (+)	NA					
Low_E	0.2856 (-)	0.4259 (+)	0.2213 (-)	NA				
High_S	0.4563 (-)	0.2670 (+)	0.3746 (-)	0.3179 (+)	NA			
Low_S	0.4016 (-)	0.3833 (+)	0.3393 (-)	0.4308 (+)	0.4334 (-)	NA		
High_G	0.3995 (-)	0.3339 (+)	0.3258 (-)	0.3898 (+)	0.4380 (-)	0.4838 (+)	NA	
Low_G	0.3772 (+)	0.1118 (+)	0.4775 (+)	0.1395 (+)	0.3215 (+)	0.3016 (+)	0.2694 (+)	NA

HML								
	High_ESG	*Low_ESG*	*High_E*	*Low_E*	*High_S*	*Low_S*	*High_G*	*Low_G*
High_ESG	NA							
Low_ESG	0.2566 (-)	NA						
High_E	0.4709 (-)	0.2931 (+)	NA					
Low_E	0.2905 (-)	0.4483 (+)	0.3268 (-)	NA				
High_S	0.4846 (-)	0.2359 (+)	0.4832 (+)	0.2763 (+)	NA			
Low_S	0.3703 (-)	0.3669 (+)	0.4041 (-)	0.4107 (+)	0.3708 (-)	NA		
High_G	0.4903 (+)	0.2452 (+)	0.4613 (+)	0.2789 (+)	0.4739 (+)	0.3594 (+)	NA	
Low_G	0.2360 (-)	0.4529 (-)	0.2711 (-)	0.4066 (-)	0.2134 (-)	0.3360 (-)	0.2250 (-)	NA

WML								
	High_ESG	*Low_ESG*	*High_E*	*Low_E*	*High_S*	*Low_S*	*High_G*	*Low_G*
High_ESG	NA							
Low_ESG	0.0737* (+)	NA						
High_E	0.4892 (-)	0.0829* (-)	NA					
Low_E	0.0738* (+)	0.4896 (+)	0.0827* (+)	NA				
High_S	0.4384 (-)	0.0402** (-)	0.4541 (-)	0.0410** (-)	NA			
Low_S	0.0865* (+)	0.4754 (+)	0.0938* (+)	0.4851 (+)	0.0539* (+)	NA		
High_G	0.4366 (+)	0.0880* (-)	0.4295 (+)	0.0880* (-)	0.3676 (+)	0.1025 (-)	NA	
Low_G	0.1961 (+)	0.2426 (-)	0.2043 (+)	0.2387 (-)	0.1317 (+)	0.2485 (-)	0.2338 (+)	NA

CVD								
	High_ESG	*Low_ESG*	*High_E*	*Low_E*	*High_S*	*Low_S*	*High_G*	*Low_G*
High_ESG	NA							
Low_ESG	0.4235 (+)	NA						
High_E	0.4715 (+)	0.4597 (-)	NA					
Low_E	0.4876 (-)	0.3705 (-)	0.4529 (-)	NA				
High_S	0.4743 (+)	0.4549 (-)	0.4968 (-)	0.4560 (+)	NA			
Low_S	0.4338 (+)	0.4879 (-)	0.4688 (+)	0.3901 (+)	0.4644 (+)	NA		
High_G	0.4686 (-)	0.3750 (-)	0.4385 (-)	0.4742 (-)	0.4411 (-)	0.3884 (-)	NA	
Low_G	0.3260 (+)	0.3385 (+)	0.3581 (+)	0.2497 (+)	0.3524 (+)	0.3402 (+)	0.2763 (+)	NA

Notes: This table presents the direction and significance of the overall and dimension ESG portfolio coefficients versus each other from 2014 to 2022. Due to a large number of statistical comparisons, only p-values are stated. For reference, coefficients are previously provided in **Table 4**. Plus symbol (+) equals 'Greater than'. Minus symbol (-) equals 'Less than'. Coefficients are compared using a one-tailed t-test. The direction of a coefficient is determined by comparing the respective ESG portfolio specified in the first column with the respective ESG portfolio in the first row (e.g., the alpha associated with *Low_ESG* is greater than *High_ESG*). *CVD* is a dummy variable designed to control for the COVID-19 pandemic. Significance: * 10% level; ** 5% level; *** 1% level.

Source: Authors' own work

Appendix 1. Variable descriptions

$$R_{it} - RF_{it} = \alpha_{iT} + \alpha_{iT}CVD + \beta_{iT}RMRF_t + \beta_{iT}SMB_t + \beta_{iT}HML_t + \beta_{iT}WML_t + \varepsilon_{it} \quad (1)$$

where R_{it} is the portfolio total return t. RF_{it} is the 30-day US T-Bill rate. $R_{it} - RF_{it}$ is the excess portfolio total return. The four risk factors ($RMRF$, SMB, HML, and WML) are total returns on Asia-Pacific factor-mimicking, value-weighted portfolios. $RMRF_t$ is the excess total return of the value-weighted Asia-Pacific market portfolio ($RM_{it} - RF_{it}$), SMB_t is size, HML_t is book-to-market, and WML_t is lagged return momentum. CVD is a dummy variable to control for any shocks associated with the COVID-19 pandemic. For instance, January 2014 to December 2019 is deemed to be the pre-COVID period (CVD dummy = 0), and January 2020 to December 2022 is the COVID period (CVD dummy = 1). α_{iT} and β_{iT} are the portfolio alpha and betas (see Carhart, 1997; Fama and French, 1993). ε_{it} is a random error term. To correct model standard errors relating to heteroscedasticity and autocorrelation, t-stats are approximated using the Newey-West method (see Westermann *et al*., 2022).