Corporate ESG Performance and Financial Market Performance

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1 Introduction and Motivation

ESG performance has become an important factor in corporate strategy and financial markets. Meta-analyses show that a majority of studies find a positive relationship between ESG scores. However, there is also a non-negligible share of research reports that report neutral or even negative effects. (Friede et al., 2015; Whelan et al., 2021) Our project focuses on Swiss companies to examine whether ESG scores are positively linked to financial performance.

Our research questions are therefore:

1. What is the relationship between ESG scores and financial performance for Swiss listed companies?
2. What is the effect of the industry type on this relationship, focusing on the top 5 industries in Switzerland?
3. If there is a clear dependency of ESG on financial performance, how do the individual effects of Environmental (E), Social (S), and Governance (G) factors compare in explaining this relationship?
4. How does the relationship between financial performance and ESG scores behave of Swiss companies compared to peers worldwide?

2 Methods

2.1 Data Acquisition

We collect data from two main company groups:

- Swiss companies listed in the Swiss Performance Index (SPI), which includes 201 companies across various sectors.
- U.S. companies from the S&P 500 Index as a global benchmark, which includes 503 leading listed companies.

For both datasets, financial and ESG data were retrieved via the Yahoo Finance API by company ticker. Since the API does not provide official documentation, we found two reliable public technical references (Ranaroussi's yfinance Documentation and the AlgoTrading101 API Guide that we can consult to ensure data accuracy and consistency. We developed a Python script to extract data via the Yahoo Finance API. By modifying the input parameter (`swiss_companies.txt`

and `S&P_companies.txt`), we generated separate datasets for Swiss and S&P companies. The complete implementation can be found in the Data folder as data_acquisition.py.

Company tickers were first collected from Wikipedia (SPI, S&P 500), and for the SPI we validated the list against a real-time source from Investing.com (as of 2025-10-17). Mismatches were resolved via Excel's VLOOKUP and manual checks. Finalized tickers were stored in company_list.xlsx.

Variables collected cover company information, financial indicators, and ESG scores:

1. Company Information: name, ticker, country, sector, industry, currency.
2. Financial and Market data, including **Stock Price**, **Profitability Metrics** (Revenue, Net Income, Operating Margin, Gross Margin, ROE, ROA, Profit Margin, EBITDA Margin, and EPS), **Valuation Metrics** (Market Capitalization, P/E Ratio, P/B Ratio, and Annual Return), **Risk and Stability Metrics** (Beta, Debt-to-Equity Ratio, Current Ratio, and (Operating Cash Flow), **Revenue Growth**.
3. ESG Scores: Total ESG Score, Environmental / Social / Governance sub-scores, Highest Controversy, and ESG Performance Category.

All financial data correspond to a **2024-12-31** snapshot, ensuring alignment with the same reporting period as the ESG scores.

2.2 Data Cleansing

First, by checking the missing ESG data, we found that only 71/201 SPI companies had full ESG data and 142/201 had Total ESG Scores. To maintain sample size, we only removed firms without Total ESG Score. Then, we examined the country distribution to ensure dataset consistency. Since 5/201 SPI firms were non-Swiss, we removed them to maintain comparability. In the S&P 500 dataset, 96% were US-based, so non-US firms were also removed. We also checked and guaranteed that no overlap existed between SPI and S&P 500 companies. Besides, 1 duplicate (SCHN.SW vs. SCHP.SW) was resolved by keeping the registered share ticker, and a missing company name (Galderma) was manually filled in this part.

A few financial variables (e.g., ROE%, Beta, Revenue) contained sporadic missing values. To ensure consistency, we dropped variables with extensive missing data or redundancy, please check the data prep code for more details.

After cleaning, we retained 134 Swiss companies (SPI) and 280 U.S. companies (S&P 500) for subsequent analysis.

For data type and range checks, numeric, categorical, and date columns were standardized. Value ranges were validated (e.g., ESG scores 0–100, controversy level 0–5). Given some companies can have extreme margins and returns, out-of-range values were treated as warnings rather than removed.

Outliers were identified using the IQR method. Given the limited ESG sample size, we retained extreme values at this stage, as they may represent valid observations. Outlier treatment will be revisited during the analysis phase based on metric distributions.

Finally, we enriched the dataset with additional attributes and prepares it for analysis. A Company_Type column was added to distinguish between SPI and S&P 500 firms in the later merged dataset. Companies were classified into five ESG Risk Categories (Negligible, Low, Medium, High, Severe) based on ESG Risk Ratings Methodology, where lower scores indicate lower risk.

After the SPI and S&P 500 datasets were merged, redundant columns with identical values were removed, and the cleaned combined dataset was saved as "Data/cleaned_combined_data.csv."

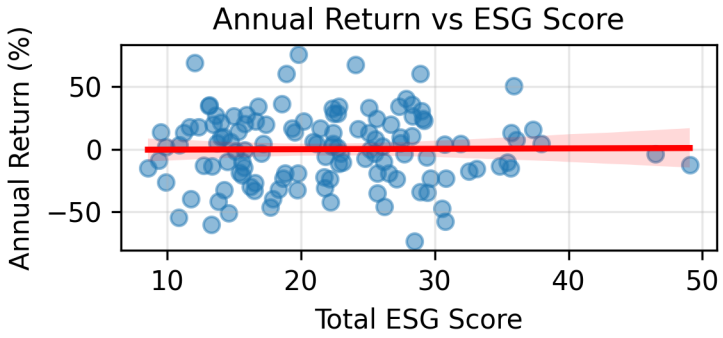
3 Analysis & discussion of results

3.1 RQ1: Relationship between financial performance and ESG

Firstly, we look at the dataset for the analysis more closely:

- The number of companies per industry reaches a maximum of 14, which is expected given the dataset of only 136 observations.
- ESG risk scores vary widely, from negligible to severe levels.
- The range of annual returns is also quite broad, with extreme outliers showing losses of up to -100% and gains exceeding +250%. We reviewed the outliers and excluded them for further analysis.

We create a scatterplot to analyse the relationship between ESG-risk and annual return visually:



The linear fit is horizontal which means that there is no effect of ESG risk on annual performance. This result implies that firms with stronger ESG do not systematically outperform or underperform peers in terms of annual stock returns. The broad confidence band further suggests that ESG factors alone have limited explanatory power for short-term returns.

Now we run a regression analysis to statistically disentangle the effects and control for several influencing factors, such as:

- **Market capitalization** (log_mc): Larger firms are typically more diversified and stable, which can affect both their ESG performance and returns.
- **Revenue growth** (Revenue_Growth_Pct): Fast-growing firms may achieve higher returns regardless of ESG, so including growth helps isolate the ESG effect.
- **Industry**: ESG relevance differs by sector, so industry dummies control for these differences.

The adjusted R-squared shows that the model explains about 49% of the variance in annual returns.

Contrary to expectations from the visual analysis, the Total ESG Score has a statistically significant effect (coef = 0.91, p = 0.047), but in the opposite direction: higher ESG risk is linked to higher annual returns. The effect is small, with about a 0.9 percentage point increase in return per ESG-risk point.

Log market capitalization is highly significant (coef = 7.22, $p < 0.001$), indicating that larger firms tend to achieve higher returns, while revenue growth has no significant impact (coef = -0.03, p = 0.78).

3.2 RQ2: Effect of industry type on financial performance and ESG relationship for top 5 Swiss industries

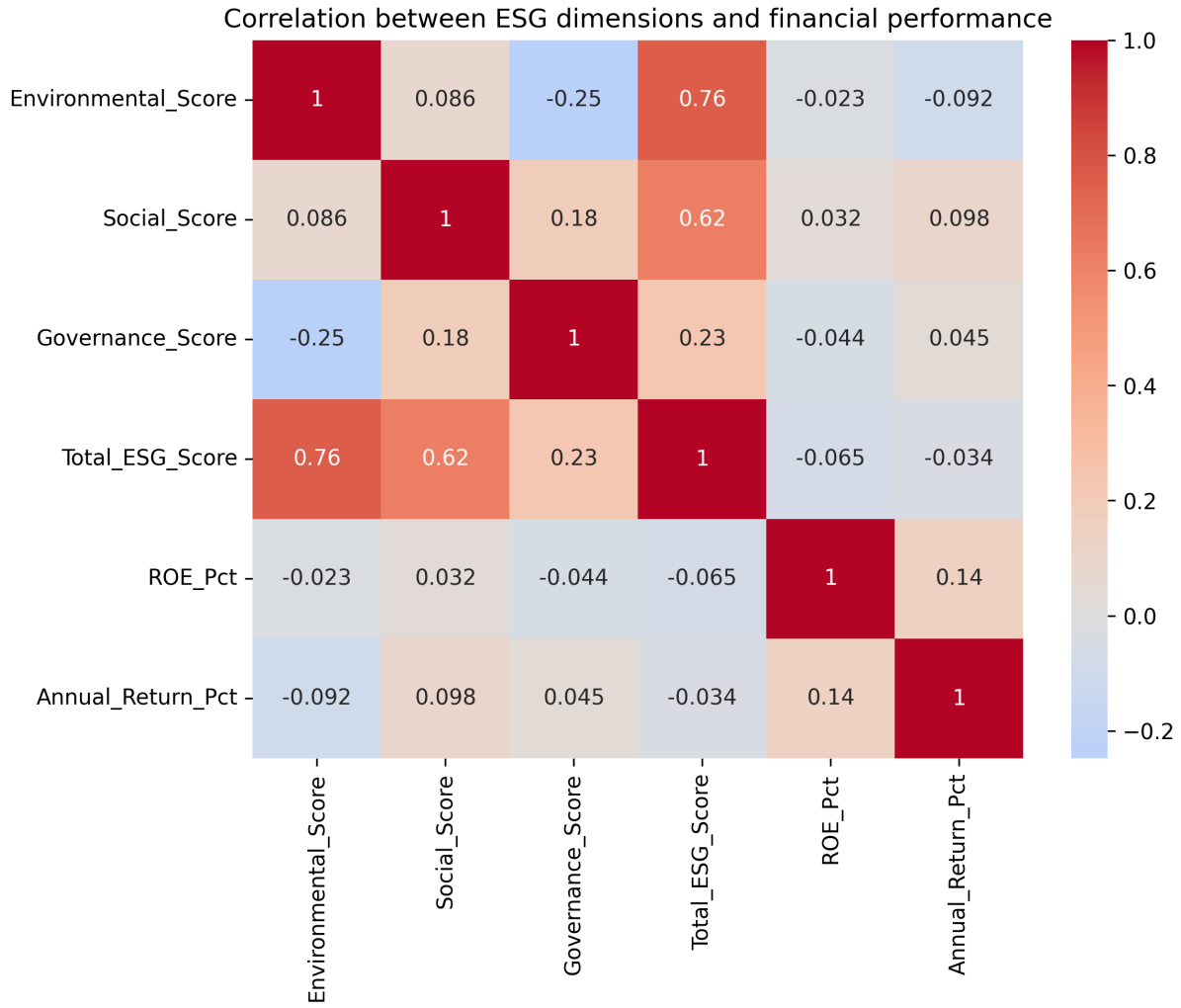
Based on the regression results from RQ1, none of the industry coefficients are statistically significant. This means that, after controlling for firm size, revenue growth, and ESG risk, there are no clear industry-specific effects on annual returns. All industry coefficients show large standard errors and high p-values, suggesting that differences across industries are not robust or meaningful in this model.

3.3 RQ3: ESG Subdimensions and Financial Performance

In this section, we explore whether the Environmental (E), Social (S), and Governance (G) components of ESG scores show a clear dependency on companies' financial performance.
The goal is to determine **which ESG dimension contributes most strongly** to explaining financial outcomes.

We focus on the following financial performance indicators: - Return on Equity (ROE) - Price-to-Earnings Ratio (P/E) - Annual Return (calculated from stock price changes)

For each metric, we first inspect pairwise correlations and then run a multiple regression model:
[Financial Performance = _0 + _1 E + _2 S + _3 G +]



The heatmap above shows how the three ESG dimensions (Environmental, Social, and Governance) relate to financial performance indicators such as Return on Equity (ROE) and Annual Return.

The results indicate no strong correlation between ESG factors and financial performance. While Environmental and Social scores are moderately correlated with the overall ESG score (E=0.76, S=0.62), their correlations with ROE and Annual Return are close to zero or slightly negative.

This suggests that, within the global dataset, higher ESG scores do not systematically translate into better short-term financial results. The weak correlations may indicate that ESG effects on financial performance are indirect, long-term, or vary strongly across industries.

Next, we quantify the relative contribution of E, S, and G factors using a multiple regression model.

OLS Regression Results

Dep. Variable:	ROE_Pct	R-squared:	0.005
Model:	OLS	Adj. R-squared:	-0.004
Method:	Least Squares	F-statistic:	0.5620
Date:	Sun, 02 Nov 2025	Prob (F-statistic):	0.640
Time:	19:10:24	Log-Likelihood:	-1742.6
No. Observations:	328	AIC:	3493.

```
Df Residuals:                      324   BIC:                             3508.
Df Model:                            3
Covariance Type:            nonrobust
==============================================================================================
                             coef    std err          t      P>|t|      [0.025      0.975]
----------------------------------------------------------------------------------------------
const                     26.2046      2.728      9.606      0.000      20.838      31.571
Environmental_Score       -2.0817      2.841     -0.733      0.464      -7.671       3.508
Social_Score               2.2470      2.786      0.807      0.420      -3.233       7.727
Governance_Score          -3.0620      2.878     -1.064      0.288      -8.723       2.599
==============================================================================
Omnibus:                      392.474   Durbin-Watson:                   1.781
Prob(Omnibus):                  0.000   Jarque-Bera (JB):            27582.188
Skew:                           5.357   Prob(JB):                         0.00
Kurtosis:                      46.628   Cond. No.                         1.39
==============================================================================

Notes:
[1] Standard Errors assume that the covariance matrix of the errors is correctly specified.
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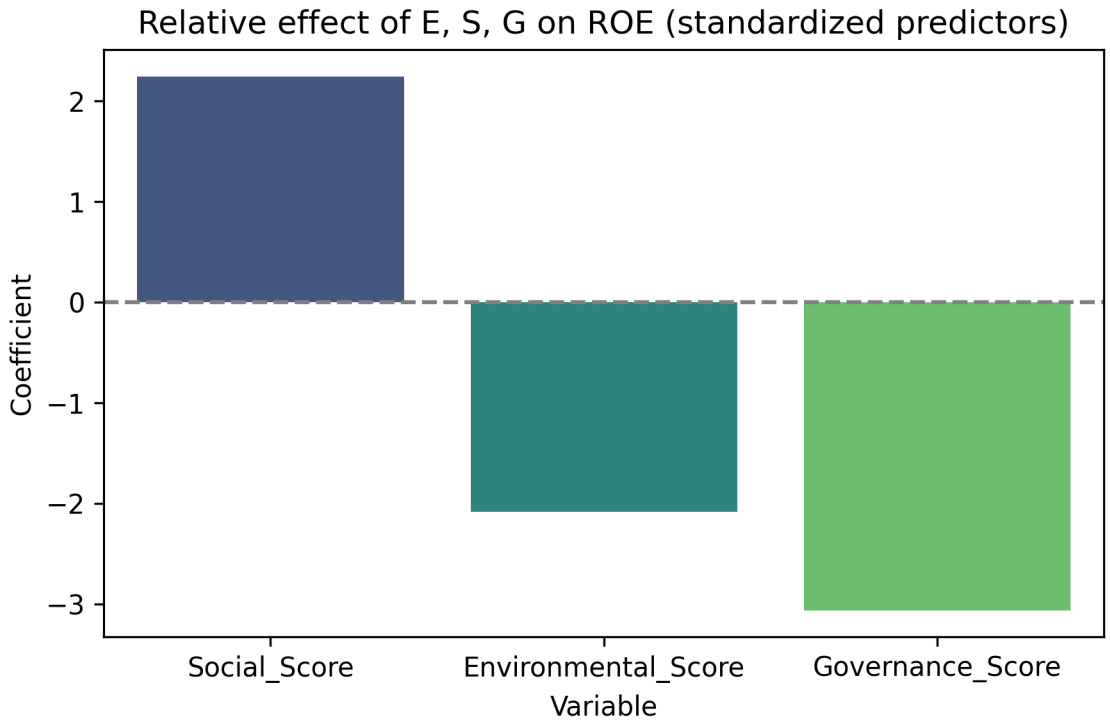
The regression model quantifies the individual contributions of E, S, and G to explaining financial performance (ROE).

The coefficients show that:

- Social factors have a small positive effect on ROE,
- Environmental and Governance factors are slightly negative,
- However, none of these effects are statistically significant (all p-values > 0.05).

The model's R^2 value of 0.005 means that ESG variables explain less than 1% of the variation in ROE. –> Overall, this indicates no clear or significant relationship between ESG subdimensions and profitability at the global level.

We can visualize the relative effect sizes to highlight which ESG pillar matters most.



The visualization illustrates the relative strength and direction of each ESG dimension's effect on ROE.

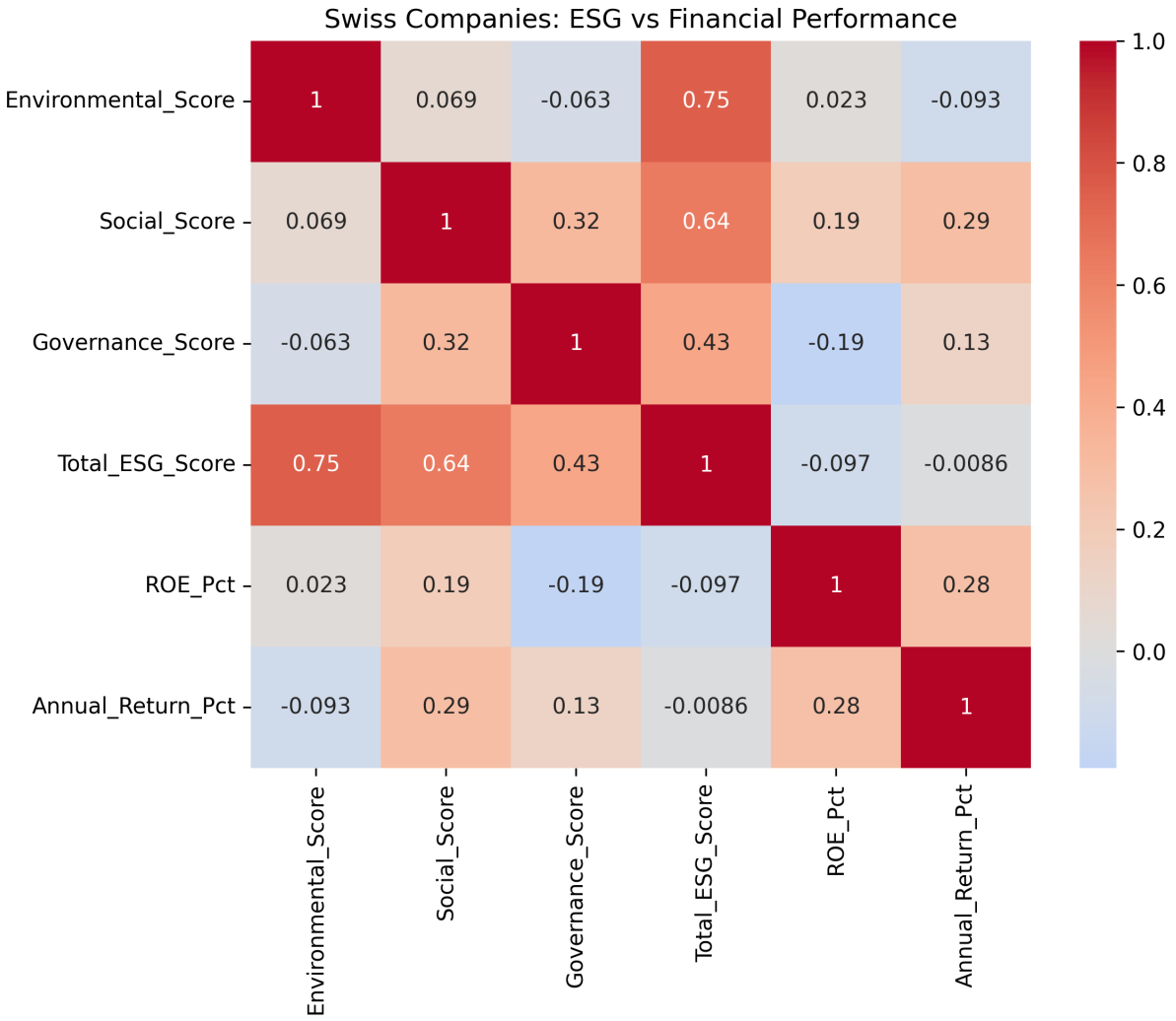
- Social_Score shows the largest positive coefficient, suggesting that firms with stronger social practices may experience slightly higher profitability.
- Governance_Score shows the largest negative effect, indicating that stricter governance practices might correspond to lower short-term returns.
- Environmental_Score has only a minor negative influence.

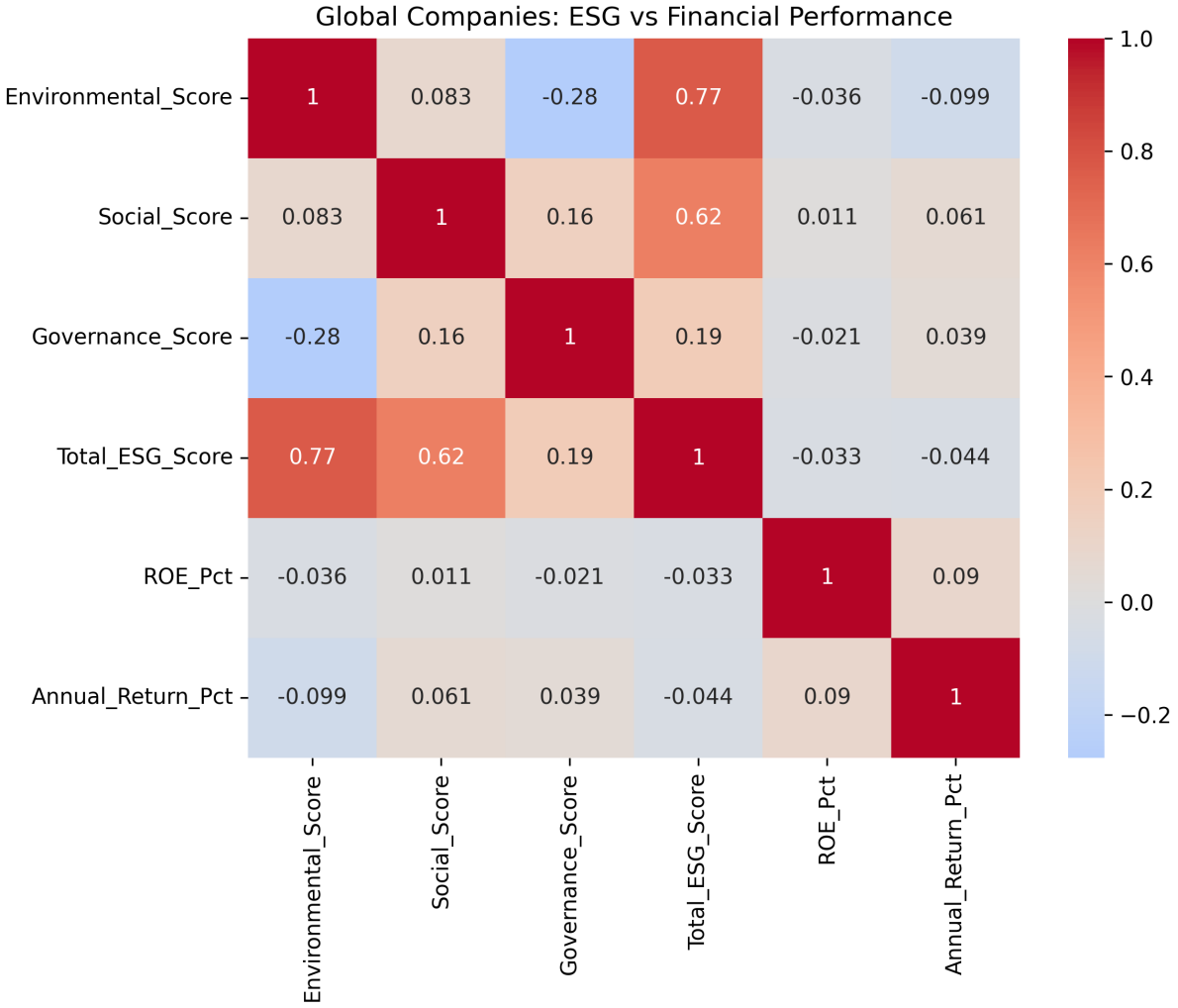
These differences are not statistically significant, but they highlight potential patterns worth further investigation — particularly the consistently positive role of social engagement.

4 RQ4: Comparison: Swiss vs. Global Companies

To assess whether the ESG–financial performance relationship differs between **Swiss firms** and **global peers**,
we divide the dataset into two groups and compare their correlation and regression results.

This allows us to test whether ESG has a **stronger or weaker link** to financial performance within Switzerland.


Swiss Companies: ESG vs Financial Performance
Environmental_Score
Social_Score
Governance_Score
Total_ESG_Score
ROE_Pct
Annual_Return_Pct
1
0.069
-0.063
0.75
0.023
-0.093
0.069
1
0.32
0.64
0.19
0.29
-0.063
0.32
1
0.43
-0.19
0.13
0.75
0.64
0.43
1
-0.097
-0.0086
0.023
0.19
-0.19
-0.097
1
0.28
-0.093
0.29
0.13
-0.0086
0.28
1
1.0
0.8
0.6
0.4
0.2
0.0



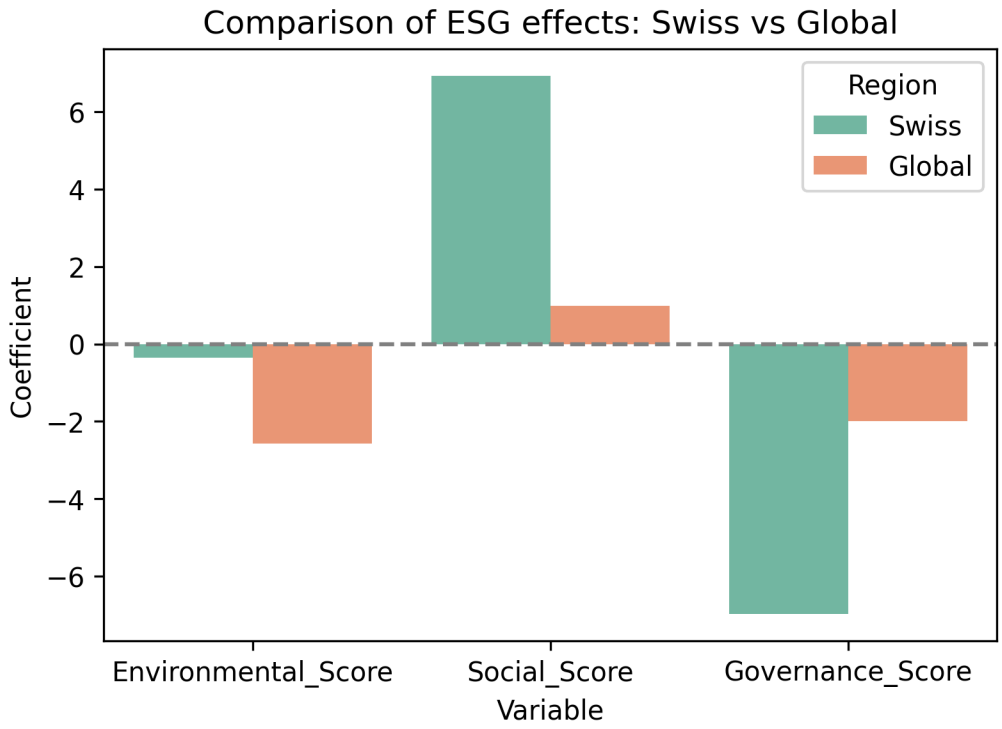
By visually comparing the two correlation heatmaps, we can assess differences in the ESG–performance relationships.
The correlation matrix for Swiss companies shows similar patterns to the global sample. The Total ESG Score remains strongly correlated with its subdimensions (E=0.75, S=0.64, G=0.43), but correlations with financial indicators (ROE and Annual Return) remain very weak.

Compared to global peers, Swiss firms exhibit a slightly stronger positive link between the Social dimension and financial returns (0.29), which may reflect the high relevance of social responsibility and stakeholder orientation in the Swiss market.

The global results confirm the earlier finding: no meaningful correlation between ESG dimensions and financial performance.

The strongest relationships occur between the ESG subdimensions themselves (e.g., Environmental and Total ESG = 0.77), while ROE and Annual Return correlations remain near zero.

This suggests that for global firms, ESG scores are more internally consistent (E–S–G linked together) than predictive of financial outcomes.



The comparison chart highlights how the relative effects of ESG dimensions differ between Swiss and global companies.

- Swiss firms show a strong positive Social effect and a negative Governance effect,
- Global firms display weaker coefficients overall, with the same general direction.

This suggests that while ESG scores are not strong predictors of profitability, the social component seems more relevant for Swiss companies, possibly due to cultural or regulatory differences emphasizing corporate social responsibility and stakeholder relations.

4.1 Interpretation and Discussion

RQ1: "Is there a clear correlation between ESG and financial performance, and how do E, S, G factors compare in explaining it?" Correlation Heatmap (Global sample)

The Total ESG Score shows moderate positive correlations with its subdimensions (E=0.76, S=0.62, G=0.23).

The correlations with financial performance metrics (ROE_Pct, Annual_Return_Pct) are very weak and slightly negative:

ROE vs. Total ESG: -0.065

Annual Return vs. Total ESG: -0.034 → This means no strong linear relationship between ESG scores and profitability or returns globally.

OLS Regression (Dependent: ROE_Pct) Variable Coefficient p-value Interpretation Environmental_Score -2.08 0.464 Negative but not significant Social_Score +2.25 0.420 Positive but not significant Governance_Score -3.06 0.288 Negative but not significant

$R^2 = 0.005$, meaning ESG dimensions together explain less than 1% of ROE variance.

None of the E, S, or G effects are statistically significant → financial performance cannot be predicted by ESG subdimensions in this dataset.

Coefficient Visualization

The bar plot confirms:

Social factors have the most positive relative impact on ROE,

Governance shows the most negative,

Environmental has almost no effect. However, none are significant — so these are tendencies, not causal effects.

Interpretation: While the overall ESG score correlates moderately with itself across subdimensions, no clear link exists between ESG and financial performance in the global sample. If any effect exists, social responsibility seems to have a more positive association with profitability than environmental or governance factors.

RQ2: "How does the correlation between financial performance and ESG scores compare between Swiss companies and global competitors?" Swiss Companies Correlation

Similar to the global sample, Total ESG is strongly correlated with its components (E=0.75, S=0.64, G=0.43).

The relationship with financial metrics remains very weak:

ROE vs. Total ESG: -0.097

Annual Return vs. Total ESG: -0.009

Slightly higher correlations between Social Score and returns (0.29) compared to global peers.

Comparative Bar Chart (Swiss vs Global)

Swiss firms: Strong positive Social impact (+7), strong negative Governance effect (-7).

Global firms: Weaker overall effects — smaller Social impact (+1) and moderate negative Governance (-2).

Environmental effects are minor in both cases.

Interpretation: The direction of effects is consistent between Swiss and global firms, but the magnitude differs:

Swiss companies exhibit stronger positive responsiveness to Social factors and stronger negative sensitivity to Governance ones.

Global firms show weaker effects across all ESG dimensions.

This may reflect differences in:

Corporate governance structures and transparency expectations,

Market maturity,

Cultural emphasis on social responsibility in Switzerland.

4. ESG Subdimensions and Financial Performance

This section examines how environmental (E), social (S), and governance (G) dimensions relate to financial performance, measured through Return on Equity (ROE) and Annual Return. Both correlation and OLS regression analyses were conducted for global and Swiss company samples.

Global Results

The correlation matrix indicates only weak relationships between ESG scores and financial performance. While the Total ESG Score correlates strongly with its subcomponents (E=0.76, S=0.62, G=0.23), correlations with ROE and Annual Return are negligible. The regression analysis confirms that none of the ESG dimensions significantly explain ROE ($R^2 = 0.005$). Among the three, the Social dimension shows the most positive (though insignificant) effect, suggesting that socially responsible practices might slightly enhance profitability, whereas Governance and Environmental factors show small negative tendencies.

Swiss vs. Global Comparison

The correlation patterns for Swiss companies mirror the global results but with slightly stronger interactions. Social and Governance factors have more pronounced coefficients in the Swiss sample:

Social factors appear more positively linked to ROE,

Governance shows a stronger negative relationship,

Environmental remains neutral.

Overall, no significant correlation between ESG and financial performance is found, but the direction and magnitude of ESG subdimension effects differ between Swiss and global companies.

Conclusion: ESG performance does not show a statistically significant effect on financial metrics in either dataset. However, social engagement seems to be the most positively associated factor, particularly in the Swiss context, while governance aspects may have a dampening effect on returns.

5 Conclusion

TBD

References

Friede, G., Busch, T., & Bassen, A. (2015). ESG and financial performance: Aggregated evidence from more than 2000 empirical studies. *Journal of Sustainable Finance & Investment*, *5*(4), 210–233. https://doi.org/10.1080/20430795.2015.1118917

Whelan, T., Atz, U., & Clark, C. (2021). *ESG and financial performance. Uncovering the relationship by aggregating evidence from 1,000 plus studies published between 2015–2020.* https://www.stern.nyu.edu/sites/default/files/assets/documents/NYU-RAM_ESG-Paper_2021%20Rev_0.pdf