

A U-SHAPED RELATIONSHIP HYPOTHESIS ON CORPORATE FINANCIAL PERFORMANCE AND ESG BEHAVIOR

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Overview

There has been a long-standing discussion on corporate social responsibility (CSR) on energy and the environment and its impact on corporate business performance. These days, a wider concept, namely, environmental, social, and governance (ESG) behavior, is getting popular, but the point remains the same: people's interest is centered around whether it helps increase corporate performance or not. Many academic studies should be on this line, but the results are mix. In fact, although the benefits of CSR/ESG behavior are emphasized, ambiguity remains in the impact of CSR/ESG on corporate performance. Moreover, almost all the past academic studies have tried to make the issue too simple: They only assume that there must be either positive or negative effect and that the study result must take one side and deny the other. They have never considered a possibility of a mixture of two effects. In contrast, the present study should be considered a first attempt to provide a convincing explanation for such a mixture of two effects. This study proposes ESG U-shaped relationship hypothesis, claiming that firm's CSR activity and financial performance are negatively correlated when the level of CSR is low whereas they are positively correlated when the CSR level is high. We investigated this hypothesis by analyzing indicators from the Toyo-Keizai CSR Ranking survey dataset, and found that our aforementioned hypothesis is plausible.

Methods

Existence of ambiguity on the effect of CSR/ESG implies both positive and negative effects. Past studies have tried to take one side and deny the other. However, a mixture of two effects can be considered quite natural: Some firms take care of the local environment, and thus, they are appreciated by the local community, which then helps contribute to their corporate performance. In contrast, some startup companies would not have enough business resources to work on ESG-related issues. This is consistent with the theory of slack resources, in which traditional and/or incumbent-leading companies in the market have redundant managerial and/or production resources that can be used for their divergent activities rather than strictly focusing on short-term profit-seeking. However, this is not the case for startup firms. Furthermore, for some startup companies, their newly innovated products and new business domain would be free of pollutants emitted by old-style manufacturing, and thus, they would not need to take care of severe environmental impacts. An example would be IT related businesses.

Based on the possible mixture of two effects, we can conduct the following thought experiment. There is one cohort of companies where the relationship between CSR and corporate financial performance is positive: CSR is one of significant determinants of profit for them, so they are willing to engage in additional CSR activities. Meanwhile, some firms in another cohort are different: For them, spending their resources on CSR is a factor that reduces their profit. Thus, they will stay away from CSR engagement.

Let us take a horizontal axis as a firm's CSR effort and a vertical axis as their financial performance in general. The former cohort of firms aforementioned should be plotted on a right-half plane, where CSR and financial performance are positively correlated. Meanwhile, the latter cohort of firms should be plotted on the other half of the plane, where CSR and financial performance are negatively correlated. Furthermore, there may be an intermediate situation. As a result, a smoothly connected curve will look like Figure 1 where we see a U-shaped curve. We thus call the graph the "ESG U-shaped relationship hypothesis."

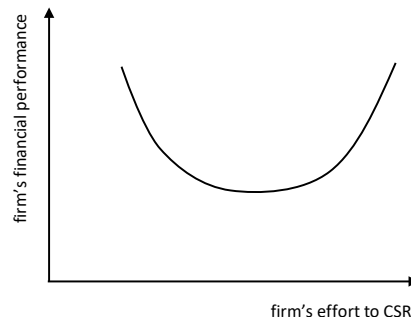


Figure 1: Conceptual diagram of a possible U-shaped relationship

We apply the above conjecture to specific modelling. Let x and y denote the axes of the Figure 1 diagram, that is, x : firm's CSR effort; y : their financial performance.

We propose following four models:

Model 1: Marginal change in y is proportional to a difference of x from a certain reference point, x_0 .

Model 2: Elasticity of y with respect to x is proportional to a difference of x from a certain reference point, x_0 .

Model 3: Marginal change in y is proportional to a difference of \log of x from a certain reference point, x_0 .

Model 4: Elasticity of y with respect to x is proportional to a difference of \log of x from a certain reference point, x_0 .

Results

We investigate the validity of these models by analyzing indicators from a Japan's well-known survey, the Toyo-Keizai CSR Ranking survey dataset that has been published as a series of White Papers every year.

The Toyo-Keizai CSR Industry White Paper provides their survey results in both quantitative and qualitative forms. The number of observations is over 1,500 Japanese companies that have issued securities reports publicly or an alternative form of financial reports as of November of the preceding year.

We used the quantitative part of the survey results outlined as follows: Toyo-Keizai, for example, sent questionnaires to about 3,800 Japanese companies for the 2022 volume, receiving responses from about 1,500 public companies and about 50 unlisted companies. Based on their responses, Toyo-Keizai estimates numerical scores for their definition, assigning digits ranging from 20.0 (the lowest) to 100.0 (the highest). The top aggregate scores are Corporate Social Responsibility (CSR) Scores (maximum 300 points) and Corporate Financial Performance (CFP) Scores (maximum 300 points), on which we worked. The scatter plot is shown as Figure 2.

The above-mentioned models are represented as regression models as follows:

Model 1: $y = \alpha x^2 - \beta x + \gamma + \varepsilon$

Model 2: $\ln y = \alpha x - \beta \ln x + \gamma + \varepsilon$

Model 3: $y = \alpha x \ln x - \beta x + \gamma + \varepsilon$

Model 4: $\ln y = \alpha (\ln x)^2 - \beta \ln x + \gamma + \varepsilon$

The U-shaped curve hypothesis suggests that $\alpha > 0$ and $\beta > 0$ for all these models. Thus, null hypothesis that should be rejected is that either of these coefficients are non-positive.

The regression result for the Model 1 is the Table 1. Similar results are obtained for other three models, which are omitted here due to space limitation. In summary, all these results show that the null hypothesis is rejected: These U-shaped curves would be good fit for the data. In other words, our U-shaped relationship hypothesis appears plausible.

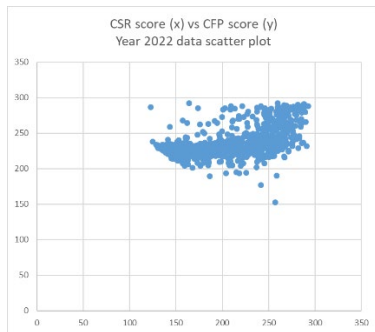


Figure 2: Scatter plot (2022)

Table 1: Linear regression result (Model 1)

Model 1						
Multiple R2	0.334478					
Adjusted R2	0.332807					
Residual standard error	17.75497					
	Coeff.	St. err.	t-value	P-value (95%)	Low 95%	High 95%
intercept	336.172	16.799	20.01142	1.71E-72	303.1965	369.1475
x^2	0.003595	0.000385	9.338423	9.52E-20	0.002839	0.004351
x	-1.25965	0.1634	-7.70895	3.78E-14	-1.58039	-0.9389

Conclusions

We proposed and investigated the hypothesis that a U-shaped curve characterizes the relationship between CSR/ESG and CFP. The definitions of scores or indicators that specify CSR/ESG and CFP can be diverse; thus, this hypothesis potentially represents only a general concept, rather than narrowly focused ones on specific datasets. Naturally, various ways of justification exist. In this study, we utilized a score dataset presented by Toyo-Keizai CSR Ranking survey. On the dataset, we ran regressions to determine whether our hypothesis is plausible. The results turned out to be supportive for the hypothesis. Similar studies could be conducted using different datasets and indicators, but that is left to other researchers.