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Relationship between corporate sustainability performance and corporate financial performance: evidence from U.S. companies

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Abstract

Research background: Sustainable development at the enterprise level is understood as the integration of economic, environmental and social dimensions aimed at meeting the needs of all firm’s stakeholders in the present and in the future. Therefore, it is crucial to evaluate the relationship between economic, environmental and social sustainability performance of a company and its financial performance.

Purpose of the article: Considering the business model for sustainability as well as the debatable results of empirical research on the relationship between corporate sustainability performance (CSP) and corporate financial performance (CFP), the essential aim of the paper is to answer the question whether the improvement of corporate sustainability performance in its all particular dimensions brings about higher total revenues (TR) of a company.

Methods: The main method of empirical research is panel regression models based on Cobb-Douglas production function, which has been extended to include variables of corporate sustainability scores. The selection between pooled OLS model, random-effects model and fixed-effects model has been made with the use of the F test, the Breusch-Pagan test and the Hausman test. Additionally, descriptive statistics and the Pearson correlation coefficients have been analyzed. The empirical studies were conducted in the period 2014–2019 among the 59 largest U.S. companies listed in the Fortune 500 ranking between 2015–2020.

Findings & value added: The research hypothesis assuming the existence of positive relationship between corporate sustainability performance (CSP) at both aggregate and disaggregate levels and corporate financial performance (CFP) expressed by TR cannot be positively verified. It means that the improvement of corporate sustainability performance in environmental, social

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and governance dimensions does not lead to an increase in TR of a company, as some empirical studies suggest.

Introduction

In the classical approach, sustainable development is understood as *development that meets the needs of the present without compromising the ability of future generations to meet their own needs* (WCED, 1987, p. 41). The concept of sustainable development has evolved over the years, steadily shifting its attention from the environmental area to social and economic areas as well as from the global level to national and local or even corporate levels (Giovannoni & Fabietti, 2013, pp. 23–28). Nowadays, it is widely considered that although corporations cause environmental deterioration and social inequality, they play a key role in sustainability implementation due to their powerful capacity to influence societies and create innovations (Gray, 2010, pp. 56–58).

The corporate sustainability can be described as *meeting the needs of firm's direct and indirect stakeholders (...) without compromising its ability to meet the needs of future stakeholders* (Dyllick & Hockerts, 2002, p. 131). In order to meet the needs of various stakeholder groups, corporations must actually satisfy all three dimensions of sustainability (Gond *et al.*, 2012, pp. 219–220) by maintaining and enhancing economic, environmental and social capital simultaneously (Oželienė, 2017, pp. 97–101). It is necessary to emphasize that the pre-condition for economic, environmental and social sustainability of a company is good governance, currently treated as the fourth dimension of corporate sustainability (UN, 2012, p. 65; UNSDSN, 2013, p. viii).

The implementation of corporate sustainability principles and practices by organizational members, who are emotionally involved to attain mission of a company, results in the improvement of performance in economic, environmental, social and governance dimensions, which in turn increases the satisfaction of stakeholders enhancing corporate reputation and brand equity (Kantabutra & Ketprapakorn, 2020, pp. 18–19). This theoretical business model for sustainability suggests the existence of positive relationship between corporate sustainability performance (CSP) and corporate financial performance (CFP), but unfortunately the results of previous empirical studies in this field are ambiguous (Wagner, 2010, pp. 1553–1560; Jha & Rangarajan, 2020, pp. 1–30). What is more, the scientists investigating the CSP–CFP link consider corporate sustainability performance in environmental, social and governance dimensions ignoring the economic sustainability performance. Such an incomplete research approach should,

therefore, be complemented to provide full scope of information about the effects of CSP on CFP to managers who implement different activities to improve performance in particular dimensions of corporate sustainability. Bearing in mind the described corporate sustainability model, as well as the debatable results of empirical research on the relationship between corporate sustainability performance (CSP) and corporate financial performance (CFP), the essential aim of the paper is to answer the question whether the improvement of corporate sustainability performance in its all particular dimensions brings about the higher total revenues of a company.

In order to realize the goal of this article, the empirical research in the years 2015–2019 among the largest U.S. companies with the use of panel regression models was conducted. These panel regression models are based on Cobb-Douglas production function, which includes variables of corporate sustainability scores. The selection between pooled OLS model, random-effects model and fixed-effects model has been made according to the analysis of the F test, the Breusch-Pagan test and the Hausman test. The descriptive statistics and the Pearson correlation coefficients have been also analyzed.

The further part of the paper is structured as follows. The next section presents the literature review. Section 3 contains the description of research methodology. Section 4 reveals the results of empirical studies on the relationship between corporate sustainability performance (CSP) and corporate financial performance (CFP) and discusses them. Section 5 shows concluding remarks. The last section includes annex.

Literature review

Theoretical and empirical studies on the effect of corporate sustainability performance¹ on the corporate financial performance (CFP) are very extensive.

Perrini *et al.* (2011, pp. 59–76) conducted an extensive review of 250 empirical and theoretical work on the relationship between corporate social performance (CSP) and corporate financial performance (CFP) to provide a guide for understanding the mechanisms by which corporate social responsibility (CSR) efforts may improve firm performance, using stakeholder-related performance drivers. Summarizing the considerations, they presented the CSP–CFP multilevel framework, where the integrated CSR in

¹ The researchers in their studies use abbreviation CSP to mark not only corporate sustainability performance but also corporate social performance, while corporate social sustainability is only one of four components of overall corporate sustainability.

particular management areas, like internal organization, customers, supply chain, society, natural environment and corporate governance can affect revenue- and cost-related firm outcomes, by its impact on, for example, employees' satisfaction and customer trust, as well as reputation, innovativeness and reliability of a company, which are treated as drivers of performance.

Tang *et al.* (2012, pp. 1274–1303), basing on environmental, social and governance (ESG) factors and financial data from the 10-year period for each of 130 companies, applied Hausman-Taylor modeling to investigate how the pace, relatedness, consistency and path of corporate social responsibility (CSR) engagement moderate the relationship between CSR and corporate finance performance as measured by the return on assets (ROA). Their empirical studies indicated that the pace of CSR implementation does not influence its relationship with ROA, but ROA is higher when the company engages in internal CSR first moving toward external CSR, considers the relations between different CSR dimensions to achieve synergies and takes CSR activities in systematic way.

Wagner (2010, pp. 1553–1560), in order to analyze the link of corporate sustainability performance with economic performance as expressed by Tobin's q , collected environmental and social measures as well as financial data of the largest U.S. companies from the years 1992–2003 and estimated a random effects panel model. As a result of research, the author found the evidence that the corporate environmental and social performance has a significant positive effect on Tobin's q but the impact of environmental performance is direct — not by the intensity of R&D or advertising — while the impact of social performance is fully moderated by the advertising intensity. What is more, the corporate sustainability performance influences Tobin's q positively and significantly also through the advertising intensity.

Sarvaes and Tomayo (2013, pp. 1045–1061) employed corporate social responsibility (CSR) activities data and financial data of U.S. companies over the period between 1991–2005 to answer the question whether companies with high consumer awareness as expressed by advertising spending can enhance a firm value as measured by Tobin's q through increasing CSR efforts. Comparing models estimated without and with fixed effects, they discovered that the positive direct CSR–firm value relation becomes insignificant, but the effect of advertising intensity on this relation remains positive and significant. Therefore, companies with high consumer awareness benefit from CSR activities but lose more when CSR controversies appear. On the other hand, for companies with the low consumer awareness the relation between CSR and firm value is insignificant or negative and

a growth in the advertising intensity does not have to improve firm value if the company has poor reputation.

Barnett and Salomon (2012, pp. 1304–1320) verified the hypothesis about the curvilinear relationship between corporate social performance (CSP) and corporate financial performance (CFP) as expressed by return on assets (ROA) and net income on an unbalanced panel of 1,214 firms and 4,730 firm-year observations from 1998 to 2006. They estimated several models with ROA and net income as dependent variables and found a U-shaped CSP–CFP link, which means that companies with low CSP have higher CFP than companies with moderate CSP, but companies with high CSP have the highest CFP. At the same time, the authors supported the claim that better stakeholder influence capacity (SIC) of a company, which is an intangible resource consisting of its dynamic relationship with a huge number of stakeholders accumulated through firm involvement in corporate social responsibility (CSR) (Barnett, 2007, p. 803), improves the corporate ability to transform social investment into financial returns.

Ziegler *et al.* (2007, pp. 661–680) applied cross-sectional regressions, which were based on time-series regressions of asset pricing models to examine the effect of sustainability performance of European corporations on their stock performance, as measured by the average monthly stock returns in the years 1996–2001. They considered the sustainability performance as average sustainability performance of the industry and relative sustainability performance of a company within a given industry where both of them were divided into environmental and social performance. After the econometric analysis, the authors stated that the average environmental performance has a significantly positive influence on the average monthly stock returns from the given research period while the impact of social performance is significantly negative. Moreover, the relative sustainability performance of a corporation within a given industry both in terms of environmental as well as social performance is insignificant for stock performance.

Xiao *et al.* (2018, pp. 325–333) gathered data about country-level sustainability performance from 22 countries to investigate how it influences the relationship between corporate sustainability performance (CSP) and corporate financial performance (CFP). The estimation of coefficients in their fixed effects model revealed that the country-level sustainability performance negatively affects the positive CSP–CFP relation, which implies that the capitalization of CSP is much more difficult in countries where the institutionalization degree of sustainable development principles and practices is high because stakeholders treat firm sustainability improvement as common.

Nizam *et al.* (2019, pp. 35–53) carried out the study of 713 institutions from 75 countries based on dataset for both social and environmental performance as well as return on equity (ROE) from 2013 to 2015 to identified channels, through which access to finance and environmental financing sustainability performance can have an impact on business performance of banks. Estimating several regression models, they pointed out that the banks' ROE is positively affected through both access to finance and environmental financing, however, this positive influence on financial performance in the case of access to finance is realized by management quality and loan growth while in the case of the environmental financing only by loan growth.

Soana (2011, pp. 133–148) using correlation methodology investigated the relationship between corporate social performance (CSP), as expressed by global and analytical ethical ratings and corporate financial performance (CFP) as measured by market and accounting ratios in a banking sector in 2005. Her research showed that global ethical ratings have not any significant impact on neither accounting ratios nor market ratios of 21 international and 16 Italian banks. The correlations of analytical ethical ratings with financial performance of international banks was significant only for the negative relation between internal social policy rating and return on average assets, price to book value and price/earnings ratio. Analyzing the correlations of analytical ethical ratings with financial performance in two different samples of Italian banks — a group of 16 commercial banks vs. a group of 31 commercial as well as saving and cooperative banks — the author received contrasting results, which was the reason to conclude that there is no evidence for a significant CSP–CFP link.

Jha and Rangarajan (2020, pp. 1–30) evaluated bidirectional causality and intensity of the relationship between corporate sustainability performance (CSP) at the aggregate and disaggregate levels and corporate financial performance (CFP), as expressed by market and accounting measures for top 500 Indian corporations in the years 2008–2018. The estimation of their fixed effects model indicated that the environmental, social and governance (ESG) score and the environmental dimension score have negative significant influence on return on assets (ROA), while none of corporate sustainability performance has significant impact on return of equity (ROE). Looking at the CSP–CFP relationship through the market measure, Tobin's *q* is significantly negatively affected by the ESG score, as well as environmental and governance dimension scores. What is the most important, the same significant negative effects were received when they investigated the reverse relationship.

Tuppura *et al.* (2016, pp. 672–686) employed the Granger causality test to examine the relationship between corporate social performance (CSP) and corporate financial performance (CFP) in four industries in the U.S. over the period 1991–2009. After the estimation of balanced panel models basing on environmental, social and governance (ESG) ratings and financial performance as expressed by accounting and market measures, they discovered that bidirectional CSP–CFP relationship exists only in clothing, energy and forest sectors, however, this link appeared most likely in the clothing and energy sectors, because it is evident both in terms of return on assets (ROA) and market capitalization. At the end of consideration, the authors suggested that the difference in bidirectional CSP–CFP relationship between industries may be caused by differences in the past corporate social responsibility (CSR) practices.

The research on the relationship between the corporate sustainability performance (CSP) and the corporate financial performance (CFP) as expressed by accounting and market measures was aimed to identify the effect of overall corporate sustainability performance as well as its particular components, like environmental, social and governance performance on CFP in different industries and countries. Additionally, scientists examined also how CFP is affected by the corporate social responsibility (CSR) activities, which can be recognized as the same as corporate sustainability if CSR includes all activities that improve the environment, society and economy in the long-term (Ashafi *et al.*, 2018, p. 678). Previous empirical studies, however, do not allow for an unequivocal assessment of the impact of corporate sustainability performance (CSP) on corporate financial performance (CFP), because they reveal contradictory results. Lu and Taylor (2016, pp. 1–15), applying a meta-analysis of 198 studies which provided the total sample of 31,514 observations, demonstrated that the corporate sustainability and financial performance link can depend on employed measurements of corporate sustainability and financial performance as well as on sample, period and method of the research. In the conclusion they suggested that CSP has a positive influence on CFP, especially when the environmental rather than social performance is considered, financial performance is expressed by accounting measures, a sample consists of non-U.S. companies from different industries, the research is conducted before the year 2000 and relates to a long period as well as when simple methods are used.

Concluding it should be noted that although the studies on the effect of corporate sustainability performance (CSP) on corporate financial performance (CFP) are very extensive and varied in terms of adapted research methodology and obtained findings, all scientists focus their attention on

corporate sustainability performance in environmental, social and governance dimensions rather forgetting about the economic sustainability performance. The identification of such a research gap in previous empirical studies has become the basis of the author's investigation on CSP–CFP link, in which the economic sustainability performance has been incorporated into estimated panel regression models as the variable alongside other corporate sustainability performance.

Research method

The research sample includes the largest non-financial U.S. companies², which were listed in the Fortune 500 ranking in the first hundred positions in each year of the period 2016–2020³. The adoption of such a condition for listed companies allowed to qualify a relatively large number of enterprises for the research sample whose top position in the ranking was stable. On the basis of the preliminary criterion, 71 firms were qualified for the research sample, but 12 of them were excluded due to a change in the form of activity as a result of an acquisition (1), running business activity as a non-publicly traded company (5) or activity sponsored by the government (2) and the lack of necessary data for the whole period of the analysis (4). The final research sample is a balanced panel dataset of 59 companies over the five-year research period, so it consists of 295 firm-year observations.

The research period covers the years 2015–2019, but because one-year lagged variables and variables expressed as average values were employed, it was necessary to collect all required data for the period 2014–2019⁴. The financial and sustainability data of investigated companies from the years 2014–2019 were retrieved from *Refinitiv Thomson Reuters Eikon* database and all calculations based on these data were made applying a statistical package *Gretl*.

Bearing in mind the business model for sustainability of Kantabutra and Ketprapakorn (2020, pp. 1–22), who emphasized the need to integrate all its dimensions, and the results of empirical studies carried out among the

² The financial companies were excluded from the research sample because of their specificity. Including these companies to the research sample would lead to the lack of comparability of some variables considered in the panel regression models.

³ The largest companies listed on the Fortune 500 ranking in the year 2020 represented approximately two-thirds of the U.S. economy in 2019 (Fortune 500, 2020).

⁴ It is worth to note that the corporate economic sustainability performance expressed as long-term return pillar score was not measured for most of companies qualified for the research sample before the year 2014.

largest U.S. companies in the years 1992–2003 by Wagner (2010, pp. 1553–1560), the following research hypothesis was formulated:

H: *The effect of corporate sustainability performance at both aggregate and disaggregate levels on corporate financial performance as expressed by total revenues is positive.*

The empirical verification of the research hypothesis aims to estimate three regression models based on the augmented production function, which in its general form looks as follows:

$$V = V(K, L, X) \quad (1)$$

where V denotes value added as the output, K and L represent the capital and labor inputs, respectively, X is a vector of corporate sustainability scores. The operationalization of the general form of an augmented production function is conducted with the use of a Cobb-Douglas production function (compare Conte & Svejnar, 1988, pp. 139–151) described by the following formula:

$$V = AK^{\alpha_1}L^{\alpha_2}e^{\beta X} \quad (2)$$

which in a logarithm form becomes:

$$\ln V = \ln A + \alpha_1 \ln K + \alpha_2 \ln L + \beta X \quad (3)$$

From the collected data, three operating variables are constructed (see Table 1):

- V (output) – value of total revenues, which is the major criterion of classifying the largest U.S. companies in the Fortune 500 ranking,
- K (capital input) – average value of fixed assets and
- L (labor input) – average number of employees.

Taking into account constructed variables as well as denoting companies by i , the time period in years by t ($t = 1, 2, \dots$) and residual by μ , the basic Cobb-Douglas production function is:

$$\ln V_{i,t} = \alpha_0 + \alpha_1 \ln K_{i,t} + \alpha_2 \ln L_{i,t} + \beta X_{i,t-1} + \mu_{i,t} \quad (4)$$

In order to reach the aim of this paper, the following three regression models, differing in the vector X (see Table 1), are considered.

The first regression model looks as follows:

$$\ln V_{i,t} = \alpha_0 + \alpha_1 \ln K_{i,t} + \alpha_2 \ln L_{i,t} + \beta_1 LTRPS_{i,t-1} + \beta_2 ESGS_{i,t-1} + \mu_{i,t} \quad (5)$$

where vector X is composed of:

- *LTRPS* – long-term returns pillar score, which measures a corporate ability to manage its long-term economic sustainability and
- *ESGS* – aggregate environmental, social, governance score based on weighted scores of particular pillar scores.

The second regression model is expressed by the given equation:

$$\ln V_{i,t} = \alpha_0 + \alpha_1 \ln K_{i,t} + \alpha_2 \ln L_{i,t} + \beta_1 LTRPS_{i,t-1} + \beta_2 WEPS_{i,t-1} + \beta_3 WSPS_{i,t-1} + \beta_4 WGPS_{i,t-1} + \mu_{i,t} \quad (6)$$

where vector X comprises the long-term returns pillar score (*LTRPS*) as well as weighted scores of particular pillars:

- *WEPS* – weighted environmental pillar score,
- *WSPS* – weighted social pillar score and
- *WGPS* – weighted governance pillar score.

The third regression model is described by the following formula:

$$\ln V_{i,t} = \alpha_0 + \alpha_1 \ln K_{i,t} + \alpha_2 \ln L_{i,t} + \beta_1 LTRPS_{i,t-1} + \beta_2 EPS_{i,t-1} + \beta_3 SPS_{i,t-1} + \beta_4 GPS_{i,t-1} + \mu_{i,t} \quad (7)$$

where vector X contains the long-term returns pillar score (*LTRPS*) and disaggregate pillar scores without weights:

- *EPS* – environmental pillar score, which shows how effectively a company avoids environmental risk and takes advantage of environmental opportunities,
- *SPS* – social pillar score, which refers to the company’s reputation and the status of its license to operate and
- *GPS* – governance pillar score, which reflects a company’s capacity to direct and control its rights and responsibilities.

The decision which kind of panel model should be used — pooled OLS, fixed-effects or random-effects model — to estimate considered regression models was taken after analyzing the results of the F test, the Breusch-Pagan test and the Hausman test (see Table 4). In the first regression model, the random-effects model should be employed because *p-values* of the F test and the Breusch-Pagan test were below 0.05, while the *p-value* of the

Hausman test was higher than 0.05. In the next two regression models, *p-values* of all tests were lower than 0.05, which means that in these cases the fixed-effects model should be applied.

Additionally, the study presents analyses of descriptive statistics for the variables considered in regression models and Pearson correlation coefficients.

Results and discussion

The research sample consists of 295 firm-year observations — 59 largest U.S. companies over the years 2015–2019 are examined. These companies operate in different sectors and have headquarters in different states. The most numerous group of enterprises (12) are companies operating in the healthcare sector. Eight enterprises are headquartered in California and eight in Texas.

Total revenues, which constitute the main criterion for the classification of the largest U.S. companies in the Fortune 500 ranking as well as the output in the considered regression models, ranged from 29,412.21 to 485,188.29 Millions of U.S. Dollars. The highest total revenues were observed in 2019 in *Walmart Inc.*, which was the first in the Fortune 500 ranking every year between 2016–2020. The lowest total revenues were recorded in 2015 in *Exelon Corp.*, which ranked the highest in 2017, when it was 89th. For all firm-year observations the mean of total revenues is USD 94,861.83 million, while the median is USD 70,665.42 million. The average value of fixed assets representing the capital input was the highest in 2019 in *AT&T Inc.* — USD 456,539.05 million — and the lowest in 2017 in *Best Buy Co., Inc.* — USD 3,202.21 million (mean is USD 72,174.00 million and median is USD 44,399.43 million). The average employment reflecting the labor input was the highest in 2016 and 2017 in *Walmart Inc.* — 2,300,000.00 employees and the lowest in 2017 in *Valero Energy Corp.* — 10,005.50 employees (mean is 190,470.23 and median is 125,000.00 employees). *Walmart Inc.* is the largest U.S. company in terms of total revenues and the average employment with the average value of fixed assets, which in the years 2015–2019 was higher than its mean for all firm-year observations.

With regard to the corporate sustainability scores, the mean of long-term returns pillar scores is 59.42 while the mean of aggregated environmental, social and governance scores is 69.67. The highest long-term returns pillar score (96.33 — the excellent score) was observed in 2015 and 2019 in *Costco Wholesale Corp.* and the lowest (3.00 — the poor score) in 2019 in

Boeing Co. The highest aggregated environmental, social and governance score (93.22 — the excellent score) was recorded in 2019 in *Microsoft Corp.* and the lowest (36.52 — the satisfactory score) in 2015 in *Phillips 66 Co.* It is worth to note, that minimum 25% of long-term returns pillar scores were at most at the satisfactory level ($Q1 = 48.33$) and minimum 25% of aggregated environmental, social and governance scores ($Q1 = 61.73$) were at most at the good level. The means of particular weighted environmental, social and governance pillar scores calculated as a product of weights for the industries and disaggregated pillar scores and then added up to receive overall environmental, social and governance score, are 17.45, 30.80 and 21.42, respectively. All the highest disaggregated — environmental (95.76 — *Target Corp.* /2016), social (97.77 — *IBM Corp.*/2019) and governance (95.77 — *Best Buy Co., Inc.*/2019) — pillar scores were at the excellent level. The lowest scores in the environmental pillar (0.00 — *Amerisource-Bergen Corp.*/2015) and governance pillar (18.54 — *Oracle Corp.*/2017) were at a poor level, while the lowest social pillar score (25.41 — *Cardinal Health Inc.*/2015) can be viewed as satisfactory. 75% of all disaggregated environmental, social and governance pillar scores were higher than 58.43, 61.45 and 56.64 (values of $Q1$) respectively, which means that minimum 75% of all observations in particular pillars were at least at a good level (see Table 2).

The correlation analysis (see Table 3) revealed that there are statistically significant correlations between a dependent variable — total revenues (TR) and some independent variables. The correlation of TR with the average value of fixed assets (AFA) is moderate ($r_{xy} = 0.4407$), while the correlation of TR with the average employment (AE) is weak ($r_{xy} = 0.2808$). Both of these correlations are positive and statistically significant at the 0.01 level. Analyzing correlations of TR with corporate sustainability scores, different results are observed. The positive and very weak ($r_{xy} = 0.1516$) correlation between TR and the long-term returns pillar score ($LTRPS$) is statistically significant at the 0.01 level. On the other hand, the correlation between TR and the aggregated environmental, social and governance score ($ESGS$), which also demonstrates the existence of positive and very weak relationship is statistically insignificant. The correlations of TR with corporate environmental scores are not coherent because the correlation with weighted environmental pillar score ($WEPS$) implies a negative relationship while the correlation with disaggregated environmental pillar score (EPS) indicates a positive relationship but none of them is statistically significant. The correlations of TR with corporate social scores point out negative and very weak relationships, however, the correlation with the weighted social pillar score ($WSPS$) is statistically insignificant while the

correlation with the disaggregated social pillar score (*SPS*) ($r_{xy} = 0.1121$) is statistically significant at the level of 0.1. The correlations of *TR* with corporate governance scores are consistent due to the fact that the correlation with weighted governance pillar score (*WGPS*) ($r_{xy} = 0.1257$) and the correlation with disaggregated governance pillar score (*GPS*) ($r_{xy} = 0.1672$) show positive and very weak relationships, which are statistically significant at levels of 0.05 and 0.01, respectively. Considering correlations between explanatory variables in particular regression models, it should be emphasized that any statistically significant correlations between these variables do not exceed the critical threshold of $|0.8|$ (see Fooladi, 2012, pp. 691–692).

The findings of this correlation analysis should be compared with results of empirical studies of Soana (2011, pp. 133–148), who used Pearson correlation to examine the relationship of corporate social performance as measured by ethical ratings with accounting and market ratios of Italian banks. Her studies demonstrated that the correlation of global ethical rating, which includes not only analytical social ratings, but also analytical ratings of environment and governance with accounting and market ratios is statistically insignificant, which is in line with the findings of our research presenting the statistically insignificant relationship between the aggregated environmental, social and governance score (*ESGS*) and *TR*. In the case of analytical ethical ratings, Soana considered two different research samples and received opposite results, because the corporate governance is positively correlated with the return of average equity in the group of 16 banks, while this correlation is negative in the group of 24 banks (commercial as well as saving and cooperative banks) — both of these correlations are statistically significant at the 0.05 level. In our studies, the statistically significant correlations between corporate governance scores and *TR* are positive.

In the first regression model, the coefficients at the variables of capital and labor inputs are positive and statistically significant at the 0.01 level, which means that the total revenues (*TR*) increase with an increase in the company's average fixed assets and average employment (coefficients are 0.2728 and 0.1279, respectively). The coefficient at the long-term returns pillar score (*LTRPS*) is positive ($\beta_1 = 0.0019$) and statistically significant at the 0.1 level, while the positive coefficient at the aggregated environmental, social and governance score (*ESGS*) is statistically insignificant, so the increase in *TR* is due to the improvement in corporate economic performance rather than improvement in overall sustainability performance of a company. In the second regression model, the coefficients at the variables of capital and labor inputs are positive (coefficients are 0.2768 and 0.1123,

respectively) and statistically significant, but the coefficient at the capital input is significant at the 0.01 level and the coefficient of labor input at the 0.1 level. The coefficient at the long-term returns pillar score (*LTRPS*), while positive, is statistically insignificant. Among weighted scores in environmental, social and governance pillars, only the coefficient at the weighted social pillar score (*WSPS*), which is positive ($\beta_3 = 0.0041$), is statistically significant at the 0.1 level, which implies that the improvement in corporate social performance causes the increase in *TR*. The statistically insignificant coefficients at the weighted environmental (*WEPS*) and governance (*WGPS*) pillar scores are positive and negative, respectively. In the third regression model, the coefficients at the variables of capital and labor inputs are positive (coefficients are 0.2769 and 0.1042, respectively), however, the coefficient at the capital input is statistically significant at the 0.01 level while the coefficient at the labor input is statistically insignificant (*p-value* = 0.1011). The coefficient at the long-term returns pillar score (*LTRPS*) is positive, but statistically insignificant. Within disaggregated environmental, social and governance pillar scores, only the coefficient at the governance pillar score (*GPS*), which is negative, is statistically insignificant. The coefficients at the environmental (*EPS*) and social (*SPS*) pillar scores are positive ($\beta_2 = 0.0015$ and $\beta_3 = 0.0018$) and statistically significant at the 0.1 level, which indicates that the improvement in corporate environmental and social performance leads to the increase in *TR* (see Table 4).

The estimation results of considered regression models in some part are similar to Wagner's findings (2010, pp. 1553–1560), where Tobin's *q* is not directly affected by the total corporate environmental and social sustainability performance, while the effect of corporate environmental performance is positive and direct. In our research the coefficient at the *ESGS* (Model 1) is also statistically insignificant, while the statistically significant coefficient at the *EPS* is positive (Model 3), however, the corporate financial performance is expressed by total revenues (*TR*). The opposite results were revealed in the case of the corporate social performance, which in Wagner's research does not influence Tobin's *q* directly. In our research, the positive coefficients at *WSPS* and *SPS* are statistically significant (Model 2 and Model 3). On the other hand, the results of estimated regression models are not in line with findings by Jha and Rangarajan (2020, pp. 1–30), who found that the overall environmental, social and governance sustainability performance of a company, as well as the corporate environmental performance, have negative impact on both return on assets and Tobin's *q*. Additionally, they recorded that the corporate social performance has an influence neither on return on assets nor Tobin's *q*, while the corporate govern-

ance performance influences negatively only Tobin's q . In our studies, the impact of corporate governance performance on TR is also negative, but the coefficients at the $WGPS$ and GPS are statistically insignificant (model 2 and Model 3). At the end of the analysis, it must be emphasized that the values of statistically significant coefficients in estimated regression models are very low, which suggests that the effect of corporate sustainability performance in particular dimensions — economic ($LTRPS$ — Model 1), environmental (EPS — Model 3) and social ($WSPS$ — Model 2 and SPS — Model 3) — on total revenues is slight. The small positive relationship between corporate sustainability performance (CSP) and corporate financial performance (CFP) in U.S. can be explained in relation to the results of empirical studies conducted by Xiao *et al.* (2018, pp. 325–333). The authors of this research investigated the effect of country-level sustainability performance on the positive CSP–CFP link in 22 countries, which were differentiated in terms of their economic, social and institutional development. After the estimation of fixed effects model, they revealed that the positive financial effect of corporate sustainability performance diminishes with the higher country-level sustainability performance.

Conclusions

The empirical studies revealed that in the estimated panel regression models there are statistically significant coefficients at the variables of corporate sustainability performance. Among these statistically significant coefficients, there are coefficients at the long-term returns pillar score ($LTRPS$ — Model 1) and disaggregated environmental pillar score (EPS — Model 3), as well as weighted social pillar score ($WSPS$ — Model 2) and disaggregated social pillar score (SPS — Model 3). All statistically significant coefficients are positive, which means that the improvement in economic, environmental and social sustainability performance leads to the increase in total revenues (TR). Unfortunately, in the considered panel regression models, the coefficients at the overall sustainability performance ($ESGS$ — Model 1) and weighted environmental performance ($WEPS$ — Model 2), as well as weighted governance performance ($WGPS$ — Model 2) and disaggregated governance performance (GPS — Model 3) are statistically insignificant. The occurrence of certain statistically insignificant coefficients in estimated panel regression models does not allow to positively verify the research hypothesis assuming the existence of a positive relationship between corporate sustainability performance (CSP) at both aggregate and disaggregate levels and corporate financial performance (CFP) ex-

pressed by *TR*. It means that the improvement of corporate sustainability performance in economic, environmental, social and governance dimensions does not lead to the higher total revenues of a company, which may result from the high institutionalization degree of sustainable development principles and practices in U.S. and thus the high sustainability level of the largest U.S. companies.

The findings of our empirical studies should not be generalized, because of their limitations. First of all, measures of corporate sustainability performance expressed by the overall corporate sustainability scores as well as weighted and disaggregated pillar scores that were retrieved from *Refinitiv Thomson Reuters Eikon* database are calculated based on the information reported by companies, so information is not deprived of subjectivism. Moreover, the research period, which covers only five years, seems to be too short to fully discover the CSP–CFP relationship, but the main reason for taking into consideration such a short analysis period was the lack of long-term returns pillar score calculations before 2014. On the other hand, it was crucial to incorporate the economic sustainability performance as the variable alongside other corporate sustainability performance into estimated panel regression models because to the best of the author's knowledge, it is not a commonly used approach in spite of the fact that the economic sustainability is one of the key corporate sustainability dimensions. Therefore, the consideration of economic sustainability performance with corporate sustainability performance in environmental, social and governance dimensions states the innovative research approach, which may provide additional information about CSP–CFP link.

The future empirical research should be conducted with the inclusion of corporate economic sustainability performance as a variable that can affect corporate financial performance to make cross-sectoral and cross-country comparisons. This kind of comprehensive studies can be very useful for managers who make decisions in the area of sustainable development of companies operating in different sectors and countries, and thus need the full scope of information about the relationship between corporate sustainability performance (CSP) and corporate financial performance (CFP). What is more, the policy makers in countries as the U.S., where the institutionalization degree of sustainable development principles and practices is high, should create the systems of financial and non-financial incentives for companies to motivate them to corporate sustainability implementation even if the positive CSP–CFP link is slight.

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Annex

Table 1. Description of variables considered in regression models

Variable	Measure
V (output) = TR	Real value of total revenues – $CPI_{2014=0}$
K (capital input) = AFA	Real average value of fixed assets (FA) – $CPI_{2014=0}$ $AFA_t = \frac{FA_t + FA_{t-1}}{2}$
L (labor input) = AE	Average number of employees (E), where part-time employment was converted into full-time employment $AE_t = \frac{E_t + E_{t-1}}{2}$
$LTRPS$ – long-term returns pillar score	It represents corporate earnings sustainability, credit risk and level of investment – it takes values from 0 to 100
$ESGS$ – environmental, social, governance score	Overall company score based on the self-reported information in the environmental, social and governance pillars, which takes values from 0 to 100 – the sum of weighted scores of environmental, social and governance pillar scores where particular weights depend on the industry in which the company operates
$WEPS$ – weighted environmental pillar score	A given weight multiplied by the environmental pillar score
$WSPS$ – weighted social pillar score	A given weight multiplied by the social pillar score
$WGPS$ – weighted governance pillar score	A given weight multiplied by the governance pillar score
EPS – environmental pillar score	Measure of a corporate impact on living and non-living natural system, including the air, land and water as well as complete ecosystems (resource use, emissions, innovations) – it takes value from 0 to 100
SPS – social pillar score	Measure of corporate capacity to generate trust and loyalty with its workforce, customers and society (workforce, human rights, product responsibility) – it takes values from 0 to 100
GPS – governance pillar score	Measure of corporate systems and processes, which ensure that its board members and executives act in the best interests of its long-term shareholders (management, shareholders, CSR responsibility) – it takes values from 0 to 100

Note: In considered panel regression models natural logarithms of V , K , L were used.

The interpretation of corporate sustainability scores:

- <0 – 25) – poor score,
- <25 – 50) – satisfactory score,
- <50 – 75) – good score,
- <75 – 100) – excellent score.

Source: own elaboration based on the *Refinitiv Sustainable Leadership Monitor* database.

Table 2. Descriptive statistics of variables

Specification	V = TR	K = AFA	L = AE	LTRPS	ESGS	WEPS	WSPS	WGPS	EPS	SPS	GPS
Mean	94,861.83	72,174.00	190,470.23	59.42	69.67	17.45	30.80	21.42	68.81	71.11	68.70
Std. Dev.	73,657.09	77,376.90	296,125.26	19.19	11.87	6.67	7.12	7.02	17.18	15.32	17.57
Min.	29,412.21	3,202.21	10,005.50	3.00	36.52	0.00	11.94	7.22	0.00	25.41	18.54
Max.	485,188.29	456,539.05	2,300,000.00	96.33	93.22	31.22	44.82	44.29	95.76	97.77	95.77
Q1	46,800.58	25,324.31	70,325.00	48.33	61.73	12.71	26.08	16.31	58.43	61.45	56.64
Median	70,665.42	44,399.43	125,000.00	62.33	70.40	16.52	31.73	21.21	74.20	72.31	72.24
Q3	120,807.62	91,707.01	215,250.00	75.00	78.57	22.05	36.29	25.42	80.54	82.81	83.32
N	295	295	295	295	295	295	295	295	295	295	295

Note: V and K are expressed in Millions of U.S. Dollars; L is measured as the number of employees; other variables takes values from 0 to 100.

Table 3. Pearson correlation matrix

Specification	lnV	lnK	lnL	LTRPS	ESGS	WEPS	WSPS	WGPS	EPS	SPS	GPS
lnV	1.0000										
lnK	0.4407***	1.0000									
lnL	0.2808***	0.2462***	1.0000								
LTRPS	0.1516***	-0.1679***	0.2273***	1.0000							
ESGS	0.0378	0.1527***	0.3114***	0.0723	1.0000						
WEPS	-0.0297	0.2313***	0.0783	-0.3105***	0.4559***	1.0000					
WSPS	-0.0332	0.2432***	0.3486***	0.0532	0.7186***	0.0719	1.0000				
WGPS	0.1257**	-0.22081***	0.0989*	0.3635***	0.5292***	-0.2526***	0.1333**	1.0000			
EPS	0.0045	0.2276***	0.2871***	-0.0226	0.7007***	0.6474***	0.4905***	0.0723	1.0000		
SPS	-0.1121*	0.2009***	0.4008***	0.0337	0.8329***	0.2945***	0.8903***	0.2261***	0.6050***	1.0000	
GPS	0.1672***	-0.0965*	-0.0302	0.1315**	0.5367***	0.0810	0.0454	0.7848***	0.0157	0.0918	1.0000

Note: *, **, *** denote statistical significance at the 10%, 5%, and 1% level, respectively.

Table 4. Estimation results of panel regression models

Specification	Model 1		Model 2		Model 3	
	coefficient	p-value	coefficient	p-value	coefficient	p-value
<i>Intercept</i>	6.6432	0.0000	6.7615	0.0000	6.8291	0.0000
<i>lnK</i>	0.2728	0.0000	0.2768	0.0000	0.2769	0.0000
<i>lnL</i>	0.1279	0.0074	0.1123	0.0771	0.1042	0.1011
<i>LTRPS</i>	0.0019	0.0774	0.0015	0.1937	0.0014	0.2083
<i>ESGS</i>	0.0012	0.2788				
<i>WEPS</i>			0.0045	0.1825		
<i>WSPS</i>			0.0041	0.0711		
<i>WGPS</i>			-0.0034	0.1126		
<i>EPS</i>					0.0015	0.0994
<i>SPS</i>					0.0018	0.0750
<i>GPS</i>					-0.0010	0.1188
F test	135.4050	0.0000	124.147	0.000	114.398	0.0000
Breusch-Pagan; $\chi^2(1)$	539.4310	0.0000	501.719	0.000	459.977	0.0000
Hausman; $\chi^2(K)$	3.2817	0.5118	15.303	0.018	24.962	0.0003
LSDV R ²			0.9796		0.9797	
within R ²			0.4015		0.4046	
corr(y,yhat) ²	0.2382					