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Corporate Social Responsibility's (CSR) Impact on Financial Performance: Moderating Effects of Earnings Management and Leverage

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Abstract
Research aims: This research attempts to test the impact of CSR on financial performance, with earnings management and leverage acting as moderating factors.

Design/Methodology/Approach: The manufacturing companies listed on the Indonesia Stock Exchange (IDX) from 2015 to 2019 served as the study object. Purposive sampling was utilized in sample selection, yielding 228 samples. Multiple linear regression and moderated regression analysis were the analytical techniques used in this study, with the EViews 10 program being used for the fixed effect model.

Research finding: The analysis results indicated that CSR had no significant effect on financial performance; earnings management could not moderate the influence of CSR on financial performance; leverage could moderate the effect of CSR on financial performance.

Theoretical contribution/Originality: The study's findings offer insight and input for company management in terms of implementing CSR and its relation to company performance.

Practitioner/Policy implication: The findings of this study should be helpful to stakeholders in selecting how to implement a CSR program in their company.

Research limitation/Implication: This study only uses ROE as an indicator of financial performance, the research period is only 5 years, and CSR data is only based on what is stated in the company's financial statements.

Keywords: CSR; Earning management; Financial performance; Leverage

Introduction

Corporate social responsibility (CSR) is one of the current confrontational issues in the corporate world and the broad management spectrum (Bagh et al., 2017). CSR carried out by certain organizations or companies is a manifestation of their social obligation to protect the environment. CSR implementation emphasizes that corporate responsibility is about economic activities that create profit and social and environmental responsibility. CSR is also a prerequisite for any entity to operate following regulations. In this respect, ethical principles and good governance help companies obtain licenses from the government, society, and relevant stakeholders (Porter & Kramer, 2006). In addition, CSR is increasingly being used as an organizational strategy because of its benefits to the company by showing trust and increasing its public profile.
These advantages will help the company gain a larger market share in the long run. Employees are also proud of the company and actively work. Additionally, businesses can lower operating expenses and draw in additional investors (Kotler & Lee, 2005).

Moreover, according to Weber (2009), financial performance (FP) is a combination of financial conditions with the firm's ability to fulfill its business policies and commitments. According to Fahmi (2012), financial performance is an analysis that demonstrates how well a company has adhered to financial implementation guidelines. Financial performance is also one factor that indicates an organization's effectiveness in achieving its goals (Erdianty & Bintoro, 2015). Five frequently used financial ratios, including liquidity, leverage, profitability, efficiency, and market ratios, can be used to assess financial performance (Hanafi, 2017). Among the widely used financial performance measures are also accounting-based profitability measures, such as return on assets (ROA), return on equity (ROE) (Bagh et al., 2017; Senyigit & Shuaibu, 2017; Zhang, 2021; Gautam et al., 2016), profit after tax (PAT), return on capital employed (ROCE) (Gautam et al., 2016), return on average assets (ROAA), and return on average equity (ROAE) (Platonova et al., 2018).

CSR has been found to have a favorable impact on financial performance in a number of earlier studies (Fu & Shen, 2015; Jayastini & Wirajaya, 2016; Bagh et al., 2017; Senyigit & Shuaibu, 2017; Wijaya & Sherly, 2017; Hou, 2018; Platonova et al., 2018; Jekwam & Hermuningsih, 2018; Zhang, 2021, Suttipun et al., 2021; Afifah & Syafruddin, 2021). On the other hand, several studies have uncovered a negative relationship between CSR operations and financial performance (Gautam, 2016). Meanwhile, research by Grecco et al. (2017), Ruwanti and Rambe (2019), Sitanggang and Ratmono (2019), and Selviana and Isbanah (2020) revealed that CSR did not affect the firm's performance. In this case, the entity could not perform its CSR in a way that meets the needs of stakeholders.

Therefore, in this study, earnings management reduced the effect of CSR on financial performance. In order to ensure that the profits reported in the firm's financial statements are in line with predetermined targets, the profits stated in the firm's financial statements might be increased or decreased by the company managers to manipulate results. Results from earlier studies by Kusuma and Syafruddin (2014), and Wijayanto et al. (2021). showed that earnings management had a moderating influence on the relationship between CSR and financial performance (2022). Meanwhile, studies by Jayastini and Wirajaya (2016), Wijaya and Sherly (2017), and Ruwanti and Rambe (2019) found that CSR has no impact on an organization's financial performance.

Leverage is also the percentage of debt used to finance investments and assets. Leverage may limit the impact of CSR on financial results (Arifulsyah & Nurulita, 2016). Fitriya and Setyorini (2019) found no moderating influence on the relationship between CSR and financial performance.

The inconsistency of prior studies then prompted the researchers to re-examine the influence of CSR on financial performance, with earnings management and leverage as moderating variables. This study was undertaken in the manufacturing sector on the
Indonesia Stock Exchange (IDX) for numerous reasons. First, there are quite a lot of manufacturing companies listed on IDX, reaching almost 25% of the total companies listed, namely 193 companies (as of January 2021) (Invesnesia, 2021). Second, the manufacturing industry has a major impact on environmental and social problems, such as climate change, the overuse of natural resources, pollution of the air, water, and soil, and health concerns. from pollution caused by industrial processes, to legal and social problems, i.e., non-compliance with environmental permits and regulations, human rights issues, occupational safety of workers and communities affected by industrialization, supply chain legality and ethical sourcing of raw materials, and marketing ethics (Barclays, 2015). Thirdly, despite having high-quality reporting, Indonesia was still lagging behind Singapore and Thailand in terms of CSR implementation at the ASEAN level, according to research by the National University of Singapore (NUS) Business School's Research Center for Governance, Institutions, and Organizations on 100 companies in the four ASEAN nations of Malaysia, Singapore, Thailand, and Indonesia (CNN Indonesia, 2016).

Literature Review and Hypotheses Development

Previous Research and Hypotheses Development

Corporate Social Responsibility (CSR) and Financial Performance

Corporate social responsibility (CSR) is the term for any socially responsible and accountable business practices that are not required by local legislation in these nations (McWilliams & Siegel, 2001). According to Nayenggita et al. (2019), CSR refers to a firm's commitment to operating legally, enhancing the quality of life for employees and their families, the government, the local community, businesses, and the larger community.

Thus, organizations undertake CSR for several reasons. Companies may participate in CSR activities for four reasons, according to Sprinkle and Maines (2010): they may do so out of altruistic motives; they may do so as "window dressing" to appease different stakeholder groups; they may do so for the potential benefits of employee recruitment, motivation, and retention; or they may do so for customer-related motivation because CSR can entice customers to purchase the company's goods and services.

CSR is also essential for companies. CSR assists businesses in obtaining licenses from the government, community, and key stakeholders and is a requirement for every company to perform in compliance with moral values and excellent management (Porter & Kramer, 2006). The implementation of CSR is ensured to be effective to attract the attention of stakeholders so that it will provide good support to the company. With the help of the company's stakeholders, CSR activities can improve the company's image to increase company sales and ultimately improve the company's financial performance.

Bagh et al. (2017) and Senyigit and Shuaibu (2017) showed that CSR influenced company performance. The same result is shown by Hou (2018), who conducted research in Taiwan and found that companies that received CSR awards had a positive and significant effect.
on company performance. In addition, Companies listed on the Thailand Stock Exchange were studied by Suttipun et al. (2021), who found that CSR had a considerable impact on financial performance. In Indonesia, several studies on companies implementing CSR revealed a significant effect between CSR and company performance. The research was conducted among others Suciwati et al. (2017), and Lestari and Lelyta (2019). Based on the theory and the previous research results, the following hypothesis was formulated:

\[ H_1: \text{Corporate social responsibility (CSR) has a significant positive effect on financial performance.} \]

**Earnings Management as a Moderating Variable in the Relationship Between CSR and Financial Performance**

According to Fischer and Rosenzweig (1995) in Sitanggang and Ratmono (2019), earnings management is management behavior that increases or decreases earnings reported by the responsible unit and has nothing to do with the increasing or long-term profitability of the company. When a corporation implements CSR, it will improve financial performance but have the opposite effect when it engages in earnings management. When businesses engage in CSR as a type of management consequence, the benefit to financial performance will be lessened. Here, corporate managers who practice earnings management tend to overinvest in CSR. It will negatively impact the firm’s financial performance in the future. According to other studies by Kusuma and Syafruddin (2014), Wijayanto et al., (2021) earnings management mitigated the impact of environmentally and socially focused CSR on the company’s financial performance. Based on the explanation above, the following second hypothesis was proposed:

\[ H_2: \text{Earnings management moderates the effect of CSR on the firm's financial performance.} \]

**The Effect of CSR on Financial Performance with Leverage as Moderating Variable**

According to Brigham and Houston (2006), leverage determines how far the company’s assets are financed through debt. In liquid companies, leverage is used to determine the level of development in conducting all the company’s financial responsibilities. Leverage is also how a company finances its assets through debt. Companies that use substantial debt have an impact on financial performance, both positively and negatively. Companies that use less debt have a minimal risk of the company’s financial condition.

Moreover, agency theory explains that companies with elevated leverage levels will disclose more information about social impacts since the agency cost of the capital structure is higher. Therefore, companies with high leverage are more obligated to meet long-term creditor information. One way to reduce agency costs is to share more details, including corporate social responsibility (CSR).
H₃: Leverage moderates the effect of corporate social responsibility (CSR) on the company’s financial performance.

Research Methods

This study’s population and sample objects were manufacturing companies listed on the Indonesia Stock Exchange (IDX) from 2015 to 2019. The sample was selected using a purposive sampling technique based on several criteria: (1) companies that earned profits during the research period; (2) companies that published annual reports during the study period; (3) companies that implemented corporate social responsibility (CSR); (4) companies that submitted financial statements in Rupiah. Based on several criteria, 428 samples were obtained. The E Views 10 program was then used to analyze the data using multiple linear regression and moderated regression analysis with the fixed effect model.

The dependent variable in this study was the financial performance as measured by return on equity (ROE), while the independent variable was CSR. According to Healy and Palepu (2001), CSR is measured by an index, calculated in this way: the social coverage disclosed by each sample company is coded 1 if the company discloses an item on the questionnaire and code 0 if the company does not disclose the item according to the questionnaire. Then, the score for each item was added, and the total score reflects the total score on the list of questions. In addition, this study employed earnings management and leverage as variables moderating the effect of CSR on financial performance. Leverage was measured by the debt-to-equity ratio (DER), while earnings management measurement referred to Savitri and Priantinah (2019), with discretionary incremental (DA) using the Jones model, with the following formula:

1. \[ TAC = Ni_t - CF_i_t \]
2. \[ TAC_{t}/TA_{t-1} = \beta_1(1/TA_{t-1}) + \beta_2[(\Delta REV_t - \Delta REC_t)/TA_{t-1}] + \beta_3(PPE_t/TA_{t-1}) + \varepsilon \]
3. Non-Accrual Discretionary:
   \[ NDTAC_t = \beta_1(1/TA_{t-1}) + \beta_2[(\Delta REV_t - \Delta REC_t)/TA_{t-1}] + \beta_3(PPE_t/TA_{t-1}) + \varepsilon \]
4. Total Discretionary Accruals:
   \[ DTAC_t = TAC_{t}/TA_{t-1} - NDTAC_t \]

Description:
TAC: Total accruals; \( Ni_t \): Net profit of company \( i \) in period \( t \); \( CF_i_t \): The operating cash flow of company \( i \) in period \( t \); Policy: Total accruals in period \( t-1 \); \( TA_{t-1} \): Total assets in period \( t-1 \); \( REV_t \): Changes in income in the period \( t \); \( t\Delta REC_t \): Changes in receivables in period \( t \); PPE: Properties, plans, and equipment periods 1, 2, 3; \( \beta \): Regression coefficient; \( \varepsilon \): Error term; NDTAC\(_t\): A non-discretionary accruals in year \( t \); DTAC\(_t\): Total discretionary accruals in year \( t \).
Results and Discussion

Table 1 shows that the financial performance variable (ROE) had a mean value of 0.142320, with a standard deviation of 0.224551. CSR variable had a mean value of 0.287233, with a standard deviation of 0.091136. The earnings management variable had a mean value of 0.000406, with a standard deviation of 0.001910. In addition, the leverage variable had a mean value of 1.008423, with a standard deviation of 1.273175.

| Variable | N  | Maximum | Minimum | Mean     | Std. Dev. |
|----------|----|---------|---------|----------|-----------|
| DEER     | 428| 2.554641| 0.000358| 0.142320 | 0.224551  |
| CSR      | 428| 0.448718| 0.064103| 0.287233 | 0.091136  |
| EM       | 428| 0.024751| -0.008057| 0.000406 | 0.001910  |
| DER      | 428| 13.97686| 0.069663| 1.008423 | 1.273175  |

The test results obtained a probability value of 0.00000, smaller than 0.05 (see Table 2) indicating that the data utilized were normally distributed.

| Variable | Centered-VIF |
|----------|--------------|
| CSR      | 1.0004       |
| EM       | 1.0045       |
| DER      | 1.0040       |

The tolerance values of all independent variables had a VIF > 10 as shown in Table 3 above. Therefore, it can be said that there was no multicollinearity symptom.

| Variable | Sig   |
|----------|-------|
| CSR      | 0.8580|
| EM       | 0.6952|
| DER      | 0.1366|

Based on Table 4 above, the test results revealed that each independent variable had a significance value of > 0.05 for the heteroscedasticity test using the Glejser test. Therefore, it is clear that there was no heteroscedasticity.

| Variable | Durbin-Watson stats |
|----------|---------------------|
|          | 1.831876            |
According to Table 5, the DU value in the Durbin Watson (DW) table was evaluated using k=3 and n=428 and the result was 1.85105, followed by 4-two=2.14895. Hence, 1.85105 > 1.947931 > 2.14895. There was no autocorrelation, it can be concluded.

| Variable | Coefficient | t-Stats | Prob. | Conclusion   |
|----------|-------------|---------|-------|--------------|
| C        | 0.102765    | 8.765254| 0.0000|              |
| CSR      | -0.067758   | -1.805710| 0.0720| Not significant |
| EM       | 4.696400    | 2.595026| 0.0099|              |
| DER      | 0.049981    | 9.965388| 0.0000|              |
| R-squared| 0.942204    |         |       |              |
| Adjusted R-squared| 0.918010    |         |       |              |
| F-statistics | 38.94408    |         |       |              |
| Prob(F-statistics) | 0.000000 |         |       |              |

Based on the data processing results, the following are the hypothesis testing results, with a significance level of 0.05. The results of testing the first hypothesis showed that CSR had no significant effect on financial performance. It signifies that the company’s low CSR exposure did not affect its financial performance. The insignificant effect of CSR on performance was because investors in developing countries paid less attention to CSR reports, so CSR carried out by Indonesian companies still could not affect the company’s performance. Sudaryanti and Riana (2017) explained that the public did not respond significantly from a financial perspective to CSR disclosure. The response might be positive on the company’s CSR reporting actions but did not impact the decision to become a company consumer. Meanwhile, Fauzi (2007) elucidated that CSR activities in Indonesia are mandatory activities that companies must carry out, so most companies avoid providing relevant information and do not consider the impact on society. It makes the company’s financial performance not affected by CSR.

This research do not support the stakeholder theory, suggesting that the higher the absorption of CSR activities, the greater the stakeholder support and public trust. It can then benefit the company by improving its financial performance. Still, this study is consistent with previous studies conducted by Selviana and Isbanah (2020), Ang et al. (2020), Ruwanti and Rambe (2019), Sitanggang and Ratmono (2019), Parengkuan (2017), and Sudaryanti and Riana (2017) but not in line with the results of research by Suciwati et al. (2017), and Lestari and Lelyta (2019).

| Variable | Coefficient | t-Stats | Prob. | Conclusion   |
|----------|-------------|---------|-------|--------------|
| C        | 0.154002    | 12.14915| 0.0000|              |
| CSR      | -0.080910   | -1.810676| 0.0712|              |
| EM       | -0.986401   | -0.087547| 0.9303|              |
| CSR*EM   | 20.15862    | 0.572832| 0.5672| Not significant |
| R-squared| 0.923219    |         |       |              |
| Adjusted R-squared| 0.891078    |         |       |              |
| F-statistics | 28.72405    |         |       |              |
| Prob(F-statistics) | 0.000000 |         |       |              |
The second hypothesis test revealed the impact of CSR on financial performance could not be moderated by earnings management. Companies must disclose their CSR activities in Indonesia, although they don’t truly care how their actions affect society (Wijaya & Sherly, 2017). Additionally, investors do not see earnings management as a crucial factor that needs to be taken into account when making investment decisions. Because investors prioritize investments that produce a profit, earning management has little bearing on the association between corporate social responsibility (CSR) and firm performance. Nevertheless, the results of this study do not reinforce the results of previous studies conducted by Kusuma and Syafruddin (2014), Wijayanto et al. (2021) who found the role of earnings management in moderating the effect of CSR on financial performance. However, this research supports studies conducted by Ruwanti and Rambe (2019), and Wijaya and Sherly (2017).

**Table 8 Hypothesis 3 testing**

| Variable | Coefficient | t-Stats  | Prob.    | Conclusion    |
|----------|-------------|----------|----------|---------------|
| C        | 0.137264    | 9.617073 | 0.0000   |               |
| CSR      | -0.195490   | -3.981610| 0.0001   |               |
| DER      | 0.005216    | 0.419640 | 0.6750   |               |
| CSR*DER  | 0.163532    | 3.966749 | 0.0001   | Significant   |
| R-squared| 0.943846    |          |          |               |
| Adjusted R-squared | 0.920340 |          |          |               |
| F-statistics   | 40.15303    |          |          |               |
| Prob(F-statistics) | 0.000000 |          |          |               |

The results of the final test of the hypothesis indicate that leverage can reduce the impact of CSR on financial performance. The study’s findings support the agency theory, which postulates that firms with higher capital structures and higher levels of leverage will disclose more details about their social impact and agency costs. The wealth transfer from creditors to corporate shareholders is better the higher the leverage. As a result, businesses with significant levels of leverage have a greater responsibility to provide long-term creditor information. Sharing more information, especially CSR disclosures, is one method to cut government expenditures. The outcomes of this study are in line with the research results of Arifulsyah and Nurulita (2016).

**Conclusion**

Based on the analysis conducted, this study concludes that (1) CSR had no significant effect on financial performance; (2) earnings management could not moderate the influence of CSR on financial performance; (3) leverage could moderate the effect of CSR on financial performance.

Based on the results of the analysis and the explanation above, this study has a number of limitations. Only five years, from 2015 to 2019, were covered by this study’s research; the independent variable used is limited; ROE was the only indicator used to measure financial performance; and information about the company’s CSR disclosure was only
available from the annual report, and not all of the disclosure's components were included.

Suggestions for further research are to (1) extend the research period so that more data are obtained, (2) add independent variables, and (3) use other proxies to measure performance, such as ROA, EPS, operating profit, and other financial performance indicators.

References

Affifah, H. N., & Syafruddin, M. (2021). Pengaruh Corporate Social Responsibility Terhadap Kinerja Keuangan Perusahaan dengan Risiko Sebagai Variabel Mediasi. Diponegoro Journal of Accounting, 10(2), 1-14. Retrieved from https://ejournal3.undip.ac.id/index.php/accounting/article/view/31022

Ang, J., Murhadi, W. R., & Ernawati, E. (2020). Pengaruh Corporate Social Responsibility terhadap Kinerja Keuangan Perusahaan dan Earning Management sebagai Variabel Moderasi. Journal of Entrepreneurship & Business, 1(1), 11-20. https://doi.org/10.24123/jerb.v1i1.2820

Arifulyah, H., & Nurulita, S. (2016). Analisis Pengaruh CSR Disclosure Terhadap Financial Performance dengan Financial Leverage dan Company Size Sebagai Variabel Moderating. Ekspansi: Jurnal Ekonomi, Keuangan, Perbankan, dan Akuntansi, 8(1), 61-75. Retrieved from https://journal.polban.ac.id/ojs-3.1.2/akuntansi/article/view/103

Bagh, T., Khan, M. A., Azad, T., Saddique, S., & Khan, M. A. (2017). The Corporate Social Responsibility and Firms' Financial Performance: Evidence from Financial Sector of Pakistan. International Journal of Economics and Financial Issues, 7(2), 301-308

Barclays. (2015). Environmental and Social Risk Briefing: General Manufacturing. Retrieved from https://home.barclays/content/dam/home-barclays/documents/citizenship/the-way-we-do-business/General_Manufacturing_Guidance_Note.pdf

Brigham, E. F., & Houston, J. F. (2006). Dasar-Dasar Manajemen Keuangan. Jakarta: Salemba Empat.

CNN Indonesia. (2016). Riset Temukan Kualitas CSR Perusahaan Indonesia Rendah. ASEAN CSR Network. Retrieved from https://www.cnnindonesia.com/nasional/20160721074144-20-146030/riset-temukan-kualitas-csr-perusahaan-indonesia-rendah

Erdianty, R., & Bintoro, I. (2015). Pengaruh Kinerja Keuangan Terhadap Nilai Perusahaan Dengan Corporate Social Responsibility dan Good Corporate Governance sebagai Variabel Pemoderasi (Studi Pada Perusahaan Manufaktur yang Terdaftar di Bursa Efek Indonesia Periode 2010-2014). Jurnal Manajemen Bisnis, 6(2), 376-396. Retrieved from https://journal.umy.ac.id/index.php/mb/article/view/3738

Fahmi, I. (2012). Analisis Kinerja Keuangan. Bandung: Alfabeta.

Fauzi, H., Mahoney, L., & Rahman, A. A. (2007). Institutional Ownership and Corporate Social Performance: Empirical Evidence from Indonesian Companies. Issues in Social and Environmental Accounting, 1(2), 334-347. https://doi.org/10.22164/sea.v1i2.21

Fischer, M., & Rosenzweig, K. (1995). Attitudes of students and accounting practitioners concerning the ethical acceptability of earnings management. Journal of Business Ethics, 14(6), 433–444. https://doi.org/10.1007/bf00872085

Fitriya, E., & Setyorini, L. (2019). Pengaruh Corporate Social Responsibility terhadap Kinerja Keuangan Perbankan dengan Size dan Leverage Ratio Sebagai Variabel Pemoderasi.
Kusumawati, Asyilah, & Bukhori
Corporate Social Responsibility’s (CSR) Impact on Financial Performance: ...
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Corporate Social Responsibility’s (CSR) Impact on Financial Performance: ...

Keuangan Perusahaan Manufaktur yang Terdaftar di Bursa Efek Indonesia Melalui Pojok Bursa FEB–UNSRAT. *Jurnal EMBA: Jurnal Riset Ekonomi, Manajemen, Bisnis dan Akuntansi*, 5(2), 564-571. Retrieved from https://ejournal.unsrat.ac.id/index.php/emba/article/view/15726

Platonova, E., Asutay, M., Dixon, R., & Mohammad, S. (2016). The Impact of Corporate Social Responsibility Disclosure on Financial Performance: Evidence from the GCC Islamic Banking Sector. *Journal of Business Ethics*, 151(2), 451–471. https://doi.org/10.1007/s10551-016-3229-0

Porter, M. E., & Kramer, M. R. (2006). *Strategy and society: The link between competitive advantage and corporate social responsibility*. Harvard Business Review, 84, 78–92. Retrieved from https://hbr.org/2006/12/strategy-and-society-the-link-between-competitive-advantage-and-corporate-social-responsibility

Ruwanti, S., & Rambe, P. A. (2019). Analisis Pengaruh Corporate Social Responsibility Pada Kinerja Keuangan dengan Manajemen Laba Sebagai Variabel Pemoderasi. *Jurnal Ilmu Manajemen*, 8(2), 246-256. Retrieved from https://ejournal3.undip.ac.id/index.php/accounting/article/view/25852

Selviana, M. A., & Isbanah, Y. (2020). Pengaruh CSR, Leverage, Kepe...
Kusumawati, Asyilah, & Bukhori
Corporate Social Responsibility's (CSR) Impact on Financial Performance: ...

Ilmiah Akuntansi, 1(4), 515-524. Retrieved from https://www.ejournal.pelitaindonesia.ac.id/ojs32/index.php/BILANCIA/article/view/186

Wijayanto, K., Sumaryati, A., & Machmuddah, Z. (2021). Pengaruh Moderasi Maajemen Laba pada Hubungan Corporate Social Responsibility terhadap Kinerja Keuangan Perusahaan. Jurnal Akuntansi Indonesia, 10(2), 175-186. Retrieved from http://lppm-unissula.com/jurnal.unissula.ac.id/index.php/iai/article/view/13155

Zhang, Z. (2021). Investigating the effects of corporate social responsibility on financial performance. Journal of Physics: Conference Series, 1903(1), 012068. https://doi.org/10.1088/1742-6596/1903/1/012068