Causality between corporate social responsibility and corporate financial performance

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An Independent Study Submitted in Partial Fulfillment of the Requirements
for the Degree of Master of Science in Finance
Department of Banking and Finance
FACULTY OF COMMERCE AND ACCOUNTANCY
Chulalongkorn University
Academic Year 2021

ผลกระทบระหว่างความรับผิดชอบต่อสังคมขององค์กรกับผลการปฏิบัติงานทางการเงินขององค์กร

น.ส.ญาธิดา ปาลศรี

สารนิพนธ์นี้เป็นส่วนหนึ่งของการศึกษาตามหลักสูตรปริญญาวิทยาศาสตรมหาบัณฑิต
สาขาวิชาการเงิน ภาควิชาการธนาคารและการเงิน
คณะพาณิชยศาสตร์และการบัญชี จุฬาลงกรณ์มหาวิทยาลัย
ปีการศึกษา 2564

Independent Study Title	Causality between corporate social responsibility and corporate financial performance
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Field of Study	Finance
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Accepted by the FACULTY OF COMMERCE AND ACCOUNTANCY, Chulalongkorn University in Partial Fulfillment of the Requirement for the Master of Science

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ญาธิดา ปาลศรี : ผลกระทบระหว่างความรับผิดชอบต่อสังคมขององค์กรกับผลการปฏิบัติงานทางการเงินขององค์กร. (Causality between corporate social responsibility and corporate financial performance) อ.ที่ปรึกษาหลัก : อ. ดร.บุญเลิศ จิตรมณีโรจน์

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สาขาวิชา การเงิน ลายมือชื่อนิสิต .....

ปีการศึกษา 2564 ลายมือชื่อ อ.ที่ปรึกษาหลัก .....

6384015126 : MAJOR FINANCE
KEYWORD: corporate social responsibility, corporate financial performance, Granger causality

Yatida Palasri : Causality between corporate social responsibility and corporate financial performance . Advisor: BOONLERT JITMANEEROJ, Ph.D.

This paper examines the causality relationship between corporate social responsibility (CSR) and corporate financial performance (CFP) of the listed companies in Asian Pacific emerging markets from 2010 to 2020. This paper analyzes the direction of causality between CSR and CFP in five different industries including energy, consumer non-cyclical, financial, technology and healthcare industries. This paper aims to study whether aggregated CSR scores and non-aggregate CSR scores (i.e., environmental, social and governance scores) toward the CFP measures (i.e., return-on-equity and Tobin's Q ratios) have unidirectional or bidirectional relationship. In doing so, the bivariate panel vector autoregressive model and Granger causality test are used as the main methodology to analyze the unbalance panel data. In addition, several exogeneous factors are included in the model as control variables.

The results reveal that CFP measured by Tobin's Q ratio negatively influences corporate governance pillar of CSR in energy industry. Moreover, the results show the negative influence of Tobin's Q toward the aggregated CSR, environment pillar and social pillar in financial industry. These results conclude that the causality relationship between CSR and CFP vary across industries and that the use of different CFP measures generate different results.

Field of Study:	Finance	Student's Signature .....
Academic Year:	2021	Advisor's Signature .....

ACKNOWLEDGEMENTS

I would like to express my sincere gratitude to my advisor, Professor Boonlert Jitmaneeroj, I would like to thank you for your continuous support throughout the processes of completing my special project. Your guidance did not only help me overcome all difficulties but also encourage me to keep motivating and putting my potential beyond my limitation. I was so grateful that I had you as my special project advisor.

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1. Introduction

There are many literatures that studied the impact of corporate social responsibility (CSR) on corporate financial performance (CFP), which were evidenced by a meta-analysis (Margolis and Walsh, 2003; Orlitzky, Schmidt and Rynes, 2003). The main finding confirmed by the meta-analyses shows a positive correlation between CSR and CFP. Generally, investments in CSR seem to benefit companies (Dixon-Fowler et al., 2012; Margolis and Walsh, 2003; Orlitzky, Schmidt and Rynes, 2003). According to Freeman (1984), stakeholder theory is the mirror image of corporate social responsibility (CSR). The theory has been used as a conceptual framework to link between CSR and CFP as it is suggested that businesses create long-term relationships with their stakeholders (Freeman, 1984), and finally enhance operational performance (Hillman and Keim, 2001).

While there has been extensive studies of the relationship between CSR and CFP through the stakeholder theory, there are only few literatures that investigate whether causation between CSR and CFP may also run from CFP to CSR. According to Melo (2012), slack resource argumentation hypothesized that companies will not behave in accordance with stakeholder theory. In other words, the assumption that superior CFP comes as a result of a strategic CSR is reverse. Based on a meta-analysis, Orlitzky, Schmidt and Rynes (2003) stated that the firms should be able to have enough slack resource in order to invest more in CSR, which in turn has a positive influence on CFP. Additionally, Orlitzky, Schmidt and Rynes (2003) recognized both concepts, stakeholder theory and slack resources descriptions, relate to each other reciprocally

that could be further conclude that there is a bidirectional relationship between CSR and CFP.

According to Barnett (2007), “Corporate social performance may be described as a snapshot of a firm’s overall social performance at a particular point in time – a summary of the firm’s aggregate social posture”. This implies that CSR occurred at different point in time for each firm. Moreover, it is possible that CFP happened before CSR and vice versa. As supported by Tuppura, Arminen, Pätäri and Jantunen (2016) that,”there is no conclusive answer to the chicken-or-egg problem of whether CSR results in increased profitability or vice versa”. Besides, in order to analyze bidirectional relationship between CSR and CFP, different industry contexts have to be considered.

It is suggested by Brønn and Vidaver-Cohen (2008) that the motives for corporate social initiative vary across the industries represent. This results from the stakeholders’ sensitivity or possibility to react to companies’ to its related industry. Therefore, it is convinced that the link between CSR and CFP differs between industries. Moreover, different levels of market developments and geographical regions could generate mixed result as well, this statement is supported by the institutional theory (Jennings and Zandbergen, 1995; Joardar and Sarkis, 2014). Multiple literatures have studied the causal relationship between CSR and CFP especially in the context of the United States listed firms. However, finding causality using the sample of listed firms in emerging Asia Pacific countries also remains unexplored.

2. Motivation

Emerging Asia Pacific countries compose of many undeveloped countries compared to other geographical regions. In the past recent years, there has been evidences of an increase in environmental and social capital expenditure, especially in the Association of Southeast Asian Nations (ASEAN) countries. Emerging Asia Pacific countries are greatly diverse in economy, culture, legal framework, and more importantly, public awareness related to sustainability issues. Because of these reasons, the results of this empirical study applying the listed firms in emerging Asia Pacific countries would be interesting and useful for several groups of people.

Over the last few decades, corporate social responsibility (CSR) has become a popular instrument for modern businesses to attract potential investors and interact with stakeholders (Xu and Lee, 2019; Yang, Chang, Chen and Shiu, 2019). As the investors believe that the company, engaging with CSR activities, tend to have better financial performance. Besides, in the view of corporate managers, the financial performance is a critical factor when they decide whether or not to take part in social responsibility programs (Zhu, Liu and Lai, 2016). Since there is no final answer of this causality, whether which come first CSR or CFP, this paper aims to find the causal relationship between CSR and CFP by applying the Granger causality test, using the sample data of emerging Asia Pacific listed firms in different industry groups.

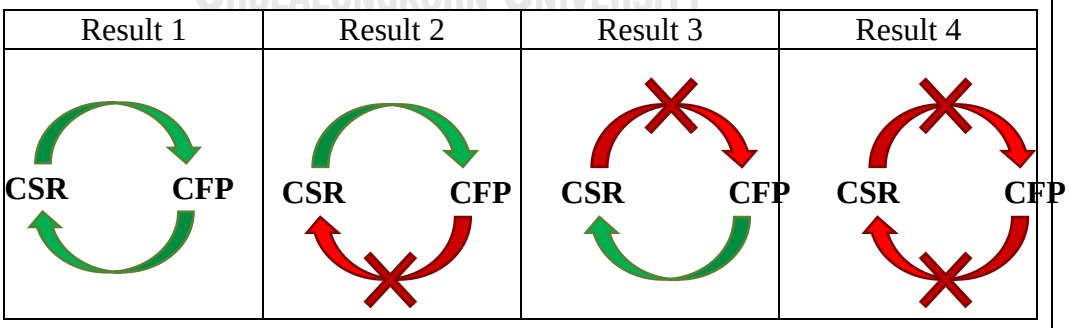
This study adds on to the existing literature in different ways. First, there is a scarcity of prior studies that examine the Granger causality between CSR and CFP in emerging Asia Pacific countries. Second, this study benefits from a unique data set obtained from the Rifinitiv ESG scores. In contrast to prior studies that examine Granger causality using equally weighted CSR measures for each dimension of CSR,

which are Environment, Social, and Corporate governance, Rifinitiv ESG scores apply different weighted scores for each dimension based on focused CSR related issues of each industry. Last, compared to previous studies, public interest in CSR concerns has increased over time, using recent time period could generate different results.

3. Contribution

Finding Granger causality between CSR and CFP, generates various results as shown in **Figure 1**. It could be that CSR granger-cause CFP and vice versa. Another possible result is that CSR granger-cause CFP but not the other way around. In the same way as CFP granger-cause CSR but CSR does not granger-cause CFP. The other result is no bilateral causality relationship at all. These variation of results benefit various groups of people in different ways. Three beneficial groups of people are socially responsible investors, corporate managers and regulators.

Figure 1 **Four possible Granger causality relation results**



Nowadays, it cannot be denied that many investors look for CSR activities in each firm and take them as one of the components in making investment decisions. As

it is discovered by Chatzitheodorou, Skouloudis, Evangelinos and Nikolaou (2019), some types of investors move to social responsible investors (SRIs) primarily to take advantage of new financial opportunities or to minimize potential risks with respect to the environmental and social aspects of sustainability. This paper will enable the SRIs to evaluate their investment opportunities more efficiently that they could find the best timing for their investments. In addition, it would also help them to identify which business sectors they should include the ESG scores for company valuation, with the possibility of performance enhancement that increase firm value.

For corporate managers, incorporating the empirical results will mainly help them for their asset allocation processes and risk managements. Particularly, the results benefit the corporate managers to correctly implement the suitable corporate strategies for firms in different industries. In other words, they can prioritize whether to emphasize on either the organizational profit or CSR first. Corporate managers could also be more assured that the allocation of company's resources will in turn result in profitability. Besides, specific type of industries will have to deal with its particular risk management. Better risk management could be more effectively handled using the results obtained from this paper.

According to Rjiba, Jahmane and Abid (2020), investing in CSR practices could have significant policy implications for regulators and public policymakers especially in emerging markets as their paper uncovered the positive impact of CSR on financial performance at times of severe uncertainty. Nonetheless, this paper will reveal different results of bilateral relationship between CSR and CFP, the results might be vary across industries or there could be no correlation at all. This means that the regulators could enact the policies more reasonable and appropriate for different business sectors. The

regulators could legalize the law in support of the company in specific sectors that have a positive correlation between CSR and CFP, convincing them to invest more in CSR.

4. Literature reviews

4.1 Causality between corporate social responsibility and corporate financial performance

Academic research has looked into the causal relationship between corporate social responsibility (CSR) and corporate financial performance (CFP) whether the "virtuous circle" exists and whether companies with better financial results commit more resources to social activities (Nelling and Webb, 2008). Virtuous circle refers to a repeating cycle of committing to socially responsible programs, which will then lead to better financial performance and the other way around. The existence of such a virtuous cycle is also supported by the results of Martínez-Ferrero and Frías-Aceituno (2013), Waddock and Graves (1997) and Hillman and Keim (2001) that the increase in CSR leads to an improvement in financial success and vice versa. However, there are also studies that propose that the result of a strong relationship may not necessary occur in both directions. Thus, it can be concluded that the empirical evidences on the association between CSR and CFP are diverse.

A few empirical studies applying the Granger causality test do not consistently support the bidirectional relationship. Granger causality, in contrast to traditional causality, indicates that changes in one variable occur before changes in another variable, but not that they cause the changes. Applying Granger causality tests, Lev,

Petrovits and Radhakrishnan (2009) found that charitable contributions were strongly related to future revenue, whereas the linkage between revenue and future contributions were rather weak. On the other hand, Scholtens (2008) concluded that financial performance precedes social performance much more often than the reverse. Nelling and Webb (2008) found that there was no evidence that CSR influences CFP, and there was little evidence that CFP influenced CSR. Finally, Schreck (2011) did not find any causal relationships between CSR and CFP at all.

The inconsistent results are due in part to the context-specific nature of CSR as suggested by Tuppura, Arminen, Pätäri and Jantunen (2016). Specifically, in different industries, the importance of responsible business practices and the efforts done to advance sustainability vary. As the industries are different by nature, their effects on society and the environment, as well as the ensuing CSR expectations of the stakeholders also differ (Panwar, Hansen and Anderson, 2010). Thus, analyzing these industries separately clarifies the causation between CSR and CFP and its context-dependency. In the next section, the focus sectors are discussed.

H1. The causality relationships between CSR and CFP differ in different industries

4.2 Corporate social responsibility in the focus industries

The Refinitiv Business Classifications (TRBC) is used to separate all emerging Asia Pacific listed firms into five different industry groups which are Energy, Consumer non-cyclicals, Financial, Technology and Healthcare industries. These five industries were chosen based on diversity of business nature. Specific industry has been used in previous studies to examine Granger causality between CSR and CFP. However, this paper applies sample listed firms from emerging Asia Pacific region, which is in

contrast with prior studies that mostly focus on developed countries such as the United States and European countries. Market development in the two markets, developed countries and emerging countries, are diverse in many aspects that the concerns toward social responsibility might be differ.

Energy industry

It can be said that firms in the energy sector are a forerunner that develop CSR-related concerns due to its nature of business (Pätäri, Arminen, Tuppura and Jantunen, 2014). Nonetheless, in the 2000s, the CSR-related concerns are thought to be result from a legal obligation imposed by legislation rather than on the companies' voluntariness (Sharratt, Brigham and Brigham, 2007). This means that law and regulation of each country enacted particularly for energy industry are related to CSR programs executed by the companies in the past. Still, because the energy industry is obvious in the company's model that directly affect the environment, the stakeholder expectation and social needs are increasingly facing board requirements as the time passes (Araújo, 2014). Thus, it is in support that the main sustainability concern is in environmental pillar, which focus on resource use, emissions and innovation category.

Consumer non-cyclical industry

Consumer non-cyclical industry refers to a group of companies that produce or sell necessary goods and services that are in demand regardless of economic condition. These include food and beverages, tobacco, household and pharmaceutical products.

Because the products and services of this industry are essential, customer choice and royalty are the determination of the business success. This is supported by Lamberti and Noci (2012) study, which specified that corporate credibility had a favorable impact on buying decisions of consumers and their attitude towards the company. Moreover, Jayakumar (2013) revealed that positive CSR relationship was more likely to lead to a good image and satisfactory consumers' reaction toward products or services of the firm. As a result, it can be stated that CSR activities of firms are one of the factors that promote customer choice and royalty. Since the nature of consumer non-cyclical industry is weigh on labor intensive of supply chains and issue with regard to food safety and security practices (Maloni and Brown, 2006). Social pillar on workforce and product responsibility categories is the concern for this industry.

Financial industry

Financial industry seems not related much to CSR activities as there are only few literatures that studied the direct impact of CSR on CFP and they only focused on the banking industry. Moreover, the studies did not show the direct association toward the corporate financial performance, but either aggregating moderating variables or using other measurements as dependent variable. For example, Zhou, Sun, Luo and Liao (2021) found that applying green credit as a moderating variable created a positive relationship between CSR and CFP in the long run. In addition, Ruiz and García (2021) implied that bank committed CSR policies programs would positively affect its reputation. It also proposed that banks should first attain a high degree of internal performance in terms of the integrity of their governance and their reputation as a good employer before engaging in socially responsible programs since the customers'

credibility toward bank was crucial. Thus, the focus areas that the financial firms should emphasize are more toward governance and social pillars, which include management, CSR strategy, work force and community category.

Technology industry

The nature of technology industry is considered to be one of the volatile industries since technology continuously changing, which implies a lot of competitions. The technology industry is comprised of companies that offer goods and services, including hardware, software, semiconductors, and consulting services. A few studies claimed that technological industries could increase their economic performance through CSR (Chang, 2007). However, some studies also refuted and purposed that the relationship is negative (Muñoz, Pablo and Peña, 2015). It is also suggested by Bernal-Conesa, Briones-Peñalver and Nieves-Nieto, (2017) that in order to have a greater chance of survival in the market, CSR has to be integrated into business processes in order to generate innovative practices and finally improved competitiveness. Thus, environment pillar in innovation category and social pillar in product responsibility category are two mains sustainability concerns for technology industry.

Healthcare industry

The healthcare industry is considered to be socially responsible industry in the view of healthcare practitioners such as doctors, nurses and pharmacists. However, apart from socially responsible conducts of individual practitioners, socially responsible in the term of organization demands a more consolidated awareness toward organization’s goal. Since the healthcare industry not only includes hospitals but also

companies engaged in the production and delivery of medicine and healthcare related products, management category in governance pillar is the main CSR attribute for this industry. In addition, it is proposed by Russo (2014) that shared governance and professional responsibility were a complete approach in both medicine and cooperation for the corporate good as well as for the health of the patient in which therefore constructed CSR in healthcare industry.

4.3 Corporate financial performance measures

Because of the distinct aspects and repeatedly goals changing of the organization, it is very difficult to define the term organizational performance (Chow, Heaver and Henriksson, 1994; Conde, Sampedro, Feliu and Sánchez, 2012). Uncertainty over the relationship between financial and social performance partially due to the lack of consensus on the measurement of financial performance (Scholtens, 2008). McGuire, Sundgren and Schneeweis, (1988) compared accounting-based and stock market-based measures. Since different aspects apply for both measures, each of them are bounded by particular biases.

The accounting-based measure has been chastised for its backward-looking element, which constrained by standards established by the accounting profession. Thus, it is biased due to the variations in accounting procedures and managerial influences (Scholtens, 2008). On the contrary, the market-based measurement is distinguished by its forward-looking nature and its reflection of the expectations of shareholders concerning the firm's future performance, which is less prone to accounting rules and managerial influences (Shan and McIver, 2011). However, the bias of the market-based measures is that if there is asymmetric information, market-

based measurement may not accurately reflect investor evaluation (Scholtens, 2008).

Two different measures of CFP are used to cope with one-sidedness bias and to analyze firm performance from different perceptions (Melo, 2012). In this paper, return on assets (ROA) is used as an accounting-based measure and Tobin's Q as a market-based measure. As for the fact that ROA gauges the company's operational and financial performance that resulted from management actions in the past (Klapper and Love, 2002), the higher ROA shows the company's efficient use of its assets in supporting its shareholder's economic interests (Ibrahim and Samad, 2011). As a result, when a company achieves a positive ROA, it demonstrates its accomplishment of prior planned high performance (Nuryanah and Islam, 2011).

While Tobin's Q refers to a traditional measure to project long-run firm performance that is calculated as the market value of a company divided by the replacement value of the firm's assets. A high Tobin's Q ratio indicates that the firm has successfully leveraged its investment to develop the company that is valued more in terms of its market value than its book value (Kapopoulos and Lazaretou, 2007). Thus, it can be inferred that return on assets (ROA) and Tobin's Q should be the two measures used as measurements of corporate financial performances.

H2. The choice of CFP measures has different implications for the results concerning the CFP and CSR relationship.

5. Data

Six unbalanced panel data sets of emerging Asia Pacific listed firms, from 2010 to 2020, are used in this paper. Five of which were applied for each of the industries.

One unbalance panel was the combination of all samples of the five industries. The main data for this empirical study are the measurements of CSR and CFP, which composed of four proxies of CSR scores and two proxies of CFP.

The four measurements of CSR are measured with the letter grades from D- to A+, which are converted from percentile rank scores, provided by Refinitiv ESG scores. ESG stands for Environmental (E), Social (S), and Governance (G), and their combinations refer to socially responsible investment as these elements are the three important measures for corporate sustainability (Nicolosi, Grassi and Stanghellini, 2014; Crifo, Forget and Teyssier, 2015). In this paper, four proxies of CSR scores which are aggregate CSR scores, Environmental pillar scores, Social pillar scores, and Governance pillar scores, will be applied in order to account for the different causal effect of CSR. The aggregate CSR scores are benchmarked against TRBC Industry Group for all Environmental and Social pillars, and against the country for all Governance pillars. Furthermore, aggregate CSR scores are calculated from Industry specific weights from each of the Environmental, Social and Governance pillars.

The table below shows descriptive statistics of aggregate CSR scores (ESG), Environmental pillar scores (ENV), Social pillar scores (SOC), and Governance pillar scores (GOV). The table summarizes time-varying statistics including the number of observations (Obs.), average (Mean), standard deviations (SD), minimum value (Min), and maximum value (Max) of all industries, Energy industry, Consumer non-cyclical industry, Financial industry, Technology industry and Healthcare industry

Descriptive statistics of CSR scores

Industry	Year	Obs.	ESG				ENV				SOC				GOV			
			Mean	SD	Min	Max	Mean	SD	Min	Max	Mean	SD	Min	Max	Mean	SD	Min	Max
All industries	2010	150	40.02	18.63	3.40	85.69	27.14	26.51	0.00	91.65	36.50	21.55	1.73	89.02	52.08	22.74	6.11	92.39
	2011	258	38.87	20.77	2.51	88.87	26.73	26.89	0.00	96.17	34.39	22.63	0.23	93.79	52.42	24.52	2.43	95.93
	2012	285	38.77	21.70	3.28	88.12	27.41	27.14	0.00	96.33	34.57	23.93	0.37	91.27	51.62	24.24	1.49	95.75
	2013	298	41.22	21.97	2.96	92.32	30.56	27.61	0.00	94.96	38.29	24.86	0.63	93.15	51.61	23.56	1.16	96.12
	2014	318	40.84	22.04	3.38	91.12	30.48	27.42	0.00	95.10	37.94	25.38	0.17	97.15	50.88	23.47	0.47	95.94
	2015	333	42.18	21.75	2.33	92.28	31.87	27.09	0.00	93.67	39.89	25.19	0.48	93.14	51.03	23.66	1.03	95.91
	2016	356	44.22	21.79	1.31	92.32	33.32	26.85	0.00	92.77	43.81	25.63	0.49	96.45	50.87	23.81	3.17	95.24
	2017	425	44.67	21.43	0.86	91.00	34.15	26.59	0.00	98.39	44.90	25.43	0.34	96.78	49.90	23.40	0.42	96.73
	2018	519	44.57	21.46	0.68	92.38	35.04	25.97	0.00	97.29	44.22	25.67	0.63	96.27	49.64	23.94	0.31	95.02
	2019	677	43.10	20.97	1.59	91.14	33.80	26.58	0.00	97.06	42.31	25.64	0.78	97.39	48.85	22.65	1.18	98.70
	2020	797	44.24	20.90	1.00	91.41	35.58	26.62	0.00	97.58	44.15	25.27	0.46	97.46	48.98	23.05	0.15	96.46
Energy industry	2010	24	44.16	17.27	8.15	75.13	40.26	23.81	0.00	79.23	42.05	21.48	2.92	84.58	50.74	24.18	6.11	87.12
	2011	36	43.85	19.09	13.18	86.75	40.79	24.56	0.00	93.10	41.78	22.90	1.40	93.79	51.06	21.18	19.60	94.70
	2012	39	46.25	19.03	15.17	87.35	43.54	25.57	0.00	91.64	43.39	23.23	1.61	91.02	53.75	20.30	12.27	94.98
	2013	40	46.81	20.91	12.08	88.92	46.04	26.68	0.00	90.29	45.32	24.40	2.02	93.15	49.89	21.49	12.22	94.12
	2014	42	46.42	21.80	9.08	88.28	45.92	27.04	0.00	92.06	45.25	25.65	3.00	97.15	48.51	22.14	18.54	94.00
	2015	42	48.12	19.78	7.91	80.82	48.31	25.61	0.00	91.93	47.58	25.04	2.97	90.74	47.77	20.87	13.62	92.08
	2016	44	48.20	19.40	7.88	82.31	47.48	23.80	0.00	92.62	49.58	23.33	3.22	92.54	46.27	23.80	6.63	91.52
	2017	48	49.03	19.48	10.22	83.04	48.94	24.28	0.00	93.65	49.64	24.69	5.37	92.96	46.94	22.94	6.17	92.28
	2018	54	49.86	19.21	12.05	83.22	50.87	22.67	3.83	93.46	51.02	24.07	2.16	87.83	46.02	23.42	6.01	87.26
	2019	58	51.61	18.45	12.97	85.63	52.26	22.98	2.50	94.29	53.43	22.87	11.39	89.05	47.59	23.88	5.91	88.79
	2020	65	55.10	18.10	7.93	87.76	55.18	22.47	2.63	93.75	56.19	22.31	13.75	92.69	52.43	25.04	1.93	94.09
Consumer non-cyclical industry	2010	29	34.62	20.79	3.40	79.64	26.45	26.51	0.00	79.84	32.70	21.45	3.14	81.73	46.75	22.77	6.73	87.05
	2011	40	30.53	20.96	2.93	77.57	23.41	24.70	0.00	76.66	28.50	22.11	2.82	83.29	41.62	23.87	4.11	88.75
	2012	50	29.98	21.59	5.04	76.04	21.86	24.50	0.00	77.22	27.03	24.14	0.37	86.92	43.59	24.28	9.89	86.81
	2013	53	32.05	21.85	4.70	77.03	24.79	24.78	0.00	85.28	29.82	24.84	0.83	92.28	43.51	23.00	5.56	86.02
	2014	56	31.90	21.73	3.38	76.39	25.62	26.19	0.00	88.65	29.98	25.12	0.67	91.73	41.64	20.79	3.07	81.18
	2015	58	33.56	22.28	3.65	76.58	27.83	26.07	0.00	87.48	31.52	25.30	2.50	88.89	43.04	23.21	3.47	89.43
	2016	66	34.47	23.38	1.31	86.66	28.54	27.86	0.00	89.83	34.19	27.25	0.55	96.45	41.17	22.59	3.17	83.06
	2017	73	35.50	24.23	0.99	87.22	30.76	28.25	0.00	91.56	35.33	27.46	0.94	95.98	40.75	24.49	0.42	86.26
	2018	88	38.14	22.38	0.68	86.50	34.01	26.98	0.00	94.59	37.04	26.12	0.68	96.27	44.28	23.39	0.31	85.06
	2019	116	36.90	21.53	3.57	87.29	31.54	26.89	0.00	94.28	34.90	26.43	0.83	97.39	45.89	21.32	3.07	98.70
	2020	139	38.51	21.29	2.81	89.96	32.98	26.75	0.00	96.16	36.82	25.70	0.74	97.18	47.17	21.24	5.72	96.46
Financial industry	2010	53	35.72	13.05	6.53	61.92	13.26	17.84	0.00	67.68	31.60	16.00	4.11	68.09	50.06	21.51	10.14	81.71
	2011	90	37.76	16.90	4.29	84.31	16.13	21.59	0.00	87.90	32.16	19.37	0.55	88.62	53.26	23.67	3.66	95.68
	2012	94	38.79	18.33	6.13	85.89	18.45	22.61	0.00	88.60	35.00	21.07	0.54	88.93	51.31	23.45	1.49	93.25
	2013	99	42.03	18.62	2.96	82.76	22.73	24.57	0.00	90.39	39.57	22.06	0.79	86.17	52.37	22.03	1.16	89.60
	2014	103	41.92	19.00	5.42	83.32	23.88	24.22	0.00	88.75	39.96	22.55	3.86	84.80	51.23	22.52	0.47	87.45
	2015	107	43.85	18.64	5.50	80.12	25.93	24.52	0.00	86.87	42.18	22.43	2.59	84.76	52.42	21.73	6.63	88.54
	2016	111	47.69	18.26	9.83	86.92	29.82	24.36	0.00	83.44	48.56	22.31	4.00	89.60	52.99	21.94	6.03	88.37
	2017	133	48.43	17.90	10.68	88.34	32.27	24.65	0.00	86.68	49.66	22.17	1.90	96.24	52.30	21.30	5.38	88.67
	2018	158	49.65	17.93	2.42	87.62	33.38	24.76	0.00	86.43	49.38	22.70	2.28	93.20	55.18	20.90	2.04	91.14
	2019	184	49.42	19.11	1.59	86.47	34.75	25.88	0.00	87.09	49.79	23.04	1.49	96.82	53.54	22.13	1.39	92.36
	2020	205	50.35	19.26	5.20	87.33	37.36	26.91	0.00	92.14	51.23	23.10	0.51	93.11	53.33	22.59	5.89	92.92

Industry	Year	Obs.	ESG				ENV				SOC				GOV			
			Mean	SD	Min	Max	Mean	SD	Min	Max	Mean	SD	Min	Max	Mean	SD	Min	Max
Healthcare industry	2010	6	26.74	27.37	4.67	79.87	9.33	17.65	0.00	44.88	26.15	33.41	1.73	89.02	38.53	30.78	12.50	91.86
	2011	10	24.40	22.69	6.95	85.73	10.81	18.64	0.00	61.36	21.21	26.88	2.00	91.94	37.60	23.67	16.70	94.32
	2012	13	22.29	20.35	6.34	85.02	10.07	16.80	0.00	60.97	18.86	22.96	3.64	91.27	35.18	22.86	8.40	93.32
	2013	16	26.20	17.15	4.77	85.13	10.17	16.32	0.00	65.20	21.73	20.54	2.81	89.68	42.29	19.81	9.57	92.96
	2014	20	27.12	16.43	5.73	85.99	10.01	15.53	0.00	67.03	20.96	20.24	2.80	88.78	46.82	20.32	6.93	95.71
	2015	26	30.31	16.26	2.33	79.51	13.75	15.18	0.00	63.46	25.99	19.05	1.34	78.56	47.02	19.93	5.13	92.70
	2016	31	33.40	18.33	5.13	81.55	14.87	17.14	0.00	66.68	30.66	21.76	1.39	79.68	49.44	21.93	12.89	95.24
	2017	43	35.39	15.91	4.33	81.74	19.63	17.29	0.00	64.01	34.34	19.28	0.34	80.41	47.78	21.56	10.40	96.73
	2018	58	34.20	17.44	0.85	82.63	23.41	19.11	0.00	66.71	32.23	19.68	0.63	82.48	44.48	22.98	1.59	95.02
	2019	95	35.34	17.74	2.42	84.44	25.69	21.05	0.00	76.22	32.88	20.58	0.78	85.05	45.31	22.86	1.18	94.78
	2020	120	38.04	17.98	1.65	85.35	30.80	22.56	0.00	81.64	36.94	22.36	0.46	91.48	44.53	21.87	0.73	90.09
Technology industry	2010	38	49.63	18.99	18.91	85.69	41.54	28.38	0.00	91.65	44.36	24.05	2.21	83.25	61.95	19.72	22.31	92.39
	2011	82	43.74	23.06	2.51	88.87	35.75	29.28	0.00	96.17	38.08	24.26	0.23	89.96	59.17	25.08	2.43	95.93
	2012	89	42.79	23.81	3.28	88.12	35.44	29.22	0.00	96.33	36.79	25.32	1.17	88.93	57.94	24.88	4.04	95.75
	2013	90	45.90	24.11	3.34	92.32	39.33	28.56	0.00	94.96	41.68	26.59	0.63	91.64	57.96	25.34	1.92	96.12
	2014	97	45.26	23.93	4.14	91.12	37.82	28.29	0.00	95.10	40.73	27.02	0.17	90.66	57.69	25.28	0.97	95.94
	2015	100	45.99	24.22	3.86	92.28	38.35	28.37	0.00	93.67	42.68	27.17	0.48	93.14	56.60	26.46	1.03	95.91
	2016	104	48.24	23.40	1.45	92.32	39.60	27.98	0.00	92.77	46.33	27.24	0.49	94.90	57.13	25.03	4.38	95.05
	2017	128	47.47	23.14	0.86	91.00	37.36	28.02	0.00	98.39	47.19	27.29	0.99	96.78	54.45	24.25	1.62	93.61
	2018	161	45.06	23.99	1.08	92.38	36.09	27.36	0.00	97.29	45.11	28.36	1.22	95.65	50.22	26.44	1.70	93.86
	2019	224	42.20	21.83	2.91	91.14	32.86	27.88	0.00	97.06	41.13	27.17	1.30	93.49	48.37	22.90	2.55	92.33
	2020	268	42.67	21.64	1.00	91.41	32.97	26.94	0.00	97.58	42.84	26.18	0.93	97.46	47.73	23.82	0.15	94.93

The number of observations is time-varying across six sample groups, which resulted in unbalanced panel data. In other words, the aggregated and non-aggregate CSR scores have become more available to public that increase the number of observation.

Comparing the four proxies of CSR measures with time variation in all industries sample group, there is a trend that show that ESG, ENV, and SOC are increasing; whereas, the trend of GOV is decreasing. Still, when examining each of the industry sample group individually, ESG, ENV, SOC, and GOV show increasing trend in Consumer non-cyclical industry, Financial industry, and Healthcare industry. However, GOV in energy industry shows downward trend. In the same way as ESG, ENV, GOV in technology industry also illustrate decreasing trend. These two sample

groups are the reason of a downward trend in GOV for all industries sample group. However, the slight downward trend of ESG and ENV in technology industry does not affect ESG and ENV of all industries sample group. In addition, the standard deviation for each CSR measure does not show significant change across time in all six sample groups.

By industry, the average score of aggregated CSR and non-aggregate CSR are compared, the table shows that the energy industry has the highest average score of ESG, ENV, SOC and the healthcare industry has the lowest average score for all of the four CSR measures. Not taking into account subdivided industry groups, comparing the average scores among CSR measures, GOV has the highest average scores. On a contrary, ENV has the lowest average scores.

CFP measures and other financial data used in this paper are obtained from Datastream and Thomson Reuters. To examine company performance from two different perspectives, two separate CFP measures are employed (Melo, 2012). Return on assets (ROA) and Tobin's Q are used for accounting-based and market-based measures, respectively. Tobin's Q are obtained from Datastream; whereas, Return on assets (ROA) other financial data used as control variables are obtained from Thomson Reuters.

6. Methodology

According to Granger (1969), Granger causality test is used to analyze the relationship between CSR and CFP. Although it is closely related to the idea of cause and effect, it is not exactly the same. Granger causality cannot be used to infer whether changes in a variable have a positive or negative impact on another variable. Instead, it explains if the past values of CSR help explain CFP even after the impact of the previous values of CFP is taken into consideration. If the answer is yes, it is said that the CSR variable Granger-causes CFP variable. Granger causality is said to be more powerful than simple contemporaneous correlation at directing the presence of traditional causation (Geweke, 1984). Examining Granger causality is appropriate when reverse causality and simultaneity concerns prevent statistical inference based on normal regression analysis (Tuppura, Arminen, Pätäri and Jantunen, 2016).

Following Lin, Law, Ho and Sambasivan, (2019), the Granger causality test conducted in this paper employed an estimation of Panel Vector Autoregression model (Panel VAR) using a package of programs created by Abrigo and Love (2016) in STATA 17. The basis of this program is the framework for a Generalized Method of Moments (GMM). Panel VAR is a form of model that allow all the dependent variables being studied have to be lagged dependent variables in which solve the problems of reverse causality and endogeneity arising from simple contemporaneous causality. In addition, since the endogenous and exogenous factors have influences on each other it is a challenging task to find an estimation of the relationship between CFP and CSR. However, this can be addressed by using Panel VAR model.

Thus, Eight Panel VAR models will be assessed to conduct Granger causality test. As this paper used two measures of CFP, and four measures of CSR scores, eight sets of Granger causality equations are applied for each industry. Therefore, the test for bilateral Granger causality between CSR and CFP can be performed in accordance with the following equations:

1. Granger causality test between Aggregate CSR and ROA

$$ROA_{it} = \alpha_0 + \sum_{j=1}^{n} \alpha_j ROA_{i,t-j} + \sum_{k=1}^{n} \beta_k ESG_{i,t-k} + \{\lambda_1 AGE_{it} + \lambda_2 \ln(SIZE_{it}) + \lambda_3 ADV_{it} + \lambda_4 R\&D_{it}\} + e_{1\,it} \quad (\mathbf{1.1})$$

$$ESG_{it} = \gamma_0 + \sum_{j=1}^{n} \gamma_j ROA_{i,t-j} + \sum_{k=1}^{n} \delta_k CSR_{i,t-k} + \{\lambda_1 AGE_{it} + \lambda_2 \ln(SIZE_{it}) + \lambda_3 ADV_{it} + \lambda_4 R\&D_{it}\} + e_{2\,it} \quad (\mathbf{1.2})$$

2. Granger causality test between Aggregate CSR and Tobin's Q

$$TQ_{it} = \alpha_0 + \sum_{j=1}^{n} \alpha_j TQ_{i,t-j} + \sum_{k=1}^{n} \beta_{i,k} ESG_{i,t-k} + \{\lambda_1 AGE_{it} + \lambda_2 \ln(SIZE_{it}) + \lambda_3 ADV_{it} + \lambda_4 R\&D_{it}\} + e_{3\,it} \quad (\mathbf{2.1})$$

$$ESG_{it} = \gamma_0 + \sum_{j=1}^{n} \gamma_j TQ_{i,t-j} + \sum_{k=1}^{n} \delta_{i,k} CSR + \{\lambda_1 AGE_{it} + \lambda_2 \ln(SIZE_{it}) + \lambda_3 ADV_{it} + \lambda_4 R\&D_{it}\} + e_{4\,it} \quad (\mathbf{2.2})$$

3. Granger causality test between Environmental Pillar and ROA

$$ROA_{it} = \alpha_0 + \sum_{j=1}^{n} \alpha_j ROA_{i,t-j} + \sum_{k=1}^{n} \beta_k ENV_{i,t-k} + \{\lambda_1 AGE_{it} + \lambda_2 \ln(SIZE_{it}) + \lambda_3 ADV_{it} + \lambda_4 R\&D_{it}\} + e_{1\,it} \quad (\mathbf{3.1})$$

$$ENV_{it} = \gamma_0 + \sum_{j=1}^{n} \gamma_j ROA_{i,t-j} + \sum_{k=1}^{n} \delta_k ENV_{i,t-k} + \{\lambda_1 AGE_{it} + \lambda_2 \ln(SIZE_{it}) + \lambda_3 ADV_{it} + \lambda_4 R\&D_{it}\} + e_{2\,it} \quad (\mathbf{3.2})$$

4. Granger causality test between Environmental Pillar and Tobin's Q

$$TQ_{it} = \alpha_0 + \sum_{j=1}^{n} \alpha_j TQ_{i,t-j} + \sum_{k=1}^{n} \beta_{i,k} ENV_{i,t-k} + \{\lambda_1 AGE_{it} + \lambda_2 \ln(SIZE_{it}) + \lambda_3 ADV_{it} + \lambda_4 R\&D_{it}\} + e_{3\,it} \quad (\mathbf{4.1})$$

$$ENV = \gamma_0 + \sum_{j=1}^{n} \gamma_j TQ_{i,t-j} + \sum_{k=1}^{n} \delta_{i,k} ENV_{i,t-k} + \{\lambda_1 AGE_{it} + \lambda_2 \ln(SIZE_{it}) + \lambda_3 ADV_{it} + \lambda_4 R\&D_{it}\} + e_{4\,it} \quad (\mathbf{4.2})$$

5. Granger causality test between Social Pillar and ROA

$$ROA_{it} = \alpha_0 + \sum_{j=1}^{n} \alpha_j ROA_{i,t-j} + \sum_{k=1}^{n} \beta_k SOC_{i,t-k} + \{\lambda_1 AGE_{it} + \lambda_2 \ln(SIZE_{it}) + \lambda_3 ADV_{it} + \lambda_4 R\&D_{it}\} + e_{1\,it} \quad (\mathbf{5.1})$$

$$SOC_{it} = \gamma_0 + \sum_{j=1}^{n} \gamma_j ROA_{i,t-j} + \sum_{k=1}^{n} \delta_k SOC_{i,t-k} + \{\lambda_1 AGE_{it} + \lambda_2 \ln(SIZE_{it}) + \lambda_3 ADV_{it} + \lambda_4 R\&D_{it}\} + e_{2\,it} \quad (\mathbf{5.2})$$

6. Granger causality test between Social Pillar and Tobin's Q

$$TQ_{it} = \alpha_0 + \sum_{j=1}^{n} \alpha_j TQ_{i,t-j} + \sum_{k=1}^{n} \beta_{i,k} SOC_{i,t-k} + \{\lambda_1 AGE_{it} + \lambda_2 \ln(SIZE_{it}) + \lambda_3 ADV_{it} + \lambda_4 R\&D_{it}\} + e_{3\,it} \quad (\mathbf{6.1})$$

$$SOC_{it} = \gamma_0 + \sum_{j=1}^{n} \gamma_j TQ_{i,t-j} + \sum_{k=1}^{n} \delta_{i,k} SOC_{i,t-k} + \{\lambda_1 AGE_{it} + \lambda_2 \ln(SIZE_{it}) + \lambda_3 ADV_{it} + \lambda_4 R\&D_{it}\} + e_{4\,it} \quad (\mathbf{6.2})$$

7. Granger causality test between Governance Pillar and ROA

$$ROA_{it} = \alpha_0 + \sum_{j=1}^{n} \alpha_j ROA_{i,t-j} + \sum_{k=1}^{n} \beta_k GOV_{i,t-k} + \{\lambda_1 AGE_{it} + \lambda_2 \ln(SIZE_{it}) + \lambda_3 ADV_{it} + \lambda_4 R\&D_{it}\} + e_{1\,it} \quad (\mathbf{7.1})$$

$$GOV_{it} = \gamma_0 + \sum_{j=1}^{n} \gamma_j ROA_{i,t-j} + \sum_{k=1}^{n} \delta_k GOV_{i,t-k} + \{\lambda_1 AGE_{it} + \lambda_2 \ln(SIZE_{it}) + \lambda_3 ADV_{it} + \lambda_4 R\&D_{it}\} + e_{2\,it} \quad (\mathbf{7.2})$$

8. Granger causality test between Governance Pillar and Tobin's Q

$$TQ_{it} = \alpha_0 + \sum_{j=1}^{n} \alpha_j TQ_{i,t-j} + \sum_{k=1}^{n} \beta_{i,k} GOV_{i,t-k} + \{\lambda_1 AGE_{it} + \lambda_2 \ln(SIZE_{it}) + \lambda_3 ADV_{it} + \lambda_4 R\&D_{it}\} + e_{3\,it} \quad (\mathbf{8.1})$$

$$GOV = \gamma_0 + \sum_{j=1}^{n} \gamma_j TQ_{i,t-j} + \sum_{k=1}^{n} \delta_{i,k} GOV_{i,t-k} + \{\lambda_1 AGE_{it} + \lambda_2 \ln(SIZE_{it}) + \lambda_3 ADV_{it} + \lambda_4 R\&D_{it}\} + e_{4\,it} \quad (\mathbf{8.2})$$

Where, Aggregate CSR scores (ESG), Environmental pillar scores (ENV), Social pillar scores (SOC), and Governance pillar scores (GOV) are measures of corporate social responsibility. Return on assets (ROA) and Tobin's Q (TQ) are the measures of CFP, and *i* indexes the company and *t* time. Besides, the following set of control variables were included in the equations, which generally happen to be correlated with CSR and CFP.

I. AGE (Firm age) defined as the number of years of incorporation of the company. Since CSR activities could be more vital toward mature company than the early-stage company, firm age was taken as control variable (Agarwal and Berens, 2009). Firm age is measured as the current year minus the year of listing on the stock market.

II. SIZE (Firm size) refers to the scale of organization and operations of a business enterprise. It is suggested by Agarwal and Berens (2009) that the firm size seemed to be relevant to develop economies of scale from investing in CSR activities, and therefore had an effect on CFP. Firm size is measured by natural logarithm of total assets of the company.

III. ADV (Advertising expenditure) is the cost that incurred from promoting a business in order to increase brand awareness and gain more customers. Advertising has been shown to be positively connected with financial performance measures in numerous studies (Rao, Agarwal and Dahlhoff, 2004). It is measured by advertising expenses divided by total revenue.

IV. R&D (Research and development investment) is activities where the companies undertake to innovate and introduce new products and services. R&D expenditures have been found to have a positive effect on financial performance (Rao, Agarwal and Dahlhoff, 2004). It is measured by R&D expenses divided by total revenue.

Granger causality Test Steps

Step 1: Conducting stationarity tests

As for the fact that Granger causality can only be examined by means of stationary variables, the panel-data unit root tests are used to check for unit roots in the panel series and their differences. The Fisher-type test is appropriate for unbalanced panel data and will be used in this study. Then the stationarity test will be conducted by augmented Dicky-Fuller unit-root tests on each panel with the lagged difference of one. Trend and drift term specification of the non-stationary data will be identified in order to apply the correct transformation.

The need of transformation of non-stationary data is because non-stationary data might result in spurious relationships. In other words, it refers to a connection between two variables that appears causal but is not. Thus, the results of the unit root tests indicate that changes in CSR measures and CFP measures are all stationary, which does not imply false relationships.

Step 2: Determining optimal lag order of Panel Vector Autoregressive (p) or PVAR (p)

The number of lags to include in the Granger causality equations for endogenous variables is a significant practical consideration that might influence causality conclusions. To determine an optimal lag order of Panel Vector Autoregressive (p), it is conditioned that the lag has to be identical for both equations since Granger causality tests are pairwise. The lag order selection is essential to progress with PVAR model. This paper applied moment selection criterion for the GMM estimation suggested by Andrews and Lu (2001) in which provide the overall

coefficient determination (CD), Hansen *J*-statistic of over-identifying restrictions and three information criteria. The three information criteria are the modification of the recognized as Akaike, Bayesian, and Hannan-Quinn information criteria, which are called, MAIC, MBIC, and MQIC respectively.

The null hypothesis for the lag selection criteria is determine when over-identified restrictions (J-statistic) are valid and cannot be rejected at 5% significance level. Also, the three information criteria has the smallest value for the lag order chosen. Then the number of lags to be used in the Granger causality test is determined.

Step 3: Testing for Panel Vector Autoregression and Granger causality

Null Hypothesis of the eight sets of Granger Causality equations are shown below:

Equation 1.1 H_0 : ESG does not granger-cause ROA, $\beta_k = 0$

Equation 1.2 H_0: ROA does not granger-cause ESG, $\delta_k = 0$

Equation 2.1 H_0 : CSR does not granger-cause TQ, $\beta_k = 0$

Equation 2.2 H_0: TQ does not granger-cause CSR, $\delta_k = 0$

Equation 3.1 H_0 : ENV does not granger-cause ROA, $\beta_k = 0$

Equation 3.2 H_0: ROA does not granger-cause ENV, $\delta_k = 0$

Equation 4.1 H_0 : ENV does not granger-cause TQ, $\beta_k = 0$

Equation 4.2 H_0: TQ does not granger-cause ENV, $\delta_k = 0$

Equation 5.1 H_0 : SOC does not granger-cause ROA, $\beta_k = 0$

Equation 5.2 H_0: ROA does not granger-cause SOC, $\delta_k = 0$

Equation 6.1 H_0 : SOC does not granger-cause TQ, $\beta_k = 0$

Equation 6.2 H_0: TQ does not granger-cause SOC, $\delta_k = 0$

Equation 7.1 H_0 : GOV does not granger-cause ROA, $\beta_k = 0$

Equation 7.2 H_0: ROA does not granger-cause GOV, $\delta_k = 0$

Equation 8.1 H_0 : GOV does not granger-cause TQ, $\beta_k = 0$

Equation 8.2 H_0: TQ does not granger-cause GOV, $\delta_k = 0$

According to the null hypothesis, CSR (ESG,ENV,SOC and GOV) is said to Granger-cause CFP (ROA or TQ) if the estimated coefficients of the lagged values of CSR in equation (1.1,2.1,3.1,4.1,5.1,6.1,7.1, and 8.1) are statistically significantly different from zero as a group, and CFP (ROA or TQ) is said to Granger-cause CSR (ESG,ENV,SOC and GOV) if the estimated coefficients of the lagged values of Y in equation (1.2,2.2,3.2,4.2,5.2,6.2,7.2 and 8.2) are statistically significantly different from zero as a group.

7. Results

This paper inclusively studies the causality relationship between CSR and CFP for listed companies in emerging Asia Pacific countries by observing the CSR scores and CFP measures during 2010-2020, using Panel Vector Autoregression model to test for Granger causality test following the testing steps as mentioned above. The data analysis results are presented as follows.

7.1 Unit root test

The Fisher-type stationary test for endogenous variables, using augmented Dicky Fuller for each of the panel series, was applied for each industries. The results of the Fisher type unit root tests for, ESG, ENV, SOC, GOV, ROA and TQ show that all variables are stationary at all level with drift for all industries combined, Energy

industry, Consumer non-cyclical industry, and Financial industry. However, Fisher type unit root test shows that all variables are stationary at level with drift for Healthcare industry except ENV score are stationary in first difference. Therefore, the difference for all endogenous variables for healthcare industry was at I (1) to further proceed with Panel VAR model. For technology industry, the unit roots cannot be performed due to data limitation; thus, this industry cannot proceed to perform panel VAR model and finally drop from the regression analysis.

7.2 Lag order selection criteria test

After testing the unit roots test, then the optimal number of lags to be included in the system equations of Panel VAR has to be identified. The selection criteria of Andrews and Lu (2001) was applied for each system equations. Normally, the determination of lag order selection is based on Hansen *J*-statistic of over-identifying restrictions and the other three information criteria. Nonetheless, for this case, after generating the results, none of the results from bivariate PVAR shows Hansen (J-statistic) and other three information criteria. Only the overall coefficient determination (CD) was generated. This occurred due to the missing value of data. As for the fact that data available regarding the aggregated CSR scores and each individual pillar scores in emerging Asia Pacific countries are limited, the alternative lag selection criteria was employed.

As for this case, the use of overall coefficient of determination (CD) was used to determine the lag difference instead of Hansen (J-statistic) and other three information criteria. This happened because of the data limitation that the STATA 17 only generate the CD. The overall coefficient determination (CD) is more generally

known as R-squared (or R^2). It is a statistical measurement that accesses how changes in one variable can be explained by the changes in a second variable, when predicting the outcome of a given event. As a result, we then use the CD to determine the lag that is most fit with each granger causality equation.

7.3 Panel Vector Autoregression and Granger causality test

Bivariate Panel VAR regression for all eight models were regressed for each of the industry; the first on all industries, followed by Energy industry, then Consumer cyclical industry, Financial Industry and finally Healthcare industry in which each model follow the equation (1) – (8) in the methodology part. After regressing Panel VAR, the Granger causality test was run accordingly.

7.3.1 All industries

The results for all industries are presented in **Table 1- 4** below. The results for Panel VAR show that there is no evidence of a causal relationship between CSR and CFP. These results are robust to all eight models, applying aggregated CSR scores, non-aggregate CSR scores and two measures of CFP as endogenous variables. Granger causality tests indicate no bidirectional relationship between CSR and CFP. Thus, it is not possible to conclude that CSR granger-caused CFP and vice versa, for all endogenous variables applied for all sampled companies in every industry combined.

The results report no evidence of a causal relationship are in support of Tuppura, Arminen, Pätäri and Jantunen (2016) which claimed that the causality

relationships between CSR and CFP differ in different industries. In addition, Jitmaneeroj (2016) also stated that the relative importance of the composite pillars of sustainability, which are ENV, SOC and GOV may vary across industries, meaning that sustainability score in itself is context-dependent, one pillar could be crucial in some industries but other might not. Thus, concluding no bidirectional relationship between CSR and CFP might not reflect the true Granger causality relationship regardless of the industry. Therefore, segregating all industries into different sectors might be more relevant and meaningful.

Table 1 Regression analysis: Granger causality tests between aggregate CSR and CFP (ROA and TQ)

variables	ESG → ROA			ROA → ESG			ESG → TQ			TQ → ESG		
	Coefficient	**z**	P>|z|	Coefficient	**z**	P>|z|	Coefficient	**z**	P>|z|	Coefficient	**z**	P>|z|
Endogenous variable												
ESG lag1	0.0029	0.58	0.563	1.1674	3.08	0.002	0.0552	1.39	0.164	1.0617	7.72	0.000
ROA lag1	-0.5628	-0.37	0.710	-37.7538	-0.34	0.737						
TQ lag1							-0.3526	-0.21	0.831	-2.9352	-0.70	0.482
Exogenous variable												
AGE	0.0179	0.45	0.656	0.8438	0.27	0.784	-0.3739	-1.51	0.131	-0.3739	-1.51	0.131
SIZE	-0.4577	-0.54	0.591	-20.9114	-0.32	0.746	3.3514	1.25	0.210	3.3514	1.25	0.210
ADV	-0.5079	-0.62	0.538	-40.7843	-0.68	0.497	-7.8740	-0.42	0.671	-7.8740	-0.42	0.671
RD	0.0687	1.12	0.264	0.0770	0.03	0.978	-2.7454	-0.53	0.595	-2.7454	-0.53	0.595
Observations		892			892			568			568	

Notes: Symbols ***, **, and * represent significance at a 1%, 5% and 10% level, respectively.

Pairwise Granger Causality Test

Null Hypothesis:	Prob.		Prob.
ESG does not granger cause ROA	0.563	ESG does not granger cause TQ	0.164
ROA does not granger cause ESG	0.737	TQ does not granger cause ESG	0.482

Table 2 Regression analysis: Granger causality tests between ENV and CFP (ROA and TQ)

variables	ENV → ROA			ROA → ENV			ENV → TQ			TQ → ENV		
	Coefficient	z	P>|z|	Coefficient	z	P>|z|	Coefficient	z	P>|z|	Coefficient	z	P>|z|
Endogenous variable												
ENV lag1	0.0073	0.28	0.782	0.7382	0.60	0.547	0.0087	0.74	0.461	0.9349	4.02	0.000
ROA lag1	-1.3801	-0.22	0.823	58.7844	0.21	0.837						
TQ lag1							0.8110	2.16	0.031	-3.8782	-0.70	0.486
Exogenous variable												
AGE	0.0301	0.24	0.812	-1.1932	-0.20	0.841	-0.0012	-0.01	0.995	4.1890	1.48	0.138
SIZE	-0.8874	-0.27	0.790	33.0840	0.21	0.832	-0.2374	-0.11	0.914	-40.4360	-1.31	0.191
ADV	-1.6146	-0.29	0.772	18.6155	0.07	0.943	14.290	0.29	0.771	506.8073	0.81	0.416
RD	0.0062	0.02	0.981	-0.6745	-0.06	0.955	38.9828	1.29	0.195	213.0968	0.35	0.726
Observations		892			892			306			306	

Notes: Symbols ***, **, and * represent significance at a 1%, 5% and 10% level, respectively.

Pairwise Granger Causality Test

Null Hypothesis:	Prob.		Prob.
ENV does not granger cause ROA	0.782	ENV does not granger cause TQ	0.461
ROA does not granger cause ENV	0.837	TQ does not granger cause ENV	0.486

Table 3 Regression analysis: Granger causality tests between SOC and CFP (ROA and TQ)

variables	SOC → ROA			ROA → SOC			SOC → TQ			TQ → SOC		
	Coefficient	z	P>|z|	Coefficient	z	P>|z|	Coefficient	z	P>|z|	Coefficient	z	P>|z|
Endogenous variable												
SOC lag1	0.0023	0.77	0.441	0.9886	3.79	0.000	0.0589	0.91	0.364	1.0693	5.42	0.000
ROA lag1	-0.5702	-0.42	0.677	43.8095	0.36	0.718						
TQ lag1							-0.6307	-0.41	0.685	-2.1697	-0.61	0.541
Exogenous variable												
AGE	0.0186	0.46	0.647	-1.3530	-0.37	0.708	-0.4181	-1.08	0.281	-1.1707	-0.73	0.467
SIZE	-0.4720	-0.60	0.548	24.1698	0.35	0.727	3.2981	1.03	0.304	14.0783	0.91	0.364
ADV	-0.4727	-0.69	0.489	-11.6598	-0.22	0.829	-11.2967	-0.44	0.659	-154.0161	-1.32	0.186
RD	0.0658	1.08	0.279	4.7909	0.87	0.385	-4.0089	-0.91	0.365	-12.3625	-0.90	0.367
Observations		892			892			568			568	

Notes: Symbols ***, **, and * represent significance at a 1%, 5% and 10% level, respectively.

Pairwise Granger Causality Test

Null Hypothesis:	Prob.		Prob.
SOC does not granger cause ROA	0.441	SOC does not granger cause TQ	0.364
ROA does not granger cause SOC	0.718	TQ does not granger cause SOC	0.541

Table 4 Regression analysis: Granger causality tests between GOV and CFP (ROA and TQ)

variables	GOV → ROA			ROA → GOV			GOV → TQ			TQ → GOV		
	Coefficient	**z**	P>|z|	Coefficient	**z**	P>|z|	Coefficient	**z**	P>|z|	Coefficient	**z**	P>|z|
Endogenous variable												
GOV lag1	0.0011	0.43	0.667	1.1727	1.62	0.105	0.0174	1.51	0.132	0.7989	7.37	0.000
ROA lag1	-0.4202	-0.36	0.718	-170.6796	-0.49	0.625						
TQ lag1							-0.0518	-0.03	0.973	-8.2065	-0.65	0.513
Exogenous variable												
AGE	0.0192	0.51	0.608	5.5884	0.52	0.604	-0.2162	-1.65	0.098	2.1188	1.41	0.158
SIZE	-0.3849	-0.58	0.564	-98.4421	-0.51	0.607	2.8830	1.46	0.144	-25.8909	-1.20	0.230
ADV	-0.3396	-0.62	0.534	-59.2142	-0.39	0.697	7.8202	0.44	0.656	127.1389	0.92	0.360
RD	0.0805	1.38	0.169	0.9407	0.07	0.944	-0.6097	-0.11	0.912	-15.2489	-0.36	0.721
Observations		892			892			568			568	

Notes: Symbols ***, **, and * represent significance at a 1%, 5% and 10% level, respectively.

Pairwise Granger Causality Test

Null Hypothesis:	Prob.		Prob.
GOV does not granger cause ROA	0.667	GOV does not granger cause TQ	0.132
ROA does not granger cause GOV	0.625	TQ does not granger cause GOV	0.513

7.3.2 Energy industry

The results of the regression for energy industry are presented in **Table 5-8** below. The results in bivariate Panel VAR regression show that there is no evidence of a causal relationship between CSR and CFP for the aggregate CSR scores and two measures of CFP. However, when CFP measures was separately regressed against each composite pillars of each CSR in different bivariate Panel VAR models, the results show that only TQ granger-cause GOV at the ten-percent significance level if the number of lags included in the equation is one. Besides, according to the Panel VAR result, Tobin'Q has a negative relationship to the Governance pillar.

The results are in line with Schreck (2011), applying the Tobin'Q as CFP measure, the literature does not find any causality between the CSR and Tobin'Q variables for aggregated CSR. However, the literature did find the correlations between

Tobin's Q with Corporate Governance. Besides, Tuppura, Arminen, Pätäri and Jantunen (2016) also studies this relationship in the context of energy industry, employing ROA and market capitalization as CFP measures, the results of this study also proposed inconclusive evidence in support that CSR granger-cause ROA and vice versa.

Table 5 Regression analysis: Granger causality tests between aggregate CSR and CFP (ROA and TQ)

variables	ESG → ROA			ROA → ESG			ESG → TQ			TQ → ESG		
	Coefficient	z	P>|z|	Coefficient	z	P>|z|	Coefficient	z	P>|z|	Coefficient	z	P>|z|
Endogenous variable												
ESG lag1	-0.0007	-0.00	1.000	0.6013	0.08	0.934	0.0004	0.04	0.971	1.0728	3.57	0.000
ROA lag1	0.0721	0.00	1.000	117.8042	0.05	0.962						
TQ lag1							0.1608	1.82	0.068	-4.1180	-0.64	0.525
Exogenous variable												
AGE	-0.0012	-0.00	1.000	0.4476	0.06	0.950	-0.0583	-1.00	0.3170	3.9858	2.46	0.014
SIZE	-0.0224	-0.00	1.000	15.8177	0.02	0.983	1.2162	1.20	0.2290	-63.8363	-2.13	0.033
ADV	17.9995	.	.	1823.1020	.	.	23.9103	0.35	0.7300	364.0461	0.21	0.831
RD	-36.3828	-0.00	0.999	1585.8270	0.08	0.938	30.7200	0.72	0.4700	-808.2998	-0.49	0.621
Observations		88			88			52			52	

Notes: Symbols ***, **, and * represent significance at a 1%, 5% and 10% level, respectively.

Pairwise Granger Causality Test

Null Hypothesis:	Prob.		Prob.
ESG does not granger cause ROA	1.000	ESG does not granger cause TQ	0.971
ROA does not granger cause ESG	0.962	TQ does not granger cause ESG	0.525

Table 6 Regression analysis: Granger causality tests between ENV and CFP (ROA and TQ)

variables	ENV → ROA			ROA → ENV			ENV → TQ			TQ → ENV		
	Coefficient	z	P>|z|	Coefficient	z	P>|z|	Coefficient	z	P>|z|	Coefficient	z	P>|z|
Endogenous variable												
ENV lag1	0.0014	0.57	0.567	0.8599	0.79	0.430	-0.0087	-0.10	0.922	1.1025	0.97	0.332
ROA lag1	1.4265	0.09	0.927	-600.5372	-0.06	0.955						
TQ lag1							0.1117	0.10	0.922	-3.6887	-0.32	0.753
Exogenous variable												
AGE	-0.0176	-0.27	0.784	3.0645	0.07	0.945	-0.3390	-0.30	0.767	11.4298	0.77	0.439
SIZE	0.4029	0.12	0.903	-136.5513	-0.06	0.952	7.8222	0.28	0.778	-244.4767	-0.68	0.495
ADV	11.8689	0.05	0.961	-7455.2160	-0.05	0.964	512.797	0.24	0.813	-10892.2400	-0.39	0.697
RD	10.2409	0.05	0.962	-9024.4280	-0.06	0.951	-0.9944	-0.02	0.988	664.0518	0.60	0.549
Observations		88			88			62			62	

Notes: Symbols ***, **, and * represent significance at a 1%, 5% and 10% level, respectively.

Pairwise Granger Causality Test

Null Hypothesis:	Prob.		Prob.
ENV does not granger cause ROA	0.567	ENV does not granger cause TQ	0.922
ROA does not granger cause ENV	0.955	TQ does not granger cause ENV	0.753

Table 7 Regression analysis: Granger causality tests between SOC and CFP (ROA and TQ)

variables	SOC → ROA			ROA → SOC			SOC → TQ			TQ → SOC		
	Coefficient	z	P>|z|	Coefficient	z	P>|z|	Coefficient	z	P>|z|	Coefficient	z	P>|z|
Endogenous variable												
SOC lag1	-0.0004	-0.00	1.000	0.4111	0.04	0.964	-0.0016	-0.45	0.656	1.2155	2.61	0.009
ROA lag1	0.3322	0.00	1.000	109.3622	0.04	0.970						
TQ lag1							0.1218	0.45	0.650	-1.0169	-0.10	0.919
Exogenous variable												
AGE	-0.0010	-0.00	1.000	0.6900	0.10	0.921	-0.0102	-0.32	0.752	4.4802	1.08	0.281
SIZE	-0.0169	-0.00	1.000	27.3564	0.04	0.968	0.5068	0.95	0.340	-83.9710	-1.34	0.179
ADV	18.9616	.	.	2529.0550	.	.	2.1501	0.07	0.941	-1457.6020	-0.37	0.714
RD	-33.9836	-0.00	0.999	7836.4040	0.16	0.876	2.1203	0.08	0.935	-1447.0890	-0.52	0.604
Observations		88			88			52			52	

Notes: Symbols ***, **, and * represent significance at a 1%, 5% and 10% level, respectively.

Pairwise Granger Causality Test

Null Hypothesis:	Prob.		Prob.
SOC does not granger cause ROA	1.000	SOC does not granger cause TQ	0.656
ROA does not granger cause SOC	0.970	TQ does not granger cause SOC	0.919

Table 8 Regression analysis: Granger causality tests between GOV and CFP (ROA and TQ)

variables	GOV → ROA			ROA → GOV			GOV → TQ			TQ → GOV		
	Coefficient	z	P>|z|	Coefficient	z	P>|z|	Coefficient	z	P>|z|	Coefficient	z	P>|z|
Endogenous variable												
GOV lag1	0.0008	0.03	0.979	0.7983	0.24	0.813	0.0018	0.05	0.960	0.5320	0.78	0.432
ROA lag1	-0.7878	-0.05	0.958	-180.8908	-0.10	0.918						
TQ lag1							0.3143	1.14	0.254	-12.0507*	-1.76	0.079
Exogenous variable												
AGE	-0.0087	-0.26	0.798	0.6742	0.17	0.868	-0.0390	-0.30	0.765	2.3093	0.77	0.440
SIZE	0.0895	0.05	0.959	-21.9023	-0.11	0.914	1.3533	0.42	0.674	-43.8879	-0.63	0.527
ADV	-8.6885	-0.05	0.959	-1069.2750	-0.05	0.957	-34.8765	-0.16	0.871	2506.1700	0.53	0.597
RD	-36.4020	-0.10	0.920	-4390.6990	-0.10	0.918	-3.6857	-0.09	0.929	-426.9261	-0.50	0.614
Observations		88			88			62			62	

Notes: Symbols ***, **, and * represent significance at a 1%, 5% and 10% level, respectively.

Pairwise Granger Causality Test

Null Hypothesis:	Prob.		Prob.
GOV does not granger cause ROA	0.979	GOV does not granger cause TQ	0.960
ROA does not granger cause GOV	0.918	TQ does not granger cause GOV	0.079

7.3.3 Consumer non-cyclical industry

For consumer non-cyclical industry, the results show in **Table 9-12** below. The results show that it is not possible to conclude CSR granger-caused CFP and vice versa for all eight models, applying aggregated CSR scores, non-aggregate CSR scores and two measures of CFP as endogenous variables.

According to Nelling and Webb (2008) conclusion, the literature found that there was no evidence that CSR influences CFP, and there was little evidence that CFP influenced CSR. In addition, it was noted in the literature that CSR seems to derive from other characteristics of companies rather than mainly from their financial performance. Thus, in contrast to earlier studies supporting the concept of a virtuous circle between CSP and CFP (Waddock and Graves, 1997). Therefore, the results regressed do not support the existence of bidirectional causality.

Table 9 Regression analysis: Granger causality tests between aggregate CSR and CFP (ROA and TQ)

variables	ESG → ROA			ROA → ESG			ESG → TQ			TQ → ESG		
	Coefficient	z	P>|z|	Coefficient	z	P>|z|	Coefficient	z	P>|z|	Coefficient	z	P>|z|
Endogenous variable												
ESG lag1	0.0014	0.72	0.474	1.2496	3.24	0.001	-0.0849	-0.19	0.853	0.5671	0.71	0.478
ROA lag1	0.7903	4.09	0.000	2.3885	0.05	0.959						
TQ lag1							-0.1916	-0.07	0.944	-0.6116	-0.11	0.914
Exogenous variable												
AGE	-0.0055	-0.97	0.334	0.1354	0.12	0.907	0.4590	0.30	0.767	2.2915	0.80	0.426
SIZE	0.0031	0.05	0.960	2.4218	0.17	0.866	0.4565	0.10	0.918	0.7015	0.07	0.947
ADV	-0.0609	-0.24	0.813	26.7877	0.65	0.518	65.1303	0.34	0.735	217.6374	0.57	0.570
RD	20.497	0.63	0.530	-4388.5990	-0.53	0.594	-3611.141	-0.67	0.505	-6920.555	-0.63	0.526
Observations		297			297			195			195	

Notes: Symbols ***, **, and * represent significance at a 1%, 5% and 10% level, respectively.

Pairwise Granger Causality Test

Null Hypothesis:	Prob.		Prob.
ESG does not granger cause ROA	0.474	ESG does not granger cause TQ	0.853
ROA does not granger cause ESG	0.959	TQ does not granger cause ESG	0.914

Table 10 Regression analysis: Granger causality tests between ENV and CFP (ROA and TQ)

variables	ENV → ROA			ROA → ENV			ENV → TQ			TQ → ENV		
	Coefficient	z	P>|z|	Coefficient	z	P>|z|	Coefficient	z	P>|z|	Coefficient	z	P>|z|
Endogenous variable												
ENV lag1	0.0009	0.69	0.488	1.2185	4.01	0.000	-0.1100	-0.08	0.938	0.6943	0.23	0.818
ROA lag1	0.9153	2.62	0.009	36.5096	0.34	0.730						
TQ lag1							-4.6347	-0.13	0.893	-11.4801	-0.15	0.877
Exogenous variable												
AGE	-0.0058	-0.99	0.321	-0.4339	-0.27	0.786	0.8256	0.13	0.893	2.2327	0.17	0.866
SIZE	0.0318	0.37	0.710	12.9801	0.48	0.629	0.3317	0.03	0.979	4.1425	0.15	0.881
ADV	-0.1249	-0.43	0.665	4.6587	0.09	0.927	56.597	0.12	0.908	176.1853	0.17	0.868
RD	10.279	0.32	0.748	-5319.5880	-0.53	0.594	-10438.08	-0.20	0.843	-21392.95	-0.19	0.851
Observations		297			297			195			195	

Notes: Symbols ***, **, and * represent significance at a 1%, 5% and 10% level, respectively.

Pairwise Granger Causality Test

Null Hypothesis:	Prob.		Prob.
ENV does not granger cause ROA	0.488	ENV does not granger cause TQ	0.938
ROA does not granger cause ENV	0.730	TQ does not granger cause ENV	0.877

Table 11 Regression analysis: Granger causality tests between SOC and CFP (ROA and TQ)

variables	SOC → ROA			ROA → SOC			SOC → TQ			TQ → SOC		
	Coefficient	z	P>|z|	Coefficient	z	P>|z|	Coefficient	z	P>|z|	Coefficient	z	P>|z|
Endogenous variable												
SOC lag1	0.0011	0.25	0.800	0.7715	0.73	0.465	-0.0617	-0.20	0.838	0.9809	2.05	0.040
ROA lag1	0.5804	1.74	0.082	16.7838	0.16	0.871						
TQ lag1							0.1726	0.08	0.935	-0.3245	-0.07	0.945
Exogenous variable												
AGE	-0.00003	-0.00	0.998	1.88807	0.70	0.482	0.4829	0.32	0.746	0.6153	0.27	0.789
SIZE	-0.0229	-0.25	0.801	-16.9445	-0.71	0.477	-0.2440	-0.04	0.968	7.1809	0.55	0.584
ADV	0.0816	0.16	0.871	13.4103	0.07	0.944	63.6014	0.37	0.712	-57.4510	-0.21	0.832
RD	-38.0763	-0.88	0.378	325.7942	0.03	0.979	-3386.577	-0.95	0.343	-5153.054	-0.82	0.411
Observations		163			163			195			195	

Notes: Symbols ***, **, and * represent significance at a 1%, 5% and 10% level, respectively.

Pairwise Granger Causality Test

Null Hypothesis:	Prob.		Prob.
SOC does not granger cause ROA	0.800	SOC does not granger cause TQ	0.838
ROA does not granger cause SOC	0.871	TQ does not granger cause SOC	0.945

Table 12 Regression analysis: Granger causality tests between GOV and CFP (ROA and TQ)

variables	GOV → ROA			ROA → GOV			GOV → TQ			TQ → GOV		
	Coefficient	z	P>|z|	Coefficient	z	P>|z|	Coefficient	z	P>|z|	Coefficient	z	P>|z|
Endogenous variable												
GOV lag1	0.0008	0.59	0.555	0.8312	2.32	0.020	0.4102	0.05	0.963	8.7572	0.05	0.958
ROA lag1	0.9761	2.77	0.006	23.9593	0.29	0.776						
TQ lag1							6.3484	0.06	0.955	109.0112	0.05	0.959
Exogenous variable												
AGE	-0.0040	-1.09	0.277	0.9477	0.95	0.343	-0.1272	-0.02	0.983	-3.1520	-0.03	0.978
SIZE	0.0397	0.48	0.630	2.5606	0.08	0.935	-1.3069	-0.03	0.980	-52.2371	-0.05	0.957
ADV	0.1292	0.31	0.755	69.3051	0.58	0.564	50.5075	0.33	0.741	439.1117	0.12	0.907
RD	17.3106	0.57	0.569	-5546.3240	-0.36	0.718	5556.3130	0.04	0.971	137101.900	0.05	0.961
Observations		297			297			195			195	

Notes: Symbols ***, **, and * represent significance at a 1%, 5% and 10% level, respectively.

Pairwise Granger Causality Test

Null Hypothesis:	Prob.		Prob.
GOV does not granger cause ROA	0.555	GOV does not granger cause TQ	0.963
ROA does not granger cause GOV	0.776	TQ does not granger cause GOV	0.959

7.3.4 Financial industry

Focusing on the results of the causality from CSR to CFP direction in **Table 13-16**. According to the results, changes in in all aggregated CSR scores and non-aggregate CSR scores (ESG, ENV, SOC or GOV) do not Granger-cause changes in CFP measures (ROA). These results are robust to the use of return on TQ as the measure of CFP instead of ROA. The results are in accordance with Nelling and Webb (2008) conclusion that there was no evidence concluding that CSR influences CFP.

Table 13-16 reports the results of the causality from CFP to CSR direction. First, with regard to accounting-based measure of CFP (ROA) to CSR scores (ESG, ENV, SOC and GOV). The results show that there seem to be no causal relationship between ROA to aggregated CSR scores and non-aggregate CSR scores. Second, with market-based measure of CFP (TQ) do not seem to Granger-cause GOV. Instead, changes in TQ seems to Granger-cause ESG, ENV, and SOC changes at the one-percent significance level for ESG and at the five-percent significance level for ENV and SOC if the number of lags included in the equation is one. Moreover, according to the PVAR results, Tobin's Q shows the negative effect on ESG, ENV, and SOC. The results are consistent with the findings of Moore and Robson (2002), suggesting that as financial performance deteriorating, overall social performance improves.

Table 13 Regression analysis: Granger causality tests between aggregate CSR and CFP (ROA and TQ)

variables	ESG → ROA			ROA → ESG			ESG → TQ			TQ → ESG		
	Coefficient	z	P>|z|	Coefficient	z	P>|z|	Coefficient	z	P>|z|	Coefficient	z	P>|z|
Endogenous variable												
ESG lag1	0.0001	0.17	0.864	1.2878	2.31	0.021	-0.0024	-0.15	0.881	0.9186	58.28	0.000
ROA lag1	0.0065	0.19	0.849	-1.7056	-0.32	0.751						
TQ lag1							0.2039	0.01	0.988	-45.8588***	-3.29	0.001
Exogenous variable												
AGE	-0.0032	-1.66	0.098	-0.3741	-0.42	0.673	0.0016	0.01	0.993	0.2610	1.40	0.161
SIZE	0.0157	0.50	0.620	-10.7303	-0.46	0.644	0.0256	0.02	0.986	-2.2837	-1.55	0.122
ADV	-0.0461	-0.20	0.840	-162.5726	-0.87	0.385	3.5261	0.01	0.993	-1057.1090	-2.79	0.005
RD	-0.3212	-0.46	0.643	-133.0607	-0.80	0.423	333.9736	.	.	186868.80	.	.
Observations		176			176			113			113	

Notes: Symbols ***, **, and * represent significance at a 1%, 5% and 10% level, respectively.

Pairwise Granger Causality Test

Null Hypothesis:	Prob.		Prob.
ESG does not granger cause ROA	0.864	ESG does not granger cause TQ	0.881
ROA does not granger cause ESG	0.751	TQ does not granger cause ESG	0.001

Table 14 Regression analysis: Granger causality tests between ENV and CFP (ROA and TQ)

variables	ENV → ROA			ROA → ENV			ENV → TQ			TQ → ENV		
	Coefficient	z	P>|z|	Coefficient	z	P>|z|	Coefficient	z	P>|z|	Coefficient	z	P>|z|
Endogenous variable												
ENV lag1	-0.0002	-0.11	0.912	0.8157	0.47	0.642	-0.0015	-0.05	0.960	0.4219	13.77	0.000
ROA lag1	0.0066	0.19	0.853	5.0855	0.37	0.708						
TQ lag1							0.1298	0.01	0.994	-45.6516**	-2.51	0.012
Exogenous variable												
AGE	-0.0046	-1.81	0.071	0.44008	0.39	0.696	-0.0003	-0.00	0.998	0.6591	5.59	0.000
SIZE	0.0445	0.46	0.647	2.7612	0.03	0.974	0.0195	0.03	0.979	1.7829	2.46	0.014
ADV	-0.0045	-0.01	0.996	56.0140	0.08	0.934	9.264	0.03	0.979	-2014.047	-5.75	0.000
RD	-0.0618	-0.05	0.960	-63.3171	-0.09	0.931	-473.165	.	.	68094.5500	.	.
Observations		176			176			113			113	

Notes: Symbols ***, **, and * represent significance at a 1%, 5% and 10% level, respectively.

Pairwise Granger Causality Test

Null Hypothesis:	Prob.		Prob.
ENV does not granger cause ROA	0.912	ENV does not granger cause TQ	0.960
ROA does not granger cause ENV	0.708	TQ does not granger cause ENV	0.012

Table 15 Regression analysis: Granger causality tests between SOC and CFP (ROA and TQ)

variables	SOC → ROA			ROA → SOC			SOC → TQ			TQ → SOC		
	Coefficient	z	P>|z|	Coefficient	z	P>|z|	Coefficient	z	P>|z|	Coefficient	z	P>|z|
Endogenous variable												
SOC lag1	-0.0004	-0.04	0.966	4.2297	0.10	0.917	-0.0016	-0.02	0.981	0.7416	10.89	0.000
ROA lag1	0.0029	0.03	0.972	22.7251	0.08	0.933						
TQ lag1							0.0936	0.01	0.996	-38.7022**	-2.23	0.026
Exogenous variable												
AGE	-0.0061	-0.15	0.884	14.3309	0.08	0.936	-0.0005	-0.00	0.999	0.8196	1.35	0.176
SIZE	0.0672	0.08	0.936	-291.6790	-0.08	0.936	0.0068	0.00	0.998	2.4402	0.74	0.460
ADV	-0.0261	-0.02	0.984	-456.2809	-0.08	0.937	6.5205	0.02	0.983	-1478.0590	-4.87	0.000
RD	0.0879	0.01	0.989	-2274.6100	-0.08	0.934	-119.7943	.	.	298987.000	.	.
Observations		176			176			113			113	

Notes: Symbols ***, **, and * represent significance at a 1%, 5% and 10% level, respectively.

Pairwise Granger Causality Test

Null Hypothesis:	Prob.		Prob.
SOC does not granger cause ROA	0.966	SOC does not granger cause TQ	0.981
ROA does not granger cause SOC	0.933	TQ does not granger cause SOC	0.026

Table 16 Regression analysis: Granger causality tests between GOV and CFP (ROA and TQ)

variables	GOV → ROA			ROA → GOV			GOV → TQ			TQ → GOV		
	Coefficient	z	P>|z|	Coefficient	z	P>|z|	Coefficient	z	P>|z|	Coefficient	z	P>|z|
Endogenous variable												
GOV lag1	0.0002	0.41	0.685	1.3308	2.52	0.012	0.0007	0.30	0.767	0.8777	2.83	0.005
ROA lag1	0.0083	0.25	0.803	-5.0966	-0.46	0.642						
TQ lag1							0.3251	0.87	0.386	0.0827	0.00	0.998
Exogenous variable												
AGE	-0.0017	-0.93	0.350	-0.1469	-0.09	0.930	-0.0027	-0.07	0.942	-3.0265	-0.25	0.800
SIZE	-0.0004	-0.02	0.985	-13.6483	-0.50	0.614	-0.0619	-0.19	0.852	32.7307	0.29	0.769
ADV	0.0396	0.25	0.800	-122.3129	-0.88	0.381	0.3165	0.05	0.957	-503.4724	-0.43	0.669
RD	-0.4896	-0.74	0.458	-162.4166	-0.56	0.576	-178.1330	-0.23	0.817	52832.8700	0.19	0.846
Observations		176			176			95			95	

Notes: Symbols ***, **, and * represent significance at a 1%, 5% and 10% level, respectively.

Pairwise Granger Causality Test

Null Hypothesis:	Prob.		Prob.
GOV does not granger cause ROA	0.685	GOV does not granger cause TQ	0.767
ROA does not granger cause GOV	0.642	TQ does not granger cause GOV	0.998

7.3.5 Healthcare industry

Table 17-20 reports eight bivariate Panel VAR regressions: four that regresses ROA and TQ on past financial performance and lagged values for the aggregated CSR variables and non-aggregate CSR variables; and four that regresses the aggregated CSR variables and non-aggregate CSR variables on lagged values and past financial performance (ROA and TQ). The test for Healthcare industry employed the first difference of endogenous variables. Granger causality tests indicate no bidirectional relationship between CSR variables and CFP variables. Thus, it is not possible to conclude CSR granger-caused CFP and vice versa.

The results are in accordance with Nelling and Webb (2008) and in argument with Waddock and Graves (1997) as stated earlier for the result in Consumer non-cyclical industry.

Table 17 Regression analysis: Granger causality tests between aggregate CSR and CFP (ROA and TQ)

variables	ΔESG → ΔROA			ΔROA → ΔESG			ΔESG → ΔTQ			ΔTQ → ΔESG		
	Coefficient	**z**	P>|z|	Coefficient	**z**	P>|z|	Coefficient	**z**	P>|z|	Coefficient	**z**	P>|z|
Endogenous variable												
ΔESG lag1	0.0040	0.40	0.689	0.1318	0.20	0.845	0.0554	0.45	0.652	1.0527	1.16	0.247
ΔROA lag1	1.3816	0.35	0.726	93.3578	0.35	0.729						
ΔTQ lag1							-0.1444	-0.35	0.727	-2.7126	-1.14	0.255
Exogenous variable												
AGE	-0.0606	-0.35	0.730	-2.9716	-0.24	0.807	1.5136	1.04	0.296	14.7027	2.54	0.011
SIZE	0.8998	0.34	0.734	34.2342	0.18	0.856	-1.5419	-0.18	0.856	-136.9386	-1.85	0.064
ADV	-2.1787	-0.64	0.524	-182.0273	-0.73	0.464	341.8012	1.14	0.256	679.7563	0.43	0.670
RD	4.1985	0.51	0.610	387.6481	0.72	0.474	-121.9667	-1.10	0.271	-792.1270	-2.43	0.015
Observations		80			80			17			17	

Notes: Symbols ***, **, and * represent significance at a 1%, 5% and 10% level, respectively

Pairwise Granger Causality Test

Null Hypothesis:	Prob.		Prob.
ESG does not granger cause ROA	0.689	ESG does not granger cause TQ	0.652
ROA does not granger cause ESG	0.729	TQ does not granger cause ESG	0.255

Table 18 Regression analysis: Granger causality tests between ENV and CFP (ROA and TQ)

variables	ΔENV → ΔROA			ΔROA → ΔENV			ΔENV → ΔTQ			ΔTQ → ΔENV		
	Coefficient	z	P>|z|	Coefficient	z	P>|z|	Coefficient	z	P>|z|	Coefficient	z	P>|z|
Endogenous variable												
ΔENV lag1	0.0022	0.09	0.924	-0.0301	-0.06	0.952	-0.2274	-1.29	0.196	0.1643	0.02	0.981
ΔROA lag1	4.0569	0.17	0.869	81.6573	0.15	0.880						
ΔTQ lag1							0.4434	0.51	0.610	-1.1823	-0.05	0.961
Exogenous variable												
AGE	-0.2014	-0.16	0.870	-2.0647	-0.08	0.939	-0.9118	-0.61	0.543	24.0896	0.47	0.637
SIZE	3.0800	0.16	0.871	31.5283	0.08	0.940	22.5143	1.13	0.257	-175.8217	-0.32	0.749
ADV	-4.6438	-0.23	0.817	-303.2649	-0.77	0.444	344.5371	1.00	0.318	4288.898	0.42	0.671
RD	9.2934	0.20	0.840	410.9657	0.45	0.654	83.7738	1.65	0.099	48.7781	0.02	0.985
Observations		80			80			22			22	

Notes: Symbols ***, **, and * represent significance at a 1%, 5% and 10% level, respectively

Pairwise Granger Causality Test

Null Hypothesis:	Prob.		Prob.
ENV does not granger cause ROA	0.924	ENV does not granger cause TQ	0.196
ROA does not granger cause ENV	0.880	TQ does not granger cause ENV	0.961

Table 19 Regression analysis: Granger causality tests between SOC and CFP (ROA and TQ)

variables	ΔSOC → ΔROA			ΔROA → ΔSOC			ΔSOC → ΔTQ			ΔTQ → ΔSOC		
	Coefficient	z	P>|z|	Coefficient	z	P>|z|	Coefficient	z	P>|z|	Coefficient	z	P>|z|
Endogenous variable												
ΔSOC lag1	0.0003	0.14	0.889	0.0197	0.05	0.963	-0.1105	-0.52	0.602	-0.3345	-0.57	0.572
ΔROA lag1	0.1103	0.05	0.962	1.0061	0.00	0.998						
ΔTQ lag1							0.7311	0.59	0.553	-0.5465	-0.11	0.909
Exogenous variable												
AGE	0.0027	0.04	0.970	0.1586	0.01	0.991	2.9811	0.82	0.410	13.3509	1.00	0.317
SIZE	0.0064	0.01	0.995	-15.5585	-0.08	0.937	13.3906	0.59	0.557	-49.4307	-0.53	0.598
ADV	0.8363	0.08	0.937	-475.6600	-0.24	0.812	1141.3990	1.27	0.205	2764.3170	0.92	0.357
RD	0.8038	0.11	0.915	256.5348	0.16	0.873	-284.2040	-1.32	0.186	-912.0272	-1.22	0.221
Observations		58			58			17			17	

Notes: Symbols ***, **, and * represent significance at a 1%, 5% and 10% level, respectively

Pairwise Granger Causality Test

Null Hypothesis:	Prob.		Prob.
SOC does not granger cause ROA	0.889	SOC does not granger cause TQ	0.602
ROA does not granger cause SOC	0.998	TQ does not granger cause SOC	0.909

Table 20 Regression analysis: Granger causality tests between GOV and CFP (ROA and TQ)

variables	ΔGOV → ΔROA			ΔROA → ΔGOV			ΔGOV → ΔTQ			ΔTQ → ΔGOV		
	Coefficient	z	P>|z|	Coefficient	z	P>|z|	Coefficient	z	P>|z|	Coefficient	z	P>|z|
Endogenous variable												
ΔGOV lag1	0.0050	0.30	0.764	-0.0140	-0.01	0.989	-0.0187	-0.34	0.736	2.0068	1.84	0.065
ΔROA lag1	2.1178	0.23	0.815	68.4722	0.11	0.911						
ΔTQ lag1							-0.2305	-0.62	0.536	4.1569	0.44	0.659
Exogenous variable												
AGE	-0.0880	-0.22	0.824	-1.3203	-0.05	0.960	-0.2800	-0.19	0.847	31.9618	1.75	0.081
SIZE	1.3781	0.22	0.823	-7.4501	-0.02	0.986	5.3475	0.78	0.435	-150.3048	-1.19	0.236
ADV	-2.5749	-0.36	0.718	-117.5156	-0.25	0.803	17.8664	0.07	0.941	5278.5650	1.58	0.115
RD	4.6725	0.29	0.770	576.5457	0.60	0.548	16.951	0.14	0.885	-1712.0240	-1.24	0.213
Observations		80			80			17			17	

Notes: Symbols ***, **, and * represent significance at a 1%, 5% and 10% level, respectively

Pairwise Granger Causality Test

Null Hypothesis:	Prob.		Prob.
GOV does not granger cause ROA	0.764	GOV does not granger cause TQ	0.736
ROA does not granger cause GOV	0.911	TQ does not granger cause GOV	0.659

8. Conclusion

This study inclusively examines the causality relationship between CSR and CFP of the listed companies in emerging Asia Pacific countries from 2010 to 2020 in yearly basis. This paper intensively analyzes the causality direction between CSR and CFP. Bivariate Panel VAR and Granger causality model are used as the main methodology to analyze the unbalance panel data to study whether aggregated CSR scores and non-aggregate CSR scores (different pillars of CSR) toward the CFP measures (ROA and Tobin's Q) have bidirectional relationship or not. In addition, other financial details and other factors, including firm age, firm size, advertising expenditure, and Research and Development expenditure are also included in the model as control variables.

In addition, this project also categorizes the samples into several sample groups consisting of all industries samples, Energy samples, Consumer non-cyclical samples, financial samples, and Healthcare samples, to investigate the causal relationship between CSR and CFP in different industry dimensions. To conclude, **Figure 2** summarizes the granger causality results between CSR and CFP in all industries and four other industries as follows:

Figure 2 **Granger causality test results**

Causality being tested	*All industries*	*Energy industry*	*Consumer non-cyclical industry*	*Financial industry*	*Healthcare industry*
ESG → ROA	No	No	No	No	No
ROA → ESG	No	No	No	No	No
ESG → TQ	No	No	No	No	No
TQ → ESG	No	No	No	Yes***	No
ENV → ROA	No	No	No	No	No
ROA → ESG	No	No	No	No	No
ENV → TQ	No	No	No	No	No
TQ → ESG	No	No	No	Yes**	No
SOC → ROA	No	No	No	No	No
ROA → SOC	No	No	No	No	No
SOC → TQ	No	No	No	No	No
TQ → SOC	No	No	No	Yes**	No
GOV → ROA	No	No	No	No	No
ROA → GOV	No	No	No	No	No
GOV → TQ	No	No	No	No	No
TQ → GOV	No	Yes*	No	No	No

Notes: Symbols ***, **, and * represent significance at a 1%, 5% and 10% level, respectively.

The Granger causality results in **Figure 2** show that changes in Tobin's Q seem to granger-cause Corporate Governance (GOV) changes in the energy industry. Moreover, in the financial industry, changes in Tobin's Q also granger-cause aggregated CSR (ESG), Environmental pillar (ENV) and Social pillar (SOC) changes.

These results are consistent with Hypothesis 1 and Hypothesis 2 that the causality relationships between CSR and CFP differ in different industries and that the choice of CFP measures has different implications for the results concerning the CFP. This is because each industry generate different results and two of the CFP measures do not result in the same conclusion. The possible reason why the causality only exists for Tobin's Q but not for ROA are discussed in the next paragraph.

As for the fact that ROA is calculated purely from the accounting value which reflected the company's financial performance in the past, incorporating one year time lag in the equation might not be suitable to perceive the effect on CSR on ROA and vice versa in long-term period, which is the possible reason why the causality does not exist for the use of ROA measure. On the contrary, Tobin's Q is the market-based measurement that calculate from the market value of a company divided by the replacement value of the firm's assets. As for this fact, it can be said that Tobin's Q already reflected a long-term shareholder's expectation, incorporating the application of CSR activities, representing in the value of Tobin's Q. Thus, the causality exists for Tobin's Q measure. Therefore, the use of one year time lag implies appropriate use of Tobin's Q than ROA performance measures.

The results in energy industry and financial industry show that CFP negatively influence CSR, which is in contrast with most of the previous literature results. However, this is in accordance with the Managerial Opportunism Hypothesis, which states that managers tend to hide the undesirable performance of the company by enthusiastically shifting focus into CSR. In other words, as the firm performance improved, the CSR activities will be reduced (Preston and O'Bannon, 1997). This

hypothesis supports the possible reason why the causality exists in financial industry more than other industries.

According to the financial industry results, there is an evidence that long-run firm performance (Tobin's Q) has a negative effect on aggregated CSR (ESG), Environmental pillar (ENV) and Social pillar (SOC). After the financial crisis in 2008, the emerging Asian economies were heavily impacted especially for the firms in financial sectors. Thus, it is possible that the financial companies are trying to improve the company's image in substitute of the fact that the companies were losing money and have not been performing well. In addition, due to the nature of financial industry itself, the financial firms could not diversify their businesses in the same way that other corporations in other industries did in order to adapt to survive during the crisis.

As for energy industry, long-run firm performance (Tobin's Q) has a negative relationship with the Corporate Governance (GOV) regarding the results obtained. The implication could be that if the company was currently having an unattractive financial performance, the firm would likely increase Governance pillar of sustainability. This is possible because good corporate governance system seems to help the company in dealing with risks such as rapid change in commodity price, policy and regulation risks. As a result, the company would try to increase the Corporate Governance in order to change the attention from decreasing financial performance by attempting to offset with the conspicuous financial programs.

For consumer non-cyclical industry and healthcare industry. The results show that the aggregate scores of CSR and each pillar of sustainability have no effect on two of the measures of CFP and vice versa. Even though the industry is separated and each

individual pillar of CSR and two CFP measures were used to regress individually in each of the Panel VAR regression. The reason of no bidirectional causality relationship could be that there are unobservable factors that influence CSR and CFP other than control variables applied in the equations.

Apart from these reasons, it is also feasible that it might be because of the limitation of data in aggregate and non-aggregate CSR scores. Since all of the samples were obtained from listed companies in emerging Asia Pacific countries, the information available are limited compared to those listed companies in developed countries. In addition, in emerging Asia Pacific countries, the popularity of conducting sustainability activities are just the beginning for certain firms; however, compared to European countries where the firms has been promoting sustainability practices for a period of time, the CSR data scores are much more valid and obtainable.

Thus, for future study, as the CSR scores are more available and the time period are longer, using the same methodology to test with different industry contexts might bring about interesting results that could be contributed to investors, managers and regulators.

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