Exploring the curvilinear relationship between corporate social performance and financial performance: Evidence from South African listed firms

by

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Abstract

In the past, there has been a wealth of research into the relationship between corporate social performance (CSP) and corporate financial performance (CFP). However, this relationship has not been thoroughly researched in developing markets, particularly in South Africa. Compelling theoretical arguments and empirical evidence have been presented both for and against the financial benefits associated with CSR. Recently, there has been an increasing number of studies attempting to reconcile these seemingly opposing views by suggesting that the CSP-CFP relationship may in fact be non-linear. This study aims to contribute to this perspective and address the research gap in South Africa by exploring the shape of the CSP-CFP relationship in a South African context. This is achieved through the use of panel regression models with fixed and random effects, on an overall CSP and component CSP level for 130 Johannesburg Stock Exchange (JSE) listed firms from 2012 to 2019 (1 040 firm-year observations). Bloomberg ESG disclosure scores are used as a proxy for CSP and its components (environmental performance, social performance, and governance performance). CFP is proxied through a measure of market-based performance, annual shareholder return (ASR), and a measure of accounting-based performance, return on assets (ROA). A significant U-shaped relationship is found between overall CSP and CFP. This same relationship is also found between environmental performance and CFP, and between social performance and CFP. Contrary to the findings of prior South African studies, a negative linear relationship is found between governance performance and CFP. The findings of this study have implications for managers facing increasing pressure to engage in environmental, social, and governance (ESG) initiatives from investors and the broader public, and for researchers in emerging markets to explore the CSP-CFP relationship from a novel perspective.

KEYWORDS: corporate social responsibility (CSR); corporate social performance (CSP); environmental, social and governance (ESG) disclosure; financial performance (FP); curvilinear; U-shape; South Africa

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List of Abbreviations

ASR:	Annual shareholder return
B-BBEE:	Broad-based black economic empowerment
BEE:	Black economic empowerment
B-P LM:	Breusch-Pagan Lagrange Multiplier
CDP:	Carbon Disclosure Project
CRISA:	Code for Responsible Investing in South Africa
CEP:	Corporate environmental performance
CSP:	Corporate social performance
CSR:	Corporate social responsibility
CFP:	Corporate financial performance
D/E:	Debt-to-equity
DEA:	Data envelopment analysis
EBITDA:	Earnings before interest, depreciation, and amortisation
ENV:	Environmental performance
EPS:	Earnings per share
ESG:	Environmental, social and governance
FE:	Fixed effects
FP:	Financial performance
GHG:	Greenhouse gas
GOV:	Governance performance
GRI:	Global Reporting Initiative
IoDSA:	Institute of Directors in Southern Africa
JSE:	Johannesburg Stock Exchange
MENAT:	Middle East, North Africa, and Turkey
MSCI:	Morgan Stanley Capital International
MVA:	Market value added
OLS:	Ordinary least squares
NRBV:	Natural resource-based view
P/B:	Price-to-book
P/E:	Price-to-earnings
PCSE:	Panel-corrected standard errors

PIC: Public Investment Corporation

PRI: Principles for Responsible Investment

PSTR: Panel smooth transition regression

R&D: Research and development

RBV: Resource-based view

RE: Random effects

ROA: Return on assets

ROC: Return on capital

ROCE: Return on capital employed

ROE: Return on equity

ROIC: Return on invested capital

ROS: Return on sales

SIC: Stakeholder influence capacity

SOC: Social performance

SRI: Socially responsible investing

TLGT: Too-little-of-a-good-thing

TMGT: Too-much-of-a-good-thing

TSR: Total shareholder return

UN: United Nations

US: United States

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Chapter 1: Introduction

1.1 Background

Corporate social responsibility (CSR) is "a concept whereby companies integrate social and environmental concerns in their business operations and in their interaction with their stakeholders on a voluntary basis" (Commission of the European Communities, 2001: 6). Firms, their various stakeholders, and researchers have long considered whether these voluntary actions provide financial benefits to the firm. Over the decades, there have been compelling arguments and evidence both for and against the business case of CSR. This relationship has however not been well-researched in developing markets, particularly South Africa (SA).

This research aims to reconcile these seemingly opposing views and findings by exploring the possibility that the relationship between corporate social performance (CSP) and corporate financial performance (CFP) may be of a non-linear nature. This would imply that the CSP-CFP relationship may be both positive and negative, dependent on a firm's current level of CSP. Particularly, this research explores the problem in a developing market context, by looking at the unique business case of CSR in SA. This paper builds on the work of Barnett and Salomon (2012) and Nollet, Filis and Mitrokostas (2016) who both explored this relationship in the US context.

1.2 Research aim and questions

This research aims to fill a gap in the existing South African CSP-CFP research landscape by investigating the shape of the CSP-CFP relationship for JSE-listed companies from 2012 to 2019. The following research questions are proposed to guide the research aim:

1. What is the shape of the CSP-CFP relationship for JSE-listed firms from 2012 to 2019?
2. What is the shape of the relationship between environmental performance (ENV) and CFP for JSE-listed firms from 2012 to 2019?
3. What is the shape of the relationship between social performance (SOC) and CFP for JSE-listed firms from 2012 to 2019?
4. What is the shape of the relationship between governance performance (GOV) and CFP for JSE-listed firms from 2012 to 2019?

1.3 Research motivation and justification

The relationship between CSP and CFP is a relationship that has seen significant debate over the prior decades. Since before the 1950s, managers and other stakeholders have questioned whether

companies have a responsibility to the interests of other stakeholders besides shareholders (Carroll, Shabana and Scherer, 2010). Questions also arose on whether a firm would be financially rewarded or punished by engaging in such responsible social actions. One of the earlier and more notable opponents of CSR was Friedman (1970), who argued that a firm's social activities are in effect taxes imposed on shareholders by managers (or activist shareholders), the benefits of which accrue solely to other stakeholders. In contrast, proponents of CSR believe that CSR provides the firm with a competitive advantage (Porter and Kramer, 2006).

While many review studies appear to point to a significant positive CSP-CFP relationship (Aguinis and Glavas, 2012; Friede, Busch and Bassen, 2015; Wang, Dou and Jia, 2016; Busch and Friede, 2018), this consensus nevertheless appears to be a fragile one, with many researchers having found negative or insignificant relationships over the years. In addition, many past studies were limited as they assumed that the CSP-CFP relationship was of a linear nature. There is a growing body of literature that recognises that a non-linear perspective may help better explain the CSP-CFP relationship (Brooks and Oikonomou, 2018; Busch and Friede, 2018).

Several studies have answered this call to reconcile these opposing views by exploring the relationship in a non-linear context. Notably, Barnett (2007) and Barnett and Salomon (2012) argue and find evidence for an inverse U-shaped relationship. It is argued that a firm's CFP is contingent on its existing CSP stock, it's *stakeholder influence capacity*. In contrast, other authors have found evidence for a U-shaped relationship, whereby a *too-much-of-a-good-thing* (*TMGT*) effect arises from a rise in agency costs in line with CSR activities (Wang, Choi and Li, 2008).

While this topic has seen significant literature in developed markets, comparably less research has been conducted in developing markets. In addition, there has been relatively more conflicting research outcomes. While some authors argue and find that this relationship should be weaker or negative in developing markets (Wang, Dou and Jia, 2016; Garcia and Orsato, 2020), other authors find the opposite (Friede, Busch and Bassen, 2015). Few studies have explored the relationship from a non-linear lens in developing markets, and most of this research has been conducted in Asia (Han, Kim and Yu, 2016; Chen and Lee, 2017; Maqbool and Bakr, 2019) or exclusively focused on the financial sector (Matuszak and Rózańska, 2019; El Khoury, Nasrallah and Alareeni, 2021).

South Africa provides an interesting and unique context to explore this relationship. All Johannesburg Stock Exchange (JSE) listed companies are required to comply with the King Code, a code of corporate

governance best practices (JSE, n.d.). In addition, South Africa has unique redress legislation like the Broad-Based Black Economic Empowerment (B-BBEE) Act, which aims to financially empower citizens previously disadvantaged under the apartheid regime (*Broad-Based Black Economic Empowerment Act, No. 53 of 2003*, 2004). Therefore, much CSR activity that South African firms conduct which may be considered voluntary in other countries is in contrast compulsory and required by law in South Africa.

Many existing South African studies make use of event studies, which provide evidence of the CSP-CFP relationship in the short-term (Wolmarans, 2012; Demetriades and Auret, 2014; Chetty, Naidoo and Seetharam, 2015). Many prior studies also made use of JSE Socially Responsible Investment (SRI) Index inclusion as the CSR variable (Ntoi, 2010; Nkomani, 2013; Demetriades and Auret, 2014; Chetty, Naidoo and Seetharam, 2015; du Toit and Lekoloane, 2018), which has several shortcomings. Firstly, this proxy is binary, in that a firm is either considered a socially responsible firm or not (in contrast to a reputation scale rating). Secondly, a firm excluded from the index is not necessarily a poor CSP firm (Madhala and Shavit, 2008). Lastly, CSR is a multidimensional construct (Gillan, Koch and Starks, 2021), and this proxy does not allow for the decomposition of CSR into environmental, social and governance factors, for example, for which several reputation ratings do allow.

This problem has real-world implications for managers, especially given increasing pressure from stakeholders and the rapid rise in ESG investing. Managers would benefit from knowing whether their CSR activities are financially beneficial or not, or whether these activities are only viable under certain circumstances.

This study seeks to address the gap in the South African literature, which has exclusively assumed that the CSP-CFP relationship is linear and have not investigated the possibility that the relationship could be non-linear.

1.4 Research method

This study takes a quantitative approach. Bloomberg ESG disclosure scores are used as a proxy for CSP. Both accounting- and market-based measures of CFP are utilised, namely, return on assets (ROA) and annual shareholder return (ASR) are used respectively. This research is focused on a South African context and thus only examines listed companies on the JSE from 2012 to 2019. The sample period selected for this study specifically excludes the period affected by the COVID-19 pandemic to avoid its confounding effects on the CSP-CFP relationship. Establishing whether causality exists between CSP

and CFP is beyond the scope of this study. Instead, this study evaluates whether a relationship exists between these variables and if so, the shape of this relationship.

1.5 Study structure

The remainder of this study is structured as follows. Chapter 2: defines and describes CSP and CFP, and reviews existing theories describing the predicted CSP-CFP relationship. This is followed by a review of empirical findings from previous studies, and a review of control variables used in prior studies. Chapter 3: identifies and justifies the sample selected for this study and the sources of this data and introduces the empirical model utilised in the study. This chapter also develops the hypotheses of this study and outlines the statistical analysis processes followed. Chapter 4: provides an analysis of the data's descriptive statistics and correlation metrics. This is followed by an examination of the model's empirical results and a discussion of these results. Lastly, Chapter 5: summarises and concludes on the results of the study, while also noting limitations of the study and directions for future research.

Chapter 2: Literature Review

2.1 Introduction

The remainder of this chapter is organised as follows. First, the dependent variable of this study, CSP, is discussed. Key terms such as corporate social responsibility (CSR), CSP and ESG are clarified, CSR is contextualised in a South African setting, and the various CSP measures are described. Next, the independent variable, CFP is discussed, as well as the various method of measurement of this variable. This is followed by a theoretical framework outlining the CSP-CFP relationship, distinguishing between theories supporting a positive, negative, inverse U-, and U-shaped relationship. Thereafter, empirical findings regarding this CSP-CFP relationship are analysed and discussed, in developed, developing and a South African market context. Penultimately, a discussion regarding the choice of control variables follows. The chapter ends with a summary and conclusions.

In light of the volume of the existing research, this literature review will not attempt to be a conclusive summary of all existing literature, but rather leverage past meta-analyses, review studies, and other second-order research. More focus will be directed at prior studies evaluating the CSP-CFP relationship in a South African context, and studies examining the non-linear CSP-CFP link.

2.2 Corporate social responsibility and corporate social performance

2.2.1 Clarification of key terms

CSR is a term lacking a single universal definition. Despite this lack of a consensus, Dahlsrud (2008) identified five common themes in an analysis of CSR definitions from 1980 to 2003. These attributes are

1. the natural environment,
2. society,
3. economic (socio-economic or financial) aspects,
4. stakeholder relationships, and
5. voluntariness.

The most commonly found definition by Dahlsrud was the Commission of European Communities' definition, which defined CSR as "a concept whereby companies integrate social and environmental concerns in their business operations and in their interaction with their stakeholders on a voluntary basis." (2001: 6). This definition will be used for the purposes of this study.

While CSR and CSP are often used as one and the same term, there is an important distinction between these terms. CSR is not a variable and is thus "impossible to measure" (van Beurden and Gössling, 2008: 409). This measurement issue is addressed through the concept of CSP. CSP can be seen as the level of an organisation's social activities at a specific point in time. In contrast, CSR relates to the social activities the organisation would have partaken in to reach a certain level of CSP (Barnett, 2007). Related to CSR and CSP, ESG is an acronym that has seen rapidly rising popularity. The term was first presented in the 2004 *Who Cares Wins* report, which was a response to a call from the Secretary-General of the United Nations, Kofi Anan (Gillan, Koch and Starks, 2021). ESG refers to the incorporation of environmental, social, and governance factors into investment decision-making (S&P Global, 2020). A major difference between CSR and ESG is each term's treatment of *governance*. As the name implies, ESG explicitly includes governance factors. On the other hand, CSR is a more multi-dimensional term, and implicitly includes governance, as it relates to the environment, society, and other stakeholder relationships (Gillan, Koch and Starks, 2021).

As discussed above, both CSR and ESG have significant overlap. For the purposes of this literature review, studies examining both CSR and ESG will be considered. Furthermore, these terms will largely be used interchangeably throughout the study.

2.2.2 CSR in a South African context (the institutional environment)

In line with Jamali and Karam's (2018) recommendation, this review includes a discussion regarding South Africa's (SA's) unique institutional and social environment. One of the earliest and most significant interactions between ESG and South Africa occurred in 1977, in response to the Apartheid regime. Civil rights leader and General Motors board member, Rev. Leon Sullivan, developed a code of conduct for US companies with investments in South Africa, which later became known as the *Sullivan Principles* (Morningstar, 2020). The code was a form of economic protest against the South African government. While the lives of some black South Africans saw slight improvements, in 1985, Sullivan presented an ultimatum to US corporations to fully withdraw from South Africa if Apartheid was not abolished in the next two years (which many corporations did) (Mangaliso, 1997). In 1986, United States (US) Congress prohibited any new investment into South Africa through the Anti-Apartheid Act (Morningstar, 2020).

Since the end of Apartheid in 1990, and the first democratic election in 1994, South Africa has made significant strides in social responsibility, through legislative and regulatory measures, corporate governance codes, integrated reporting, the creation of a SRI index, inter alia.

CSR-enabling legislation

The South African regulatory environment includes several enabling legislations relating to CSR. This is summarised in Table 1.

Table 1: Summary of CSR enabling legislation in South Africa

Environmental aspects	*Social aspects*	*Governance aspects*
• National Environmental Management Act (1998) • Environmental Conservation Act (1989) • National Water Act (1998) • National Environmental Management: Protected Areas Act (2003) • National Environmental Management: Air Quality Act (2004) • The Constitution: Chapter 2: Bill of Rights – Section 24 (1996)	• Broad-Based Black Economic Empowerment Act (2003) • Labour Relations Act (1995) • Skills Development Act (1998) • Housing Protection Measures Act (1998) • Unemployment Insurance Act (2001) • Basic Conditions of Employment Act (1997) • Promotion of Equality and Prevention of Unfair Discrimination Act (2000) • Preferential Procurement Policy Framework Act (2000)	• Companies Act (2008) • National Credit Act (2005) • Insider Trading Act (1998) • Consumer Protection Act (2008)

Source: Adapted from Mans-Kemp and Viviers (2015)

A notable and relatively unique act is the Broad-Based Black Economic Empowerment (B-BBEE) Act, which aims to financially empower black people through increased corporate ownership and management involvement; access to capital, training, and other resources; meaningful economic participation; amongst others (*Broad-Based Black Economic Empowerment Act, No. 53 of 2003*, 2004).

The King Reports on Corporate Governance and Integrated Reporting

One of the Johannesburg Security Exchange's (JSE's) listing requirements is the implementation, compliance, and disclosure of compliance to the King Code (n.d.). King IV, introduced in 2016, is the fourth and most recent edition of the King Code, a code setting out corporate governance best practices for South African organisations (Institute of Directors in Southern Africa (IoDSA), 2016). The King IV report addressed each of the five aspects of the CSR definition in detail. For example, Principle 3 recommends that a company act as a responsible corporate citizen, monitoring how their actions impact the economy, society, and the environment. Principle 1 recommends that the company adopt a "stakeholder-inclusive approach", and act "beyond mere legal compliance" (voluntariness) while executing their duties (Institute of Directors in Southern Africa (IoDSA), 2016: 43–44). Therefore, one might expect that JSE-listed firms and those intending to list would exhibit better CSP than non-listed firms.

King IV also expanded on integrated reporting guidelines, originally introduced in King III. King III introduced a guideline for companies to release integrated reports alongside their annual reports. The aim of this reports was to better inform stakeholders of the company's economic value, through the disclosure of a various additional financial and sustainable information (IoDSA, 2009). King IV further emphasised the progression from siloed to integrated reporting (IoDSA, 2016).

Amendment to Regulation 28 of the Pension Funds Act and CRISA

In 2011, Regulation 28 of the Pension Funds Act was amended. The preamble to this regulation added a statement explicitly mentioning environmental, social and governance factors, and required consideration of these and other factors that would affect sustainable long-term fund performance. In addition, a fund's investment policy statement must also include an explanation of how a fund applies these ESG principles, as well as B-BBEE issues (*Pension Funds Act, 1956: Amendment of Regulation 28 of The Regulations Made Under Section 36*, 2011). The IoDSA provided more clarity on the incorporation of ESG considerations into investment considerations when they issued the Code for Responsible Investing in South Africa (CRISA), also in 2011 (IoDSA, 2011). This report also provided

guidance for investors of how King III and the United Nations (UN) Principles for Responsible Investment (PRI) initiative could be applied in practice (Mans-Kemp and Viviers, 2015).

The FTSE/JSE Responsible Investment Index

In 2004, the JSE formed the Socially Responsible Investing Index (SRI) Index, becoming the first emerging market stock exchange to form such a sustainability index (2022b). This index aimed to include companies with strong triple bottom line performance and to make comparisons between socially responsible and non-socially responsible firms easier (Gladysek and Chipeta, 2012). The JSE later adopted the FTSE Russel ESG Rating methodology, and the SRI Index was replaced with the FTSE/JSE Responsible Investment Index and the FTSE/JSE Responsible Investment Top 30 Index (JSE, 2022). The use of ESG Ratings from a large international rating agency like FTSE Russell allowed South African investors to integrate ESG considerations more directly into their investment decisions.

2.2.3 Measures of CSP

Galant and Cadez (2017) distinguish between several forms of CSP measurement. These include *reputation indices, content analyses, questionnaire-based surveys,* and *one-dimensional measures*. Wang, Dou, and Jia (2016) noted similar categories. Each of these approaches has their benefits and shortcomings, as discussed below.

Reputation ratings and indices

This method involves ratings of firms' corporate social responsibility by experts (Galant and Cadez, 2017) or ratings agencies (Wang, Dou and Jia, 2016). Adjacently, many of these ratings agencies also compile indices for the CSP performers with the highest ratings. These ratings are one of the more commonly used forms of CSP.

Examples of social responsibility indices include the MSCI KLD 400 Social Index (MSCI, 2022a), Fortune magazine's reputation index (2022), the Dow Jones Sustainability World Index (2022), and numerous other national indices such as the FTSE/JSE Responsible Investment Index in South Africa (JSE, 2022).

An advantage of using this type of reputation rating is the ease of data collection, and the improved comparability amongst firms. On the other hand, ratings that are only provided as an aggregated score are not of much use to researchers wishing to study a specific dimension of CSR, such as a firm's environmental performance for example (Galant and Cadez, 2017). Another downside of these measures is that it allows more opportunity for researcher bias, whereby a researcher could simply choose a CSP rating that aligns with their research objectives (Entine, 2003). However, this is arguably a drawback inherent

to all measures of CSP, and not confined to the use of a rating. Despite the different ratings agencies and indices, similar themes emerge, such as the environment, the community, and employees. Another related downside is that even if researcher bias can be overcome, many ratings are compiled by private firms with their own goals and agendas (Galant and Cadez, 2017).

Another weakness of these measures, particularly for developing countries, is that the geographical coverage of these ratings agencies is often limited. In addition, some ratings agencies automatically exclude firms from industries which they deem as controversial or unsustainable. For example, the MSCI KLD 400 Social Index excludes firms involved in controversial business activities (such as tobacco, nuclear power, and civilian firearms) (MSCI, 2021) and the S&P Dow Jones Sustainability Indices exclude firms engaged in unsustainable activities (such as adult entertainment, alcoholic beverages production, and military weapons contracting) (S&P Dow Jones Indices, 2022b). This means that firms engaging in responsible environmental or social practices may be excluded, simply due to the industry which they form a part of. Lastly, socially responsible firms may also be excluded if they are not publicly listed or large enough to receive ratings agency coverage (Madhala and Shavit, 2008).

Content analysis

Content analysis first involves the collection of qualitative information from company communications such as company annual reports, personal handbooks, employee newspapers, press releases, executive speeches, and so on (Abbott and Monsen, 2017). This qualitative data is then codified and categorised to enable quantitative comparisons through statistical methods. Examples include the methodologies used by the studies by Bowman and Haire (1975), and Matuszak and Rózańska (2019).

A key advantage of this measure is the comparative low costs of data collection (Wang, Dou and Jia, 2016). An advantage of this measure over reputation ratings is the customisability of this measure, permitting researchers to select the CSR dimensions of interest and select how those dimensions are reflected in firm communications. This subjectivity is however also a key disadvantage of this measure (Galant and Cadez, 2017), which introduces more opportunities for bias and reduces comparability among research output. Another shortcoming arises from the largely voluntary and unaudited nature of CSR reporting. It may be unclear whether a firm's communications are an appropriate reflection of CSR involvement, or merely a method for positively signalling CSR activities that may lack substance to shareholders (Abbott and Monsen, 2017).

Questionnaire-based surveys

A survey is an ideal method of CSP measurement for companies that do not have CSP ratings or do not have sufficient information available for meaningful content analysis (Galant and Cadez, 2017), such as for unlisted companies.

Surveys often take a forced-choice format to prevent social desirability bias, where survey respondents may answer in an untrue manner to appear more favourably viewed by others (Wang, Dou and Jia, 2016). Another survey method to avoid this bias is through collecting data from external stakeholders in addition to internally from the firm (Cadez and Czerny, 2016). An early example of such a survey was used by Aupperle, Carroll and Hatfield (1985).

As with content analysis, this measure benefits from adaptability and flexibility afforded to the researcher (Galant and Cadez, 2017). In addition to social desirability bias, a downside is that the nature of survey research introduces certain biases. Selection bias may occur because more socially responsible firms tend to have a higher response rate than less socially responsible firms (Cadez and Czerny, 2016).

One-dimensional proxy

The final measure of CSP, the one-dimensional proxy, involves the choice of a single variable, usually representing a single dimension of CSP (Galant and Cadez, 2017). Examples of such proxies include pollution control (Bowman and Haire, 1975) and corporate giving (Brammer and Millington, 2005).

An advantage of this method is the ease at which data can be collected (Galant and Cadez, 2017). As with the previous two measures, this measure also has the advantage and disadvantage of researcher subjectivity in the selection of the proxy variable. As discussed earlier, CSP is multi-dimensional. For example, an environmentally sustainable firm that does not make many charitable donations would be considered to have strong CSP if an environmental proxy like pollution control is used, but low CSP if charitable giving was the selected proxy. This is especially important when comparisons are made across different industries, where different CSP dimensions have various levels of importance (Waddock and Graves, 1997).

2.3 Corporate financial performance

Measures of CFP can generally be divided into three broad categories: accounting-based, market-based, and perceptual measures (Orlitzky, Schmidt and Rynes, 2003). Each measures' respective downsides and benefits are discussed in the remainder of this section.

2.3.1 Accounting-based measures

Accounting measures principally focus on how different management decisions affect financial performance (Cochran and Wood, 1984). Measures include Earnings per share (EPS), Return on sales (ROS), Return on assets (ROA), Return on equity (ROE), Return on capital (ROC), EBITDA, net income (NI), operating profit margin, and net profit margin.

A key disadvantage of accounting-based measures is that they are by their nature backwards-looking. If absolute figures are used, such as EBIT or net income, then differences in company size cannot be controlled for. Relative ratios may be used to remedy this, but this introduces bias if comparisons are made between firms with different operational characteristics, such as firms from different industries or in different stages of their corporate lifecycle (Al-Tuwaijri, Christensen and Hughes, 2004). Comparisons may be difficult between different regions where different accounting standards apply, or even when the same standards are used, due to management discretion of accounting policies. They are also more open to management manipulations such as earnings management. However, accounting-based measures are the most objective of the three measurement types, particularly if the firm's results are audited (Lu et al., 2014).

2.3.2 Market-based measures

Market-based measures principally view shareholders as the primary stakeholder of the firm (Cochran and Wood, 1984). Measures include share price, share price appreciation, annual shareholder return (ASR), annual excess return, price-to-earnings (P/E) ratio, market value added (MVA), and Tobin's Q.

A key advantage of market-based measures is that they tend to be more forward-looking in nature than accounting-based measures. These measures should react faster to changes in CSP than accounting-based measures, which are generally limited to annual or interim releases (Galant and Cadez, 2017). In efficient markets, stock prices should adjust instantly to new and unexpected material information, such as information about a firm's CSR activities (Demetriades and Auret, 2014). Data used for market-based measures is however only available for publicly traded listed firms.

On the other hand, market-based measure may introduce systematic market factors (such as a recession), which creates undesirable noise between the CSP-CFP relationship (McGuire, Sundgren and Schneeweis, 1988). In addition, market-based measures may also incorporate other factors that inform aggregate investor expectations, rather than the true economic performance of the firm

(Huang, 2019). This includes market anomalies such as momentum (Nuber, Velte and Hörisch, 2020). This contrasts with accounting-based measures, which better reflects a firm's internal decision-making and management skill as opposed to market responses to these actions (Orlitzky, Schmidt and Rynes, 2003). Lastly, investors may have different responses to a firm's increased CSP – some investors may view a firm's increased CSP favourably, and others may view it negatively (Ullmann, 1985).

2.3.3 Perceptual measures

Perceptual measures reflect survey respondents' views of financial performance, such as goal attainment relative to competitors (Reimann, 1975), "wise use of corporate assets" and "soundness of financial position" (Wartick, 1988: 19). Perceptual measures are the most subjective of the three measurement types, as results will depend on survey respondents' beliefs (Lu et al., 2014). Lu et al. (2014) advise for the use of more objective measures due to the inherent difficulty and breadth of CSP and CFP measurement.

2.3.4 Use of multiple measures

As no measure of financial performance is perfect, the use of multiple measures can provide a better overall reflection of CFP, as the strengths of one measure can alleviate the weaknesses of another measure (McGuire, Sundgren and Schneeweis, 1988). In addition, multiple measures can reflect the perspectives of different firm stakeholders (Ye, Wang and Lu, 2021). Many prior studies have used both accounting and market performance, and also multiple measures of each type of performance, as can be seen in 0.

2.4 Theoretical framework of the CSP-CFP relationship

Over the years, many theories have attempted to explain the CSP-CFP relationship. These theories have explored the problem from economic, ethical, political, social, and institutional lenses (Garriga and Melé, 2004; Jamali and Karam, 2018). Given the lack of clarity around this relationship and recognising the complexity of this relationship, this study takes a multi-theoretical approach. This section of the chapter is organised as follows. First, a taxonomy of different CSR theories is presented. Then, each subsection discusses theories supporting a positive linear, negative linear, inverse U-shaped, and U-shaped relationship, respectively.

2.4.1 Taxonomy of CSR theories

Garriga and Melé (2004) classify CSR theories into four categories, with each category demonstrating a justification for a firm's engagement in CSR. *Instrumental theories* view CSR as purely a means to an

end. A firm will thus only engage in CSR activities if and only if these activities are ultimately expected to result in increased shareholder value. *Political theories* focus on the relationship between the firm and society, and how this relationship affects the firm's political power. A firm will thus accept its responsibilities to society by engaging in CSR activities due to the power it is granted in society. *Integrative theories* state that a firm is dependent on society for its survival and growth and should therefore consider the demands of society. A firm thus must engage in CSR activities to ensure its long-term survival and continued growth. Lastly, *ethical theories* assumes that the relationship between a business and society is underpinned by certain ethical values. Firms thus have a moral duty to engage in some level of CSR activities because it is considered the right thing to do. This literature review will largely focus on instrumental theories, as it has been found that firm's primary motivation for engaging in CSR is for instrumental reasons (Aguinis and Glavas, 2012).

2.4.2 Theories supporting a positive (linear) relationship

Theories supporting this view have been referred to as the *social impact hypothesis*, the *revisionist view*, or *win-win* theories in the literature. It is argued that both a firm and stakeholders benefit from increased CSP. Firms benefit financially through a combination of cost reduction or increased revenues, with a net benefit. One explanation of these cost reductions or increased revenues is through neoclassical economic theory (Brammer and Millington, 2008). These benefits arise from a firm's management of their stakeholder relationships, and include reduced litigation risk, improved employer reputation, increased customer loyalty and favourable media coverage, inter alia. These benefits were summarised by Malik and can be seen in Figure 1 (2015).

CSR activities like charitable giving used as part of advertising activities could increase revenues through reducing price elasticity of demand (Navarro, 1988), or improving customer perceptions of products or services (Sen and Bhattacharya, 2001). Charitable giving could also reduce future costs, for example, through strategic benefits achieved through lobbying, or reduced personnel costs due to worker's placing a premium on a firm's social activities. It can also reduce a firm's tax burden through tax deductibility of these donations (Navarro, 1988). CSR activities may also increase the productivity of a firm's labour force, increase the supply of skilled labour, or reduce wastage (Brammer and Millington, 2008).

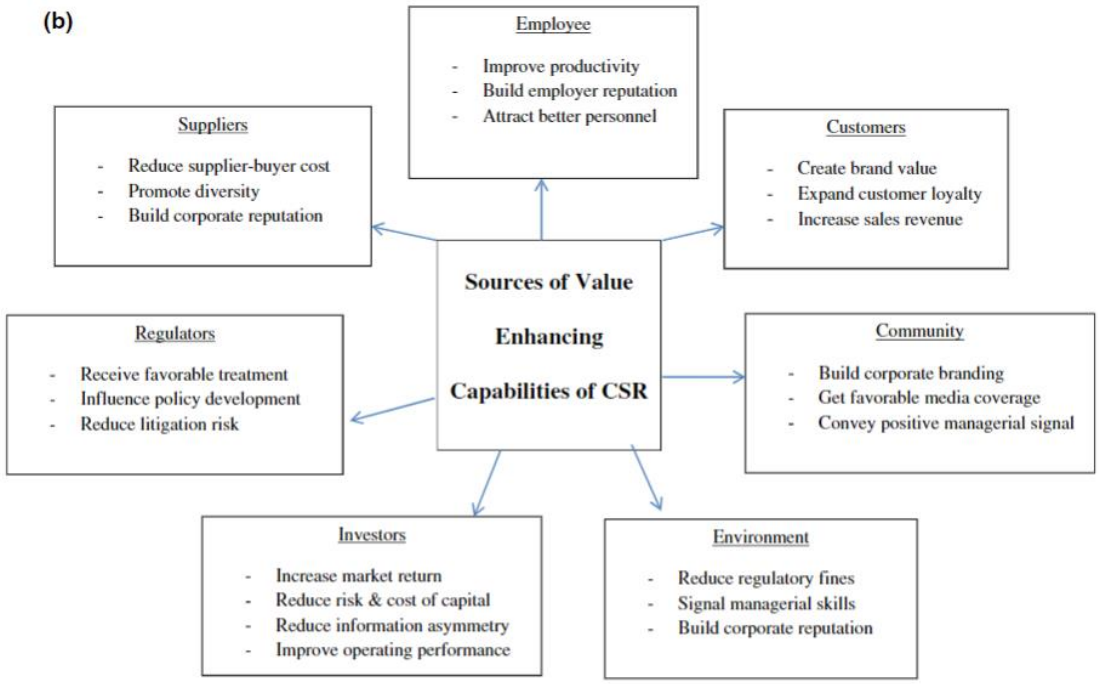

Figure 1: Summary of the financial benefits of CSR (Malik, 2015)

Competitive advantage

An alternative perspective of explaining the financial benefits of CSR is through a management studies lens. These theories explain how increased CSP can provide a firm with a competitive advantage. Porter and Kramer (2006) argue that strategic social investments may be a source of a firm's competitive advantage. They propose that the firm and society are interdependent, and that a firm should identify *shared value* activities to engage in, where the interests of the firm and society intersect. These activities ultimately benefit the firm and society and provide the firm with a competitive advantage. They differentiate between *responsive CSR*, which includes acting as a good corporate citizen and mitigating the current or potential externalities arising from the firm's activities, and *strategic CSR*, which is a step further than responsive CSR and involves focused and specific initiatives that benefit the business and society.

An adjacent theory is the resource-based view of the firm (RBV), which was further developed when Barney identified that a firm's resources must have several characteristics to provide the firm with a sustained competitive advantage (Wernerfelt, 1984; Barney, 1991). The resources must be valuable, rare, inimitable, and able to be easily deployed by the organisation. This theory of competitive advantage was expanded upon by Teece, Pisano and Shuen (1997) with the *dynamic capabilities* approach, which explores how the firm can fruitfully adapt its resources to changes in its operating

environment. Several authors have adapted and expanded upon the RBV of the firm to incorporate CSR aspects such as natural environment, social factors, and stakeholder relationships.

Hart (1995) extended the RBV and dynamic capabilities approach by incorporating the natural environment, with the natural resource-based view of the firm (NRBV). This theory considered the inherent constraints imposed by the natural environment. Continuous improvement, stakeholder integration and a shared vision were the resources presented to generate a competitive advantage. Three interdependent strategies which are proposed taking advantage of these three resources: pollution prevention, product stewardship and sustainable development, respectively. Each of the three strategies are expected to result in a financial benefit: cost savings through pollution prevention, increased revenues through better product stewardship, or expectations of future growth in the long-term through investments in sustainable development.

Litz (1996) incorporated social aspects into the RBV. He considered firms that could identify their interdependence on society, apply appropriate ethical standards to issues, and respond to issues in a timely and effective manner had valuable, rare, inimitable, and non-substitutable resources. Similarly, Petrick and Quinn (2001) suggest that better moral decision-making (*integrity capacity*) is another resource that can function as a competitive advantage.

Hillman and Keim (2001: 127) considered the effects of stakeholder relationships. They argued that relationships with key stakeholders ("customers, employees, suppliers and communities where businesses operate") are strategic resources that can lead to a sustained competitive advantage.

Finally, Jones (1995) introduced the concept of instrumental stakeholder theory, building on Freeman's (2010) stakeholder theory concept. He suggests that stronger stakeholder relationships built on co-operation and trust will create a competitive advantage for a firm. This competitive advantage is achieved through decreased transaction costs, agency costs and team production problems. It is argued that commitment to stakeholder relationship needs to be genuine to lead to benefits; it is difficult to maintain "sincere manner and reputation" if this behaviour is purely strategic and not intrinsic (1995: 416). Thus, firms and their managers should co-operate and behave trustworthily because these acts are intrinsically good, and not because they are a means to an end (improved CFP). Only if these actions are authentic would they result in improved CFP.

2.4.3 Theories supporting a negative (linear) relationship

Theories supporting this view are known as *trade-off* theories or the *traditionalist view* and argue that increased CSP will increase costs without a corresponding improvement in CFP. As with how neoclassical economic theory can explain a positive CSP-CFP link, it can also explain a negative link (Brammer and Millington, 2008). All else equal, if CSR activities do not have a large enough positive payoff, a firm that dedicates resources to these activities will be worse off than a firm that does not.

Shareholder value maximisation

In the much-cited essay, Friedman (1970) argued that a firm's only responsibility is to generate profits for shareholders. He argues that most social activities undertaken by firms are taxes by management (or activist shareholders) on other shareholders, the benefits of which accrue to the former parties. Notably, Friedman did not completely disregard CSR or social activities. These activities were however only considered justified if they ultimately are in shareholders' best financial interests (that is, they increase CFP).

Jensen (2001) expanded on this idea of shareholder value maximisation. He argued against stakeholder theory for several reasons. Firstly, social performance could not be benchmarked (compared to shareholder value maximisation). Secondly, in an environment where managers have multiple objectives (social and financial performance), trade-offs will inevitably be required between these objectives, yet stakeholder theory does not specify how these trade-offs should be made. Finally, multiple objectives benefit managers, as they have reduced accountability compared to a single objective, for example, they could argue that they underperformed financially due to greater social performance.

He thus introduced two theories two reconcile these conflicts: enlightened value maximisation and enlightened stakeholder theory. Enlightened value maximisation built on stakeholder theory but introduced maximisation of firm value in the long run as a requirement for specifying the above-mentioned trade-offs. He recognises that this goal will not be possible if any stakeholder is ignored, however, this theory helps managers make a choice when different stakeholders interests conflict. Enlightened stakeholder theory clarifies that a firm's long-term objective is long-term value maximisation. In summary, these enlightened theories form a better middle ground between shareholder value maximisation and stakeholder theory, but the benefit ultimately goes to shareholders if there are conflicts.

2.4.4 Theories supporting a (non-linear) inverse U-shaped relationship

These theories argue for a positive CSP-CFP relationship, but only up to certain point, whereafter diminishing and eventually decreasing marginal returns begin. Pierce and Aguinis (2013) propose a too-much-of-a-good-thing (TMGT) effect as a reason for seemingly counterintuitive or anomalous empirical findings in various management disciplines. This view reconciles both win-win and trade-off theories of the CSP-CFP relationship. The former theories would prevail while a firm is below the optimal level of CSP, and the latter would apply when above the optimal level of CSP.

TMGT effect

Lankoski (2008) builds on neoclassical economic theory. If the marginal costs of CSR activities are increasing (which is the case as a marginal cost curve is designed to include CSR activities from lowest to highest costs) and the marginal revenues from the outcomes of these activities are declining, an inverted U-shaped must exist by definition.

Wang, Choi and Li (2008) focused on a single element of CSR, corporate philanthropy. They theorised that the benefits of corporate philanthropy would first be expected to increase, as stakeholders react positively, followed by diminishing marginal returns, due to limitations on the resources (financial benefits) that socially conscious stakeholders can offer a firm. On the other hand, the direct costs should change more or less linearly with every unit of currency spent. There may be some economies of scales for costs like human resources, resulting in these costs to flatten out as spending increases (McWilliams and Siegel, 2001). However, the existence of agency costs transforms this otherwise positive relation to a concave nature. While these costs are initially expected to be low as corporate philanthropy starts increasing, these agency costs start to increase more at some point when these funds are directed to sources not acceptable to stakeholders. Nevertheless, this cannot continue forever, as control mechanisms such as shareholder voting power or other monitoring mechanisms result in these managers being disciplined or removed, and hence the curve would start to flatten out at a certain high level (Wang, Choi and Li, 2008). Thus, as shown in Figure 2, the net benefit of corporate philanthropy is hypothesised to initially be positive, but to decline once a certain level is reached.

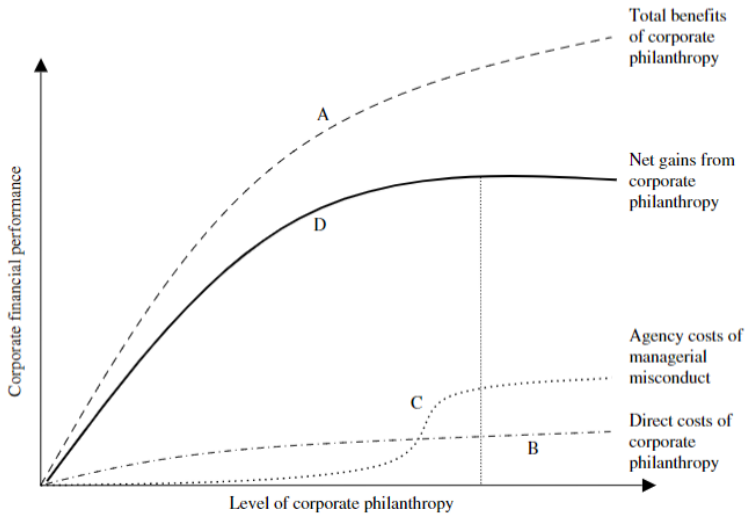

Figure 2: The hypothesised curvilinear relationship between corporate philanthropy and corporate financial performance (Wang, Choi and Li, 2008)

Stakeholder management versus social issue participation

Hillman and Keim (2001) argue that the CSP-CFP relationship is contingent on the type of CSR a firm engages in. They believe that (primary) stakeholder management increases shareholder value, compared to social issue participation, which destroys it. Social issue participation involves the diversion of resources to issues not directly related to primary stakeholder relationships. This view aligns with the distinction between strategic and responsive CSR (Porter and Kramer, 2006). If firms invest in strategic CSR, the CSP-CFP relationship may be positive, however, responsive CSR may have a negative or neutral effect on CFP.

It also aligns with agency theory (Brammer and Millington, 2008). While shareholders are generally assumed risk neutral to firm-specific risk (as it can be easily diversified away), managers can be assumed to be risk-averse, as their financial wellbeing and livelihood largely depends on their company's performance. Thus, they may take decisions, which reduce firm-specific risk at the expense of firm-specific risk-neutral shareholders' returns. If investment in CSR activities exhibits diminishing returns with CFP, yet continues to reduce firm-specific risk, managers may overinvest at the shareholders' expense (Wiseman and Gomez-Mejia, 1998; Brammer and Millington, 2008).

2.4.5 Theories supporting a (non-linear) U-shaped relationship

In contrast to theories supporting an inverted U-shape, this theory is known as the *too-little-of-a-good-thing (TLGT) effect* (Trumpp and Guenther, 2017; Nuber, Velte and Hörisch, 2020). It is argued that a firm will only reap the rewards of CSR after a certain level of CSP. This theory supports the view

that CSR provides a firm with competitive advantage, but caveats this with a required level of CSP before the benefits from CSR outweigh its costs.

Competitive advantage

Porter (1980: 41–42) provided three generic strategies firms could employ to have a competitive advantage –cost leadership, differentiation, and focus. A firm that does not pursue either of these strategies may find itself "stuck in the middle". These firms tend to performer poorer than both cost leaders (as they lose volumes to these firms) and successfully differentiated firms (as they lose on margins to these firms).

This concept could be applied to the CSP-CFP relationship. If a firm has neither made sufficient investments in CSR to differentiate their products or services (to consumers and other stakeholders like employees), nor has chosen to avoid CSR investments to save these direct costs, it will be "stuck in the middle" (Brammer and Millington, 2008: 1329). The firm would have incurred the costs of CSR without reaping the benefits, and this would explain a U-shaped CSP-CFP relation.

Stakeholder influence capacity

Barnett (2007) built on stakeholder theory and developed *stakeholder influence capacity (SIC)*, to explain the variation in previously studied CSP-CFP relationships. The idea behind this theory is that previous stakeholder relations moderate the CSP-CFP relationship. Barnett argues that stakeholders will consider prior engagement with firms when evaluating the effects of their current CSR activity. A firm that has had good stakeholder relationships in the past will have a greater SIC stock. Thus, in line with Porter (1980), a firm with low CSP will have not incurred many costs. As firms continue to invest and build their SIC, there comes a turning point where sufficient SIC has been reached such that the benefits of CSR investment exceed the cost (Barnett and Salomon, 2012). A summary of the CSP-CFP relationship theories can be seen in Table 2.

Table 2: Summary of the CSP-CFP relationship theories

View	*Theory*	*Predicted Relationship*
Win-win	Neoclassical economic theory	Positive
	Competitive advantage	
Trade-off	Shareholder value maximisation	Negative
TMGT	Neoclassical economic theory (increasing agency costs)	Inverse U-shape
	Stakeholder management versus shareholder issue participation	
TLGT	Competitive advantage	U-shape
	Stakeholder influence capacity	

Source: Author's own contribution

2.5 Empirical findings on the CSP-CFP relationship

This section of the chapter is organised as follows. First, the findings of several developed and developing market (excluding SA) review studies and meta-analyses are discussed. This is followed by a review of studies evaluating a non-linear relation, in both a developed and developing market context. Lastly, several findings in a South African market context are reviewed.

2.5.1 Review studies

Aguinis and Glavas (2012) found a minor positive relationship between ESG and CFP at the organisational level. They attribute inconsistencies in their findings to different definitions of ESG used in different studies. In an analysis of more than 2 200 empirical studies covering the period until December 2014, Friede, Busch and Bassen (2015) found support for a positive relationship. Approximately 90% of studies showed a non-negative ESG-CFP relationship with most of them showing a positive relationship. Evidence was most significant for governance performance (GOV) and weakest for social performance (SOC), although this difference was not significant. This positive relationship was relatively widespread, with the exception of portfolio studies which showed mostly mixed or neutral results. This difference they believe is due to overlapping CSR factors (distorting or cancelling out one another), and additional costs like management fees accounted for in these portfolio studies.

Busch and Friede (2018) further found in an analysis of twenty-five meta-analyses over the same period a very significant positive ESG-CFP relationship. In line with their 2015 study, they found GOV to be the key determinant of ESG, but the other components were still significant and positive. Their findings are thus consistent at a first- and second-order level. They believe that studies that consider non-linear effects could further explain this positive relationship.

Wang, Dou, and Jia (2016), in a meta-analysis of studies from 2003 to 2012, also found a positive significant relationship. Lu et al. (2014) confirmed this between 2002 and 2011, although they note that there is still notable inconsistency in prior results.

Looking to developing markets, it is important to consider additional moderating factors in this relationship. Julian and Ofori-Dankwa (2013) proposed that sub-Saharan African firms prioritise capital accumulation over CSR investment, because they operate in a weaker institutional environment and with greater financial constraints. These firms fail to recognise the strategic value of CSR investment and see an accumulation of capital as a better alternative. This was termed the *institutional difference hypothesis*. They found support for this theory in Ghana. Garcia and Orsato (2020) also found support for the theory in South Africa and Brazil, as they found a significant negative ESG-CFP relationship in these countries, compared to a positive relationship in the US and Europe.

This was supported by Wang et al. (2016), who proposed that the CSP-CFP is stronger in developed markets than developing ones. They theorise that it may be that CSR actions are more visible in developed markets is due to the greater efficiency of markets and more developed institutions. In contrast, Friede, Busch and Bassen's (2015) sample of developing market studies had a significantly higher share of positive outcomes compared to developed markets.

While more prior review studies discussed found a significant positive relationship in a developed market context and a negative significant relationship in a developing market context, the consensus is not entirely clear. Most past studies have assumed a linear relationship. In addition to methodological choices like different definitions of CSR and CFP, time periods, or samples, another possible explanation for these differences is that the CSR-CFP relationship is non-linear.

2.5.2 Studies evaluating a non-linear relationship

Developed market and global studies

The CSP-CFP relationships have been explored non-linearly across various countries, industries, and other contexts. These studies are summarised in Table A1 of Appendix A:.

Possibly one of the earliest considerations that this relationship may not simply be linear came from Bowman and Haire (1975). They used Moskowitz's (1972) reputational scale as a sample and found that firms with moderate CSR disclosure performed better than those with high or low disclosure. In another study, they found that moderate polluters performed better than the worst and best polluting

firms. Both of these findings indicated an inverse U-shaped relationship. Two years later, Sturdivant and Ginter (1977) found comparable results, also using Moskowitz's scale. They found that firms with good social performance performed better than those with the best or worst social performance. However, Ullmann (1985) pointed out problems with drawing inferences from Moskowitz's sample as many researchers came to different conclusions using the same Moskowitz reputation scale.

The literature was relatively quiet for many years, but this concept saw a revival in the 2000s. Barnett and Salomon (2006) investigated the relationship between SRI screens and fund performance and found a U-shaped relationship. While increased screens would result in better financial performance, these benefits would be offset by a loss of diversification benefits. While interesting, this was not directly a study of the CSP-CFP relationship but rather was from the approach of a diversified investor in a portfolio of firms.

One of the first studies' (to this author's knowledge) explicitly testing for a non-linear CSP-CFP relationship was by Wang, Choi, and Li (2008) in the US from 1987-1999. An inverse U-shaped relationship was supported for both accounting- and market-based performance. This was justified by diminishing marginal financial benefits from stakeholders compared with increasing agency costs. However, the study was limited to a single element of CSR, corporate philanthropy. On the other hand, Brammer and Millington (2008) looked at UK firms in the 1990s (also limited to corporate philanthropy) but found a U-shaped relationship, which they justified based on Porter's (1980) theory of competitive advantage. They also found that very poor social performers do the best in the short-run, whereas very strong social performers do the best in the long-run.

In contrast to earlier US studies, Park, and Lee (2009) looked at a small sample of US restaurants and found the existence of a U-shaped relationship in terms of accounting-based performance only. They believed that it took time for stakeholders to recognise and approve of a firm's CSR activities. Several authors explored this relationship in a broader US context in the 2000s (particularly looking at the S&P 500). Barnett and Salomon (2012) found support for SIC (that is, a U-shaped relationship) with regards to accounting performance from 1991 to 2006 based on the KLD database. This was confirmed by Oikonomou, Brooks and Pavelin (2014) over a similar time period (1991 to 2008), but with regards to market-performance. Both studies also found that firms with the highest CSP outperformed those with the lowest CSP. Nollet, Filis and Mitrokostas (2016) looked at the S&P 500 from 2007 to 2011 and found a U-shaped relationship with regards to ESG score and accounting performance, further supporting SIC. They also found governance to be the key driver of this relationship (with no significant

relationship with the social or environmental element). Chen et al. (2018) looked at the KLD database from 2003 to 2009 and also found a U-shaped relationship.

Turning to the Eurozone, Nuber, Velte and Hörisch (2020) found support for SIC with a U-shaped relationship between ESGEP (ESG and Sustainable Economic Performance) and CFP in Germany from 2008 to 2017. In France however, Lahouel, Bruna and Zaied (2020) found an inverted U-shaped relationship between environmental performance and market-based performance and an inverted V-shaped relationship with accounting-based performance from 2005 to 2017. Lastly, Lahouel et al. (2022) found that a non-linear positive, non-linear negative or inverted U-shaped relationship between environmental CSR and CFP could be possible with a larger sample of French, German, and Italian firms from 2005 to 2017. This was more robust than their earlier study, through the use of a panel smooth transition regression regime-switching model as opposed to a simple quadratic polynomial model used in many other studies.

On a global basis, with regards to environmental performance, Misani and Pogutz (2015) found an inverse U-shaped relationship between carbon performance and market-based performance for carbon intensive firms from 2007 to 2013. Wang et al. (2016) found a U-shaped relationship between CSP and CFP in terms of accounting performance for a small sample of the international construction industry for the same years, supporting SIC. Trumpp and Guenther (2017) found support for the TLGT effect (that is, a U-shaped relationship) between environmental performance and CFP for international (mostly developed countries) manufacturing firms from 2008 to 2012.

Overall, even with regards to non-linear performance, there does not appear to be a consensus whether this relationship is U-shaped, inverse U-shaped or some other non-linear specification. The relationship appears to vary across different institutional contexts, as not much conflicting research within the same time period and country and sector appears to exist.

Developing market studies

Turning to a developing market context, several authors found significant non-linear relationships between CSP and CFP. Han, Kim, and Yu (2016) found a U-shaped relationship between environmental performance and CFP, an inverse U-shaped relationship between governance performance and CFP and no significant relationship between social performance and CFP. They looked at Korean firms from 2008 to 2014. Chen and Lee found a U-shaped relationship between marked-based performance from 2010 to 2012 for Taiwanese firms, which they attribute to learning curve and synergy effects (2017).

Maqbool and Bakr (2019) found a U-shaped relationship between CSP and accounting performance for Indian companies from 2008 to 2017.

Matuszak and Rózańska (2019) explored the relationship for firms in often-excluded financial sector (for banks specifically) in Poland. They used four individual CSR disclosure indices and found varying results for accounting performance (no significant relationship between overall CSP and CFP, a U-shaped relationship between human resources performance and CFP, and an inverse U-shaped relationship between community involvement and CFP, and between product and customers and CFP). El Khoury, Nasrallah and Alareeni (2021) also looked at banks, but in the Middle East, North Africa, and Turkey (MENAT) region. They found an inverse U-shaped relationship between CSP and CFP, social performance and CFP and governance performance and accounting-based CFP. However, a U-shaped relationship was found for environmental performance.

2.5.3 South African studies evaluating the CSP-CFP relationship

Due to a differing institutional environment, the relationship between CSP and CFP in South Africa would be expected to differ to developed or other developing markets. Due to factors like the size and well-established nature of the JSE (JSE, 2022b), South Africa is more comparable to smaller developed countries than other African (and also many other developing) countries in some respects. A summary of South African studies can be seen in Table A2 of Appendix A:. A limitation arises from this summary due to the limited number of studies evaluating the CSP-CFP relationship in a South African context. Three out of the ten South African studies summarised are masters' dissertations and are therefore not peer reviewed.

While there have been several studies evaluating either elements of CSR (often corporate governance and the environment) or socially responsible investing, fewer studies have explored the link between CSP (as a whole) and CFP. Most South African studies that did evaluate this relationship did so through an event study when the JSE SRI index was launched, a regression analysis, or both.

Many authors pursued the methodology of comparing performance of firms included in the JSE SRI Index to firms which were not included. Ntoi (2010) claims to be the first to do this and found a positive relationship between an element of accounting performance (the PB ratio only) and CSP, from 2000 to 2010 for the JSE Main Board (the Main Board). A shortcoming of this study was that it included the effects of the global financial crisis from late 2007, which was not controlled for. Nkomani (2013) conducted a similar study, but for the JSE Top 100 from 2002 to 2011. They found a negative

relationship between CSP and total return, ROA and net profit margin. These results at first seem contradictory, but both authors used different measures of CSP, with neither significant relationship found by one author contradicted the other. du Toit and Lekolane (2018) explored the relationship between 2009 to 2014 for the Main Board but found no significant relationship. A downside of this study was that the early base years of the study include the effect of the global financial crisis (du Toit and Lekoloane, 2018).

Several authors conducted both an event study to evaluate the short-term financial effects of the announcement of inclusion into the JSE SRI and a regression to determine the longer-term financial effects. Demetriades and Auret (2014) found that the listing was not rewarded in the short-term or the long-term from 1995 to 2009. These long-term effects were confirmed by Chetty, Naidoo and Seetharam (2015) from 2004 to 2013, however, they did find that CSP was rewarded in the short-term. A significant limitation of these studies based on index inclusion is that company's CSP was binary (either included in the index or not) and not rated, which limits the conclusions drawn (Ntoi, 2010).

Other studies differed in their methodology in respect of the CSP variable. Wolmarans (2012) looked to a form of CSR companies can engage in, BEE engagement, for the Main Board. They conducted an event study exploring the effect on share price of BEE announcements before, during, and after the global financial crisis. They however that BEE companies (good CSR performers) performed worse than the market before the crisis but saw a lesser decline in market value during the crisis. It is however questionable whether BEE is an ideal proxy for CSR engagement, as there are other forms of CSR engagement that non-BEE companies may have engaged in, such as emissions reductions.

Sampong et al. (2018) generally found insignificant results, save for a positive significant relationship between social performance and CFP (Tobin's Q) from 2010 to 2015 for the Main Board. These authors used Global Reporting Initiative (GRI) G3.1 Guidelines to measure CSR disclosure. Nyeadi, Ibrahim and Sare (2018) explored the relationship for the JSE Top 100 from 2011 to 2013, with the Public Investment Corporation (PIC's) Corporate Governance Rating Matrix (a survey) as a measure of CSP. They found a positive relationship between CSP and CFP and governance score and CFP. A limitation of this study is the very short time period, due to the survey only being undertaken for three years.

Lastly, a handful of studies used a rating, to overcome to overcome the previously discussed shortcoming. Johnson, Mans-Kemp, and Erasmus (2019) found mixed results when using the

Bloomberg ESG disclosure scores for a sample from the Main Board from 2011 to 2016. They found that the relationship differed significantly across sectors, and no overall relationship existed across the overall sample. However, there was a negative significant relationship between environmental performance and an element of accounting-based performance, EPS. There was a positive relationship between social performance and an element of accounting performance, but negative with an element of market performance. Lastly, Ball (2020) made use of privately held proprietary ESG data and found no significant relationships from 2012 to 2019.

Three observations are evident from the existing South African literature. Firstly, a variety of different methodologies have been used, particularly with regards to the measurement of CSP. Few studies have made use of a reputation rating. Secondly, the results of these studies have been mixed, with a range of positive and negative insignificant, positive significant and negative significant results. Thirdly, to this author's knowledge, it appears that no study has considered the possibility that this relationship may be non-linear in South Africa.

2.6 Control variables

Several authors find industry, size, and risk to be the most frequently controlled for variables in the CSP-CFP relationship (Margolis et al., 2009; Andersen and Dejoy, 2011). Andersen and Dejoy also note the importance of controlling for research and development (R&D) and advertising intensity. Lu et al. (2014) consistently found size, industry, capital structure, financial return, and risk to be the most controlled for variables.

Regarding the non-linear studies evaluated by this author, nearly all of them control for size (usually through market capitalisation or total assets) and (financial) risk (through the debt ratio, debt-to-equity ratio, or total liabilities to total assets). For the South African studies analysed, the most frequent control variables were size (mostly measured by market capitalisation or total assets) and (financial) risk (usually with the debt ratio or debt-to-equity ratio). Some studies also included an industry dummy control variable, reflecting operational risk.

Smaller firms have been argued to not exhibit as much CSP as larger firms which face more public scrutiny (Waddock and Graves, 1997). Larger firms may also have more resources to invest in CSR. Regarding CFP, greater firm size could increase control over stakeholders, attract better employees, and provide other financial benefits (Orlitzky, 2001). Thus a positive relationship between size and both CSP and CFP are expected.

Several authors have emphasised the importance of adjusting for differences in firm's risk (Cochran and Wood, 1984; Aupperle, Carroll and Hatfield, 1985; Ullmann, 1985). Orlitzky and Benjamin (2003) found that risk and CSP are negatively correlated in a meta-analysis on two decades of studies. Thus, firms with lower CSP would be riskier, and lower-risk firms would engage in less CSR activities. Risk and financial performance are also of course linked.

Another moderator of the CSP-CFP relationship is industry (Rowley and Berman, 2016). This has been shown to influence both CSP and CFP by many authors in the past (Waddock and Graves, 1997). Industry is controlled explicitly by several non-linear studies (Brammer and Millington, 2008; Misani and Pogutz, 2015; Chen et al., 2018; Nuber, Velte and Hörisch, 2020). It is also implicitly controlled for when studies are confined to a specific industry, for example, the construction industry (Wang, Dou and Jia, 2016). McWilliams and Siegel argue that industry advertising intensity needs to be controlled for (McWilliams and Siegel, 2000). They argue that this is a proxy for the level of product differentiation and barriers to entry at an industry level. Different industries would also face different regulatory environments, social issues, and respond to these issues differently (Arlow and Gannon, 1982; Griffin and Mahon, 1997).

Another frequently controlled for variable is R&D intensity, usually measured relative to sales (Brammer and Millington, 2008; Wang, Choi and Li, 2008; Barnett and Salomon, 2012; Misani and Pogutz, 2015; Nollet, Filis and Mitrokostas, 2016; Trumpp and Guenther, 2017; Maqbool and Bakr, 2019; Nuber, Velte and Hörisch, 2020). McWilliams and Siegel (2000) find a strong correlation between R&D investment and CSR due to both investments being related to product and process innovation (that is, a way firms can differentiate from one another) and suggest it should be controlled for. It is expected to result in long-term increases in CFP, such as through increased revenues or productivity.

Similar to R&D intensity, advertising intensity is another relatively commonly used control variable, often measured as advertising expenditure relative to sales (Wang, Choi and Li, 2008; Barnett and Salomon, 2012a). Firms can also use advertising to differentiate themselves, increase visibility and ultimately increase CFP. Related to advertising, Rahman et al. (2017) find a positive relationship between CSR activities and marketing performance.

2.7 Summary and conclusions

It is evident from the existing literature that a consensus on the CSP-CFP relationship has not yet been reached. Studies that have approached this research problem from a non-linear perspective have somewhat reconciled opposing viewpoints, although there is still debate surrounding the particular nature of this non-linear relationship.

Therefore, this study aims to continue to explore the CSP-CFP relationship from a non-linear perspective, and to specifically contribute to the literature in a South African context, in light of its unique institutional environment.

Chapter 3: Research Methodology

3.1 Introduction

This chapter begins with a review of the research method. This is followed by an explanation of the data sources and sample selection process. The independent, dependent and control variables are then discussed, followed by the study's various empirical models. The study's hypotheses are then presented. Lastly, the data and statistical analysis processes followed are described and the chapter concludes with a summary.

3.2 Research method

This study takes a quantitative research approach. Bloomberg ESG disclosure scores are used as a proxy for CSP. CSP is decomposed into three elements: environmental performance (ENV), social performance (SOC), and governance performance (GOV). Both accounting- and market-based metrics of CFP are utilised. This research is focused on a South African context and thus only examines listed companies on the Johannesburg Stock Exchange (JSE). The time period selected for this study specifically excludes the effects of the COVID-19 pandemic to avoid its confounding effects on the CSP-CFP relationship. The final sample comprised of a balanced panel of 1 040 firm-years. This study does not attempt to determine causality between CSP and CFP, but rather if a relationship exists between these variables and the shape of this relationship.

3.3 Data and sample selection

All the data for this study was collected from Bloomberg. More specially, data was collected from a Bloomberg Terminal at UCT. This data includes both financial data (proxies for CFP and control variables) and non-financial data (ESG disclosure scores which are proxies for CSP).

The initial population of this study comprises of all companies listed on the FTSE/JSE All Share Index (ALSI) from 2012 to 2019. More specifically, the index's constituents were extracted as at 31 December of each year (from 2012 to 2019) to account for firms moving into and out of the index. The ALSI is largely representative of the broader South African equities market, comprising of the largest 99% (by market values) of the companies listed on the Main Board of the JSE (JSE, 2022c). In addition, the use of the ALSI as opposed to the Main Board avoids liquidity and data availability issues associated with smaller firms.

In line with Johnson, Mans-Kemp, and Erasmus (2019), the start of the sample period in 2012 is after the launch of integrated reporting in South Africa. The end of the sample period was December 2019, in order to avoid possible confounding effects of the COVID-19 pandemic on the relationship. The sampling process is illustrated in Table 3. Many firms were missing data for all or some of the sample period years. Firstly, many firms were missing ESG data, including 89 firms which were missing data for all of the years of the sample period. The sample was further reduced by several firm-year observations which were missing CFP variable data. This resulted from missing ASR data due to a firm listing sometime during the subsequent year after 31 December. Lastly, control variable data was also missing for 32 firm-year observations, namely, market capitalisation figures. Due to the econometric challenges created by unbalanced panels (Baltagi, 2005), it was elected to make use of a balanced panel instead of an unbalanced panel. The final sample therefore consisted of a balanced panel of 130 firms and 1 040 firm-year observations.

Table 3: Sample selection process

	No. of Firms	*No. of Firm-Year Observations*
Initial population	248	1 984
Population reduced by:		
Missing ESG disclosure scores	(110)	(880)
Missing CFP variable data	(4)	(32)
Missing control variable data	(4)	(32)
Final sample before adjustment for outliers	130	1 040

Source: Data obtained from Bloomberg

In terms of the sample selected, this study differs from previous South African studies in several ways. Firstly, the ALSI was used as opposed to the Top 100 firms on the JSE, as in Nkomani (2013) and Nyeadi, Ibrahaim and Sare (2018). Secondly, the sample period is longer than most studies reviewed. Specifically, the studies of du Toit and Lekoloane (2018), Sampong et al. (2018), and Johnson, Mans-Kemp, and Erasmus (2019), had a sample period of 5 years, 6 years, and 6 years, respectively. These

two factors result in more observations and should result in more generalisable results in some respects.

As seen in Table 4, the representation of different industries is mixed. There are few firms represented from the energy, health care, technology, and telecommunications industries, which limits the generalisability of this study's results to those industries. One of the industries with the most firms is the financial industry. Several studies have excluded companies from the financial sector in the past (Johnson, Mans-Kemp and Erasmus, 2019). Motivations for excluding these sectors surround their significantly different nature of operations, levels of regulations, and higher leverage ratios. This was decided against, and instead, individual firms within this industry which were considered outliers were adjusted. The inclusion of the financial industry in the final sample is consistent with du Toit and Lekoloane (2018). The treatment of outliers is discussed in Chapter 4:.

Table 4: Industry distribution of the sample

ICB Industry	*No. of Firms Before Adjusting for Outliers*
Basic Materials	27
Consumer Discretionary	18
Consumer Staples	14
Energy	3
Financials	25
Health Care	5
Industrials	18
Real Estate	9
Technology	6
Telecommunications	5
Total	130

Source: Data obtained from Bloomberg

3.4 Model variables

All variable data points were extracted as at the close of the last business day of each respective calendar year.

3.4.1 Corporate financial performance

As discussed in Section 2.3, CFP, the dependent variable of this study, can be measured using accounting-based, market-based, and perceptual measures. Given the high degree of subjectivity, perceptual measures are not used in this study. Instead, both an accounting- and a market-based measure is used, as both measures have their respective benefits and downsides. For example, accounting-based measures are more affected by management discretion in accounting policy choices, yet are less affected by systematic market factors, such as a recession (McGuire, Sundgren

and Schneeweis, 1988). On the other hand, accounting-based measures tend to be more backwards-looking than market-based measures.

In line with previous studies, CFP is proxied by ROA and annual shareholder return (ASR). An accounting-based and a market-based measures also contributes to the robustness of this study. A summary of the calculation of these measures and examples of prior studies making use of these measure can be found in Table 5.

Table 5: CFP proxy variables and their measurement

CFP Measure	*Formula*	*Examples of Prior Studies That Made Use of the Measure*
ROA	$\frac{\text{Net Income}}{\text{Average Total Assets}}$	Waddock and Graves (1997), Nollet, Filis and Mitrokostas (2016), and Johnson, Mans-Kemp, and Erasmus (2019)
ASR	$\frac{P_{i,t} - P_{i,t-1}}{P_{i,t-1}}$ Where: *P* = closing share price *i* = firm *t* = year	Wang et al. (2016), Han, Kim, and Yu (2016), and du Toit and Lekoloane (2018) Several authors have similarly used Total Stockholder Return, which incorporated dividends, such as Park and Lee (2009), and Johnson, Mans-Kemp, and Erasmus (2019); and or excess stock return like Nollet, Filis and Mitrokostas (2016).

Source: Author's own contribution

3.4.2 Corporate social performance

CSP was selected as the independent variable of this study in line with many prior studies of the CSP-CFP relationship. CSP is proxied through Bloomberg ESG disclosure scores, in line with, Han, Kim and Yu (2016), Nollet, Filis and Mitrokostas (2016), Xie et al. (2018), and Johnson, Mans-Kemp and Erasmus (2019). Bloomberg provides four main disclosure scores, namely, the Environmental Disclosure Score, the Social Disclosure Score, the Governance Disclosure Score, and an overall ESG Disclosure Score, the latter being a composite weighted score (Bloomberg, 2022). The use of individual component scores for the three ESG elements makes it easier to identify whether one or more of these three components is driving the relationship. These scores are largely based on publicly available data. The scores are also transparent, as investors have the ability to view factors driving each score. A summary of the three pillars, issues, and sub-issues can be found in Table 6. All four scores range from 0 to 100, and therefore can directly be squared for non-linear application.

The methodology for environmental and social scores differs to that of governance scores. Environmental and social scores are industry-specific, with these industries determined by the Bloomberg ESG Classification Scheme (BECS), which is in turn based on Bloomberg Industry Classification Standard (BICS) industry groups. Different emphasis is placed on different themes,

issues, or sub-issues relevant to a particular industry. In contrast, governance scores are more general and do not account for industry-specific differences, but rather only country-specific factors (Bloomberg, 2022).

Table 6: Bloomberg ESG disclosure scores pillars, issues, and sub-issues

Pillar	*Issue*	*Sub-Issues*
Environmental	Air Quality	Air Emissions Air Emissions Policies
	Climate Exposure	Transition Risk
	Ecological Impact	Ecosystem Protection Environmental Fines Environmental Incidents
	Energy Management	Energy Consumption Renewable Energy Use
	Environmental Supply Chain Management	Sustainable Sourcing
	GHG Emissions Management	GHG Emissions GHG emissions Policies GHG Regulation GHG Target
	Sustainable Product	Green Product
	Waste Management	Hazardous Waste Management Hazardous Waste Recycling Waste Generation Waste Recycling
	Water Management	Wastewater Water Use Water Use Policies
Social	Community Rights and Relations	Community and Human Rights Community Relations
	Ethics and Compliance	Business Ethics Competitive Behaviour Legal and Regulatory Management
	Labour and Employment Practices	Labour Actions Organized Labour Training
	Occupational Health and Safety Management	Fatalities Health and Safety Fines Health and Safety Policies Safety Incidents
	Operational Risk Management	Operational Incidents Operational Preparedness
	Product Quality Management	Product Quality and Safety
	Social Supply Chain Management	Supplier Social Compliance
Governance	Board Composition	Diversity Refreshment Director Roles Independence
	Executive Compensation	Incentive Structure Pay for Performance

		Pay Governance
	Shareholder Rights	Shareholder Policies Director Voting

Source: Bloomberg (2022)

A limitation of using a disclosure-based proxy of ESG is that disclosure does not necessarily exactly reflect CSP itself. A stronger CSP performer may not necessarily make more ESG disclosures. However, a study by Clarkson et al. (2008) indicates that stronger environmental performers provide more voluntary disclosures, and Al-Tuwaijri, Christensen and Hughes (2004) finds a positive relation between environmental performance and disclosure. While both studies occurred in a US context, these findings could be generalised to other markets. In addition, Bloomberg uses a proprietary disclosure factor to score companies that do not report all metrics to prevent "selective disclosure bias." In addition, Bloomberg's environmental, social, and governance scores are not entirely disclosure-based, but consider performance as well, and this limitation is thus addressed (Bloomberg, 2022).

Alternatives to the Bloomberg scores were Morningstar Sustainalytics ESG Risk Ratings. However these ratings are unavailable for many JSE-listed firms and are only available from 2014 onwards on Bloomberg. Another alternative was Thomson Reuters ESG scores (which replaced the ASSET4 ratings), available through Refinitiv Eikon Datastream.

The use of Bloomberg disclosure scores means that this study is not perfectly comparable to prior studies with different CSP measures, such as South African studies using the JSE SRI index, and global studies making use of MSCI KLD ratings or Thomson Reuters ESG Scores (or ASSET4 ratings). However, the comparison is still somewhat valid. Bloomberg, ASSET4 and KLD ratings all consider similar environmental, social, and governance aspects, differences instead arise from the weightings of these three aspects (Dorfleitner, Halbritter and Nguyen, 2015). Overall ESG scores for these three providers were found to be significantly positively correlated, but only with regards to the environmental and social aspects.

Like Bloomberg, Thomson Reuters ESG scores weigh environmental and social factors differently for different industries, whereas governance factors are not weighted separately, which increase the comparability of this study's findings to these ratings (Refinitiv, 2022). FTSE Russell's ESG rating (upon which the FTSE/JSE Responsible Investment index is based) of different ESG themes differs by relevance to the company, rather than relevance to the industry (FTSE Russell, 2020). Lastly, MSCI ESG ratings (upon which inclusion into the KLD Social Index is based) also consider materiality of different

environmental and social issues to different industries, whereas governance issues are applicable to all industries (MSCI, 2022b).

3.4.3 Control variables

This study makes use of several control variables to control for size, risk, industry, and research and development (R&D) intensity. The justification for choosing these specific control variables was discussed extensively in Section 2.5.

Size is proxied by the natural logarithm of a firm's market capitalisation (measured in millions of Rands). Risk is proxied by financial leverage, specifically through the ratio of total debt to total assets. Differences in firm industry are controlled for through a dummy variable, based on a firm's FTSE Russell Industry Classification Benchmark (ICB), which is also the JSE's industry classification system (JSE, 2020). Although Bloomberg's scores control for the relative importance of different environmental and social issues to different industries, industry may have other confounding effects on the CSP-CFP relationship, such as the level of CFP of different industries for example. Given that most firms came from the basic materials industry, this industry was selected as the reference category for ease of interpretation.

Lastly, R&D intensity is controlled for. This is proxied by dividing R&D expenditure (both expensed to profit and loss and capitalised) by sales. Where firms did not disclose R&D expenditure or this data was not available on Bloomberg, this amount was assumed to be zero. Advertising intensity was also considered as a control variable. However, since many firms do not report advertising expenditure, and only a handful of firms in the sample had advertising expenditure data on Bloomberg, this was not included in this study.

Since many firms did not incur any or a significant proportion on revenue on R&D, it was decided to transform this from a continuous variable into a categorical dummy variable. Observations are classified into one of the groups presented in Table 7. This is similar to this variable's treatment by Nyeadi, Ibrahim and Sare (2018) who used a binary dummy to classify firms as either engaging or not engaging in R&D activities. The reference category selected was an R&D intensity of None.

Table 7: R&D Intensity dummy variable classification groups

R&D Intensity	*Category*	*Observations*
R&D Intensity = 0%	None	930
0% < R&D Intensity ≤ 1%	Low	218

R&D Intensity > 1%	High	7

Source: Author's own contribution

3.5 Empirical models

In the past, researchers have often made use of panel regression models to explain the CSP-CFP relationship, such as Barnett and Salomon (2012), Han, Kim, and Yu (2016), Nollet, Filis and Mitrokostas (2016), and Johnson, Mans-Kemp, and Erasmus (2019). The use of a panel regression has several advantages over cross-sectional or time-series data, such as better control over missing or unobserved variables, the development of more accurate predictions for individual firms in light of a short history of data, amongst others (Hsiao, 2022). Thus, a panel regression has been selected for this study.

The first estimation technique considered is a pooled ordinary least squares (OLS) panel regression. This estimation technique would be appropriate under conditions of homogeneity. However, given the likely existence of unobserved heterogeneity (that is, unobserved firm and period effects being correlated with estimators), a pooled OLS model would produce inconsistent estimators, and a fixed effects (FE) model would thus be more appropriate. In other words, this would be the case where, for example, the CSP-CFP relationship was not the same across different firms. On the other hand, where unobserved firm and period effects are uncorrelated with all of the explanatory variables in all time periods, then the use of a FE model would be inefficient, and a pooled OLS model should be used. However, in this case, if autocorrelation exists, a pooled OLS model would result in biased and inconsistent estimators, and a random effects (RE) model would be more appropriate (Wooldridge, 2015).

Consideration is also given to the dynamism of the CSP-CFP relationship over time. Unobserved firm-invariant factors (that is, factors varying across time but constant across firms) may exist (Baltagi, 2005). Several previous studies have used two-way FE models (Barnett, 2007; Nollet, Filis and Mitrokostas, 2016), or mixed models (fixed period effects alongside random firm effects, or random period effects alongside fixed firm effects) (Barnett and Salomon, 2012; Han, Kim and Yu, 2016), and have found these period effects to be significant. In line with these previous studies, consideration is also given to the significance of fixed and random period effects.

It is possible that changes in a firms CSP may not be fully realised through CFP immediately. For example, for this to be the case, share prices and profits would have to instantly adjust for changes in the level of CSP, which is unlikely. Another motivation is to make more robust causal inferences and

prevent endogeneity issues such as simultaneity, whereby the independent and dependent variable are both affected by the existence of one or more omitted variables. Therefore, the independent variable, CSP, has been lagged in line with many previous studies such as those of Waddock and Graves (1997), Nollet, Filis and Mitrokostas (2016), Trumpp and Guenther (2017), Matuszak and Rózańska (2019), Nuber, Velte and Hörisch (2020), and El Khoury, Nasrallah and Alareeni (2021).

Since current CFP may be related to past CFP, it may also be necessary to lag the dependent variable. This would also address issues of reverse causality, which, if not addressed, could result in heterogeneity and incorrect inferences. Particularly, in this study, it may lead to inferences that CSP causes CFP, when in fact it is CFP that causes CSP. This was the approach followed by Misani and Pogutz (2015), and Sun, Yao, and Govind (2019), inter alia. However, when a lagged dependent is included in a panel model, it poses several issues (Baltagi, 2005). A pooled OLS model could not be used in this case as it would result in biased and inconsistent results due to endogeneity issues. This is also the case for FE and RE estimators. Thus, in light of these potential issues, and the fact that many prior studies did not lag CFP as the dependent variable (Nollet, Filis and Mitrokostas, 2016; Wang et al., 2016; Nuber, Velte and Hörisch, 2020; El Khoury, Nasrallah and Alareeni, 2021), CFP was not lagged in this study. Further, the aim of this study is not to determine causality between CSP and CFP.

To capture non-linear CSP effects, a squared CSP term was added to the linear model such that it remains an intrinsically linear model, but with non-linear variables (Greene, 2003). This is in line with much of the prior literature that attempted to explain this relationship, such as Barnett and Salomon (2006), Park and Lee (2009), Nollet, Filis and Mitrokostas (2016), and Wang et al. (2016), to name a few. However, several authors (Chen and Lee, 2017; Lahouel, Bruna and Zaied, 2020; Lahouel et al., 2022) have employed another method of determining whether the CSP-CFP relationship is non-linear, namely, a panel smooth transition regression (PSTR) model, based on a working paper by González, Teräsvirta, and Van Dijk (2005). This PSTR model is an extension of the panel threshold regression model (PTR) model developed by Hansen (1996). The PSTR model is in essence a FE model that is effective as either a linear heterogonous panel model, with dynamic regression coefficients with regards to firms and time, or as a non-linear homogenous panel model (González, Teräsvirta and van Dijk, 2005).

When applied to the CSP-CFP relationship, this model aims to determine the threshold where the CSP-CFP relationship changes from positive to negative or negative to positive (Chen and Lee, 2017). It is possible that the use of a purely linear model and the assumption that the link between CSP and CFP

is one-way and direct may not sufficiently explain this relationship (Lahouel, Bruna and Zaied, 2020). A quadratic polynomial model also *a priori* assumes that a non-linear relationship exists, rather than a PSTR model, which explicitly tests for non-linearity (Lahouel et al., 2022). Regardless of these shortcomings, a quadratic polynomial model has been selected consistent with prior studies (Barnett and Salomon, 2012; Han, Kim and Yu, 2016; Nollet, Filis and Mitrokostas, 2016).

The full (or unrestricted) base model is presented in Equation 1.

$$y_{it} = \alpha_0 + \beta_1 CSP_{i,t-n} + \beta_2 CSP_{i,t-n}^2 + \beta_3 X_{it} + \beta_4 R\&D_{it} + \beta_5 IND_{it} + \upsilon_{it},$$
$$\text{for } i = 1, 2, \dots, K \text{ and } t = 1, 2, \dots, N \tag{1}$$

y_{it} is the CFP measure proxied by either ROA or ASR (ROA_{it}, ASR_{it}) depending on the specification of the model, for firm i at time t. α_0 is the constant term. $CSP_{i,t-n}$ is the firm's lagged CSP, which is either the overall ESG score ($ESG_{i,t-n}$), or one of its three components ($ENV_{i,t-n}, SOC_{i,t-n}, GOV_{i,t-n}$), depending on the specification, for firm i at time $t-n$, where $n = 1$. $CSP_{i,t-n}^2$ represents the firm's lagged CSP squared, which is either the overall ESG score or one of its three components. $X_{it} = [SIZE_{it}, RISK_{it}]$, and is a vector of the control variables for firm i at time t. $R\&D_{it}$ represents a vector of three dummy variable for R&D intensity ($LOW_{it}, HIGH_{it}$). IND_{it} is a vector of dummy control variables for industry. ε_{it} comprises of v_{it} , which represents the independent idiosyncratic error term.

The use of both time-invariant industry dummy variables as well as FE creates multicollinearity issues. That is to say, these industry effects are already accounted for via the FE term. Therefore, the set of industry dummy variables was removed from the FE model. The inclusion of these dummy variables would not provide any additional information not captured by the FE term. This is in line with the treatment of industry effects by Barnett and Salomon (2012). This is not the case for the R&D dummy variables, because firms' R&D expenditure varies across time. In addition, in order to estimate random period effects, the number of time period must exceed the number of coefficients for the between estimator (Baltagi, 2005). In the case of this model, there are nine time periods, but sixteen coefficients (mostly due to the inclusion of the numerous dummy variables). Therefore, in order to estimate two-way effects models, the industry dummy variables were omitted from the RE model specification. The specifications of the models which include FE and/or RE therefore exclude the industry dummy control variables. In addition, the error term, ε_{it} includes c_i, which is the error term

which controls for unobserved firm and time effects, in addition to v_{it} (Nollet, Filis and Mitrokostas, 2016).

The reduced (also known as the restricted or nested) base model is identical to Equation (1), except that this model exclude the quadratic CSP term. This model is presented below.

$$y_{it} = \alpha_0 + \beta_1 CSP_{i,t-n} + \beta_2 X_{it} + \beta_3 R\&D_{it} + \beta_4 IND_{it} + v_{it},$$
$$\text{for } i = 1, 2, \dots, K \text{ and } t = 1, 2, \dots, N \tag{2}$$

3.6 Hypotheses development

The first research question was to determine the shape of the relationship between CSP and CFP for South African listed firms from 2012 to 2019. In line with this objective, Hypotheses 1 and 5 are developed below. The next and final three research questions were similar to the first but explore the relationship on a component level (in other words, in terms of ENV, SOC and GOV). Hypotheses 2 to 4 and 6 to 8 address these objectives. CFP_{it} in each hypothesis refers to overall CFP, and not a specific measure. That is to say, each hypothesis will be tested in terms of each expression of CFP (ROA and ASR). If support is found for a hypothesis in terms of one expression of CFP, this will be considered sufficient evidence to reject the null hypothesis.

Hypothesis 1: There is a significant relationship between overall CSP and CFP

The null hypothesis is that there is no relationship between CFP_{it} and $CSP_{i,t-n}$. The alternative hypothesis is that there is a relationship between these variables. Stated alternatively:

$H1_0$: $\beta_{CSP_{i,t-n}} = 0$

$H1_a$: $\beta_{CSP_{i,t-n}} \neq 0$

Hypotheses 2-4: There is a significant ENV-CFP, SOC-CFP, and/or GOV-CFP relationship

The next three hypotheses are nearly identical to Hypothesis 1 but decompose $CSP_{i,t-n}$ into its components and are presented below.

$H2_0$: $\beta_{ENV_{i,t-n}} = 0$

$H2_a$: $\beta_{ENV_{i,t-n}} \neq 0$

$H3_0$: $\beta_{SOC_{i,t-n}} = 0$

$H3_a$: $\beta_{SOC_{i,t-n}} \neq 0$

$H4_0$: $\beta_{GOV_{i,t-n}} = 0$

$H4_a$: $\beta_{GOV_{i,t-n}} \neq 0$

Hypothesis 5: The shape of the overall CSP-CFP relationship is non-linear

The null hypothesis is that the full model (Equation (1)) does not provide a significant better fit than the restricted model (Equation (**2**)). The alternative hypothesis is that the full model does provide a significantly better fit than the restricted model. Stated alternatively:

$H5_0$: $\beta_{CSP^2_{i,t-n}} = 0$

$H5_a$: $\beta_{CSP^2{}_{i,t-n}} \neq 0$

Hypotheses 6-8: The shape of the ENV-CFP, SOC-CFP, and/or GOV-CFP relationships are non-linear

The next three hypotheses are nearly identical to Hypothesis 5 but decompose $CSP_{i,t-n}$ into its components and are presented below.

$H6_0$: $\beta_{ENV^2_{i,t-n}} = 0$

$H6_a$: $\beta_{ENV^2_{i,t-n}} \neq 0$

$H7_0$: $\beta_{SOC^2_{i,t-n}} = 0$

$H7_a$: $\beta_{SOC^2_{i,t-n}} \neq 0$

$H8_0$: $\beta_{GOV^2_{i,t-n}} = 0$

$H8_a$: $\beta_{GOV_{i,t-n}^2} \neq 0$

3.7 Statistical analysis processes

Statistical tests will be performed using EViews 13 to determine which estimation technique is most appropriate and results in the most consistent, unbiased, and efficient estimators. A Breusch-Pagan Lagrange Multiplier (B-P LM) test will be conducted to determine whether random firm or period effects are significant and therefore a RE model is more appropriate than the pooled OLS model. A restricted (partial) F-test will be conducted to determine whether fixed firm or period effects are significant and therefore a FE model is more appropriate than the pooled OLS model. In cases where both FE and RE are significant, a Hausman test will be conducted to determine whether a FE or RE model is more appropriate (Park, 2011). These series of tests are in line with previous studies such as Wang et al. (2016), Maqbool and Bakr (2019), and Nuber, Velte and Hörisch (2020).

Expected violations of regression assumptions such as multicollinearity, endogeneity, heteroskedasticity, and autocorrelation are addressed in the following chapter's robustness tests.

Once the most appropriate model has been selected, the Hypotheses 1-4 are tested through a calculation of the F-statistic for overall significance of the models, and t-test statistics of each independent variable, to determine the individual significance of each regressor. R-squared is also examined to evaluate goodness of fit. Unless specified otherwise, statistical significance is examined at the 5% significance level, and probability values (p-values) lower than this threshold are considered to indicate statistical significance.

Hypotheses 5-8 are then tested through restricted F-tests to determine which model provides a better statistical fit and is thus more appropriate. This test has been performed by authors investigating the non-linear CSP-CFP relationship in the past, such as by Trumpp and Guenther (2017).

3.8 Summary and conclusions

This chapter discussed and justified key methodological choices in this study. CSP is proxied through Bloomberg ESG disclosure scores, and the decision was made to utilise both an accounting- (ROA) and a market-based measure of CFP (ASR). Factors such as size, risk, industry, and R&D expenditure are controlled for. Various panel regression model estimation techniques, namely the pooled OLS, FE, and RE estimators are employed. Lastly, several hypotheses were presented in line with the study's research aim and questions, and the data and statistical analysis processes to be followed were outlined.

Chapter 4: Data Analysis, Research Results and Discussion

4.1 Introduction

Chapter 4 begins with an analysis of the descriptive statistics of the study variables. This is followed by an analysis of the study's correlation metrics, and the existence of possible multicollinearity. The results of panel model specification tests are then reported, and the most appropriate panel model specifications are selected. Before the empirical results are presented, the robustness of these results is discussed in relation to violations of OLS assumptions. This is followed by the presentation of the regression results and discussion of whether these results find support for the hypotheses presented in Chapter 3: Finally, the chapter ends with a conclusion.

4.2 Descriptive statistics

A summary of key descriptive statistics before adjustment for outliers is presented in Table 8. Table 9 and Table 10 provide a summary of frequency descriptive statistics for the R&D control variables and industry control variables respectively. It is evident that both measures of CFP show a large amount of variation, as can be seen by the large standard deviations. Both CFP measures are not normally distributed, as they exhibit significant positive excess kurtosis (heavier tails). ASR exhibits high positive skewness, while ROA is close to symmetrical. The minimum and maximum figures indicate the exceptionally strong and poor financial performers, which contribute to this lack of normality. The average firm had an ASR of 8.18% and an ROA of 5.27% over the period.

Table 8: Descriptive statistics, before adjustment for outliers

	ASR_{it}	ROA_{it}	$CSP_{i,t-1}$	$ENV_{i,t-1}$	$SOC_{i,t-1}$	$GOV_{i,t-1}$	$SIZE_{it}$	$RISK_{it}$
Mean	8.1754	5.2723	42.8979	21.7592	28.7042	79.9990	9.8833	20.4071
Median	5.0216	4.4778	41.7261	19.3144	29.5647	83.0223	9.7835	17.7609
Mode	30.3147	3.4570	26.9088	0	0	80.5238	7.9845	0
Standard Error	1.3129	0.2629	0.3604	0.5648	0.4266	0.3302	0.0532	0.5090
Standard Deviation	42.3408	8.4811	11.6227	18.2167	13.7588	10.6495	1.7162	16.4152
Sample Variance	1792.7430	71.9301	135.0880	331.8514	189.3051	113.4125	2.9454	269.4593
Kurtosis	10.6854	10.7028	–0.3276	–0.3509	–0.4873	2.3727	1.1746	3.5576
Skewness	1.8806	0.0502	0.2220	0.6607	–0.0769	–1.4051	–0.1619	1.1708
Range	443.9691	136.0799	65.5166	76.1099	60.3688	74.6538	12.6663	148.1452
Minimum	–98.9691	–58.0923	8.2386	0	0	24.6538	1.7923	0
Maximum	345	77.9867	73.7552	76.1099	60.3688	99.3076	14.4587	148.1452
Observations	1040	1040	1040	1040	1040	1040	1040	1040

Source: Data obtained from Bloomberg and results obtained using Excel

Table 9: Descriptive statistics of R&D dummy control variables

Category	*Frequency*
NONE	832
LOW	201
HIGH	7
Total	1040

Source: Data obtained from Bloomberg

Table 10: Descriptive statistics of industry dummy control variables

Category	*Frequency*
Basic Materials	216
Consumer Discretionary	144
Consumer Staples	112
Energy	24
Financials	200
Health Care	40
Industrials	144
Real Estate	72
Technology	48
Telecommunications	40
Total	1040

Source: Data obtained from Bloomberg

Turning to the CSP measures, the minimum and mode values indicate that some firms were given a score environmental and social disclosure scores of 0 due to a lack of such disclosure or performance. The mean (and median) ENV and SOC scores are also low compared to GOV scores. The average firm had an ESG disclosure of 42.90 (in the prior period), an environmental disclosure score of 21.76, a social disclosure score of 28.70, and a governance disclosure score of 80.00. Turning to skewness, SOC is close to symmetrical, while overall CSP and ENV and are slightly positively skewed. GOV is the exception here, being quite negatively skewed. This is not unexpected, in light of the higher governance requirements imposed on listed companies by the King Code, inter alia. In contrast to CFP measures, most of the CSP measures have negative excess kurtosis and are less in the tails. The exception again is GOV. It Is thus evident that the various components of CSP exhibit significant differences and supports the argument that CSR is of a multidimensional nature.

Appendix B: provides a graphical representation of aggregate and component CSP performance across different industries across the sample period. Average overall CSP and its components appear to be increasing over time across most industries. Differences across industries appear to be most pronounced for ENV and SOC, with GOV appearing much more uniform. On average, the Basic Materials industry appears to be the best performing industry by overall CSP, with the real estate industry being the worst performing. This is indicative of the importance of controlling for firm effects, and for time effects due to dynamic nature of the CSP-CFP relationship.

Lastly, the control variables also do not appear to follow a normal distribution. After market capitalisation was natural logarithmically transformed, it appears more stable. The standard deviation is however still high. Size is now relatively symmetrical, but still exhibits some negative excess kurtosis. The average firm exhibits a low level of gearing at 20.41%, with many firms having no debt. The negative excess kurtosis indicates that there are few firms with extremely high and low levels of debt. The slight positive skewness also makes logical sense, as one would expect fewer firms to have higher levels of debt.

The data includes the presence of several outliers for both CFP measures, size, and risk. In addition, many of these variables are not normally distributed. Therefore, winsorizing of 5% was applied to reduces these extreme values for these variables, in line with other studies (du Toit and Lekoloane, 2018). Quantile-quantile (Q-Q) plots before and after winsorization are presented in Appendix C:. It is evident that from Table 11 and Appendix C: that the winsorization reduced standard errors, excess kurtosis, and skewness in the dataset.

Table 11: Descriptive statistics, after winsorization

	ASR_{it}	ROA_{it}	$CSP_{i,t-1}$	$ENV_{i,t-1}$	$SOC_{i,t-1}$	$GOV_{i,t-1}$	$SIZE_{it}$	$RISK_{it}$
Mean	6.3030	5.4790	42.8979	21.7592	28.7042	79.9990	9.8927	19.7655
Median	5.0216	4.4778	41.7261	19.3144	29.5647	83.0223	9.7835	17.7609
Mode	–51.3733	–4.9387	26.9088	0	0	80.5238	7.2256	0
Standard Error	0.9750	0.1799	0.3604	0.5648	0.4266	0.3302	0.0458	0.4529
Standard Deviation	31.4440	5.8034	11.6227	18.2167	13.7588	10.6495	1.4801	14.6073
Sample Variance	988.7281	33.6797	135.0880	331.8514	189.3051	113.4125	2.1909	213.3737
Kurtosis	–0.5290	–0.0905	–0.3276	–0.3509	–0.4873	2.3727	–0.7874	–0.8525
Skewness	0.1129	0.5584	0.2220	0.6607	–0.0769	–1.4051	0.0840	0.4025
Range	121.0451	23.1385	65.5166	76.1099	60.3688	74.6538	5.4185	49.3236
Minimum	–51.3733	–4.9387	8.2386	0	0	24.6538	7.2256	0
Maximum	69.6718	18.1998	73.7552	76.1099	60.3688	99.3076	12.6442	49.3236
Observations	1040	1040	1040	1040	1040	1040	1040	1040

Source: Data obtained from Bloomberg and results obtained using Excel and EViews

4.3 Correlation metrics

One of the assumptions for OLS estimation to produce consistent estimates is that no perfect multicollinearity exists (Wooldridge, 2010). A Pearson correlation matrix is presented in Table 12, indicating the strength, direction, and statistical significance of the linear relationship between the variables. Although there are high correlations between a number of the variables, such as between CSP and its components, this did not result in multicollinearity issues, since a single model comprises of a single CSP variable. In addition, in line with previous literature (Han, Kim and Yu, 2016; Nollet, Filis and Mitrokostas, 2016; Nuber, Velte and Hörisch, 2020), a variance inflation factor (VIF) test was conducted to detect multicollinearity issues. A centred VIF was calculated using EViews 13 as a constant term is present in the model. The results of this test are presented in Appendix A:. With the exception of the CSP and squared CSP variables (the implications of which are explained below), for each of the models, the highest centred VIF did not exceed 1.1, and therefore, multicollinearity does not appear to be present.

Overall CSP and all of its components except GOV show a statistically significant weak negative correlation with ASR. The correlation between GOV and ASR and CSP and ASR is significant at the 0.1% level. The correlation between SOC and ASR is significant at the 5% level, while the correlation between ENV and ASR is significant at the 10% level. In contrast, these same variables show a mostly statistically insignificant weak positive correlation with ROA. The exception is SOC, which shows a significant relation at the 10% level. This is an indicator of how accounting- and market- based performance measures capture different elements of financial performance, and the merits of using both measures in this study. Another indicator of this is the moderately low correlation between ROA and ASR of 0.26, which is significant at the 1% level.

Size shows a moderate positive correlation with all CFP and CSP measures, significant at the 0.1% level. This is in line with much prior research, as discussed in Chapter 2:. This correlation is strongest for overall CSP (0.38), and weaker for the components of CSR. On the other hand, risk (proxied through financial leverage) is weakly negatively correlated with both CFP measures and this correlation is statistically significant at the 1% level. The relationship between risk and CSP, ENV and GOV is very weakly positive, being less than 0.10 for each of these variables. The only one of these correlations which is significant is the correlation between risk and ENV (at the 5% level). In contrast, the correlation between risk and SOC is also weakly negative, significant at the 5% level. This is illustrative of the multi-dimensional nature of CSR.

Table 12: Pearson correlation matrix

	ASR_{it}	ROA_{it}	$CSP_{i,t-1}$	$ENV_{i,t-1}$	$SOC_{i,t-1}$	$GOV_{i,t-1}$	$SIZE_{it}$	$RISK_{it}$
ASR_{it}	1.0000							
ROA_{it}	0.2621†	1.0000						
$CSP_{i,t-1}$	–0.1088†	0.0227	1.0000					
$ENV_{i,t-1}$	–0.0596*	0.0075	0.9033†	1.0000				
$SOC_{i,t-1}$	–0.0698**	0.0605*	0.7829†	0.6942†	1.0000			
$GOV_{i,t-1}$	–0.1334†	0.0171	0.6064†	0.3261†	0.2128†	1.0000		
$SIZE_{it}$	0.2045†	0.2485†	0.3811†	0.3311†	0.2421†	0.3169†	1.0000	
$RISK_{it}$	–0.1195†	–0.1171†	0.0226**	0.0682**	–0.0785**	0.0454	0.0166	1.0000

Note: *, **, ***, and † denote significance at the 10%, 5%, 1%, and 0.1% level respectively
Source: Data obtained from Bloomberg and results obtained using EViews 13

Although not presented in the correlation matrix, the quadratic CSP proxies have a high correlation with the linear CSP proxies. However, this is expected, given that the quadratic term is a transformation of the linear term, and this does not create any empirical concerns with the model.

Caution should be exercised before drawing inferences from these correlation metrics. Firstly, firm and period effects are not controlled for in this correlation matrix. Secondly, these correlations are only presented in terms of the linear models. Lastly, the economic and statistically significance of several of these correlations is not significant.

4.4 Panel model specification

Equations were created using EViews 13 for each specification of the model. These models and the results of the Hausman test, restricted F-test, and Breusch-Pagan Lagrange Multiplier (B-P LM) Test for all of the models is summarised in Table 13.

Table 13: Summary of panel model specifications

Model Name	*CSP proxy*	*CSP specification*	*Firm effect specification*	*Period effect specification*
CSP-ASR	ASR	CSP	Fixed	Random
ENV-ASR	ASR	ENV	Fixed	Random
SOC-ASR	ASR	SOC	Fixed	Fixed
GOV-ASR	ASR	GOV	Fixed	Fixed
CSP-ROA	ROA	CSP	Fixed	Fixed
ENV-ROA	ROA	ENV	Fixed	Fixed
SOC-ROA	ROA	SOC	Fixed	Fixed
GOV-ROA	ROA	GOV	Fixed	Fixed

Source: Results obtained using EViews 13

F-tests indicated fixed firm and period effects were significant at a 1% significance level in all models. For the ASR models, the BP L-M test indicated that random period effects were significant for each of these models at the 1% level. However, for the ROA models, random firm and period effects were significant at the 1% level. For the ASR models, the null hypothesis of the Hausman tests was rejected at a 1% level for SOC and GOV, indicating that fixed period effects are more appropriate than RE. However, the null hypothesis was not rejected for CSP and ENV, indicating random period effects are more appropriate. On the other hand, for the ROA models, both fixed firm and period effects were significant at the 1% level. The full results of these tests are reported in Appendix E:.

4.5 Robustness of the results

Before the results of the regression can be reported and interpreted, it is important to perform several robustness (or diagnostic) tests to identify significant violations of regression assumptions to ensure meaningful inferences of the regression results.

Firstly, this analysis assumes exogeneity, that is, that all independent variables are independent of the residual errors (Wooldridge, 2010). If any of the independent variables are instead correlated with the error term, this results in endogeneity and incorrect inferences would be made. Endogeneity may arise from measurement error, simultaneity (and similarly, reverse causality), and omitted variables, inter alia (Hill et al., 2021). Omitted variables results in unobserved heterogeneity. This is partially addressed through the use of FE estimators (Wooldridge, 2015). This issue is also addressed through the use of several control variables which may confound the CSP-CFP relationship.

Secondly, homoscedasticity is another key assumption, which means that the error term should have a constant variance across time for each firm (Baltagi, 2005). If the residuals are heteroskedastic, the coefficient estimates will not be efficient, and may produce coefficient estimates further away from the true population value (Brooks, 2008). In addition, test statistics may be inflated, resulting in understated p-values and inferences of statistical significance when none is in fact present.

Thirdly, another important assumption is non-autocorrelation of the error term, which means that the error terms should not be correlated with one another over time. The consequences of serially correlated errors are similar to heteroskedastic errors, namely, inefficient coefficient estimates. In the case of positive serial correlation of the errors, standard error estimates will be understated, increasing the probability of a type I error and potentially overstating R-squared (Brooks, 2008). To address the possible existence of heteroskedasticity and autocorrelation, White period (cross-section cluster) standard errors were computed, which are robust to both heteroskedasticity and autocorrelation (IHS Global Inc, 2020). This is in line with the treatment of these issues in existing literature (Oikonomou, Brooks and Pavelin, 2014; Sun, Yao and Govind, 2019).

Lastly, while not required for the estimates to be unbiased and efficient, the error term should follow an approximately normal distribution to perform hypothesis testing and make inferences from the

regression (Brooks, 2008). This was briefly addressed through the inspection of graphs showing the distribution of the error term in each model to be asymptotically normal, included in the Appendix F:. Significant departures from the normal distribution were not identified. Therefore, the test statistics and p-values can be relied on.

4.6 Empirical results

The empirical results of the aggregate and component CSP models are summarised in Table 14 and presented in full in Appendix G:. In addition, a summary of hypotheses 1 to 4 testing results is presented in Table 15.

4.6.1 The CSP-CFP relationship

Hypothesis 1: There is a significant relationship between overall CSP and CFP

An F-test was conducted to determine the overall significance of the model. The F-test statistic indicates that both the CSP-ASR and CSP-ROA models are overall significant at the 0.1% level. In addition, the p-value of the t-test statistic of the CSP term indicate a statistically significant relationship between CSP and CFP at the 1% level for both models. Therefore, the null hypothesis that there is no CSP-CFP relationship can be rejected and there is evidence is found in support of Hypothesis 1.

The coefficient of CSP is negative for both models. This negative relationship appears to be stronger for the CSP-ASR model, with a coefficient of –4.4540, compared to a coefficient of –0.3564 for the CSP-ROA model. Quadratic CSP is also significant in both models (at the 5% level for the CSP-ASR model and at the 1% level for the CSP-ROA model). The coefficient is positive, indicating a U-shaped CSP-CFP relationship. R-squared indicates that the CSP-ROA model (75%) provides a significantly better fit than the CSP-ASR model (25%).

Holding all other independent variables constant, an increase of 1 in a firm's overall ESG disclosure score is associated with a 4.45% decrease in a firm's ASR and a 0.36% decrease in ROA in the following year. In addition, on a quadratic level, this same increase in overall CSP is also associated with a further 0.04% increase in ASR and 0.0039% increase in ROA.

Table 14: Summary of regression output for by model

CFP proxy	ASR_{it}				ROA_{it}			
Model name	*CSP-ASR*	*ENV-ASR*	*SOC-ASR*	*GOV-ASR*	*CSP-ROA*	*ENV-ROA*	*SOC-ROA*	*GOV-ASR*
CSP specification	CSP	ENV	SOC	GOV	CSP	ENV	SOC	GOV
$CSP_{i,t-1}$	–4.4540***	–1.1867***	–2.1099†	0.5710	–0.3564***	–0.0798**	–0.0797	–0.1245
$CSP^2_{i,t-n}$	0.0403**	0.0176**	0.0233**	–0.0115	0.0039***	0.0165**	0.0015	0.0006
Control variables								
$SIZE_{it}$	22.3541†	21.6790†	22.6329†	22.0051†	2.1677†	2.1446†	2.1338†	2.1257†
$RISK_{it}$	–0.3590**	–0.4149**	–0.4262**	–0.5084***	–0.0950†	–0.0984†	–0.0995†	–0.1009†
LOW_{it}	–0.7342	–1.5231	0.0077	–2.8307	0.2907	0.2400	0.1463	0.0865
$HIGH_{it}$	24.1042*	21.6153	25.0204**	17.2530	–1.5158	–1.7434	–1.3899	–1.4768
α_0 (constant)	–96.3377**	–188.1792†	–172.4088†	–171.1390***	–6.7098	–13.4209†	–12.9562***	–7.9734
Observations	1 040	1 040	1 040	1 040	1 040	1 040	1 040	1 040
F-statistic	2.2986†	2.1020†	2.2640†	2.3318†	18.8279†	18.7784†	18.5237†	18.4654†
R^2	0.2555	0.2389	0.2526	0.2582	0.7487	0.7482	0.7457	0.7451
Adjusted R^2	0.1443	0.1252	0.1410	0.1475	0.7090	0.7084	0.7054	0.7047
Partial F-test	20.6218†	18.3608†	13.2035†	2.2810	15.67220†	12.8596†	4.7514**	0.6258
Adjusted R^2 of restricted model	0.1258	0.1084	0.1294	0.1463	0.7042	0.7045	0.7042	0.7048

Note: *, **, ***, and † denote significance at the 10%, 5%, 1%, and 0.1% level respectively

Source: Data obtained from Bloomberg and results obtained using EViews 13

Table 15: Summary of Hypotheses 1 to 4 testing results

	Hypotheses	*t-statistic*	*Results*
H1	There is a significant relationship between CSP and CFP	–3.052386*** –2.407554***	Supported
H2	There is a relationship between ENV and CFP	–3.083555*** –1.711798**	Supported
H3	There is a relationship between SOC and CFP	–3.736453† –0.986414	Supported
H4	There is a relationship between GOV and CFP	0.477747 –0.761964 –4.982857† (restricted model)	Supported

Note: t-values from the ASR models are presented first, followed by t-values from the ROA models.
*, **, ***, and † denote significance at the 10%, 5%, 1%, and 0.1% level respectively
Source: Data obtained from Bloomberg and results obtained using EViews 13

Hypothesis 2: There is a significant relationship between ENV and CFP

In terms of environmental performance, the F-test statistic indicates that both the ENV-ASR and ENV-ROA models are overall significant at the 0.1% level. In addition, the p-value of t-test statistic of the ENV term indicate a statistically significant relationship between ENV and CFP at the 1% level in terms of ASR and 5% in terms of ROA. Therefore, the null hypothesis that there is no CSP-CFP relationship can be rejected and there is evidence is found in support of Hypothesis 2.

The coefficient of the ENV terms is negative and significant in both models, while the quadratic ENV term is positive and significant in both ENV models at the 5% level. This indicates a U-shaped ENV-CFP relationship. Holding all other independent variables constant, an increase of 1 in a firm's overall ENV disclosure score is associated with a 1.19% decrease in a firm's ASR and a 0.08% decrease in ROA in the following year. In addition, on a quadratic level, this same increase in ENV is also associated with a further 0.02% increase in ASR and 0.02% increase in ROA.

Hypothesis 3: There is a significant relationship between SOC and CFP

In terms of social performance, the F-test statistic indicates that both the SOC-ASR and SOC-ROA models are overall significant at the 0.1% level. The p-value of the t-test statistic of the SOC term indicate a statistically significant relationship between SOC and ASR at the 0.1% level, but no statistically significant relationship between SOC and ROA. Therefore, the null hypothesis that there

is no CSP-CFP relationship can be rejected and there some evidence is found in support of Hypothesis 3. There is however no evidence that this relationship exists in terms of accounting-based CFP.

The coefficient of the SOC terms is negative in both models. The quadratic SOC term is positive in both models but is only significant in terms of market-based performance at the 5% level. This indicates a U-shaped SOC-ASR relationship. Holding all other independent variables constant, an increase of 1 in a firm's overall SOC disclosure score is associated with a 2.11% decrease in a firm's ASR in the following year. In addition, on a quadratic level, this same increase in SOC is also associated with a further 0.02% increase in ASR.

Hypothesis 4: There is a significant relationship between GOV and CFP

Lastly, in terms of governance performance, the F-test statistic indicates that both the GOV-ASR and GOV-ROA models are overall significant at the 0.1% level. However, the p-value of the of t-test statistic of the GOV term indicates that no statistically significant relationship exists between SOC and accounting- or market-based CFP. Therefore, the null hypothesis that there is no SOC-CFP relationship cannot be rejected and there is no evidence is found in support of Hypothesis 4. However, consideration still has to be given to whether the GOV term is significant in the restricted specification of this model, which is discussed in Subsection 4.6.2**Error! Reference source not found.**. The c oefficients of quadratic GOV in both models are not significant, indicating that the relationship is not quadratic.

With regards to the results of the component models as a whole, this CSP-CFP relationship is stronger for ASR specifications of the models, with the coefficients of these models being greater than the coefficients of the ROA models. R-squared indicates that the ROA models provides a significantly better fit than the ASR models for all component specifications of CSP, with R-squared of approximately 70% compared to the ASR models' R-squareds ranging from 11% to 15%.

4.6.2 The shape of the CSP-CFP relationship

A summary of hypotheses 5 to 8 testing results is presented in Table 16.

Table 16: Summary of Hypotheses 5 to 8 testing results

	Hypotheses	*F-test statistic*	*Results*
H5	The shape of the CSP-CFP relationship is non-linear	20.62175† 15.67220†	Supported
H6	The shape of the ENV-CFP relationship is non-linear	18.36084† 12.85962†	Supported
H7	The shape of the SOC-CFP relationship is non-linear	13.20352† 4.751471**	Supported
H8	The shape of the GOV-CFP relationship is non-linear	2.281030 0.625851	Not supported

Note: F-test values from the ASR models are presented first, followed by F-test values from the ROA models. *, **, ***, and † denote significance at the 10%, 5%, 1%, and 0.1% level respectively
Source: Data obtained from Bloomberg and results obtained using EViews 13

Hypothesis 5: The shape of the relationship between overall CSP and CFP is non-linear

Detailed results of the redundant variables tests are presented in Appendix H: for all models. The null hypothesis is that the quadratic CSP term is not significant. In light of the results of the restricted F-test, this null hypothesis is rejected for both CFP models at the 0.1% level. The unrestricted CSP models provide a better fit than the restricted models, as is also indicated by the lower adjusted R-squared of the restricted models. Therefore, the null hypothesis that the restricted model provides a statistically significantly better fit than the unrestricted model can be rejected and there is evidence in support of Hypothesis 5. In other words, a U-shaped CSP-CFP relationship provides a better fit than a simple negative linear relationship.

It is also noteworthy from both restricted models that the CSP-term coefficient is negative, as with the unrestricted model. However, this term is only significant in terms of the CSP-ASR model, at the 1% level. This indicates that, although the unrestricted model indicates a better fit, there is still a statistically significant negative linear relationship between CSP and market-based performance.

Hypothesis 6: The shape of the relationship between ENV and CFP is non-linear

The results of the restricted F-test provide evidence that the null hypothesis that quadratic ENV is not significant can be rejected at the 0.1% level. The unrestricted ENV models therefore provide a better fit than the restricted models, as is also indicated by the lower adjusted R-squared of the restricted models. Therefore, the restricted model does not provide a statistically significantly better fit than the

unrestricted model and evidence is found in support of Hypothesis 6. In other words, a U-shaped ENV-CFP relationship provides a better fit than a simple negative linear relationship.

It is also noteworthy from both restricted models that the ENV term is not significant. This indicates that, there is no statistically significant linear relationship between ENV and CFP, and that this relationship only exists when specified in a quadratic context.

Hypothesis 7: The shape of the relationship between SOC and CFP is non-linear

The coefficient of the SOC terms is negative in both models. The quadratic SOC term is positive in both models but is only significant in terms of market-based performance at the 5% level. This indicates a U-shaped SOC-ASR relationship.

The evidence in terms of SOC is mixed. As discussed in Subsection 4.6.1, the quadratic SOC term was not significant for the SOC-ROA model. Regardless, the restricted F-test provides evidence to reject the null hypothesis at the 5% level. Further, the test provides evidence to reject the null hypothesis at the 0.1% level in terms of the SOC-ASR model. Two conclusions can be drawn from the results of these tests.

Firstly, the unrestricted SOC-ASR model provide a statistically significant better fit than the restricted SOC-ASR model, as is also indicated by the lower adjusted R-squared of the restricted models. Therefore, the null hypothesis that there that the restricted model provides a statistically significantly better fit than the unrestricted model can be rejected and there is some evidence is found in support of Hypothesis 7. It is also noteworthy the restricted SOC-ASR model has significant CSP coefficients at the 0.1% level. This indicates that, although the unrestricted model indicates a better fit, there is still a statistically significant negative linear relationship between SOC and market-based CFP. Secondly, while the unrestricted SOC-ROA model provides a better fit than the restricted model, there is insufficient evidence to conclude that a relationship exists between ROA and SOC.

Hypothesis 8: The shape of the relationship between GOV and CFP is non-linear

As discussed in Subsection 4.6.1, the quadratic component CSP term was not significant for the GOV-ASR or GOV-ROA models. In line with these results, results of the restricted F-test provide no significant evidence that the null hypothesis that quadratic GOV is not significant can be rejected. Therefore, there is no evidence to support Hypothesis 8. Further, the p-value of the GOV term is significant at the 0.1% level in the restricted GOV-ASR model, indicating that a relationship exists between ASR and GOV. The coefficient (–1.1454) also indicates a negative relationship, in line with the unrestricted model. No such evidence is found in the GOV-ROA model. Therefore, it can be concluded that there is support for a negative linear relationship between market-based performance and GOV, and there is therefore some support for Hypothesis 4.

4.6.3 Control variables

In terms of the all CSP-CFP models, size is found to have a positive statistically significant relationship with CFP at a 0.1% level. The relationship between risk and CFP is also positive and statistically significant at the 5% level for CSP-ASR and the 0.1% level for CSP-ROA in terms of the overall CSP models. The relationship between risk and CFP is also positive and statistically significant at the 5% level for market-based performance and the 0.1% level for accounting-based performance in terms of the component models.

The p-values of LOW_{it} are not significant for any of the models, indicating that there is no statistically significant difference between firms that engage in no R&D spending and low levels of R&D. However, in terms of the CSP-ASR model, there is a statistically significant difference between firms that engage in no R&D and firms that engage in high levels of R&D (at the 10% level). In addition, in terms of the SOC-ASR model, there is a statistically significant difference between firms that engage in no R&D and firms that engage in high levels of R&D at the 5% level. On average, firms with higher R&D in these model specifications appear to exhibit better ASR.

4.7 Discussion of results

This study aimed to identify the shape of the CSP-CFP relationship at an overall and component level. To this author's knowledge, no South African studies have explored the shape of these relationships in the past. Therefore, the results of this study are discussed in the context of studies in developed and other developing markets of the shape of this relationship. Furthermore, the results of this study

are discussed in the context of the existing South African literature exploring a linear CSP-CFP relationship.

4.7.1 Overall corporate social performance

At an overall level, a non-linear U-shaped relationship was found between CSP and CFP in terms of both accounting-based CFP (proxied by ROA) and market-based CFP (proxied by ASR). Therefore, support is found for the too-little-of-a-good-thing (TLGT) effect. In other words, stronger financial performance is associated with stronger CSP, but only after a certain level of CSR investment during which this relationship is negative. This finding is in line with Barnett's (2007) stakeholder influence capacity (SIC) theory.

This finding supports the results of similar studies in developed markets, such as those of Barnett and Salomon (2012), Oikonomou, Brooks and Pavelin (2014), Nollet, Fillis and Mitrokostas (2016), and Chen at al. (2018). This indicates that despite the differing institutional environments, the non-linear CSP-CFP relationship still appears to be present amongst JSE-listed firms. It is however not in line with the results of Lahouel, Bruna and Zaied's (2020) study of French firms, which found an inverse U-shaped relationship. This may be due to methodological differences, as that study made use of a PSTR model. In addition, it supports findings in developing markets such as the studies of Chen and Lee (2017) and Maqbool and Bakr (2019).

In light of the absence of research on this study's research topic in a South African context, comparisons are also made to past linear studies in a South African context. This study's unrestricted and restricted linear models had a CSP term with a negative coefficient, indicating a negative CSP-CFP relationship. However, this relationship was only significant in terms of market-based CFP. This result does not invalidate the results of the unrestricted model, as the unrestricted model with the squared CSP term was found to provide a better statistical fit.

This finding is in contrast with the findings of du Toit and Lekoloane (2018), Demetriades and Auret (2014), and Chetty, Naidoo and Seetharam (2015) who found no significant relationship between CSP and CFP from 2009 to 2014. However, a key methodological difference is that these authors' studies made use a binary CSP proxy, JSE SRI Index inclusion. It is also in conflict of the results of the study of

Johnson, Mans-Kemp, and Erasmus (2019), who used the same Bloomberg CSP proxy and similar CFP proxies. However, Mans-Kemp and Erasmus' study only made use of 359 firm-year observations from 2011 to 2016 compared to this study's 1040 firm-year observations from 2012 to 2019. It may be that the larger sample size and lengthier time period is the cause of these differences.

For researchers, the findings of this study reinforce the need to consider the relevance of non-linearity when exploring the CSP-CFP relationship. In addition, this result provides another methodical perspective for reconciling prior differences in the literature. For managers and investors, this finding indicates that firms should either limit CSR participation and focus on cost-leadership or spend a significant amount on CSR to differentiate themselves from competitors. Firms that try to do both will find themselves "stuck in the middle" (Porter, 1980: 41–42).

4.7.2 Component CSP

Overall, the results of the different component models present differences, which are discussed below. This supports the idea that CSR is a multidimensional construct and the methodological choice to decompose CSP into its components.

Environmental performance

A non-linear U-shaped relationship was found between ENV and CFP in terms of both accounting-based and market-based CFP. Therefore, support is also found for the TLGT effect. This finding is contrast to the inverse U-shaped relationship found by Lahouel, Bruna and Zaied (2022). However these authors made use of a PSTR model and focused on European firms over a longer time period from 2005 to 2017. The finding however is in line with the findings of Trumpp and Guenther (2017) in a developed market context, and Han, Kim, and Yu (2016), in a South Korean context. The latter study also used the same CSP proxy.

This study's unrestricted and restricted linear models had a ENV term with a negative coefficient, indicating a negative ENV-CFP relationship. However, this coefficient was not significant for the restricted models, indicating that there is no significant linear relationship between ENV and CFP. This is in contrast to Johnson, Mans-Kemp, and Erasmus (2019), who found a negative significant relationship. The reasons for this difference may be those discussed above. On the other hand, this study's results align with Sampong et al. (2018), who also found a negative insignificant relationship.

Practically, this finding suggests that, as with aggregate CSP, firms should either limit spending on environmental initiatives and focus on cost-leadership or spend a significant amount on these initiatives to differentiate themselves from competitors. Firms that try to do both will find themselves "stuck in the middle" (Porter, 1980: 41–42). In addition, this result also provides another methodical perspective for reconciling some of the past conflicting findings in a South African context and abroad.

Social performance

A non-linear U-shaped relationship was found between SOC and CFP in terms of ASR only. Therefore, support is also found for the TLGT effect in terms of market-based performance only. In contrast, Han, Kim, and Yu (2016) found no significant relationship using the same CSP proxy. The differences may be due to the differing institutional environment between South Korea and South Africa. It may be that social spending is more valued by investors in JSE-listed firms (but only at higher levels). This study's findings are in line with the results of Nollet, Filis and Mitrokostas (2016) study in the US.

The unrestricted and restricted linear models had a SOC term with a negative coefficient, indicating a negative CSP-CFP relationship. However, this relationship was only significant in terms of market-based CFP. In contrast, Johnson, Mans-Kemp, and Erasmus (2019), and Sampong et al. (2018) found a positive significant relationship between SOC and EPS. It also conflicts with the findings of, who found a significant positive relationship. However, this insignificant finding is in line with Nyeadi, Ibrahim and Sare's (2018) finding of no significant relationship with SOC.

Practically, this finding indicates that firms should either limit spending on social spending and focus on being lean cost-leaders or use significant social spending to differentiate themselves from competitors. Firms that try to do both will find themselves "stuck in the middle" (Porter, 1980: 41–42). This finding also provides another methodical perspective for reconciling some of the past conflicting findings in a South African context.

Governance performance

No significant non-linear relationship was found between GOV and CFP. This is contrast with the findings of Han, Kim, and Yu (2016) who find an inverse U-shaped relationship in a South Korean context and Nollet, Filis and Mitrokostas (2016) who find GOV to be main driver of improved CFP. A

possible explanation is the more stringent governance requirements and disclosures in South Africa (such as those imposed by the King Code). These stricter governance requirements mean that all else equal, South African listed firms should be better governance performance than firms in countries without such stringent requirements. It may be that the financial gains or losses from this compliance have already been realised for South African firms, whereas firms in other countries still have capacity to realise the gains or losses associated with increased GOV.

Interestingly, this study's GOV-ASR restricted linear model had a GOV term with a significant negative coefficient, indicating a negative CSP-CFP relationship. In contrast, Nyeadi, Ibrahim and Sare (2018) find a significant positive relationship between GOV and CFP. Johnson, Mans-Kemp, and Erasmus (2019) also found a significant positive relationship, but only for firms in the consumer goods and industrial firms. While these studies' findings do somewhat contradict the explanation presented above, it is noteworthy that the time periods of these studies are from 2011 to 2013 and 2011 to 2016, respectively. As discussed in Section Descriptive statistics4.2, GOV has generally been increasing throughout the sample period, in line with advancements in governance such as revisions to the King Code and increased investor focus on ESG. It may be that the financial effects of increased GOV were already realised in prior years, which these studies included in their sample period.

Practically, this finding suggests that firms should avoid further investments into governance initiatives, as this is expected to reduce share price performance.

4.7.3 Control variables

Lastly, the results of the control variables are discussed. Support is found for a significant positive relationship between size and CFP across all models. This is in line with theoretical explanations (Orlitzky, 2001) and comparable past empirical studies. It is however surprising that the relationship holds and is strongly significant with the ROA models, since the denominator of this equation includes total assets, another proxy for size. ROA would thus be expected to eliminate much of this size effect (Barnett and Salomon, 2012). Support is also found for a significant positive relationship between risk and CFP across all models in line with theory and empirical expectations (Orlitzky and Benjamin, 2001; Andersen and Dejoy, 2011).

In this study, low levels of spending were defined as R&D spending of lower than and equal to 1% of R&D, whereas firms spending greater than 1% were considered high R&D spenders. No significant

difference is found between firms that do not engage in R&D spending and those that engage in low levels of such spending. However, some support was found for firms that engage in high levels of R&D spending were found to exhibit better ASR in terms of the SOC-ASR model. This is somewhat in line with theoretical expectations (McWilliams & Siegel, 2000).

4.8 Summary and conclusions

In summary, support was found for all hypotheses except for Hypothesis 8. In other words, a relationship was found between overall and all aggregate forms of CSP and CFP. Furthermore, this relationship was found to be non-linear U-shaped for overall CSP, ENV, and SOC. This provides for support for the TLGT effect, which suggests that firms require significant amounts of spending on these forms of CSP to reap financial benefits. Lower levels of investment will not be rewarded, but punished, and firms find themselves unable to compete on cost or significantly differentiate themselves from competitors.

Chapter 5: Conclusions

5.1 Introduction

This chapter will conclude the study by summarising the key research findings in relation to the research questions, as well as the value and contribution thereof. The limitations of the study will also be reviewed, and directions for future research will be proposed.

5.2 Summary of key findings and contributions

This study aimed to contribute to the existing South African CSP-CFP literature by considering the possibility that a non-linear relationship exists between these two variables. This research was conducted in the context of 130 JSE-listed firms from 2012 to 2019. Furthermore, this study aimed to decompose CSP into three components: environmental performance (ENV), social performance (SOC), and governance performance (GOV). Accounting-based financial performance was proxied by ROA, market-based performance was proxied by ASR, and CSR and its components were proxied by Bloomberg ESG disclosure scores. Notwithstanding the study's limitations, the results provide support for a non-linear U-shaped relationship between overall CSP and CFP. Furthermore, the results indicate a non-linear U-shaped relationship between ENV and SOC with CFP. Both these findings provide support for the TLGT effect. In other words, CSR does provide firms with a competitive advantage, but

only after a certain level of CSP (or stakeholder influence capacity) whereafter the benefits of CSP outweigh its costs.

While various studies have explored the non-linearity of this relationship in developed markets, fewer studies have considered the relationship in developing markets and Southern Africa. This is important because developing markets, particularly South Africa provide unique institutional and contextual factors that affect this relationship, such as the King Code. This study added to the existing developed and developing market literature and showed that support is still found for this relationship despite differing contextual factors. This study also reconciled previous opposing findings on this relationship and provided a challenging new perspective for future researchers to consider.

The findings of this study have several practical implications. This study provides guidance for managers and investors contemplating the benefits of firm's increased CSR activities. Support is found for both a positive and negative relationship, depending on the firm's current level of CSR, indicating that CSR pays off, but only in the long-term after a certain level.

5.3 Limitations and directions for future research

As with all empirical studies, this study has several limitations which can be improved upon in future research. In terms of the literature reviewed in this study, due to the limited number of studies evaluating the CSP-CFP relationship in a South African context, three out of the ten South African studies summarised are masters' dissertations and are therefore not peer reviewed.

In terms of the firms sampled in this study, a limitation was a reduction in the number of firms sampled due to missing ESG disclosure scores. In addition, relatively fewer firm were selected from the energy, health care, technology, and telecommunications industries. Regardless, the sample does include 1 040 observations, which is larger than many other South African studies, which does enhance the generalisability of the results. Lastly, the study specifically excludes the effects of the COVID-19 pandemic and does not consider the possible effects of this event on the CSP-CFP relationship. These limitations can be addressed by future research by including a more recent sample period, as the availability of this data increases over time. While the results of this study contribute to the South African CSP-CFP research landscape, these results have limited generalisability in a developing market context outside South Africa. Future studies could also assess whether this relationship is the same in other developing African markets.

In addition, the dependent variable is proxied by Bloomberg ESG disclosure scores. This measure does not differentiate between the type of CSR engages in, that is to say, strategic or responsive CSR. It is possible that these different forms of CSR have different relationships with CFP. This is however a drawback of most measures of CSP.

In terms of the methodology employed, this study employed a panel regression model with FE and RE, with a quadratic (squared) CSP term, in line with much of the prior literature. In contrast to this, a PSTR model explicitly tests for non-linearity and does not *a priori* assume that it exists. It can also be used to determine the threshold where the CSP-CFP relationship changes from negative to positive or negative to positive. Future studies could employ this latter model or other methodologies to determine the level at which the relationship changes, and whether this level is consistent among different industries in South Africa.

Lastly, a limitation of this study is that it did not attempt to determine whether a causal relationship exists between CSP and CFP. An avenue for future research in a South African context is assessing whether such a causal relationship exists and the direction of causation.

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Appendices

Appendix A: Summary of selected prior studies

Table A1: Summary of select prior studies examining a non-linear CSP-CFP relationship (presented in chronological order)

Authors (Date)	*Methodology*	*Context*	*CSP Measure(s)*	*CFP Measure(s)*	*Control Variables (And Proxy)*	*Theory*	*Findings*
Lahouel et al. (2022)	Panel smooth transition regression (PTSR) model	Listed French, German, Italian, and Spanish firms from 2005 to 2017	Thomson Reuters ESG environmental performance score	Tobin's Q	Size (logarithm of market capitalisation) Risk (total liabilities to total assets) Current growth rate (% change on previous year's sales) Year (dummy variable)	Shareholder value maximisation Agency theory Competitive advantage Natural resource-based view (NRBV) Stakeholder theory	Various possibilities of nonlinear positive, nonlinear negative, and inverted U-shaped relationships between environmental CSR and CFP. The relationship is likely to change over time, and is dependent on other confounding variables (at the firm- and macro-level) and context (both regulatory and geographical).
El Khoury, Nasrallah and Alareeni (2021)	Panel regression model with fixed firm effects (for ROA) and random firm effects (for ROE, total return, and Tobin's Q)	Middle East, North Africa, and Turkey (MENAT) listed banks from 2007 to 2019	Thomson Reuters ESG combined score Thomson Reuters ESG components pillars scores	ROA ROE Tobin's Q Stock return	Bank-specific control variables Macroeconomic control variables Financial development control variables	Shareholder value maximisation Stakeholder theory	Inverse U-shaped relationship between ESG and CFP. Inverse U-shaped relationship between SOC and CFP, and between GOV and accounting performance. U-shaped relationship between ENV and market-based CFP.

Lahouel, Bruna and Zaied (2020)	PSTR model	Listed French firms from 2005 to 2017	Thomson Reuters ESG environmental performance score	ROA Tobin's Q	Size (market capitalisation) Financial risk (total liabilities to total assets) Current growth rate (% change on previous year's sales)	Shareholder value maximisation Stakeholder theory	Inverted V- and U-shaped relationship between CSP and CFP when CFP is measured by Tobin's Q and ROA, respectively.
Nuber, Velte and Hörisch (2020)	Panel regression model with fixed firm and period effects	(DAX30, MDAX, and TecDAX) Listed German firms from 2008 to 2017	Thomson Reuters ESGEP score (equal weighted rating of ESG and Sustainable Economic Performance scores)	ROA Tobin's Q	Systematic risk (beta) Capital intensity (capex to opening balance of total assets) Cash flow return on sales (net cash flows to sales) Financial risk (debt ratio) R&D intensity (expenditure as a % of sales) Size (natural logarithm of total assets) Industry (dummy variable)	Shareholder value maximisation Managerial opportunism hypothesis Competitive advantage Stakeholder agency theory	Significant U-shaped relationship between ESGEP and CFP.
Matuszak and Rózańska (2019)	OLS regression model	Polish commercial banks from 2008 to 2015	Four individual CSR disclosure indices (for the environment, human resources, product and customers, and community involvement dimensions) based on content analysis	Net Interest Margin ROA	Size (logarithm of total assets) Risk (D/E ratio) Listing status (dummy variable)	Shareholder value maximisation Stakeholder theory	No significant linear relationship between CSP and CFP. U-shaped relationship between human resources dimension and CFP. Inverse U-shaped relationship between community involvement and CFP, and between product and customers and CFP.

Maqbool and Bakr (2019)	Panel regression model with random effects (for ROE and ROCE) and fixed effects (for total returns)	(BSE Top 100) Listed Indian firms from 2008 to 2017	Thomson Reuters ESG Score	ROE ROCE Total return	Size Risk (leverage ratio) Capital intensity R&D intensity	Shareholder value maximisation Stakeholder theory Stakeholder influence capacity (SIC)	No significant linear relationship between CSP and CFP. Significant U-shaped relationship between CSP and CFP (measured by ROE and ROCE).
Sun, Yao, and Govind (2019)	Panel regression model	Listed US firms from 2000 to 2010	MSCI KLD ratings	Tobin's Q	Size (logarithm of total assets) Age Asset growth rate Firm income level Cash flow Performance volatility Firm diversification Munificence Turbulence Competition Time (dummy variable)	Instrumental stakeholder theory Resource-based view (RBV) Dynamic capabilities theory	Significant inverted U-shaped between CSP and CFP for firms with low marketing capability.
Chen et al. (2018)	Panel regression model	Listed US firms from 2003 to 2009	MSCI KLD ratings	EBITDA	Year (dummy variable) Intangible assets (market to book ratio) Industry (dummy variable) Size (logarithm of number of employees)	Shareholder value maximisation Stakeholder theory Learning curve effect Prospect theory Competitive advantage	Significant U-shaped relationship between CSP and CFP.
Xie et al. (2018)	Data envelopment analysis (DEA) to estimate corporate efficiency with an OLS regression	Mostly US, Chinese and Japanese firms (various countries and sectors) in 2015	Bloomberg ESG disclosure score	Corporate efficiency ROA Tobin's Q	Sector (dummy variable) Country (dummy variable) R&D intensity (expenditure) Size Risk (natural logarithm value of total liabilities to equity)	Legitimacy theory Information asymmetry	Positive relationship between CSR disclosure and CFP at the moderate disclosure level only (strongest for governance, followed by social and environmental disclosure).

							Negative relationship between CSP and CFP at both low and high CSR disclosure levels.
Chen and Lee (2017)	PSTR model	Listed Taiwanese firms from 2010 to 2012	Taiwan Stock Exchange CSR Index	Tobin's Q	Institutional shareholding Risk (debt ratio) Size (market capitalisation)	Stakeholder theory (social impact hypothesis) Shift of focus hypothesis	Significant U-shaped relationship between CSP and CFP.
Trumpp and Guenther (2017)	Panel regression model with OLS	International firms (CDP Global 500, S&P 500, and FTSE 350) from 2008 to 2012	Corporate Environmental Performance (CEP): carbon performance and waste intensity	Total stockholder return ROA	R&D intensity (expenditure as a % of sales) Capital intensity (capex to opening balance assets) Risk (debt ratio) Growth (% change in total assets) Cash flow return on sales Size (natural logarithm of total assets) Legal origin (dummy variable)	Shareholder value maximisation (trade-off hypothesis and managerial opportunism hypothesis) Competitive advantage) NRBV Instrumental stakeholder theory	Significant U-shaped relationship between CEP and CFP. Differing relationships for manufacturing compared to service firms.
Han, Kim, and Yu (2016)	Panel regression models with pooled OLS, fixed effects, random effects	Listed Korean firms from 2008 to 2014	Bloomberg ESG disclosure score	ROE P/B ratio Stock return	Risk (D/E ratio) Size Lagged dependent variable	Competitive advantage	Negative or U-shaped relationship between ENV and CFP. Positive or inverse U-shaped relationship between GOV and CFP.
Nollet, Filis and Mitrokostas (2016)	Panel regression model with a pooled OLS, and firm and time fixed effects	S&P 500 firms from 2007 to 2011	Bloomberg ESG disclosure score	ROA ROC Excess stock returns	Size (sales) Risk (leverage ratio) R&D intensity (expenditure) Crisis (dummy variable)	Shareholder value maximisation Enlightened shareholder value maximisation Competitive advantage	No significant relationship between CSP and CFP with linear models.

						RBV	U-shaped relationship between CSP and CFP (measured by ROA and ROC). GOV is the main driver of improved CFP.
Wang et al. (2016)	Panel regression model with pooled OLS, fixed effects, and random effects	International construction industry firms from 2007 to 2013	MSCI ESG Intangible Value Assessment Index rating	ROA ROE EPS Stock return P/E ratio	Size (natural logarithm of market capitalisation) Risk (D/E ratio) Country (dummy variable)	Shareholder value maximisation Stakeholder theory	Significant U-shaped relationship between CSP and CFP (measured by ROA and EPS). Significant positive and linear relationship between CSP and CFP (measured by ROA and EPS).
Misani and Pogutz (2015)	Pooled OLS panel regression	Global firms in carbon intensive industries (energy, materials, industrial, and utilities) that disclosed their greenhouse gas emissions through the Carbon Disclosure Project (CDP) from 2007 to 2013	Carbon performance (ratio of firm's Scope 1 and Scope 2 emissions to sales divided by the industry average) Environmental management (Thomson Reuters ASSET4 Environmental Performance Score)	Tobin's Q ROE ROS ROA	Country (dummy variable) Industry (dummy variable) Size (natural logarithm of total assets) Corporate governance (ASSET4's corporate governance score) Adherence to UN's Global Compact within a year (dummy variable) Climate change innovation (ratio of climate change patents to total patents of a firm) R&D intensity (expenditure as a % of sales) Risk (D/E ratio)	Stakeholder theory	Inverse U-shaped relationship between carbon performance and Tobin's Q.

Oikonomou, Brooks and Pavelin (2014)	Pooled OLS panel regression	S&P 500 firms from 1991 to 2008	MSCI KLD rating	Annual stock return	Excess market return Size (small-minus-big portfolio returns) Value – P/B ratio (high-minus-low portfolio returns) Momentum	Stakeholder theory Social judgement theory	Significant U-shaped relationship between CSP and CFP. CFP from uniformly positive CSP firms is better than those with uniformly negative CSP.
Barnett and Salomon (2012)	Panel regression with fixed firm, industry, and period effects	MSCI KLD database firms (mostly S&P 500 firms) from 1991 to 2006	MSCI KLD rating	ROA Net income	Size (number of employees in thousands) Risk (debt ratio) R&D intensity (expenditure as a % of sales) Advertising intensity (expenditure as a % of sales)	Shareholder value maximisation Stakeholder theory SIC	Significant U-shaped relationship between CSP and CFP. Firms with the highest CSP generally have the highest CFP.
Park and Lee (2009)	Pooled OLS regression model	Listed US restaurants from 1991 to 2006	MSCI KLD rating	ROE Total stockholder return	Size (logarithm of total assets) Financial risk (debt ratio) Year (dummy variable)	Slack resources theory Managerial opportunism theory	Significant U-shaped relationship between CSP and CFP (measured by ROE).
Brammer and Millington (2008)	Panel regression with tobit model	(LSE) Listed UK firms from 1990 to 1999	Corporate philanthropy (charitable donations to sales)	Risk-adjusted market performance	Industry (dummy variable) R&D intensity (expenditure as a % of sales) Advertising intensity (dummy variable) Size (natural logarithm of total assets) Year (dummy variable) Risk (D/E ratio) Profitability (pre-tax profits to total assets)	Neoclassical economic theory Instrumental stakeholder theory Agency theory Competitive advantage	Significant U-shaped relationship between CSP and CFP. Unusually poor CSP performers have best CFP in short-run, compared to unusually good CSP performers doing best in the long-run.

					Cash holdings (cash and cash equivalents to sales) Dividends (dividend pay-out to total assets) Labour intensity (total employment costs to sales)		
Wang, Choi, and Li (2008)	Pooled OLS panel regression model	Listed US firms in the Taft Corporate Giving Directory from 1987 to 1999	Corporate philanthropy (charitable donations to sales)	ROA Tobin's Q	Lagged CFP variables R&D intensity (expenditure as a % of sales) Advertising intensity (expenditure as a % of sales) Size (natural logarithm of total assets) Age (years since initial public offering) Risk (debt ratio)	Instrumental stakeholder theory Shareholder value maximisation Agency theory Resource dependence theory	Significant inverse U-shaped relationship between CSP and CFP. This relationship is stronger for more dynamic industries.
Barnett and Salomon (2006)	Panel regression with fixed year effects and random fund effects	Mutual funds tracked by the Social Investment Forum from 1972 to 2000	Screening intensity	Risk-adjusted performance	Age (months since funds inception) Size (fund assets) Global fund (dummy variable) Relative bond and stock fund composition (as a % of total assets) Residual macroeconomic factors (dummy variable)	Modern portfolio theory Stakeholder theory	Significant positive (negative) relationship between community relations (environment and labour relations) and CFP. Significant U-shaped relationship between SRI screens and CFP.
Sturdivant and Ginter (1977)	Correlation analysis	Companies cited by Milton Moskowitz (1972) as exhibiting	Social performance (survey responses)	Economic performance (various factors)	None	None explicitly mentioned	Firms with good social performance had greater CFP than the best and worst performers (inverse U-shape).

		exceptional social responsiveness or a lack thereof					Firms with high CSP perform better than those with low CSP
Bowman and Haire (1975)	Correlation analysis	Various samples	Content analysis (proportion of lines in annual report devoted to social responsibility) Council on Economic Priorities (CEP) rating	ROE	None	None explicitly mentioned	Firms with mediocre CSP perform better than those with the highest or lowest CFP (inverse U-shape).

Source: Author's own contribution

Table A2: Summary of select prior studies examining the CSP-CFP relationship in a South African context (presented in chronological order)

Authors (Date)	*Methodology*	*Context*	*CSP Measure(s)*	*CFP Measure(s)*	*Control Variables (Proxy)*	*Theory*	*Findings*
Ball (2020)	Panel regression models with pooled OLS, fixed effects, and random effects	JSE ALSI from 2012 to 2019	Privately held, proprietary ESG data from a large JSE-listed financial firm	ROA P/E ratio Annual stockholder return	Risk (debt ratio) Size (market capitalisation)	Social impact hypothesis Stakeholder inclusive approach Enlightened value maximisation theory	Positive insignificant relationship between ESG performance and stock return. Negative insignificant relationship between ESG performance and ROA and PE ratio.
Johnson, Mans-Kemp, and Erasmus (2019)	Panel regression models with pooled OLS, fixed effects, and random effects	JSE-listed firms from 2011 to 2016	Bloomberg ESG disclosure score	ROA EPS Earnings yield Total shareholder return (TSR) ROIC Spread (ROIC minus WACC) MVA Cash ROIC	Size (market capitalisation) Risk (debt ratio) Industry (dummy variable)	None explicitly mentioned	The relationship differs significantly across different sectors. Most significant relationships were only found when the ESG score was disaggregated, or this relationship was examined for specific sectors. Negative significant relationship between ENV and EPS. Positive significant relationship between SOC and EPS. Negative significant relationship between SOC and TSR.
Du Toit and Lekoloane (2018)	Logistic regression	JSE-listed firms from 2009 to 2014	JSE SRI Index	ROE Market-based stock return P/E ratio Return	Size (market capitalisation)	Stakeholder theory	No significant relationship between CSP and CFP.
Nyeadi, Ibrahim and Sare (2018)	Panel corrected standard errors (PCSE) regression	JSE Top 100 firms from 2011 to 2013	Public Investment Corporation's (PIC) Corporate	ROA Tobin's Q	Size (logarithm of total assets) Risk (debt ratio) R&D intensity Age Industry (dummy)	Stakeholder theory Agency cost theory	Significant positive relationship between CSP and CFP. Significant positive relationship between GOV and CFP; no significant evidence for

			Governance Rating Matrix		Time (dummy)		relationship between ENV and SOC with CFP.
Sampong et al. (2018)	Panel regression with fixed effects	JSE-listed firms from 2010 to 2015	Global Reporting Initiative (GRI) G3.1 guidelines	Tobin's Q	Size (natural log of total assets) Audited by Big Four audit firm (dummy variable) Age Number of independent directors on board of directors ROA Financial risk (debt ratio)	Stakeholder theory Legitimacy theory	Positive insignificant relationship between CSP and CFP. Negative insignificant relationship between ENV and CFP. Positive significant relationship between SOC performance and CFP
Chetty, Naidoo and Seetharam (2015)	Event study OLS regression	JSE-listed firms from 2004 to 2013	JSE SRI Index	ROA ROE EPS Stock returns	Risk (long-term debt to assets ratio) Size (market capitalisation)	Competitive advantage Shareholder value maximisation	CSP was rewarded in the short-term. No significant relationship between CSP and CFP in the long-term.
Demetriades and Auret (2014)	Event study Multiple regression	JSE-listed firms from 1995 to 2009	JSE SRI Index	ROE ROA	Size (assets, sales, employees) Risk Industry (dummy variable)	Shareholder value maximisation Stakeholder theory Competitive advantage	No significance in the short-term or long-term between CSP and CFP.
Nkomani (2013)	Multiple regression	JSE Top 100 firms from 2002 to 2011	JSE SRI Index	Total return P/B ratio P/E ratio Net profit margin ROA ROE	Size (market capitalisation) Industry	None explicitly mentioned	Negative significant relationship between CSP and total return, ROA, and net profit margin.
Wolmarans (2012)	Event study	JSE-listed firms from	Engagement in BEE transactions	Share price performance	None explicitly mentioned	Stakeholder theory	BEE companies performed worse than the market before the global financial crisis, saw a smaller decline in market value

		2007 to 2009					during the crisis, and were not significantly different to the market after the crisis.
Ntoi (2010)	Multiple regression	JSE-listed firms from 2004 to 2010	JSE SRI Index	Average market return P/B ratio P/E ratio	None explicitly mentioned	Managerial opportunism hypothesis Social impact hypothesis	Positive significant relationship between P/B ratio and CSP.

Source: Author's own contribution

Appendix B: Average CSP by industry and year before outlier removal

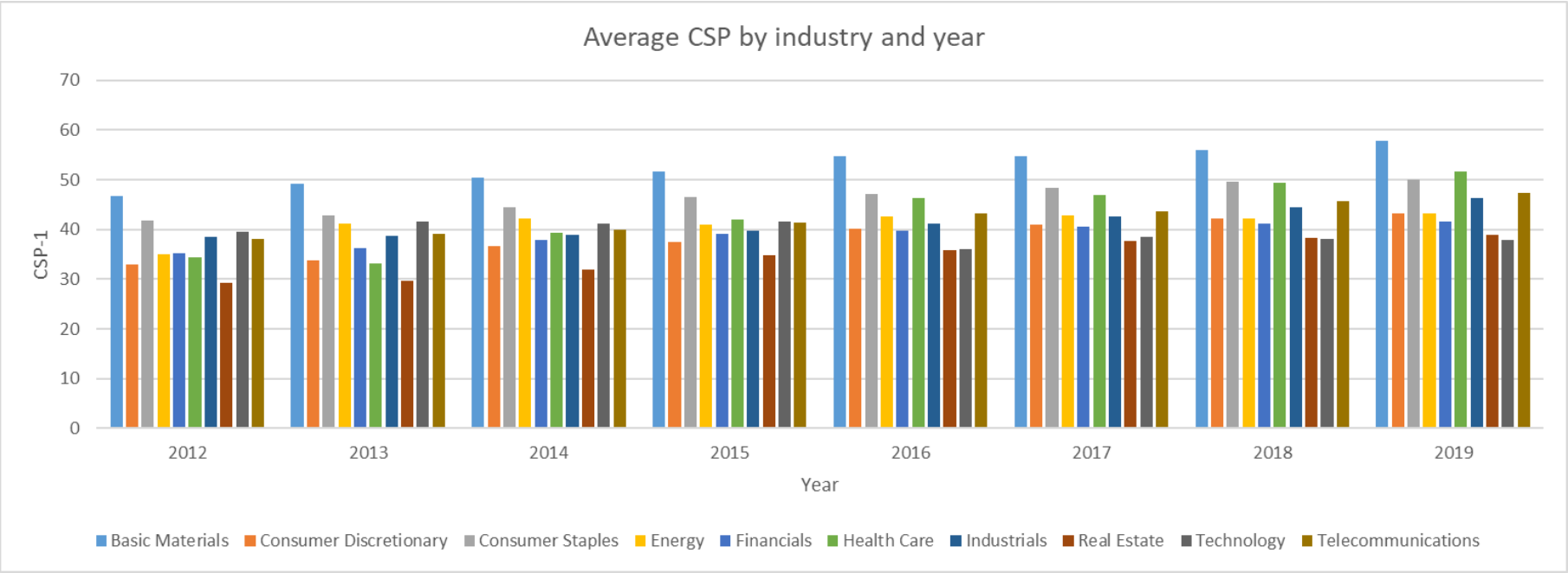

Figure B1: Average overall CSP by industry and year

Source: Data obtained from Bloomberg and results obtained using Excel

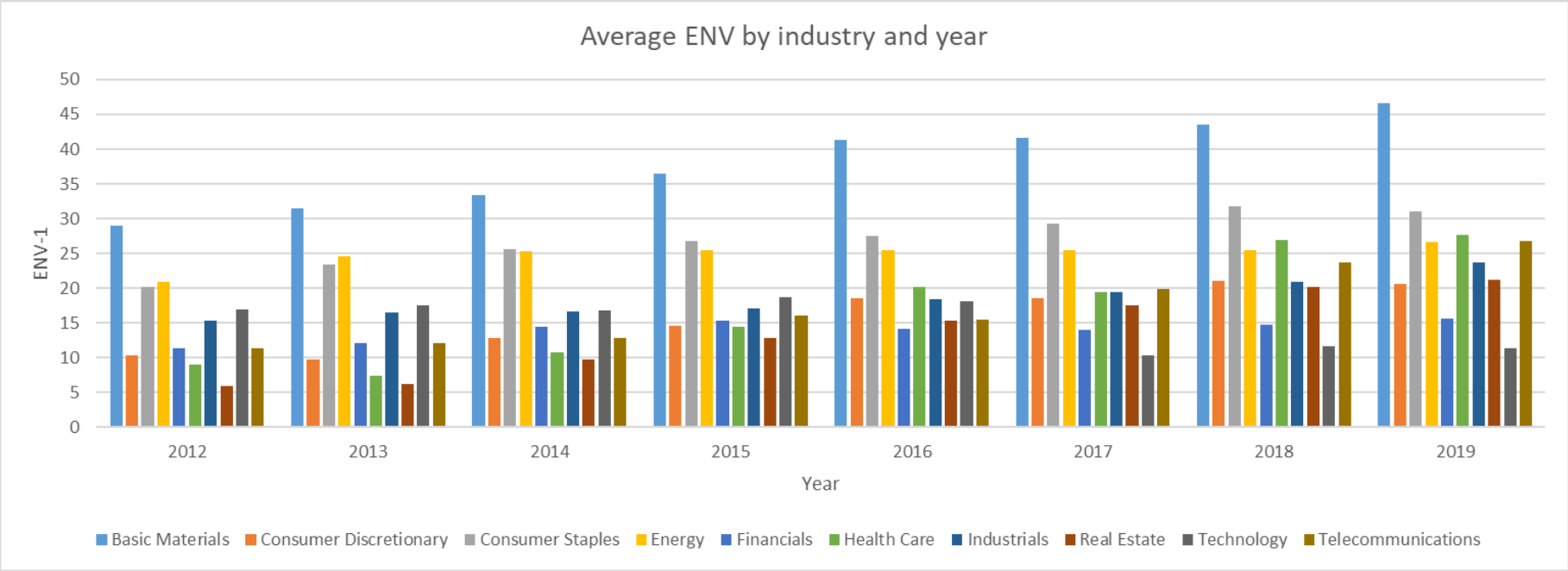

Figure B2: Average ENV by industry and year

Source: Data obtained from Bloomberg and results obtained using Excel

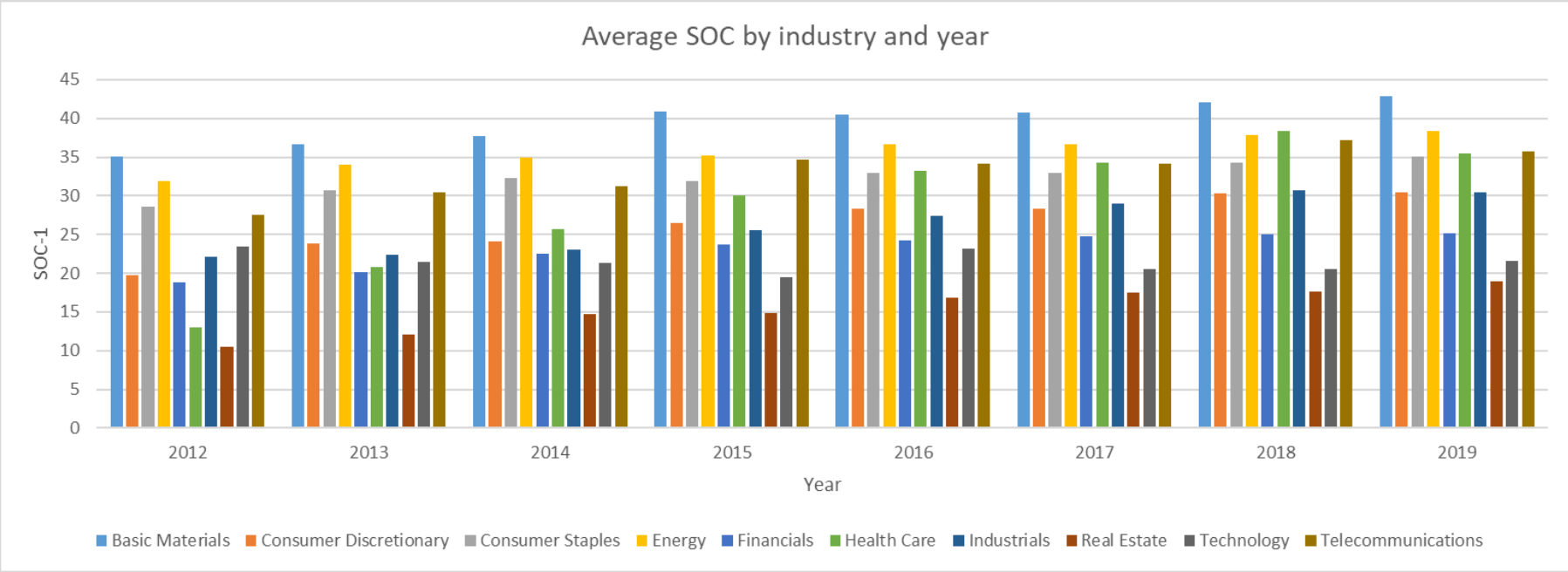

Figure B3: Average SOC by industry and year

Source: Data obtained from Bloomberg and results obtained using Excel

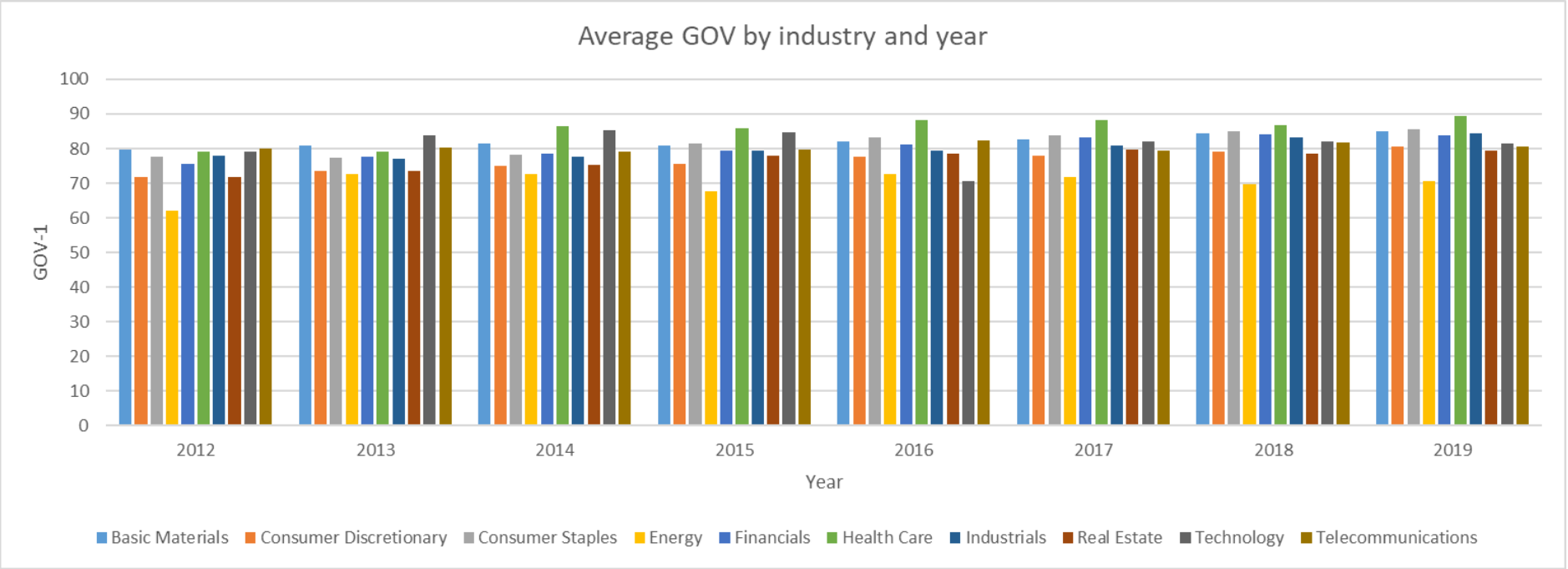

Figure B4 Average GOV by industry and year

Source: Data obtained from Bloomberg and results obtained using Excel

Appendix C: Graphical comparison of transformed variables

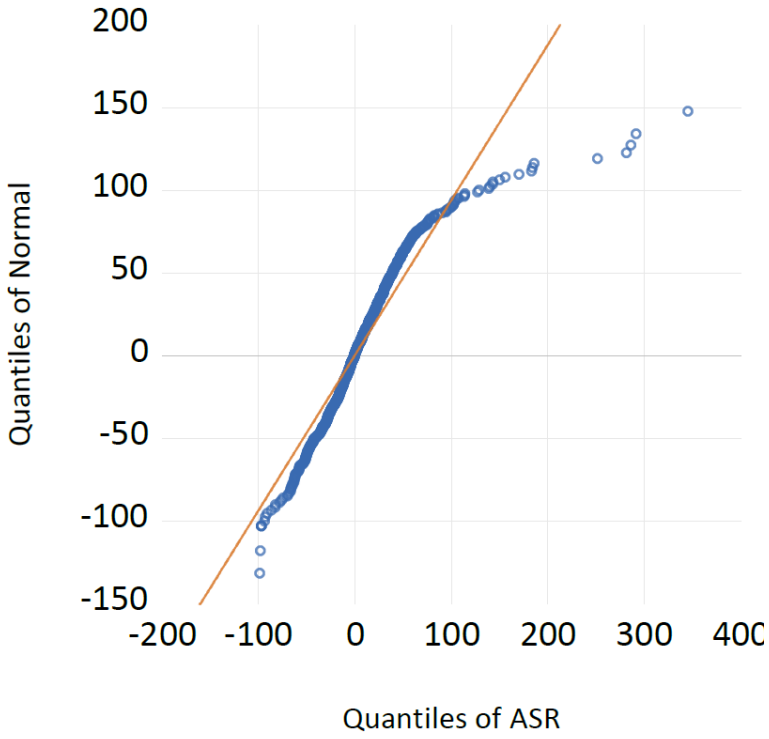

Figure C1: Q-Q plot of ASR before winsorization
Source: Data obtained from Bloomberg and results obtained using EViews 13

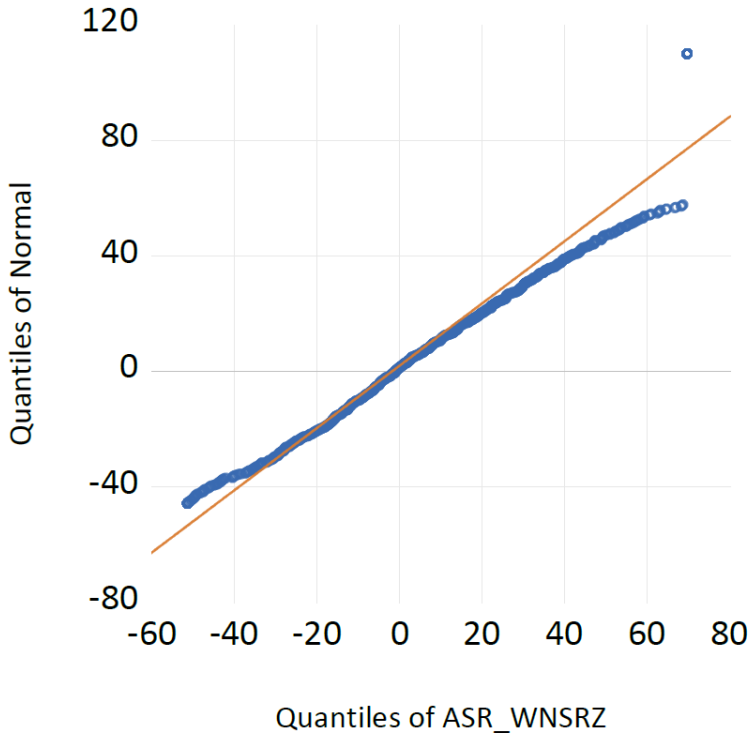

Figure C2: Q-Q plot of ASR after winsorization
Source: Data obtained from Bloomberg and results obtained using EViews 13

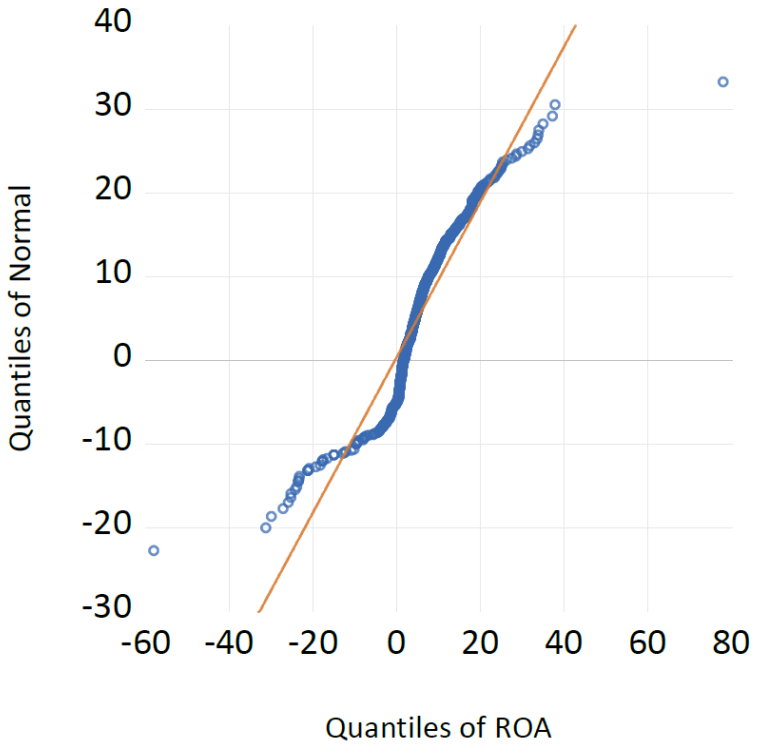

Figure C3: Q-Q plot of ROA before winsorization
Source: Data obtained from Bloomberg and results obtained using EViews 13

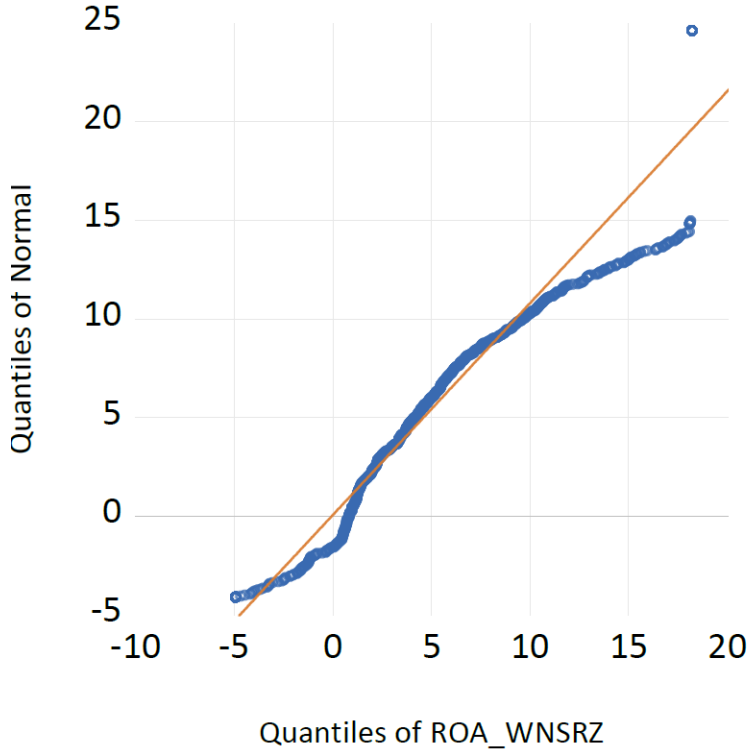

Figure C4: Q-Q plot of ROA after winsorization
Source: Data obtained from Bloomberg and results obtained using EViews 13

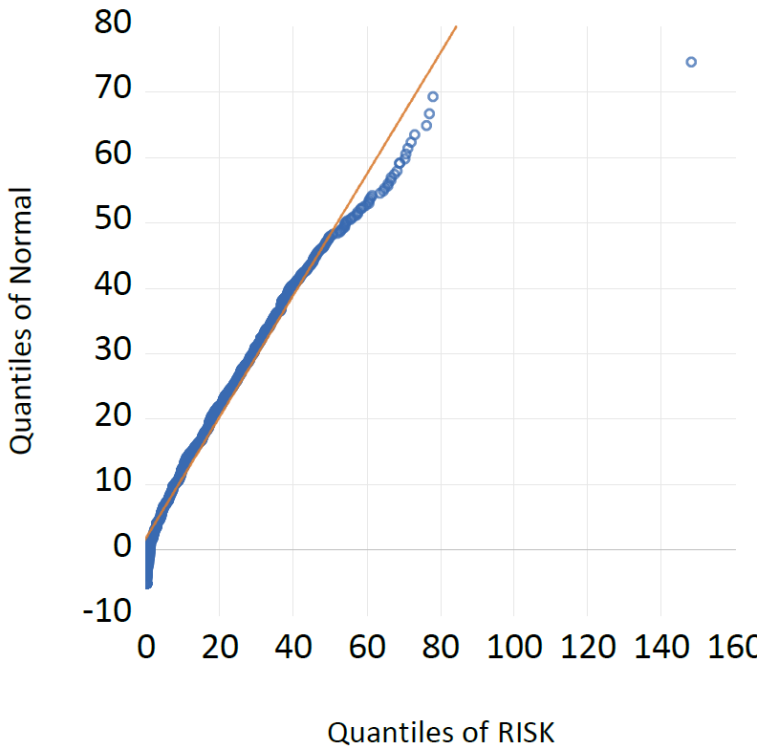

Figure C5: Q-Q plot of Risk before winsorization
Source: Data obtained from Bloomberg and results obtained using EViews 13

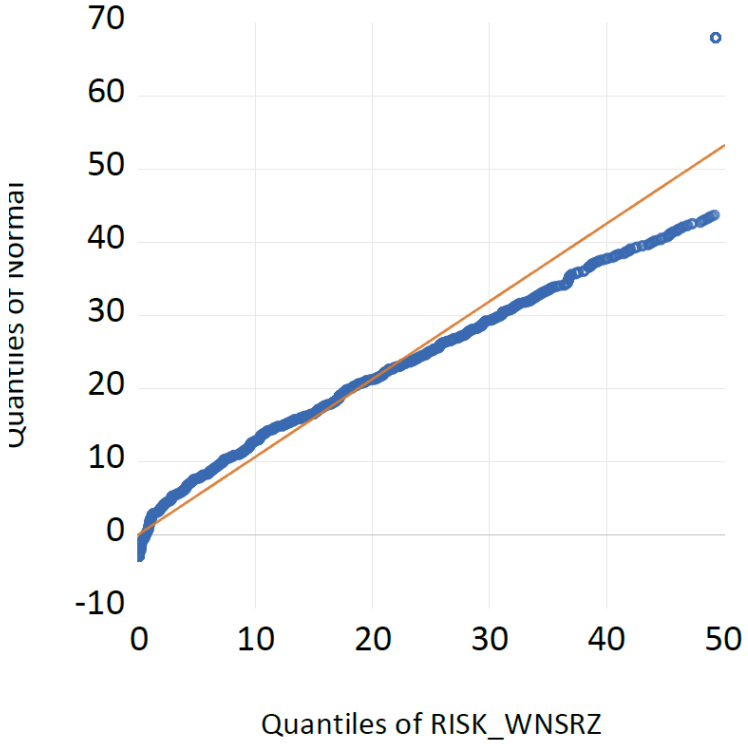

Figure C6: Q-Q plot of Risk after winsorization
Source: Data obtained from Bloomberg and results obtained using EViews 13

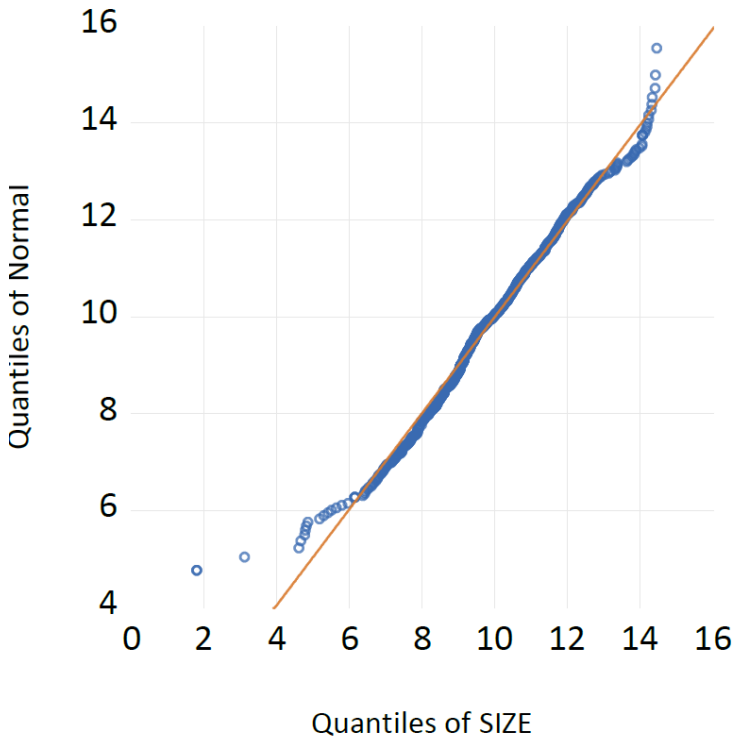

Figure C7: Q-Q plot of Size before winsorization
Source: Data obtained from Bloomberg and results obtained using EViews 13

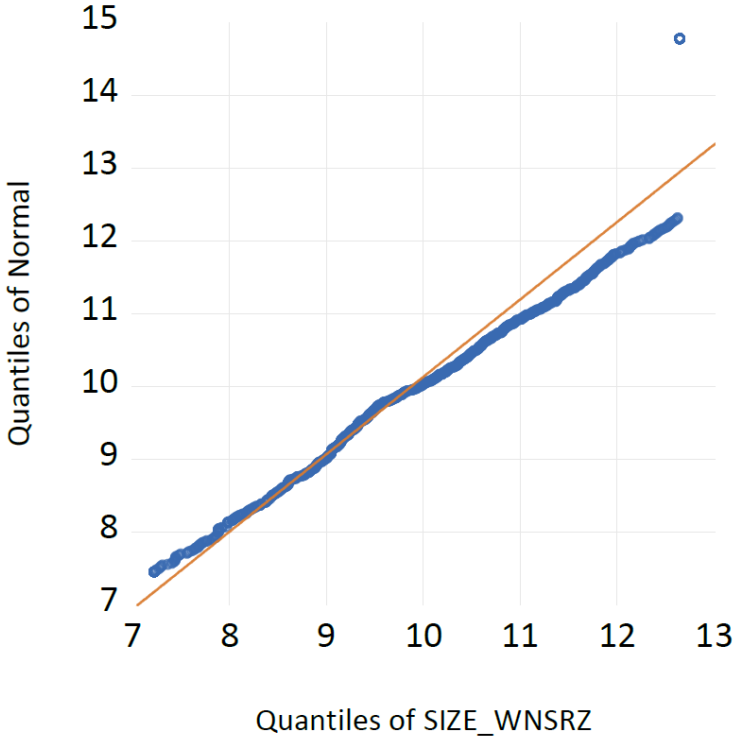

Figure C8: Q-Q plot of Size after winsorization
Source: Data obtained from Bloomberg and results obtained using EViews 13

Appendix D: Multicollinearity tests

Table D1: Results of the CSP-ASR VIF multicollinearity test

Variance Inflation Factors
Date: 04/08/23 Time: 23:14
Sample: 2012 2019
Included observations: 1040

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
CSP	0.643714	1629.197	16.18190
CSP2	7.87E-05	434.4064	16.06265
SIZE_WNSRZ	4.729264	631.2602	1.024129
RISK_WNSRZ	0.013078	8.009732	1.052496
LOW	11.81267	1.646412	1.045591
HIGH	154.4002	1.035905	1.026380
C	716.4360	975.5481	NA

Source: Data obtained from Bloomberg and results obtained using EViews 13

Table D2: Results of the CSP-ROA VIF multicollinearity test

Variance Inflation Factors
Date: 04/08/23 Time: 23:11
Sample: 2012 2019
Included observations: 1040

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
CSP	0.008286	1633.572	15.53158
CSP2	1.01E-06	434.6212	15.41707
SIZE_WNSRZ	0.060928	633.7885	1.024098
RISK_WNSRZ	0.000168	8.013478	1.050953
LOW	0.151641	1.646668	1.045593
HIGH	1.982565	1.035583	1.026051
C	9.247510	981.3204	NA

Source: Data obtained from Bloomberg and results obtained using EViews 13

Table D3: Results of the ENV-ASR VIF multicollinearity test

Variance Inflation Factors
Date: 04/08/23 Time: 23:15
Sample: 2012 2019
Included observations: 1040

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
ENV	0.069331	48.77341	4.924209
ENV2	1.69E-05	19.52489	4.898172
SIZE_WNSRZ	4.808210	629.6172	1.020572
RISK_WNSRZ	0.013226	7.945824	1.043660
LOW	11.97394	1.637123	1.039658
HIGH	158.2915	1.041635	1.032055
C	483.2346	645.5179	NA

Source: Data obtained from Bloomberg and results obtained using EViews 13

Table D4: Results of the ENV-ROA VIF multicollinearity test

Variance Inflation Factors
Date: 04/08/23 Time: 23:12
Sample: 2012 2019
Included observations: 1040

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
ENV	0.000877	48.84684	4.855239
ENV2	2.13E-07	19.46727	4.830734
SIZE_WNSRZ	0.060827	631.4891	1.020382
RISK_WNSRZ	0.000167	7.950634	1.042711
LOW	0.151063	1.637156	1.039553
HIGH	1.997645	1.041404	1.031819
C	6.112221	647.3339	NA

Source: Data obtained from Bloomberg and results obtained using EViews 13

Table D5: Results of the SOC-ASR VIF multicollinearity test

Variance Inflation Factors
Date: 04/08/23 Time: 23:16
Sample: 2012 2019
Included observations: 1040

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
SOC	0.127420	147.4651	5.929446
SOC2	3.84E-05	59.00696	5.835978
SIZE_WNSRZ	4.647647	614.2320	1.024082
RISK_WNSRZ	0.012986	7.889907	1.050520
LOW	11.82243	1.634427	1.039083
HIGH	155.2243	1.038105	1.028624
C	473.4627	638.2959	NA

Source: Data obtained from Bloomberg and results obtained using EViews 13

Table D6: Results of the SOC-ROA VIF multicollinearity test

Variance Inflation Factors
Date: 04/08/23 Time: 23:14
Sample: 2012 2019
Included observations: 1040

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
SOC	0.001668	149.1938	5.090982
SOC2	5.02E-07	58.98747	5.011825
SIZE_WNSRZ	0.061468	631.6650	1.020666
RISK_WNSRZ	0.000168	7.934903	1.040648
LOW	0.152803	1.639209	1.040857
HIGH	2.009335	1.036868	1.027325
C	6.285226	658.9016	NA

Source: Data obtained from Bloomberg and results obtained using EViews 13

Table D7: Results of the GOV-ASR VIF multicollinearity test

Variance Inflation Factors
Date: 04/08/23 Time: 23:16
Sample: 2012 2019
Included observations: 1040

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
GOV	1.209324	10446.83	54.60209
GOV2	5.41E-05	3134.438	54.60149
SIZE_WNSRZ	4.586832	603.7814	1.016739
RISK_WNSRZ	0.012731	7.709962	1.031551
LOW	11.77414	1.622359	1.031816
HIGH	154.2294	1.029908	1.020526
C	2126.123	2854.861	NA

Source: Data obtained from Bloomberg and results obtained using EViews 13

Table D8: Results of the GOV-ROA VIF multicollinearity test

Variance Inflation Factors
Date: 04/08/23 Time: 23:12
Sample: 2012 2019
Included observations: 1040

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
GOV	0.015836	10646.79	47.35617
GOV2	7.19E-07	3237.162	47.35600
SIZE_WNSRZ	0.061255	628.0025	1.014748
RISK_WNSRZ	0.000166	7.805220	1.023640
LOW	0.151559	1.622052	1.029962
HIGH	2.003787	1.031579	1.022085
C	27.73106	2900.321	NA

Source: Data obtained from Bloomberg and results obtained using EViews 13

Appendix E: Panel model selection tests

Table E1: Results from the redundant fixed effects test, Lagrange Multiplier test, and Hausman test for CSP-ASR

Redundant Fixed Effects TestsEquation: ASR_CSP_FEM Test cross-section and period fixed effects			
Effects Test	Statistic	d.f.	Prob.
Cross-section F	1.464913	(129,897)	0.0012
Cross-section Chi-square	198.823568	129	0.0001
Period F	10.603962	(7,897)	0.0000
Period Chi-square	82.685318	7	0.0000
Cross-Section/Period F	2.182106	(136,897)	0.0000
Cross-Section/Period Chi-square	297.245350	136	0.0000

Source: Data obtained from Bloomberg and results obtained using EViews 13

Lagrange Multiplier Tests for Random EffectsNull hypotheses: No effects Alternative hypotheses: Two-sided (Breusch-Pagan) and one-sided(all others) alternatives			
	Test Hypothesis		
	Cross-section	Time	Both
Breusch-Pagan	1.243957 (0.2647)	379.4163 (0.0000)	380.6603 (0.0000)
Honda	-1.115328 (0.8676)	19.47861 (0.0000)	12.98480 (0.0000)
King-Wu	-1.115328 (0.8676)	19.47861 (0.0000)	18.71767 (0.0000)
Standardized Honda	-0.346943 (0.6357)	21.16594 (0.0000)	6.644046 (0.0000)
Standardized King-Wu	-0.346943 (0.6357)	21.16594 (0.0000)	16.41268 (0.0000)
Gourieroux, et al.	--	--	379.4163 (0.0000)

Source: Data obtained from Bloomberg and results obtained using EViews 13

Correlated Random Effects - Hausman TestEquation: ASR_CSP_REM Test period random effects			
Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Period random	6.979008	6	0.3228

Source: Data obtained from Bloomberg and results obtained using EViews 13

Table E2: Results from the redundant fixed effects test, Lagrange Multiplier test, and Hausman test for CSP-ROA

Redundant Fixed Effects TestsEquation: ROA_CSP_FEM Test cross-section and period fixed effects			
Effects Test	Statistic	d.f.	Prob.
Cross-section F	17.872792	(129,897)	0.0000
Cross-section Chi-square	1323.565694	129	0.0000
Period F	7.294696	(7,897)	0.0000
Period Chi-square	57.579560	7	0.0000
Cross-Section/Period F	17.484432	(136,897)	0.0000
Cross-Section/Period Chi-square	1346.780726	136	0.0000

Source: Data obtained from Bloomberg and results obtained using EViews 13

Lagrange Multiplier Tests for Random EffectsNull hypotheses: No effects Alternative hypotheses: Two-sided (Breusch-Pagan) and one-sided(all others) alternatives			
	Test Hypothesis		
	Cross-section	Time	Both
Breusch-Pagan	1162.750 (0.0000)	15.05288 (0.0001)	1177.803 (0.0000)
Honda	34.09912 (0.0000)	3.879804 (0.0001)	26.85515 (0.0000)
King-Wu	34.09912 (0.0000)	3.879804 (0.0001)	11.51475 (0.0000)
Standardized Honda	36.31081 (0.0000)	4.395047 (0.0000)	21.43362 (0.0000)
Standardized King-Wu	36.31081 (0.0000)	4.395047 (0.0000)	8.589700 (0.0000)
Gourieroux, et al.	--	--	1177.803 (0.0000)

Source: Data obtained from Bloomberg and results obtained using EViews 13

Correlated Random Effects - Hausman TestEquation: ROA_CSP_REM Test cross-section random effects			
Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	20.149420	6	0.0026

Source: Data obtained from Bloomberg and results obtained using EViews 13

Correlated Random Effects - Hausman TestEquation: ROA_CSP_REM Test period random effects			
Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Period random	50.965269	6	0.0000
** WARNING: estimated period random effects variance is zero.			

Source: Data obtained from Bloomberg and results obtained using EViews 13

Table E3: Results from the redundant fixed effects test, Lagrange Multiplier test, and Hausman test for ENV-ASR

Redundant Fixed Effects TestsEquation: ASR_ENV_FEM Test cross-section and period fixed effects			
Effects Test	Statistic	d.f.	Prob.
Cross-section F	1.470429	(129,897)	0.0011
Cross-section Chi-square	199.504765	129	0.0001
Period F	14.565359	(7,897)	0.0000
Period Chi-square	111.962639	7	0.0000
Cross-Section/Period F	2.289141	(136,897)	0.0000
Cross-Section/Period Chi-square	309.850327	136	0.0000

Source: Data obtained from Bloomberg and results obtained using EViews 13

Lagrange Multiplier Tests for Random EffectsNull hypotheses: No effects Alternative hypotheses: Two-sided (Breusch-Pagan) and one-sided(all others) alternatives			
	Test Hypothesis		
	Cross-section	Time	Both
Breusch-Pagan	2.194899 (0.1385)	533.9615 (0.0000)	536.1564 (0.0000)
Honda	-1.481519 (0.9308)	23.10761 (0.0000)	15.29195 (0.0000)
King-Wu	-1.481519 (0.9308)	23.10761 (0.0000)	22.16896 (0.0000)
Standardized Honda	-0.727060 (0.7664)	24.88358 (0.0000)	9.083415 (0.0000)
Standardized King-Wu	-0.727060 (0.7664)	24.88358 (0.0000)	20.00066 (0.0000)
Gourieroux, et al.	--	--	533.9615 (0.0000)

Source: Data obtained from Bloomberg and results obtained using EViews 13

Correlated Random Effects - Hausman TestEquation: ASR_ENV_REM Test period random effects			
Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Period random	7.416402	6	0.2840

Source: Data obtained from Bloomberg and results obtained using EViews 13

Table E4: Results from the redundant fixed effects test, Lagrange Multiplier test, and Hausman test for ENV-ROA

Redundant Fixed Effects TestsEquation: ROA_ENV_FEM Test cross-section and period fixed effects			
Effects Test	Statistic	d.f.	Prob.
Cross-section F	17.784191	(129,897)	0.0000
Cross-section Chi-square	1319.847481	129	0.0000
Period F	9.974543	(7,897)	0.0000
Period Chi-square	77.956671	7	0.0000
Cross-Section/Period F	17.432842	(136,897)	0.0000
Cross-Section/Period Chi-square	1344.550225	136	0.0000

Source: Data obtained from Bloomberg and results obtained using EViews 13

Lagrange Multiplier Tests for Random EffectsNull hypotheses: No effects Alternative hypotheses: Two-sided (Breusch-Pagan) and one-sided(all others) alternatives			
	Test Hypothesis		
	Cross-section	Time	Both
Breusch-Pagan	1162.750 (0.0000)	15.05288 (0.0001)	1177.803 (0.0000)
Honda	34.09912 (0.0000)	3.879804 (0.0001)	26.85515 (0.0000)
King-Wu	34.09912 (0.0000)	3.879804 (0.0001)	11.51475 (0.0000)
Standardized Honda	36.31081 (0.0000)	4.395047 (0.0000)	21.43362 (0.0000)
Standardized King-Wu	36.31081 (0.0000)	4.395047 (0.0000)	8.589700 (0.0000)
Gourieroux, et al.	--	--	1177.803 (0.0000)

Source: Data obtained from Bloomberg and results obtained using EViews 13

Correlated Random Effects - Hausman TestEquation: ROA_ENV_REM Test cross-section random effects			
Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	19.553589	6	0.0033

Source: Data obtained from Bloomberg and results obtained using EViews 13

Correlated Random Effects - Hausman TestEquation: ROA_ENV_REM Test period random effects			
Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Period random	69.730606	6	0.0000
** WARNING: estimated period random effects variance is zero.			

Source: Data obtained from Bloomberg and results obtained using EViews 13

Table E5: Results from the redundant fixed effects test, Lagrange Multiplier test, and Hausman test for SOC-ASR

Redundant Fixed Effects TestsEquation: ASR_SOC_FEM Test cross-section and period fixed effects			
Effects Test	Statistic	d.f.	Prob.
Cross-section F	1.537925	(129,897)	0.0003
Cross-section Chi-square	207.804458	129	0.0000
Period F	13.314627	(7,897)	0.0000
Period Chi-square	102.807630	7	0.0000
Cross-Section/Period F	2.349448	(136,897)	0.0000
Cross-Section/Period Chi-square	316.885691	136	0.0000

Source: Data obtained from Bloomberg and results obtained using EViews 13

Lagrange Multiplier Tests for Random EffectsNull hypotheses: No effects Alternative hypotheses: Two-sided (Breusch-Pagan) and one-sided(all others) alternatives			
	Test Hypothesis		
	Cross-section	Time	Both
Breusch-Pagan	0.932692 (0.3342)	520.2400 (0.0000)	521.1727 (0.0000)
Honda	-0.965760 (0.8329)	22.80877 (0.0000)	15.44534 (0.0000)
King-Wu	-0.965760 (0.8329)	22.80877 (0.0000)	21.99492 (0.0000)
Standardized Honda	-0.189741 (0.5752)	24.56359 (0.0000)	9.246436 (0.0000)
Standardized King-Wu	-0.189741 (0.5752)	24.56359 (0.0000)	19.81269 (0.0000)
Gourieroux, et al.	--	--	520.2400 (0.0000)

Source: Data obtained from Bloomberg and results obtained using EViews 13

Correlated Random Effects - Hausman TestEquation: ASR_SOC_REM Test period random effects			
Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Period random	71.233622	6	0.0000

Source: Data obtained from Bloomberg and results obtained using EViews 13

Table E6: Results from the redundant fixed effects test, Lagrange Multiplier test, and Hausman test for SOC-ROA

Redundant Fixed Effects TestsEquation: ROA_SOC_FEM Test cross-section and period fixed effects			
Effects Test	Statistic	d.f.	Prob.
Cross-section F	17.561566	(129,897)	0.0000
Cross-section Chi-square	1310.445704	129	0.0000
Period F	8.924910	(7,897)	0.0000
Period Chi-square	70.022931	7	0.0000
Cross-Section/Period F	17.310265	(136,897)	0.0000
Cross-Section/Period Chi-square	1339.231264	136	0.0000

Source: Data obtained from Bloomberg and results obtained using EViews 13

Lagrange Multiplier Tests for Random EffectsNull hypotheses: No effects Alternative hypotheses: Two-sided (Breusch-Pagan) and one-sided(all others) alternatives			
	Test Hypothesis		
	Cross-section	Time	Both
Breusch-Pagan	1174.062 (0.0000)	15.78915 (0.0001)	1189.851 (0.0000)
Honda	34.26459 (0.0000)	3.973556 (0.0000)	27.03845 (0.0000)
King-Wu	34.26459 (0.0000)	3.973556 (0.0000)	11.64360 (0.0000)
Standardized Honda	36.48066 (0.0000)	4.494526 (0.0000)	21.62725 (0.0000)
Standardized King-Wu	36.48066 (0.0000)	4.494526 (0.0000)	8.726974 (0.0000)
Gourieroux, et al.	--	--	1189.851 (0.0000)

Source: Data obtained from Bloomberg and results obtained using EViews 13

Correlated Random Effects - Hausman TestEquation: ROA_SOC_REM Test cross-section random effects			
Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	19.452850	6	0.0035

Source: Data obtained from Bloomberg and results obtained using EViews 13

Correlated Random Effects - Hausman TestEquation: ROA_SOC_REM Test period random effects			
Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Period random	62.331876	6	0.0000
** WARNING: estimated period random effects variance is zero.			

Source: Data obtained from Bloomberg and results obtained using EViews 13

Table E7: Results from the redundant fixed effects test, Lagrange Multiplier test, and Hausman test for GOV-ASR

Redundant Fixed Effects TestsEquation: ASR_GOV_FEM Test cross-section and period fixed effects			
Effects Test	Statistic	d.f.	Prob.
Cross-section F	1.435530	(129,897)	0.0021
Cross-section Chi-square	195.187211	129	0.0002
Period F	12.395604	(7,897)	0.0000
Period Chi-square	96.028904	7	0.0000
Cross-Section/Period F	2.157392	(136,897)	0.0000
Cross-Section/Period Chi-square	294.312983	136	0.0000

Source: Data obtained from Bloomberg and results obtained using EViews 13

Lagrange Multiplier Tests for Random EffectsNull hypotheses: No effects Alternative hypotheses: Two-sided (Breusch-Pagan) and one-sided(all others) alternatives			
	Test Hypothesis		
	Cross-section	Time	Both
Breusch-Pagan	1.543438 (0.2141)	431.7927 (0.0000)	433.3361 (0.0000)
Honda	-1.242352 (0.8929)	20.77962 (0.0000)	13.81494 (0.0000)
King-Wu	-1.242352 (0.8929)	20.77962 (0.0000)	19.95593 (0.0000)
Standardized Honda	-0.486775 (0.6868)	22.45189 (0.0000)	7.508011 (0.0000)
Standardized King-Wu	-0.486775 (0.6868)	22.45189 (0.0000)	17.66556 (0.0000)
Gourieroux, et al.	--	--	431.7927 (0.0000)

Source: Data obtained from Bloomberg and results obtained using EViews 13

Correlated Random Effects - Hausman TestEquation: ASR_GOV_REM Test period random effects			
Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Period random	85.815274	6	0.0000
** WARNING: estimated period random effects variance is zero.			

Source: Data obtained from Bloomberg and results obtained using EViews 13

Table E8: Results from the redundant fixed effects test, Lagrange Multiplier test, and Hausman test for GOV-ROA

Redundant Fixed Effects TestsEquation: ROA_GOV_FEM Test cross-section and period fixed effects			
Effects Test	Statistic	d.f.	Prob.
Cross-section F	17.433806	(129,897)	0.0000
Cross-section Chi-square	1305.011567	129	0.0000
Period F	8.065630	(7,897)	0.0000
Period Chi-square	63.482632	7	0.0000
Cross-Section/Period F	17.025371	(136,897)	0.0000
Cross-Section/Period Chi-square	1326.762786	136	0.0000

Source: Data obtained from Bloomberg and results obtained using EViews 13

Lagrange Multiplier Tests for Random EffectsNull hypotheses: No effects Alternative hypotheses: Two-sided (Breusch-Pagan) and one-sided(all others) alternatives			
	Test Hypothesis		
	Cross-section	Time	Both
Breusch-Pagan	1155.947 (0.0000)	12.60940 (0.0004)	1168.557 (0.0000)
Honda	33.99923 (0.0000)	3.550972 (0.0002)	26.55200 (0.0000)
King-Wu	33.99923 (0.0000)	3.550972 (0.0002)	11.17183 (0.0000)
Standardized Honda	36.18333 (0.0000)	4.056808 (0.0000)	21.12233 (0.0000)
Standardized King-Wu	36.18333 (0.0000)	4.056808 (0.0000)	8.239805 (0.0000)
Gourieroux, et al.	--	--	1168.557 (0.0000)

Source: Data obtained from Bloomberg and results obtained using EViews 13

Correlated Random Effects - Hausman TestEquation: ROA_GOV_REM Test cross-section random effects			
Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	17.878692	6	0.0065

Source: Data obtained from Bloomberg and results obtained using EViews 13

Correlated Random Effects - Hausman TestEquation: ROA_GOV_REM Test period random effects			
Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Period random	55.727001	6	0.0000
** WARNING: estimated period random effects variance is zero.			

Source: Data obtained from Bloomberg and results obtained using EViews 13

Appendix F: Histogram of residual term distribution

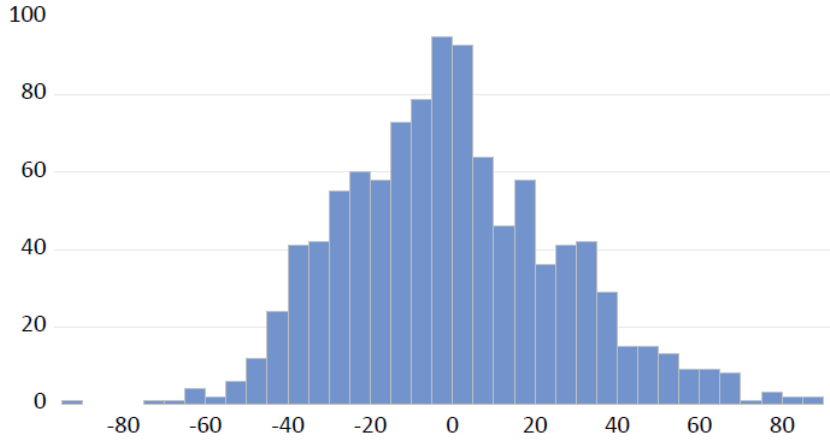

Figure F1: Histogram of CSP-ASR residual term distribution

Source: Data obtained from Bloomberg and results obtained using EViews 13

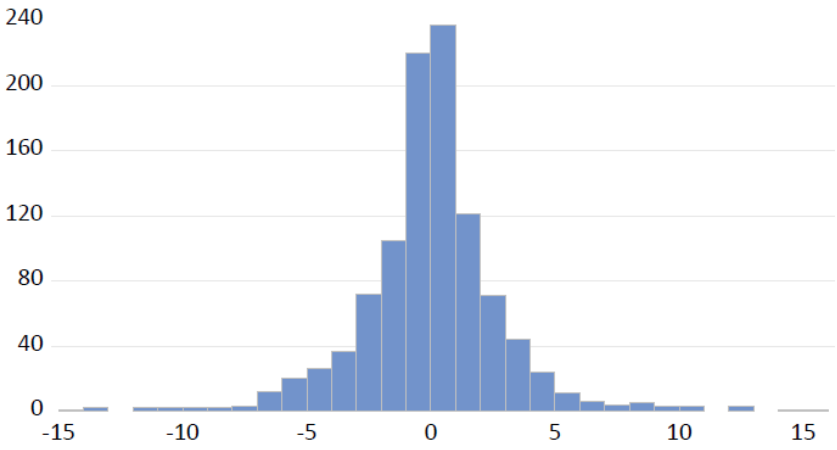

Figure F2: Histogram of CSP-ROA residual term distribution

Source: Data obtained from Bloomberg and results obtained using EViews 13

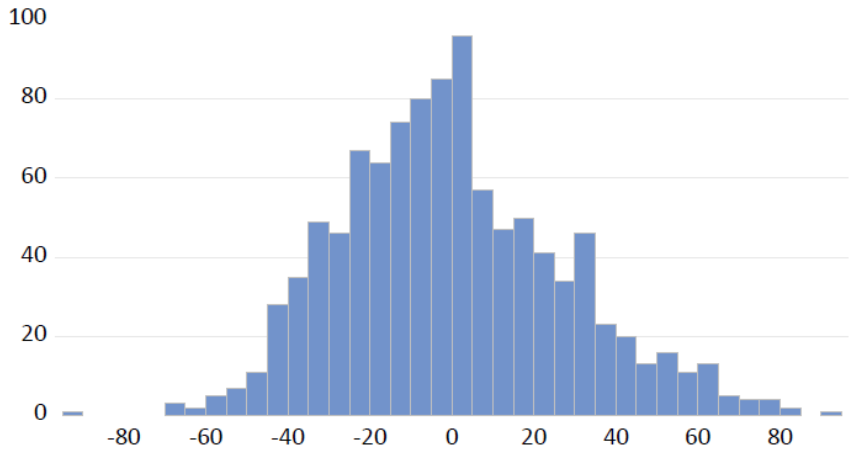

Figure F3: Histogram of ENV-ASR residual term distribution

Source: Data obtained from Bloomberg and results obtained using EViews 13

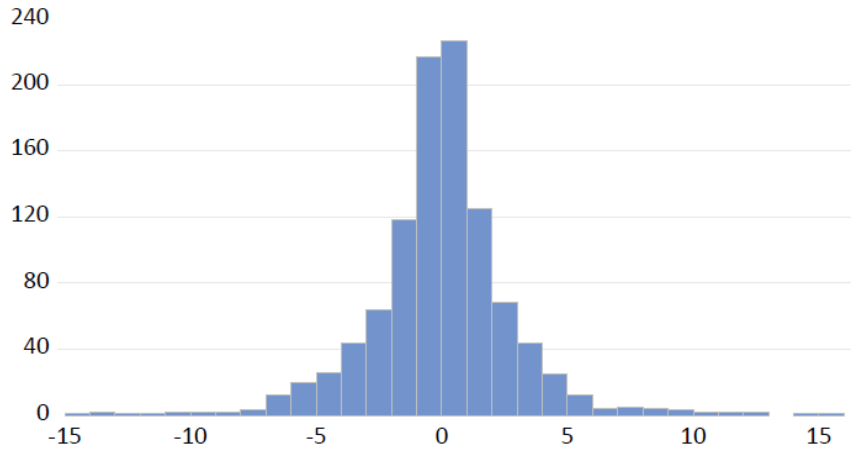

Figure F4: Histogram of ENV-ROA residual term distribution

Source: Data obtained from Bloomberg and results obtained using EViews 13

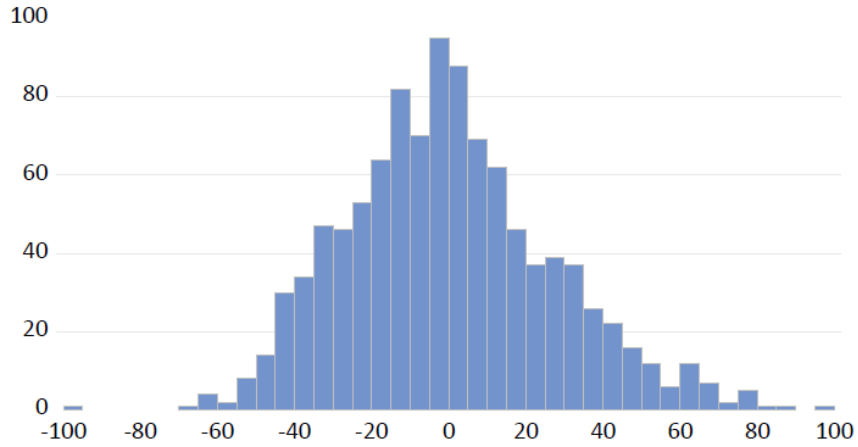

Figure F5: Histogram of SOC-ASR residual term distribution

Source: Data obtained from Bloomberg and results obtained using EViews 13

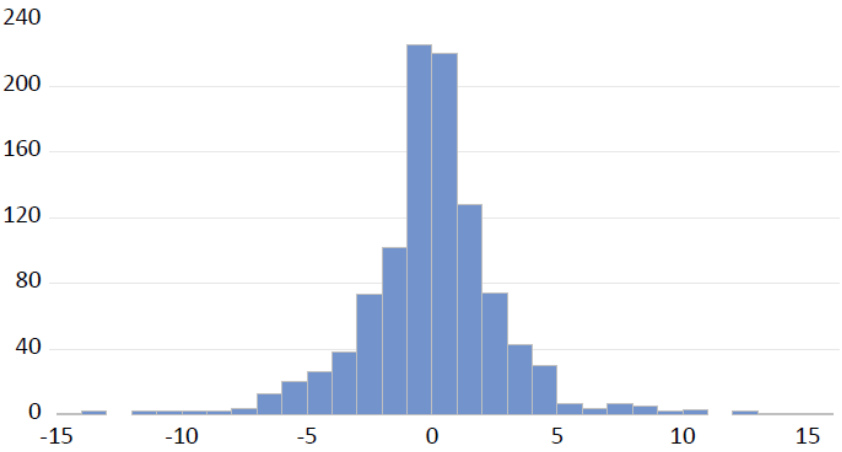

Figure F6: Histogram of SOC-ROA residual term distribution

Source: Data obtained from Bloomberg and results obtained using EViews 13

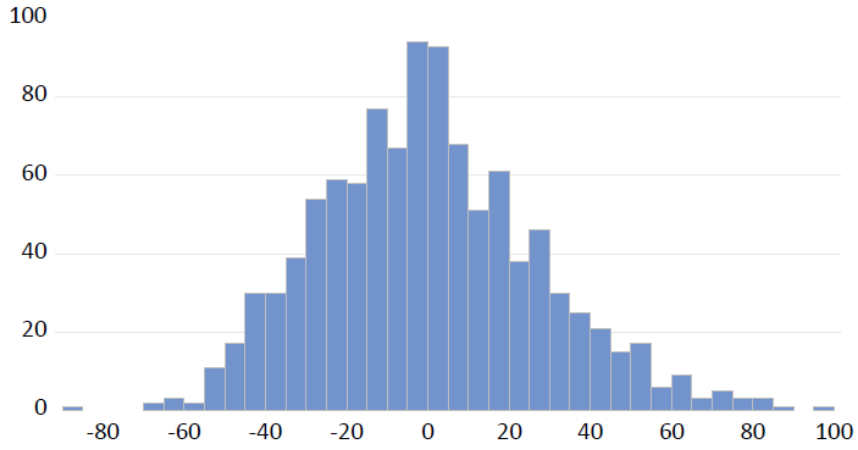

Figure F7: Histogram of GOV-ASR residual term distribution

Source: Data obtained from Bloomberg and results obtained using EViews 13

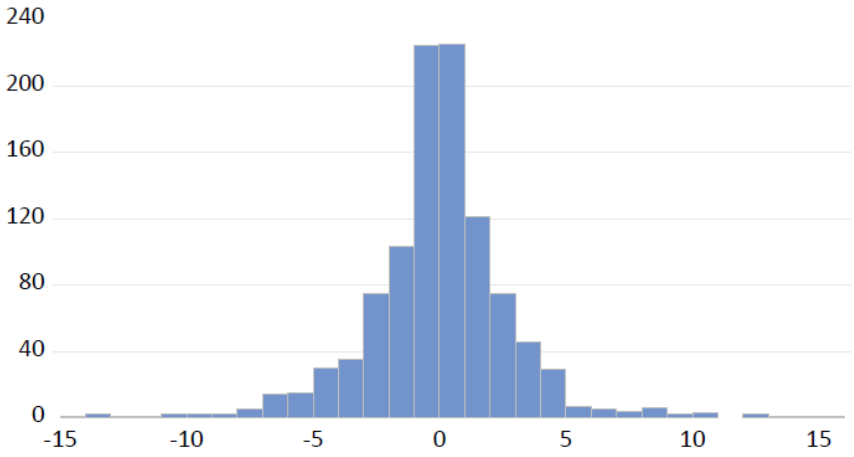

Figure F8: Histogram of GOV-ROA residual term distribution

Source: Data obtained from Bloomberg and results obtained using EViews 13

Appendix G: Model estimation output

Table G1: CSP-ASR model estimation output

Dependent Variable: ASR_WNSRZ
Method: Panel EGLS (Period random effects)Date: 04/08/23 Time: 12:38
Sample: 2012 2019
Periods included: 8
Cross-sections included: 130
Total panel (balanced) observations: 1040
Swamy and Arora estimator of component variances
White period (cross-section cluster) standard errors & covariance (d.f.corrected)
WARNING: estimated coefficient covariance matrix is of reduced rankStandard error and t-statistic probabilities adjusted for clustering

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CSP	-4.454002	1.459187	-3.052386	0.0028
CSP2	0.040320	0.017419	2.314725	0.0222
SIZE_WNSRZ	22.35412	2.687973	8.316350	0.0000
RISK_WNSRZ	-0.359017	0.165078	-2.174833	0.0315
LOW	-0.734260	3.926689	-0.186992	0.8520
HIGH	24.10424	12.30539	1.958836	0.0523
C	-96.33775	41.56010	-2.318035	0.0220

Effects Specification	S.D.	Rho
Cross-section fixed (dummy variables)		
Period random	7.449827	0.0677
Idiosyncratic random	27.63637	0.9323

Weighted Statistics			
R-squared	0.255545	Mean dependent var	6.303031
Adjusted R-squared	0.144371	S.D. dependent var	29.89326
S.E. of regression	27.65133	Sum squared resid	691194.9
F-statistic	2.298603	Durbin-Watson stat	1.874583
Prob(F-statistic)	0.000000		

Unweighted Statistics			
R-squared	0.272037	Mean dependent var	6.303031
Sum squared resid	747827.7	Durbin-Watson stat	1.873284

Source: Data obtained from Bloomberg and results obtained using EViews 13

Table G2: CSP-ROA model estimation output

Dependent Variable:
ROA_WNSRZMethod: Panel
Least Squares Date: 04/08/23
Time: 12:57 Sample: 2012 2019
Periods included: 8
Cross-sections included: 130
Total panel (balanced) observations: 1040
White period (cross-section cluster) standard errors & covariance (d.f.corrected)
WARNING: estimated coefficient covariance matrix is of reduced rankStandard error and t-statistic probabilities adjusted for clustering

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CSP	-0.356460	0.148059	-2.407554	0.0175
CSP2	0.003984	0.001639	2.430660	0.0164
SIZE_WNSRZ	2.167777	0.400147	5.417448	0.0000
RISK_WNSRZ	-0.095087	0.027086	-3.510601	0.0006
LOW	0.290733	0.710827	0.409007	0.6832
HIGH	-1.515845	2.381007	-0.636640	0.5255
C	-6.709830	4.233991	-1.584753	0.1155

Effects Specification

Cross-section fixed (dummy variables)Period fixed (dummy variables)

R-squared	0.748780	Mean dependent var	5.479034
Adjusted R-squared	0.709010	S.D. dependent var	5.803429
S.E. of regression	3.130572	Akaike info criterion	5.247388
Sum squared resid	8791.030	Schwarz criterion	5.927597
Log likelihood	-2585.642	Hannan-Quinn criter.	5.505422
F-statistic	18.82796	Durbin-Watson stat	1.314309
Prob(F-statistic)	0.000000		

Source: Data obtained from Bloomberg and results obtained using EViews 13

Table G3: ENV-ASR model estimation output

Dependent Variable: ASR_WNSRZ
Method: Panel EGLS (Period random effects)Date: 04/08/23 Time: 12:42
Sample: 2012 2019
Periods included: 8
Cross-sections included: 130
Total panel (balanced) observations: 1040
Swamy and Arora estimator of component variances
White period (cross-section cluster) standard errors & covariance (d.f.corrected)
WARNING: estimated coefficient covariance matrix is of reduced rankStandard error and t-statistic probabilities adjusted for clustering

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ENV	-1.186746	0.384863	-3.083555	0.0025
ENV2	0.017628	0.007195	2.450080	0.0156
SIZE_WNSRZ	21.67901	2.948179	7.353356	0.0000
RISK_WNSRZ	-0.414988	0.182783	-2.270390	0.0248
LOW	-1.523177	4.469556	-0.340789	0.7338
HIGH	21.61535	13.68503	1.579489	0.1167
C	-188.1792	31.28227	-6.015522	0.0000

Effects Specification	S.D.	Rho
Cross-section fixed (dummy variables)		
Period random	8.597733	0.0867
Idiosyncratic random	27.90240	0.9133

Weighted Statistics

R-squared	0.238915	Mean dependent var	6.303031
Adjusted R-squared	0.125258	S.D. dependent var	29.85668
S.E. of regression	27.92425	Sum squared resid	704906.3
F-statistic	2.102064	Durbin-Watson stat	1.838018
Prob(F-statistic)	0.000000		

Unweighted Statistics

R-squared	0.235804	Mean dependent var	6.303031
Sum squared resid	785049.3	Durbin-Watson stat	1.798647

Source: Data obtained from Bloomberg and results obtained using EViews 13

Table G4: ENV-ROA model estimation output

Dependent Variable:
ROA_WNSRZMethod: Panel
Least Squares Date: 04/08/23
Time: 13:02 Sample: 2012 2019
Periods included: 8
Cross-sections included: 130
Total panel (balanced) observations: 1040
White period (cross-section cluster) standard errors & covariance (d.f.corrected)
WARNING: estimated coefficient covariance matrix is of reduced rankStandard error and t-statistic probabilities adjusted for clustering

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ENV	-0.079872	0.046660	-1.711798	0.0893
ENV2	0.001656	0.000810	2.044853	0.0429
SIZE_WNSRZ	2.144608	0.395118	5.427765	0.0000
RISK_WNSRZ	-0.098455	0.028093	-3.504623	0.0006
LOW	0.240010	0.708949	0.338543	0.7355
HIGH	-1.743459	2.277398	-0.765549	0.4453
C	-13.42093	3.905785	-3.436167	0.0008

Effects Specification

Cross-section fixed (dummy variables)Period fixed (dummy variables)

R-squared	0.748284	Mean dependent var	5.479034
Adjusted R-squared	0.708435	S.D. dependent var	5.803429
S.E. of regression	3.133661	Akaike info criterion	5.249361
Sum squared resid	8808.389	Schwarz criterion	5.929570
Log likelihood	-2586.668	Hannan-Quinn criter.	5.507395
F-statistic	18.77840	Durbin-Watson stat	1.316732
Prob(F-statistic)	0.000000		

Source: Data obtained from Bloomberg and results obtained using EViews 13

Table G5: SOC-ASR model estimation output

Dependent Variable: ASR_WNSRZ
Method: Panel EGLS (Period random effects)Date: 04/08/23 Time: 12:48
Sample: 2012 2019
Periods included: 8
Cross-sections included: 130
Total panel (balanced) observations: 1040
Swamy and Arora estimator of component variances
White period (cross-section cluster) standard errors & covariance (d.f.corrected)
WARNING: estimated coefficient covariance matrix is of reduced rankStandard error and t-statistic probabilities adjusted for clustering

Variable	Coefficient	Std. Error	t-Statistic	Prob.
SOC	-2.109954	0.564694	-3.736453	0.0003
SOC2	0.023324	0.010655	2.189108	0.0304
SIZE_WNSRZ	22.63297	2.596917	8.715322	0.0000
RISK_WNSRZ	-0.426284	0.169735	-2.511470	0.0133
LOW	0.007706	4.480600	0.001720	0.9986
HIGH	25.02046	11.95593	2.092724	0.0383
C	-172.4088	26.44371	-6.519844	0.0000

Effects Specification	S.D.	Rho
Cross-section fixed (dummy variables)		
Period random	1.388096	0.0025
Idiosyncratic random	27.77465	0.9975

Weighted Statistics			
R-squared	0.252676	Mean dependent var	6.303031
Adjusted R-squared	0.141074	S.D. dependent var	31.03135
S.E. of regression	28.75932	Sum squared resid	747696.8
F-statistic	2.264074	Durbin-Watson stat	1.862467
Prob(F-statistic)	0.000000		

Unweighted Statistics			
R-squared	0.256038	Mean dependent var	6.303031
Sum squared resid	764263.4	Durbin-Watson stat	1.861033

Source: Data obtained from Bloomberg and results obtained using EViews 13

Table G6: SOC-ROA model estimation output

Dependent Variable:
ROA_WNSRZMethod: Panel
Least Squares Date: 04/08/23
Time: 13:06 Sample: 2012 2019
Periods included: 8
Cross-sections included: 130
Total panel (balanced) observations: 1040
White period (cross-section cluster) standard errors & covariance (d.f.corrected)
WARNING: estimated coefficient covariance matrix is of reduced rankStandard error and t-statistic probabilities adjusted for clustering

Variable	Coefficient	Std. Error	t-Statistic	Prob.
SOC	-0.079765	0.080863	-0.986414	0.3258
SOC2	0.001544	0.001313	1.176084	0.2417
SIZE_WNSRZ	2.133891	0.416864	5.118917	0.0000
RISK_WNSRZ	-0.099585	0.026653	-3.736289	0.0003
LOW	0.146310	0.722824	0.202415	0.8399
HIGH	-1.389991	2.520590	-0.551455	0.5823
C	-12.95621	3.871861	-3.346248	0.0011

Effects Specification

Cross-section fixed (dummy variables)Period fixed (dummy variables)

R-squared	0.745703	Mean dependent var	5.479034
Adjusted R-squared	0.705446	S.D. dependent var	5.803429
S.E. of regression	3.149683	Akaike info criterion	5.259560
Sum squared resid	8898.691	Schwarz criterion	5.939770
Log likelihood	-2591.971	Hannan-Quinn criter.	5.517595
F-statistic	18.52374	Durbin-Watson stat	1.311820
Prob(F-statistic)	0.000000		

Source: Data obtained from Bloomberg and results obtained using EViews 13

Table G7: GOV-ASR model estimation output

Dependent Variable: ASR_WNSRZ
Method: Panel EGLS (Period random effects)Date: 04/08/23 Time: 12:50
Sample: 2012 2019
Periods included: 8
Cross-sections included: 130
Total panel (balanced) observations: 1040
Swamy and Arora estimator of component variances
White period (cross-section cluster) standard errors & covariance (d.f.corrected)
WARNING: estimated coefficient covariance matrix is of reduced rankStandard error and t-statistic probabilities adjusted for clustering

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GOV	0.571071	1.195342	0.477747	0.6336
GOV2	-0.011585	0.008262	-1.402260	0.1632
SIZE_WNSRZ	22.00517	3.196618	6.883891	0.0000
RISK_WNSRZ	-0.508408	0.190765	-2.665101	0.0087
LOW	-2.830728	4.400124	-0.643329	0.5212
HIGH	17.25304	11.96402	1.442076	0.1517
C	-171.1390	56.47907	-3.030131	0.0030

Effects Specification	S.D.	Rho
Cross-section fixed (dummy variables)		
Period random	0.000000	0.0000
Idiosyncratic random	27.83033	1.0000

Weighted Statistics

R-squared	0.258284	Mean dependent var	6.303031
Adjusted R-squared	0.147519	S.D. dependent var	31.44405
S.E. of regression	29.03226	Sum squared resid	761956.2
F-statistic	2.331819	Durbin-Watson stat	1.872082
Prob(F-statistic)	0.000000		

Unweighted Statistics

R-squared	0.258284	Mean dependent var	6.303031
Sum squared resid	761956.2	Durbin-Watson stat	1.872082

Source: Data obtained from Bloomberg and results obtained using EViews 13

Table G8: GOV-ROA model estimation output

Dependent Variable:
ROA_WNSRZMethod: Panel
Least Squares Date: 04/08/23
Time: 13:13 Sample: 2012 2019
Periods included: 8
Cross-sections included: 130
Total panel (balanced) observations: 1040
White period (cross-section cluster) standard errors & covariance (d.f.corrected)
WARNING: estimated coefficient covariance matrix is of reduced rankStandard error and t-statistic probabilities adjusted for clustering

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GOV	-0.124480	0.163368	-0.761964	0.4475
GOV2	0.000671	0.001082	0.619744	0.5365
SIZE_WNSRZ	2.125722	0.406929	5.223817	0.0000
RISK_WNSRZ	-0.100902	0.027583	-3.658175	0.0004
LOW	0.086568	0.709873	0.121949	0.9031
HIGH	-1.476871	2.555883	-0.577832	0.5644
C	-7.973370	7.042367	-1.132200	0.2597

Effects Specification

Cross-section fixed (dummy variables)Period fixed (dummy variables)

R-squared	0.745105	Mean dependent var	5.479034
Adjusted R-squared	0.704754	S.D. dependent var	5.803429
S.E. of regression	3.153384	Akaike info criterion	5.261909
Sum squared resid	8919.617	Schwarz criterion	5.942119
Log likelihood	-2593.193	Hannan-Quinn criter.	5.519944
F-statistic	18.46546	Durbin-Watson stat	1.300764
Prob(F-statistic)	0.000000		

Source: Data obtained from Bloomberg and results obtained using EViews 13

Appendix H: Redundant variable tests

Table H1: CSP-ASR redundant variable test

Redundant Variable Test
Equation: ASR_CSP
Redundant variables:
CSP2
Specification: ASR_WNSRZ CSP CSP2 SIZE_WNSRZ RISK_WNSRZLOW HIGH C
Null hypothesis: CSP2 is not significant

	Value	df	Probability
t-statistic	4.541117	904	0.0000
F-statistic	20.62175	(1, 904)	0.0000

F-test summary:

	Sum of Sq.	df	Mean Squares
Test SSR	15767.31	1	15767.31
Restricted SSR	706962.2	905	781.1737
Unrestricted SSR	691194.9	904	764.5962

Restricted Test Equation:
Dependent Variable: ASR_WNSRZ
Method: Panel EGLS (Period random effects)Date: 04/08/23 Time: 12:39
Sample: 2012 2019
Periods included: 8
Cross-sections included: 130
Total panel (balanced) observations: 1040
Use pre-specified random component estimates
Swamy and Arora estimator of component variances
White period (cross-section cluster) standard errors & covariance (d.f.corrected)
WARNING: estimated coefficient covariance matrix is of reduced rankStandard error and t-statistic probabilities adjusted for clustering

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CSP	-0.926064	0.352094	-2.630157	0.0096
SIZE_WNSRZ	21.81373	2.916782	7.478696	0.0000
RISK_WNSRZ	-0.419247	0.184019	-2.278276	0.0244
LOW	-2.658675	4.397811	-0.604545	0.5465
HIGH	25.27153	11.69847	2.160242	0.0326
C	-161.1391	35.14776	-4.584620	0.0000

Effects Specification	S.D.	Rho
Cross-section fixed (dummy variables)		
Period random	7.449827	0.0677
Idiosyncratic random	27.63637	0.9323

Weighted Statistics

R-squared	0.238563	Mean dependent var	6.303031
Adjusted R-squared	0.125820	S.D. dependent var	29.89326
S.E. of regression	27.94949	Sum squared resid	706962.2
F-statistic	2.115985	Durbin-Watson stat	1.846019

Prob(F-statistic)	0.000000		
	Unweighted Statistics		
R-squared	0.254388	Mean dependent var	6.303031
Sum squared resid	765958.5	Durbin-Watson stat	1.851630

Source: Data obtained from Bloomberg and results obtained using EViews 13

Table H2: CSP-ROA redundant variable test

Redundant Variable Test
Equation: ROA_CSP
Redundant variables:
CSP2
Specification: ROA_WNSRZ CSP CSP2 SIZE_WNSRZ RISK_WNSRZLOW HIGH C
Null hypothesis: CSP2 is not significant

	Value	df	Probability
t-statistic	3.958813	897	0.0001
F-statistic	15.67220	(1, 897)	0.0001
Likelihood ratio	18.01375	1	0.0000

F-test summary:

	Sum of Sq.	df	Mean Squares
Test SSR	153.5951	1	153.5951
Restricted SSR	8944.625	898	9.960607
Unrestricted SSR	8791.030	897	9.800479

LR test summary:

	Value
Restricted LogL	-2594.649
Unrestricted LogL	-2585.642

Restricted Test Equation:
Dependent Variable:
ROA_WNSRZMethod: Panel
Least Squares Date: 04/08/23
Time: 12:59 Sample: 2012 2019
Periods included: 8
Cross-sections included: 130
Total panel (balanced) observations: 1040
White period (cross-section cluster) standard errors & covariance (d.f.corrected)
WARNING: estimated coefficient covariance matrix is of reduced rankStandard error and t-statistic probabilities adjusted for clustering

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CSP	-0.008196	0.034385	-0.238368	0.8120
SIZE_WNSRZ	2.116076	0.405372	5.220079	0.0000
RISK_WNSRZ	-0.101072	0.027811	-3.634266	0.0004
LOW	0.100463	0.717128	0.140090	0.8888
HIGH	-1.404667	2.524312	-0.556455	0.5789
C	-13.11550	4.155155	-3.156441	0.0020

Effects Specification

Cross-section fixed (dummy variables)Period fixed (dummy variables)

R-squared	0.744390	Mean dependent var	5.479034
Adjusted R-squared	0.704256	S.D. dependent var	5.803429
S.E. of regression	3.156043	Akaike info criterion	5.262786
Sum squared resid	8944.625	Schwarz criterion	5.938239
Log likelihood	-2594.649	Hannan-Quinn criter.	5.519016
F-statistic	18.54730	Durbin-Watson stat	1.297250
Prob(F-statistic)	0.000000		

Source: Data obtained from Bloomberg and results obtained using EViews 13

Table H3: ENV-ASR redundant variable test

Redundant Variable Test
Equation: ASR_ENV
Redundant variables:
ENV2
Specification: ASR_WNSRZ ENV ENV2 SIZE_WNSRZ RISK_WNSRZLOW HIGH C
Null hypothesis: ENV2 is not significant

	Value	df	Probability
t-statistic	4.284955	904	0.0000
F-statistic	18.36084	(1, 904)	0.0000

F-test summary:

	Sum of Sq.	df	Mean Squares
Test SSR	14317.11	1	14317.11
Restricted SSR	719223.5	905	794.7221
Unrestricted SSR	704906.3	904	779.7637

Restricted Test Equation:
Dependent Variable: ASR_WNSRZ
Method: Panel EGLS (Period random effects)Date: 04/08/23 Time: 12:43
Sample: 2012 2019
Periods included: 8
Cross-sections included: 130
Total panel (balanced) observations: 1040
Use pre-specified random component estimates
Swamy and Arora estimator of component variances
White period (cross-section cluster) standard errors & covariance (d.f.corrected)
WARNING: estimated coefficient covariance matrix is of reduced rankStandard error and t-statistic probabilities adjusted for clustering

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ENV	-0.181826	0.221608	-0.820485	0.4135
SIZE_WNSRZ	21.08642	3.141732	6.711719	0.0000
RISK_WNSRZ	-0.462894	0.198325	-2.334021	0.0211
LOW	-2.981247	4.646904	-0.641556	0.5223
HIGH	23.35109	12.08241	1.932652	0.0555
C	-188.7759	33.46842	-5.640420	0.0000

Effects Specification	S.D.	Rho
Cross-section fixed (dummy variables)		
Period random	8.597733	0.0867
Idiosyncratic random	27.90240	0.9133

Weighted Statistics

R-squared	0.223457	Mean dependent var	6.303031
Adjusted R-squared	0.108478	S.D. dependent var	29.85668
S.E. of regression	28.19082	Sum squared resid	719223.5
F-statistic	1.943448	Durbin-Watson stat	1.813617
Prob(F-statistic)	0.000000		

Unweighted

Statistics			
R-squared	0.220773	Mean dependent var	6.303031
Sum squared resid	800491.0	Durbin-Watson stat	1.779175

Source: Data obtained from Bloomberg and results obtained using EViews 13

Table H4: ENV-ROA redundant variable test

Redundant Variable Test
Equation: ROA_ENV
Redundant variables:
ENV2
Specification: ROA_WNSRZ ENV ENV2 SIZE_WNSRZ RISK_WNSRZLOW HIGH C
Null hypothesis: ENV2 is not significant

	Value	df	Probability
t-statistic	3.586031	897	0.0004
F-statistic	12.85962	(1, 897)	0.0004
Likelihood ratio	14.80384	1	0.0001

F-test summary:

	Sum of Sq.	df	Mean Squares
Test SSR	126.2793	1	126.2793
Restricted SSR	8934.668	898	9.949519
Unrestricted SSR	8808.389	897	9.819831

LR test summary:

	Value
Restricted LogL	-2594.070
Unrestricted LogL	-2586.668

Restricted Test Equation:
Dependent Variable:
ROA_WNSRZMethod: Panel
Least Squares Date: 04/08/23
Time: 13:03 Sample: 2012 2019
Periods included: 8
Cross-sections included: 130
Total panel (balanced) observations: 1040
White period (cross-section cluster) standard errors & covariance (d.f.corrected)
WARNING: estimated coefficient covariance matrix is of reduced rankStandard error and t-statistic probabilities adjusted for clustering

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ENV	0.014494	0.020554	0.705175	0.4820
SIZE_WNSRZ	2.089631	0.406728	5.137659	0.0000
RISK_WNSRZ	-0.102969	0.027624	-3.727564	0.0003
LOW	0.102926	0.723764	0.142209	0.8871
HIGH	-1.581585	2.608720	-0.606269	0.5454
C	-13.48266	4.073744	-3.309648	0.0012

Effects Specification

Cross-section fixed (dummy variables)Period fixed (dummy variables)

R-squared	0.744675	Mean dependent var	5.479034
Adjusted R-squared	0.704585	S.D. dependent var	5.803429
S.E. of regression	3.154286	Akaike info criterion	5.261672
Sum squared resid	8934.668	Schwarz criterion	5.937125
Log likelihood	-2594.070	Hannan-Quinn criter.	5.517902
F-statistic	18.57507	Durbin-Watson stat	1.299482
Prob(F-statistic)	0.000000		

Source: Data obtained from Bloomberg and results obtained using EViews 13

Table H5: SOC-ASR redundant variable test

Redundant Variable Test
Equation: ASR_SOC
Redundant variables:
SOC2
Specification: ASR_WNSRZ SOC SOC2 SIZE_WNSRZ RISK_WNSRZLOW HIGH C
Null hypothesis: SOC2 is not significant

	Value	df	Probability
t-statistic	3.633665	904	0.0003
F-statistic	13.20352	(1, 904)	0.0003

F-test summary:

	Sum of Sq.	df	Mean Squares
Test SSR	10920.61	1	10920.61
Restricted SSR	758617.4	905	838.2513
Unrestricted SSR	747696.8	904	827.0982

Restricted Test Equation:
Dependent Variable: ASR_WNSRZ
Method: Panel EGLS (Period random effects)Date: 04/08/23 Time: 12:49
Sample: 2012 2019
Periods included: 8
Cross-sections included: 130
Total panel (balanced) observations: 1040
Use pre-specified random component estimates
Swamy and Arora estimator of component variances
White period (cross-section cluster) standard errors & covariance (d.f.corrected)
WARNING: estimated coefficient covariance matrix is of reduced rankStandard error and t-statistic probabilities adjusted for clustering

Variable	Coefficient	Std. Error	t-Statistic	Prob.
SOC	-0.889630	0.250202	-3.555643	0.0005
SIZE_WNSRZ	22.12733	2.741987	8.069815	0.0000
RISK_WNSRZ	-0.453505	0.181151	-2.503458	0.0135
LOW	-0.750075	4.779679	-0.156930	0.8755
HIGH	24.63752	11.63086	2.118290	0.0361
C	-178.1191	29.18918	-6.102230	0.0000

Effects Specification	S.D.	Rho
Cross-section fixed (dummy variables)		
Period random	1.388096	0.0025
Idiosyncratic random	27.77465	0.9975

Weighted Statistics

R-squared	0.241761	Mean dependent var	6.303031
Adjusted R-squared	0.129492	S.D. dependent var	31.03135
S.E. of regression	28.95257	Sum squared resid	758617.4
F-statistic	2.153399	Durbin-Watson stat	1.830419
Prob(F-statistic)	0.000000		

Unweighted

Statistics			
R-squared	0.246043	Mean dependent var	6.303031
Sum squared resid	774531.0	Durbin-Watson stat	1.830539

Source: Data obtained from Bloomberg and results obtained using EViews 13

Table H6: SOC-ROA redundant variable test

Redundant Variable Test
Equation: ROA_SOC
Redundant variables:
SOC2
Specification: ROA_WNSRZ SOC SOC2 SIZE_WNSRZ RISK_WNSRZ LOW HIGH C
Null hypothesis: SOC2 is not significant

	Value	df	Probability
t-statistic	2.179787	897	0.0295
F-statistic	4.751471	(1, 897)	0.0295
Likelihood ratio	5.494413	1	0.0191

F-test summary:

	Sum of Sq.	df	Mean Squares
Test SSR	47.13698	1	47.13698
Restricted SSR	8945.828	898	9.961946
Unrestricted SSR	8898.691	897	9.920502

LR test summary:

	Value
Restricted LogL	-2594.719
Unrestricted LogL	-2591.971

Restricted Test Equation:
Dependent Variable:
ROA_WNSRZMethod: Panel
Least Squares Date: 04/08/23
Time: 13:07 Sample: 2012 2019
Periods included: 8
Cross-sections included: 130
Total panel (balanced) observations: 1040
White period (cross-section cluster) standard errors & covariance (d.f.corrected)
WARNING: estimated coefficient covariance matrix is of reduced rankStandard error and t-statistic probabilities adjusted for clustering

Variable	Coefficient	Std. Error	t-Statistic	Prob.
SOC	-0.000224	0.031524	-0.007091	0.9944
SIZE_WNSRZ	2.107940	0.412260	5.113136	0.0000
RISK_WNSRZ	-0.101581	0.027387	-3.709046	0.0003
LOW	0.098542	0.714092	0.137997	0.8905
HIGH	-1.435634	2.522302	-0.569176	0.5702
C	-13.36955	3.965169	-3.371747	0.0010

Effects Specification

Cross-section fixed (dummy variables)Period fixed (dummy variables)

R-squared	0.744356	Mean dependent var	5.479034
Adjusted R-squared	0.704216	S.D. dependent var	5.803429
S.E. of regression	3.156255	Akaike info criterion	5.262921
Sum squared resid	8945.828	Schwarz criterion	5.938373
Log likelihood	-2594.719	Hannan-Quinn criter.	5.519150
F-statistic	18.54395	Durbin-Watson stat	1.297393
Prob(F-statistic)	0.000000		

Source: Data obtained from Bloomberg and results obtained using EViews 13

Table H7: GOV-ASR redundant variable test

Redundant Variable Test
Equation: ASR_GOV
Redundant variables:
GOV2
Specification: ASR_WNSRZ GOV GOV2 SIZE_WNSRZ RISK_WNSRZLOW HIGH C
Null hypothesis: GOV2 is not significant

	Value	df	Probability
t-statistic	1.510308	904	0.1313
F-statistic	2.281030	(1, 904)	0.1313

F-test summary:

	Sum of Sq.	df	Mean Squares
Test SSR	1922.616	1	1922.616
Restricted SSR	763878.8	905	844.0650
Unrestricted SSR	761956.2	904	842.8719

Restricted Test Equation:
Dependent Variable: ASR_WNSRZ
Method: Panel EGLS (Period random effects)Date: 04/08/23 Time: 12:51
Sample: 2012 2019
Periods included: 8
Cross-sections included: 130
Total panel (balanced) observations: 1040
Use pre-specified random component estimates
Swamy and Arora estimator of component variances
White period (cross-section cluster) standard errors & covariance (d.f.corrected)
WARNING: estimated coefficient covariance matrix is of reduced rankStandard error and t-statistic probabilities adjusted for clustering

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GOV	-1.145444	0.229877	-4.982857	0.0000
SIZE_WNSRZ	21.99630	3.210907	6.850496	0.0000
RISK_WNSRZ	-0.508996	0.191885	-2.652601	0.0090
LOW	-2.802389	4.488512	-0.624347	0.5335
HIGH	17.15106	11.79906	1.453595	0.1485
C	-109.1808	37.63611	-2.900959	0.0044

Effects Specification	S.D.	Rho
Cross-section fixed (dummy variables)		
Period random	0.000000	0.0000
Idiosyncratic random	27.83033	1.0000

Weighted Statistics

R-squared	0.256413	Mean dependent var	6.303031
Adjusted R-squared	0.146312	S.D. dependent var	31.44405
S.E. of regression	29.05280	Sum squared resid	763878.8
F-statistic	2.328901	Durbin-Watson stat	1.859456
Prob(F-statistic)	0.000000		

Unweighted

Statistics			
R-squared	0.256413	Mean dependent var	6.303031
Sum squared resid	763878.8	Durbin-Watson stat	1.859456

Source: Data obtained from Bloomberg and results obtained using EViews 13

Table H8: GOV-ROA redundant variable test

Redundant Variable Test
Equation: ROA_GOV
Redundant variables:
GOV2
Specification: ROA_WNSRZ GOV GOV2 SIZE_WNSRZ RISK_WNSRZLOW HIGH C
Null hypothesis: GOV2 is not significant

	Value	df	Probability
t-statistic	0.791108	897	0.4291
F-statistic	0.625851	(1, 897)	0.4291
Likelihood ratio	0.725372	1	0.3944

F-test summary:

	Sum of Sq.	df	Mean Squares
Test SSR	6.223359	1	6.223359
Restricted SSR	8925.841	898	9.939689
Unrestricted SSR	8919.617	897	9.943832

LR test summary:

	Value
Restricted LogL	-2593.556
Unrestricted LogL	-2593.193

Restricted Test Equation:
Dependent Variable:
ROA_WNSRZMethod: Panel
Least Squares Date: 04/08/23
Time: 13:14 Sample: 2012 2019
Periods included: 8
Cross-sections included: 130
Total panel (balanced) observations: 1040
White period (cross-section cluster) standard errors & covariance (d.f.corrected)
WARNING: estimated coefficient covariance matrix is of reduced rankStandard error and t-statistic probabilities adjusted for clustering

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GOV	-0.025990	0.023686	-1.097271	0.2746
SIZE_WNSRZ	2.127027	0.407803	5.215815	0.0000
RISK_WNSRZ	-0.101056	0.027707	-3.647280	0.0004
LOW	0.085026	0.708316	0.120040	0.9046
HIGH	-1.489406	2.575585	-0.578279	0.5641
C	-11.49307	4.229255	-2.717517	0.0075

Effects Specification

Cross-section fixed (dummy variables)Period fixed (dummy variables)

R-squared	0.744927	Mean dependent var	5.479034
Adjusted R-squared	0.704877	S.D. dependent var	5.803429
S.E. of regression	3.152727	Akaike info criterion	5.260684
Sum squared resid	8925.841	Schwarz criterion	5.936136
Log likelihood	-2593.556	Hannan-Quinn criter.	5.516914
F-statistic	18.59974	Durbin-Watson stat	1.300654
Prob(F-statistic)	0.000000		

Source: Data obtained from Bloomberg and results obtained using EViews 13