ESG pricing in the Australian equity market: An empirical analysis.

Caleb Shephard

Under the supervision of:

Rodrigo Taveras

Date: 20th May 2022

1. Abstract

This study investigates how an organisation's environmental, social and governance (ESG) rating is priced into the Australian equity market and the implications this has on the firm valuation. The study utilises a blended ESG rating, and also analysis the impact of each respective ESG pillar, so as to provide insight on the individual effect of each pillar on organisation value. The study is conducted over the top 200 firms listed on the ASX200 and utilises commonly applied relative valuation multiples such as enterprise value / earnings-before-interest-tax-and-depreciation (EVEBITDA), price-to-earnings next twelve months (PENTM) and price-to-book (PB), as a basis for value.

Keywords: Finance, ESG rating, relative valuation metrics, Blended ESG rating, ESG pillars

2. Acknowledgements

The success of this paper would not have been possible without acknowledging some key figures for their support and input. Firstly, in the development of this study I would like to thank my advisor Rodrigo Taveras for his input and guidance and for taking the time to review the initial drafts and provide feedback across the entire process. Secondly, Alastair Marsden, Director at KPMG New Zealand, for his consultation and support around the type of analysis and providing insights from a market and academic perspective. Lastly, Cecilia González González for her support, review, and consultation across the paper.

3. Introduction

ESG has been growing in prominence within global markets as it can have large implications for organisations depending on each ESG pillars level of materiality and the risks that are relevant to that company. Investors often recognise that a company's ESG profile can be utilised as an indication of the potential ESG opportunities and risks facing a firm, and as such, investors might look to incorporate such metrics into their valuation assessments. Consequently, an organisation's ESG rating is often utilised as an initial proxy of a company's ESG position and risk in the market, relative to its peers, in order to help investors make financial decisions.

The overall research question is: Does a positive ESG rating impact Australian organisation value positively and a negative ESG firm rating impact an Australian organisation value negatively? We would therefore expect to see a negative coefficient on the independent variable in relation to its impact on one of the valuation metrics utilised as the dependent variable. In addition to the above, this is an interesting and relevant research topic as the Australian equity market is relatively large and significant on a global scale and has a broad composition from corporates in mining and energy sectors to financial and consumer goods. Therefore, by adding to the growing literature on how ESG ratings impact on firm value from a specific Australian context, this analysis can help provide valuable insight that could be utilised in valuations and financial decision making across Australasia. The study is structured as follows. Firstly a systematic literature review of the metrics for determining business value. Secondly, ESG literature and rating determinants. Thirdly, the methodology and hypothesises and lastly, the research design and analysis before concluding and discussing limitations with suggestion made on future research.

4. Systematic literature overview

3.1 Metrics for determining business value

Typically, the process of valuing a business is often to determine the fair value of the organisation's equity, which can be required for a multitude of purposes (Brealey, Myers and Allen 2020). In order to define a set measure for analysing the impact on a company's fair value for the purpose of this study, an overview of commonly applied relative valuation measures and their determinants is completed.

Relative valuation techniques are often applied to measure comparable firms, this assumes that markets are efficient and the law of one price holds (Fama 1991). As such, comparable companies are assumed to trade at equivalent prices and value to be correspondingly linked to the particular multiples value driver (Forte, Gianfrate and Rossi 2018). Under this conventional multiple valuation method, Alford (1992) highlights how comparing the P/E ratio based on firms in a set sector, improves the accuracy of a valuation, as well as a positive relationship between the size of an organisation and valuation accuracy. Despite this, a limitation of using P/E ratios is this type of multiple is impacted by differences in capital structure which could introduce bias with estimates of total enterprise value (Boatsman and Baskin 1981). Further, as it is an earnings based estimate, it may include many non-operating items from one off events which could in turn be misleading. (Boatsman and Baskin 1981).

The P/B ratio, which is calculated as the market value of equity divided by an organisation's book value of equity, is determined by the product of both growth and profitability, while P/E is influenced through growth in future residual earnings (Lundholm and Sloan 2007). Although P/B is an often utilised valuation multiple, it is also widely applied as a proxy for Tobin's q, a replacement cost ratio when is seen as a predictor of future investment (Nezlobin and Rajan 2016). Moreover, P/B and the forward P/E ratio are regularly utilised as key valuation multiples for companies in the financial industry (e.g.

banks and finance companies) due to EV/EBITDA no longer being a meaningful measure as interest is a key component of revenue and expenses for these types of organisations (Forte, Gianfrate and Rossi 2018).

In comparison, Kaplan and Ruback (1995) found that enterprise value (EV) to EBITDA multiples had larger success in determining value where leverage was a factor. Further, Kim and Ritter (1999) identified the EV/EBITDA multiple to be the most accurate out of their study which included P/E, price to sales, market to book value and EV/revenue multiples as it implied less bias due to removing the cost of debt, taxes and depreciation and amortisation which made for a more concise overview of a company's financial performance. Likewise, as EV comprises of equity and net debt (e.g. debt minus cash and cash equivalents), EV/EBIT yields similar results to EV/EBITDA as both are relatively independent of a company's capital structure (Lie and Lei 2002). However, EV/EBITDA is preferred due to depreciation being found to distort true earnings and therefore negatively impact estimates of value (Lie and Lei 2002). A limitation of EV/EBITDA is it does not include capital expenditure, which can be significant across industries, and therefore could produce a more favourable multiple in sectors with a higher capital expenditure spend (Liu, Nissim and Thomas 2002).

For the purpose of this analysis, a stronger reliance will be placed on EV/EBITDA as a measure of value due to its more robust nature in regards to capital structure. However, the analysis will also utilise forward P/E multiples and P/B multiples as applicable crosschecks. Further, as forementioned, the forward P/E multiple will be considered for financial companies, like banks, and cross analysed to P/B multiples as these can be more useful determinants of value for these type of industries as discussed by (Forte, Gianfrate and Rossi 2018). In addition, valuation multiples are based on a single point in time and assume no significant change on the organisation (Schreiner 2007) which makes it useful for the purpose

of this analysis as ESG ratings are usually static for at least a period of twelve months (Huber, et al. 2017).

4.2 ESG ratings

When approaching this analysis, some of the key questions that were asked as this study was outlined centred around, does an ESG score accurately achieve its purpose? Is it reliable? Why consider an ESG score and not, say, just a firm's individual carbon intensity? What about the limitations across ESG rating providers? This literature review attempts to unpack some of these primary questions in order to begin to prepare a methodology and set of key ESG determinants for the analysis.

As a brief overview, when considering ESG data it is important to note that the data is often immense and collected from a variety of alternative sources including industry, government, company disclosures, country policies, news, etc (Baldini, et al. 2018). What makes this unique is each organisation is different in its material firm-specific ESG risks, although it will usually share similar exposures to sector peers (Baldini, et al. 2018). Consequently, there is a lot of data to be congregated, analysed, weighted and interpretated in order to find out what actually are the material issues at stake and how well an organisation is taking steps to mitigate them, without destroying value (In, Rook and Ashby 2019). For example, it could be limiting to only assess, through an environmental lens, a particular companies carbon emissions and exposure, when the real material issues facing it are actually social or governance related. As a consequence, the 'ESG rating system' has emerged with an aim to collate, measure, and assess an enterprises resilience to relevant environmental, social and governance pressures within that sector over the long term, and encompass it into one rating or score (Chen, von Behren and George 2021). This is basically a third-party service that does the 'leg work' in an attempt to provide greater insights into these material issues.

Naturally, as forementioned, there are various limitations with this which are unpacked later within this analysis.

Consequently, this study aims to consider the impact of an organisations ESG score across each individual pillar to understand its impact. As such, rather than relying on just one data point which may be more material for some sectors over others, the study will attempt to be more holistic in analysing each ESG rating pillars impact to value. This is not to say that an ESG score is the sole measure that should be utilised, but rather an adequate proxy to assess these type of practices with critical evaluation.

The overall importance of ESG incorporation into corporate operations and investment has been widely investigated globally. In 2020, NYU Stern Centre for Sustainable Business and Rockefeller Asset Management, completed a meta study of over a thousand research papers from the previous five years which examine the relationship between ESG and organisation financial performance (Whelan, Atz and Van Holt, et al. 2021). The study notes that evidence has shown a business strategy focused on material ESG issues goes in conjunction with top management teams and better financial performance (Whelan, Atz and Holt, et al. 2021). While many studies vary in terms of their methodology and consensus reached, some trends of the key determinants of ESG across the literature are company size, profitability, leverage, and sector which are identified across multiple academic articles as influencing ESG performance, value, and disclosure (Fatemi, Glaum and Stefanie 2018). Moreover, while Baldini, et al. (2018) also noted that some of the key explanatory variables at a firm-specific level are size, profitability, sector and leverage, they found that firm-visibility impacts a company's available ESG data and at a macro-level the political, labour environment and country culture have an impact. Interestingly, Drempetic, Klein and Zwergel (2019) raised a critical question where their results indicated a positive correlation between firm size and a 'good' ESG rating and whether this is in fact influenced by the larger organisations' greater

resources. This implies that, small firms with a genuine interest in increasing their sustainability performance, but limited by their resources, are in a disadvantaged position when considering the absolute level of the ESG rating. As such, this study will control for firm size as part of the analysis.

In a study of ESG impact within financial firms, Crespi and Migliavacca (2020) attempted to split out the various ESG pillars and found the E and S pillars in large financial firms had a stronger impact and drove the ESG rating results in developed countries, while G had a stronger impact in smaller financial firms. This conclusion was also supported by, Buallay (2019) who had a similar analysis and results on the European market for the E pillar that highlighted an influence on firm value.

Furthermore, country effects are often controlled for in ESG studies, especially in a European setting, with cross country differences and varying legal systems among the member states e.g. common law to civil law and preference for shareholders to stakeholders (Kaiser 2020). This type of controlling variable is not required for our study within an Australasian context as there are few cross listings with the majority from New Zealand firms which share a similar geography and market as well as common-law legal system.

In addition, the impact on ESG performance through differences in ownership structures being either state, family, institutional or individual shareholder has been widely studied but the results are often mixed (Gillan, Koch and Starks 2021). Institutional ownership is argued to have a positive relationship on ESG performance due to their longer term investment horizons (Gillan, Koch and Starks 2021), this is contradicted by Nofsinger, Sulaeman and Varma (2019) whom conclude a negative relationship. In contrast, institutional investors which are signatories to the Principles of Responsible Investment (PRI) and engage and coordinate through activism, were seen to have a positive influence on an organisations ESG performance (Dimson, Karakas and Li 2021). Further, Abeysekera and Fernando (2020)

studied the impact that family ownership can have and found that despite potential conflicts between family owners and minority shareholders, family owned companies were found to be more responsible about environmental investments. Alternative studies have supported this conclusion, but the results appear to vary across geographies or with potential data differences (Gillan, Koch and Starks 2021). Boubakri, et al. (2019) found similar results for state owned enterprises as they were more engaged in environmental and social issues over privatised firms, however they note this is also geographically dependent and can vary with set levels of state ownership, depending on if there is a lower or higher state ownership stake. Overall, as the results are relatively mixed for an ownership structures influence on ESG decisions, this study will not control for institutional ownership, with Starks, Venkat and Zhu (2019) also stating that these relationships are likely dynamic with varying conclusions to be drawn. Moreover, due to the significant privatisation of the Australian market, and minimal controlling interest of family ownership in the ASX200 companies, controlling for state and family ownership is arguably irrelevant.

Literature on ESG specific to the Australian market is continuing to develop. Limkriangkrai, Koh and Durand (2017) completed a review of ESG pillars, and while their focus was on financing decisions from ESG ratings, the rating data was split out into the separate ESG pillars to analyse their independent effects and attempt to demonstrate inferences which may be drawn from each component relevant to that firm. Moreover, Galbreath (2013) predicted, based on the global movement and the new ASX principles recommendations for listed companies, that Australian organisations' ESG performance would improve over time. A study by Balatbat, Siew and Camichael (2012), attempted to measure the impact ESG had on the performance of the top Australian companies using a range of performance metrics. While they found a positive relationship in some industries such as the food and beverage, and travel and leisure sectors, most others were weak

positives or inconclusive. Consequently their analysis concluded that ESG scores had little correlation to performance. Considering the early stage of Balatbat, Siew and Camichael's (2012) research, this analysis challenges their hypothesis in today's climate and rather argues that there is a stronger positive correlation between ESG and firm performance which translates into an impact on company value.

4.3 ESG raters

The concept of an ESG rating is provided by a range of raters with the aim to inform decision makers of how well an organisation is managing it's ESG risks and opportunities in a consolidated score (Huber, et al. 2017). As forementioned, the term 'ESG', encompasses the environmental, social and governance performance of corporations, but is often used as a general term for a range of specific attributes such as, carbon emissions, human rights, diversity etc (Berg, Koelbel and Rigobon 2020). Specifically, raters often vary in their conclusions, due to their different evaluation methodologies and source data, with a cross-sectional study of the top four providers Sustainalytics, MSCI, RobecoSAM's CSA (managed by S&P Global) and Bloomberg ESG that revealed a correlation of just 0.53 while credit ratings are correlated 0.99 (Kumar and Weiner 2019). For example, Chatterji, et al. (2015) discusses the lack of cohesion among rating firms across six established raters, their evaluation finds little correlation among data providers and warns against relying on solely this source. Further, 'Rate the Raters' by SustainAbility is one of the most popular external evaluation reports and has been rating the raters since 2010 in yearly publications which has helped provide data on raters to help them improve and even adapt to meet the end user expectations. The most recent report highlighted how due to potential coverage issues and limitations among individual rating agencies, many investors opt to utilise more than one ESG rating provider (SustainAbility 2020). Perhaps unsurprisingly, as ESG information is less standardised than financial information, raters often evaluate ESG data in different ways

and apply varying processes which can result in different assessments (Crespi and Migliavacca 2022). Interestingly, the same study found that just more ESG data disclosure only caused greater divergence and disagreement among providers, rather than solving it (Crespi and Migliavacca 2022). As such, the divergence of ESG ratings has been attributed to around three areas which Hirai and Brady (2021) summarise as:

1. Scoping factors and methodology;
2. Measurement of set categories; and
3. Weighting of each category.

A regular discussion point is the proposed regulation and standardisation of ESG raters. However, this is not advocated for by the investment community, as while many agree a quality standard should be set, they argue the methodologies to assess ESG data should not be, as the market has yet to agree on what ESG actually means, and stating how it should be measured would only cause further limitations (Hirai and Brady 2021). As such, divergence among rating providers goes from fact to opinion, where fact is the data and the opinion is what data is considered and the set weights which are given to it (Berg, Koelbel and Rigobon 2020). Further, Dimson, Marsh and Staunton (2020) in their study of the disparity amongst ESG rating providers, conclude that a rating used in isolation is unlikely to be material in determining future portfolio returns.

Consequently, as a form of mitigation for the variances across third party ESG data providers, blending these scores has become a common methodology utilised by asset managers in their analysis (JP Morgan 2020). In addition, Deng and Cheng (2019), in their study of how ESG indices can improve an organisation's stock price, blended two ESG raters from China by sorting between high and low levels and then counting the smallest level as one and changing the rank by one, this split was done for each provider giving a total of four including the separate ESG raters used in their analysis. In addition, Berg, Koelbel, and

Pavlova, et al. (2021) in an attempt to tackle the measurement bias, tested the validity of ESG ratings as valid instruments by assessing the noise contained in their ratings. Their analysis found that S&P Global was least rejected and MSCI, Sustainalytics, and ISS had the least amount of noise, which meant these raters were found to align more closely to the underlying ESG factors facing the company. Despite this, they were careful to note that all raters scores contain valuable information, as to discard one would be throwing out valuable ESG information that could correlate to a specific organisation. Consequently, by combining multiple complimentary ratings and excluding scores that are invalid instruments, a more accurate signal can be found in relation to specific ESG attributes (Berg, Koelbel and Pavlova, et al. 2021). Applying a similar methodology in their recent analysis, Seafeim and Yoon (2022) find a strong relationship between ESG ratings and future ESG news, but note that this relationship is much less when there is large disagreement among rating providers. As such, they split their analysis into high and low as a combined averaged consensus ESG rating. Their findings note that by ESG ratings capturing organisations activities and strategies undertaken towards mitigating future ESG risks, this can create a proxy of investor expectations about future material news, whereby a positive (negative) score is positively related to future positive (negative) news (Seafeim and Yoon 2022).

5. Methodology and analysis

4.1 Outline and methodology

The primary purpose of this study is to assess the impact of a firms ESG rating on company value within the Australian equity market. In doing so, this analysis relies on the academic literature previously outlined, in order to define a basis for value as the P/E multiple for financial firms, due to its strengths in valuing this type of business model, and the EV/EBITDA multiple for all other organisations due to its more robust nature when controlling for R&D, the P/B multiple will also be utilised as a cross-check.

Further, this analysis will control for firm size, proxied for by market capitalisation, company sector, profitability by return on equity (ROE) which is measured by net income over average shareholder equity, leverage as long term and current debt to total assets and capex as capex/revenue. Moreover, the individual pillars being E S & G of an organisation's ESG score can have varying material impacts. As such, the analysis will split out each individual pillar score to assess the factors which might have a stronger impact on value. Furthermore, in an attempt to account for the individual limitations of each rating provider, this analysis will consider a blend of each of the chosen rating providers which is outlined in the following section. Consequently for this analysis we test a set of hypotheses as outlined below:

- **H1.** The overall ESG score of an organisation can positively or negatively impact firm value.
- **H2** The respective good or bad ESG pillars of an organisation's rating impact a firm's value differently.

These hypothesis therefore predict a negative coefficient on the independent variable against the respective valuation metric, this would be interpreted as a positive or ´good´ ESG score increases firm value and a negative ESG score decreases firm value.

5.2 Data and sample

The sample consists of the 200 companies listed on the Australian Securities Exchange ASX200. The timeframe of this analysis is set out from December 2017 to December 2021, i.e., for a maximum total of five years. This allows for a sufficient data set of relative valuation metrics and adequate historical and current ESG rating data as this data can be difficult to acquire past five years. The dependent variables are EV/EBITDA, PBV, and PENTM, collectively ("the relative valuation metrics"). The independent variable is set as the ESG score, which is measured by RobecoSAM's CSA (S&P Global) and Thomson Reuters

(Refinitiv) ESG scores. These raters were chosen based on their wide level of ESG coverage and split out of the data for separate ESG pillar ratings. Both Refinitiv and S&P Global provide a rating out of 100, their methodologies are outlined in **Table 1** below:

Table 1 ESG Rating Providers

Rater	Score range	Methodology
S&P Global	0 to 100	Industry weighted score
Thomson Reuters (Refinitiv)	0 to 100	Industry weighted score

Further, the blended score ESG rating is defined as the average of the two ESG raters combined, which follows the similarly utilised methodology in the forementioned analysis by (Berg, Koelbel and Pavlova, et al. 2021) and (Seafeim and Yoon 2022). The relative valuation metrics, and firm specific data will be acquired from Bloomberg and CapitalIQ respectively. The components for the ESG scores and it's pillars will be acquired from S&P Global and Refinitiv directly. In addition, some data may need to be acquired manually from company disclosures, depending on availability from the databases.

5.3 Preparing the data

In order to prepare the data for analysis, the data was first tested for outliers and missing values. This process found that while over the five years 1,000 data points per variable was collected (per year 200 * 5 years), as anticipated by the literature, EV/EBITDA metrics were unavailable or not useful measures of value for financial companies. However, this was also the case for some real estate listed funds whereby PENTM and/or PB were more reflective. As such, each datapoint which was unavailable or not reflective was removed. The second step was to transform the dataset whereby the dependent variables and control variables were logged to normalise and account for various differences and the dependent variables were winsorized to reduce the impact of identified outliers and limit the impact of any extreme

values. In addition, the data was tested for normality which utilised the Jarque-Bera test which confirmed the goodness of fit of the variables.

Further, initial tests for the statistical assumption of homoscedasticity within the model data implied the potential for heteroscedasticity causing bias among the standard errors contained within the model parameters. Consequently, in order to maintain the statistical assumption of homoscedasticity within the model, the analysis is completed with robust standard errors to heteroscedasticity to mitigate any biased standard errors. As such, the use of robust standard errors helps reduce variation error among the residuals, thereby maintaining the assumption of homoscedasticity. Further, as the data is a panel data set, the Hausman test was used to determine if a fixed effects (Fe) or random effects model should be utilised. The results found statistically significant evidence to support the use of a Fe model.

6. Research design and results

6.2 Summary statistics

Table 2 below presents the summary statistics for the dependent and control variables.

Table 2 Descriptive statistics

Summary Statistics	**N**	**Mean**	**St Dev.**	**Min**	**Max**
Leverage	949	0.22	0.17	0.00	0.93
SPESGscore	1,000	28.83	23.05	0.00	91.00
RefinitivESGscore	917	51.16	19.98	4.17	95.83
Blendedscore	917	42.49	18.30	4.08	92.92
Environmental	917	35.01	25.16	2.08	102.60
Social	917	40.44	19.97	2.08	98.35
Governance	917	46.89	18.76	2.08	90.32
l_EVEBITDA	773	2.72	0.68	1.49	4.21
l_PBV	940	1.10	0.91	-0.12	3.03
l_PENTM	884	3.00	0.51	2.22	4.23
l_mktcp	945	8.37	1.34	3.31	12.25
l_capex	864	-3.39	1.81	-9.27	8.75
l_ROE	830	-2.38	1.04	-8.05	6.07
Number of Year	5	5	5	5	5

While the number of observations can vary, this is still reflected in the regression analysis, which will only take the variable with the smallest number of observations and use that as the base point for the analysis. The range of ESG sores is from 4.1 to 92.9 for the Blendedscore with a mean of 42.5 which is the combination of S&P Global and Refinitiv. Likewise, for the separate pillars of Environment, Social, and Governance these are a combination of each of the two raters separate pillar scores over the total five-year period to account for differences in the methodologies. **Table 3** highlights the correlation across the control variables and ESG measures.

Table 3 Matrix of correlations

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
(1) l_EVEBITDA	1.00										
(2) l_PBV	0.57	1.00									
(3) l_PENTM	0.75	0.59	1.00								
(4) l_ROE	-0.15	0.56	-0.10	1.00							
(5) l_capex	-0.31	-0.18	-0.05	-0.12	1.00						
(6) l_mktcp	-0.01	0.08	0.09	0.06	0.11	1.00					
(7) Leverage	0.07	-0.01	0.05	-0.06	0.16	0.22	1.00				
(8) Blendedscore	-0.23	-0.32	-0.20	-0.14	0.08	0.52	0.10	1.00			
(9) Environmental	-0.27	-0.38	-0.23	-0.17	0.16	0.54	0.16	0.88	1.00		
(10) Social	-0.17	-0.22	-0.13	-0.09	0.08	0.55	0.11	0.90	0.81	1.00	
(11) Governance	-0.31	-0.40	-0.25	-0.15	0.15	0.45	0.10	0.84	0.73	0.72	1.00

The purpose of the analysis in **Table 3** is to check for correlation amongst the key variables to mitigate the likelihood of multicollinearity creating skewed and potentially misleading results. As such, applying this analysis helps avoid making less decisive statistical inferences from the regression results. The usual breakpoint for concern on multicollinearity is greater than 0.70 amongst the variables. Based on this, the primary control variables sit well below this threshold and only the Blendedscore, Environmental, Social and Governance have high correlation which is to be expected due to the combination of these measures. Consequently, these variables are run on separate regressions. While not presented in the correlation matrix, dummy variables for each industry were created, these are presented in the table below.

Table 4 Industries

Industry	N
Communication Services	11
Consumer Discretionary	22
Consumer Staples	11
Energy	8
Financials	29
Health Care	14
Industrials	17
Information Technology	14
Materials	37
Real Estate	24
Utilities	3
Total	**190**

The total number of industries is reduced to 190 from 200 as 10 company observations were removed from the total base data set due to not being listed on the ASX200 over the entire five-year sample period from 2017 to 2021. Materials is the largest sample industry which is mostly composed of metal, mining and construction companies. The second largest sector is Financials which is largely comprised of retail banks, finance companies, investment banks and insurance companies. For each regression analysis, one industry is left out to avoid multicollinearity, as such Financials is dropped for l_EVEBITDA, Utilities for l_PENTM and Industrials for l_PBV.

6.3 Fixed regression analysis

The equation below outlines the fixed effects multiple regression analysis.

$$\text{Valuation metric}^{1} = \beta_0 + \beta_1\ \text{ESGrating}^{2} + \text{Control Variables} + \text{Dummy Industries} + \text{Year FE} + \varepsilon$$

This analysis is presented in **Table 5** below. As forementioned, the standard errors highlighted in brackets are robust to control for heteroskedasticity.

[1]One of l_EVEBITDA; l_PBV; l_PENTM

[2]Either Blended ESG or an ESG pillar being Environmental; Social; or Governance

Table 5 Fixed Effects Regression Panel Data

VARIABLES	(1) EVEBITDA	(2) PBV	(3) PENTM
Blendedscore	-0.012***	-0.015***	-0.008***
	(0.001)	(0.001)	(0.001)
l_capex	-0.071**	-0.043**	0.016
	(0.016)	(0.013)	(0.013)
l_ROE	-0.156***	0.442***	-0.079***
	(0.019)	(0.037)	(0.005)
Leverage	0.127	-0.115	-0.414**
	(0.131)	(0.071)	(0.105)
l_mktcp	0.103***	0.130***	0.089***
	(0.018)	(0.019)	(0.015)
Communication Services	0.098	0.587**	0.250
	(0.077)	(0.159)	(0.126)
Consumer Discretionary	0.147***	0.477**	0.026
	(0.030)	(0.133)	(0.062)
Consumer Staples	0.122**	0.540**	0.043*
	(0.042)	(0.122)	(0.017)
Energy	-0.383**	-0.059	-0.403**
	(0.099)	(0.043)	(0.094)
HealthCare	0.724***	1.110***	0.406***
	(0.046)	(0.136)	(0.041)
Industrials	0.026	0.405**	
	(0.042)	(0.088)	
Information Technology	0.713***	1.219***	0.402***
	(0.031)	(0.125)	(0.028)
Materials	-0.259***	0.230*	-0.388***
	(0.032)	(0.083)	(0.053)
Real Estate	0.310***	0.143	-0.114
	(0.053)	(0.131)	(0.062)
Utilities	-0.122		-0.041
	(0.084)		(0.089)
Financials		0.237	-0.199***
		(0.113)	(0.027)
Constant	1.552***	1.112***	2.587***
	(0.170)	(0.192)	(0.094)
Observations	677	732	729
R-squared	0.439	0.584	0.362
Number of Year	5	5	5
Year FE	Yes	Yes	Yes

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

The results of the analysis presented in columns one to three finds a significant correlation at the 1.0%, 5% and 10% level between the firms overall ESG score and value. The coefficient estimate on Blendedscore is -0.012, -0.015 and -0.008 for EVEBITDA, PENTM and PBV respectively. As predicted by **H1**, the coefficient is negative and implies that a firm's overall ESG rating does impact firm value whereby a positive score increases company value and a negative score decreases firm value. More specifically, a company which has a one standard deviation higher (positive or negative) Blendedscore would see a corresponding change in value equal to the coefficient on the valuation metric in **Table 5**.

Interestingly, in comparison to some of the literature, the analysis did not find a strong relationship between leverage for EVEBITDA or PENTM as an explanatory control variable. Consequently, to check the model for potentially implied specification error, linktest for model specification was completed on a pooled OLS test to approximate for any errors of omission or errors of inclusion within the model parameters. The results from this are outlined in the table below which show a hatsq test that has no significant p-value. As such, the model is concluded to be correctly specified. In addition, to support this a Ramsay test was undertaken which also returned an insignificant p-value and supports a conclusion of no omitted variables.

Table 6 Model specification error tests

Tests	**Linktest**	**Ramsay Test**
P-value	0.102	0.1746

*** p<0.01, ** p<0.05, * p<0.1
Note: Approximated for by pooled OLS regression

The industries best predicted by the analysis in **Table 5** highlights Information Technology and Healthcare as the only industries with a level of significance at the 1.0% level across each valuation metric. This is perhaps not surprising as it is likely reflective of

how Information Technology and Healthcare companies typically have a minimal level of exposure to environmental pillar issues, and instead tend to face more social capital and governance orientated pillar issues. This could see investors pricing in a lower ESG risk exposure in their assessments of these comments. This is supported by Consolandi, et al. (2020) who found that Healthcare companies had stronger resilience to ESG issues and similar conclusions for technology companies were made by Lin, Li and Wu (2021) whereby areas such as data privacy and customer welfare were more prevalent. Moreover, the remaining nine industries vary in their significance depending on the respective metric with companies in the financial sector only statistically significant at the 1.0% level for PENTM, as predicted by the literature. As not all industries are significant, this corresponds with the literature whereby the respective ESG score impacts organisation value differently depending on the industry, this is reflected across the different coefficients of the metrics.

Furthermore the analysis was replicated on a per ESG pillar basis to assess each individual pillar impact. Similarly to the overall ESG score, each Environmental, Social & Governance pillar is a blended score, a summary of the analysis is outlined in **Table 7** below. This table highlights how for each individual pillar the coefficient is also negative, as predicted by **H2**, and significant at the 1.0% level. The consolidated table used the same control variables as previously discussed which yielded similar results to **Table 5**. Overall the R-squared for the explanatory variables is 0.447, 0.603 and 0.336 respectively.

Table 7 Fixed Effects Regression Individual Pillars

Variables	EVEBITDA	PBV	PENTM
Environmental	-0.008***	-0.012***	-0.006***
R-squared	0.435	0.595	0.369
Social	-0.008***	-0.010***	-0.005***
R-squared	0.417	0.562	0.345
Governance	-0.011***	-0.016***	-0.005***
R-squared	0.447	0.603	0.336
Number of Year	5	5	5
Year FE	Yes	Yes	Yes

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

This analysis confirms **H2** whereby the respective ESG pillar impacts firm value differently and the corresponding coefficient is negative.

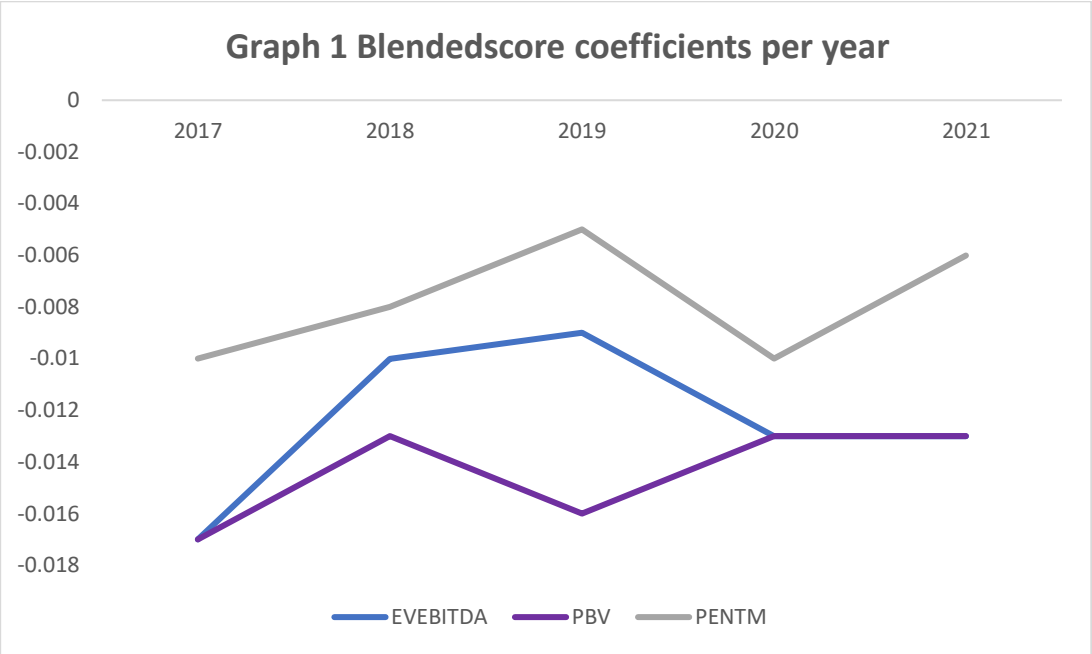
6.4 Linear regression analysis (per year)

In addition to the fixed effects regression over the entire five years, the analysis was split and run separately over each of the five years from 2017 to 2021. The regression equation is outlined below.

$$\text{Valuation metric} = \beta_0 + \beta_1 \text{ ESGrating} + \text{Control Variables} + \text{Dummy Industries} + \varepsilon$$

The chart below plots the respective coefficients for the dependent variables EVEBITDA, PBV and PENTM against the Blendedscore as the independent variable. The analysis was completed with the same control variables and industries applied in the fixed effects regression and each coefficient was found to be significant at the 1%, 5%, and 10% significance levels, also supporting **H1**. For the sake of presenting multiple separate

regressions, the analysis is presented in a line graph for the Blendedscore, the detailed tables for this analysis are outlined in the **Appendix.**



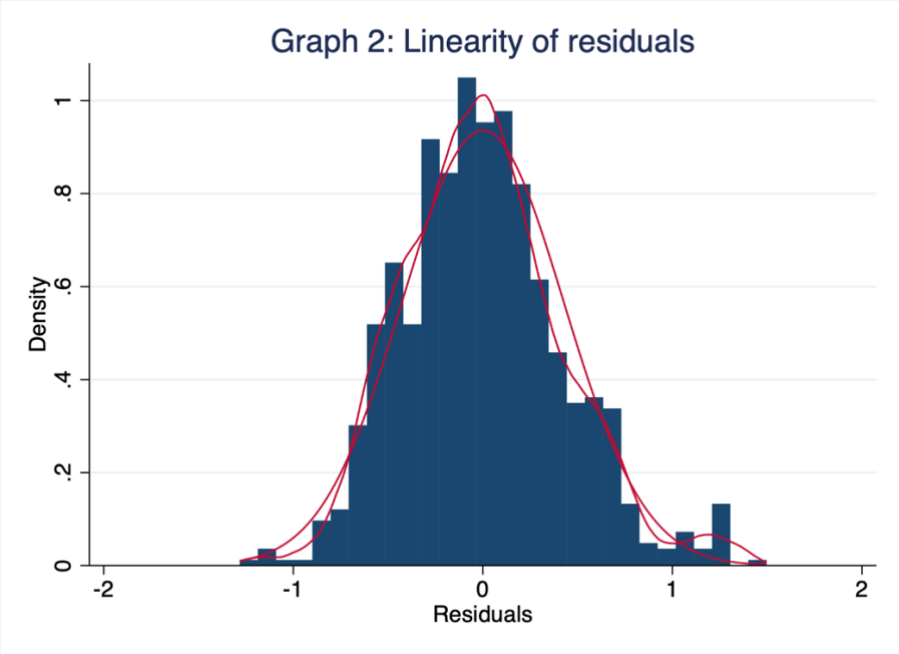
Graph 1 highlights how each year the coefficient based off the Blendedscore can vary across the sample period per year. It would be expected that this would fluctuate, as in part it is impacted by the availability of ESG information as more corporations start to report material ESG data and ESG ratings coverage increases as well. The increase in the negative coefficient in 2020 is interesting to see as this aligns with the commencement of the Covid-19 pandemic and could imply companies saw a stronger impact to value based on their respective ESG profiles when Covid-19 caused a market shock. There is a range of existing literature that has looked at the impact of an organisations ESG profiles during the Covid-19 pandemic, including (Diaz, Ibrushi and Zhao 2021) and (Zhou and Zhou 2022) which found strong supportive evidence that ESG stocks appreciated in value and were more resilient through Covid-19. It is interesting to see this trend potentially reflected in **Graph 1.**

Similarly to the fixed effects regressions analysis, this yearly analysis is also replicated over the respective ESG pillars scores on a per year basis and these tables are outlined in the

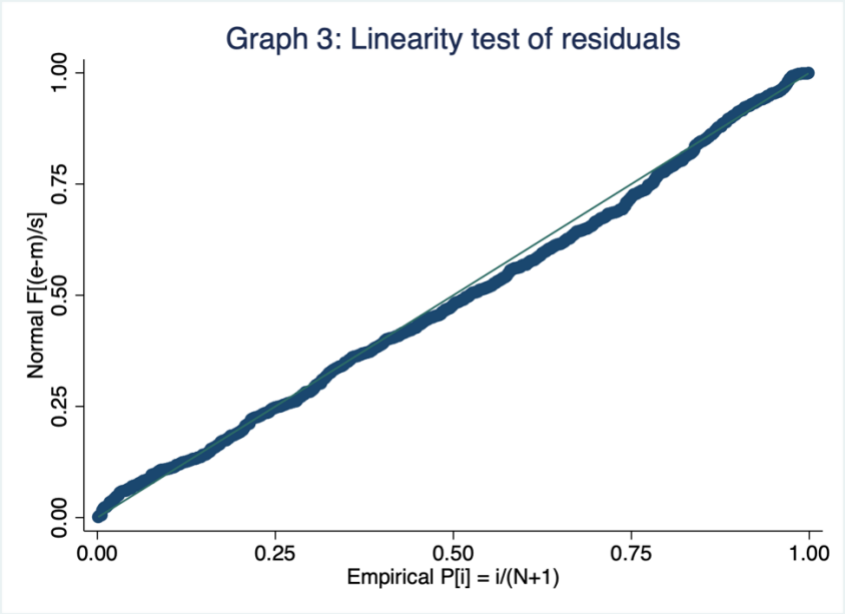
Appendix. This individual analysis aligns with **H2** whereby firm value is impacted differently depending on the pillar and its material relevance to the organisation.

6.5 Testing for linearity

Further, as a final test of the linear regression output assumptions, a test was conducted over the linearity of the regression residuals. **Graph 2** below highlights how the linearity assumption is met. While the right tale indicates partial kurtosis, this is of minimal concern as it is appears to be minor and as such unlikely to have a strong impact which could lead to a violation in the assumption of linearity for the regression analysis.



As a cross check **Graph 3** plots the residuals in a line graph, which also indicates close alignment to linearity assumption. As such the null hypothesis of linearity is maintained and is not rejected.



7. Conclusion

In this paper, the analysis focuses on the ASX200 listed companies and studies the relationship between company value, as defined by common relative valuation metrics EV/EBITDA, P/E, and P/B, against its ESG rating. The analysis predicts that a positive ESG rating impacts Australian firm value positively and a negative ESG score impacts Australian firm value negatively. Therefore predicting a negative coefficient on the ESG score as the independent variable. Moreover, to mitigate the impact of differences across ESG ratings and methodologies amongst providers, the study combines two ESG scores from Refinitiv and S&P Global respectively to create a blended ESG score. In addition, the respective ESG pillar scores of environmental, social, and governance and their individual impact on company value are also investigated.

The findings of the study are outlined as follows. Firstly, the results find a negative coefficient which is statistically significant across all levels for the blended ESG score confirming the first hypothesis that a positive or negative ESG score impacts company value. Secondly, the study also finds a statistically significant relationship across all levels among

each individual ESG pillar which had varying negative coefficients, confirming the second hypothesis that each ESG pillar can impact organisation value differently. Interestingly, the analysis notes an increase in the blended ESG score negative coefficient around the commencement of Covid-19 which likely supports emerging academic literature of the resilience of ESG stocks and appreciation this can have to value during volatile time-periods.

In summary, the findings in this study suggest that ESG ratings can be used as a proxy for a company´s ESG issues which in turn, impact company value, especially if these are not being appropriately considered and mitigated for by management in comparison to market expectations. It is worth noting that ESG ratings are not necessarily the sole predictor of environmental, social and governance issues and are still an evolving resource. However, the ability of ESG ratings to provide a basepoint that reflects the commitment of an organisation to achieving an ESG outcome, which in turn has a statistically significant impact on company value, is a useful tool for professional practitioners to utilise and take steps to consider ESG in their valuation assessments. Therefore, the findings in this analysis could help encourage organisations to increase their focus and disclosure on key material ESG issues which may lead to further understanding of the impact of ESG scores on organisation value.

8. Limitations & further research

While the analysis combined two ESG scores to account for an impact in different methodologies, the analysis omits other key providers such as MSCI and Sustainalytics, two relatively large ESG rating providers. This is mitigated by the fact that MSCI has lower coverage of the ASX200 market and publicly available data for Sustainalytics is only available for the current year, both also do not publish an individual split out ESG pillar rating. There is growing literature related to identifying causation and transmission channels to company value based on a firm's ESG profile through lower cost of capital and systematic

risk. This is outside the scope of the current paper, however future research based on the analysis presented in this study, could be to utilise the emerging research on transmission channels within an ESG rating context and apply it to an Australasian market specific context. Moreover, as the results have implications for market participants and professional practitioners in their assessments of company value, future research could attempt to quantify the following; industry specific ranges for an ESG ratings transmission impact to a company's cost of capital or cash flows, e.g., by quantifying a premium or discount that could then be considered and applied by participants analysing companies in these sectors.

References

Abeysekera, A.P., and C.S. Fernando. 2020. “Corporate Social Responsibility versus Corporate Shareholder Responsibility: A Family Firm Perspective.” *Journal of Corporate Finance* 1-22.

Alford, A. 1992. “The Effect of the Set of Comparable Firms on the Accuracy of the Price-Earnings Valuation Method.” *Journal of Accounting Research vol 30 no.1* 94-108.

Balatbat, Maria, Renard Siew, and David G Camichael. 2012. “ESG Scores and its Influence on Firm Performance: Australian Evidence.” *ResearchGate.* 14 September. Accessed March 14, 2022. https://www.researchgate.net/publication/260907931_ESG_Scores_and_its_Influence_on_firm_performance_Australian_Evidence.

Baldini, Maria, Lorenzo Maso, Giovanni Liberatore, and Francesco Mazzi. 2018. “Role of Country- and Firm-level determinants in Environmental, Social and Governance Disclosure.” *Journal of Business Ethics* 79-98.

Berg, Florian, Julian Koelbel, and Roberto Rigobon. 2020. “Aggregate Confusion: The Divergence of ESG Ratings.” *SSRN.* 15 August. Accessed February 12, 2022. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3438533.

Berg, Florian, Julian Kolbel, Anna Pavlova, and Roberto Rigobon. 2021. “ESG Confusion and Stock Returns: Tackling the Problem of Noise.” *SSRN.* 12 October. Accessed March 13, 2022. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3941514.

Boatsman, James R, and Elba F Baskin. 1981. “Asset Valuation with Incomplete Markets.” *The Accounting Review* 38-53.

Boubakri, N, O Guedhami, C.C Kwok, and H.H Wang. 2019. “Is Privatisation a Socially Responsible Reform?” *Journal of Corporate Finance* 129-151.

Brealey, Richard, Stewart Myers, and Franklin Allen. 2020. *Principles of Corporate Finance.* New York: McGraw-Hill.

Buallay, A. 2019. “Is Sustainability Reporting (ESG) Associated With Performance? Evidence from the European Banking Sector.” *Management Environment Qual* 98-115.

Chatterji, Aaron K, Drand Rodolphe, David I Levine, and Samuel Touboul. 2015. “Do Ratings of Firms Converge? Implications for Managers, Investors and Strategy Researchers.” *Strategic Management Journal* 1597-1614.

Chen, Mike, Robert von Behren, and Mussalli George. 2021. “The Unreasonable Attractiveness of More ESG Data.” *Journal of Portfolio Management* 147-162.

Crespi, Fabrizio, and Milena Migliavacca. 2020. “The Determinants of ESG Rating in the Financial Industry: The Same Old Story or a Different Tale?” *Sustainability* 12.

Crespi, Fabrizio, and Milena Migliavacca. 2022. “Why is Corporate Virtue in the Eye of The Beholder? The Case of ESG Ratings.” *The Acccounting Review* 147-175.

Deng, Xiang, and Xiang Cheng. 2019. “Can ESG Indices Improve the Enterprises’ Stock Market Performance?—An Empirical Study from China.” *Sustainability.*

Diaz, Violeta, Denada Ibrushi, and Jialin Zhao. 2021. “Reconsidering Systematic Factors During the Covid-19 Pandemic – The Rising Importance of ESG.” *Finance Research Letters.*

Dimson, Elroy, Oguzhan Karakas, and Xi Li. 2021. “Coordinated Engagements.” *SSRN - European Corporate Goverance Institute Financing working paper.* 7 January. Accessed March 13, 2022. https://papers.ssrn.com/sol3/Papers.cfm?abstract_id=3209072.

Dimson, Elroy, Paul Marsh, and Mike Staunton. 2020. “Divergent ESG Ratings.” *The Journal of Portfolio Management* 75-87.

Drempetic, Samuel, Christian Klein, and Bernhard Zwergel. 2019. “The Influence of Firm Size and the ESG Score: Corporate Sustainability Ratings Under Review.” *Journal of Business Ethics* 333-360.
Fama, E. 1991. “Efficient Capital Markets: II.” *Journal of Finance* 1575-1617.
Fatemi, Ali, Martin Glaum, and Kaiser Stefanie. 2018. “ESG Performance and Firm Value: The Moderating Role of Disclosure.” *Global Finance Journal* 45-64.
Forte, Gianfranco, Gianfranco Gianfrate, and Emanuele Rossi. 2018. “Does Relative Valuation Work for Banks?” *Global Finance Journal* 1044-0283.
Galbreath, Jermey. 2013. “ESG in Focus: The Australian Evidence.” *Journal of Business Ethics* 529-541.
Gillan, Stuart L, Andrew Koch, and Laura T Starks. 2021. “Firms and Social Responsibility: A Review of ESG and CSR Research in Corporate Finance.” *Journal of Corporate Finance.*
Hirai, Anna, and Andrew Brady. 2021. “Managing ESG Data and Rating Risk.” *Harvard Law School Forum on Corporate Governance.* 28 July. Accessed March 14, 2022. https://corpgov.law.harvard.edu/2021/07/28/managing-esg-data-and-rating-risk/.
Huber, Betty, Michael Comstock, Davis Polk, and Wardwell LLP. 2017. “ESG Reports and Ratings: What They are, Why They Matter.” *Harvard Law School Forum on Corporate Governance.* 27 July. Accessed March 2022, 13. https://corpgov.law.harvard.edu/2017/07/27/esg-reports-and-ratings-what-they-are-why-they-matter/.
In, Soh Young, Dane Rook, and Monky Ashby. 2019. “Integrating Alternative Data (Also Known as ESG Data) in Investment Decision Making.” *Global Economic Review* 237-260.
JP Morgan. 2020. *ESG Considerations with Regards to Third Parties.* 20 October. Accessed February 10, 2022. https://am.jpmorgan.com/ie/en/asset-management/institutional/investment-strategies/insurance/insights/sustainability-and-insurance-industry/esg-considerations-third-parties/.
Kaiser, L. 2020. “ESG integration. Value, Growth and Momentum. .” *Journal of Asset Management* 32-51.
Kaplan, Steven N, and Richard S Ruback. 1995. “The Valuation of Cash Flow Forecasts: An Empiricial Analysis.” *The Journal of Finance* 1055-1093.
Kim, Moonchul, and Jay R Ritter. 1999. “Valuing IPOs.” *Journal of FInancial Economics* 409-437.
Kumar, Rakhi, and Ali Weiner. 2019. “The ESG Data Challenge.” *State Street Global Advisors.* March. Accessed March 16, 2022. https://www.ssga.com/investment-topics/environmental-social-governance/2019/03/esg-data-challenge.pdf.
Lie, Erik, and Heidi Lei. 2002. “Multiples Used to Estimate Corporate Value.” *Financial Analysts Journal* 44-54.
Limkriangkrai, Manapon, Szekee Koh, and Robert B Durand. 2017. “Environmental, Social, and Governance (ESG) Profiles, Stock Returns and Financial Policy: Australian Evidence.” *International Review of Finance* 461-471.
Liu, Jing, Doron Nissim, and Jacob Thomas. 2002. “Equity Valuation Using Multiples.” *Journal of Accounting Research* 135-72.
Lundholm, Russell, and Richard Sloan. 2007. “Equity Valuation and Analysis with eVal.” Chapter 13.
Nezlobin, Alexander, and Madhav V Rajan. 2016. “Structural Properties of the Price-to-Earnings and Price-to-Book Ratios.” *Review of Accounting Studies* 438-472.
Nofsinger, J R, J Sulaeman, and A Varma. 2019. “Institutional Investors and Corporate Social Responsibility.” *Journal of Corporate Finance* 7000-725.

Schreiner, A. 2007. *Equity Valuation Using Multiples: An Empirical Investigation.* Wiesbaden: DUV Gabler Edition Wissenschaft,.

Seafeim, George, and Aaron Yoon. 2022. “Stock Price Reactions to ESG News: The Role of ESG Ratings and Disagreement.” *Review of Accounting Studies.*

Starks, L T, P Venkat, and Q Zhu. 2019. “Corporate ESG Profiles and Investor Horizons.” *SSRN*. 9 October. Accessed March 17, 2022. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3049943.

SustainAbility. 2020. “Rate the Raters.”

Whelan, Tensie, Ulrich Atz, Tracy Van Holt, and Casey Clark. 2021. *ESG and Financial Performance: Uncovering the Relationship by Aggregating Evidence from 1,000 Plus Studies Published between 2015 – 2020.* New York: NYU Stern; Rockerfeller Asset Management.

Zhou, Dongyi, and Rui Zhou. 2022. “ESG Performance and Stock Price Volatility in Public Health Crisis: Evidence from COVID-19 Pandemic .” *International Journal of Environmental Research and Public Health.*

Appendix

Table 8 Linear regression (2017)

Variables	EVEBITDA	PBV	PENTM
Blendedscore	-0.017***	-0.017***	-0.010***
R-squared	0.359	0.551	0.442
Environmental	-0.014***	-0.015***	-0.009***
R-squared	0.382	0.577	0.463
Social	-0.010**	-0.010***	-0.006**
R-squared	0.319	0.512	0.416
Governance	-0.015***	-0.015***	-0.010***
R-squared	0.35	0.545	0.453

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 9 Linear regression (2018)

Variables	EVEBITDA	PBV	PENTM
Blendedscore	-0.010***	-0.013***	-0.008**
R-squared	0.528	0.590	0.419
Environmental	-0.009***	-0.013***	-0.007***
R-squared	0.542	0.625	0.433
Social	-0.007**	-0.008**	-0.006**
R-squared	0.514	0.573	0.414
Governance	-0.011***	-0.016***	-0.009***
R-squared	0.539	0.617	0.438

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 10 Linear regression (2019)

Variables	EVEBITDA	PBV	PENTM
Blendedscore	-0.009***	-0.016***	-0.005**
R-squared	0.486	0.583	0.384
Environmental	-0.007***	-0.015***	-0.005***
R-squared	0.478	0.61	0.401
Social	-0.008***	-0.015***	-0.005**
R-squared	0.484	0.579	0.389
Governance	-0.010***	-0.017***	-0.006**
R-squared	0.500	0.611	0.403

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 11 Linear regression (2020)

Variables	EVEBITDA	PBV	PENTM
Blendedscore	-0.013***	-0.013***	-0.010***
R-squared	0.470	0.671	0.381
Environmental	-0.008***	-0.009***	-0.006***
R-squared	0.439	0.667	0.364
Social	-0.011***	-0.009***	-0.007***
R-squared	0.455	0.653	0.359
Governance	-0.014***	-0.014***	-0.010***
R-squared	0.483	0.684	0.388

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 12 Linear regression (2021)

Variables	EVEBITDA	PBV	PENTM
Blendedscore	-0.013***	-0.013***	-0.006***
R-squared	0.468	0.626	0.323
Environmental	-0.006***	-0.005**	-0.003**
R-squared	0.427	0.608	0.309
Social	-0.006**	-0.005**	-0.003**
R-squared	0.417	0.603	0.298
Governance	-0.011***	-0.015***	-0.006***
R-squared	0.46	0.654	0.329

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1