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The Value of Environmental, Social and Governance Performance: Attenuating the Corporate Diversification Discount

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Abstract

This study explores the relationship between corporate diversification, ESG performance, and excess value. Confirming a diversification discount for value and ESG performance, findings seem to indicate that firms disclosing ESG data outperform the market. Notably, for firms that disclose ESG data as well as for firms with higher ESG performance, the negative diversification-excess value relationship is attenuated. Diversification type (related or unrelated) does not significantly impact this moderation effect. These findings contribute to understanding the nuanced dynamics of diversification and ESG, providing valuable insights for businesses seeking to enhance financial performance through strategic choices.

Keywords (Corporate Diversification Discount; Excess Value; ESG scores; Relatedness; ESG Disclosure)

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1. Introduction

In the landscape of corporate strategy, corporate diversification has been the subject of persistent interest, and whether to diversify or not diversify has been a debated topic amongst researchers and professionals. Already in 1997, Constantino C. Markides published in the Harvard Business Review an article "To Diversify or Not To Diversify" addressing exactly this topic, as one "of the most challenging decision a company can confront" (p.1). Only two years prior, Berger and Ofek (1995) developed a methodology to measure the excess value due to diversification, with findings indicating that Corporate Diversification leads to firm value loss.

Simultaneously, Environmental, Social, and Governance (ESG) considerations are also very important components of strategic decisions of companies. As businesses operate in an environment that demands high social responsibility, the relationship between diversification strategies and ESG performance emerges as a critical research avenue. ESG factors, encompassing issues ranging from environmental impact to ethical governance practices, have become integral components of corporate evaluation. Firms that show higher ESG performance not only respond to societal expectations but also navigate potential risks and create long-term value. Though being a very debated topic, several recent studies address it and findings indicate that ESG performance positively influences firm value (Henisz, Koller, and Nuttall 2019; Wang et al. 2023; Li et al. 2021). In this context, the following research question emerges: how does ESG performance impact the relationship between the degree of corporate diversification and firms' excess value?

The objective of this study is to support and extend the research in the literature on corporate diversification discount based on the methodology of Berger and Ofek (1995). Firstly, this study analyzes the effect of degree of diversification (using three different measures of concentration of diversification) on the excess firm value and excess ESG scores of corporates for a sample of firms from 2002 to 2021. In a next step, this effect is measured for two different subgroups, companies that disclose ESG-related data and those that don't. Thirdly, the effect of the above sample mean ESG score on the relationship between diversification and value. To conclude, the influence of the type of diversification and its interaction with ESG value is studied. This study does not only contribute to the ongoing discourse on corporate diversification but also sets a stepstone in exploring the importance of the role of ESG in shaping the diversification-value relationship.

2. Literature Review

2.1. Corporate Diversification Strategy

Corporate Diversification represents a strategic decision, in which a "single-business company that expands its strategic scope by adding new businesses becomes a diversified, multibusiness company" (Wiersema and Beck 2017, 1). This diversification can be organic or inorganic. Firms can decide to diversify for several strategic reasons, mainly to enter a growth stage, gain a competitive advantage or reduce firms' risk (Shyu and Chen 2009), by benefiting from cost reductions, synergies, market power, and internal capital market efficiency (Kang 2013; Chen and Yu 2012; Purkayastha 2013; Montgomery 1994).

Corporate Diversification is one of the main research topics in strategic management from different perspectives. Firstly, the actual effect of Corporate Diversification on firm value is a very debated topic in the literature. Some argue that it does not lead to the benefits listed above, and on the contrary to inefficiencies and information asymmetries, and thus to a value loss and a corporate diversification discount (Berger and Ofek 1995; Hoechle et al. 2012; Fuente and Velasco 2020; Chen and Yu 2012). This opens the question of why would corporates continue diversifying, even though empirical evidence seems to indicate that it leads to value loss. Many research papers answer this question by emphasizing that agency problems are one of the reasons firms keep pursuing value-reducing diversification. This strategy is mainly pursued by managers who follow their self-interest and benefit from an “empire-building” strategy (Denis, Denis, and Sarin 1997; Amihud and Lev 1999; Hoechle et al. 2012).

2.2. Corporate Social Responsibility, Corporate Sustainability and ESG

ESG is a very actual and emerging topic in the literature (Li et al. 2021). The concept of ESG first appeared in 2004, in the United Nations Global Compact, which had been released in partnership with twenty financial institutions (United Nations 2004). However, even before 2004, the concepts of Corporate Social Responsibility and Corporate Sustainability already existed. They have been mainly debated over time following either the stakeholder or shareholder view.

2.2.1. Shareholder Theory

The shareholder view was first supported by Berle and Means (1932) and later defined in 1962 by Milton and Rose Friedman. The couple then extended and reiterated it in 1970 in an article published in the New York Times Magazine with the telling title “The Social Responsibility of Business is to Increase Its Profits”. This view follows the agency theory and relies on three principles. Firstly, businesses – defined as groups of persons and thus, as “artificial persons”– cannot have moral responsibility. Only individual persons have moral responsibility. Secondly, managers should not engage in social activities, and should just act in the shareholders’ best interests. Finally, managers cannot decide what is “good” or “evil”, and hence, cannot define what is in society’s best interest. It would be in this way unethical for a manager to spend the money that belongs to the owners to other individuals (Castelo 2013). This implies that a company’s goal (and responsibility) should only be profit maximization, as long as “it stays within the rules of the game” (Friedman 1970).

2.2.2. Stakeholder Theory

The opposing theory is the stakeholder theory. The notion of stakeholders was first described in an internal memorandum at the Stanford Research Institute in 1963 p.89 as “those groups without whose support the organization would cease to exist” (Donaldson and Preston 1995; Grunig and Kim 2017). Freeman later defined stakeholders in 1984 p.91 as “any identifiable group or individual who can affect the achievement of an organization's objectives or who is affected by the achievement of an organization's objectives” and argued that a sustainable business focuses on stakeholders and shareholders. Based on this theory, Archie B. Carroll summarised in 1991 in his article “The Pyramid of Corporate Social Responsibility: Toward the Moral Management of Organizational Stakeholders” a concept of corporate responsibility on four different levels. The first one is the economic responsibility (be profitable), the second one is the legal responsibility (obey the law), the third one is the ethical responsibility (be ethical) and the fourth one is the philanthropic responsibility (be a good corporate citizen) (Carroll 1991).

2.2.3. ESG trend: ratings and scores

Nowadays, the focus on sustainability has increased and companies are viewed as engines of Environmental, Social and Governance impact (KPMG International 2022; PWC 2023). They should not only focus on reducing their negative externalities but also act as positive drivers. Thus, ESG became a component of the decision-making process of corporates, but also of individuals and investment firms. To that purpose, different ESG measurement methodologies have been developed. Some common indicators for each component of ESG scores are Climate Change and Greenhouse Gas (GHG) emissions, Energy Efficiency, Human rights, Working Conditions, Executive Pay, Data Protection, Transparency, etc.

These indicators are being used to calculate either ESG ratings or scores. ESG ratings result from both, qualitative and quantitative data points, while ESG scores only rely on quantitative ones (Tavares 2023). This study will focus on ESG scores.

The data points used to measure these indicators are oftentimes collected from the corporate annual sustainability reports, company websites, questionnaires, media articles, financial news and reports. Most of these are data points that are published voluntarily while being unaudited and unstandardized (Kotsantonis and Serafeim 2019; Tavares 2023). Therefore, it sets a limit on the credibility of these scores. For example, a recent examination of the cross-sectional correlations shows a correlation of only 0.53 among the scores of four leading data providers' ESG scores, meaning that their ratings of companies are only consistent for about half of the coverage universe (Bender and Maffina 2023; Tavares 2023).

3. Theory and Hypothesis

3.1. The corporate diversification-value relationship

Corporate Diversification can lead to information asymmetries, bad corporate governance and agency costs due to decreased transparency (Hoechle et al. 2012; Thomas 2002). Empirical evidence from studies such as those conducted by Michael Firth, Man Jin, and Yuanyuan Zhang (2013) for firms listed in the Chinese market suggests that corporate diversification results in higher information asymmetry, consequently leading to value loss and a diversification discount. Moreover, other studies indicate that it also results in inefficient capital allocation and investments amongst the diversified divisions of the corporation. This inefficient allocation amongst divisions combined with information asymmetries indicates potential value loss consequent to the diversification strategy (Rajan, Servaes, and Zingales 2023). Even though managers aim to achieve value gain, synergies and risk reduction through diversification (Kang 2013; Montgomery 1994; Chen and Yu 2012), these objectives are oftentimes not reached (Le 2019). On the contrary, this strategy seems to lead to value loss as empirically studied in prior literature (Berger and Ofek 1995). Therefore, the following hypothesis can be formulated:

H1: A higher degree of diversification results in firm-value loss

3.2. ESG Disclosure and Firm Value

Fahad Khalid, Asif Razzaq and Jiang Ming (2022) found in a recent paper that ESG disclosure is related to a better governance structure, low corruption, and better liquidity positions of firms. Additional studies argue that firms' ESG disclosure is related, on the one hand, to country-level characteristics such as a political system. On the other hand, ESG disclosure seems to be related to firm-level characteristics, mainly associated with the firm's visibility, such as analyst coverage, cross-listing and leverage (Baldini et al. 2018).

Analyst coverage, cross-listing and leverage are all firm characteristics that are often a determinant of financial performance (Dhiensiri and Sayrak 2010; Bancel, Kalimipalli, and Mittoo 2009; Akhtar et al. 2022; Lopez-Valeiras, Gomez-Conde, and Fernandez-Rodriguez 2016). Therefore, it could be expected that these characteristics could lead to higher performance. The panel data of companies that disclose ESG data can be estimated to perform better and have a lower diversification discount than the panel of firms that do not disclose ESG-related data. This study proposes the following hypothesis to test this notion:

H2: For firms that disclose ESG-related data, the negative relationship between the Degree of Diversification and Excess Value is attenuated.

3.3. ESG as a Friendly Channel

The effect of ESG performance on the relationship between corporate diversification and firm value is a topic that has not been researched extensively yet. In a recent study, 129 cross-border M&A transactions have been examined in the Korean Stock Price Index (KOPSI). The results of this study indicate that ESG can mitigate the negative relationship between corporate diversification and firm value in cross-border M&A as a friendly channel (B. Kim, Jung, and Cho 2022). This study contributes to providing first empirical evidence that ESG can serve as a friendly channel through which to address the diversification discount.

Corporate diversification discount results among others from information asymmetries and bad corporate governance (see *3.1. The corporate diversification-value relationship*). Empirical Studies argue that ESG performance reduces information asymmetries (Usman, Bernardes, and Kananlua 2020; J. W. Kim and Park 2023). Furthermore, firms that perform better at ESG also have better Corporate Governance. This suggests that focusing on ESG performance could serve as a channel to reduce the discount resulting from corporate diversification (B. Kim, Jung, and Cho 2022). Additionally, recent studies argue that ESG "performance promises financial return for the firm in terms of both value and profitability" (Aydoğmuş, Gülay, and Ergun 2022, 120). Therefore, this study proposes the following hypothesis to test this notion, following a methodology similar to Fuente and Velasco (2020):

H3: A firm's above sample mean ESG score positively influences the relationship between the degree of diversification and the firm's excess value.

3.3 Type of diversification

Studies argue that the type of diversification influences the relationship between diversification and value. More specifically related diversification affects value more positively than unrelated diversification (Berger and Ofek 1995; Villalonga 2004) because skills and resources can be used in related industries while having a higher transparency. Furthermore, the effect of reputation is available for related while it is not for unrelated diversification (Nayyar 1993). Therefore, it could be expected that the higher degree of transparency associated with a higher ESG performance will especially affect positively the diversification-value relationship for unrelated diversification.

Added to this, as long as shareholders can diversify in the financial market on their own, unrelated diversification “primarily satisfies managers” and does not serve the stock owners (Fuente and Velasco 2020). One of the reasons for firms to diversify in an unrelated industry is to reduce the risk related to the existing industry or industries. This risk includes ESG risk and would be especially true for low-ESG firms. This supports the idea that the type of diversification (whether related or unrelated) is also influenced by ESG factors. In a recent survey from Deloitte, nearly 70% of the respondents “considered ESG of high strategic importance in M&A” (Shah et al. 2023). Furthermore, firms with better ESG performance tend to have higher transparency and less information asymmetries (Usman, Bernardes, and Kananlua 2020; J. W. Kim and Park 2023), which addresses one of the main issues of unrelated diversification. Considering these arguments, the following hypothesis can be formulated using a methodology similar to Fuente and Velasco (Fuente and Velasco 2020):

H4: The positive influence of a firm's above sample mean ESG score on the relationship between the degree of diversification and the firm's excess value is higher for unrelated than related diversification.

4. Methodology

4.1. Data Sample

The data sample starts with 1,889,320 segment-year observations from Compustat Historical Segment obtained on the Wharton Research Database (WRDS). In a first step, I dropped 1,040,151 observations that are in Geographical Segments, Operating Segments and State Segments to only keep observations in Business Segments. Business Segments for a specific period can be reported over several periods by companies. To avoid duplicates, I only kept observations where the source date is the closest to the data date, leaving the dataset with 350,861 segment-year observations. Segments with missing NAICS codes are dropped, as well as segments with missing or negative sales and assets. Finally, companies with more than 50% of their assets in the financial industry are also dropped (NAICS codes between 52,000 and 52,999) (Anjos and Fracassi 2015; Berger and Ofek 1995).

Using Compustat Fundamental Annual Data for North American Companies (275,475 firm-year observations), the data is merged with the segment-year observations. Data points with missing total sales, under 20 million or where the sum of the segment sales and the sum of the segment assets differs more than 5% and 25% respectively to the total sales and total sum of assets of the company are deleted (Anjos and Fracassi 2015; Çolak 2010; Berger and Ofek 1995). Finally, to have the data on a firm-year observation, only one observation per year is kept. See Table 2, appendix, to see the distribution of the observations per fiscal year between diversified and specialized firms. The results are in line with prior studies with 75% of specialized firms and 25% of diversified firms (Berger and Ofek 1995; Anjos and Fracassi 2015; Fuente and Velasco 2020).

Table 1: Refinitiv category indicators for Environmental, Social and Governance scores (LSEG Data & Analytics 2022).

Environmental	Social	Governance
Emission	Community	CSR Strategy
Innovation	Human Rights	Management
Resource Use	Product Responsibility	Shareholders
	Workforce	

In a final step, the firm-year observations are merged with the Refinitiv ESG scores, leaving the dataset with 16,298 firm-year observations from 2002 to 2021. With a data range starting in 2002, Refinitiv provides one of the most comprehensive datasets in the market (Aydoğmuş, Gülay, and Ergun 2022). Refinitiv ESG scores are calculated based on 10 category scores as presented in Table 1. These category scores are calculated using a rank-scoring methodology of 186 data points.

After these steps, the final data distribution per fiscal year is as presented in Table 3, appendix. 69% of the firms are specified in the final data sample, which is slightly less than before merging with the ESG dataset (75%, see Table 2 appendix). Furthermore, the tendency seems to indicate that the percentage of diversified firms decreases over the year (40% diversified firms in 2002 vs. 23% in 2021). Relevant data from Compustat are listed in Table 2, appendix.

4.2. Statistical Model

4.2.1. Baseline Model

The baseline model to study the effect of diversification on firm value is expressed as follows as in previous studies (Berger and Ofek 1995):

(1) $$EV_{i,t} = \alpha_i + \alpha_t + \beta_1 DIV_{i,t} + \beta_2 EBITsales_{i,t} + \beta_3 CAPEXsales_{i,t} + \beta_4 Size_{i,t} + \varepsilon_{i,t}$$

α_i, and α_i are respectively firms' fixed effects and years' fixed effects.

EV – representing the Excess Value – is the dependent variable. Excess Value is calculated as defined by Berger and Ofek (1995) as the natural logarithm of the actual value divided by its gross imputed value per firm-year observation. The main results have been calculated using a sales multiplier. These calculations have also been repeated using the Excess Value measure based on the total sum of assets, see Appendix Tables 4, 5 and 6 for detailed calculations and Appendix Tables 8, 9, 10 and 11 for regression results. One possible extension to this study would be to use TobinsQ as a more reliable measure of firm value (Montgomery 1994; Custódio 2014). EV_{ESG} is calculated as the natural logarithm of the actual ESG score divided by the imputed ESG score.

DIV – being the measure of diversification – is the independent variable. In this study for robustness, three different methods are used to calculate the degree of diversification: the number of different business segments (“*ndistinct*”), the Herfindahl index and the Tentropy measure. Additionally, the baseline model is also run using a Diversification Dummy (“*DivDummy*”), which is equal to one for diversified firms and 0 for specialized firms. Both the Herfindahl index and Tentropy measure the concentration of diversification and are commonly used as a measure of diversification in the literature (Schommer, Richter, and Karna 2019). The higher “*ndistinct*”, “*tentropy*” and “*DivDummy*” values are, the higher the degree of diversification. On the other hand, the “*herfindahl*” variable is inverse, i.e., the lower its value, the higher the degree of diversification. See Table 6 appendix for detailed calculations.

EBITsales, *CAPEXsales* and *Size* are the control variables considered by previous research as well (Berger and Ofek 1995). To eliminate the effect of outliers, all control variables have been winsorized at the 1 and 99 % level using the command winsor2 on Stata (Lian 2020). See Table 6 appendix for detailed calculations.

Furthermore, for all analyses conducted in this study, robust estimates of heteroscedasticity-consistent standard errors (Huber/White/sandwich estimators) are used, which still assume independence between observations.

To run a regression with fixed effects on Stata, the command reghdfe has been used (Guimarães and Portugal 2010; Gaure 2010). In the appendix Tables 12 to 16 are presented all the regression analyses results without firms’ fixed effects.

4.2.2. Moderating Effect of ESG Disclosure

To analyze the moderating effect of ESG disclosure on the relationship between degree of diversification and excess value, this study follows a similar methodology as Fuente and Velasco (2020). They analyzed the moderating effect of debt on the relationship between excess value and the degree of diversification. This study utilizes a similar equation by replacing their leverage dummy with a Disclosure dummy and adding an interaction term Disclosure dummy multiplied by the degree of diversification as presented in equation **(2)**.

$$\textbf{(2)}\ EV_{i,t} = \alpha_i + \alpha_t + \beta_1 DIV_{i,t} + \beta_2 DIV_{i,t} * ESGDisclosure_{i,t} + \beta_3 ESGDisclosure_{i,t} + \beta_4 EBITsales_{i,t} + \beta_5 CAPEXsales_{i,t} + \beta_6 Size_{i,t} + \varepsilon_{i,t}$$

To avoid collinearity issues and to facilitate the economical interpretation of the model, the interaction terms are included in the form of dummy variables. These dummy variables take the value of one for observations above the sample mean of the relevant variable and zero otherwise (Fuente and Velasco 2020; Pindado, Requejo, and De La Torre 2012).

To test **H2**, the first interaction term used in this study is the Disclosure Dummy ("*ESGDisclosure*"), which is equal to one for companies that disclose ESG-related data and zero otherwise. A firm is considered to disclose ESG data if a Refinitv ESG score exists.

4.2.3. Moderating Effect of ESG Performance

Similar to equation **(2)**, the moderating effect of ESG performance on the relationship between degree of diversification and excess value (**H3**) is studied by adding an ESG dummy in the interaction term as presented in equation **(3)**. The ESG dummy is equal to one for firms with an above sample mean ESG score and 0 otherwise.

$$\textbf{(3)}\ EV_{i,t} = \alpha_i + \alpha_t + \beta_1 DIV_{i,t} + \beta_2 DIV_{i,t} * ESGdummy_{i,t} + \beta_3 ESGdummy_{i,t} + \beta_4 EBITsales_{i,t} + \beta_5 CAPEXsales_{i,t} + \beta_6 Size_{i,t} + \varepsilon_{i,t}$$

The ESG score sample mean of the dataset used in this study is 39.59. As the mean is quite low, it might impact the interpretation of ESG performance, as performing better than others does not mean performing well. A possible extension of this study would be to build the ESG dummy using the Refinitv score categorizations, with a dummy taking the value of 1 for a score above 75 and 0 otherwise (LSEG Data & Analytics 2022).

4.2.4. Effect of Relatedeness

Finally, to analyze the effect of relatedness as in **H4** and following the methodology of Fuente and Velasco (2020), relatedness is added as a dummy in equation **(4)**. The triple interaction term enables us to examine whether ESG performance plays a different role in the value effect of diversification when firms follow a related diversification strategy versus an unrelated diversification strategy (Fuente and Velasco 2020).

$$\textbf{(4)}\ EV_{i,t} = \alpha_i + \alpha_t + \beta_1 DIV_{i,t} + \beta_2 Div_{i,t} * ESGdummy_{i,t} + \beta_3 Div_{i,t} * ESGdummy_{i,t} * Relateddummy_{i,t} + \beta_4 ESGdummy_{i,t} + \beta_5 Relateddummy_{i,t} + \beta_6 EBITsales_{i,t} + \beta_7 CAPEXsales_{i,t} + \beta_8 Size_{i,t} + \varepsilon_{i,t}$$

Relatedness is calculated as in previous studies (Berger and Ofek 1995; Fuente and Velasco 2020) using the measure of related entropy developed by Jacquemin and Berry (1979).

In a next step, a relatedness dummy is calculated, taking the value of one for firms that are above the sample mean entropy relatedness, and zero otherwise. This sample mean takes the value of 0.10. See Table 6 for more detailed calculations.

5. Results

5.1. Summary Statistics

Table 2 presents the summary statistics of the final observation sample (after merging with ESG data) for the main dependent and independent variables. It is observable that the mean Excess Value for the final data sample is slightly positive and seems to indicate an 8% value premium in the total sample of ESG reporting companies.

The correlation between the relevant variables in the final sample is presented in the correlation matrix Table 3. The absolute value of the correlation between the different measures of degree of diversification is equal or superior to 0.88, which supports the idea that they are all suitable as alternative measures of degree of diversification, as in previous studies

(Fuente and Velasco 2020). Additionally, the Relatedness Dummy variable ("*REDum*") also strongly correlates with the measures of the degree of diversification (-0.72, 0.70 and 0.63 respectively with *herfindahl*, *tentropy* and *ndistinct*). This is in line with the formula of the relatedness dummy, which also depends on the degree of diversification.

Table 2: Summary Statistics presenting the mean, median, standard deviation, minimum and maximum value of all main variables used in this study.

	Mean	Median	SD	Min	Max
EV	0.08	0.03	0.73	-2.43	1.91
herfindahl	0.88	1.00	0.21	0.00	1.00
tentropy	0.20	0.00	0.36	0.00	2.11
ndistinct	1.53	1.00	0.98	1.00	10.00
size	7.24	7.24	1.81	3.22	11.41
EBITsa	0.03	0.09	0.40	-2.51	0.58
CAPEXsa	0.08	0.03	0.15	0.00	1.07
ESGDum	0.44	0.00	0.50	0.00	1.00
REDum	0.17	0.00	0.38	0.00	1.00
Observations	16298				

Table 3: Correlation matrix of the main dependent and independent variables used in this study.

	EV	herfind.	tentropy	ndistinct	size	Ebit/sa.	Capex/sa.	ESGDum	REDum
EV	1.00								
herfindahl	0.13^{***}	1.00							
tentropy	-0.14^{***}	-0.98^{***}	1.00						
ndistinct	-0.14^{***}	-0.88^{***}	0.92^{***}	1.00					
size	-0.03^{**}	-0.29^{***}	0.29^{***}	0.32^{***}	1.00				
Ebit/sa.	-0.12^{***}	-0.11^{***}	0.11^{***}	0.11^{***}	0.33^{***}	1.00			
Capex/sa.	0.10^{***}	0.02^{*}	-0.02	0.01	0.14^{***}	-0.10^{***}	1.00		
ESGDum	-0.05^{***}	-0.09^{***}	0.09^{***}	0.09^{***}	0.44^{***}	0.12^{***}	-0.04^{***}	1.00	
REDum	-0.11^{***}	-0.72^{***}	0.70^{***}	0.63^{***}	0.24^{***}	0.09^{***}	-0.05^{***}	0.10^{***}	1.00

5.2. Corporate Diversification Discount and ESG Disclosure

In Table 4 can be found the descriptive statistics for the variable Excess Value (winsorized) for specialized (number of distinct segments on the 6-digit level NAICS code equals to one), and diversified firms (number of distinct segments on the 6-digit level NAICS code is superior to one). These statistics are presented for firms that disclose and do not disclose ESG data. For the total observations, findings are in line with previous research and **H1**, with a diversification discount of 23% (mean) for diversified firms (Berger and Ofek 1995).

Table 4: Excess Value (based on sales multiple) Mean, Median and number of observations for groups of firms that disclose and don´t disclose ESG-related data and Diversified and Specialized firms.

		ESG Disclosure			No ESG Disclosure			Total		
		Mean	Median	Obs.	Mean	Median	Obs.	Mean	Median	Obs.
EV	**Spec.**	0.19378	0.12495	6533	-0.05849	0	39535	-0.02272	0	46068
	Div.	-0.07571	-0.05055	3211	-0.25388	-0.19651	12633	-0.21777	-0.16448	15844

Interestingly, a difference can be observed between firms that disclose ESG-related data and those that don't. A diversification discount is still observable in both cases; however, it is -7% for firms that disclose ESG-related data and -25% for firms that do not disclose (using the mean). Furthermore, it can be observed that specialized firms that disclose ESG-related data have an excess value of +19%. This suggests that these firms have a higher market value than the industry median, and thus that they outperform the market, which would support **H2**.

Table 5: Fixed Effects Regression analysis with dependent variable Excess Value (Sales EV winsorized) and respectively independent variable (1) *ndistinct* (2) *herfindahl* and (3) *tentropy* and (4) *DivDummy* with control variables and robust standard errors.

	EXCESS VALUE			
	(1)	(2)	(3)	(4)
ndistinct	-0.065^{***}			
	(0.013)			
herfindahl		0.389^{***}		
		(0.060)		
tentropy			-0.238^{***}	
			(0.036)	
DivDummy				-0.125^{***}
				(0.025)
size	0.070^{***}	0.071^{***}	0.072^{***}	0.068^{***}
	(0.012)	(0.011)	(0.012)	(0.011)
EBITsales	-0.248^{***}	-0.249^{***}	-0.249^{***}	-0.247^{***}
	(0.025)	(0.025)	(0.025)	(0.025)
CAPEXsales	0.732^{***}	0.729^{***}	0.728^{***}	0.743^{***}
	(0.062)	(0.063)	(0.063)	(0.063)
Constant	-0.387^{***}	-0.834^{***}	-0.452^{***}	-0.431^{***}
	(0.085)	(0.102)	(0.084)	(0.084)
Observations	14979	14979	14979	14979
R^2	0.610	0.610	0.610	0.610
Adjusted R^2	0.567	0.568	0.568	0.567
Year fixed effects	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Using a regression analysis on the baseline model **(1)** with dependent variable Excess Value and independent variables the four different measures of diversification, respectively *ndistinct* (1), *Herfindahl* (2), *Tentropy* (3) and *DivDummy* (4) (see table 5 for results) for the final sample of data (containing ESG scores), results are statistically significant at the 5% level or more. These coefficients are negative for the regressions with independent variables "*ndistinct*", "*tentropy*" and "*DivDummy*" and positive for the regression with independent variable "*Herfindahl*". This is in line as all the variables measure the degree of diversification - with the Herfindahl index being an inverse measure of it. The results indicate that a higher diversification leads to a higher value discount.

The control variables *CAPEXsales* and *size* are consistent with prior studies with positive coefficients statistically significant at or beyond the 0.1% level (Fuente and Velasco 2020; Berger and Ofek 1995). On the other hand, the control variable *EBITsales* shows a negative statistically significant coefficient, which is not in line with other studies (Berger and Ofek 1995; Fuente and Velasco 2020; Custódio 2014). One possible explanation for this difference in signs is the effect of outliers with negative EBIT, that have not been completely removed by winsorizing the variable at the 1% and 99% level. For example, Claudia Custódio (2014) has a sample minimum value for the variable *EBITsales* of -0.93 and a maximum value of 0.41, while in this study the sample minimum value for the variable *EBITsales* is -2.51 and the maximum value is 0.58 (see Table 2).

Table 6: ESG Excess Value Mean, Median and number of observations for Diversified and Specialized firms

	ESG EXCESS VALUE		
	Mean	Median	Obs.
Spec.	-0.04661	0	6636
Div.	-0.90267	-0.79147	2336

Table 6 presents the summary statistics (mean, median and number of observations) for the variable EV_{ESG} for diversified and specialized firms. The mean EV_{ESG} being -0.90 and the median -0.79 for diversified firms indicate the presence of an ESG diversification discount.

Table 7: Fixed Effects Regression analysis with dependent variable ESG Excess Value (based on sales multiple and winsorized) and respectively independent variable (1) *ndistinct* (2) *herfindahl* (3) *tentropy* and (4) *DivDummy* with control variables and robust standard errors.

	ESG EXCESS VALUE			
	(1)	(2)	(3)	(4)
ndistinct	-0.204^{***}			
	(0.032)			
herfindahl		0.793^{***}		
		(0.149)		
tentropy			-0.510^{***}	
			(0.090)	
DivDummy				-0.478^{***}
				(0.061)
size	-0.501^{***}	-0.507^{***}	-0.505^{***}	-0.497^{***}
	(0.024)	(0.024)	(0.024)	(0.024)
EBITsales	-0.508^{***}	-0.510^{***}	-0.510^{***}	-0.512^{***}
	(0.049)	(0.049)	(0.049)	(0.049)
CAPEXsales	0.297^{***}	0.289^{***}	0.286^{***}	0.312^{***}
	(0.085)	(0.085)	(0.085)	(0.085)
Constant	3.987^{***}	3.037^{***}	3.812^{***}	3.793^{***}
	(0.191)	(0.249)	(0.192)	(0.191)
Observations	8161	8161	8161	8161
R^2	0.784	0.783	0.784	0.785
Adjusted R^2	0.742	0.742	0.742	0.744
Control variables	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Using a regression model based on equation **(1)** using EV_{ESG} as a dependent variable, results are presented in Table 7. All results are statistically significant at the 5% level or more. The negative coefficients on the independent variable *ndistinct* (1), *tentropy* (3) and *DivDummy* (4) as well as the positive coefficient on the variable *herfindahl* (2) indicate that a higher diversification also leads to a higher ESG diversification discount.

Results from equation **(2)** are presented in Table 8, respectively using *ndistinct* (1), *Herfindahl* (2) and *tentropy* (3) variables as a measure of the degree of diversification. All results are statistically significant. The coefficients are positive for the interaction term *ndistinct* * *ESGDisclosure* and *tentropy * ESGDisclosure* and negative for the interaction *Herfindahl * ESGDisclosure*. This indicates that for the companies that disclose ESG-related data (*ESGDisclosure* = 1), the relationship between the degree of diversification and excess value is attenuated, which supports **H2**.

Table 8: Fixed Effects Regression analysis with dependent variable Excess Value (Sales EV winsorized) and respectively independent variable (1) *ndistinct* (2) *herfindahl* and (3) *tentropy* and interaction terms (1) *ndistinct* ESGDisclosure* (2) *herfindahl* ESGDisclosure* (3) *tentropy* ESGDisclosure* with control variables and robust standard errors.

		EXCESS VALUE	
	(1)	(2)	(3)
ndistinct	-0.118^{***}		
	(0.008)		
herfindahl		0.523^{***}	
		(0.037)	
tentropy			-0.340^{***}
			(0.023)
ndistinct*ESGDisclosure	0.027^{*}		
	(0.011)		
Herfindahl*ESGDisclosure		-0.113^{*}	
		(0.051)	
Tentropy*ESGDisclosure			0.066^{*}
			(0.030)
ESGDisclosure	0.042^{*}	0.182^{***}	0.069^{***}
	(0.020)	(0.047)	(0.014)
size	0.117^{***}	0.116^{***}	0.118^{***}
	(0.007)	(0.007)	(0.007)
EBITsales	-0.151^{***}	-0.152^{***}	-0.152^{***}
	(0.015)	(0.015)	(0.015)
CAPEXsales	0.428^{***}	0.429^{***}	0.429^{***}
	(0.020)	(0.020)	(0.020)
Constant	-0.715^{***}	-1.350^{***}	-0.833^{***}
	(0.042)	(0.057)	(0.042)
Observations	51047	51047	51047
R^2	0.645	0.645	0.645
Adjusted R^2	0.591	0.591	0.592
Year fixed effects	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

5.3. Moderating effect of ESG

Going further, a regression is conducted for the subgroup of companies that disclose ESG. To test **H3**, the interaction terms with the ESG Dummy are added to the baseline models, respectively using *ndistinct* (1), *Herfindahl* (2) and *Tentropy* (3) as a measure of the degree of diversification.

Table 9: Fixed Effects Regression analysis with dependent variable Excess Value (Sales EV winsorized) and respectively independent variable (1) *ndistinct* (2) *herfindahl* and (3) *tentropy* and interaction terms (1) *ndistinct*ESGdum* (2) *herfindahl*ESGdum* (3) *tentropy*ESGdum* with control variables and robust standard errors.

		EXCESS VALUE	
	(1)	(2)	(3)
ndistinct	-0.082***		
	(0.018)		
herfindahl		0.359***	
		(0.094)	
tentropy			-0.238***
			(0.054)
ndistinct*ESGdum	0.032*		
	(0.013)		
Herfindahl*ESGdum		-0.155*	
		(0.061)	
Tentropy*ESGdum			0.088*
			(0.034)
ESGDum	-0.083**	0.101	-0.052**
	(0.025)	(0.056)	(0.018)
size	0.063***	0.061***	0.063***
	(0.018)	(0.018)	(0.018)
EBITsales	-0.285***	-0.285***	-0.286***
	(0.035)	(0.035)	(0.035)
CAPEXsales	0.673***	0.667***	0.667***
	(0.074)	(0.074)	(0.074)
Constant	-0.302*	-0.725***	-0.379**
	(0.145)	(0.176)	(0.145)
Observations	8914	8914	8914
R^2	0.700	0.699	0.700
Adjusted R^2	0.646	0.646	0.646
Control variables	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

For all three regressions, the interaction terms are statistically significant at the 5% level (see Table 9). The coefficients are positive for the interaction term *ndistinct*ESGdum* and *tentropy*ESGdum* and negative for the interaction *Herfindahl*ESGdum*. This suggests that a firm having an above-sample mean ESG score influences positively the relationship between the degree of diversification and excess value, which validates **H3**. For example, it indicates in (1) that the diversification discount is 3.2 percentage points lower for firms that have an above mean ESG score, and respectively 15.5 and 8.8 percentage points lower for (2) and (3).

Thus, it can be concluded that having an above mean ESG score serves as a friendly channel and moderates the diversification discount. In other words, ESG is more important for value if firms are diversified.

Additionally, the same regression has been conducted using ESG scores as a continuous variable instead of the ESG dummy (see Table 7 appendix). Results are consistent with the analysis using an ESG dummy with statistically significant positive coefficients for the interactions with *ndistinct* (1) and *tentropy* (3) and negative with h*erfindahl* (2).

5.4. Moderating Effect of Relatedness

Finally, this study analyses whether the type of diversification influences this interaction between the above sample mean ESG and degree of diversification. Just as in the previous analysis, the dependent variable Excess Value is regressed to the degree of diversification and the interaction between the degree of diversification and the ESG dummy, adding to this, an additional interaction term *DIV*ESGDummy*REDummy*. See Table 10 for results. The relatedness dummy shows a negative sign, which indicates that unrelated diversification outperforms related diversification. This does not support previous studies (Palich, Cardinal, and Miller 2000; Berger and Ofek 1995; Fuente and Velasco 2020). However, as the coefficient is not significant in either of the three regressions, no statistical conclusions can be made.

Furthermore, all three coefficients on the terms *DIV*ESGDummy*REDummy* indicate a negative effect. This would support that relatedness attenuates the effect of an above sample ESG on the relationship between Diversification and Excess Value, which is in line with **H4**. However, these coefficients are in all three cases not statistically significant. Therefore, no statistical effect of the type of diversification on the interaction between the above sample ESG and diversification on excess value can be observed.

Table 10: Fixed Effects Regression analysis with dependent variable Excess Value (Sales EV winsorized) and respectively independent variable (1) *ndistinct* (2) *herfindahl* and (3) *tentropy* and interaction terms (1) *ndistinct*ESGdum* (2) *herfindahl*ESGdum* (3) *tentropy*ESGdum* and (1) *ndistinct*ESGdum*REDum* (2) *herfindahl*ESGdum*REdum* (3) *tentropy*ESGdum*REdum* with control variables and robust standard errors.

	EXCESS VALUE		
	(1)	(2)	(3)
ndistinct	-0.076***		
	(0.020)		
herfindahl		0.347**	
		(0.116)	
tentropy			-0.211***
			(0.063)
ndistinct*ESGdum	0.049*		
	(0.020)		
Herfindahl*ESGdum		-0.229**	
		(0.075)	
Tentropy*ESGdum			0.115*
			(0.054)
ndistinct*ESGdum*RE	-0.018		
	(0.016)		
Herfindahl*ESGdum*RE		-0.125	
		(0.073)	
Tentropy*ESGdum*RE			-0.036
			(0.059)
ESGDummy	-0.100***	0.179*	-0.053**
	(0.030)	(0.071)	(0.018)
REDummy	-0.040	-0.015	-0.043
	(0.045)	(0.054)	(0.046)
size	0.064***	0.062***	0.064***
	(0.018)	(0.018)	(0.018)
EBITsales	-0.286***	-0.286***	-0.287***
	(0.035)	(0.035)	(0.035)
CAPEXsales	0.672***	0.673***	0.667***
	(0.074)	(0.074)	(0.074)
Constant	-0.315*	-0.723***	-0.386**
	(0.145)	(0.186)	(0.145)
Observations	8914	8914	8914
R^2	0.700	0.700	0.700
Adjusted R^2	0.646	0.646	0.646
Year fixed effects	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

5.5. Assets Excess Value measure

In the appendix, Tables 8, 9, 10 and 11 present the results of the equations **(1)**, **(2)**, **(3)** and **(4)** using the Excess Value measure based on the assets multiple. In Tables 8 and 9 appendix, the results seem to indicate statistically significantly that a higher diversification leads to firm value loss (**H1**). Furthermore, ESG disclosure has a statistically significant positive effect on firm value (see table 8, appendix). However, the coefficients on the interaction between the degree of diversification and ESG disclosure dummy are not significant. Furthermore, the results in Tables 10 and 11 appendix are not significant, neither for the independent variables nor for the interaction terms. This difference in findings when using the assets Excess Value measure instead of the sales Excess Value measure can be explained by how the dataset has been built. This study allows a 25% variance between the sum of segment assets and the firm assets. Only a 5% variance between the sum of segment sales and the firm sales, which would lead to deleting too many observations if doing the same with assets, as assets are oftentimes missing or incorrect on the segment level. Calculating the gross imputed value to compensate for the variation for non-reported segments did not remove this variance completely. Indeed, the correlation of Excess value based on assets and sales multiples is only 0.68, which is quite low for two variables that measure the same outcome.

6. Conclusion and Discussion

Prior studies in the field of corporate diversification mainly analyzed the relationship between the degree of diversification and firms' excess value. However, only a few studies concluded about how different factors can impact this relationship, and to what extent ESG considerations play in role in this interaction. A recent study indicates that leverage can play the role of a friendly channel in this diversification-value relationship (Fuente and Velasco 2020). Only one paper identified that ESG can mitigate the diversification discount in cross-border M&A (B. Kim, Jung, and Cho 2022).

Firstly, this study successfully supports **H1** and previous studies in concluding that there is an existing diversification discount (Berger and Ofek 1995). For this sample, the discount is equal to 22% (using the mean as a measure of excess value). Additionally, findings indicate that diversification not only negatively impacts the value of firms but also the ESG scores of firms. Secondly, the results of this study confirm that for firms that report and disclose ESG-related data, the negative relationship between degree of diversification and excess value is attenuated (**H2**). It would be interesting to analyse in further studies which specific characteristics of firms that disclose ESG data lead to the attenuating effect on the diversification-value relationship.

Going further it is also observable that specialized firms that disclose ESG-related data outperform the market by having an excess value premium of +19.3% compared to the industry median. Thirdly, this research empirically demonstrates that performing better at ESG – meaning having an above sample mean ESG score – moderates the relationship between degree of corporate diversification and excess value, which validates **H3**. Finally, having no statistically significant three-way interaction when predicting excess value indicates that the attenuating effect of ESG performance on the relationship between degree of diversification and firm excess value does not vary depending on different types of diversification.

In conclusion, deciding to pursue a diversification strategy leads to firm value and ESG performance loss, while ESG performance attenuates the value loss. The observed ESG discount could indicate that conglomerates are having a harder time adapting to the ESG imperatives. Another explanation could be that segments with bad ESG scores disproportionally influence overall ESG scores compared to their segment sales or assets share. This opens a new research avenue in understanding the intriguing dynamics of strategic decisions on firm value and how to improve them.

An interesting possible extension of this study involves exploring whether firms adopt diversification strategies to enhance their overall ESG performance. This hypothesis could be especially true for companies with low ESG performance, that try to diversify into high ESG scores segments. This research offers initial empirical insights into the excess ESG discount resulting from such a diversification strategy.

There are some limitations to this study. Firstly, it utilizes the methodology introduced by Berger and Ofek (1995) to measure the corporate diversification discount by calculating excess value using stand-alone companies as a measure of the industry median. However, it has been indicated that for many segments, the discount measured already existed as a stand-alone firm before being acquired (Graham, Lemmon, and Wolf 2002). Further research could explore alternative ways of methodologies to address these nuances.

Furthermore, this study relies on the Compustat historical segments database, which has certain limitations. For example, only 13% of the concentration measures built with Compustat data correlate with the corresponding US Census measures and findings indicate that “Compustat-based industry concentration measures may lead to incorrect conclusions” (Ali, Klasa, and Yeung 2009, 3841; Keil 2017). Future studies should explore alternative databases to build variables on a business segment level.

Finally, as described in *2.2.3. ESG trend: ratings and scores*, the calculation and credibility of ESG scores remain subjects of ongoing debate. To address these concerns in future research, incorporating multiple ESG rating agencies or considering alternative ESG metrics could provide a more robust understanding of the relationship between diversification and firm performance.

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Appendix

Table 1: List of abbreviations with respective meanings used in this study.

Abbreviation	Meaning
CAPEX	Capital Expenditures
CSR	Corporate Social Responsibility
EBIT	Earnings before Income Taxe
ESG	Environmental, Social & Governance
EV	Excess Value
GHG	Greenhouse Gas
KOPSI	Korean Stock Price Index
M&A	Mergers & Acquisitions
MSCI	Morgan Stanley Capital International
NAICS	North American Industry Classification System
UN	United Nations
WRDS	Wharton Research Database

Table 2: Distribution per fiscal year between specialized and diversified firms from merged Compustat segments and Compustat fundamental annual data observations.

Year	Specialized Firms		Diversified Firms		Total
	n	%	n	%	
2000	2946	74%	1039	26%	3985
2001	2777	74%	965	26%	3742
2002	2674	74%	952	26%	3626
2003	2590	74%	928	26%	3518
2004	2569	74%	914	26%	3483
2005	2519	74%	906	26%	3425
2006	2460	74%	865	26%	3325
2007	2495	74%	860	26%	3355
2008	2430	75%	831	25%	3261
2009	2361	75%	800	25%	3161
2010	2330	76%	743	24%	3073
2011	2313	76%	717	24%	3030
2012	2289	76%	739	24%	3028
2013	2230	75%	731	25%	2961
2014	2175	75%	728	25%	2903
2015	2077	74%	721	26%	2798
2016	2022	74%	713	26%	2735
2017	2034	76%	650	24%	2684
2018	2040	77%	610	23%	2650
2019	2155	79%	589	21%	2744
2020	2136	80%	534	20%	2670
2021	2193	80%	538	20%	2731
2022	2125	80%	527	20%	2652
2023	167	87%	26	13%	193
Total	54107	75%	17626	25%	71733

Table 3: Distribution per fiscal year between specialized and diversified firms of the final data sample.

Year	Specialized Firms		Diversified Firms		Total
	n	%	n	%	
2002	329	60%	216	40%	545
2003	350	62%	216	38%	566
2004	363	62%	223	38%	586
2005	384	63%	221	37%	605
2006	402	66%	206	34%	608
2007	432	65%	229	35%	661
2008	450	66%	233	34%	683
2009	454	66%	235	34%	689
2010	481	66%	244	34%	725
2011	507	67%	245	33%	752
2012	524	67%	263	33%	787
2013	560	67%	278	33%	838
2014	586	68%	275	32%	861
2015	615	69%	280	31%	895
2016	652	69%	296	31%	948
2017	696	70%	297	30%	993
2018	774	73%	288	27%	1062
2019	867	75%	288	25%	1155
2020	893	76%	276	24%	1169
2021	898	77%	272	23%	1170
Total	11217	69%	5081	31%	16298

Table 4: Key Compustat Variables used in this study and their descriptions (Standard & Poor's 2022).

Variable Name	Compustat-Variable Description
gvkey	This item is a unique identifier and primary key for each company in the database.
fyear	This item represents the fiscal year of the current fiscal year-end month. If the current fiscal year-end month falls in January through May, this item is the current calendar year minus 1 year. If the current fiscal year-end month falls in June through December, this item is the current calendar year.
at	This item represents the total value of assets reported on the Balance Sheet.
sid	This item represents a unique identifier code for every segment reported by a company that is classified as either an operating, state or business segment type.
naics	This item represents North American Industrial Classification System codes.
sale	This item represents gross sales, the amount of actual billings to customers for regular sales completed during the period, reduced by cash discounts, trade discounts, and returned sales and allowances for which credit is given to customers. This item is scaled in millions.
csho	This item represents the net number of all common shares outstanding at year-end, excluding treasury shares and scrip. For foreign companies trading on a U.S. exchange, this item represents the number of American Depositary Receipts or American Depositary Shares.
ebit	This item is the sum of Sales - Net (SALE) minus Cost of Goods Sold (COGS) minus Selling, General & Administrative Expense (XSGA) minus Depreciation/Amortization (DP).
dlc	This item represents the total amount of short-term notes and the current portion of long-term debt (debt due in one year).
dltt	The item represents debt obligations due more than one year from the company's balance sheet date.
capx	This item represents cash outflow or the funds used for additions to the company's property, plant and equipment, excluding amounts arising from acquisitions, reported in the Statement of Cash Flows (Format Code = 7).
prcc_f	This item represents the absolute close transactions during the year for companies on national stock exchanges and bid prices for over-the-counter issues.

Table 5: Calculations of key variables, using Compustat and Refinitv variables. See Table 2, appendix for Compustat variables definition

Variable Name	**Calculations using Compustat and Refinitv variables**
EBITsa	ebit / sale
CAPEXsa	capx / sale
size	ln(at)
actualvalue	prcc_f*csho+dlc+dltt
valuesales	actualvalue/segment_sales
indmedian_sales	median(valuesales)
valueassets	atualvalue/segment_assets
indmedian_assets	median(valueassets)
imputedvalue_sales	indmedian_sales*segment_sales
imputedvalue_assets	indmedian_assets*segment_assets
diff_sales	1-(total_segment_sales/sale)
diff_assets	1-(total_segment_assets/at)
Gross_imputedvalue_sales	imputedvalue_sales*(1+diff_sales)
Gross_imputedvalue_assets	imputedvalue_assets*(1+diff_assets)
EV_sales	ln(actualvalue/Gross_imputedvalue_sales)
EV_assets	ln(actualvalue/Gross_imputedvalue_assets)
ESGsales	ESGscore/segment_sales
Indmedian_ESG	median(ESGsales)
Imputedvalue_ESG	indmedian_ESG*segment_sales
Gross_imputedvalue_ESG	imputedvalue_ESG*(1+diff_sales)
EV_ESG	ln(ESGscore/Gross_imputedvalue_ESG)

Table 6: Detailed description of the methodology to calculate the main dependent and independent variables

Variable Name	**Description**
Excess value	The dependent variable used in this study is Excess Value. Excess Value is calculated as defined by Berger and Ofek (1995) as the natural logarithm of the actual value divided by its gross imputed value per firm-year observation. The imputed value is the sum of the segment sales multiplied by the industry median. The industry median has been calculated using a group of at least 5 specialized firms in the same industry (at the 6, 5, 4, 3 or 2 digit NAICS code level), and is calculated as the median of the actual value divided by the segment sales. The Excess Value formula was also adapted to account for non-reported segments by calculating the gross imputed value by adding the difference in the sum of segment sales and total sales of the company per year (a difference that should not be bigger than 5%) (Çolak 2010; Hoechle et al. 2012; Kuppuswamy and Villalonga 2016). The Excess Value variable has been winsorized at the 1 and 99 levels to eliminate the effect of outliers using the command winsor2 on Sata (Ahn, Denis, and Denis 2006; Lian 2020).
ndistinct	Represents the number of distinct business segments per firm-year using NAICS at the 6-digit code level.
herfindahl	Represents the Herfindahl-Hirschman index (Hirschman 1964) and is calculated as follows, where n is the number of distinct business segments at the 6-digit level NAICS code: **(1)** $Herfindahl = \sum_{s=1}^{n} \frac{Segment\ Sales^2}{Total\ Sales}$.
tentropy	Represents the concentration of diversification (Jacquemin and Berry 1979; Fuente and Velasco 2020) and calculated as follows: **(2)** $Tentropy = \sum_{s=1}^{n} \frac{Segment\ Sales}{Total\ Sales} * \ln\left(\frac{1}{Segment\ Sales / Total\ Sales}\right)$.
size	Represents a firm's size and is calculated as the natural logarithm of the total assets of the firm.
EBITsales	Measures the profitability of the firm as the EBIT divided by the total sales.
CAPEXsales	Measures the investments made by the company as the CAPEX divided by the total sales.
ESGDisclosure	The Disclosure Dummy is equal to one for companies that disclose ESG-related data and zero otherwise. A firm is considered to disclose ESG data if a Refinitv ESG score exists.
ESGDummy	This dummy is based on ESG scores from Refinitiv, which take a value between 0 and 100, 100 being the best score. The dummy variable takes the value of 1 if the firms' ESG scores are above the sample mean and zero otherwise. The sample mean of the dataset used in this study is 39.59.
RelatednessDummy	Relatedness is calculated as in previous studies (Berger and Ofek 1995; Fuente and Velasco 2020) using the measure of related entropy developed by Jacquemin and Berry (1979). Related entropy equals to the tentropy minus the unrelated tentropy for segments defined at the 2-level digit NAICS code, both calculated as in equation **(2)**. In a next step, a relatedness dummy is calculated, taking the value of one for firms that are above the sample mean entropy relatedness, and zero otherwise. This sample mean takes the value of 0.10.
DivDummy	Represents the Diversification Dummy, which is equal to 1 for diversified companies (i.e. with ndistinct > 1) and 0 for specialized firms.

Table 7: Fixed Effects Regression analysis with dependent variable Excess Value (Sales EV winsorized) and respectively independent variable (1) *ndistinct* (2) *herfindahl* and (3) *tentropy* and interaction terms (1) *ndistinct**ESGscore* (2) *herfindahl* ESGscore* (3) *tentropy* ESGscore* with control variables and robust standard errors.

	EXCESS VALUE		
	(1)	(2)	(3)
ndistinct	-0.110***		
	(0.025)		
herfindahl		0.562***	
		(0.120)	
tentropy			-0.349***
			(0.070)
DivDummy			
ndistinct*ESGscore	0.001**		
	(0.000)		
Herfindahl_ESGscore		-0.005**	
		(0.002)	
Tentropy_ESGscore			0.003**
			(0.001)
ESGscore	-0.002*	0.004*	-0.001
	(0.001)	(0.002)	(0.001)
size	0.063***	0.064***	0.066***
	(0.018)	(0.018)	(0.018)
EBITsales	-0.284***	-0.286***	-0.286***
	(0.035)	(0.035)	(0.035)
CAPEXsales	0.684***	0.680***	0.679***
	(0.073)	(0.073)	(0.073)
Constant	-0.267	-0.938***	-0.388**
	(0.147)	(0.189)	(0.145)
Observations	8905	8905	8905
R^2	0.701	0.702	0.702
Adjusted R^2	0.648	0.648	0.649
Control variables	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 8: Fixed Effects Regression analysis with dependent variable Excess Value (Assets EV winsorized) and respectively independent variable (1) *ndistinct* (2) *herfindahl* and (3) *tentropy* with control variables and robust standard errors.

	EXCESS VALUE		
	(1)	(2)	(3)
ndistinct	-0.018		
	(0.009)		
herfindahl		0.092*	
		(0.046)	
Tentropy			-0.056*
			(0.028)
Size	-0.116***	-0.116***	-0.116***
	(0.009)	(0.009)	(0.009)
EBITsales	0.140***	0.140***	0.140***
	(0.020)	(0.020)	(0.020)
CAPEXsales	0.166***	0.166***	0.166***
	(0.043)	(0.043)	(0.043)
Constant	0.962***	0.855***	0.945***
	(0.068)	(0.083)	(0.068)
Observations	14960	14960	14960
R^2	0.571	0.571	0.571
Adjusted R^2	0.524	0.524	0.524
Control variables	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 9: Fixed Effects Regression analysis with dependent variable Excess Value (Assets EV winsorized) and respectively independent variable (1) *ndistinct* (2) *herfindahl* and (3) *tentropy* and interaction terms (1) *ndistinct*Diclosuredum* (2) *herfindahl* Diclosuredum* (3) *tentropy* Diclosuredum* with control variables and robust standard errors.

	EXCESS VALUE		
	(1)	(2)	(3)
ndistinct	-0.054***		
	(0.007)		
herfindahl		0.230***	
		(0.029)	
tentropy			-0.153***
			(0.018)
ndistinct*Disclosure	0.010		
	(0.008)		
Herfindahl*Disclosure		-0.045	
		(0.043)	
Tentropy*Disclosure			0.028
			(0.025)
Disclosure	0.112***	0.166***	0.122***
	(0.017)	(0.040)	(0.012)
size	-0.105***	-0.105***	-0.104***
	(0.005)	(0.005)	(0.005)
EBITsales	0.214***	0.214***	0.214***
	(0.013)	(0.013)	(0.013)
CAPEXsales	0.095***	0.096***	0.096***
	(0.016)	(0.016)	(0.016)
Constant	0.678***	0.396***	0.623***
	(0.035)	(0.046)	(0.035)
Observations	51050	51050	51050
R^2	0.581	0.581	0.581
Adjusted R^2	0.518	0.518	0.518
Control variables	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 10: Fixed Effects Regression analysis with dependent variable Excess Value (Assets EV winsorized) and respectively independent variable (1) *ndistinct* (2) *herfindahl* and (3) *tentropy* and interaction terms (1) *ndistinct*ESGdum* (2) *herfindahl*ESGdum* (3) *tentropy*ESGdum* with control variables and robust standard errors.

	EXCESS VALUE		
	(1)	(2)	(3)
ndistinct	-0.001		
	(0.014)		
herfindahl		0.037	
		(0.073)	
Tentropy			-0.011
			(0.043)
ndistinct*ESGdum	0.006		
	(0.011)		
Herfindahl*ESGdum		-0.059	
		(0.051)	
Tentropy*ESGdum			0.019
			(0.029)
ESGdummy	0.023	0.083	0.028^{*}
	(0.021)	(0.047)	(0.014)
Size	-0.181^{***}	-0.179^{***}	-0.181^{***}
	(0.015)	(0.015)	(0.015)
EBITsales	0.116^{***}	0.116^{***}	0.116^{***}
	(0.023)	(0.023)	(0.023)
CAPEXsales	0.140^{*}	0.138^{*}	0.140^{*}
	(0.055)	(0.055)	(0.055)
Constant	1.553^{***}	1.504^{***}	1.548^{***}
	(0.120)	(0.147)	(0.121)
Observations	8895	8895	8895
R^2	0.690	0.690	0.690
Adjusted R^2	0.635	0.635	0.635
Control variables	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 11: Fixed Effects Regression analysis with dependent variable Excess Value (Assets EV winsorized) and respectively independent variable (1) *ndistinct* (2) *herfindahl* and (3) *tentropy* and interaction terms (1) *ndistinct*ESGdum* (2) *herfindahl*ESGdum* (3) *tentropy*ESGdum* and (1) *ndistinct*ESGdum*REDum* (2) *herfindahl*ESGdum*REdum* (3) *tentropy*ESGdum*REdum* with control variables and robust standard errors.

	EXCESS VALUE		
	(1)	(2)	(3)
ndistinct	-0.004		
	(0.016)		
herfindahl		0.090	
		(0.089)	
Tentropy			-0.020
			(0.050)
ndistinct*ESGdum	0.011		
	(0.015)		
Herfindahl*ESGdum		-0.103	
		(0.059)	
Tentropy*ESGsum			0.018
			(0.041)
Ndistinct*ESGdum*REdum	-0.006		
	(0.012)		
Herfindahl*ESGdum*REdum		-0.078	
		(0.051)	
Tentropy*ESGdum*REdum			-0.000
			(0.046)
ESGdummy	0.018	0.130^{*}	0.029^{*}
	(0.023)	(0.056)	(0.014)
REdummy	0.019	0.046	0.014
	(0.033)	(0.038)	(0.034)
Size	-0.182^{***}	-0.180^{***}	-0.181^{***}
	(0.015)	(0.015)	(0.015)
EBITsales	0.117^{***}	0.116^{***}	0.116^{***}
	(0.023)	(0.023)	(0.023)
CAPEXsales	0.141^{**}	0.143^{**}	0.141^{*}
	(0.055)	(0.055)	(0.055)
Constant	1.559^{***}	1.456^{***}	1.550^{***}
	(0.120)	(0.154)	(0.121)
Observations	8895	8895	8895
R^2	0.690	0.690	0.690
Adjusted R^2	0.635	0.635	0.635
Control variables	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 12: Years Fixed Effects Regression analysis with dependent variable Excess Value (Sales EV winsorized) and respectively independent variable (1) *ndistinct* (2) *herfindahl* and (3) *tentropy* with control variables and robust standard errors.

	EXCESS VALUE		
	(1)	(2)	(3)
ndistinct	-0.126***		
	(0.006)		
herfindahl		0.542***	
		(0.027)	
tentropy			-0.329***
			(0.016)
Size	0.039***	0.036***	0.037***
	(0.004)	(0.004)	(0.004)
EBITsales	-0.254***	-0.250***	-0.252***
	(0.018)	(0.018)	(0.018)
CAPEXsales	0.419***	0.408***	0.408***
	(0.034)	(0.034)	(0.034)
Constant	-0.039	-0.685***	-0.148***
	(0.028)	(0.042)	(0.028)
Observations	14968	14968	14968
R^2	0.060	0.057	0.058
Adjusted R^2	0.058	0.055	0.056
Control variables	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
Firm fixed effects	No	No	No

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 13: Years Fixed Effects Regression analysis with dependent variable ESG Excess Value (based on sales multiple and winsorized) and respectively independent variable (1) *ndistinct* (2) *herfindahl* and (3) *tentropy* (4) *DivDummy* with control variables and robust standard errors.

	(1)	(2)	(3)	(4)
ndistinct	-0.287***			
	(0.014)			
herfindahl		1.124***		
		(0.057)		
tentropy			-0.707***	
			(0.034)	
DivDummy				-0.506***
				(0.026)
size	-0.395***	-0.402***	-0.400***	-0.403***
	(0.008)	(0.008)	(0.008)	(0.008)
EBITsales	-0.095***	-0.090***	-0.092***	-0.082**
	(0.027)	(0.027)	(0.027)	(0.027)
CAPEXsales	0.926***	0.901***	0.899***	0.932***
	(0.050)	(0.050)	(0.050)	(0.050)
Constant	3.183***	1.823***	2.933***	2.968***
	(0.058)	(0.094)	(0.061)	(0.061)
Observations	8345	8345	8345	8345
R^2	0.408	0.403	0.406	0.404
Adjusted R^2	0.406	0.401	0.404	0.402
Control variables	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Firm fixed effects	No	No	No	No

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 14: Years Fixed Effects Regression analysis with dependent variable Excess Value (Sales EV winsorized) and respectively independent variable (1) *ndistinct* (2) *herfindahl* and (3) *tentropy* and interaction terms (1) *ndistinct*Diclosuredum* (2) *herfindahl* Diclosuredum* (3) *tentropy* Diclosuredum* with control variables and robust standard errors.

	EXCESS VALUE		
	(1)	(2)	(3)
ndistinct	-0.140***		
	(0.005)		
herfindahl		0.564***	
		(0.020)	
tentropy			-0.363***
			(0.012)
ndistinct*Disclosure	-0.021*		
	(0.009)		
Herfindahl*Disclosure		0.087*	
		(0.038)	
Tentropy*Disclosure			-0.038
			(0.022)
Disclosure	0.208***	0.107**	0.190***
	(0.017)	(0.035)	(0.011)
size	0.087***	0.081***	0.083***
	(0.002)	(0.002)	(0.002)
EBITsales	-0.212***	-0.209***	-0.210***
	(0.012)	(0.012)	(0.012)
CAPEXsales	0.364***	0.368***	0.364***
	(0.012)	(0.012)	(0.012)
Constant	-0.494***	-1.170***	-0.615***
	(0.013)	(0.024)	(0.013)
Observations	52347	52347	52347
R^2	0.088	0.083	0.085
Adjusted R^2	0.087	0.083	0.085
Control variables	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
Firm fixed effects	No	No	No

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 15: Years Fixed Effects Regression analysis with dependent variable Excess Value (Sales EV winsorized) and respectively independent variable (1) *ndistinct* (2) *herfindahl* and (3) *tentropy* and interaction terms (1) *ndistinct*ESGdum* (2) *herfindahl*ESGdum* (3) *tentropy*ESGdum* with control variables and robust standard errors.

	EXCESS VALUE		
	(1)	(2)	(3)
ndistinct	-0.149^{***}		
	(0.011)		
herfindahl		0.613^{***}	
		(0.049)	
Tentropy			-0.382^{***}
			(0.028)
ndistinct*ESGdum	0.062^{***}		
	(0.014)		
Herfindahl*ESGdum		-0.253^{***}	
		(0.066)	
Tentropy*ESGdum			0.160^{***}
			(0.038)
ESGdummy	-0.108^{***}	0.212^{***}	-0.043^{*}
	(0.029)	(0.060)	(0.020)
Size	0.001	-0.003	-0.003
	(0.006)	(0.007)	(0.006)
EBITsales	-0.212^{***}	-0.209^{***}	-0.210^{***}
	(0.023)	(0.023)	(0.023)
CAPEXsales	0.367^{***}	0.355^{***}	0.355^{***}
	(0.039)	(0.039)	(0.039)
Constant	0.315^{***}	-0.419^{***}	0.190^{***}
	(0.049)	(0.070)	(0.048)
Observations	8937	8937	8937
R^2	0.065	0.061	0.063
Adjusted R^2	0.062	0.058	0.060
Control variables	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
Firm fixed effects	No	No	No

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 16: Years Fixed Effects Regression analysis with dependent variable Excess Value (Sales EV winsorized) and respectively independent variable (1) *ndistinct* (2) *herfindahl* and (3) *tentropy* and interaction terms (1) *ndistinct*ESGdum* (2) *herfindahl*ESGdum* (3) *tentropy*ESGdum* and (1) *ndistinct*ESGdum*REDum* (2) *herfindahl*ESGdum*REdum* (3) *tentropy*ESGdum*REdum* with control variables and robust standard errors.

		EXCESS VALUE	
	(1)	(2)	(3)
ndistinct	-0.130***		
	(0.014)		
herfindahl		0.640***	
		(0.071)	
Tentropy			-0.335***
			(0.036)
ndistinct*ESGdum	0.046*		
	(0.023)		
Herfindahl_ESGdum		-0.384***	
		(0.081)	
Tentropy_ESGdum			0.108
			(0.059)
Ndistinct*ESGdum*REdum	0.017		
	(0.017)		
Herfindahl*ESGdum*REdum		-0.225**	
		(0.075)	
Tentropy*ESGdum*REdum			0.074
			(0.062)
ESGdummy	-0.093**	0.352***	-0.042*
	(0.034)	(0.077)	(0.020)
REdummy	-0.083*	0.022	-0.065*
	(0.033)	(0.039)	(0.033)
Size	0.001	-0.003	-0.002
	(0.006)	(0.007)	(0.007)
EBITsales	-0.211***	-0.208***	-0.210***
	(0.023)	(0.023)	(0.023)
CAPEXsales	0.358***	0.360***	0.352***
	(0.039)	(0.040)	(0.039)
Constant	0.297***	-0.447***	0.190***
	(0.050)	(0.086)	(0.048)
Observations	8937	8937	8937
R^2	0.065	0.063	0.063
Adjusted R^2	0.063	0.060	0.061
Control variables	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
Firm fixed effects	No	No	No

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$