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Multiple Capitals Disclosure in European Companies' Integrated Reports: The Role of Organisational Complexity

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ABSTRACT This paper examines the association between organisational complexity and the extent of multiple capital disclosure in European companies' integrated reports. The study uses content analysis to collect data from 81 European companies that adopted the integrated reporting <IR> framework for the period 2014–2020. We proxy the extent of multiple capital disclosure by an aggregate score of natural, human, social, intellectual, manufactured, and financial capital disclosure. We analyse two forms of organisational complexity: industrial (related to the different product segments) and geographical (linked with conduction operations beyond the domestic market). The results show that industrial complexity has a significant positive association with the extent of multiple capitals disclosure, whereas geographical complexity has an insignificant positive relationship. The study concludes that organisational complexity explains the variability in the extent of multiple capitals disclosure.

Keywords: integrated capitals; disclosure; companies' complexity; European economy

1. Introduction

Integrated Reporting <IR> has emerged to the fore of corporate reporting due to the growing pressure on companies to report on how they manage their capitals to create value. The most significant contribution of <IR> is the introduction of the multiple capitals approach to corporate reporting (Sun et al., 2022). The new disclosure approach seeks to inform stakeholders about how a firm deploys all its six capitals (natural, human, intellectual, social and relationship, manufactured and financial) to achieve its goals. Though <IR> remains a voluntary endeavour in Europe and other jurisdictions, it is fast gaining prominence globally. Some scholars have shown that <IR> enhances disclosure of organisation capitals (Melloni, 2015), reduces market imperfection and information asymmetry (Anifowose et al., 2020), and increases firm value (Rinaldi et al., 2018).

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Prior research suggests that, due to greater sophistication of firm structures, organisational complexity increases information asymmetry between a firm and its stakeholders (Alhadab & Nguyen, 2018; Bushman et al., 2004). However, from the stakeholder theory perspective, firms dealing with diverse groups of stakeholders can enhance their transparency by disclosing information beyond the minimum regulatory requirements (Cannizzaro & Weiner, 2015). In contrast, the information asymmetry hypothesis suggests that complexity leads to information aggregation difficulties, which lead to lower disclosures (Bushman et al., 2004). Based on these premises, this study investigates the association between organisational complexity and multiple capitals disclosure in the context of European companies' integrated reports.

European companies are relevant in investigating the extent of capitals disclosure because <IR> is gaining acceptance among large corporations. Prior to 2016, 73% of companies in Europe had released some form of non-financial reports that are similar to integrated reports (Burke & Clark, 2016). The European firms are also relevant in organisational complexity analysis because a good number are large with industrial and geographical segments. These firms provide a suitable context for understanding complexity and capitals disclosure relationship.

The debate around the future of corporate reporting and the role of government, which started in 2011, led to the adoption of the Directive 2014/95/EU of the European Parliament and amending Directive 2013/34/EU. These Directives relate to the disclosure of non-financial and diversity information by groups and some large undertakings. The adoption of the Directive 2014/95/EU (Non-financial Reporting Directive) was perceived by the European Commission as the legal step forward concerning the implementation of the <IR> framework (Chersan, 2017).

Though European companies had for long acknowledged the importance of nonfinancial disclosure, there had not been any mandatory requirement to that effect. The new Directive together with <IR> had reinformed disclosures regarding nonfinancial and diversity information (Breijer & Orij, 2022; Korca et al., 2021). In addition, the Directive opens new research avenues aimed at understanding the interactions among accountability, disclosure and corporate characteristics.

Some scholars (such as Caglio et al., 2020; Melloni, 2015) perceive <IR> as an impression management tool rather than an instrument for transparency. Others have argue that <IR> increases transparency and information contents of financial and nonfinancial capitals (Anifowose et al., 2020). This is because the <IR> framework places emphasis on greater representation of sustainability through enhanced capitals disclosures (Setia et al., 2022). Superior disclosures benefit both investors and the company. While enhanced disclosure improves investors' ability to assess a firm's prospect, it also benefits the firm by achieving lower cost of capital.

The economics and finance literature frequently analyses industrial and geographical complexities (Alhadab & Nguyen, 2018; Bushman et al., 2004). On the one hand, industrial complexity relates to firms' diversification into different product segments, with each segment contributing significantly to the firm's total revenue. On the other hand, geographical complexity arises due to the diversification of a firm's business operations to serve international markets. Also, the literature has provided evidence on the associations between organisational complexity and information asymmetry (Albertini, 2019), firm value (Rinaldi et al., 2018; Tlili et al., 2019), and earnings management (Alhadab & Nguyen, 2018; Bushman et al., 2004; Masud et al., 2017). Prior studies have also provided guidance on the determinants of specific capitals disclosures such as intellectual capital (Kamath, 2017; Salvi et al., 2020), human capital (Möller et al., 2011), and environmental capital (Monteiro & Aibar-Guzmán, 2010).

Despite the growing interest in nonfinancial reporting research, the literature that examines the association between organisational complexity and multiple capitals disclosure remains scarce. Therefore, the primary goal of this study is to address the following research question: what is the relationship between organisational complexity and the extent of multiple capitals disclosure? The study uses content analysis to proxy the extent of multiple capitals disclosure based on

the IIRC (2013) Framework. The organisational complexity variables were measured based on the guidance of prior studies (such as Bushman et al., 2004).

In line with the stakeholder theory and contrary to the information asymmetry hypothesis, the findings indicate that industrial complexity has a significant positive relationship with the extent of multiple capitals disclosure. However, geographical complexity has an insignificant positive relationship with the extent of multiple capitals disclosure. Concerning individual capitals, industrial complexity positively relates to natural and financial capitals disclosures, whereas its association with human capital disclosure is negative. On the other hand, geographical complexity is positively related to human, social, and financial capitals disclosures. Overall, the results suggest that organisational complexity as a corporate characteristic explains the variability in the extent of multiple capitals disclosure.

The results have some practical and policy implications. The findings allude to the possibility that industrial complexity and product diversification increases voluntary disclosure in general and multiple capitals disclosure in particular. Thus, the results may be useful to the development of future integrated reporting frameworks aimed at enhancing capitals disclosures. In addition, given the low multiple capitals disclosure in geographically complex firms, there is a need for standard-setters to consider promoting specific requirements targeted at improving disclosure among firms with significant international presence.

We contribute to accounting and finance literature in many ways. First, we investigated organisational complexity effect on the extent of disclosure in integrated reports. We predicted and found that multiple capitals disclosures vary across companies depending on their degree of complexity. Second, we developed a unique measurement of all the six firms' capitals based on the IIRC (2013) Framework to capture the extent of multiple capitals disclosure. Third, in contrast to previous studies, which focus on silo approach to disclosures (Kamath, 2017; Melloni, 2015), we investigated the aggregate effect of all corporate capitals on organisational complexity. Fourth, our research departs from many disclosure studies that focused on single countries (Ahmed Haji, 2015; Albertini, 2019) and specific industries (Alhadab & Nguyen, 2018; Cannizzaro & Weiner, 2015). Our data were drawn from integrated reports of companies from nine countries and span different sectors.

The remainder of this paper proceeds as follows. Section 2 discusses the concepts of <IR>, organisational complexity, and hypotheses development. Section 3 describes the research designs and methods, and section 4 presents our results. Section 5 concludes the paper.

2. Literature Review and Hypotheses Development

2.1. Concept of Multiple Capitals Disclosure

The term 'multiple capitals' became popular due to attempts by various initiatives to extend capitals disclosure beyond the traditional financial perspective. For example, the SIGMA Project (2003) introduced five forms of capitals (natural, social, human, manufactured, and financial) by building on the triple bottom approach. In 2009, another initiative called Forum for the Future suggested the same capitals earlier introduced by the SIGMA Guidelines as a framework for sustainability. On its part, the IIRC (2013) Framework introduces the categorisation of capitals into six, known as multiple capitals. The Framework suggested 'a revised view of the concept of intellectual capital, restricting it to only one of its traditional components (i.e. structural/organisational capital) to emphasise the role exerted by the other two components, i.e. human and social/relational capital' (Doni et al., 2019, p. 171). Thus, multiple capitals disclosure refers to the information about how a firm integrates all its six financial and nonfinancial capitals to create value (Sun et al., 2022). We briefly discuss each of the six capitals as follows.

Natural capital comprises all the natural elements that either directly or indirectly contribute to human welfare (Tlili et al., 2019). It includes, for example, C02 emissions, energy consumption, amount of waste disposed and recycled wastes. Human capital disclosure focuses on the employee composition of an organisation. It typically includes disclosures about the number of employees, employee diversity, extent of commitment to training, skills and competencies, and employees in corporate e-learning, among other things (IIRC, 2013). Social capital disclosure deals with information regarding actual and potential resources acquired through a firm's network of resources (Anifowose et al., 2020). It includes *inter alia* involvement in social investments, philanthropic activities, cultural projects, and claims and lawsuits.

Unlike natural capital, manufactured capital includes resources produced and are available for use in a firm's production process. The manufactured capital disclosure includes providing information about the production of goods and services and information on building, property, and equipment infrastructure. In contrast to both natural and manufactured capital, which are the tangible organisational resources, intellectual capital refers to intangible resources in the value-creation process (Melloni, 2015). The disclosures include information about organisational change, software acquisition, investment in new technologies, and brand awareness. Lastly, financial capital disclosure comprises information about shares and bonds, equity, investments, bank deposits, and other forms of financial instruments (Anifowose et al., 2020).

The IIRC (2013) Framework is an attempt to shift management's focus away from the provision of basic information to approaching strategic reporting in a manner that will change how companies think, operate, monitor, and disclose performance in a more connected way (Pistoni et al., 2018). Previous studies have shown that firm characteristics affect the extent of disclosure in integrated reports (Möller et al., 2011; Salvi et al., 2020). Also, Anifowose et al. (2020) found that the multiple <IR> capitals disclosure affects firm value. However, prior studies have not explained how organisational complexity affects multiple capitals disclosure.

2.2. Organisational Complexity

Organisational complexity refers to the characteristics of the operations and communication processes within an organisation (Jennings et al., 2012). It describes the extent of the interaction among the various segments of the firm. As a characteristic feature, complexity occurs and grows when the interdependence of the elements within the system becomes relevant (Borah et al., 2018). In such systems, each part has a significance of its own, and the removal of a certain element from the system leads toward destruction of the existing systems' behaviour. This means that complexity varies positively with the number of elements that must be simultaneously dealt with as well as the level of activities and subsystems (Zurub et al., 2015).

Generally, previous literature discusses two types of complexity, namely industrial (product) and geographical (international). On the one hand, industrial complexity refers to a combination of diverse business operations that cut across diverse industries. Managers in diversified firms are required to obtain, consolidate and process information from each segment and make a decision accordingly (Jennings et al., 2012). This means that industrial complexity results in information aggregation problems and potentially decreases corporate transparency. On the hand, geographical complexity refers to dispersion in international segments. A firm that operates in different international markets also faces information aggregation problems resulting from cultural differences and varying customer bases. Multinational companies face information aggregation challenges due to the international dispersion of operations, currency differences, and varying legal systems (Bushman et al., 2004).

Early studies found that greater complexity leads to opaqueness in firms' activities, thereby reducing corporate transparency (Bushman et al., 2004; Dichev et al., 2012) and lowering the

quality of audited earnings (Alhadab & Nguyen, 2018). In the same vein, Lee et al. (2007) observe that because direct monitoring by principals is difficult, the scope for moral hazard increases with complexity, especially in firms with high organisation relatedness (e.g. Aguilera-Caracuel et al., 2015; Mihalache et al., 2022). The stakeholders' informational disadvantage inherent in organisational complexity increases management's incentive to pursue personal goals. However, superior disclosure reduces the scope for pursuing non-value-maximising objectives and thereby reducing agency costs (Cannizzaro & Weiner, 2015; Webb et al., 2008). Since organisational complexity increases the difficulty of corporate monitoring by external parties, there is a need for greater disclosure in corporate reports to reduce information asymmetry.

2.3. Theoretical Framework and Hypotheses Development

The existing literature provided mixed evidence on whether or not organisational complexity increases financial and non-financial information disclosures (Webb et al., 2008), and reduces information asymmetry (Albertini, 2019; Clarke et al., 2004). Meanwhile, stakeholder theory seeks to assert the importance of all corporate participants in assessing management's decisions by suggesting that the agency costs can be reduced through greater disclosures (Dilling & Caykoylu, 2019). The theory assumes that since a social contract exists between a firm and its stakeholders, companies must strive to meet the informational need of all stakeholders' by expanding disclosure to cover all aspects of firm resources (Manes-Rossi et al., 2020). Interestingly, companies are increasingly preparing their annual reports with enhanced disclosures in compliance with the IIRC (2013) Framework and other nonfinancial reporting guidelines (Cho et al., 2022).

The growing demand for <IR> can be perceived as a consequence of the stakeholder's greater demand for corporate transparency due to growing business complexity (Frias-Aceituno et al., 2014; Grassmann et al., 2019). From the stakeholder theory lens, we assume that <IR> addresses the information needs of all stakeholders. The stakeholder theory is related to the multiple components of capitals disclosure as it suggests going 'beyond compliance' on matters such as corporate transparency, lending criteria, responsible investments, human rights, corporate philanthropy, and the adoption of international standards (Batae et al., 2021). The theory is relevant in examining capitals disclosure among European companies. This is because in Europe, corporate strategies are stakeholder oriented and legal and regulatory frameworks are aimed at protecting all stakeholders and not just the shareholders (Flores et al., 2019). Therefore, the extent to which organisational complexity derives capitals disclosure among European companies can be investigated through the lens of stakeholder theory.

As mentioned earlier, the information asymmetry hypothesis assumes that due to diversification, organisational complexity is associated with low transparency because of the greater sophistication of management structure and operation (Gaur & Kumar, 2009). Also, complexity has been associated with low quality of earnings due to the higher cost of monitoring management's decisions (Jennings et al., 2012). Thus, based on the information asymmetry hypothesis, we expect that organisational complexity will lead to disclosing less information about the multiple capitals.

Meanwhile, companies are characterised by many complex structures that could influence the level of capitals disclosures. For instance, firms in the extractive industry were found to be more likely to disclose information about their environmental and corporate social responsibility (Hackston & Milne, 1996; Songini et al., 2020). In addition, Ji et al. (2015) found that internal control weaknesses were strongly correlated with factors including profitability and business complexity. This seems to support the notion that complexity increases difficulty in internal

control coordination, which could also increase opacity and monitoring difficulty by external parties.

H1: Ceteris paribus industrial (business) complexity is significantly associated with the extent of multiple capitals disclosure in European companies integrated reports.

Multinational companies are exposed to additional disclosure requirements (Gray et al., 1995; Hackston & Milne, 1996), hence they report more information to legitimise their operations abroad. The role of geographical (international) complexity in voluntary disclosure has been sparsely investigated. Webb et al. (2008) found that globalised firms engage in more voluntary disclosure in countries having weak legal environment. Also, Cahan et al. (2005) found that companies with global operations provided superior voluntary disclosure in a sample of 17 countries.

In addition, Cannizzaro and Weiner (2015) hypothesised that globally diversified firms disclose more information about cross-border investments than domestic firms. They found that globally diversified firms disclosed less information in cross-border transactions. However, the firms disclosed more when societal expectations were high and less when faced with political risk.

H2: Ceteris paribus, geographical (international) complexity is significantly associated with the extent of multiple capitals disclosure among European companies integrated reports.

We stated both hypotheses in a non-directional way because positive and negative directions are predicted by the stakeholder theory and information asymmetry hypothesis, respectively.

3. Research Design

3.1. Sample and Data Sources

We employed a quantitative research design to test our hypotheses. The data were collected from the <IR Examples> database, which provides integrated reports of all companies that prepare their annual reports consistent with the IIRC (2013) Framework. The initial population comprised 182 European companies. However, as this study focuses on organisational complexity, we dropped 42 companies that did not provide industrial and/or geographical segment disclosures. To obtain balanced panel data, we filtered 59 companies that did not have integrated reports for all the seven (7) years (2014–2020). The final sample comprised 81 European companies (567 firm-year observations) that cut across nine countries, including UK (England, Wales and Ireland), Netherlands, Germany, Sweden, Austria, Italy, and Sweden. Since the IIRC framework was introduced in 2013, the 2014 financial year serves as the first year for the disclosure to be informed by <IR> (Manes-Rossi et al., 2020).

3.2. Model Specification

This study used a panel instead of cross-sectional regression analysis because of the expected variability of the dependent variable over time. Accordingly, we run both the fixed and random effect regression analyses. We also conducted the Hausman's (1978) specification test, and the result favours the random effect analysis. Furthermore, we conducted the Lagrangian Multiplier test, and the result indicated the absence of panel effect in the data, suggesting that the Ordinary Least Square (OLS) regression is more appropriate for our analysis. Consequently, we use OLS regression with robust standard errors to solve the potential effect of heteroscedasticity in the analyses. We use the following regression equation to test the

hypotheses.

$$MUL\_CAP_{it} = \theta_0 + \theta_1 IND\_COMP_{it} + \theta_2 GEO\_COMP_{it} + \theta_3 F\_SIZ_{it} + \theta_4 PROF_{it} + \theta_5 B\_SIZ_{it} + \theta_6 B\_IND_{it} + \theta_7 GEN\_DIV_{it} + \theta_8 DUAL_{it} + \varepsilon_{it}$$

Table 1 presents a detailed definition of the symbols and measurement of variables.

Table 1. Multiple Capitals Disclosure checklist.

S/N	Type of Capital		Disclosure Items
1.	Natural Capital	1	CO2 emissions
		2	Energy consumption
		3	Amount of waste disposed
		4	Environmental accidents
		5	Recycled waste
		6	Investment in environmental protection
		7	Biodiversity and ecosystem
2.	Human Capital	8	Number of employees
		9	Employee diversity
		10	Investment in training
		11	Number of employees in corporate e-learning
		12	Average employee age
		13	Training days per employee
		14	Employee wage ratio
		15	Employee survey results
		16	Injuries per million working hours
		17	Rate of absenteeism
		18	Severance rate
3.	Social Capital	19	Great-Place-Work for employees ranking
		20	Number of volunteers
		21	Claims/lawsuits
		22	Involvement in social actions
		23	Involvement in cultural projects
		24	Customer satisfaction index
		25	Investment in customer relationship
		26	Investment in other philanthropic activities
4.	Intellectual Capital	27	Number of patent applications filed
		28	Expenditure on organisational change
		29	Money spent on research and development
		30	Brand awareness
		31	Number of new products developed
		32	Employee skills and knowledge
		33	Expenditure on software development for internal systems
		34	Sales generated by R & D-driven products
5.	Manufactured Capital	35	Production of goods and services
		36	Information on buildings
		37	Information on property
		38	Information on equipment
		39	information on infrastructure (roads, bridges, waste equipment etc.)
6.	Financial capital	40	information on debt capital
		41	information on equity share capital
		42	information on government grants
		43	Information on investments

3.3. Measurement of Variables

3.3.1 Dependent Variable

We measured the extent of multiple capitals disclosures (*MUL_CAP*) based on the IIRC (2013) Framework, which indicates the disclosure requirements for each of the six corporate capitals. Also, building on prior literature, such as Anifowose et al. (2020) and Abang et al. (2020), we employed a detailed scoring scheme to measure the extent of multiple capitals disclosure. A total of 43 disclosure items encompassing all the multiple capitals are required to be present in integrated reports: 7 items for natural capital, 11 for human capital, 8 for social capital, 8 for intellectual capital, 5 for manufactured capital, and 4 for financial capital. We assigned a value of 1 when a firm discloses each of the items in its annual report and 0 otherwise. The disclosure value ranged from 0 (no disclosure) to 43 (maximum disclosure). A firm that disclosed 40 out of the 43 items, for example, provided superior multiple capitals disclosure than one that provided information on 35 items.

We manually scored the companies separately and compared our scoring afterwards. We acknowledge that this approach may suffer from inherent bias associated with content analysis. To overcome this weakness, the authors employed the inter-rater reliability approach suggested by Elo et al. (2014). Two people separately coded a sample of 10 firms on the list of the < IR > Example database and later reconciled the difference. This was to ensure consistency of the scoring and the multiple capitals measurement.

For each of the multiple capitals, we divided the total firm's score by the maximum score obtainable. For example, if a firm disclosed 5 out of the 7 items under natural capital, the firm's disclosure score for that capital is 0.71 (5 divided by 7). Under intellectual capital for example, we coded 1 for a company that provides information about brand awareness and 0 if not. The same procedure was employed for other aspects of the capital such as the number of patent applications filed, expenditure on organisational change and money spent on research and development. Thus, to obtain a firm's multiple capitals disclosure for a particular year, we divided a firm's total disclosure by the maximum disclosure obtainable (x divided by 43). These variables' measurements are consistent with Anifowose et al. (2020).

Table 2 below shows the disclosure requirements of each of the multiple capitals.

Table 2. definition and measurement of variables.

Variable	Definition	Measurement	Nature
MUL_CAP	Multiple Capitals Disclosure	Disclosure index	Dependent Variable
IND_COMP	Industrial complexity	Sum of squares of product segment sales divided by total firm sales	Independent Variable
GEO_COMP	Geographical complexity	Sum of squares of geographical (international) segment sales divided by total firm sales	Independent Variable
F_SIZ	Firm size	Natural logarithm of total assets	Control Variable
PROF	Profitability	Return on Assets, i.e. Earnings Before Interest and Tax (EBIT) divided by total assets	Control Variable
B_SIZ	Board size	Number of directors on the board	Control Variable
B_IND	Board independence	Ratio of non-executive directors to board size	Control Variable
GEN_DIV	Gender Diversity	Ratio of female directors to board size	Control Variable
DUAL	Duality	Dummy variable equals 1 if there is CEO and Chairman role separation and 0 otherwise	Control Variable
$\varnothing_0$ - $\varnothing_5$	Parameters to be estimated.		

3.3.2 Independent Variables

Consistent with Jennings et al. (2012), we measured complexity as an indicator variable, where high complexity is represented by one (zero) for firm-year observations with above (below) the median first principal component of the proportion of segment sales to total sales of the firm.

$$\sum_{\text{industry}=1}^{n}\left(\frac{\text{Sales}_{\text{Segment}}}{\text{Total Firm Sales}}\right)^{2}$$

The measure ranges between 0 and 1. Higher values of these indices imply more industry and segment sales concentration and, therefore, less complexity. This is because when activities are concentrated in one or few segments, there is less coordination challenges. Thus, a value of '0' represents complex firms and '1' otherwise. Many previous studies have used this measurement to proxy organisational complexity (Bushman et al., 2004: Jennings et al., 2012; Masud et al., 2017).

Firstly, we measured industrial complexity (IND_COMP) as the sum of squares of product segment sales divided by total firm sales. Mathematically, $IND\_COMP = \sum_{industry=1}^{n}\left(\frac{Sales_{Industry\,Segment}}{TotalFirm\,Sales}\right)^{2}$. We also employed an alternative measure of industrial complexity as the number of business (product) segments in line with previous studies (Masud et al., 2017).

Similarly, we measured geographical complexity (GEO_COMP) as the sum of squares of geographical (international) segment sales divided by the total firm sales. This means that $GEO\_COMP = \sum_{industry=1}^{n}\left(\frac{Sales_{GeographicalSegment}}{TotalFirm\,Sales}\right)^{2}$. In addition, we used an alternative measure of geographical complexity, which is the number of geographical (international) segments (see Masud et al., 2017).

3.3.3 Control variables

To avoid misspecification of the regression model, we controlled for firm size and profitability. Many studies have demonstrated that these variables impact corporate disclosure (Ahmed Haji, 2015; Lopatta et al., 2017; Terblanche & De Villiers, 2019; Vitolla et al. 2020b). We measured firm size (F_SIZ) as the natural logarithm of a total asset to control for the possible difference in disclosure practices due to asset standing. We proxied profitability (PROF) by Return on Assets (ROA), measured as Earnings Before Interest and Tax (EBIT) divided by total assets. Since the process of providing quality information and hiring the right personnel are costly (Frias-Aceituno et al., 2014), profitable firms deploy more resources to provide the required data.

In addition, we controlled for corporate governance variables such as board size (B_SIZ), board independence (B_IND), gender diversity (GEN_DIV) and CEO-Chairman role separation (DUAL). This is because different governance structures have been found to influence the extent of corporate disclosure (Vitolla et al., 2020a; Lopatta et al., 2017).

Other corporate governance variables such as audit quality and specialised board committees have been shown to impact disclosure (Vitolla et al., 2020b; Dilling & Caykoylu, 2019). In this article, we controlled for variables that are prominent in the <IR> literature and have significant variability across the sampled firms. For example, we did not control for audit quality because our initial observation revealed that over 90% of the companies in our sample were clients to the Big4 auditors. Nevertheless, the selected control variables were considered most relevant for our analyses.

4. Results and Discussion

4.1. Descriptive Analysis

Table 3 presents the descriptive analysis of the variables.

Table 3 shows that the average multiple capitals disclosure is 0.727, indicating high disclosure among the firms. The minimum and maximum disclosures are 0.432 and 0.955, respectively. Industrial complexity has a mean of 0.447, a minimum of 0.115 and a maximum of 0.872, indicating that most companies have a high degree of complexity. Geographical complexity has a lower mean (0.316) compared to industrial complexity, suggesting that the sample firms are more complex across international markets. The greater degree of geographical complexity of the sampled companies is further evidenced by a lower minimum 0.027 and maximum of 0.985.

Firm size has a mean of 7.425, with a minimum and maximum of 6.178 and 8.470, respectively. The average profitability (return on assets) of the firms during the period of study is 6.0% (0.060). Board size averages 11 members. The company with the largest board has 20 directors, while the smallest board has 8 members. Board independence has a mean of 0.622, indicating that more than half of the board members are non-executive directors. The mean of gender diversity is 0.218, indicating that women represent 21.8% of the total boards size. This means that women participation on the boards of European companies is below average. Furthermore, most of the firms in the sample (64%) have separate CEO and Chairman roles.

The results of the skewness and kurtosis values indicate that the data are normally distributed. For instance, the kurtosis values for all variables are consistently below 3 and skewness values are between −1 and +1, suggest that the data exhibit a normal pattern. These results show that regression analysis is appropriate for testing the hypothesised relationships.

As part of the descriptive analysis, we examined the changes in the multiple capitals disclosure over the period of 2014–2020.

Figure 1 demonstrates an overall improvement in the multiple capitals disclosure since the adoption of the <IR> framework in 2014. The year 2020 witnessed the highest disclosure as companies met about 76% of the total disclosure requirement. This is greater than the year of initial adoption (2014) by 6%. It seems that European companies are gradually improving on the extent of disclosure in line with the IIRC framework. This improvement reflects the growing acceptance of <IR> by companies across the globe. The result supports the submission of Cho et al. (2022) that disclosure quantities increased following the EU Non-Financial Disclosure (Directive 2014/95/EU).

Table 3. Descriptive statistics.

Variables	Mean	SD	Minimum	Maximum	Skewness	Kurtosis
MUL_CAP	0.727	0.123	0.432	0.955	−0.089	2.386
IND_COMP	0.447	0.209	0.115	0.872	0.064	2.064
GEO_COMP	0.316	0.198	0.027	0.982	1.014	3.046
F_SIZ	7.425	0.548	6.178	8.470	0.300	2.348
PROF	0.060	0.047	−0.076	0.161	0.098	2.701
B_SIZ	11	3.189	8	20	1.306	3.423
B_IND	0.622	0.059	0.461	0.727	−0.113	2.146
GEN_IND	0.287	0.123	0.137	0.567	0.772	2.493
DUAL	0.639	0.482	0	1	−0.581	1.337
n	567	567	567	567	567	567

Note: SD is Standard Deviation.

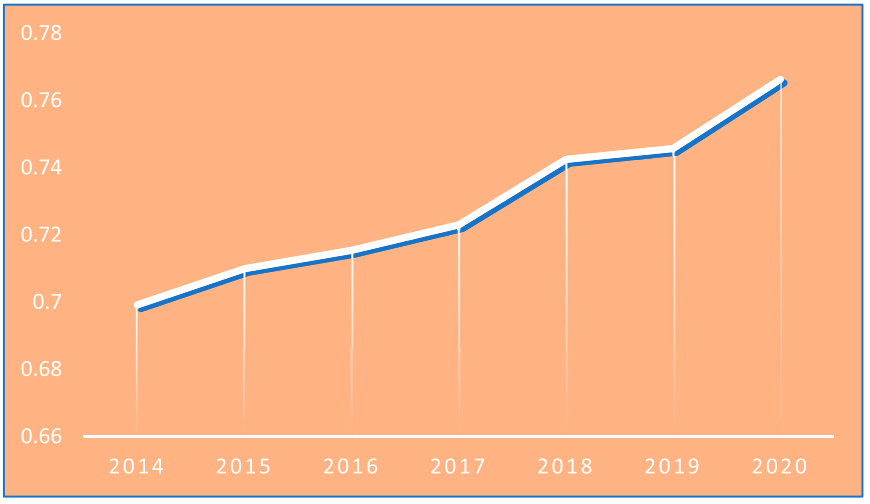

Figure 1. Yearly change in multiple capitals disclosures.

4.2. Correlation analysis

Table 4 presents the result of the correlation analysis.

The results in Table 4 show no excessive correlation among the organisational complexity and control variables as the highest correlation value is 0.290 (for industrial complexity and board independence). According to Gujarati (2004), correlation values less than 0.80 indicate absence of multicollinearity. Nevertheless, we tested for multicollinearity by examining the Variance Inflation Factor (VIF). All the VIF values are between 1.04 and 1.17, suggesting lack of harmful multicollinearity among the variables. Generally, VIF values less than 10 indicate absence of exact correlation between variables (Salvi et al., 2020).

4.3. Basic Analysis

Table 5 presents the OLS regression results.

The results in Table 5 shows that the OLS regression model has coefficient of determination (R2) of 0.6679, suggesting that organisational complexity and the control variables explain about 67% variation of multiple capitals disclosure. The F probability of 78.45 is significant at the 1% level, indicating that the model is adequate. The coefficients of determination for the fixed effect and random effect regressions are 0.6679 and 0.6057, respectively.

The result supports H1 that industrial complexity is significantly associated with the extent of multiple capitals disclosure ($\beta = 0.014$, $p = .000$). This implies that firms that are complex product-wise disclose more information about multiple capitals. However, the result does not support H2 by showing that geographical complexity has an insignificant positive association with the extent of multiple capitals disclosure ($\beta = 0.001$, $p = 0.180$). This result suggests that firms with greater international presence do not disclose superior information about multiple capitals.

Regarding the control variables, the results show that firm size has a significant negative association with the extent multiple capitals disclosure. This implies that because larger companies may be having difficulty in aggregating information about their capitals, they provide less disclosure. Surprisingly, profitability does not appear to be significantly associated with multiple capitals

Table 4. Correlation matrix.

Variable	*IND_COMP*	*GEO_COMP*	*F_SIZ*	*PROF*	*B_SIZ*	*B_IND*	*GEN_DIV*	*DUAL*	VIF
IND_COMP	1.000								1.13
GEO_COMP	0.144	1.000							1.04
F_SIZ	−0.240	−0.088	1.000						
PROF	−0.106	−0.076	−0.101	1.000					1.04
B_SIZ	−0.223	0.257	0.210	−0.317	1.000				
B_IND	−0.290	−0.004	0.170	−0.021	0.156	1.000			
GEN_DIV	−0.157	−0.058	0.023	−0.217	0.283	0.189	1.000		1.07
DUAL	0.239	0.187	−0.025	−0.079	−0.085	−0.145	0.168	1.000	1.17

disclosure. It is expected that since <IR> is costly, companies with superior profit figures will dedicate more resources to gather disclosure data. Nevertheless, the result points to the possibility that profitable firms may be reluctant to impress their stakeholders through capitals disclosure. The table further reveals that companies with large board sizes, having greater female presence on their boards, and segregated CEO and Chairman role provide superior capitals disclosure.

The fixed effect and OLS regression results for industrial complexity are similar. However, geographical complexity becomes significant at the 10% level in the fixed effect regression result. The results for the control variables remain largely the same for all three models. For instance, firm size remains negative and significant, profitability positive and insignificant, and board size positive and significant. However, board independence is insignificant in the fixed effect model, gender diversity insignificant in the random effect result, while duality is significant at the 10% level in the random effect analysis. Overall, the results suggest that the choice of a regression model does not appear to significantly affect the outcomes.

4.4. Additional Analyses

We tested the possibility that previous years' organisational complexity variables may impact current aggregate score of the multiple capitals disclosure. Table 6 below presents the panel regression with lagged predictors.

Table 5. OLS, Fixed Effect and Random Effect regression results for predictors in the same period.

Variable	OLS Coef. (*p*-value)	Fixed effect Coef. (*p*-value)	Random effect Coef. (*p*-value)
Constant	0.561***(0.000)	0.561***(0.000)	0.581***(0.000)
IND_COMP	0.014***(0.000)	0.014***(0.071)	0.001***(0.001)
GEO_COMP	0.001(0.180)	0.001*(0.071)	0.001(0.989)
F_SIZ	−0.047***(0.000)	−0.047***(0.000)	−0.027(0.132)
PROF	0.053(0.739)	0.053(0.732)	−0.073(0.379)
B_SIZ	0.020***(0.000)	0.020**(0.000)	0.008***(0.007)
B_IND	0.100(0.320)	0.100(0.223)	0.214**(0.018)
GEN_DIV	0.346***(0.000)	0.348***(0.000)	0.128***(0.000)
DUAL	0.065***(0.000)	0.065***(0.000)	0.029***(0.000)
R2	0.6679	0.6679	0.6057
F/Wald chi2	78.45	685.30	64.28
Prob.	0.000	0.000	0.000

Note: *** Significant at the 1% level; ** Significant at the 5% level and *Significant at the 10% level.

Table 6. Panel regression results for the first lag of organisational complexity dimensions with robust standard errors.

Variable	Coefficient	Robust Standard Error	z. Value	Prob.
Constant	0.551	0.124	4.45	0.000***
IND_COMP (L1)	0.002	0.002	1.07	0.286
GEO_COMP (L1)	0.003	0.001	0.27	0.786
F_SIZ	−0.010	0.016	−0.63	0.527
PROF	−0.010	0.090	−1.11	0.268
B_SIZ	0.009	0.004	2.47	0.014**
B_IND	0.133	0.090	1.47	0.140
GEN_DIV	0.137	0.032	4.35	0.000***
DUAL	0.028	0.017	1.65	0.098*
R2 (overall)	0.6902			
Wald chi (2)	53.81			
Prob.	0.000***			

Note: *** Significant at the 1% level; ** Significant at the 5% level and *Significant at the 10% level; *IND_COMP (L1)* is prior year industrial complexity*; GEO_COMP (L1)* prior year geographical complexity.

Based on the results in Table 6, none of the lagged organisational complexity variables is significant. For the control variables, however, previous years board size and gender diversity have significant relationships with the extent of multiple capitals disclosure. These results indicate that no significant relationship exists between previous years' organisational complexity and the extent of the multiple capitals disclosure.

Furthermore, we ran separate regressions on the role of organisational complexity on each of the multiple capitals. We employed the Hausman specification test to determine the most suitable technique regression of analysis.

Table 7 above shows coefficient of determination (R2) of 46.6% for Model 1 (natural capital disclosure), 47.27% for Model 2 (human capital disclosure), 28.61% for Model 3 (social capital disclosure), and 22.53% for Model 4 (intellectual capital disclosure). Model 5 (manufactured capital disclosure), and Model 6 (financial capital disclosure), have R2 of 8.59% and 19.29%, respectively. The results also reveal that the human capital disclosure model has the highest F. value (36.64%), while social capital disclosure has the lowest value (7.97%). The F. probabilities and the Wald chi2 demonstrate that all the models are well fitted.

The results also show that industrial complexity has significant positive associations with natural and financial capitals disclosures, while its association with human capital disclosure is negative and significant. On the other hand, geographical complexity has significant positive associations with intellectual, social, and financial capitals disclosures. The relationships between geographical complexity and intellectual and financial capital disclosures are positive and significant. These results indicate that both industrial and geographical complexity have mixed associations with the extent multiple capitals disclosure. Previous studies also reported inconsistent evidence on the association between organisational complexity and non-financial information disclosure and information asymmetry (Albertini, 2019; Clarke et al., 2004).

Furthermore, we find a significant negative relationship between firm size and natural and human capital disclosures. Profitability is positively related to human and social capital disclosures. Board size has a significant positive relationship with all capitals disclosures except for manufactured capital. The consistent positive associations indicate that board size significantly relates to the extent of multiple capitals disclosure. The influence of board independence is positively significant for natural, human and social capitals, but negatively significant for intellectual capital disclosure. Gender diversity is positively associated with all but natural and financial capitals disclosures. Duality is positively and significantly related with only human capital disclosure.

Table 7. Analysis of individual capitals disclosures.

Variable	Natural Capital	Manufactured Capital	Human Capital	Intellectual Capital	Social Capital	Financial Capital
Constant	.982	.941	.598	.557	.133	1.025
	(.000)***	(.000)***	(.000)***	(.029)**	(.430)	(.000)***
IND_COMP	.013	-.001	-.004	.002	-.002	.009
	(.000)***	(.647)	(.050)**	(.727)	(.378)	(.015)**
GEO_COMP	−.002	−.001	−0.001	.014	.003	.009
	(.057)*	(.714)	(.821)	(.000)***	(.014)**	(.000)***
F_SIZ	−.114	.008	−.149	−.032	−.017	−.042
	(.000)***	(.626)	(.000)***	(.279)	(.429)	(.129)
PROF	.016	-.177	.611	.599	.501	.401
	(.368)	(.502)	(.050)**	(.100)	(.039)**	(.191)
B_SIZ	0.007	-.004	.027	.041	.024	.019
	(.003)***	(.376)	(.000)***	(.000)***	(.000)***	(.000)***
B_IND	.748	−0.008	.480	-.780	.409	-.380
	(.000)***	(.965)	(.053)**	(.004)***	(.027)**	(.073)*
GEN_DIV	.047	.220	.490	.312	.296	.189
	(.409)	(.004)***	(.000)***	(.011)**	(.001)***	(.102)
DUAL	.037	.022	.090	.054	.011	.032
	(.092)*	(.380)	(.000)***	(.071)*	(.674)	(.366)
R2 (overall)	.4646	.0859	.4727	.2253	.2861	.1924
F./Wald chi2	20.40	2.63	28.20	9.98	7.57	6.98
	(.000)***	(.010)**	(.000)***	(.000)***	(.000)***	(.000)***
OLS/FE/RE	OLS	FE	RE	OLS	OLS	RE

Note: *** Significant at the 1% level; ** Significant at the 5% level and *Significant at the 10% level.

4.5. Diagnostic Tests

We tested for omitted variables using the Ramsey Reset test. The results, which is unreported for brevity, revealed an insignificant F probability, indicating that the model has no omitted variables. In addition, endogeneity is a potential concern in our analysis because the organisational complexity variables are not randomly determined. Due to their acceptability, <IR> compliant firms may diversify into other products (industrial complexity) and open branches in other regions (geographical complexity) giving rise to potential problem of reverse causality. To overcome this problem, we employed granger causality tests, and used lagged independent variables (industrial complexity and geographical complexity) and dependent variables (MUL_CAP) in the models. These results (also not reported) demonstrated a flow from organisational complexity to multiple capitals disclosure, but not vice versa.

4.6. Discussion of Results

We stated the hypotheses on the premise that organisational (industrial and geographical) complexity significantly affects the extent of multiple capitals disclosure. The analysis supports H1, which states that industrial complexity is significantly associated with the extent of multiple capitals disclosure. However, H2 is not supported as geographical complexity is found to have an insignificant positive association with the extent of multiple capitals disclosure.

The results partly conform to the stakeholder theory that corporate actions (such as disclosure) should aim at satisfying the needs of diverse groups of stakeholders. Accordingly, multiple capitals disclosure should be targeted at reducing information asymmetry between preparers and

users of corporate reports by providing more information about the deployment of organisational resources. However, the result on geographical complexity does not support both the stakeholder theory and information asymmetry hypotheses. We do not find evidence suggesting that geographical complexity is significantly associated with multiple capitals disclosure. The result seems to contradict the assertion that increased international presence increases managements' cost of gathering and accumulating information relevant to the stakeholders (Jennings et al., 2012).

Over and above, the findings seem to align with the stakeholder theory, which posits that management's strategy is influenced by its stakeholders. Since complex firms have diverse groups of stakeholders that are interested in their social and environmental activities, they may employ superior disclosure strategies to develop and maintain a more satisfactory relationship with all parties. Also, since<IR> provides information about how the organisational capitals are employed to drive value, different groups of stakeholders will be interested in the extent of disclosure for their decision-making. This aligns with the evidence that companies with powerful stakeholders have begun adopting disclosure strategies to maintain relevance (Lu & Abeysekera, 2014). Thus, managers view voluntary disclosure, including <IR>, as a way of achieving greater stakeholder engagements as well as providing them with an opportunity to enhance their corporate image and reputation.

The result contrasts the information asymmetry hypothesis, which predicts lower financial and nonfinancial disclosures by complex firms due to aggravated difficulty in information aggregation by managers and greater cost of monitoring by external parties. The results indicate that firms having geographical complexity firms do not significantly suffer from informational asymmetry regarding multiple capitals disclosure.

The finding of a significant positive relationship between industrial complexity and multiple capitals disclosure is consistent with the results of previous literature that found a reduction of information asymmetry as firms become more diversified (Clarke et al., 2004). However, the result does not support the notion that industrial complexity leads to a reduction in corporate transparency (Alhadab & Nguyen, 2018; Jennings et al., 2012; Ji et al., 2015) due to a greater cost of monitoring managements' decisions (Denis et al., 2002). Thus, industrial complexity does not exacerbate asymmetric information between firms and external market participants.

The finding of an insignificant positive association between geographical complexity and multiple capitals disclosure contradicts the results of (Cahan et al., 2005; Cannizzaro & Weiner, 2015; Webb et al., 2008) who showed that globalised firms disclose more voluntary information than domestic firms. The reason for this finding could be that since <IR> is voluntary among the sample companies, the geographically complex firms opt to disclose the minimum information required due to the high cost associated with information accumulation. Previous studies also showed that complexity arising from globalisation increases voluntary disclosure in countries with weak legal environment (Webb et al., 2008). Since our sample includes firms in Europe, it could be that most companies are from countries having strong legal environments, hence the finding of an insignificant relationship.

Concerning the control variables, we find that larger firms are associated with less capitals disclosures. This result is surprising, because it is expected that larger firms have more resources to be deployed for providing superior information to their stakeholders. Songini et al. (2020) contents because larger firms have greater conflict of interest among stakeholders, they disclose more voluntary information due to the need for more external funding. Nevertheless, our finding points to the possibility that large firms suffer from information aggregation problems, which lead to lower capitals disclosures.

The result of an insignificant negative effect of profitability on multiple capitals disclosure is also surprising. Nevertheless, the result suggests the possibility that profitable firms do not see

much utility in disclosing more information about corporate capital as an additional strategy to impress their investors. On the other hand, less profitable firms may seek to portray themselves as being more compliant with new reporting frameworks. Thus, the finding contradicts the notion that profitable companies disclose more voluntary information to distinguish themselves from smaller companies (Frias-Aceituno et al., 2014).

The analysis further reveals that companies having larger boards provide superior multiple capitals disclosure, suggesting that diverse experiences and boardroom discussions offered by larger boards lead to extended corporate disclosures. This finding is consistent with previous studies (Vitolla et al., 2020b; Songini et al., 2020), that board size influences the integrated reporting quality. The result for board gender diversity is consistent with the notion that firms with greater female presence on their boards are more transparent (Frias-Aceituno et al., 2014) and provide more disclosure in <IR> (Salvi et al., 2020).

5. Conclusions

In this study, we examined the association between organisational complexity and the extent multiple capitals disclosure across a sample of European companies' integrated reports. More specifically, we examined whether industrial and geographical complexities are related to multiple capitals disclosure. In line with findings from data analyses, we concluded that while industrial complexity leads to enhance capitals disclosures, geographical complexity does not.

We contribute to the literature in many ways. First, we add to accounting and finance literature by examining a relationship that has rarely been studied. We predicted and found that multiple capitals disclosures vary across companies depending on their degree of complexity. Second, we developed a unique measurement of all the six firms' capitals based on the IIRC (2013) Framework to capture the extent of multiple capitals disclosure. Third, in contrast to previous studies, which focus on silo approach to disclosures (such as environmental, social, or intellectual capitals), we captured all the six capitals into a single variable (multiple capitals disclosure) and investigated the aggregate effect of corporate capitals on organisational complexity. Fourth, our research departs from many disclosure studies that focused on single countries (Ahmed Haji, 2015; Albertini, 2019) and specific industries (Alhadab & Nguyen, 2018; Cannizzaro & Weiner, 2015). Our data are drawn from integrated reports of companies from nine countries and span different sectors.

Our results have implications for policy makers, standard-setters and practitioners. First, the findings may be useful to the development of future integrated reporting frameworks aimed at enhancing capitals disclosures. Second, policy makers may see the need for more specific disclosure requirements as firms' complexity across geographical lines increases. Third, our findings may be relevant to standard-setters (such as the IIRC) when providing guidelines for corporate disclosures. Fourth, the results may be relevant to academics as they suggest that organisational complexity is an important variable that has been scarcely considered by previous studies but has implications on the information content of integrated reports. Hence future studies on corporate disclosure should consider at least controlling for the impact of organisational complexity.

The results should be interpreted in light of its limitation. First, due to limited data, the sample consisted of only 81 European companies. Secondly, we examined the association between organisational complexity and multiple capitals disclosure in a voluntary setting. These limitations may hinder the generalisability of the findings to companies in a mandatory <IR> setting such as South Africa. As integrated reporting data becomes more available, future studies may endeavour to examine whether there is difference in organisational complexity

influence on the extent multiple capitals disclosure across different continents, and among different regulatory settings (voluntary versus mandatory).

It is noteworthy that the corporate reporting landscape is fast changing as disclosure requirements shift further away from the traditional financial reporting. Accordingly, there is a growing emphasis on improving the relevance of corporate reports through value reporting. The role of integrated reports in enhancing firm transparency may become less important in the future due to the growing popularity of the value reporting. Thus, the impact of establishment of the Value Reporting Foundation (VRF) and its engagements in further harmonisation of the extended external reporting environment maybe in the context of future research possibilities.

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