NON-FINANCIAL DISCLOSURE AND INFORMATION ASYMMETRY: A STAKEHOLDER VIEW ON U.S. FIRMS

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Keywords – Non-financial disclosure; information asymmetry; corporate social responsibility; stakeholder engagement; sustainability reporting; materiality.

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Abstract

The purpose of this paper is to test whether the structure of non-financial disclosure, defined as the diffusion of financial, social and environmental information as part of the dialogue between a firm and its stakeholders, reduce information asymmetry. We adopt a stakeholder view of the firm to analyze the structure of non-financial disclosure along three dimensions: non-financial disclosure depth, breadth and concentration. To operationalize the variables, we applied content analysis technique to non-financial reports released by U.S. firms included in S&P500 index over the period 2004 – 2014. We combined content data and Bid-Ask spread data to test our hypotheses relying on feasible least squared (FLGS) estimation method. Results show that both the level of non-financial disclosure and the breadth of stakeholder-related themes covered in the reports reduce information asymmetry. In addition, firms that are consistent in how information is distributed across the different stakeholder categories benefit from lower opacity and reduced information asymmetry. Our findings contribute to the debate on the need to move beyond a one-fits-all approach to the study of non-financial disclosure and its related impacts.

Keywords: Non-financial disclosure; information asymmetry; corporate social responsibility; stakeholder engagement; sustainability reporting; materiality.

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Introduction

Asymmetric information between firms and financial markets is commonly considered a critical determinant of negative performance outcomes. When investors lack reliable information to assess a firm, they might ask a higher return to finance it (Lambert, Leuz, & Verrecchia, 2012; Sufi, 2007). Additionally, the increased complexity in assessing the firm when information is absent or limited might bias its market evaluation, increasing the risk of hostile takeovers (Grossman & Hart, 1981). As a consequence, research has long investigated the potential mitigating effect of information directly disclosed by firms on engaging and aligning investors (García-Sánchez & Noguera-Gámez, 2017).

Early emphasis on the amount and reliability of financial and accounting information disclosed by firms (Healy & Palepu, 2001), has been steadily complemented by a focus on the effects of non-financial disclosure (Egginton & McBrayer, 2019). Non-financial disclosure, defined as the diffusion of financial, social and environmental information as part of the dialogue between a firm and its stakeholders, has grown in popularity to engage and align external audiences (Adams, 2004; Al-Shaer, 2020). By providing financial markets with additional information about how the firm organizes its activities, treats its stakeholders and generates profits, non-financial disclosure has been considered as a key element that mitigates the problems related to the asymmetric distribution of information among firms and financial markets (Cormier, Ledoux, & Magnan, 2011; Gelb & Strawser, 2001; Romero, Ruiz, & Fernandez-Feijoo, 2019).

In the discussion about how the disclosure of non-financial information might mitigate information asymmetry problems, scholars have long focused on the volume of the information released (Cui, Jo, & Na, 2018). Yet, these studies lie on the implicit assumption that disclosure is

homogenously distributed across the different stakeholder categories to which a firm is tied. Recent literature on stakeholder management and corporate social responsibility (CSR, hereafter), however, points out that firms are heterogeneous in their stakeholder management approaches (Hawn & Ioannou, 2016). Some firms, in fact, focus their activities and investments only on certain stakeholders (Boesso, Favotto, & Michelon, 2015). Similarly, firms vary in the extent to which they assign priorities to stakeholders in decision making, treating the different categories more or less equally (Talbot, Raineri, & Daou, 2020). This heterogeneity is likely to affect the non-financial information disclosed, as disclosure mirrors firm's strategies and actions (Vurro & Perrini, 2011). If this is the case, we can expect information asymmetry to be alleviated or exacerbated not only by the amount of information disclosed but also by the structure of non-financial disclosure in terms of breadth of stakeholder-related themes and relative emphasis devoted by the firm to each stakeholder category.

With the aim to extend the recent debate on the effects of the quality of non-financial disclosure (Al-Shaer, 2020; Martínez-Ferrero, Ruiz-Cano, & García-Sánchez, 2016), in this paper we build on the stakeholder theory of the firm (Freeman, 2010) to analyze how the stakeholder-related information included in non-financial disclosure issued by firms that regularly reports this information, influences the degree of information asymmetry. In particular, we investigate the impact of non-financial disclosure on information asymmetry along three dimensions: *(i) disclosure depth*, *(ii) disclosure breadth*, and *(iii) disclosure concentration* (Allee & DeAngelis, 2015; Brammer & Pavelin, 2008). The first aspect is related to the amount of information disclosed. In line with extant literature, we predict a negative relationship between the depth of non-financial information disclosed and the level of information asymmetry. The second aspect, disclosure breadth, is related to the variety of stakeholder-related themes on which firms decide to disclose. We submit that disclosure breadth reduces the investors' efforts to retrieve information about the firm and to compare its results with those of its peers. Accordingly, we hypothesize a negative relation between disclosure breadth

and the level of information asymmetry. The third aspect, disclosure concentration, is related to the level of attention that is devoted to each stakeholder mentioned within a firm's non-financial disclosure. Literature has long documented that the relative emphasis placed on given themes compared to others is likely to reflect the relative importance attributed by the firm to those themes (Adams, 2002). In this regard, the decision to prioritize certain stakeholders over others might generate ambiguity in third party evaluations because of the difficulties in interpreting incongruent signals (Hawn & Ioannou, 2016; Luffarelli & Awaysheh, 2018). Therefore, unbalanced non-financial disclosure might increase the perceived uncertainty in assessing a firm's value creation configuration, as well as its potential for future value creation. For this reason, in our third hypothesis we predict that the more firms balance their attention across stakeholder categories the better it is to reduce opacity.

To test the hypotheses, we analyzed 1.448 non-financial reports yearly issued by a sample of 187 U.S listed firms included in the S&P500 index that regularly released non-financial reports between 2004 and 2014. Our results confirm the notion that the amount of information disclosed is associated to lower information asymmetry, thus alleviating adverse selection problems. In addition, results show that the wider the variety of stakeholder-related themes covered, the higher the level of firm's liquidity and the lower the level of information asymmetry, confirming the notion that investors value information heterogeneity. Moreover, the more equally distributed the information is across stakeholders, the lower the information asymmetry, confirming that balanced disclosure matters in aligning investors' perceptions.

Adopting a stakeholder-based view to formalize and test our hypotheses, we contribute to extant debate on the need to move beyond a one-fits-all approach to the study of non-financial disclosure and its related impact. According to our results, the decision on how much to disclose is as conducive to lower information opacity as the variety of stakeholder-related topics covered and the relative importance attributed to the different stakeholders on which firms disclose.

The reminder of the paper is structured as it follows. First, earlier research focused on non-financial disclosure and information asymmetry in presented. Second, the theoretical framework and hypotheses are developed. These sections are followed by the empirical analysis. Finally, the findings and contributions are discussed, as well as the limitations of the study.

Theoretical Background and Hypotheses

Resource seekers and investors are in constant search for each other. In the absence of frictions, the two parties are easily able to get in contact and complete a market transaction. However, this might not occur due to market imperfections that arise because the two parties do not possess the same amount of information about each other and perceive exchange related risks (Akerlof, 1978). Initially, researchers have mostly pointed their attention to the disclosure of economic and financial information (Healy & Palepu, 2001), focusing on the volume (Verrecchia, 2001) and on the quality of the information disclosed to reduce exchange related hazards (Brown & Hillegeist, 2007).

More recently, scholars have started investigating the role played by the disclosure of non-financial information as a tool to mitigate the risks associated to limited or absent information in market transactions (Gao, Dong, Ni, & Fu, 2016). This type of information, in fact, complements financial disclosure and offers additional insights about initiatives related to every area and to every stakeholder that the firms consider as part of their overall strategy (Chen & Roberts, 2010). While financial information targets primarily the investor community and focuses on financial data, non-financial disclosure targets a wider set of stakeholders and focuses on the actions undertaken by the firm in respect to multiple stakeholder categories (Du & Yu, 2020). In so doing, non-financial disclosure enhances firm accountability about targets, achievements and internal processes, increasing the level of transparency to external audiences (Hamrouni, Uyar, & Boussaada, 2019; Romero et al., 2019). It is for this reason that non-financial disclosure is expected to facilitate the assessment of a firm’s intangible value better than through traditional corporate reporting (Adams,

2004), providing external audiences with extra-financial indicators to understand how firms create value (Aureli, Gigli, Medei, & Supino, 2020; Cuadrado-Ballesteros, Garcia-Sanchez, & Ferrero, 2016).

Literature so far has been mostly focused on the link between the depth of non-financial information disclosed and the degree of information asymmetry. An increase in the depth of non-financial disclosure, defined as the total amount non-financial information disclosed by firms, might provide external audiences with additional elements useful to understand how profits were obtained and how stakeholders contributed to value creation (Vurro & Perrini, 2011). In addition to the increased availability of information, non-financial disclosure depth contributes to enhancing firm reputation, which in turn, elicits more favourable judgements about the focal firm. The depth of non-financial information disclosed, in fact, represents a signal of a firm commitment towards CSR activities, enhancing trustworthiness and mitigating informational frictions (García-Sánchez & Noguera-Gámez, 2017). Research corroborates expectations about a negative effect of disclosure depth on the degree of information asymmetry. Cuadrado-Ballesteros et al. (2016), for instance, found that the more firms disclose social and environmental voluntary information the lower the cost of capital, via a decrease of information asymmetry. Similarly, Cui et al. (2018) found that the volume of non-financial information disclosed is associated with a reduced level of opacity. Thus, in line with previous research, we posit:

H1: There is a negative association between the depth of non-financial disclosure and the level of information asymmetry

Along with the increasing number of firms adopting CSR strategies by internalizing social and environmental concerns into their business operations and interactions with their stakeholders (Clarkson, 1995; Scherer & Palazzo, 2011), research on social, environmental and sustainability reporting has started to acknowledge the need for incorporating stakeholders in the analysis of the content and impact of non-financial disclosure (Gray, Owen, & Adams, 1996; Torelli, Balluchi, &

Furlotti, 2020). The integration between the study of non-financial disclosure and the stakeholder-based view of the firm assumes even more relevance in light of the widespread adoption of the materiality principle in scoping and defining the content of sustainability reporting (Hsu, Lee, & Chao, 2013). Having a long history in accounting research and practice (Heitzman, Wasley, & Zimmerman, 2010), materiality is the principle that determines which topics are sufficiently important to require disclosure. It implies an extensive reflection on the usefulness of information for decision makers, equally driven by stakeholder expectations, international standards and alignment with a firm's overall mission and competitive strategy (Fasan & Mio, 2017; Fernandez-Feijoo, Romero, & Ruiz, 2014). According to the materiality principle, non-financial disclosure is expected to mirror the information needs of the firm and its stakeholders, thus opening new opportunities for research on the multiple dimensions along which disclosure can be structured.

As firms increasingly engage in non-financial disclosure to inform and involve their stakeholders, we can expect disclosure structure and composition to be far from homogeneous (Fernández-Gago, Cabeza-García, & Nieto, 2018). Heterogeneity is partly related to the different orientation of firms towards their stakeholders, that is, the degree to which a firm integrates stakeholder interests and knowledge in its decision-making processes (Bridoux & Stoelhorst, 2014). Some firms, in fact, tend to adopt an inclusive approach and consider a vast set of stakeholders in their decision making, while others might opt for prioritization and engage in less extensive interactions (Boesso et al., 2015). Heterogeneity is also dependent on the decision context, as a piece of information might have limited or no bearing on one type of decision, but extremely important for another. This is exacerbated in a stakeholder-network, where stakeholders might have diverging expectations regarding relevant topics on which firms should disclose (Fasan & Mio, 2017). Thus, internal and external factors can affect how non-financial disclosure is structured both in term of variety of stakeholders and topics covered in reporting, and the relative importance attributed to each stakeholder category relative to all the others.

Heterogeneity in non-financial disclosure practices leads to question whether it is just the level of disclosure to affect opacity or the impact of non-financial disclosure on information asymmetry should be studied along different disclosure dimensions. Heeding the call for further studies on the multifaceted impact of non-financial disclosure practices (Unerman & Zappettini, 2014), we account for the impact of disclosure breadth and concentration on information asymmetry.

Disclosure breadth refers to the variety of stakeholder-related themes covered within non-financial disclosure (Vurro & Perrini, 2011), which in turn, might be negatively associated with firm opacity. The availability of information on a broader set of topics has the potential to reduce the effort exerted by potential investors in retrieving information to assess the firm, which in turn is associated to lower uncertainty about how it creates value (Coff, 1999). Potential investors, in fact, need a considerable amount of information related to a wide set of aspects to assess the firm. In such situations in which the information required is not disclosed by the firm, it might be complicated or costly from an external standpoint to retrieve that information. The higher the effort required to potential investors to assess the firm, the higher the perceived uncertainty related to the focal firm, which results in a higher degree of information asymmetry. Additionally, potential investors usually compare a group of peers when formulating their judgments (Cao, Liang, & Zhan, 2019). Thus, a firm that does not disclose information that, in turn, is disclosed by its peers might be perceived as opaquer by external investors. Taken together, these arguments point to the fact that firms that cover a broader set of stakeholder-related topics facilitate the process of assessment by potential investors, resulting in a reduced degree of opacity. Thus, we hypothesize:

H2: There is a negative association between the breadth of non-financial disclosure and the level of information asymmetry

Non-financial disclosure differs across firms not only in the variety of themes covered but also in the emphasis given to some stakeholders over others, that is, the level of disclosure concentration. Concentrated disclosure reflects the decision to devote unbalanced attention towards

certain stakeholders and related information rather than opt for equal disclosure across stakeholder categories. Concentrated disclosure is generally expected to flow from materiality assessment of the most relevant issues, in order to reach focus and conciseness in reporting (De Villiers, Unerman, & Rinaldi, 2014). Yet, evidence shows that concentrated disclosure can be a double-edged sword as firms that prioritize certain stakeholders over others might send misleading signals about their ability to deal with complex challenges that requires stakeholder-oriented skills (Hsu et al., 2013). Additionally, firms that decide to prioritize a narrower group of stakeholders expose themselves to the risk of being perceived as mostly self-interested and short-sighted on those issues that can impact upon the organization (Deegan & Rankin, 1997). It is for this reason that recent advancements in instrumental stakeholder theory and CSR literature indicate that firms that prioritize certain stakeholders over others might be perceived as opaquer than firms that adopt an approach that is consistent across the different stakeholder categories. This might be related to the fact that the inconsistencies in the way the firm manages its stakeholders are associated to an increased evaluation complexity. For instance, Vurro and Perrini (2011) found that firms that devote a disproportionate attention to certain stakeholders are penalized in term of CSR performance. Similarly, it has been argued that firms that prioritize internal stakeholders suffer for a reduced market evaluation because financial markets are less likely to recognize the value of the CSR-related actions undertaken by the firm (Hawn & Ioannou, 2016). In other words, more balanced disclosure is expected to reflect a stronger commitment of a firm towards the multiple sides of its business and act as a signal of consistency and credibility.

Even more importantly, stakeholder views and expectations regarding what is appropriate and relevant can be heterogeneous, dynamic and conflicting, such that choosing between mutually exclusive stakeholder demands is not only fairly straightforward but even risky (Unerman & Zappettini, 2014). This is the reason why recent research suggests to incorporate materiality consideration into analyses of presence or absence of information from sustainability reports, as these

decisions can also reflect purposive, symbolic representations of results and commitments (Edgley, 2014).

Taken together, these arguments point to the fact that firms that pay disproportionate attention on a few stakeholders induce biased assessment from external observers about their skills and attitudes, resulting in an increased degree of opacity. Prioritizing certain stakeholder categories, in fact, might be interpreted as an incongruent signal by investors, who typically incorporate various dimensions when assessing a firm (Luffarelli & Awaysheh, 2018; Paruchuri, Han, & Prakash, 2020). We argue that, in such cases, investors judgments are more exposed to the risk of ambiguous interpretation of firm's actions, which in turn, increases the perceived uncertainty surrounding the focal firm. Thus, we hypothesize:

> *H3*: There is a positive association between the concentration of non-financial disclosure and the level of information asymmetry

Methodology

Sample selection and data source

This study applies the content analysis technique to analyse non-financial reports issued by U.S. firms included in the S&P500 index that regularly disclose non-financial information over the period 2004-2014. Consistent with previous studies, we selected a sample of firms located in the same country in order to mitigate concerns related to country-specific effects (such as different legal, corporate governance systems, writing styles) that could affect the structure and the nature of information disclosed (Brüggen, Vergauwen, & Dao, 2009; Cahan, De Villiers, Jeter, Naiker, & Van Staden, 2016). To retrieve non-financial reports issued by firms we complemented the Corporate Register database with a manual checking on corporate websites. Lastly, we collected financial data from CRSP and Datastream. Due to the absence of non-financial reports and the lack of financial data, the

sample was reduced to 187 firms over the period 2004-2014, resulting in 1,448 firm-year observations.

Dependent variable: information asymmetry

Following an established practice in finance and accounting literature, we used Bid-Ask spread as a measure for information asymmetry (Cui et al., 2018). Bid-Ask spread, in fact, represents the monetary compensation requested by market makers to cover the risk of dealing with better-informed traders (Kim & Verrecchia, 1994). As the availability and the reliability of information to assess a given firm increase, the market makers' risk of adverse selection becomes lower, reducing the monetary compensation requested (Gregoriou, Ioannidis, & Skerratt, 2005). Thus, less information asymmetry implies less adverse selection, which, in turn, implies a smaller Bid-Ask spread (Leuz & Verrecchia, 2000). To operationalize the variable, we followed the procedure suggested by Daske et al. (2008). First, we collected the daily closing bid and ask prices for each firm in the sample. We then computed the daily Bid-Ask spread as the difference between the two prices divided by the midpoint. Lastly, we took the median of the daily Bid-Ask spread over the year.

Independent variables: Non-financial disclosure depth, breadth and concentration

The three main explanatory variables, disclosure depth, breadth and concentration, were operationalized using content analysis of the non-financial reports published by firms included in the sample. Previous research has suggested content analysis as an appropriate research method to capture and organize stakeholder-related information (Roberts, 1992). It aims at quantifying the level and compare the structure of a firm's disclosures by means of a disclosure instrument comprised of a list of items that are representative of stakeholder categories and related themes (Cormier et al., 2011; Gray, Kouhy, & Lavers, 1995; Vurro & Perrini, 2011). To develop the disclosure instrument we relied on previous analyses of the standard reporting frameworks[1] most commonly adopted by firms to

[1]The standards we reviewed to identity the stakeholder categories and the themes related to each stakeholder are the Global Reporting Initiative's GRI, the AccountAbility's AA1000—Principles Standard, the United Nations (UN) Global Compact's COP, and the ISO 2600.

disclose non-financial information to their stakeholders (Landrum & Ohsowski, 2018; Tschopp & Nastanski, 2014). Specifically, we included 8 stakeholder categories in the interrogation instrument, namely employees, shareholders, financial partners, customers, suppliers, public authorities and institutions, local communities, and the natural environment. For each stakeholder category we identified a set specific themes, for a total of 48 different themes. The distribution of the themes across the different categories is reported in Table 1. To check which stakeholder-related themes among those included in the disclosure instrument were mentioned by each firm in its report, we counted the number of sentences related to that theme. Consistently with previous research, we used sentences as unit of analysis to assess non-financial reports because using sentences in both coding and assessing provide more reliable results as compared to those obtained using different methodologies such as word counting or areas of page (da Silva Monteiro & Aibar-Guzmán, 2010; Milne & Adler, 1999). In fact, using sentences reduces the risk of overestimating the volume of information disclosed when, for instance, the same information is repetitively offered in different section of the document (Holder-Webb, Cohen, Nath, & Wood, 2009).

Insert Table 1 here

Disclosure Depth represents the total volume of the stakeholder-based information disclosed yearly by each firm in the sample through a non-financial report. To operationalize the variable, we summed the number of sentences referring to each disclosure category related to stakeholder *j* disclosed by firm *i* in year t. To mitigate concerns related to the arbitrariness in the selection of themes to be included in the interrogation instrument, we scaled the total number of sentences related to each stakeholder by the ratio between the total number of sentences written about that stakeholder by the whole sample and the total number of sentences in the sample. Analytically, we adopted the following formula to compute the index:

$$Disclosure\ depth = \sum_{j=1}^{m} stk_{jit} \frac{\sum_{j=1}^{n} stk_{jit}}{\sum_{j=1}^{m} \sum_{i}^{n} stk_{jit}}$$

Where Stk_{jit} represents the number of sentences relative to stakeholder j issued by firm i in year t; m is the number of stakeholders included in the analysis, and n is number of firms included in the sample.

It worth noting that previous studies on information asymmetry have directly investigated the link between the volume of information disclosed and the degree of information asymmetry using CSR performance ratings as a proxy for the amount of information disclosed (see for example, Cui et al., 2018; Martínez-Ferrero et al., 2016). Instead, we directly operationalized stakeholder-based disclosure by means of an extensive content analysis performed over firms' non-financial reports. This procedure allowed us to dig deeper into the relationship between stakeholder-based non-financial information and information asymmetry, distinguishing among different dimensions of the non-financial disclosure.

Disclosure Breadth accounts for the variety of stakeholder-related themes covered by each firm in its non-financial reports. To operationalize the variable, for each stakeholder we divided the total number of themes covered by the overall number of themes related to that stakeholder. We then summed each quantity, obtaining a variable that, theoretically, ranges from 0 to 8 (when all the topics related to the 8 stakeholder categories are mentioned within the sustainability report). The variable is an index equal to the share of themes disclosed in the non-financial report.

Disclosure Concentration resembles how non-financial disclosure released by each firm is distributed across themes and, consequently, stakeholders. It reflects the extent to which a firm balance its attention toward the different categories of stakeholders. Following the suggestion by Pfarrer et al. (2008) we used the Gini coefficient to operationalize the equality\inequality in the salience of the different stakeholder groups for each firm. We calculated the index taking stakeholders as a level of analysis. In particular, we adopted the following formula:

$$Concentration\ index = 1 + \frac{1}{m} - \left(\frac{2}{m^2\bar{y}}\right)(y_1 + 2y_2 + 3y_3 + 4y_4 + \ldots + my_m)$$

Where the expression $(y_1 + 2y_2 + 3y_3 + 4y_4 + \cdots + my_m)$ is the sequence of disclosure levels for each stakeholder in decreasing order of size for each firm in year t; $\bar{y}$ is the overall average disclosure level for each firm in year *t* and *m* = number of stakeholders included in the analysis. We calculated the index for each firm *i* in each year *t*. According to the approach we followed to measure concentration, it can range from 0 to 1, where 0 corresponds to a balanced stakeholder-based disclosure while 1 to a fully concentrated disclosure approach on a singly stakeholder category.

Controls

In addition to *firm* and *year fixed effect*, several controls were included in our models to mitigate unobserved heterogeneity concerns. Prior studies, in fact, indicate that numerous factors are associated to information asymmetry (Al-Shaer, 2020; Cormier et al., 2011; Leuz & Verrecchia, 2000). Accordingly, we controlled for *ownership type*, measured as the percentage of total shares that are available to ordinary investors; *firm performance,* measured as the return on asset (ROA); *size*, measured as the natural logarithm of firm total asset*; solvency,* measured as the debt equity ratio; *age,* operationalized as the natural logarithm of the number of months since the IPO; and *idiosyncratic risk* measured as the portion of the variance of residuals of firm stock volatility that is not explained by factors that are exogenous to the firm. Consistent with the literature, we used the logistic transformation of the measure of *idiosyncratic risk* (Ferreira & Laux, 2007; Luo & Bhattacharya, 2009).[2]

Table 2 presents descriptive statistics and pairwise correlations of the variables.

[2] This measure corresponds to 1- the R-Squared of the daily return stock equation proposed in the Fama and French 4 factors model (Fama and French 2006). Data to estimate the equation and as well as a detailed description of the model can be found at the following link: http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html#Research. Following Ferrera and Laux (2007), for the logistic transformation of the variable we applied the formula $Idiosincratic\ Risk = \ln\left(\frac{1-R^2_{i,t}}{R^2_{i,t}}\right)$, where $R^2_{i,t}$ the coefficient of determination of the Fama and French 4 factors model.

Insert Table 2 here

Empirical model

We conduct several tests to determine the appropriate estimation method. First, the result of the Hausman test (Hausman, Hall, & Griliches, 1984) shows that the random-effect models are more suitable than fixed-effect models (p-value=0.000). In addition, the Wald modified test indicates the presence of heteroscedasticity in the residuals (p-value=0.000). Lastly, the Wooldrige test indicates the absence of serial autocorrelation in the residuals. Consistently with the results of these tests, we use the Feasible Least Squared (FLGS) method, an estimation method that allows to handle with problems of heteroscedasticity in the residuals (Hamrouni et al., 2019). To ensure the robustness of our results, we tested our hypotheses using random effect estimation with robust standard errors.

Results

Table 3 reports the results of our main analyses. Model 1 reports the baseline regression including only controls. As expected, size (p-value<0.01), ownership (p-value<0.01) and age (p-value<0.01) are all negatively associated to information asymmetry. These results confirm the notion that the perceived information asymmetry is lower for large, established firms. On the contrary, an increase in the degree idiosyncratic risk results into a higher level of information asymmetry (p-value<0.01), as the fluctuations of stock prices of these firms are less predictable.

In our first hypothesis, we predicted a negative effect of the depth of stakeholder-based disclosure on the level of information asymmetry. Results reported in Model 2 confirm our prediction: the coefficient estimate of disclosure depth is negative and statistically significant (b=-0.043, p-value<0.01), providing support for hypothesis 1.

Insert Table 3 here

In Model 2, we tested the effect of the breadth of disclosure on information asymmetry. The results provide support for our second hypothesis (Model 3, b= -0.034; p-value<0.01), indicating that disclosure breadth is associated to a lower level of opacity, as it reduces investors' efforts to retrieve information.

Lastly, in our third hypothesis we predicted a positive effect of disclosure concentration on information asymmetry. Results reported in Model 4 confirm our prediction: the coefficient estimated of disclosure concentration is positive and statistically significant (b=0.02 p-value<0.01) providing strong support for our third hypotheses.

Discussion

Our study builds on and extends recent research on the performance consequences of non-financial disclosure by substantiating the extant understanding that the decisions on variety of and relative emphasis attributed to stakeholders in non-financial disclosure are as relevant as the volume of information disclosed in alleviating opacity (Al-Shaer, 2020; Hamrouni et al., 2019; Romero et al., 2019). The findings confirm the view that non-financial reports act as conduits of information that drives investors' reaction (Leuz & Verrecchia, 2000). As firms increasingly rely on non-financial disclosure to convey information about their social and environmental commitments and outcomes, our results support the usefulness of such practice. Consistently with previous research, we show that the more firms disseminate stakeholder-related information the better it is to mitigate market frictions and increase capital market's efficiency (Healy & Palepu, 2001).

We also show that the level of non-financial disclosure is not the only driver of reduced opacity, as the decision about the stakeholder-related topics to be covered and the relative importance attribute to each stakeholder included in the report have also a role to play in reducing information asymmetry (Cho, Michelon, Patten, & Roberts, 2015). Results support the still anecdotal belief that managers who increase the breadth of their reports are able to reduce information asymmetry,

regardless of the volume of information released. As a result of the changing institutional environment and following the suggestions of standard-setting bodies like the Global Reporting Initiative (GRI), firms are increasingly enriching their disclosure strategy adding themes across multiple stakeholder categories (Guenther, Guenther, Schiemann, & Weber, 2016). Similarly, the capital market itself is affecting decisions about disclosure as a result of the growing importance of sustainable and responsible assets under management (Cormier et al., 2011; Veltri, De Luca, & Phan, 2020). Our results provide further justification to the need for extended non-financial disclosure by showing that investors not only ask for breadth but also shape their market reactions based on this disclosure dimension. Finally, we find that firms that convey a more balanced portrait of their engagement with stakeholders are better able to reduce information asymmetry. Managers that produce a comprehensive and well-balanced report are more likely to mitigate adverse selection and secure a more favourable market reaction. The findings seem to suggest that given a certain amount of stakeholder-based disclosure volume and coverage, concentration on a few stakeholder categories resembles concealing, thus turning into higher opacity or higher risks of adverse selection (Gao & Liang, 2013; Verrecchia & Weber, 2006).

In light of the growing pressures to select and disclose only on those topics that reflect a firm's significant economic, environmental, and social impacts, our findings offer a less simplistic understanding of the role of materiality in non-financial reporting. Defining materiality ex-ante, before a potential material information is used in decisions, could be complex as the expectations of stakeholders regarding what drives decisions are not necessarily straightforward (Hsu et al., 2013; Lo, 2010). Our findings corroborate the conflicting view of the materiality determination, as investors' decisions appear to be facilitated by comprehensive, well-balanced disclosures. This evidence becomes particularly relevant considering that the number of firms that regularly disclose non-financial information on a voluntary basis has grown tremendously in the last years. According to the Governance & Accountability Institute, in fact, in 2019 90% of firms included in S&P500 index

disclosed non-financial information through sustainability or integrated reports, while in 2011 the same percentage was around 20%. Similarly, in Europe disclosing such information has become mandatory for listed firms since 2017 (Mazzotta, Bronzetti, & Veltri, 2020). Thus, as disclosure of non-financial information is becoming a standardized practice, firms should focus their attention on elaborating non-financial reports that are comprehensive and balanced across the different stakeholders in order to avoid market's frictions and align potential investors' perceptions in peer-based evaluations.

Given the increasing expectations about corporate conduct in a stakeholder society, our study provides further guidance to firms engaged in stakeholder dialogue and scholars addressing the value of non-financial disclosure (Gelb & Strawser, 2001). Most of existing research has overlooked disclosure heterogeneity, based on the often-unstated assumption that the more firms disclose the more accountable they are, with disclosure volume turning into lower information asymmetry. We show that by structuring non-financial disclosure in the proper way, managers strengthen investors' ability to fully assess a firm's potential. We further contribute to such literature by showing that volume and structure equally shape investors' perceptions. In so doing, we suggest that broader and more balanced disclosures are more conducive to lower information asymmetry.

Our paper opens potentially new grounds for appreciating the role of non-financial disclosure structure in influencing exchange related risks and market frictions. Yet, this study is not free from limitations. First and consistent with previous research, the operationalization of non-financial disclosure relies on content analysis as an appropriate technique to investigate the multiple dimensions of disclosure (Milne & Adler, 1999; Peyrefitte & Forest, 2006). Despite appropriateness, it might be subject to misleading interpretation or subjective information categorization. We dealt with this issue by classifying sentences rather than counting words, as they have been considered to be less related to individual biases (Gray et al., 1995). Additionally, we relied on a tested disclosure instrument rather than a self-developed one. Secondly, we evaluated the impact of stakeholder-based

disclosure on information asymmetry with approximately one-year lag. Although this approach has already been used in accounting literature (Daske et al., 2008), other studies have analysed the effect on liquidity around the date of the news-release in an attempt to better isolate the effect of this information on firm liquidity. The decision to use a one-year lag was motivated by the need to preserve comparability and consistency across firm-year observations. We used disclosure as released through non-financial reports. Indeed, the large majority of these reports lack a clear release date, and this made it difficult to perform a date-specific, consistent analysis of the effects of disclosing stakeholder-based information.

In line with previous research, we proxied information asymmetry with stock liquidity though we acknowledge that asymmetry is mostly related to access, interpretation and processing of information by individual investors. Future research could dig deeper into the individual determinants of information asymmetry, building on multiple disciplines such as psychology and behavioural finance, to bring new important insights into how disclosure shape investors' perceptions. For example, it would be fruitful to further investigate how individuals interpret specific information and which channels are more effective in reducing opacity.

Although this study focuses on the U.S. market in order to guarantee comparability in firms' behaviour and isolate institutional influence, it is possible to state that non-financial reporting practices are becoming increasingly standardized over time. Our study, in fact, includes observations over a relatively long period of time. As mentioned before, the number of firms disclosing non-financial information as well as financial market's interest in those themes have grown, and reporting practices have become more consolidated. Although we tried to tease out the effect of time by including a year fixed effect, future research might directly investigate the effect of time over these relationships.

Lastly, it could be interesting to further investigate contingencies that could affect the impact of stakeholder-based disclosure and information asymmetry. For instance, future research could

investigate the impact of disclosure structure over information asymmetry in both domestic and international markets, or alternatively investigate whether internationalization amplifies or dampens the beneficial impact of disclosure on opacity.

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Table 1: Stakeholder related topics

Community	Corporate giving; Direct involvement; Stakeholder engagement; Relations with the media; Virtual community; Corruption prevention.
Customers	General characteristics; Market development; Customer satisfaction and loyalty; Product information and labeling; Ethical and environmental products; Promotional policies; Privacy protection.
Employees	Staff composition; Employment turnover; Equality of treatment; Training; working hours; Schemes of wages and incentives; Absenteeism; Employees' benefits; Industrial relations; Internal Communication; Health and safety; Personnel's satisfaction; Protection of workers' rights; Disciplinary measures and litigation
Environment	Energy and materials consumption and emissions; Environmental strategy.
Public Sector	Taxes and duties; Relations with local authorities; Codes of conduct and compliance with law; Conformity verification and inspection; Contributions, benefits; Easy-term financing.
Shareholders	Capital stock composition; Shareholders' remuneration; Financial highlights; Rating; Corporate governance; Benefits and services for shareholders; Investor relations.
Suppliers	General characteristics; Supplier selection; Communication, Awareness creation and information; Contractual terms;

Table 2 Descriptive analyses and pairwise correlations

	Variables	**Mean**	**Std. Dev.**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
1	Information Asymmetry	0.001	0.001	1									
2	Depth	63.061	48.549	-0.128	1								
3	Breadth	3.606	1.229	-0.210	0.573	1							
4	Concentration	0.473	0.147	0.176	-0.361	-0.779	1						
5	Idiosyncratic Risk	0.282	0.804	0.016	0.005	0.018	-0.045	1					
6	Solvency	0.643	0.183	0.158	-0.042	-0.067	0.136	-0.123	1				
7	Size	19.496	1.361	-0.052	0.269	0.171	-0.013	-0.236	0.326	1			
8	Firm performance	0.061	0.064	-0.300	0.061	0.036	-0.071	0.076	-0.429	-0.202	1		
9	Age	6.302	0.542	0.029	0.107	0.121	-0.120	0.017	0.071	0.190	0.046	1	
10	Ownership Type	0.849	17.089	-0.069	0.241	0.230	-0.125	-0.250	0.069	0.258	-0.078	0.014	1

Table 3 Main regression results

	Model 1	Model 2	Model 3	Model 4
Depth (HP1)		-0.043***		
		(0.006)		
Breadth (HP2)			-0.030***	
			(0.005)	
Concentration (HP3)				0.019***
				(0.004)
Idiosyncratic Risk	0.032***	0.034***	0.024***	0.033***
	(0.004)	(0.004)	(0.005)	(0.005)
Solvency	0.183***	0.172***	0.177***	0.177***
	(0.04)	(0.041)	(0.040)	(0.041)
Size	-0.090***	-0.120***	-0.090***	-0.087***
	(0.014)	(0.014)	(0.015)	(0.014)
Firm performance	-0.557***	-0.509***	-0.537***	-0.526***
	(0.75)	(0.079)	(0.078)	(0.077)
Age	-3.293***	-3.436***	-3.375***	-3.350***
	(0.454)	(0.465)	(0.448)	(0.453)
Ownership Type	-0.188***	-0.176***	-0.136***	-0.152***
	(0.034)	(0.034)	(0.035)	(0.034)
Constant	23.771***	25.257***	24.290***	24.077***
	(3.064)	(3.124)	(3.015)	(3.054)
Firm	Included			
Year	Included			
Observations	1,448	1,448	1,440	1,448
Number of id	187	187	187	187
Wald Chi2	14057.29	10900.53	14791.17	103218.7
Prob Wald Chi2	0	0	0	0
Standard errors in parentheses				
*** p<0.01, ** p<0.05, * p<0.1				