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The impact of gender diversity on digital reporting in the USA

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Abstract. This study aims to examine the impact of gender diversity on the digital reporting practices of non-financial U.S. firms listed on the S&P 500 index. Our results confirm the proposed hypothesis, indicating that the presence of female board members improves the levels of digital reporting. This could relate to the thought that gender diversity may correspond to more extensive discussions within the boardroom, which leads to better-informed decisions based on greater levels of information exchange both between the board and other stakeholders and amongst board members themselves. Our findings provide evidence for policy makers that gender diversity enhances online disclosure and thus, the transparency of the firm. The findings can be used, also, by corporate governance institutions to raise awareness of the advantages of having female members on the board. Our study contributes to the body of literature on both gender diversity and corporate online disclosure by providing new evidence that gender diversity on the board can improve digital reporting.

Keywords: Digital reporting; gender diversity; corporate governance; S&P500.

1. INTRODUCTION

In financial reporting, appropriate disclosure of financial data is always a major concern. Currently, a large number of businesses post financial information on their

websites (Akbar & Syah, 2021; Hasan et al., 2022). The concept of digital reporting creates an unambiguous mechanism to identify and compare the business performance of one organization to another (Liu et al., 2017; Locke et al., 2018). Since digital reporting allows for the conversion of data at the item level into a format that computers can understand, allowing for searching and automated processing (Hoffman & Rodriguez, 2013).

Unlike hard copy reporting, digital reporting is considered a powerful tool for the distribution of information for both firms and users. It provides flexible methods of presentation, allows communication with an unlimited number of potential and existing investors, increases the potential frequency of such disclosure and eliminates the costs associated with annual report distribution (Pendley & Rai, 2009; Samaha et al., 2012; Yassin, 2017). The vast majority of firms utilize the incredible power and reach of the internet to share useful information with the wider market.

The primary purpose of the establishment of corporate governance practices is the desire to build investor confidence, which plays a significant role in expanding the economy and attracting both local and foreign investments. According to Almlia (2015), good corporate governance enables firms to present comparable, clear, and timely information regarding firm management and finances. The inclusion of more women on boards of directors and in top management roles has the potential to add value to organizations (Pathak & Purkayastha, 2016; Hollindale et al., 2019). It can increase a firm's understanding of stakeholders' needs, which in turn can improve its effectiveness in terms of risk management and general business practices (Manita et al., 2018). In addition, the process of decision-making can also be enhanced through the diverse ideas and perspectives brought to the boardroom by female directors. Moreover, greater levels of gender diversity can lead to greater levels of social sensitivity in problem solving and increased variety in a group's thinking, which can result in improved firm performance (Perryman et al., 2016).

A number of existing studies have examined the impact of gender diversity on financial reporting; however, they limit their examination to the information disclosed in the annual report (Nalikka, 2009; Bravo, 2018; Waweru, 2020). Furthermore, some empirical studies investigated the impact of gender diversity on non-financial reporting (Zumente & Lāce, 2020; Nicolò et al., 2021; Atripaldi et al., 2022). Regarding the digital reporting studies, we are unaware of any previous

study investigating the relationship between gender diversity and digital reporting; consequently, our paper is the first to explore this issue. This paper provides new empirical evidence to the literature on the impact of gender diversity on digital reporting. It analyses the impact of gender diversity on the digital reporting practices of firms listed on the S&P 500, which is considered a proxy for the U.S. market; it tracks 500 large-cap U.S. firms and represents between 80-85% of this market. While the existing literature predominantly focuses on agency theory as a lens for studying the role of the board of directors, our paper takes a multi-theoretical approach, including agency theory and the stakeholder model, in order to better encompass the specific resources that directors can bring to a board and illuminate the role of gender diversity in digital reporting.

Moreover, in a further divergence from annual report studies, this study incorporates two additional measurements of gender diversity: the Blau Index and the Shannon Index. Furthermore, it relies on a modified scoring scale which quantifies a firm's extent of digital reporting according to five levels (4, 3, 2, 1, and 0) which will provide a more comprehensive picture of each item on the disclosure index (Shehadeh et al., 2021).

The rest of this paper is organized as follows: Section 2 discusses the relevant existing literature and develops the hypotheses of the study; Section 3 outlines the study's methodology and presents descriptive statistics; Section 4 and 5 present and discusses the study's findings and Section 6 provides a summary and conclusion.

2. LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

Gender diversity has evolved into a challenging academic research issue in recent decades. Most such research has stemmed from the fact that increasing numbers of women are being found holding both directorships and top management positions (Singh et al., 2001). Despite this increase, however, female board representation remains low. Zelechowski and Bilimoria (2004), for example, conclude that very few of the female board members in their sample had real power and were instead appointed for strategic reasons. Moreover, according to a survey by the European Commission (2012), the average proportion of female board directors was just 13.7%. In response to this, the Commission launched the "Women on the Board Pledge for Europe" campaign calling for firms to sign a voluntary commitment to increase female directorships to 30% by 2015 and 40% by 2020.

As noted in the previous section, gender diversity on boards of directors and in executive positions has the potential to add value to organizations. Previous research has documented differences between men and women in terms of decision-making, risk-taking, management, leadership, and communication styles (Walt & Ingley, 2003; Peterson & Philpot, 2007; Dang & Vo, 2012; Ahmed, 2021). According to Alvarez and McCaffery (2000), diversity can benefit a board's decision-making process by increasing the range of perspectives and ideas brought to the table. Moreover, diversity broadens a board's knowledge base and enhances creativity and innovation, all factors thought to contribute to competitive advantage (Erhardt et al., 2003; Gupta et al., 2021). Woolley et al. (2010) argue that gender diversity can lead to greater social sensitivity in problem-solving.

In their analysis of S&P firms, Adams and Ferreira (2009) found that female directors are more likely to have excellent attendance records and can even increase the likelihood of good attendance by their male counterparts. This study's results also indicate that women directors are more likely to be assigned to committees with a monitoring role and less likely to be assigned to remuneration committees.

Several key financial accounting studies have investigated the importance of gender diversity in corporate governance (Walt & Ingley, 2003; Huse & Solberg, 2006; Peterson & Philpot, 2007; Schubert, 2006; Jallow et al., 2012; Elgammal et al., 2018; Yousef et al., 2020). The findings of Huse and Solberg (2006) reveal that female directors believe the board's decision-making process extends beyond the boardroom itself to include time spent before, after, and entirely outside of meetings. This suggests that women may be more prepared for meetings than men, which could correspond to better decisions. Westphal and Milton (2000) emphasize that marginalized groups including ethnic minorities and women can be important sources of unique perspectives which can enrich the board's decision-making process. Schubert (2006) stipulates that women are better than men at multitasking, communication, and risk management, and these abilities can be linked to high levels of competence and willingness to assume responsibility.

In addition to this capacity to improve the effectiveness of corporate governance, the findings of some previous studies also support the idea that gender diversity can enhance firm performance. For example, an extant number of studies investigated the effect of board gender diversity in S&P500. Vemala et al. (2018) and Đặng et al. (2020) assessed how gender diversity affects the firm's profitability while Bruna

et al. (2020) focused on the effect of female diversity on firms' social performance and Lu and Herremans (2019) looked at the effect of female presence on the board on firm's environmental performance. Carter et al. (2010) analyzed S&P 500 firms to reveal a significant positive correlation between the proportion of female directors and ROA. The researchers argue that firms which commit to increasing female board representation also tend to have greater representation by other minorities. Similarly, Erhardt et al. (2003) also found a positive relationship between the variables of gender diversity and financial performance.

Based on this empirical background, it is thought that gender diversity can influence a variety of corporate outcomes, including firm performance and corporate governance. According to Young (2009), gender diversity correlates to increased diversity in thought which in turn results in improved financial performance, and other studies combined the variables of corporate governance and directorial financial experience with corporate disclosures to investigate accounting disclosure.

Conversely, having females on the boards could show an insignificant effect on board performance. Additionally, women directors rely on more compliance within the boardroom in order to gain more accessibility and credibility from management, while men can be more assertive and not fear the group's rejection. Furthermore, Darmadi (2013) concluded that female representation amongst top executives correlated negatively to both ROA and Tobin's Q, suggesting that women executives can hinder organizational performance. Studies by Watson (2002), and Rose (2007) revealed no correlation between performance and gender diversity. However, none of the previous studies investigated the effect of board gender diversity on Digital reporting in S&P500.

Agency theory which was developed by Jensen and Meckling (1976) explains the managerial motivation for policies of voluntary disclosure. Information asymmetry, which occurs when one party attempts to hide information from the other, is considered a serious problem in financial theory. In the corporate context, it most commonly occurs when managers withhold inside information about a firm from shareholders and use this knowledge to maximize their interests. The consequence of such behavior, however, is an increase in agency costs. Concerning gender diversity, agency theory asserts that diverse boards will correlate to enhanced board

independence and managerial monitoring (Elzahar & Hussainey, 2012; Poletti-Hughes & Briano-Turrent, 2019; Guping et al., 2020).

Watson et al. (2002) argue that disclosure provides a means for managers to demonstrate to investors that shareholder interests are being honoured, and this should therefore provide an incentive for high levels of financial transparency. Furthermore, it is generally true that widely-held firms disclose more information to the public for this very reason. Digital reporting is arguably the most important type of voluntary disclosure in the modern world and has the potential to play a significant role in reducing the incidence of agency problems.

According to Pfeffer and Salancik, (1978), the board offers important resources such as personal relationships, knowledge, or legitimacy to the company from a theoretical standpoint of resource dependency theory. The board not only advises, guides, and assists managers but also provides a tool for innovation and strategic thought on new development possibilities. Thus, the efficiency of the Board relies on the capabilities that the directors contribute, both personal and relational capital. Diversity is viewed as an expert and quality improvement element in decision-making. In addition, diversity involves that the mixed makeup of the board of directors allows for an expansion of the network linkages between the firm and the surroundings because of the various characteristics (Daily & Dalton, 2003).

The resource dependency theory establishes the function of women in introducing special resources into the board by extending access to the wealthy and expanding social and human capital (Terjesen et al., 2009). The increase in female representation can enhance the process of decision-making by examining a wider spectrum of opinions and questions and considering more results (Eagly et al., 2003). According to Zhang (2012), more women can also stimulate more interactive communication amongst board members, since previous research shows that women are more participative, egalitarian, and social in leadership. Besides the psychological characteristics of women also allow them to decrease information asymmetry for the market and stakeholders (Bear et al., 2010).

Furthermore, according to the resource dependency theory, Hillman et al. (2007) stated that the gender diversity in the board of directors might be seen as an indicator of the fulfilment of the expectations of stakeholders. The diversity of the board gender hence can be considered to mean a rise in the corporate social performance (Manita et al., 2018).

The theory of social roles states that the two genders obey the rules and norms associated with their social function (Eagly & Wood, 2012). Such ideas may be viewed as societal norms that others demand and as a character of a person. Furthermore, the theory claims that women are more caring and sympathetic than men. Ethical decision-making for example depends on the individual features of the activity. Slote (2007) further emphasizes that the relative relevance of personal and environmental variables might vary greatly between issues. Comparisons of ethical views of gender should thus also take into consideration the features of the activities examined.

Both previous research and the theoretical arguments above suggested that voluntary disclosure levels are affected by gender diversity (Nalikka, 2009; Manita, et al. 2018; Nadeem, 2020; Seebeck & Vetter, 2021). The study of corporate disclosure has received an enormous amount of attention in recent years, but the vast majority of such research has focused on a firm's characteristics of voluntary disclosure in the form of annual reports (Soliman, 2013; Habbash et al., 2016). Furthermore, other studies focus on the impact of corporate governance factors (Alfraih & Almutawa, 2017; Saha & Kabra, 2020).

However, limited previous studies are focusing on the impact of gender diversity on disclosure in the form of digital reporting. The current study, therefore, attempts to address this gap by presenting new empirical evidence on the potential benefits of gender-diverse boards concerning digital reporting practices. Based on earlier findings of a positive correlation between gender diversity and the effectiveness of corporate boards of directors, this study assumes that the presence of women on the board plays a key role in both communication and decision-making processes concerning the type of information disclosed in reports.

Based on the above discussion, this study argues that gender diversity will improve the level of voluntary digital reporting practices. In particular, we argue that the reduced information asymmetry experienced by gender-diverse boards makes such firms more likely to engage in digital reporting. The hypothesis of the study can thus be formulated as follows:

H1: There is a positive correlation between gender diversity on the board of directors and a firm's level of digital reporting.

3. DATA AND METHODS

This study explores the impact of gender diversity on digital reporting for non-financial U.S. firms listed on the S&P 500 index. In order to accomplish this, data are gathered from the following sources: Compustat, BoardEx, and the Financial Ratios Suite by WRDS. The period of study is the year 2019. A snapshot of the firms' websites at a specified point in time and downloads the websites for later offline viewing, checking and scanning. In order to construct the sample of the study, we first pull annual accounting data from Compustat for all non-financial firms with non-negative assets listed on the S&P500. In order to compute certain variables (e.g. ROA), we then match these data with figures from the Financial Ratios Suite by WRDS. Finally, the data are matched again with corporate governance data (e.g. board size, director nationality) from the BoardEx database. Following prior research (Elzahar & Hussainey, 2012; Hassanein & Hussainey, 2015; Nelson, 2016), financial firms have been excluded from our sample because they are subject to specific disclosure requirements which do not apply to non-financial firms. Furthermore, the inclusion of such firms would likely create bias in the results given their unique financial characteristics. The final sample of the study thus included 328 non-financial American firms.

3.1. Measurement of digital reporting using a disclosure index

There is no general theory exists to clarify the selection process for disclosure items, and the dimensions used by different researchers to construct indices for representing digital reporting vary greatly. This lack of uniformity has contributed to inconsistency in the findings reported as well as difficulty comparing such results to provide a clear explanation of the factors influencing disclosure practices (Khan & Ismail, 2012). The current study has thus developed a compound, integrated disclosure index to comprehensively assess digital reporting levels based on all key dimensions previously used in the literature. These include content (i.e. general information, financial information, corporate governance, and investor relations), technology, user support, and timeliness. This compound measurement tool could be usefully applied in future studies to measure digital reporting levels in any context.

A disclosure index can be scored in two ways: weighted and unweighted. Previous studies on corporate disclosure have commonly used the unweighted approach (Aly et al., 2010; Lipunga, 2014; Masum et al., 2021). Proponents of this approach argue

that its superiority derives from the fact that it avoids the issue of subjective bias by giving equal importance to all items. In this sense, it is considered more suitable for targeting a broad range of user groups. However, the approach can also be criticized insofar as it fails to capture the extent to which characteristics are present, using only a binary scale of 1 and 0 for disclosure and non-disclosure. Furthermore, it fails to take into consideration how the information is disclosed or whether it is clarified through graphs, charts, or tables (Al-Janadi et al., 2012).

The current study, therefore, attempts to avoid this limitation by following the scoring system that has been modified by Shehadeh et al., (2021), where they extended it to five levels (4, 3, 2, 1, and 0) rather than 1 and 0 only. This modified measurement method is capable of providing more detailed information related to each item on the voluntary disclosure index (Shehadeh et al., 2021).

To thoroughly measure the level of digital reporting, the current study developed a disclosure index as a compound measuring tool by integrating the essential aspects used in earlier studies (Shehadeh et al., 2021). As a result, the proposed disclosure index incorporated content, technology, user support, and timeliness as four essential dimensions with the content dimension including general information, corporate governance, financial information, and investor relations. The content dimension assesses the accessibility as well as the type (financial and non-financial) of the revealed information about the company. However, the technology evaluates if and how organizations use increasingly advanced tools, while support evaluates the layout and design of the website. Finally, there's timeliness, which refers to the accuracy of the information presented, such as stock prices and press release availability.

| The score given | The decision rules |
|------------------------------|--|
| Level A (scored as 4) | Given to the item if it is fully published and includes the provision of both quantitative and qualitative information, followed by graphs, charts, or tables. |
| Level B (scored as 3) | Given to the item if it is published and includes the provision of both quantitative and qualitative information. |
| Level C (scored as 2) | Given to the item if it is published and includes the provision of either a) qualitative information followed by graphs, charts, or tables or b) quantitative information followed by graphs, charts, or tables. |

| | |
|------------------------------|--|
| Level D (scored as 1) | Given to the item if it is published and includes the provision of one of the following: a) qualitative information, b) quantitative information, or c) graphs, charts, or tables. |
| Level E (scored as 0) | Given to the item if it is not published in any manner. |

Table 1. The five levels of the extended scoring system based on Shehadeh, et al. (2021)

| Criteria | Definition |
|----------------------------------|--|
| Quantitative Information | Deals with numbers that can be directly measured and includes only information that can be expressed numerically (rather than narrative data). |
| Qualitative Information | Deals with description and evidence that can be observed but not measured; it includes only information that can be expressed as narrative (rather than numerical data). |
| Graphs, Charts, or Tables | Graphical representation of information for clarity and comparative purposes. |

Table 2. Definition of each criteria used in the disclosure index

3.2. Measures of gender diversity

In this research, gender diversity was measured in several methods by using different proxies. First, we use the percentage of the woman on the board, i.e. the number of women directors divided by the total number of directors. Second, we use the absolute value of the total number of female directors on the board, and finally, we use two measures which take into account both the number of gender categories (i.e. two) as well as how evenly distributed board members are among these categories.

These last two diversity attributes, which are referred to as ‘variety’ and ‘balance’, respectively, can be combined in a ‘dual concept’ measure of diversity. In addition to their application in economics research, such measures are used widely across a variety of scientific and sociological fields, including genetics, ecology, linguistics, communications, and cultural studies (Cooke et al., 2013; Bello-Pintado & Bianchi, 2020; Shin & Throsby, 2022; Jahnke et al., 2022). The first of the two measures used here is known as the Blau index (Blau, 1977), which is formulated as follows:

$$\text{Blau index} = 1 - \sum_{i=1}^n P_i^2 \quad (1)$$

Where p_i is the percentage of board members in each category and n is the total number of directors. Blau index values for gender diversity range from a minimum of 0 to a maximum of 0.5, which occurs when the board is composed of an equal number of men and women.

The second measure is known as the Shannon index and is calculated as follows (Shannon, 1948):

$$\text{Shannon index} = -\sum_{i=1}^n P_i \ln P_i \quad (2)$$

Where P and n are defined as in the previous expression. The minimum value of the index is 0, and the maximum value of 0.69 is achieved when both genders are represented in equal proportions. Although the properties of the Shannon index are qualitatively similar to those of the Blau index, the former measure is a logarithmic diversity indicator. As such, it is more sensitive to small differences in board composition and will always yield a larger number.

Some researchers consider a board to be gender diverse only when it contains both men and women (Randel, 2002). In other words, a board comprising entirely women would not be considered diverse in this sense. For this reason, diversity indices are considered more precise measurements than simply using proportions and dummy variables. However, these indices reach their maximum value when the number of females on the board is equal to the number of males. The proportion of women on the board is usually quite low, and it is rare to find a board with women comprising a majority, but it is for this reason that the present study uses a diversity index not as an alternative measurement but as a complementary one. The use of multiple proxies in this regard will add robustness to our results. Moreover, only a small number of studies use metrics such as the Blau Index and Shannon Index for diversity (Talavera et al., 2018; Unite et al., 2019; Zaid et al., 2020), which are better measures of diversity (Aggarwal et al., 2019). Therefore, following Aggarwal et al. (2019), Unite et al. (2019) and Zaid, et al. (2020), the Blau Index and Shannon Index are used.

3.3. Control variables and model of study

Based on our proposed hypothesis of the study, gender diversity is our primary independent variable. We follow previous studies and included other important control variables which could explain variations in digital reporting (Nadeem, 2020; Seebeck & Vetter, 2021; Gupta et al., 2021). The following variables are thus

included as corporate governance control variables: (1) the percentage of non-executive directors, and (2) board size, as measured by the logarithm of the total number of directors. Additionally, we control for the following firm-specific variables: (1) firm size, as measured by the logarithm of total assets; (2) profitability, as measured by ROA; and (3) leverage, as measured by the ratio of total debt to total assets.

To analyze the effect of gender diversity on digital reporting, we employ a cross-sectional model:

$$IFR_i = \beta_0 + \beta_1 FS_i + \beta_2 ROA_i + \beta_3 LEV_i + \beta_4 LIQ_i + \beta_5 BS_i + \beta_6 NONEXC_i + \beta_7 GD_i + \varepsilon \quad (3)$$

Where i denotes a firm; IFR_i is the digital reporting index score; FS_i is the firm size (i.e. logarithm of total assets); ROA_i is profitability (i.e. return on total assets); LEV_i is leverage (i.e. debt-to-assets ratio); LIQ_i is liquidity (i.e. current assets to current liabilities ratio); BS_i is board size (i.e. total number of directors on the board); and $NONEX_{i,t}$ is the fraction of non-executive directors (i.e. total number of non-executive directors divided by board size).

In order to determine the state of the digital reporting, a disclosure index may be established by finding the items specified on the websites of the firm and then calculating the real score for each company's total score. Hossain et al. (1995) have recommended using a disclosure index as a proxy to understand company disclosure status. In addition, as a suitable way for evaluating the level of disclosure of businesses, Marston and Shrives (1991) suggested the creation of the disclosure index.

Coy and Dixon (2004) have stated that the disclosure indexes for accounting studies are a method that is primarily used in annual report disclosure research to provide a summarizing indicator of the full contents of the Annual Reports or as a measure of a group of items included in those reports.

The disclosure index has been used in a variety of digital reporting studies for the measurement of information available on the Web (Xiao et al., 2004; Aly et al., 2010; Kelton & Yang, 2008; Lipunga, 2014). The dependent variable (digital reporting) will be quantified for the current study by utilizing a disclosure index intended to identify the things that are revealed on the websites of each of the companies investigated and quantify them.

In the last couple of decades, studies on gender diversity have developed into a significant research problem, starting with the fact that the number of female executives and board members is growing remarkably. Carter et al. (2003) summed up the advantages of women's participation as follows: increasing the diversity in the board of directors' points of view, introducing board strategic input, impacting overall management styles and decision making, enhancing the image of the firm from the point view of stakeholders, inadequately qualified managers, capable and available women managers, and better" behaviour of the boardroom.

4. EMPIRICAL RESULTS

4.1. Descriptive statistics for the presence of female directors

This section presents the descriptive statistics for the five-gender diversity variables pertaining to the presence of female directors on the boards of non-financial U.S. firms listed on the S&P 500 index. The results for the ‘Female Count’ variable reveal that the average number of female directors on the boards of the sampled firms was 2.67. The minimum value was 0, but only two of the 328 sampled firms had no female directors serving on the board.

Table 3 presents the results for the four variables measuring gender diversity. ‘Female Count’ is the number of female directors on the board. ‘Gender Ratio’ is the number of female directors divided by the total number of directors on the board. ‘Blau Index’ portrays the percentage of board members in each gender category (male and female) with a minimum value of 0 (indicating a board comprised entirely of a single gender) and a maximum value of 0.5 (indicating a board comprised of equal numbers of men and women) (see Equation 1 in Section 3.2). ‘Shannon Index’ portrays gender diversity with a minimum value of 0 and a maximum value of 0.69 to indicate both genders are present in equal proportions (see Equation 2 in Section 3.2).

| | N | Minimum | Maximum | Mean | Std. Dev. |
|---------------|-----|---------|---------|-------|-----------|
| Female Count | 328 | .000 | 8.000 | 2.673 | 1.128 |
| Gender Ratio | 328 | .000 | .556 | .248 | .090 |
| Blau Index | 328 | .000 | .500 | .357 | .087 |
| Shannon Index | 328 | .000 | .693 | .538 | .104 |

Table 3. Descriptive statistics for presence of female directors

The third gender diversity measurement is ‘Gender Ratio’, which divides the number of female directors by the total number of board members. The results presented in Table 3 reveal that the average value for this ratio was 24.8%. The final two gender diversity measures, the Blau index and the Shannon index, were included to test the consistency of the results. The mean values for these two indices were 35.7% and 53.8%, respectively.

4.2. Correlation analysis

Table 4 presents the results of the correlation analysis for the main variables of study. The sample included 328 non-financial firms listed on the S&P 500 index. We use and a 0-4 index to measure the internet financial reporting score, and the variables are denoted as follows: ‘FS’ is firm size (logarithm of total assets); ‘ROA’ is profitability (return on total assets); ‘LEV’ is debt-to-assets ratio; ‘BS’ is board size (logarithm of the total number of directors); ‘NONEX’ is the proportion of non-executive directors (total number of non-executive directors divided by board size); and ‘GR’ is gender ratio (the percentage of female directors divided by board size). In addition, the Blau Index provides measure of ‘variety’, defined as whether boards include representatives of both genders, and the Shannon Index provides a measure of ‘balance’, defined as how equally men and women are represented on the board (see Equation 2 in Section 3.2). Asterisks indicate significance at the levels of 10% (*), 5% (**), and 1% (***).

| | Mean | 0-4 | FS | ROA | LEV | BS | NONEX | GR | Blau | Shannon |
|---------|-------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 0-4 | 57% | 1 | .271*** | .087 | .260*** | .266*** | .233*** | .236*** | .247*** | .245*** |
| FS | 4.078 | .271*** | 1 | -.094* | .310*** | .335*** | .256*** | .175*** | .207*** | .213*** |
| ROA | 9% | .087 | -.094* | 1 | -.099* | -.132** | -.072 | .084 | .104* | .097* |
| LEV | 49% | .260** | .310*** | -.099* | 1 | .258*** | .208*** | .108* | .116** | .118** |
| BS | 1.022 | .266** | .335*** | -.132** | .258*** | 1 | .280*** | .102* | .121** | .127** |
| NONEX | 88% | .233** | .256*** | -.072 | .208*** | .280*** | 1 | .243*** | .284*** | .293*** |
| GR | 25% | .236** | .175*** | .084 | .108* | .102* | .243*** | 1 | .960*** | .937*** |
| Blau | 36% | .247** | .207*** | .104* | .116** | .121** | .284*** | .960*** | 1 | .995*** |
| Shannon | 54% | .245** | .213*** | .097* | .118** | .127** | .293*** | .937*** | .995*** | 1 |

Table 4. Correlation analysis

Table 4 presents the results of the correlation analysis. Although the matrix shows the results of the analysis between all variables of the study, we will focus on the correlation between digital reporting (as measured by the 0-4 indices) and gender diversity (as measured by gender ratio, the Blau index, and the Shannon index). The results clearly reveal a positive correlation between digital reporting and gender diversity, and this finding is significant at a level of 1%. This implies that increasing the presence of female directors on the board may improve a firm’s level of digital

reporting on its firm website. This could be justified by the fact that female directors typically have significantly different life experiences which lead to a different orientation towards stakeholders. Besides, they are usually more likely to have support from influential people in the community. Consequently, having more female directors may lead boards to a greater conscientiousness of the value of engaging in high levels of digital reporting.

4.3. Regression analysis

For the regression analysis, as indicated above, we began by estimating the model (see Equation 3 in Section 3.3). Table 5 presents the results of the OLS regression analysis for our model. The dependent variable is internet financial reporting, which is scored using 0-4 indices. The independent variables are as follows: 'FS' is firm size (logarithm of total assets); 'ROA' is profitability (return on total assets); 'LEV' is debt-to-assets ratio; 'BS' is board size (logarithm of the total number of directors); 'LIQ' is the current ratio measured by the current assets divided by current liabilities; 'NONEX' is the proportion of non-executive directors (total number of non-executive directors divided by board size). We use four variables to measure both the presence of female directors and gender diversity. 'GDC: Female Count' is the number of female directors on the board. 'GR: Gender Ratio' is the number of female directors divided by the total number of directors on the board. 'Blau Index' portrays the percentage of board members in each gender category (male and female) with a minimum value of 0 (indicating a board comprised entirely of a single gender) and a maximum value of 0.5 (indicating a board comprised of equal numbers of men and women) (see Equation 1 in Section 3.2). 'Shannon Index' portrays gender diversity with a minimum value of 0 and a maximum value of 0.69 to indicate both genders are present in equal proportions (see Equation 2 in Section 3.2). Asterisks indicate significance at the levels of 10% (*), 5% (**), and 1% (***).

The regression results presented in Table 5 depict the impact of the firm and corporate governance on the digital reporting practices of the 328 non-financial S&P 500 firms in our sample. Both an OLS regression and a heteroskedasticity-corrected model with 0-4 index scores were used as dependent variables.

| N=328, | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|
| OLS | | | | HCM | | | | |
| R ² | 0.213 | 0.216 | 0.213 | 0.212 | 0.218 | 0.243 | 0.217 | 0.223 |
| Adj. R ² | 0.196 | 0.198 | 0.196 | 0.195 | 0.201 | 0.226 | 0.200 | 0.206 |
| F(6, 321) | 12.40*** | 12.57*** | 12.38*** | 12.28*** | 12.78*** | 14.64*** | 12.68*** | 13.10*** |
| P-value(F) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) |
| const | 0.469*** (0.000) | 0.520*** (0.000) | 0.468*** (0.000) | 0.459*** (0.000) | 0.412*** (0.000) | 0.447*** (0.000) | 0.415*** (0.000) | 0.422*** (0.000) |
| FS | 0.025*** (0.000) | 0.024*** (0.000) | 0.024*** (0.000) | 0.024*** (0.000) | 0.025*** (0.000) | 0.027*** (0.000) | 0.026*** (0.000) | 0.026*** (0.000) |
| ROA | 0.133*** (0.001) | 0.132*** (0.001) | 0.131*** (0.001) | 0.132*** (0.001) | 0.125*** (0.000) | 0.126*** (0.000) | 0.133*** (0.000) | 0.130*** (0.000) |
| LEV | 0.029*** (0.010) | 0.029*** (0.009) | 0.029*** (0.009) | 0.029*** (0.009) | 0.030*** (0.003) | 0.027*** (0.007) | 0.028*** (0.005) | 0.025** (0.011) |
| LIQ | 0.024*** (0.001) | 0.024*** (0.001) | 0.024*** (0.001) | 0.024*** (0.001) | 0.021*** (0.003) | 0.022*** (0.001) | 0.022*** (0.001) | 0.023*** (0.001) |
| BS | 0.128* (0.001) | 0.073* (0.079) | 0.127*** (0.001) | 0.127*** (0.001) | 0.138*** (0.000) | 0.108*** (0.002) | 0.144*** (0.000) | 0.139*** (0.000) |
| NONEX | 0.087* (0.090) | 0.095* (0.061) | 0.081 (0.117) | 0.081 (0.118) | 0.103* (0.076) | 0.109* (0.056) | 0.098* (0.078) | 0.094* (0.095) |
| GR | 0.097*** (0.003) | | | | 0.080** (0.024) | | | |
| GDC | | 0.009*** (0.002) | | | | 0.007** (0.030) | | |
| Blau | | | 0.101*** (0.004) | | | | 0.070** (0.038) | |
| Shannon | | | | 0.083*** (0.005) | | | | 0.063** (0.019) |

Table 5. OLS regression analysis and heteroskedasticity-corrected extended model (Equation 3)

It can be noted that firm size correlates significantly and positively with digital reporting, demonstrating that large U.S. firms disclose more information on their websites than small firms. In addition, the regression results for profitability demonstrate a significant positive correlation with digital reporting, meaning that the more profitable firms in our sample disclose more information on their websites than less profitable ones. Moreover, the regression results for leverage indicate that this variable also has a significant positive correlation with digital reporting; in other words, the sampled firms with a higher debt ratio disclose more information on their websites than those with lower debt ratios. Furthermore, the results of the regression analysis showed that the liquidity measured by the current ratio has a significant positive impact on digital reporting; in other words, the sampled firms with a higher current asset to current liabilities ratio disclose more information on their websites than those with lower current ratio.

With regard to the corporate governance variable of board size, the results in Table 5 illustrate that this factor also has a significant positive correlation with digital

reporting, i.e. the sampled firms with larger boards disclose more information on their websites than those with smaller boards. The second corporate governance variable is the percentage of non-executive directors, and the results above indicate that this factor also correlates significantly and positively with digital reporting, meaning that the sampled firms with larger proportions of non-executive board members disclose more information on their websites than those with fewer non-executive directors.

This study focuses on the correlation between gender diversity in the boardroom and digital reporting disclosure practices, and in this section, we test the previously stated hypothesis, i.e. that this correlation will be positive. We use four variables to measure both the presence of female directors on the board and gender diversity more generally. These are the number of female directors on the board (female count), the percentage of female directors on the board (gender ratio), the Blau index to measure ‘variety’, and the Shannon index to measure ‘balance’.

The results of both the OLS and heteroskedasticity-corrected models reveal that, regardless of the gender diversity proxy, the presence of female directors on the board has a significant positive impact on digital reporting. In other words, in our sample of non-financial firms listed on the S&P 500, the presence of female board members appears to enhance digital reporting levels on the firms’ websites, and this finding supports our hypothesis of the study.

5. DISCUSSION OF THE FINDINGS

The results of the descriptive analysis show that the average value for gender diversity was 24.8%, and for the Blau index and the Shannon index, the average was 35.7% and 53.8%, respectively. These values are much higher than in previous studies in other contexts. In their study of Spanish firms, for example, Abad et al. (2017) found average Blau and Shannon ratios of 8.4% and 14.19%, respectively, and Man’s (2011) findings for Hong Kong firms were 27.74% and 38.28%, respectively. However, even our findings for American firms fall shy of the values for perfectly gender-diverse boards (i.e. 0.5 for the Blau and 0.69 for the Shannon Index).

The results of the regression analysis indicate that firm size has a significant positive impact on digital reporting. In fact, firm size is considered an important determinant of corporate disclosure, and several arguments may explain this

relationship. First, large organizations usually have more robust internal reporting systems and enjoy an economy of scale when it comes to the production of information and the use of information technology, making the costs of producing and collating data, as well as maintaining and updating websites, lower for these firms. Second, large firms typically face greater political and other outside pressures, and they may thus also have greater incentive toward disclosure. Third, smaller firms may be more apt to hide crucial information due to competition within the industry. Moreover, our results are consistent with previous studies, for example, Bollen et al. (2006) and Dolinsek et al. (2014) asserted that firm size was identified as a positive and significant predictor concerning digital reporting practices.

In addition, the results of the current study indicate that profitability has a significant positive impact on digital reporting. This implies that profitability can act as an indication of good management since managers tend to disclose more information when profitability is high, and we thus argue that higher levels of profitability provide firms with the financial resources necessary to voluntarily share information on their websites. Furthermore, signaling theory stipulates that profitability itself may provide an incentive to share information since it is an indication of the organization's success and can signal to the market that the firm's current management is succeeding in making the firm's shares a good investment. This further allows such firms to secure additional capital at low prices. Agency theory also predicts that managers will want to disclose positive information about profitability insofar as it can help them to increase their compensation. Furthermore, our results are consistent with previous studies, for example, Aly et al. (2010), Bananuka et al. (2018), and Sarea (2020) asserted that firm profitability was identified as a positive and significant predictor concerning digital reporting practices.

Moreover, our findings show that leverage has a significant positive impact on digital reporting. Studies such as Xiao et al. (2004), and Momany and Al-Shorman (2006) have concluded that a high level of leverage correlates positively with internet financial disclosure. Agency theory offers one possible reason for this relationship; it argues that increased transparency can reduce the inclination of debt holders to price protect against the transfer of wealth from themselves to stockholders. By voluntarily disclosing information on the internet, the

management allows creditors to continuously monitor the firm's ability to meet its debt obligations. Although disclosing corporate information to the public does entail extra costs, it is thought that this is balanced by the reduction in agency costs which comes from such transparency.

In the same context, we find liquidity has a significant positive impact on digital reporting. Ruhana and Hidayah (2019) observed that high liquidity firms are regarded to be in a position to manage their businesses and hence have a minimal level of risk. A high liquidity firm is a representation of the financial success of the firm in prompt payment of its short-term commitments. This clearly demonstrates the capacity of a trustworthy firm to establish a strong, favorable image of itself, which allows stakeholders to constantly assist and support the firm.

Furthermore, we find that board size has a significant positive impact on digital reporting. Laksmana (2008) argued that board size has a positive correlation with disclosure level. According to resource dependence theory, higher numbers of board members will correspond to a greater variety in expertise and thus also an increased capacity to effectively manage the firm's resources. Larger boards may also be more effective with respect to the monitoring function. It is thought that the improved decision-making capacity of larger boards is what contributes to the higher rates of digital reporting found in our regression.

The second corporate governance variable is the percentage of non-executive directors, and the results indicate that this factor also correlates significantly and positively with digital reporting. AbdelSalam et al. (2007) and Kelton and Yang (2008) found a positive correlation between the variables. These results are consistent with agency theory, which predicts that the independence and objectivity of non-executive directors mean that their presence on the board reduces agency problems between a firm's management and its shareholders. A high proportion of non-executive directors is thought to improve the board's monitoring capability, preventing instances of managerial opportunism, and reducing their tendency to withhold information from the public. In this way, high numbers of non-executive directors can lead to better control of management and improved informational transparency, as our results indicate.

The results of regression analysis revealed that the presence of female directors on the board has a significant positive impact on digital reporting. Several arguments can help to explain this phenomenon. Increasing the number of females in the

boardroom is thought to lead to an increase in the diversity of opinions and the strategic input brought to the table. This may have an influence on the decision-making processes and leadership styles of the organization as a whole. It can improve the firm's image within various stakeholder groups, with female directors serving as mentors and role models. Female directors may also help to promote 'better behaviour' in the boardroom, which can also improve the overall functioning of the board.

The correlation between women on the board and digital reporting practices may be related to gender-based differences and differing perceptions of leadership roles. According to Eagly et al. (2003), for example, men tend to be characterized by argentic qualities while women are often more community-focused, embodying such qualities as supportiveness, empathy, and gentleness. In other words, they tend to be more mindful of the welfare of others. In practical terms, these qualities may help female directors to prioritize and better address stakeholder interests while their male counterparts focus on shareholder needs and economic concerns (Adams et al., 2011).

Furthermore, agency theory predicts a positive relationship between corporate transparency and gender diversity. This is based on the idea that diversity, in general, promotes board independence, which in turn has a positive impact on disclosure practices. Moreover, stakeholder theory also posits such a correlation based on the notion that firms which can cite female representation in top management positions, including the board of directors, are more capable of protecting the interests of a wide array of stakeholders.

6. CONCLUSIONS

Participating in digital reporting is expected to have significant advantages for organizations. As a means of distributing information, it is quick, easy, flexible, and cost-effective, and it provides easy access to potential investors and other categories of stakeholders. The composition of the board of directors is a topic that has been receiving increasing attention for its potential role in board independence and the effectiveness of its monitoring capabilities. Of the various issues related to board composition, gender diversity is increasingly seen as a characteristic that can help firms achieve a competitive advantage and enhance firm value. Complements in the work and cognitive styles of males and females can enhance decision-making processes and lead to broader knowledge, expertise, creativity, and innovation in

board functioning, and it is thus thought that a more diverse team will prove better able to solve the most complex problems and reach the best decisions.

At present, the empirical evidence relating to the impact of gender diversity on corporate disclosure remains inconclusive, especially with respect to digital reporting. By extending previous studies, the current research has tested the correlation between the presence of female board members and digital reporting practices for non-financial firms listed on the S&P 500 index in the United States. Digital reporting levels were measured using a comprehensive disclosure index which was formulated by combining the key dimensions employed in earlier studies. This study used a modified scoring scale which extended digital reporting engagement to five levels (4, 3, 2, 1, and 0).

The results of our regression analysis confirmed the hypothesis of the study, namely that the presence of female directors on the board improved levels of internet disclosure for our sample of firms. This may relate to the fact that female board members have skills and knowledge which differ from their male counterparts, and such variety is often a benefit to decisions regarding transparency. Moreover, the results indicate that firm size, profitability, and non-executive directors enhance online disclosure levels.

Our findings provide evidence for policy makers that gender diversity enhances online disclosure and thus, the transparency of the firm. The findings can be used, also, by corporate governance institutions to raise awareness of the advantages of having female members on the board. The study will be of value to the academic researcher in the field of corporate governance, internet reporting and disclosure, as well as to users of online reporting for decision making. We focus only on S&P 500. However, we believe that the same hypotheses are worth testing in other countries. Moreover, cross-country analyses can be incorporated.

In order to estimate the digital reporting level among the listed firms in the USA in 2019, this study initially established a self-compound index with a strong effort to reduce subjectivity in picking index items, however, it does not make sense to claim that the study is clear of subjectivity which is the first limitation of the current study. The identification of these elements was nevertheless based upon incorporation in the prior literature assessment of the digital reporting field, of the main aspects. Secondly, although an enlarged modified scoring system (4,3,2,1 and 0) inked to

the unweighted scoring method (1 and 0) was employed by this study to reduce subjectivity it is still to a certain degree suffers from subjectivity.

Despite the previously mentioned limitations, it may be helpful to give a few ideas and recommendations for future studies based on the obtained results and the preceding limitations. For instance, a future study may draw comparisons between the digital reporting and the traditional reporting on paper (annual report) to show the differences between these two channels of disclosure as the current study focuses primarily on online disclosures. Regarding the sample of the study, the current study is for the USA. A comparison between two or more distinct nations might be used to justify the causes behind the implementation of digital reporting. moreover, the progress of using digital reporting practices among companies could be surveyed over more years.

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