

Can Gender Diversity Influence Liquidity and Risk of Companies?

A Diversidade de Gênero Pode Afetar a Liquidez e o Risco de Companhias?

Igor Bernardi Sonza¹

Universidade Federal de Santa Maria – UFSM
igorsonza@gmail.com

Vanessa Martins Valcanover²

Universidade Federal de Santa Catarina – UFSC
vanessamvalcanover@gmail.com

Abstract: The gender diversity in boardrooms and high management positions of firms is a subject that has been gaining visibility, since it started to be seen as a corporate governance practice, regarding the participation in monitoring committees and the better disclosure of information. Thus, this paper sought to verify how gender diversity, through the participation of female directors and executives, impacts on the accounting liquidity and risk of companies listed in the Brazilian stock exchange. An analysis of unbalanced panel data was performed using the Generalized Method of Moments, considering 234 companies in the period from 2010 to 2016. Results showed that the number of women in those positions still small, and that the proportion of female directors is negatively linked to liquidity and positively linked to risk, contrary to much of the literature. For the proportion of female executives, the relation to liquidity was significant and positive. It can be inferred that female directors act as a corporate governance mechanism, being more confident and encouraging the risk-taking in order to meet the interests of shareholders, while female executives tend to be less confident, protecting their positions.

Keywords – Gender diversity; Listed firms; Accounting liquidity; Risk.

Resumo: A diversidade de gênero nos conselhos e alta gestão das firmas é um assunto que tem ganhado visibilidade, desde que começou a ser considerada prática de governança corporativa, em relação à participação em comitês de monitoramento e a

¹ Universidade Federal de Santa Maria — Rua Roraima, 1000 – CEP 97105-900 – Santa Maria (RS) – Brasil

² Universidade Federal de Santa Catarina — Rua Engenheiro Agrônomo Andrei Cristian Ferreira, s/n – CEP 88040-900 – Florianópolis (SC) – Brasil

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melhor divulgação de informações. Assim, esta pesquisa buscou verificar como a diversidade de gênero, através da participação de mulheres conselheiras de administração e executivas, impacta na liquidez contábil e no risco de companhias listadas na bolsa de valores brasileira. Uma análise de painel de dados não balanceados foi realizada através do Método de Momentos Generalizados, considerando 234 empresas no período de 2010 a 2016. Os resultados mostraram que o número de mulheres atuando naqueles cargos ainda é pequeno, e que a proporção de conselheiras está negativamente ligada à liquidez e positivamente ligada ao risco, contrariando boa parte da literatura. Para a proporção de executivas a relação para liquidez foi significativa e positiva. Pode-se inferir que mulheres conselheiras atuam como um mecanismo de governança corporativa, sendo mais confiantes e encorajando a tomada de risco de forma a atender os interesses dos acionistas, enquanto mulheres executivas tendem a ser menos confiantes, protegendo suas posições.

Palavras-chave – Diversidade de gênero. Firmas listadas. Liquidez contábil. Risco.

Introduction

The gender diversity in boardrooms and high management positions of firms is a subject that has been gaining visibility recently, since the increasing participation of females in a mostly male environment started to be seen as a corporate governance practice. Regarding this issue, Adams and Ferreira (2009) showed that female directors have better attendance records and are more likely to join monitoring committees than male directors, and Abad, Lucas-Pérez, Minguez-Vera, & Yagüe (2017) revealed that gender diversified boards improve the quantity and quality of public disclosure by firms, leading to a reinforcement in the companies' governance.

Beyond corporate governance, the gender diversity concept has also been discussed regarding the financial performance of firms. Liu, Wei, & Xie (2014) verified this connection, finding a positive relation between gender diversity and performance, and detected that boards with three or more female directors have a stronger impact in the performance than boards with less than three females. Moreover, Ahmed and Ali (2017) confirmed the efficiency of boards with greater gender diversity, showing that a higher stock liquidity can be achieved through an efficient monitoring by the boardrooms.

Despite the rising quantity of researches focusing on gender diversity in the companies, probably all of the studies face the same issue: the small quantity of females in boardrooms around the world. According to the Corporate Women Directors International (CWDI) (2015), in a study released in 2015,

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19,2% of the board members in North America were women. Similar results were found in Europe (20%), but, in other regions, the participation of females was even fewer: in the Asia-Pacific region, 9,4% of the board members were females, and in Latin America, this percentage was of only 6,4%. Globally, gender diversity in corporate boards is increasing, but not in Latin America; and in Brazil, the average participation of women in the boards was of 6,3%, while over 40% of the female directors had family ties to the company (CWDI, 2015).

The small participation of women in firms' top positions had already been pointed out by Kanter (1977), which argued that females were treated as tokens, that is, an individual that is the only representative of a particular demographic group, such as gender or race; so they did not had the chance to participate equally in the decision-making process for being considered as representative "objects". In order to increase the proportion of females in the firms' boardrooms, and consequently reduce the tokenism and the gender inequalities, many countries have been adopting mandatory rules, such as Norway, France, Spain, Italy and Netherlands (IBGC, 2013). In Brazil, since 2010 a bill that aims to increase to a minimum of 40% the participation of females in the boardrooms of public firms has been going through the legislative, but the process is not over yet (Brasil, 2010).

Considering the presented background, this paper aims to identify how gender diversity affects the companies' performance, verifying the influence of the female participation, as directors and executives, on the accounting liquidity and risk of firms listed in the Brazilian Stock Exchange (B3). It is important to inform that Brazilian papers linking accounting, liquidity and gender diversity were not found; however, there are few studies related to gender and firm performance in the country, being possible to emphasize the papers of Silva and Margem (2015), Segura, Formigoni, Abreu, & Costa (2016), Vaccari and Beuren (2017) and Silva Júnior and Martins (2017).

Data regarding boardrooms, directors and executives were collected from the Brazilian Securities Exchange Commission (CVM), and the sample included 234 companies in the period between 2010 and 2016, since the CVM information disclosure started in 2010. The dependent variables, accounting liquidity and risk, and the control variables were taken from the ECONOMATICA database. It was identified that women as directors have a negative impact on accounting liquidity, while female executives increase the firms' liquidity. For risk, only one variable related to gender was significant, women as directors, and has

a positive influence. This way, it can be inferred that female directors act as a corporate governance mechanism, being more confident and encouraging the risk-taking in order to meet the interests of shareholders, while female executives tend to be cautious, protecting their position.

The importance of studying companies listed in Brazil involves the fact that this country has weak corporate governance and legal protection, so the conflict of interests between majority and minority shareholders tend to be prominent (Black, De Carvalho, & Gorga, 2010). This issue requires more practices to improve the corporate governance, and a greater gender diversity in the boardrooms and in the management of firms could help. Besides, the paper innovates in suggesting the use of two variables that are not usually considered in studies regarding this subject: the participation of females as independent directors and a woman as the chairperson of the boardroom. Even though these variables were not significant in the analysis, other researchers can add them in their studies, considering different countries and samples, and find significant relations.

The paper is structured in five sections, being this introduction the first of them. The literature related to gender diversity, liquidity and risk are shown in section two. Section three presents the methodology and the variables used, section four shows the research results and section five closes the paper, with the final considerations, contributions and limitations of the study.

Corporate Governance, Gender and Performance: Concepts and Hypothesis

This section is divided into two parts to better explain the state of the art of the proposed subject, as it follows: (i) gender diversity and liquidity; and (ii) gender diversity and risk.

Gender Diversity and Liquidity

Liquidity, in accounting and finance, is a measure of the ability of a borrower to pay his debts at the due date, or the ability to pay short-term debt (Tirole, 2006). Few studies in financial literature have tried to relate gender diversity and liquidity on firms, and, overall, they showed similar results, that is, female leaders tend to use more long-term debt and hold more cash.

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For example, when examining the influence of gender in financial decisions of micro and small start-ups firms in Spain, Hernandez-Nicolas, Martín-Ugedo, & Mínguez-Vera (2015) argued that these companies have large problems in security funding and the owners' and managers' characteristics play a crucial role in obtaining financing. The authors verified the level, the cost and the maturity of debt, and identified that the presence of females, as CEOs or as board members, leads to a lower debt financing, reduces the cost of debt and increases the debt maturity, showing that the participation of women can improve the financial situation of a firm and also increases the firm's liquidity, since they prefer long-term debt.

As well, Zeng and Wang (2015) related the gender of CEOs of Chinese listed firms with the corporate cash holdings, what is also connected to a firm's liquidity. Considering a sample of 468 firms from 2007 to 2011, the authors found that female CEOs were related with a higher level of cash holdings, and cared less about the opportunity cost of cash than their male counterparts. Using a sample of Tunisian listed firms, Loukil and Yousfi (2016) studied the gender diversity on firms' boardrooms and its impact on the risk-taking, in the period from 1997 to 2010. The authors linked the risk perception with the firm's liquidity, and found that the presence of women in the boardrooms, even if there is only one female director, is positively associated with the cash ratio, what ensure a certain liquidity level and reduces the risk behavior. Similarly, Adhikari (2018) found that firms with more females in their top executive teams tend to hold more cash as a proportion of total assets, but the author related the result with the risk-aversion behavior, which is usually conceived as a female characteristic.

Beyond the direct relation between gender and liquidity in firms, authors have added a concept from the psychology that is widely used in behavioral finance researches to explain this relation: the overconfidence. Usually, it is expected that males are more overconfident than females, and like to embrace competition while females refuse it (Niederle & Vesterlund, 2007). Huang and Kisgen (2013) brought the gender differences regarding overconfidence to the corporate finance. Using a sample of US listed firms in the period from 1993 to 2005, they studied the impact of the CEO's and CFO's gender on the financial and investment decisions of firms. The authors found that male executives perform more acquisitions and issue debt in a higher frequency than female executives, what suggests that, even in the corporate decisions, men exhibit more overconfidence when compared to women.

Moreover, without considering gender, Huang, Tan, & Faff (2016) examined whether and at what extent the CEO's overconfidence affect the firm's debt maturity decisions, e.g., if they prefer short-term debt or long-term debt. They found that overconfident CEOs change the debt maturity structure using a higher proportion of very short-term debt. Besides, authors showed that this action is not threatened by the existing liquidity risk of firms that take a large amount of short-term debt, that is, overconfident CEOs are not afraid of suffering from illiquidity.

Connecting the studies from Huang and Kisgen (2013), which suggested that male leaders reduces the liquidity, and Huang *et al.* (2016), which appointed that overconfident leaders also reduces the liquidity, it is possible to expect that, if the CEO is male, he is overconfident and can cause a reduction in the liquidity. Meanwhile, it is expected that a female CEO is less overconfident and can lead to a higher liquidity. Based on the researches presented, which relate gender and liquidity, the first and the second hypotheses of this paper were prepared, H1 and H2:

H1: A greater proportion of females as board members leads to an increase in the liquidity of the companies listed in the Brazilian Stock Exchange.

H2: A greater proportion of females as executives leads to an increase in the liquidity of the companies listed in the Brazilian Stock Exchange.

Gender Diversity and Risk

The relation between gender diversity and risk has been widely explored in the financial literature, but still there is no consensus about the issue. To explain this relation, it is important to bring results found on researches from psychology, that are frequently used in the behavioral finances. Studies like Byrnes, Miller, and Schafer (1999), Weber, Blais, and Betz (2002), Harris, Jenkins, and Glaser (2006), Charness and Gneezy (2012) and Sarin and Wieland (2016), have tried to explain the relation between gender and the risk propensity, that is, the implementation of choices that could lead to negative consequences, where prevailed the idea that women are more risk averse than men.

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In the corporate finance, Berger, Kick, and Schaeck (2014) verified how the gender composition of executive teams, among other variables, affected the portfolio risk of the German banking industry between 1994 and 2010. Results suggested that board changes, which increase the representation of female executives, do not lead to a reduction in the portfolio risk. Instead, a higher proportion of female executives increased the portfolio risk measurements, even though the coefficients were only marginally significant. These findings do not coincide with psychological studies that appointed women as more risk averse than men, such as Byrnes *et al.* (1999).

An important contribution to the issue was made by Adams and Funk (2012), which studied the gender differences between male and female directors and CEOs, considering a sample of 628 individuals. The authors explained that most of studies regarding gender differences usually consider students, workers, the general population, so it is not clear to what extent women at the top of corporate positions really are different from men. In their research, results showed that even at the top positions, there are behavioral differences between males and females: male directors focus more on achievement and power than women, and less on benevolence. However, unlike the prior literature, women in the boardrooms focus less about security than men, and are slightly more risk loving than their male counterparts (Adams & Funk, 2012).

From another point of view, Sila, Gonzalez, and Hagendorff (2015) examined the risk implications of gender diversity in the boards of 1.960 non-financial US firms between 1996 and 2010. They found no evidence that female board representation influences equity risk, and suggested that the lack of solid empirical evidence on the relationship between gender diversity in boards and risk does not make this diversity more or less desirable, because this issue is much more a case of fairness than pure economic considerations.

On the other hand, Gulamhussen and Santa (2015) investigated the role of women in bank boards, considering a sample of 461 large banks from the Organization for Economic Co-operation and Development (OECD) countries. The authors found that the presence and proportion of women directors in the boards have a positive effect on the banks' performance, and detected that exists a negative relation between females in the board and risk-taking.

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A similar influence was found in Baixauli-Soler, Belda-Ruiz, and Sanchez-Marin (2015), where companies with women in the top management team exhibit more conservative behavior and take less risk than firms without gender diversity in the top management team. Also, in Perryman, Fernando, and Tripathy (2016), and in Faccio, Marchica, and Mura (2016), it was found that transitions from male to female CEOs are linked with significant reductions in corporate risk-taking. Furthermore, Palvia, Vähämaa, and Vähämaa (2015) argued that a female CEO or chairperson promotes more conservative strategies, leading to a lower asset risk in U. S. commercial banks.

Based on the literature presented, and given the fact that there is no consensus in the literature about this issue, the second group of hypotheses was prepared, H3 and H4, with their alternative hypotheses, H3A and H4A.

H3: A greater proportion of females as board members leads to a reduction in the risk of the companies listed in the Brazilian Stock Exchange.

H3A: A greater proportion of females as board members leads to an increase in the risk of the companies listed in the Brazilian Stock Exchange.

H4: A greater proportion of females as executives leads to a reduction in the risk of the companies listed in the Brazilian Stock Exchange.

H4A: A greater proportion of females as executives leads to an increase in the risk of the companies listed in the Brazilian Stock Exchange.

Research Methodology

This paper is labeled as a descriptive research, according to Triviños (1987), because it aims to describe facts and events of a given situation. The descriptive research implies the use of hypotheses that

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were described in the previous section. It is also a quantitative research, since it uses a large sample and the results can be quantified through mathematical and statistical methods (Fonseca, 2002). It was used secondary data from the companies listed in the Brazilian Stock Exchange (B3), in the period from 2010 to 2016. The data related to the board composition were obtained in the site of the Brazilian Securities Exchange Commission (CVM) and the data regarding the performance measures of the firms were taken from ECONOMATICA. The final sample included 234 firms, considering all the companies (listed and delisted), to avoid the survivorship bias. Non-industrial firms, those with Tobin's Q negative or above 10 were excluded, and the period between 2010 and 2016 was chosen because the CVM information disclosure started in 2010.

Regarding statistical analysis, at first it was performed a correlation test among the variables used, and then proceeded to the descriptive statistics. Later, to verify the influence of women in the boardroom and as executives on the liquidity and risk of companies, it was used an unbalanced panel data by Generalized Method of Moments (GMM), attributed to Hansen (1982). Specifically, it was applied the dynamic, which considers the lagged dependent variable as an explanatory variable, and in-differences model (GMM-Sys). The instruments used were the explanatory variables lagged in one and two periods, as proposed by Almeida, Campello, and Galvão (2010). When there are more than three observations by each cross-sectional unity, additional instruments are available. If the model has $T > 3$ and the error term in first differences presents serial correlation of first order, assuming that the equations' error terms are not correlated, the Ordinary Least Squares (OLS) and the Two-Stage Least Squares (2SLS) estimators are not asymptotically efficient even if the complete set of instruments is used (Bond, 2002).

In such case, the GMM provides a convenient structure to the achievement of asymptotically efficient instruments, as the In Difference GMM (GMM-Dif) and the System GMM (GMM-Sys). Theoretically, the difference between the two estimators lies in the conditions of moment used in each estimator, which implies in a bigger or smaller set of instruments available in those approaches. The conditions of moment depend on the suppositions regarding the initial condition of the model's series. Thus, the set of instruments available in the GMM-Sys estimator is larger and allows more precise estimates in certain contexts, however, the assumptions in relation to the initial conditions are more restrictive. In this case, it is supposed that the initial conditions satisfy the property of stationarity in mean,

so that the series have constant mean for each individual i . This specification implies that for $i=1, 2, \dots, N$, which, given the model's autoregressive structure and the supposition that for $i = 1, 2, \dots, N$ and $t = 3, 4, \dots, T$, implies the following $T-2$ non-redundant conditions of moment: for $i = 1, 2, \dots, N$, and $t = 3, 4, \dots, T$, additional to those specified for the first-difference equations. So, in the case of the GMM-Sys, beyond the available instruments for the GMM-Dif estimator, the variables in difference can be used as instruments for the equations in level.

According to Bond (2002), the GMM-Sys estimator has a much lower bias of finite samples and much higher precision when it is necessary to estimate autoregressive parameters using series with high persistence, being more suitable for the analysis. Finally, it is highly recommended to investigate the properties of the time series of the individual series when it is used the GMM estimators for dynamic panel models (Bond, 2002). The dynamic model is obtained using the lagged endogenous variable as explanatory in the model. In the case, following Mátyás (1999), the efficiency gains allowed by the homoscedasticity condition are reduced with the analysis of dynamic panels, being possible to dismiss the condition, since it has a more robust assumption. To perform the analysis, the following tests were used: (i) Arellano and Bond (1991) test, which verify the existence of serial autocorrelation in the sample; (ii) qui-square test (X^2); and, (iii) the Hansen J (1982) over-identification test. The following equations (1) and (2) show the regression models that attend the hypotheses previously described.

$$L_{it} = \alpha_i + WDir_{it}\gamma + WExec_{it}\mu + C_{it}\theta + \varepsilon_{it} \quad (1)$$

$$R_{it} = \alpha_i + WDir_{it}\gamma + WExec_{it}\mu + C_{it}\theta + \varepsilon_{it} \quad (2)$$

In equation (1), L represents the firm's Liquidity, and in (2) R is the firm's Risk. For both equations, α is the intercept, γ , δ , μ and θ are the variables' coefficients, $WDir$ is the first independent variable, related to the participation of women in the boardroom, and $WExec$ is the second independent variable, the proportion of female executives on the firm. C is related to the control variables and ε is the error term, i represents the firms and t represents the time. The data was corrected by the IGP-DI index and the outliers

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were winsorized by 5%. All the variables used in the regressions are presented in Appendix 1, including descriptions, main authors and expected signals.

Analysis of Results

Before performing the main analysis, the correlation test was applied to the variables selected to compose the model. The results can be seen in Table 1.

	Liq	Risk	WDir	WExec	WIn	BS	TE	InDir	Q	ROA	Tang	Lev	LTA	CFR	Div
Risk	-0,050														
WDir	-0,096	0,004													
WExec	-0,022	0,000	0,049												
WIn	-0,105	0,052	0,488	-0,051											
BS	0,310	-0,301	-0,037	-0,084	-0,082										
TE	0,304	-0,140	-0,074	0,132	-0,130	0,377									
InDir	0,370	-0,135	-0,154	-0,044	-0,188	0,479	0,352								
Q	0,252	0,006	-0,025	-0,007	-0,007	0,162	0,301	0,174							
ROA	0,118	-0,476	0,027	0,064	-0,039	0,229	0,264	0,077	0,434						
Tang	-0,126	0,008	0,080	-0,258	0,089	0,032	-0,184	-0,081	-0,139	-0,230					
Lev	0,110	-0,312	-0,060	-0,035	-0,069	0,206	0,073	0,197	0,286	-0,049	-0,018				
LTA	0,446	-0,369	-0,184	-0,030	-0,102	0,603	0,395	0,404	0,186	0,293	-0,050	0,316			
CFR	-0,030	-0,101	0,023	-0,024	-0,023	-0,008	-0,013	-0,026	0,056	0,155	0,026	0,058	-0,018		
Div	0,096	-0,198	0,018	0,003	0,008	0,186	0,112	0,072	0,178	0,347	-0,065	-0,036	0,221	-0,109	
CE	0,108	-0,132	0,018	0,021	0,038	0,246	0,092	0,091	0,220	0,149	0,174	0,121	0,262	-0,046	0,093

Note. Liq = liquidity, WDir = women as directors, WExec = women as executives, WIn = women as independent directors, BS = total number of members in the board, TE = total number of executives, InDir = total number of independent directors in the board, Q = Tobin's Q, ROA = return on assets, Tang = tangibility, Lev = leverage, LTA = logarithm of total assets, CFR = cash flow risk, Div = Dividends, CE = capital expenditures.

Table 1. Correlation matrix

Source: Prepared by the authors (2018).

As presented in Table 1, the variables chosen to compose the model did not present a high correlation value (above 0,7) between each other. Next, after winsorizing the variables at 5%, the descriptive statistics were performed, and the results are shown in Table 2. The first dependent variable, Liquidity, had a positive mean (8,8%) and a small standard deviation, which shows that, on average, the

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firms had a cash increase during the period. Risk, the second dependent variable, also had a positive mean (7,3%) and a small standard deviation. The mean and the median (p50) had close values.

Observing the independent variables, the results for women as directors (WDir) showed that, on average, only 7,9% of the directors in the companies were females. For women as executives (WExec), 7,1% of the executives were females, on average. The last variable considering gender is women as independent directors (WIn), which indicated that only 4,3% of the independent directors were women. For the three gender variables, means and medians were quite similar, since a small number of companies had a woman in its boardroom or as an executive, indicating the weak gender diversity in Brazilian firms.

The study by Margem (2013) pointed out that 9,13% of the directors and only 4,93% of the executives were female, considering data from companies listed in the BM&FBOVESPA (now B3), from 2002 to 2009. The results suggest that the average proportion of women acting in the boards of directors of firms listed in Brazil decreased from the period studied by Margem (2013) to the period studied in here, while the proportion of females in executive positions increased. Otherwise, when compared to the findings by CWDI (2015), in which until the ending of 2014 only 6,3% of the directors in the boards in Brazil were women, it is possible to notice an increase in the female participation in the last years.

The average number of members in the board of directors (BS) was around 6,55 members, and the biggest boardroom had 19 members. Regarding the number of executives (TE), the average number was of 4,48 executives and the firm with the greatest amount had 33 members. On average, the number of independent directors (InDir) in a boardroom was of only 1,43, and the firm with the greatest number had 13 independent members. The mean and median values were quite close for these variables. Concerning the performance variables, the companies had, on average, a market value that exceeds the total assets on 55% (Tobin's Q) and the mean value for ROA was positive (0,9%), which showed that the firms may be reaching positive net profits. Relating to tangibility (Tang), the companies had around 24,9% of tangible assets in relation to the total assets.

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stats	Liq	Risk	WDir	WExec	WIn	BS	TE	InDir	Q	ROA	Tang	Lev	TA	CFR	Div	CE
N	1072,0	1072,0	1352,0	1342,0	735,0	1360,0	1360,0	1360,0	983,0	1072,0	1072,0	983	1077,0	844	1005	991
Mean	0,088	0,073	0,079	0,071	0,043	6,555	4,488	1,429	1,550	0,009	0,249	0,906	3063009,00	-0,013	0,353	0,051
p50	0,002	0,051	0,002	0,003	0,005	6,000	4,000	1,000	1,138	0,024	0,241	0,708	978075,30	-0,008	0,174	0,039
p10	0,000	0,007	0,001	0,001	0,003	3,000	2,000	0,000	0,086	-0,125	0,002	0,000	76348,54	-0,100	-0,002	0,000
p25	0,000	0,019	0,001	0,003	0,003	5,000	3,000	0,000	0,567	-0,020	0,015	0,157	277492,80	-0,042	0,000	0,011
p75	0,055	0,098	0,112	0,010	0,010	8,000	6,000	3,000	2,150	0,068	0,391	1,297	2763567,00	0,016	0,558	0,073
p90	0,367	0,163	0,287	0,253	0,010	10,000	8,000	4,000	3,892	0,120	0,574	2,326	7586328,00	0,067	1,133	0,126
Variance	0,034	0,005	0,022	0,021	0,023	7,853	7,449	2,935	1,971	0,011	0,047	1,004	3.51e+13	0,005	0,251	0,002
Min	0,000	0,003	0,001	0,000	0,001	0,000	0,000	0,000	-0,203	-0,284	0,000	-0,433	694,60	-0,182	-0,222	-0,002
Max	0,681	0,293	1,010	1,005	1,010	19,000	33,000	13,000	5,125	0,172	0,677	3,604	4.51e+07	0,147	1,692	0,175
Sd	0,185	0,074	0,149	0,146	0,150	2,802	2,729	1,713	1,404	0,104	0,216	1,002	5922365,00	0,071	0,501	0,048
Skewness	2,342	1,596	2,851	2,837	4,866	0,509	2,439	1,307	1,119	-1,210	0,423	1,212	3,720	-0,172	1,303	1,110
Kurtosis	7,224	5,070	13,904	13,526	28,333	3,440	17,710	5,362	3,527	4,646	2,020	4,033	18,898	3,890	3,855	3,563

Note. Liq = liquidity, WDir = women as directors, WExec = women as executives, WIn = women as independent directors, BS = total number of members in the board, TE = total number of executives, InDir = total number of independent directors in the board, Q = Tobin's Q, ROA = return on assets, Tang = tangibility, Lev = leverage, TA = total assets, CFR = cash flow risk, Div = dividends, CE = capital expenditures, Min = minimum, Max = maximum, Sd = standard deviation.

Table 2. Descriptive statistics of the variables

Source: Prepared by the authors (2018).

Regarding leverage (Lev), for each R\$ 1,00 of equity, the companies had a non-operational debt of R\$ 0,91. The mean of the total assets (TA) was of R\$ 3.063 billion, while its median was of R\$ 978.075 million, and the high values for standard deviation and variance suggested the use of logarithm in the model. Regarding the cash flow risk (CFR), the mean was around -1,3%, while the median was of -0,08%, showing that firms did not present a high variation in their cash, reducing the uncertainty in relation to the cash retention. For dividends (Div), the average dividend payout ratio was about 35,3% of the net profit, while the median was around 17,4%. Finally, the mean value for the capital expenditure (CE) indicated that the fixed assets of the firms represented 5,1% of their total assets, while the median was of 3,9%. The next step in the analysis aimed to verify the impact of the gender diversity on liquidity and risk, through the use of the GMM-sys method, as shown in Table 3.

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	Liquidity				Risk			
	Coef.	Rob. Std. Err.	z	P>z	Coef.	Rob. Std. Err.	z	P>z
L1.	0,886***	0,072	12,330	0,000	0,223	0,163	1,370	0,172
WDir	-0,284**	0,144	-1,970	0,049	0,243*	0,140	1,730	0,083
WExec	0,177*	0,095	1,870	0,062	-0,017	0,069	-0,240	0,808
WIn	0,105	0,120	0,870	0,382	0,040	0,138	0,290	0,773
WChair	0,080	0,073	1,090	0,276	-0,037	0,050	-0,750	0,452
BS	0,012*	0,007	1,770	0,077	-0,015**	0,007	-2,120	0,034
TE	0,000	0,005	0,070	0,947	0,003	0,005	0,580	0,565
InDir	0,001	0,008	0,110	0,915	0,009	0,010	0,900	0,368
Dual	0,017	0,043	0,390	0,698	-0,038	0,035	-1,070	0,282
Q	0,018*	0,009	1,910	0,056	0,023**	0,011	2,100	0,035
ROA	0,049	0,116	0,420	0,676	-0,759***	0,145	-5,220	0,000
Tang	0,092	0,074	0,950	0,343	0,032	0,079	0,400	0,687
Lev	-0,012	0,010	-1,240	0,216	0,001	0,011	0,040	0,964
LTA	0,002	0,015	0,150	0,880	0,011	0,013	0,820	0,412
CFR	0,209**	0,104	2,010	0,045	0,012	0,108	0,110	0,911
Div	0,015	0,020	0,760	0,450	0,026	0,021	1,230	0,219
CE	0,217	0,193	1,120	0,261	-0,040	0,164	-0,240	0,809
cons	-0,163	0,158	-1,030	0,301	-0,076	0,145	-0,520	0,603
Chi2	1184,893	-	-	0,000	203,688	-	-	0,000
Hansen	56,569	-	-	0,894	38,784	-	-	0,852
Ar1	-1,971	-	-	0,049	-1,883	-	-	0,060
Ar2	1,369	-	-	0,171	-0,996	-	-	0,319

Note. L1 = dynamic variable (lag of the dependent variable), WDir = women as directors, WExec = women as executives, WIn = women as independent directors, WChair = woman as chairperson, BS = total number of members in the board, TE = total number of executives, InDir = total number of independent directors in the board, Dual = duality CEOxChairman, Q = Tobin's Q, ROA = return on assets, Tang = tangibility, Lev = leverage, LTA = logarithm of total assets, CFR = cash flow risk, Div = dividends, CE = capital expenditures, cons = constant. * = significant at 10%, ** = significant at 5%, *** = significant at 1%

Table 3. Regression analysis using GMM-sys: impact of the gender diversity on liquidity and risk

Source: Prepared by the authors (2018).

The Arellano and Bond (1991) test (Ar1 and Ar2) for liquidity and risk indicated that the models do not reject the null hypothesis of no serial correlation in the first order residuals, and this serial correlation in first order justifies the use of a dynamic model such as GMM-sys. The Hansen test (1982) does not reject the null hypothesis for both cases, which shows that there are no specification problems in the instrumental variables. As suggested by Almeida *et al.* (2010), the lagged independent variables were used as instruments. Lastly, it was applied the Chi-square test (Chi2), which rejected the null hypothesis and indicated that there is an association within the group of variables for both cases.

Analyzing the results for the liquidity regression, only two gender variables were significant. Women as directors (WDir) had a significance level of 5% and a negative impact on the firm's liquidity,

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where the increase of 1% in the proportion of females in the boardroom reduces in 0,28% the liquidity. Otherwise, the variable women as executives (WExec), significant at 10%, had a positive impact on liquidity, where a growth of 1% in the number of female executives increases the liquidity of the firms in around 0,18%. For women as independent directors (WIn), an increase of 1% in the number of female independent directors would raise the liquidity in about 0,11%, but the variable did not reach the significance level.

The negative relation between the variable women as directors and firms' liquidity was not expected, contradicting the studies by Hernandez-Nicolas *et al.* (2015) and Loukil and Yousfi (2016), while the positive impact of women in top management positions on the liquidity of firms agreed with the literature exposed previously. For example, Zeng and Wang (2015) found out that female CEO's are connected to a higher level of cash holdings and don't mind much about the opportunity costs of cash, and Adhikari (2018) found that firms with more female executives tend to hold more cash as a proportion of total assets. This way, it can be said that female directors and executives behave in a different way. Could be the case that, as a corporate governance mechanism, the female directors are inclined to attend the shareholders' interests and take a more confident position, suggesting a smaller retention of cash and reducing the firms' liquidity; whilst the female executives would be more careful in financial and investment decisions, holding more cash and leading to an increase in the liquidity, a confidence issue pointed by Huang and Kisgen (2013).

The board size (BS) variable was significant at the level of 10%, and the increase of 1% in the size of boards leads to an increase of 0,01% in the liquidity. This result reflects Gill and Shah's (2012) findings, which affirmed that a larger boardroom can lead to an excessive cash holding in firms, consequently increasing the liquidity; however, possibly leaving aside the preferences of the shareholders. Tobin's Q (Q) was significant at the level of 5%, and an increase of 1% on it raises the liquidity in 0,02%, an expected result, being in accordance with John (1993) and Feng, Lu, and Wang (2017), suggesting that a higher growth opportunity will enhance the firm's liquidity. The cash flow risk (CFR) variable was also significant at 5%, and an increase of 1% in the variable increases the liquidity in 0,21%. The relation between the variables reflects the exposed by Dutra, Sonza, Ceretta, and Galli (2018), which stated that

an increase in the cash flow risk appoints to a higher need of cash to ensure it, increasing the firm's liquidity.

Finally, it was performed the regression for risk and only one variable regarding gender diversity was significant. Women as directors (WDir) had a significance level of 10% and a positive impact on risk, where an increase of 1% in the number of female directors increases the firm's risk in 0,24%. This finding contradicts Sila *et al.* (2015) and Gulamhussen and Santa (2015), which stated that female directors are linked to a lower risk level on firms, while also go against much of the psychology literature. However, Adams and Funk (2012) brought a significant support to the risk behavior of female directors, affirming that most of the studies regarding the subject surveys the general population, were the men tend to be more risk-loving than women. However, the authors' research suggested that women in leadership positions do not satisfy the gender stereotypes, having a higher willingness to take risks than their male colleagues. Furthermore, females in the general population may have significantly different values from women who reached their director positions in the competitive market for directors (Adams & Funk, 2012).

The variable Board Size (BS) was significant at the level of 5%, and an increase on its value reduces the risk in 0,01%, an impact that agrees with Yermack (1996) and Loukil and Yousfi (2015), which stated that a bigger board size has a slower decision-making and is biased against risk-taking. Again, Tobin's Q (Q) was significant at the level of 5% and impacted on the risk positively, leading to an increase of 0,02%. This result goes against Shin and Stulz (2000) and Sila *et al.* (2015), which found a negative relationship between risk and Tobin's Q. Probably, in the sample, a higher growth opportunity will end up inducing an increase in risk-taking, hoping to raise the shareholder value in the future. Lastly, return on assets (ROA) was significant at 1%, and has a negative impact, where a growth of 1% on the returns reduces the risk in 0,75%, indicating that firms with higher profitability tend to be less risky (Huang *et al.*, 2016).

Conclusions and Contributions

This paper sought to verify the impact of females as directors and as executives on the accounting liquidity and on the risk of 234 companies listed in the Brazilian Stock Exchange. Regarding the findings, a greater participation of female directors reduces the level of liquidity in firms, doubting the idea that

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women are less overconfident than men, what could lead to a higher liquidity. This result indicates the rejection of the H1 hypothesis, and it is contrary to what was stated by Hernandez-Nicolas *et al.* (2015) and Loukil and Yousfi (2016), which proposed that female directors increase liquidity.

As an argument for this outcome is the fact that most of the studies investigated the behavior differences between genders considering the general population, while specific studies do not find that women are less overconfident than men (Deaves, Lüders, & Luo, 2009; Sila *et al.*, 2016). In addition, this result can suggest that female directors work as an effective corporate governance mechanism, aiming to meet the interests of shareholders, while other mechanisms considered in the model, such as independent directors, women as independent directors, and women as chairperson, were not significant, thus, they do not affect the firm's liquidity in the sample studied.

Meanwhile, a higher proportion of female executives increases the level of liquidity in firms, demonstrating that the H2 hypothesis was not rejected and corroborating the findings of Huang and Kisgen (2013), Hernandez-Nicolas *et al.* (2015) and Zeng and Wang (2015). This can be explained by two points of view: first, executives in general are usually inclined to hold more cash; however, the variable total number of executives (TE) was not significant, leading to the second point of view, in which women as executives tend to hold even more cash than men, being less overconfident and increasing the liquidity.

In sequence, the H3 hypothesis was rejected, but its alternative confirmed, confirming the results of Adams and Funk (2012) and Berger *et al.* (2014). Considering that there is no consensus on the literature about this subject, it was found that female directors lead to an increase on the risk of firms, what can be explained by Deaves *et al.* (2009) and Sila *et al.* (2016). As Adams and Funk (2012) affirmed, females in high positions such as members of a company's boardroom may present a behavior that is different from the expected to women in general and even show a higher disposition to face risks than their male counterparts. Regarding the H4 hypothesis, which assumes that female executives leads to a smaller risk and is based on the inferences by Baixauli-Soler *et al.* (2015), Perryman *et al.* (2016) and in Faccio *et al.* (2016), it was rejected, since its coefficient was not significant, even at the 10% level. The result for this variable agrees with the other variable regarding executives (TE), since both of them were not significant, suggesting that possibly there are no gender differences in the behavior of executives towards risk.

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As contributions, this paper brought the entanglement of financial terms, such as liquidity and risk, with psychological terms, such as gender differences, overconfidence and risk-taking, to the Brazilian perspective, a country where this kind of research still poorly explored. The approach to gender diversity raises the issue that, even nowadays, women have a small participation on high positions, despite the fact that they can contribute to increase the corporate governance level and the performance of companies. However, the Brazilian law shows an effort to reduce the gender inequalities, even if the progress is slow. This is a field yet to be explored, since it is unknown how far the gender differences in behavior and its effect on the firm performance will persist, maybe until the proportion of men and women occupying these leadership positions will be equal. Then, possibly the relation between the variables will become clearer.

As limitations, it was considered the difficulty of comparing the results with other papers performed in Brazil, since the researches about this subject are sparse. Actually, it was difficult to find works approaching the specific issue between liquidity, risk and gender in other countries, because many studies try to link the gender diversity with firm performance in general. Another limitation is the fact that the relationship between gender and the dependent variables may be endogenous. Finally, as suggestions for future research, additional variables could be used to approach the issue, such as the educational level, the age and the previous professional experience of the female directors and executives, and could be questioned how these characteristics moderate the results towards liquidity and risk.

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Appendix 1. Variables definition		Variable Name	Measurement	Main Authors	Expected Signal	
		Dependent Variables				
Liquidity	Cash holding to total assets ratio, a measure commonly used in corporate finance studies of liquidity management. A higher ratio indicates a greater liquidity.		$\frac{\Delta Cash}{Total\ assets}$	John (1993), Feng <i>et al.</i> (in press).	NA NA	
Risk	Standard deviation of the asset turnover ratio, it is a volatility measure. The greater the volatility, the greater the risk.		$\sigma \left(\frac{Operating\ revenue}{Total\ assets} \right)$	Gatti and Nakamura (2013).	NA NA	
		Independent Variables				
Variable Name	Description		Measurement	L R	L R	
Women in the Board (WDir)	Ratio of the number of female directors to the total number of directors on the board. We expect that an increase in the proportion of female board members raises the liquidity and increases or decreases the risk.		$\left(\frac{0.01 + Number\ of\ women\ in\ the\ board}{Total\ number\ of\ members\ in\ the\ board} \right)$	Hernandez-Nicolas <i>et al.</i> (2015), Loukil and Yousfi (2016).	Gulambussen and Santa (2015), Sıla <i>et al.</i> (2015), Loukil and Yousfi (2016).	(+) or (-)
Women as Executives (WExec)	Ratio of the number of female executives to the total number of executives in the firm. We expect that an increase in the proportion of female executives raises the liquidity and increases or decreases the risk.		$\left(\frac{0.01 + Number\ of\ women\ executives}{Total\ number\ of\ executives} \right)$	Huang and Kising (2013), Hernandez-Nicolas <i>et al.</i> (2015), Zeng and Wang (2015).	Baixaui-soler <i>et al.</i> (2014), Berger <i>et al.</i> (2014).	(+) or (-)
Women as the Independent Directors (WInDir)	Ratio of the number of female independent directors to the total number of independent directors on the board. We expect that an increase in the proportion of female independent directors raises the liquidity and increases or decreases the risk.		$\left(\frac{0.01 + Number\ of\ women\ in\ dir.}{Total\ number\ of\ ind.\ directors} \right)$	Liu <i>et al.</i> (2014).	Liu <i>et al.</i> (2014).	(-)
Woman as the Chairperson (WChair)	Dummy variable. It is expected that a female chairperson will assume less risk and be positively related to liquidity.		Score 1 if the Chairperson is a woman 0 otherwise	Palvia <i>et al.</i> (2015).	Palvia <i>et al.</i> (2015).	(-)
Independent Directors (InDir)	Ratio of the number of independent directors to the total number of directors on the board. It is expected that independent directors will strive to meet the shareholders' interests, leading to lower cash holdings, thus, to a smaller liquidity. Otherwise, their participation will increase the firm's risk: the liquidity and the smaller the risk.		$\left(\frac{0.01 + number\ of\ ind.\ directors}{Number\ of\ directors} \right)$	Lee and Lee (2009).	Fama (1980).	(+)
Board Size (BS)	A larger board size may cause to hold excess cash in the firm, what increases the liquidity but does not attend the shareholder's interests. Lately, they would lead to a reduction on the firm's risk. Smaller boards tend to encourage risk-taking, so, the greater the number of directors on the board, the smaller is the risk.		Total number of directors on the board	Gill and Shah (2012).	Yermack (1996), Loukil and Yousfi (2015).	(+)

Can Gender Diversity Influence Liquidity and Risk of Companies?

Total Executives (TE)	Executives tend to hold more cash, increasing the liquidity, and usually assume less risk to preserve their positions. Dummy variable. The CEO/Chairperson duality may not be in favor of the firms' shareholders, since the CEO can protect the executives' position through the excessive cash holding, increasing the liquidity. Meanwhile, it tends to reduce the firm's risk-taking propensity.	Total number of executives in a firm	NF	Berger <i>et al.</i> (2014).	(+)	(-)
Duality (Dual)		Score 1 if the CEO is the chairman of the board Score 0 otherwise	Gill and Shah (2012).	Kim and Buchanan (2008).	(+)	(-)
Firm Size (LTA)	The firm size is measured as the logarithm of the firm's total assets. The greater the firm size, the smaller the propensity to hold cash, so it is expected a lower liquidity. Additionally, larger firms tend to have a lower risk.	Logarithm of firm's total assets	Drobetz and Grüniger (2007), Dutra <i>et al.</i> (2018).	Faccio <i>et al.</i> (2016).	(-)	(-)
Leverage (Lev)	Firms with high leverage have to compromise a significant part of their cash to pay debts and face higher default risk. Thus, the higher the firm's leverage ratio, the smaller is the liquidity and the higher is the risk.	$\frac{\text{Financial Debt}}{\text{Net equity}}$	Diamond (1991), Huang <i>et al.</i> (2016).	Diamond (1991), Huang <i>et al.</i> (2016).	(-)	(+)
Profitability (ROA)	Return on assets. Profitable firms are more capable of paying dividends, paying their debt obligations and holding cash, leading to a higher liquidity and a smaller risk.	$\frac{\text{Net profit}}{\text{Total assets}}$	Al-Najjar (2013), Hernandez-Nicolas <i>et al.</i> (2015).	Myers and Majluf (1984), Huang <i>et al.</i> (2016).	(+)	(-)
Tangibility (Tang)	Firms with more tangible assets are expected to have a lower liquidity because the tangible assets can be sold if a cash shortfall occurs. Meanwhile, they usually present a smaller risk.	$\frac{\text{Fixed assets}}{\text{Total assets}}$	Drobetz and Grüniger (2007).	Faccio <i>et al.</i> (2016).	(-)	(-)
Growth Opportunity (Q)	Tobin's Q is a measure for growth opportunity. An increase in Tobin's Q is linked to an increase in liquidity. A fall in Q's value is associated with an increase in the firm's total equity risk.	$\frac{\text{Market value}}{\text{Total assets}}$	John (1993), Feng <i>et al.</i> (in press).	Shin and Stulz (2000), Sila <i>et al.</i> (2015).	(+)	(-)
Dividends (Div)	The dividends payment is positively related to cash reserves, indicating a higher level of liquidity. Meanwhile, a higher dividend payout ratio can lead to an increase on the firm's risk.	$\frac{\text{Dividends payout}}{\text{Net profit}}$	Drobetz and Grüniger (2007).	Khambata and Liu (2005).	(+)	(+)
Capital Expenditures (CE)	If the capital expenditures create assets that can be used as a guarantee, the capital expenditures reduce the demand for cash, reducing the firm's liquidity. However, if the expenditures do not create assets as expected, it increases the firm's risk.	$\frac{\text{CAPEX}}{\text{Total assets}}$	Bates <i>et al.</i> (2009), Dutra <i>et al.</i> (2018).	Amir <i>et al.</i> (2007).	(-)	(+)
Cash Flow Risk (CFR)	A higher cash flow risk increases the firm's risks and demands more cash retention to ensure it, leading to a higher liquidity.	$\frac{\Delta \text{EBIT}}{\text{Total assets}}$	Han and Qiu (2007), Dutra <i>et al.</i> (2018).	Dutra <i>et al.</i> (2018).	(+)	(+)

Note. NA = does not apply; NF= papers using these variables in relation to liquidity and risk were not found.
Source: Prepared by the authors (2018).