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Correlation between women representation on board and company performance

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<p>Researchers cannot provide us with the definite answer whether board diversity influences company performance or not. Findings are very controversial and have many limitations, such as causality direction, comparability of data and variety of the research methods. This paper is going to examine the relationship between women representation on board and company performance. Performance factors used in this research are revenue, ROI, ROE, ROA, firm value and innovation. Data from 46 companies from S&P500 was analysed to identify the relationship between performance and board diversity. The correlation coefficient was found with Excel formula and significance level identifying suitability of data was found from ANOVA table after running regression analysis. Hypotheses were made on the basis of theoretical assumptions and previous findings and had to be rejected after conducting quantitative analysis. Secondary sources used for the research mainly included articles on the previous similar works, annual reports and financial databases. This research has identified no statistically significant correlation exists between any of the performance factors used and women representation on board. Even though weak correlations either with positive or negative direction were found, the extent of correlation aka p-value aka Significance F was too high making results statistically insignificant and not suitable for use.</p>	
Keywords	board, diversity, performance, correlation

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1 Introduction

Gender inequality at workplace issue has been actively discussed already for few decades and has strong historical routes that have shaped our perceptions on what is “right” and what is “wrong”. This issue has been raised since 20th century, when feminists’ movements started in Western society, and now more and more attention is paid on it. Governments and organizations are trying to change discrimination practices and ensure the equality by introducing quotas and improving recruitment processes. For instance, researches have revealed that blind auditions in Top US orchestras have increased the chances of women to get to the finals by 50%, which resulted in rise of the women representation in orchestras from 1970 to 2013 by more than 25% (Rice 2013). Another example is Apple, who promised to consider women to their boards after Sustainable Group was unhappy seeing only one woman on board (O’Connor 2014). European Commission also has introduced the gender quota for non-executive director positions in 2012 for all public companies (European Commission 2012). The reason for this was that only 15% of non-executive board members were females and EC wanted to increase the equality.

There are a lot of journal articles about inequality at workplace, since there are many debates on this topic. Majority of authors claim that gender inequality at work is a major global problem that needs a solution, which has to include abandonment of stereotypical societal thinking. Historically, the role of women was to take care of household when men were earning money and leading armies. Even the greatest leaders of all times were men, such as Julius Ceasar, Abraham Lincoln, Mahatma Gandhi, Winston Churchill and others. Of course, there were couple famous women, such as Queen Victoria and Indira Gandhi, but traditionally, men were seen as great leaders and this perception is very hard to battle even now. In case of organizational culture for example, “top management” is often associated with “white men”, as it has been and continues to be the case most of the time even now since previous centuries (Chu 2014). For example, in the pool of the top 20 individuals across the UK FTSE 100 in 2014 95 per cent were white and 80 per cent male (Ehenberg 2014). However, organizations are trying to combat unconscious biases (the way of building links, patterns between subjects because of the common use of them together) and prioritise traits and skills over the gender (traits theory of the leadership).

Eagly claims that gender stereotypes are the reason that holds women back, however in the last 40 years it has changed and people are more open to having woman boss, since now mostly are the traits and skills that matter (Northwestern 2016). This is supported by research held by Yang and Aldrich (2014:314), which shows that gender influence is reducing when multiple merits are taken into the account to assign a leader. At the same time though, another research held by EU shows the opposite results: "the cumulative effects of gender and ethnic inequalities lead to a gender stratification in which native men have the best labour market opportunities and migrant and minority women are the most disadvantaged in many EU member states": low pay, low status and insecure job (EU Monitoring Centre on racism and Xenophobia, 2003 cited in Kraal et al, 2009, ch. 1:11). However, partly it could be explained by lack of skills of immigrants, so ethnicity aspect has to be neglected and only personal characteristics in combination with gender should be discussed.

Historically gender is one of the society-wide classification systems, which is logical taking into account differences. But how do these differences influence quality of work if both candidates have required skills? Mueller et al. (2002:165) claims that perception of women and men about their own skills and expectations differ (women generally accept the fact that expectations to them are lower, which is also proved by research made by Eagly (Northwestern 2016) (about participation in groups) and this eventually contributes to the gender stereotyping, division and discrimination. It could also influence the readiness to accept promotion opportunities. At the same time, however, women have different perception about communication, which is perceived to be the most essential leader's attribute (Medland, 2016). So the problem might be that forwarding the message is what needed from leader of the company rather than two-way dialogue, which is needed for management level. What if it is not about inequality but about matching skills? What if women's ability for two-way dialogue is more beneficial to the managerial level and one-way unobjectionable order positioning is required to become a director?

Many authors agree that gender inequality at workplace is identified by the gender wage gap, concentration of women vs. men in the leadership positions, involvement in senior management and the difference in time needed for men and women to advance in their

careers (Stamarski 2015: 5; Mueller 2002: 173, 174; Yang and Aldrich 2014: 304). According to the research in US top companies, 65% of all the promotions to corporate executives goes to men (Strauss 2017).

Gender Equality Recast Directive 2006/54/EC from the European Union Employment Law, stating that "there should be no direct or indirect discrimination on ground of sex in employment and occupation", including access to employment, trainings, career advancement and working conditions (European Commission 2006) is hard to use; it is also difficult to prove the case of discrimination, since anything could be seen from the perspective of abilities and fit to the company.

Wage gap is a major problem many researches are concerned about. On the other hand, some companies eliminate gender pay gap by making wage information public and available for employees (Elsesser, 2015). The only EU gender equality legislation is Article 141 EC that states "Each Member State shall (...) ensure and subsequently maintain the application of the principle that men and women should receive equal pay for equal work" (European Commission 2008). However, current numbers show that majority of countries are breaking the law by having women's wage represent only 70%-90% of the men's for the same job (International Labour 2009, 19 cited in Mukhopadhyay, 2015: 68). The issue with this legislation is that it can be cheated, since "an important question in equal pay cases is always whether the work performed by a female worker is 'equal' to the work performed by a male worker" (European Commission 2008). Unfortunately, the understanding of "equality" or "work of equal value" stays subjective and open to interpretations and therefore not really workable. Even though it is a very interesting topic, it will not be the focus of this work.

1.1 What to expect from this paper

The aim of this paper is to analyse and examine relationship between female representation in top management and company performance.

There has been some evidence shown of correlation between gender balance in the boards of directors and financial performance of the company in previous researches, however results were very controversial. There were different performance indicators

and different calculation techniques used, which made results hard to compare. Therefore, this paper is going to use the main factors to identify their correlation with the board composition.

Firstly, the current situation in the world regarding gender balance in the higher layers of the organisations is going to be demonstrated with some statistics and examples from the individual companies. It will be shown that there is still unequal representation of genders in the top management and boards.

Secondly, theoretical framework about benefits of the diverse management on the economic results of the company in general and on board decision-making process in particular will be discussed followed by the real life examples. Deloitte will be one of the successful examples of the diversity management incorporation into the board of directors.

Thirdly, the existing researches on this topic are going to be analysed and compared. It will be divided into sections by the performance factors used in the research. It will be seen that there is no single answer to the question whether there is a correlation after all or not.

Lastly, the practical part is going to be presented. The data from 46 S&P500 top companies is going to be analysed taken from the financial database. It includes ROI, ROE, ROA coefficients; revenues, innovation coefficients and assets/liabilities in addition to the board of directors' composition information taken from the annual reports. Data from 2013 and 2016 is going to be compared to identify the performance indicator and female representation change in % in order to be able to run the correlation analysis.

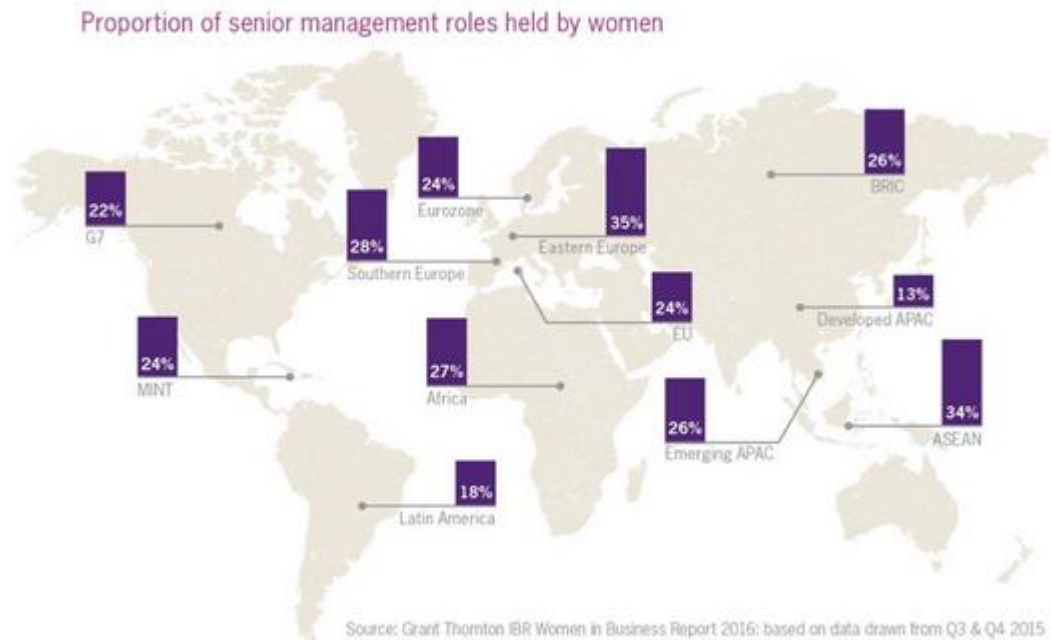
Results are presented and analysed in the end of the report to drive conclusions, accept or reject the hypotheses, evaluate some shortcomings and limitations of the research and advise on future research practices followed by appendices with the correlation calculations.

2 Literature review

This chapter is going to present different statistics and results of the gender board compositions and its influence on company performance. Some benefits of diverse workforce in general and diverse top management in particular are going to be discussed followed by real-life examples.

2.1 Current situation of the women representation in the top management

Even though the quota was introduced by European Commission (EC) in 2012, there is still an underrepresentation of women on the senior positions. According to the European Commission (2016), only 23.3% of the leadership positions in the largest publicly-listed companies in the European Union (EU) were occupied by women. It is worth remembering however, that EC quota proposal was to influence only EU member states. The overall current situation for senior management positions taken by females in the world is shown in Figure 1 below. It is seen that on average 25% of the senior managers in the world were women in 2016.



Senior Management roles held by women Source: Grant Thornton UK LLP London March 8, 2016

Figure 1. Proportion of senior management roles held by women. Source: Medland 2016

European Commission introduced quota in 2012, therefore it is worth analysing the situation in Europe and US since 2011 to spot the changes and compare the results. Table 1 shows the situation in the UK for 2011 when only 5.5% of executive directors were women. In other countries the situation in 2011 was even worse, for example Germany, France, Norway and Switzerland had no female chief executives among the top listed companies at all; US was performing better with 4% of CEOs being females in S&P 500 list (Kollewe 2015).

Table 1. Percentage of Companies with female CEOs per country in 2011. Source: Kollewe 2015

Global Index Ranking	Percentage of Companies with Female CEOs
OMX (Sweden)	7%
FTSE-100 (UK)	5.5%
Bel 20 (Belgium)	5%
FTSE 250 (UK)	4.2%
Nasdaq (US)	4%
S&P 500 (US)	4%
AEX (Netherlands)	4%
IBEX 35 (Spain)	3%
CAC 40 (France)	0
DAX (Germany)	0
OBX (Norway)	0
SMI (Switzerland)	0

In 2014 the UK market reported that only 20,7% of board members in FTSE 100 companies were women, which was almost 100% increase from 2011, when the figure was only 12.5%, however the result was still far from the gender balanced board formula (Chu 2014). By 2015, only 41 out of FTSE100 companies have achieved the target of 25% female directors on the board. In addition, even though it is indicated already as a 4,5% increase from 2011, there were only 24 female executive directors in the FTSE100 in 2015 (Vinnicombe et al. 2015: ch.3), which comprised less than 10% of executive directors claimed by MWM Consulting (Kollewe 2015). These numbers above indicate slight improvements in women representation on board in the timeframe between 2011 and 2015, but still the percentage was quite low.

Report for 2017 however already shows that 56% of the FTSE100 companies have at least 27% female directors, which confirms the consistent uprising trend towards gender equality on board in the UK (Vinnicombe et al. 2017: 1). The representation of women directors increased almost by 28 through thought the last year and this tendency allows us to assume that by 2020 it would be possible to achieve 33% women boards in FTSE 100 (Vinnicombe et al. 2017: 1). On the other hand, the female executive directorship number has increased only by one since 2015. An increase in women representation is seen in France and Germany as well since 2011 but by a very small number: only 2% and 1% respectively of CEOs are females (Snyder 2017).

Currently US has the largest percentage of the female CEOs, which equals to 8% and UK is a follow-up with 6% at the moment (Snyder 2017). On average 28% of the top 60 NAFE's list executives are women (Strauss 2017) and 5.2% (26 people) for S&P 500 list (Catalyst 2018) (See Figure 2 below), which shows that US is ahead of UK and the rest of Europe. Another example of it is that 32% of the top companies NAFE highlights have at least five women on their boards in 2017 (Strauss 2017).

Women in S&P 500 Companies



Figure 2. Catalyst, Pyramid: Women in S&P 500 Companies (February 2, 2018). Source: Catalyst 2018

2.2 Some obstacles and reasons for inequality

There are some obstacles in society for a woman to take a leadership position or become a director on the board. The first female leader of the IMF, Christine Lagarde, has shared with the Guardian her own experience from the early career revealing that she was warned by a reputable company in France that her sex is going to be an obstacle for her to become a partner (Chu 2014).

There are quite a few research papers published on this topic. For example, Yang and Aldrich (2014: 314) point out that entrepreneurs often launch a business with co-founders and if this co-founder is a woman, she is most likely not going to be the «Boss». This research is based mostly on spousal co-founders, but some great points are made on general topic. Gender stereotypes and social perceptions of leaders intensively constrain women's access to power position and scientists supporting merit-based view believe that gender still remains a major factor for distributing rewards and leadership roles (Yang and Aldrich, 2014: 306).

Ridgeway (1997 cited in Mueller 2002:165) also recognizes that organizational culture is the factor influencing inequality, since some of the companies are gender-bias. There are still quite many «sexist organizations». The problem might have not been solved yet because of lack of measures taken by the higher layers of societies. There are some legislations introduced in the EU mentioned in the Introduction, but how effective and accurate are they? As discussed above, European Commission established quota legislation in 2012 and it can be seen from Figure 3 that there are some improvements seen by 2015. On average across all the sector there has been 10% increase in women representation on board of directors since 2011 (ISS and EU 2016). However, companies who wanted to avoid the regulation went private (Ahern 2012: 169).

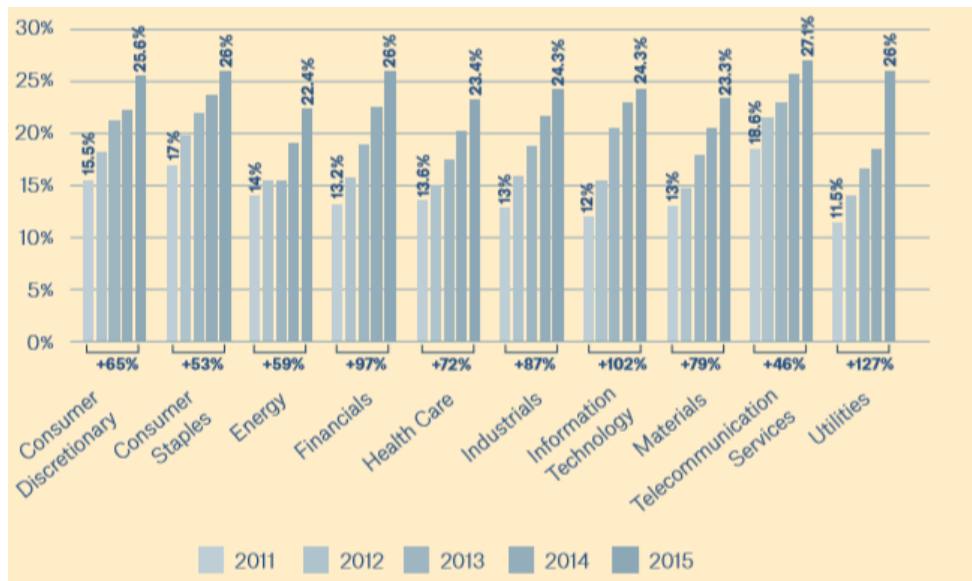


Figure 3. Proportion of women on boards per sector (2011-2015). Source: ISS and EU 2016

2.3 Benefits of the diverse workforce

The results from the research conducted by Kakabadse et al. (2015) indicate the importance of female board members, as it encourages mix of skills and backgrounds to be incorporated into the company processes, which results in the higher quality of the decisions leading to the greater company efficiency. The study shows that most of the respondents believe that female representation in the board encourages creativity and discussions, minimizes "groupthink" and improves problem-solving that may become a sustainable competitive advantage (Kakabadse et al. 2015).

The claim that companies having diverse workforce are more innovative as well is supported by Forbes Insights (Rizy et al.) magazine. Having varied experiences and opinions leads to generating new competitive solutions about product and practices improvements, which stimulates innovation intensity. This may lead to the higher demand or cost reductions, which not only creates more profits but also benefits other financial performance indicators.

Kanter's study (1983) shows that the most innovative companies are creating heterogeneous teams in order to encourage ideas, recognizing that the best solution could be

found by considering multiple points of view (Cox, 1994:32). These practices could be justified by the statement made by Deloitte Tax manager that "when at least one of the team members has similar traits with end user, the entire team understands customer better and therefore there is a greater chance to succeed" (Hewlett et al, 2013). The same could be argued to be true in regard to the board members, if at least one of them has similar traits to the employees (females), it may be easier to manage and coordinate their work and if both parties understand each other, efficiency may increase. What is more, female directors may initiate product line development which will benefit female segment of the target market, which may not happen if the board is male-only. Fulfilling needs of different segments may enrich customer database by retaining loyal customers and recruiting new ones, which definitely will have a positive effect on the revenues of the company.

What is more, research held by Hewlett et al. (2013) shows that the companies with diversity, who encourage "out of box" ideas and accept ideas of cultural minorities, out-innovate and out-perform others.

Research shows that diverse workforce has an influence on financial performance of the company: diverse companies have better financial results (Hunt et al. 2015). Diversity leads to better ability to win top talents and improvement of customer orientation, employee satisfaction and decision-making, which inevitably leads to the better returns (Hunt et al. 2015). It is proved by research held by McKinsey (Barta et al. 2012) that there is a correlation between board diversity and returns (See Figure 4). Companies with high executive-board diversity (top quartile in Figure 4) had on average 53 percent higher ROEs than the ones with the lower diversity (Bottom quartile). In addition, EBIT margins in the most diverse companies were 14 percent higher than in the least diverse ones (Barta et al. 2012).

Average returns on equity (ROE) and margins on earnings before interest and taxes (EBIT),¹ 2008–10, %

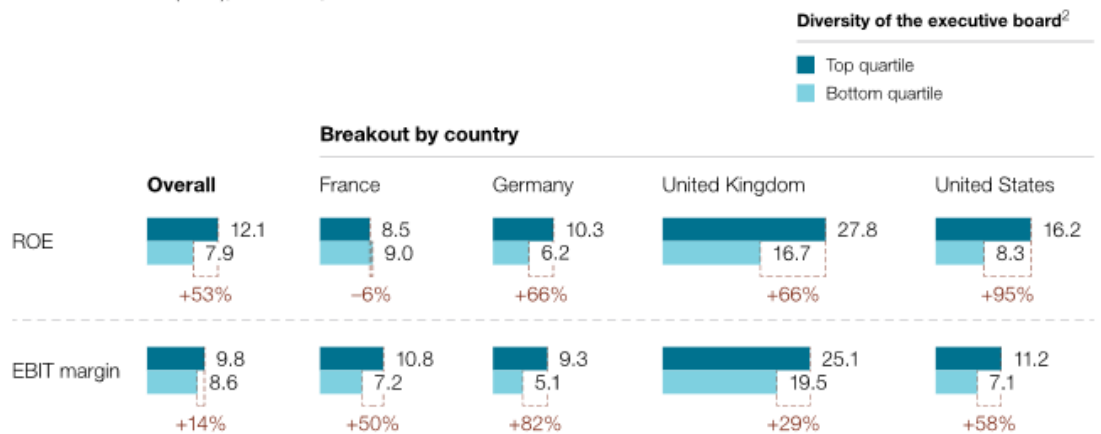


Figure 4. Correlation between board diversity and returns. Source: McKinsey and Company. Source: Barta et al. 2012

Another example of financial success because of the diversity could be Deloitte Tax. It is one of the companies that promotes diversity by investing around £30m yearly into diversity learning and development (Deloitte UK 2015:15). In 2015, 66% of new recruiters were women or minorities (Llopis 2016), which was followed by increase in revenue the same year, which could be seen from Figure 5 below.

	Notes	2015 £m	*2014 £m
Revenue	3	2,827	2,676
Expenses and disbursements on client assignments	3	(460)	(423)
Net revenue		2,367	2,253
Operating expenses			
Staff costs	4	(1,233)	(1,160)
Depreciation and amortisation	5	(61)	(52)
Other operating expenses		(376)	(428)
Share of results of joint venture	17	–	11
Operating profit		697	624
Other income	19	10	10
Finance cost	6	(87)	(53)
Profit before tax		620	581

Figure 5. Deloitte UK Annual Report 2015. Source: Deloitte UK 2015:15

However, it cannot be proved that there is a direct relationship between diversity and financial performance as there are other factors shaping and influencing results at the

same time (Barta et al. 2012). However, it shows a consistent trend which cannot be ignored or random.

2.4 Benefits of the diverse boards

Diversity management is more and more becoming part of the organisational strategy (Moss 2009 : ch.2), as it has financial impact: reduces labour costs, recruitment, turnover and training (McEnrue 1993 cited in Moss 2009: ch.2), encourages growth possibilities: greater creativity and new product development (McEnrue 1993 cited in Moss 2009:ch.2), improved innovation capability (Nieto and Quevedo 2005 in Moss 2009) and better "corporate agility" (Sambamurthy et al. 2003 cited in Moss, 2009: ch.2) and, of course, it allows to provide better service: understanding of customer needs (Day and Van den Bulte, 2002 in Moss 2009 :ch.2), better customer loyalty (Rigby, 2006 cited in Moss 2009:ch.2) and greater ability to adapt to changing environments (Lowell and Zanini 2005 cited in Moss 2009:ch.2). To obtain all these competitive advantages listed above that become more and more of a strategic focus, the diversity has to be fostered at the organisational level (Moss 2009: ch.2), and therefore it has to come from the board. Smith (2014) claims that if the board and the senior management are not the same diverse as workforce, companies might experience communication problems, which inevitably influence company's performance. This also supports the argument made by author in the previous chapter about leaders' better understanding their employees' needs if they have similar traits. Therefore, diversity management should begin from the top level of the organizational hierarchy pyramid. Figure 6 reflects the significance of the correlation between diversity on board and company performance factors found by Moss (2009). According to Fenton and Neil (2012: ch.1) the smaller p -value is, the more statistically significant the result is and the less chances are that relationship found is random. Figure 6 shows that p -value (extent of correlation) is lower than 0.001 meaning that correlation is statistically highly significant and exists.

Table 1.1 Correlations between perceived diversity in the senior management and outputs (taken from Allen *et al.*, 2008)

Factor with which a perceived diversity in senior management is correlated	Extent of the correlation
Overall firm performance	$p < 0.001$
Quality	$p < 0.001$
Productivity	$p < 0.001$
Profitability	$p < 0.001$

Figure 6. Extent of the correlation between board diversity and various performance factors. Source: Moss 2009: ch.2

According to different researchers, the companies with diverse board of directors can fulfil the stakeholders' requirements and needs better, as diversity brings variety of the opinions to the board and it helps to find the best solution (Solimene et al. 2017). According to an MSCI study of 6,500 global companies, firms with board diversity face less governance scandals and greater equity and capital returns, which can be justified by less groupthink and a better understanding of both customers and diverse workforce needs (FT 2015).

On the other hand, Smith (2014) argues against the assumption that diverse board is more effective than homogeneous. Experts point at a significant financial results' decrease of the companies with a vast number of women in leading positions. This argument is supported by Eagly, who claims that we are used to be surrounded by similar people, therefore the attempt to diversify the workforce might lead towards drop in efficiency and smoothness of group work (Elsesser 2016).

Research held by Adams and Ferreira (2009: 292) has identified the tendency that women are better with attendance and are likely to influence their male colleagues' attendance patterns positively according to S&P companies. However, it is not clear whether better attendance guarantees better results. But this is already a topic for another research.

2.5 Previous research

One of the solutions offered to decrease inequality in the companies' management was quota: specific number of women has to be in the board of directors or in the senior management layer (Northwestern 2016). This could be argued to be unfair, since it would inevitably lead towards positive discrimination but against men this time, when to the positions females would be chosen even in case of males having better qualifications. On the other hand, in theory diversification of boards would lead towards different advantages mentioned in the previous chapter. The question is whether diversification works in real life or not?

Lately, there have been quite a few papers written on the topic of the relationship between women representation in the top management and company performance, however the results are quite controversial and the topic is very recent itself. Consequently, issue requires more and more research on it. There are different findings by several researches presented in this chapter that demonstrate that no defined conclusion can be made on this matter yet.

Some authors claim that increase in female representation on boards positively influences company performance and is a "driving force of performance" (European Commission 2012). Others claim that "the composition of boards, in terms of characteristics such as gender diversity, age dispersion and the share of directors chosen by the employees, is likely to be relevant as it influences board decision-making processes" (Bøhren 2007 cited in Marinova et al. 2015: 1779). However, the direction of the influence is not clear. Therefore, this chapter is going to present and compare different researches on the issue in order to be able to develop hypothesis for the current work. To make it easier for the reader, the chapter is going to be divided into sections by performance factor analysed.

2.5.1 ROI, ROA, ROE

First financial performance factors to analyse are return on investment (ROI), return on assets (ROA) and return on equity (ROE). Example of Norway, who was first to introduce

the quota law, shows that there was no influence of quota neither on ROA nor on revenue and greater women representation did not have any influence on the company performance in general (Dale-Olsen et al. 2013:124-127). On the other hand, Carter et al. (2010) researched firms in the S&P 500 in the period between 1998 and 2002 to find out the relationship between firm's performance and the gender diversity on board. The research showed a positive and significant relationship between the number of female directors and the ROA (Solimene et al., 2017).

The Credit Suisse Research Institute's research that included data from 2,360 companies worldwide from 2006 to 2012 found out that if the companies with a market capitalization of more than \$10 billion have at least one female director, they perform better than companies with no women on board by 26 percent (Lilienfeld, 2014:19). This research also showed that companies with gender balanced boards experienced "higher net income growth, lower net debt-to-equity ratio, and faster reduction in debt compared to companies with all-male boards" (Lilienfeld, 2014:19). Contradictory, research by Chapple and Humphrey (2014) on American (S&P 300) and Australian (ASX 300) listed companies does not show any significant correlation between women representation and financial results.

The study conducted by Catalyst (2004) which ranked the Fortune 500 companies according to the women representation on their top management starting from the highest % and compared financial performance of top 25% of the companies to the lowest 25% (return on equity (ROE), sales and total return to shareholders), showed better results among the top companies (Elsesser 2016). Results showed that companies with the lower women representation on their boards had $\frac{2}{3}$ lower ROI than the companies with the highest number of females (Elsesser 2016). Catalyst (2004) found out that performance indicators, such as return on equity and total return to shareholders were around $\frac{1}{3}$ higher in case of higher women representation on board. Research held on Asian firms from Hong Kong, South Korea, Malaysia and Singapore has shown the positive impact of female directors on firm ROE as well (Low et al. 2015:397).

Eagly, however, argues that high increase in ROI is not justified by increase in women, as there is no control over direction of causality and more importantly, it is impossible to eliminate the possibility of the third variable existence, which influences both women

hiring and company performance (Elsesser 2016). She also claims that when using sophisticated statistical techniques, the influence of women representation vanishes away (as no correlation is shown anymore). This argument makes it very hard to analyse and interpret research results; and advises to use as many variables that possibly may influence company performance in the calculation formula as possible.

Another research held among large 1,050 listed companies in the UK, US and India has also revealed that the companies with the male-only boards are missing on about US\$655 billion in comparison to diverse-board peers in 2014 in terms of ROA (ROI) (Lagerberg 2015). Figure 7 shows the diverse board companies outperformance by country and demonstrates how losses of the male-only boards sums up to US\$655 billion. In comparison to given work though, similar research conducted on SMEs (small and medium enterprises) in the UK has shown the opposite result with the negative relation between board diversity and accounting performance measures (Shenata et al. 2017). As a result, the size of the company may play a big role in the outcomes of the research and results may differ significantly.

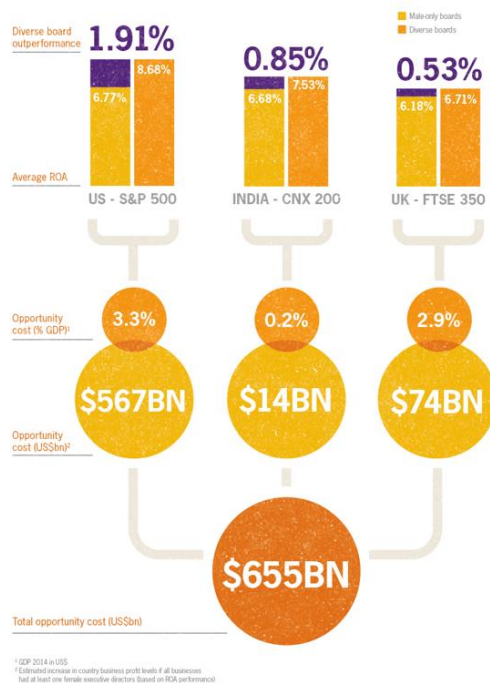


Figure 7. Diverse board companies' win over male-only board counter partners. Source: Lagerberg 2015

2.5.2 Acquisition

Does board composition influence acquisitions? Ahern and Dittmar (2012:169) assume that the reason for the company performance changes might be the differences in characteristics between new females and exiting males. Their analysis shows that even though new members are younger and less- experienced on the CEO positions, they are more likely to be higher educated. Ahern's research shows that with the increase of the women representation, companies are increasing their financial risks and are involved in acquisition processes more than others (Ahern 2012: 180). "The magnitude of the coefficient estimates implies meaningful increase of 1 to 4 percentage points of acquisition relative to assets for a 20% increase in female representation" (Ahern 2012: 180).

On the other hand, according to the research held by Chen et al (2014) on US public firms showed that greater female representation on the board leads to the acquisition activity diminution. This might be because women are more risk averse due to high emotionality (Byrnes et al, 1999, in Carlsson et al., 2010). This finding is also supported by research held by Jizi and Nehme (2017), confirming that women's presence on boards positively influences firms' risks by decreasing stock return volatility.

However, the acquisition activities may bring better returns to the company in the future, these investment practices cannot guarantee to be successful. Therefore, higher or lower acquisition intensity do not necessarily mean better performance. It describes the company behaviour change towards being more or less risky and active on market in qualitative terms, but research is trying to identify quantitative results. What is more, acquisition practices are most likely to be reflected in ROI performance factor in the number of years from acquisition action taking place, which is analysed in this paper. Therefore, author decided not to consider acquisition practices as a separate performance indicator.

2.5.3 Firm value, revenue and gross profit

This section is going to present an overview of research findings in regard to firm value, revenue and gross profit changes due to board composition change. For example, Cristian Dezsö and David Ross (2012), who studies gender diversity effect on the top firms' performance in Standard & Poor's Composite 1500 list, found out the positive correlation between two variables. They examined the relationship between gender composition of firm's top management and its financial performance; findings show that female representation in top management leads to an increase of \$42 million in firm value.

Another example showing positive results, but this time in revenue and profit growth, due to the gender diverse board, is Sodexo. 40% of all staff members in Sodexo in 2016 were women (just 17% in 2009); 43% of the members on the board of directors were females and the company run 14 Gender Balance Networks worldwide. Researchers found out on the example of Sodexo that when there is an optimal gender balance in the company, employee engagement increases by 4% and gross profit increases by 23% (Burke, 2016).

At the same time, Ahern and Dittmar (2012:188) on the example of the Norwegian market after the quota law implementation, show that sudden increase in female representation leads to the significant economic decrease in value. It is explained by board characteristic changes brought by new female directors that may lead to board become dysfunctional (Ahern 2012: 163) or by intensity of the acquisitions caused by greater female representation, which is inevitably reflected in the firm value. This argument alone would not show that female representation leads towards decline of the value neither would it prove the opposite. It would just draw our attention towards the fact that even if the positive influence of the women representation on the performance of the company is going to be proved during this work, the introduction of the law has to be done gradually and thoughtfully and not forcefully, otherwise result could be reverse. However, Ahern and Dittmar (2012: 164) also have found out that there is a high threat for long-run value loss. On the other hand, when more variables are taken into account, the results are insignificant and void (Ahern 2012: 167). This research emphasises the controversial nature of the results depending on data and methods used.

For the Latin American study conducted by Pletzer et al (2015) the results did not show any significant relationship between female representation and overall company performance. The correlation coefficient equals 0.0195, which falls under the category of $0.5 > |r|$ and very close to 0, meaning that there is no correlation between variables and the result is statistically insignificant according to p -value. On the other hand, another research conducted by Flabbi indicates a significant positive impact of female board representation on profit margins (increase by 14%) in the region overall, however it admits that it differs from sub region to sub region, because of the characteristics differences (2017:807).

2.5.4 Innovation

Another performance indicator to analyse is innovation intensity by comparing R&D coefficients. Hewlett et al. (2013) claim that companies whose leaders have diversity traits out-perform and out-innovate their peers. It is shown that the probability of market share growth for those companies is 45% higher and the chance to capture a new market is 70% higher than for others, as their ability to innovate increases. And gender-balanced board is one way of the leadership diversification.

Research by Horak (2017:859), however, explored the tendency when female representation influences negatively on the R & D investment rise. It was shown that boards with no women invest more in R&D than their counterparts. However, this research has low statistical significance levels (high p -value) and high error rate of 28% and cannot be considered accurate. Therefore, it shall not be taken into the consideration. The same research has not given any significant differences in returns on equity, showing no relation between women representation and financial success. On the other hand, asset growth (of 6,3%) and sales growth (of 6,87%) comes with confidence level of 90% and 80% respectively in the Chinese automotive industry (Horak, 2017:857).

Dezsö and Ross's research has indicated that companies prioritizing innovation got greater financial gains when women were part of the leadership positions, however, they also found out that female presence in top management benefits innovation intensity

and company performance “only to the extent that a firm’s strategy is focused on innovation” (Dezsö 2012: 1073). This argument offers that there is no correlation between board composition and R&D coefficient.

2.5.5 Researches with using Tobin’s Q

There are some researchers that use Tobin’s Q as an indicator of the correlation. The research held in Spain, for example, has shown a positive correlation between board gender diversity and the company financial performance (Reguera-Alvarado et al. 2015: 347). The research on Danish market though shows that gender in relation to board composition does not influence firm performance at all (Rose, 2007). Tobin’s Q was used in this research as well and it was close to zero when the cross-sectional regression was used, meaning that there is no dependence between variables. Carter et al (2010 cited in Solimene, 2017) have found the same result with no significant relationship between women representation and Tobin’s Q.

Adams and Ferreira (2009:306), however, while examining correlation between gender diversity on board and Tobin’s Q, have revealed that the relationship appears to be negative.

As a result of comparing different works, it is seen that Tobin’s Q declined for Norway with increase in women representation (Ahern 2012); it increased for Netherlands and Denmark (Marinova et al. 2015) but decreased in another research of the same region (Rose, 2017). Tobin’s Q is a measure showing ratio of market value of the company to replacement cost of assets and the higher this ratio is the better, as it indicates future growth opportunities if it is over 1 (Marinova et al. 2015: 1782). Tobin’s Q however is considered to be a bad method for comparing the company performance, because “it likely contains a great deal of measurement error because of a conceptual gap between true investment opportunities and observable measures...” (Erickson 2012: 1286).

2.6 Results from the literature review

Results are very controversial and no consistent trends or results are seen. For example, some researchers found that revenue (gross profit) as an indicator of financial performance was increasing with greater number of women on board (Horak 2017; Flabbi 2017; Burke 2016; Lilienfeld 2016 and Deloitte 2015). There are also authors, who claimed the positive relationship between factors, such as ROA, ROI and ROE, and board diversity (Barta et al. 2012; Carter et al. 2010; Elsesser 2016; Low et al. 2015 and Lagerberg 2015), however there are the ones claiming the negative relationship (Shenata et al. 2017) or no correlation at all (Horak 2017 and Dale-Olsen et al. 2013). The same situation was with firm value, when Dezsö and Ross (2012) found out the positive relationship, but Ahern and Dittmar (2012) experienced the opposite results. Our literature review consists of 3 different outcomes for Tobin's Q correlation with female representation being positive for Reguera- Alvarado et al. 2017), negative for Rose (2007) and neutral for Carter et al. (2010). Innovation intensity has been positively increasing in Hewlett et al. (2013) research, declining in research of Horak (2017) with female representation increase and was confirmed to be influential by other factors than board composition in Dezsö and Ross (2012).

It should be pointed out that even when the positive correlation is indicated, it cannot be proved that there is a direct relationship between gender diversity and financial performance as there are other factors shaping and influencing results at the same time (Barta et al. 2012). Smith et al. (2006 cited in Marinova 2015:1778) also claims that in this type of study the direction of causality is always questionable: "more female board directors may contribute to higher firm performance, but it might also be the case that better-performing firms tend to appoint more women on their boards". Dezsö and Ross (2012:1073) have also indicated in their research that results on this topic are very controversial and do not identify the direction of the causality.

Looking at all the results summarised above, it is very hard to make conclusions after theoretical secondary research. Therefore, practical research has to be conducted.

2.7 Knowledge gap

Majority of the sources are minimum 3 years old, which means situation could have already changed. Companies started incorporating more diversity policies and some governments introducing the quota law, therefore current situation might be more accurate and with more distinct results. Therefore, literature review could be used for the theoretical background and for hypothesis making, but actual data should come from the databases to reveal up-to-date results.

What is more, every research in the literature review used different financial performance indicators and different calculation methods, which leads to the complexity in interpreting/comparing results and drawing conclusions. Researched questions are offered below followed by hypotheses and methodology statement.

2.8 Research question and hypothesis

The aim of this research is to identify whether there is a relationship between gender balance on board and company performance analysing different factors of the financial success.

According to the results from the theoretical part, author decided to introduce two hypotheses for the practical part. The aim of the primary research is either support or reject those:

Hypothesis 1. There is a positive correlation between women representation in top management and financial performance of the company.

Hypothesis 2. There is a positive correlation between women representation in top management and investment intensity.

3 Methodology

This chapter is going to introduce the research design, analysis structure and calculation formulas used to conduct the research.

As part of this research top 46 S&P 500 companies (taken from Slickcharts 2018), as per 27 January 2018, are analysed to define whether there is a correlation between women representation on board and company performance. The idea was to use sample of 10% from the S&P registered companies, however, due to unavailability of some data used for analysis among the last companies chosen from the list, the amount had to be reduced by 4. The purpose of this part is to correlate the differences in women representation on boards of the corporations from 2013 to 2016 by taking data from the annual reports provided by the companies to the public use with changes in different performance factors from the same time period. Performance factors used are ROA, ROI, ROE, revenue, firm value and innovation intensity, as these are the ones brought in by different authors in the literature review part. Pearson's correlation method is going to be used, which only identifies linear relationship. Pearson's correlation coefficient is found by using Excel formulas and significance level of the relationship is found through the regression analysis and ANOVA tables.

Even though, some authors used additional variables in their formulas in similar experiments, such as *country development index*, *income index* and *mean board size* (Pletzer et al. 2015), the calculation used in the current research is straightforward and simple: the percentage change in women representation is correlated with the percentage difference in performance factor. It is possible to do so, as this research is based on the companies operating in the same country (US) and having boards more or less of the same size. What is more, the % change in female representation is used for analysis, therefore board size variable can be omitted.

According to the previous researches held by different academics from all over the world, with the presence of women in the top management the firm value increases and companies prioritize innovation (Derzsö 2012). In addition, it was explored by Burke (2016) that gross profit of the company is influenced by gender balance in the management layers. However, there were contradictory findings presented in the

literature review part as well. Therefore, to make own conclusions from recent data, this research is held.

To research the relation between women representation in the top management and the company performance and either support or decline the findings above, research on all factors indicating financial performance is made.

To conduct this research the secondary data is used: annual reports about the management layout and database with financial reports. I am comparing financial performance data from year 2013 and 2016 taken from FINRA database (FINRA 2018) in relation to the gender composition change in the top management of the companies.

As some companies operating in service sector do not have gross profit number, to make my research consistent revenue is going to be compared instead. Research by Sodexo (2016), Deloitte (2015) and Horak (2017:857) have found revenue and women increase relationship to be positive, however Dale-Olsen et al. (2013:124-127) has shown no correlation between two variables. To find relationship, the revenue change between two years should be found. To do so, income statements from two years have to be compared. Formula used to calculate the difference is $(\text{Revenue (2016)} - \text{Revenue (2013)}) / \text{Revenue (2013)}$ (Appendix 1). Another factor indicating companies' performance is firm value. To indicate company value, total liabilities have to be deducted from the total assets. This information could be found on the balance sheets from both years and the final results compared the same way as revenue: $(\text{Firm value (2016)} - \text{Firm value (2013)}) / \text{Firm value (2013)}$ (Appendix 5).

In addition, the factor brought by Dezsö (2012) and Horak (2017:859) is the tendency of the companies with the high number of women in the management to favour innovation. Indicator for this aspect is the R&D ratio. The difference is going to be found through the following formula: $(\text{R\&D coef. (2016)} - \text{R\&D coef. (2013)}) / \text{R\&D coef. (2013)}$. Calculations can be found from Appendix 6.

Return on investment (ROI), return on equity (ROE) and return on assets (ROA) are other performance factors brought by different researchers into the account as being influenced by board gender composition. These three indicators are taken from the financial statements of the companies and compared the same way: $(ROA/ROI/ROE(2016) - ROA/ROI/ROE(2013)) / ROA/ROI/ROE(2013)$ (Appendices 2-4).

In order to perform a correlation analysis, women representation numbers are going to be taken from annual reports of both years and difference presented in decimal points to make correlation easier and clearer. The formula used to calculate the change is $(\text{Woman \% (2016)} - \text{Woman \% (2013)}) / \text{Woman \% (2013)}$.

No Tobin's Q is used in this research because of the complicated calculations, difficulty to interpret and difference in accounting methods used by banks and insurance companies. Results of these companies would not be comparable with others and this paper has some banks in the sample. After changes for each variable are calculated according to the formulas above, the correlation coefficient has to be found and significance levels determined.

4 Results

This section is going to review the results for each factor separately. When looking for correlation, it is important to execute both steps. First of all, the coefficient of correlation has to be found that indicates the strength and the direction of the relationship. Secondly, the significance level has to be identified. Significance F could be found through ANOVA table of the regression analysis and it equals to p -value. The lower p -value the better, as it demonstrates the possibility in % that the relationship found is random (Fenton and Neil 2012: ch.1). Therefore, statistically if p -value is higher than 5% the analysis is inaccurate and results shall not be used. Another way to check whether your correlation is valid is in the statistical table (Figure 8). Left-hand column indicates the number of observations and the column headings identify the allowed significance F (p -value) levels that make results statistically significant. We check the highest allowed p -value of 0.05 and identify the lowest acceptable correlation coefficient for the result to

be valid. **Please note:** *significance level and significance F are not the same. Significance level indicates how statistically significant the results are and the lower Significance F (p-value) is the higher statistical significance level is observed.* This research has used 46 companies for analysis, therefore data for either 40 or 50 observations from the table shall be used. We can see that the lowest value of the correlation coefficient for this research to be statistically significant has to be 0.23 or 23%. However, due to the data availability, some of the performance factors were correlated with the smaller amount of data pairs. As a result, the lowest correlation value should be checked case by case in the section below.

One-Tailed Probabilities^a

N	.05	.025	.01	.005	.0005
5	.80	.88	.93	.96	.99
6	.73	.81	.88	.92	.97
7	.67	.75	.83	.87	.95
8	.62	.71	.79	.83	.93
9	.58	.67	.75	.80	.90
10	.55	.63	.71	.77	.87
11	.52	.60	.69	.73	.85
12	.50	.58	.66	.71	.82
13	.48	.55	.63	.68	.80
14	.46	.53	.61	.66	.78
15	.44	.51	.59	.64	.76
16	.43	.50	.57	.62	.74
17	.41	.48	.56	.61	.73
18	.40	.47	.54	.59	.71
19	.39	.46	.53	.57	.69
20	.38	.44	.52	.56	.68
22	.36	.42	.49	.54	.65
24	.34	.40	.47	.51	.63
26	.33	.39	.45	.50	.61
28	.32	.37	.44	.48	.59
30	.31	.36	.42	.46	.57
40	.26	.31	.37	.40	.50
50	.23	.28	.33	.36	.45
60	.21	.25	.30	.33	.41
80	.19	.22	.26	.29	.36
100	.17	.20	.23	.26	.32
250	.10	.12	.15	.16	.21
500	.07	.09	.10	.11	.15
1000	.05	.06	.07	.08	.10

Figure 8. Correlation coefficient value depending on the p-value (chance for correlation to be random) and number of observations. Source: Oneonta 2018

The strength and direction of the correlation are identified according to the following rules. The results are interpreted according to Devore and Farnum (2005) as per correlation coefficient absolute value being equal to:

0.00-0.1 – “no correlation”

0.1-0.5 – “weak correlation”

0.5-0.8 – “moderate correlation”

0.8- 1.0 – “strong correlation”. Figure 9 demonstrates the strength and direction of the correlation visually.

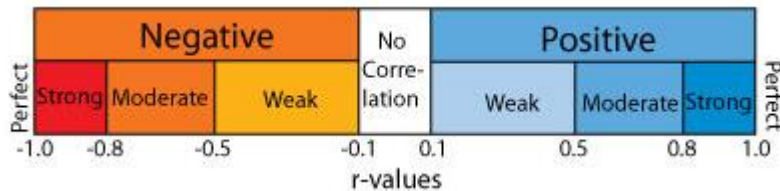


Figure 9. Strength and direction of the correlation coefficient. Source: Devore and Farnum 2005: 109

If the correlation coefficient is close to 0, it does not indicate lack of any correlation between variables, only linear. If the coefficient is negative, it indicates the opposite movement of the correlated variables: increase in one leads to decrease in another.

To ensure there is a correlation between two variables, both correlation strength must be decent (at least greater than 0.1 in absolute value) and p -value (extent of the correlation) identifying statistical significance level has to be acceptable (no more than 0.05). The following sections are going to present the results from the primary research and analyse the validity of the observations.

Please note: *Appendices display data for differences in decimal points and if the difference shown is 0.00 it does not equal to 0, just data could not be fit into the table to show further decimal points. It was not really necessary, as the formula used for the calculation is available in the methodology part and original data is shown in the appendices. However, reader can be sure that reference cells were used where every decimal was calculated without being rounded to 0.00 shown due to capacity.*

4.1 Revenue

In this analysis, revenue changes between 2013 and 2016 are calculated and correlated to the women representation on board differences.

Appendix 1. demonstrates very weak positive correlation between changes in women representation on board and revenue changes. It identifies that the more women on board the better revenue is but correlation is so weak and close to 0 ($r=0.0014$) that according to Devore and Farnum (2009: 109) indicates no correlation. In addition, only $R^2= 0.15\%$ (Figure 10) of the variable Y is described by this linear regression, which is a very insignificant number. Therefore, conclusion would be: there is no mutual linear relationship between revenue and women representation changes on board, according to Devore and Farnum (2005) value table above. This could be also seen from the scatter plot below (Figure 10).

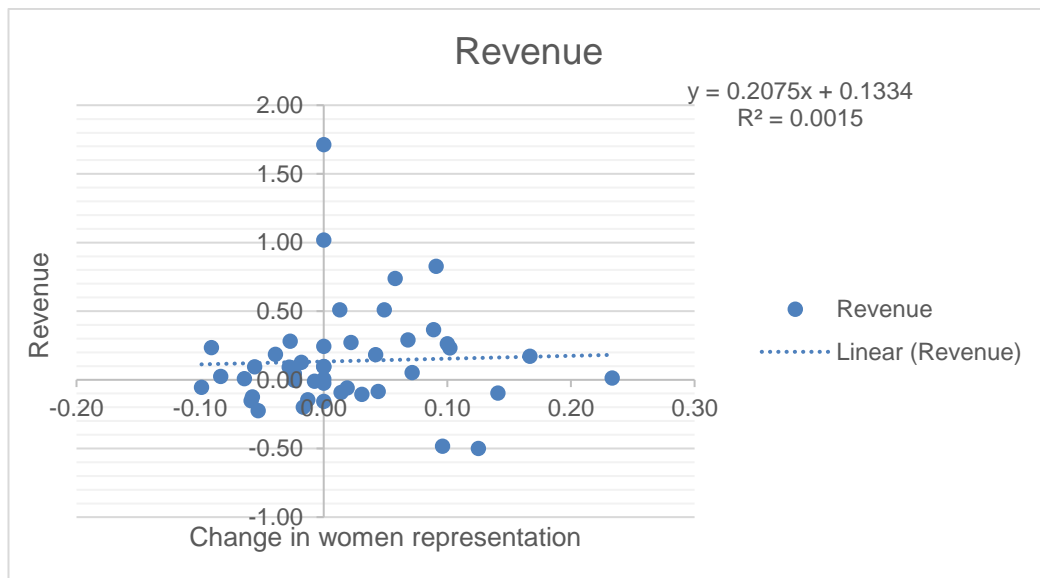


Figure 10. Scatter plot showing correlation between women representation and revenue (Original 2018)

Even without checking the extent of the correlation for this analysis, we see that there is no correlation. But after having a look into the p-value (Significance F) from the Table 2, we can state that 99% chance of the relationship being random is not acceptable even if the correlation coefficient would have indicated the significant result. To conclude, revenue and board diversity do not have any LINEAR relationship at all.

Table 2. ANOVA table (regression analysis) for revenue and diversity variables (Original 2018)

SUMMARY OUTPUT					
<i>Regression Statistics</i>					
Multiple R	0.001403952				
R Square	1.97108E-06				
Adjusted R Square	-0.022220207				
Standard Error	0.513111033				
Observations	47				
<i>ANOVA</i>					
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	1	2.34E-05	2.34E-05	8.87E-05	0.992527262
Residual	45	11.84773	0.263283		
Total	46	11.84776			
<i>Coefficients</i>					
	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>
Intercept	0.189416431	0.077241	2.452279	0.018139	0.033845136
X Variable	0.010360206	1.100043	0.009418	0.992527	-2.205239711

4.2 ROA

In this part, ROA coefficients were taken from the financial database and difference in % between two years was calculated. Calculations could be seen from the Appendix 2 and the calculation formula could be found from the methodology section. After running the correlation analysis to identify relationship between return on assets and female representation on board changes, weak negative correlation was revealed with $r = -0.19$. Appendix 2 is showing the calculations and observations as well as variables dependence could be seen from the Figure 11 below.

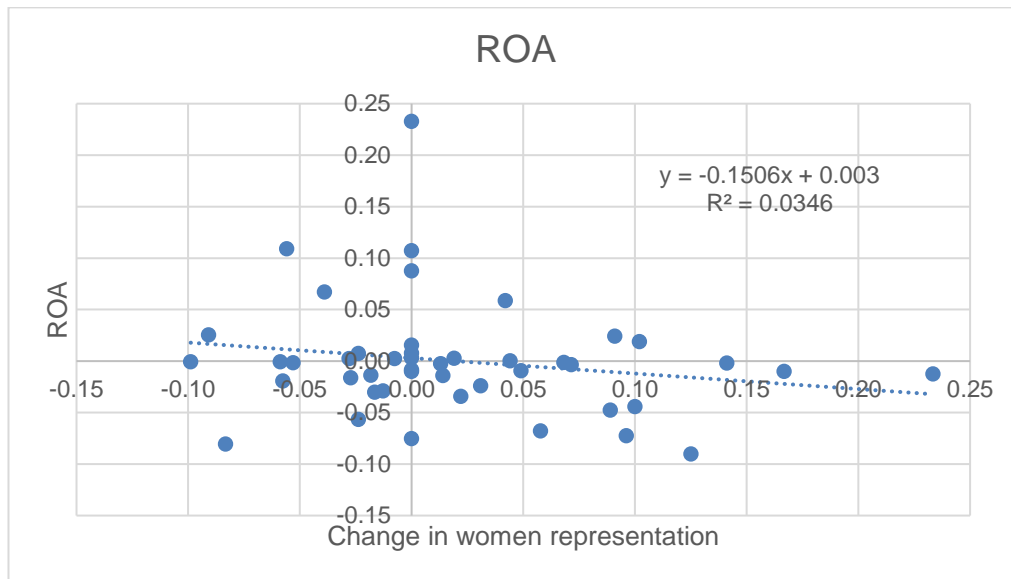


Figure 11. Scatter plot showing relationship between women representation on board and ROA (Original 2018)

The second step would be to identify the validity of the result. In order to do this, we should check significance F from the ANOVA table below (Table 3). The value is 20% in this analysis, which is too high for the correlation result to be statistically valid. If we check data from the Figure 8, we also see that with the amount of the observations of 46, the critical value for correlation with the highest possible error of 5% would be 0.23 and our result is slightly below this mark. The conclusion would be that there is a weak negative correlation between variables with a low statistical significance.

Table 3. ANOVA table (regression analysis) for women representation and ROA (Original 2018)

SUMMARY OUTPUT					
<i>Regression Statistics</i>					
Multiple R	0.188126				
R Square	0.035392				
Adjusted R Sq	0.013956				
Standard Error	0.054394				
Observations	47				
ANOVA					
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	1	0.004884982	0.004885	1.651052	0.205390452
Residual	45	0.133141856	0.002959		
Total	46	0.138026837			
	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>
Intercept	0.002851	0.00818818	0.34822	0.729299	-0.013640553
X Variable 1	-0.14984	0.116613619	-1.28493	0.20539	-0.384712551

4.3 ROE

This section is running a similar analysis to the previous one, but using ROE coefficients from both years instead. The result shows a weak negative correlation with value of -0.21, which is described and shown in the Appendix 3 and Figure 12 below. R^2 indicates the proportion of dependable variable (Y) being explained by independent (X). In our analysis women representation on board is an independent variable and any financial performance factor is a dependable, as it changes with females increase/decrease. As explained before, negative correlation means that with increase of independent variable, dependant is decreasing. Only 4,5% of variables (companies) in this research follow the trend where with the increase of female representation the ROE decreases following this linear regression formula.

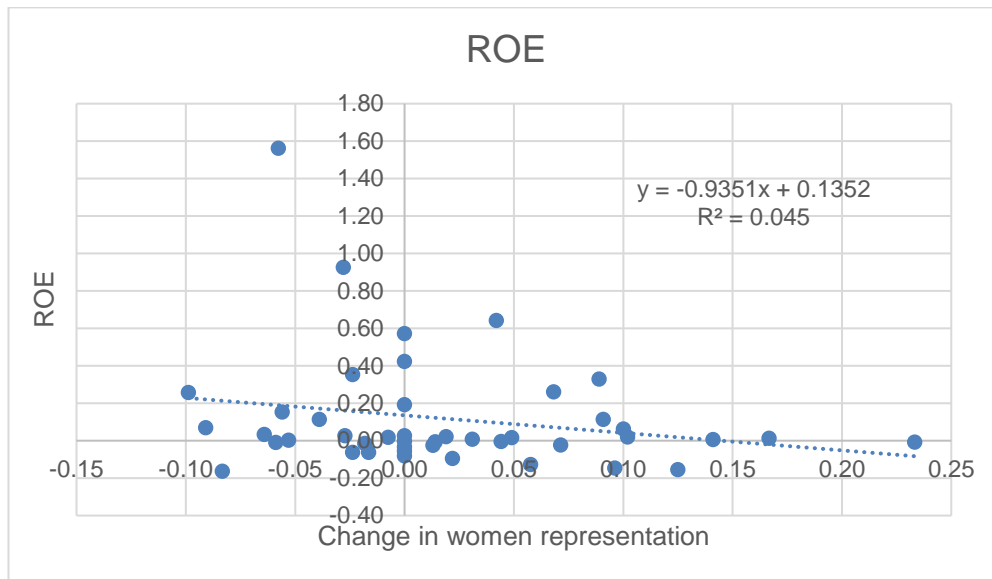


Figure 12. Scatter plot showing relationship between women representation on board and ROE (Original 2018)

In addition to R^2 , we have to take p-value into consideration. Table 4 shows this parameter being equal to 16%, which is lower than before but still not low enough to be ignored. 16% chance of correlation being random is too high of a risk to take in assumption that there is a weak negative correlation between two variables. What is more, according to Figure 8, with the observation number of 45 (used in this calculation; please see Appendix 3), correlation should be at least 0.23 and it is lower in this case. To conclude, this analysis does not indicate statistically significant correlation between ROE and women representation.

Table 4. ANOVA table (regression analysis) for women representation and ROE (Original 2018)

SUMMARY OUTPUT					
<i>Regression Statistics</i>					
Multiple R	0.208582				
R Square	0.043507				
Adjusted R Squa	0.021768				
Standard Error	0.302508				
Observations	46				
<i>ANOVA</i>					
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	1	0.183146422	0.183146	2.001362	0.16419617
Residual	44	4.026480106	0.091511		
Total	45	4.209626528			
	<i>Coefficient</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>
Intercept	0.130865	0.046112551	2.837949	0.006843	0.037931344
X Variable 1	-0.91945	0.649927764	-1.41469	0.164196	-2.229292818

4.4 ROI

Correlation between ROI and women representation on board appeared to be -0.19 interpreted as negative weak. Only 3,6% of the variables are explained by the linear regression, which shows the insignificance of the results. Calculations and the trend image could be found from Appendix 4 and Figure 13 below.

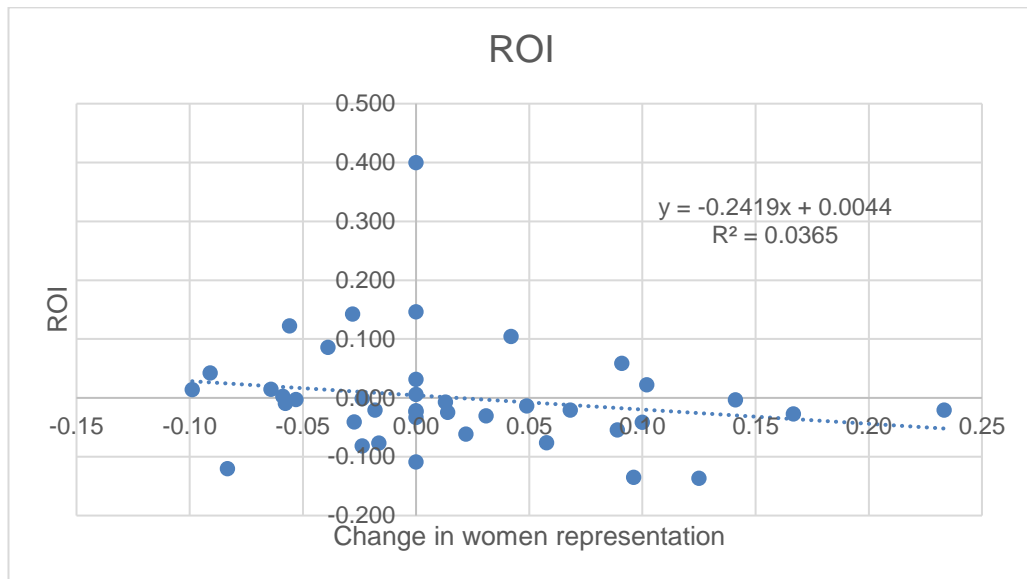


Figure 13. Scatter plot showing relationship between women representation on board and ROI (Original 2018)

When p-value analysis is concerned (See table 5 below), it highlights a 22% chance for a mistake. According to the Figure 8 with a number of observations being 40, the correlation should be at least 0.28. All things considered, there is no reason to count this correlation as a valid result.

Table 5. ANOVA table (regression analysis) for women representation and ROI (Original 2018)

SUMMARY OUTPUT					
<i>Regression Statistics</i>					
Multiple R	0.19434				
R Square	0.037768				
Adjusted R Squ	0.013095				
Standard Error	0.092702				
Observations	41				
<i>ANOVA</i>					
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	1	0.013154933	0.013155	1.530761	0.223396204
Residual	39	0.335155065	0.008594		
Total	40	0.348309998			
<i>Coefficients</i>					
	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	
Intercept	0.006643	0.014881575	0.446423	0.657761	-0.023457345
X Variable 1	-0.24905	0.201292229	-1.23724	0.223396	-0.656198638

4.5 Firm value and innovation

According to our analysis neither firm value nor innovation is seen to be dependent on the women representation changes in top management. Both correlations show weak positive results of 0.128 and 0.108 respectively. Results could be found from Appendix 5 and 6 as well as from the figures 14 and 15.

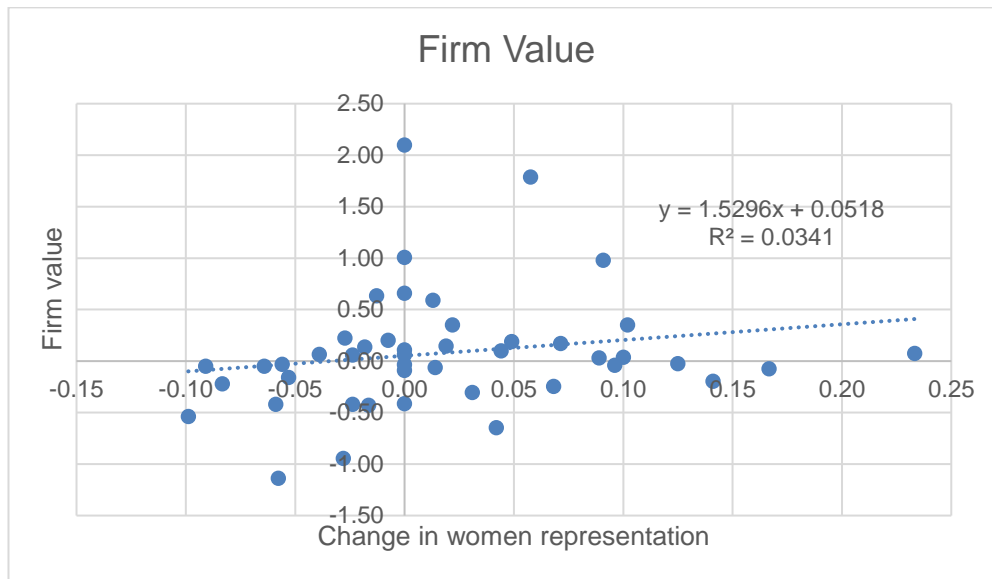


Figure 14. Scatter plot showing relationship between women representation on board and firm value (Original 2018)

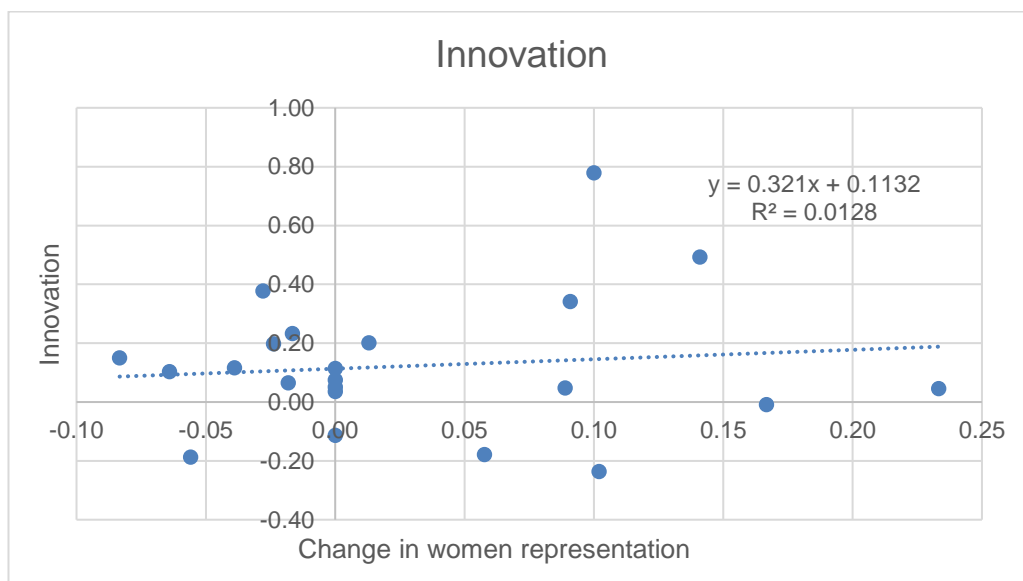


Figure 15. Scatter plot showing relationship between women representation on board and innovation (Original 2018)

Even though the correlation coefficients are quite low for the firm value analysis being very close to no correlation point, it is worth checking p-value (see Table 6) to be sure. Significance F in this analysis is 40%, which is way higher than the allowed 5%. The confirmation of invalidity of the result is found from the Figure 8. With the used number of variables of 46, the minimum requirement of correlation coefficient to be 0.23 is not

reached. Therefore, no statistically significant correlation is found between women representation and firm value.

Table 6. ANOVA table (regression analysis) for women representation and firm value (Original 2018)

SUMMARY OUTPUT					
<i>Regression Statistics</i>					
Multiple R	0.127569				
R Square	0.016274				
Adjusted R Sq	-0.00559				
Standard Error	0.697665				
Observations	47				
<i>ANOVA</i>					
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	1	0.362343017	0.362343	0.744433	0.392819673
Residual	45	21.90316165	0.486737		
Total	46	22.26550467			
<i>Coefficients</i>					
	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	
Intercept	0.119786	0.105022778	1.140569	0.260083	-0.091741014
X Variable 1	1.2905	1.495703033	0.862805	0.39282	-1.722000054

For the innovation calculations less data points were used as many companies did not invest into innovation at all during decades. 22 observations were considered, therefore according to Figure 8 correlation was meant to be at least 0.36 to be statistically significant. Unfortunately, this is far from the reality (0.108). In addition, p-value is over 60% (see Table 7) and is too high of a chance for an error. Conclusion is that there is no correlation between board diversity and company's innovation intensity.

Table 7. ANOVA table (regression analysis) for women representation and innovation (Original 2018)

SUMMARY OUTPUT					
<i>Regression Statistics</i>					
Multiple R	0.10770429				
R Square	0.01160021				
Adjusted R Square	-0.0354664				
Standard Error	0.23036547				
Observations	23				
<i>ANOVA</i>					
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	1	0.01307939	0.013079	0.246464	0.624733032
Residual	21	1.11443325	0.053068		
Total	22	1.12751263			
	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>
Intercept	0.11707623	0.05121039	2.286181	0.032735	0.01057839
X Variable 1	0.304986	0.61433265	0.496451	0.624733	-0.972588679

5 Conclusions

All things considered, despite the fact that many authors (Dezsö 2012, Barta et al. 2012, Lilienfeld 2014, Elsesser 2016, Shenata et al. 2017, Burke 2016, Flabbi 2017) claimed that there was a significant correlation between women representation in top management and financial performance either with negative or positive direction, our research shows that there is no statistically significant correlation as such. The correlation coefficient for any of the performance factors had at maximum value of 0.21, which does not even qualify for "moderate" correlation according to Devore and Farnum (2005). More importantly, p -values were too high, making correlation random with a high possibility for errors. In addition to this, less than 10% of dependant variables were explained by women representation on board variable with the regression equation. Due to high significance F and p -value levels, no statistically significant correlation has been found. Even though, there were coefficients indicating existence of weak correlations for majority of the financial performance factors with the women representation, overall result cannot be used for the future observations due to high chance for it being random. Therefore,

our research supports the findings of authors, such as Eagly (2016), partly Dezsö (2012), Dale-Olsen et al. (2013) and Horak (2017), who reported either no correlation between two examined variables or statistically not significant results (high significance F = high p -value and high chance for the error).

As a result, both hypotheses:

Hypothesis 1. There is a positive correlation between women representation in top management and financial performance of the company.

Hypothesis 2. There is a positive correlation between women representation in top management and investment intensity; have to be rejected and conclusion should state that correlation between financial performance and women representation on board was not found during this research due to results being of low statistical significance and weak.

5.1 Critique and limitations

The research has several limitations that are brought to the reader's attention in this part, therefore all the results have to be used with caution.

The accuracy of analysis might be questioned as other variables influencing performance are not taken into account due to the resource and time limits. For example, country variable and board size variables could have been omitted as explained in the methodology part, however industry factor had to be taken into account. For instance, having females on the board of cosmetic company might have more influence than in automotive industry. On the other hand, having an opposite gender on the board of the untraditional for them industry might have unpredictable impact and foster diversity and innovation (Horak 2017:848) as discussed in this paper. But overall, industry variable would make research more accurate (Pletzer et al. 2015).

What is more, company strategy change and any other managerial improvements could influence company performance, but could not possibly be reflected in the research.

Another issue in this research might be the number of the companies analysed, which influences the accuracy of the research. The bigger sample is taken, the more accurate

the results are. This research was using sample of less than 10% due to limited time and the information availability (the lower in the S&P ranking company is, the harder is to find Annual Report data freely available in the Internet or database).

The main issue in this research is the direction of causality. It is very hard to identify whether female directors contribute to the better economic performance or well-performing companies tend to diversify their top management. Even though, Smith et al. (2006: 571) managed to find out in their research that board diversity influences performance and not the opposite, this test has to be performed in every research on this topic. However, due to time constraints, it was impossible to perform this time.

We also need to remember that not always the financial performance improves and indicates changes that fast, as managing diversity is a costly and time-consuming process (Smith et al. 2006: 572). Therefore, the year difference of 3 years used in this research might be too low for reflecting those processes in the results. On the other hand, processes started before 2013 might not be reflected in 2013 results but already are in 2016 data meaning some of the changed are reflected and used in the research but cannot really be tracked.

Lastly, even though R&D coefficient is an indication for the innovation intensity (innovation in the text), greater investment into innovation does not necessarily guarantee better performance. Therefore, it is hard to make conclusions about success of the company only by this factor. However, Chen et al. (2016:618) claims that "gender-diverse boards reduce the positive relation between R&D and earnings/returns volatility."

5.2 Future research

This research has identified a weak correlation between two variables with the low significance levels. As a result, we do not know whether it is a board factor influencing the results or it is just a coincidence that variables are changing together. Therefore, this could be one of the directions for the new research.

As this topic is relatively new, there is a lot of space for further research. There are some aspects for the research when adding up to this paper. First of all, as mentioned before,

test for causality can be performed in the similar researches in the future. However, in order for it to be sensible to do, correlation findings need to be statistically significant unlike in this paper. What is more, qualitative research based on managerial strategies, processes and operational improvements could be conducted to analyse how much it influences the firm performance and influences correlation.

This research used a basic definition of correlation to find out whether there is a trend of one variable changing in a specific pattern (according to the specific equation) due to changes in another not searching for reasons for this trend to appear. More sophisticated research could be conducted using all the relevant variables: company size (Pletzer et al. 2015, Shenata et al. 2017), board size (Pletzer et al. 2015), industry (Pletzer et al. 2015), strategic focus on innovation etc.

6 References

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This paper used the board composition data from Annual Reports of the companies mentioned in the Appendices for years 2013 and 2016. As only one number was used from each for the purpose of the board composition change calculations, to avoid 100 additional references they have been taken away from the thesis.

Appendix 1: Correlation between women representation and revenue

<i>Company</i>	<i>Revenue</i>			<i>Women in the board</i>		
	<i>2013</i>	<i>2016</i>	<i>Differ- ence</i>	<i>201 3</i>	<i>201 6</i>	<i>Differ- ence</i>
Apple Inc.	170,910	215,639	0.26	10.0 0%	20.0 0%	0.10
Microsoft Corp	77,849	85,320	0.10	36.3 6%	36.3 6%	0.00
Amazon.com Inc	74,452	135,987	0.83	18.1 8%	27.2 7%	0.09
Facebook Inc A	7,872	27,638	2.51	20.0 0%	20.0 0%	0.00
Berkshire Hathaway B	182,150	223604	0.23	0.00 %	0.00 %	0.00
Johnson & Johnson	71,312	71,890	0.01	23.0 8%	16.6 7%	-0.06
JP Morgan Chase & Co	96,606	95,668	-0.01	9.09 %	8.33 %	-0.01
Exxon Mobil Corp	438,255	226,094	-0.48	15.3 8%	25.0 0%	0.10
Alphabet Inc A	59,825	90,272	0.51	27.2 7%	28.5 7%	0.01
Bank of America Corporation	88,942	83,701	-0.06	26.6 7%	28.5 7%	0.02
Wells Fargo & Company	83,780	88,267	0.05	28.5 7%	35.7 1%	0.07
AT&T Inc.	128,752	163,786	0.27	28.5 7%	30.7 7%	0.02
Home Depot Inc.	74,754	88,519	0.18	23.0 8%	27.2 7%	0.04
Chevron Corporation	228,848	114,472	-0.50	25.0 0%	37.5 0%	0.13
UnitedHealth Group Incorporated	122,489	184,840	0.51	18.1 8%	23.0 8%	0.05
Visa Inc. Class A	11,778	15,082	0.28	30.0 0%	27.2 7%	-0.03
Intel Corporation	52,708	59,387	0.13	20.0 0%	18.1 8%	-0.02
Procter & Gamble Company	84,167	65,299	-0.22	41.6 7%	36.3 6%	-0.05
Pfizer Inc.	51,584	52,824	0.02	33.3 3%	25.0 0%	-0.08
Verizon Communications Inc.	120,550	125,980	0.05	35.7 1%	33.3 3%	-0.02

Cisco Systems Inc.	48,60 7	49,24 7	0.01	10.0 0%	33.3 3%	0.23
Citigroup Inc.	76,36 6	69,87 5	-0.08	25.0 0%	29.4 1%	0.04
Boeing Company	86,62 3	94,57 1	0.09	18.1 8%	15.3 8%	-0.03
Comcast Corporation Class A	64,65 7	80,40 3	0.24	0.00 %	0.00 %	0.00
AbbVie Inc.	18,79 0	25,63 8	0.36	11.1 1%	20.0 0%	0.09
Coca-Cola Company	46,85 4	41,86 3	-0.11	26.3 2%	29.4 1%	0.03
DowDuPont Inc.	57,08 0	48,15 8	-0.16	0.00 %	0.00 %	0.00
PepsiCo Inc.	66,41 5	62,79 9	-0.05	38.4 6%	28.5 7%	-0.10
Walt Disney Company	45,04 1	55,63 2	0.24	36.3 6%	27.2 7%	-0.09
Mastercard Incorporated Class A	8,346	10,77 6	0.29	18.1 8%	25.0 0%	0.07
Philip Morris International Inc.	31,21 7	26,68 5	-0.15	16.6 7%	15.3 8%	-0.01
Merck & Co. Inc.	44,03 3	39,80 7	-0.10	16.6 7%	30.7 7%	0.14
Oracle Corporation	37,18 0	37,04 7	0.00	16.6 7%	14.2 9%	-0.02
3M Company	30,87 1	30,10 9	-0.02	18.1 8%	18.1 8%	0.00
NVIDIA Corporation	4,280	5,010	0.17	0.00 %	16.6 7%	0.17
International Business Machines Corporation	99,75 1	79,91 9	-0.20	23.0 8%	21.4 3%	-0.02
General Electric Company	146,0 45	123,6 93	-0.15	29.4 1%	23.5 3%	-0.06
McDonald's Corporation	28,10 6	24,62 2	-0.12	30.7 7%	25.0 0%	-0.06
Amgen Inc.	18,67 6	22,99 1	0.23	13.3 3%	23.5 3%	0.10
Altria Group Inc.	17,66 3	19,33 7	0.09	18.1 8%	18.1 8%	0.00
Honeywell International Inc.	39,05 5	39,30 2	0.01	0.00 %	0.00 %	0.00
Netflix Inc.	4,375	8,831	1.02	0.00 %	0.00 %	0.00
Medtronic plc	16,59 0	28,83 3	0.74	25.0 0%	30.7 7%	0.06
Gilead Sciences Inc.	11,20 2	30,39 0	1.71	20.0 0%	20.0 0%	0.00

Bristol-Myers Squibb Company	16,38 5	19,42 7	0.19	18.1 8%	14.2 9%	-0.04
Union Pacific Corporation	21,96 3	19,94 1	-0.09	7.69 %	9.09 %	0.01
Texas Instruments Incorporated	12,20 5	13,37 0	0.10	36.3 6%	30.7 7%	-0.06
Correlation			0.00140			

Appendix 2: Correlation between women representation and ROA

<i>Company</i>	<i>ROA</i>			<i>Women in the board</i>		
	<i>2013</i>	<i>2016</i>	<i>Difference</i>	<i>2013</i>	<i>2016</i>	<i>Difference</i>
Apple Inc.	19.34 %	14.93 %	-0.04	10.00 %	20.00 %	0.10
Microsoft Corp	16.58 %	9.08 %	-0.08	36.36 %	36.36 %	0.00
Amazon.com Inc	0.75 %	3.19 %	0.02	18.18 %	27.27 %	0.09
Facebook Inc A	9.04 %	17.82 %	0.09	20.00 %	20.00 %	0.00
Berkshire Hathaway B	4.27 %	4.10 %	0.00	0.00 %	0.00 %	0.00
Johnson & Johnson	10.89 %	12.05 %	0.01	23.08 %	16.67 %	-0.06
JP Morgan Chase & Co	0.70 %	0.95 %	0.00	9.09 %	8.33 %	-0.01
Exxon Mobil Corp	9.57 %	2.35 %	-0.07	15.38 %	25.00 %	0.10
Alphabet Inc A	12.62 %	12.37 %	0.00	27.27 %	28.57 %	0.01
Bank of America Corporation	0.47 %	0.75 %	0.00	26.67 %	28.57 %	0.02
Wells Fargo & Company	1.42 %	1.10 %	0.00	28.57 %	35.71 %	0.07
AT&T Inc.	6.63 %	3.22 %	-0.03	28.57 %	30.77 %	0.02
Home Depot Inc.	11.11 %	16.99 %	0.06	23.08 %	27.27 %	0.04
Chevron Corporation	8.80 %	0.19 %	-0.09	25.00 %	37.50 %	0.13
UnitedHealth Group Incorporated	6.91 %	5.99 %	-0.01	18.18 %	23.08 %	0.05
Visa Inc. Class A	13.11 %	11.49 %	-0.02	30.00 %	27.27 %	-0.03
Intel Corporation	10.89 %	9.53 %	-0.01	20.00 %	18.18 %	-0.02
Procter & Gamble Company	8.15 %	7.99 %	0.00	41.67 %	36.36 %	-0.05
Pfizer Inc.	12.30 %	4.26 %	-0.08	33.33 %	25.00 %	-0.08
Verizon Communications Inc.	4.61 %	5.37 %	0.01	35.71 %	33.33 %	-0.02

Cisco Systems Inc.	10.35 %	9.13 %	-0.01	10.00 %	33.33 %	0.23
Citigroup Inc.	0.72 %	0.77 %	0.00	25.00 %	29.41 %	0.04
Boeing Company	5.05 %	5.31 %	0.00	18.18 %	15.38 %	-0.03
Comcast Corporation Class A	4.21 %	5.01 %	0.01	0.00 %	0.00 %	0.00
AbbVie Inc.	14.69 %	9.94 %	-0.05	11.11 %	20.00 %	0.09
Coca-Cola Company	9.74 %	7.36 %	-0.02	26.32 %	29.41 %	0.03
DowDuPont Inc.	6.39 %	5.39 %	-0.01	0.00 %	0.00 %	0.00
PepsiCo Inc.	8.85 %	8.79 %	0.00	38.46 %	28.57 %	-0.10
Walt Disney Company	7.86 %	10.42 %	0.03	36.36 %	27.27 %	-0.09
Mastercard Incorporated Class A	23.34 %	23.23 %	0.00	18.18 %	25.00 %	0.07
Philip Morris International Inc.	22.50 %	19.63 %	-0.03	16.67 %	15.38 %	-0.01
Merck & Co. Inc.	4.16 %	3.98 %	0.00	16.67 %	30.77 %	0.14
Oracle Corporation	13.64 %	7.98 %	-0.06	16.67 %	14.29 %	-0.02
3M Company	13.82 %	15.39 %	0.02	18.18 %	18.18 %	0.00
NVIDIA Corporation	9.40 %	8.43 %	-0.01	0.00 %	16.67 %	0.17
International Business Machines Corporation	13.43 %	10.42 %	-0.03	23.08 %	21.43 %	-0.02
General Electric Company	1.95 %	1.91 %	0.00	29.41 %	23.53 %	-0.06
McDonald's Corporation	15.51 %	13.59 %	-0.02	30.77 %	25.00 %	-0.06
Amgen Inc.	8.44 %	10.35 %	0.02	13.33 %	23.53 %	0.10
Altria Group Inc.	12.92 %	36.23 %	0.23	18.18 %	18.18 %	0.00
Honeywell International Inc.	8.99 %	9.30 %	0.00	0.00 %	0.00 %	0.00
Netflix Inc.	2.40 %	1.57 %	-0.01	0.00 %	0.00 %	0.00
Medtronic plc	10.21 %	3.43 %	-0.07	25.00 %	30.77 %	0.06
Gilead Sciences Inc.	14.06 %	24.81 %	0.11	20.00 %	20.00 %	0.00

Bristol-Myers Squibb Company	6.88 %	13.62 %	0.07	18.18 %	14.29 %	-0.04
Union Pacific Corporation	9.06 %	7.67 %	-0.01	7.69 %	9.09 %	0.01
Texas Instruments Incorporated	11.10 %	22.01 %	0.11	36.36 %	30.77 %	-0.06
Correlation			- 0.18813			

Appendix 3: Correlation between women representation and ROE

<i>Company</i>	<i>ROE</i>			<i>Women in the board</i>		
	<i>2013</i>	<i>2016</i>	<i>Differ- ence</i>	<i>2013</i>	<i>2016</i>	<i>Differ- ence</i>
Apple Inc.	30.64 %	36.90 %	0.06	10.0 0%	20.0 0%	0.10
Microsoft Corp	30.09 %	22.09 %	-0.08	36.3 6%	36.3 6%	0.00
Amazon.com Inc	3.06 %	14.52 %	0.11	18.1 8%	27.2 7%	0.09
Facebook Inc A	10.95 %	19.70 %	0.09	20.0 0%	20.0 0%	0.00
Berkshire Hathaway B	9.51 %	8.94 %	-0.01	0.00 %	0.00 %	0.00
Johnson & Johnson	19.92 %	23.37 %	0.03	23.0 8%	16.6 7%	-0.06
JP Morgan Chase & Co	8.40 %	10.27 %	0.02	9.09 %	8.33 %	-0.01
Exxon Mobil Corp	19.17 %	4.64 %	-0.15	15.3 8%	25.0 0%	0.10
Alphabet Inc A	16.25 %	13.85 %	-0.02	27.2 7%	28.5 7%	0.01
Bank of America Corporation	4.61 %	6.82 %	0.02	26.6 7%	28.5 7%	0.02
Wells Fargo & Company	13.99 %	11.78 %	-0.02	28.5 7%	35.7 1%	0.07
AT&T Inc.	19.91 %	10.56 %	-0.09	28.5 7%	30.7 7%	0.02
Home Depot Inc.	25.42 %	89.64 %	0.64	23.0 8%	27.2 7%	0.04
Chevron Corporation	15.00 %	0.33 %	-0.15	25.0 0%	37.5 0%	0.13
UnitedHealth Group Incorporated	17.76 %	19.46 %	0.02	18.1 8%	23.0 8%	0.05
Visa Inc. Class A	18.28 %	21.01 %	0.03	30.0 0%	27.2 7%	-0.03
Intel Corporation	17.58 %	16.21 %	-0.01	20.0 0%	18.1 8%	-0.02
Procter & Gamble Company	17.14 %	17.43 %	0.00	41.6 7%	36.3 6%	-0.05
Pfizer Inc.	27.94 %	11.62 %	-0.16	33.3 3%	25.0 0%	-0.08
Verizon Communications Inc.	31.94 %	67.40 %	0.35	35.7 1%	33.3 3%	-0.02

Cisco Systems Inc.	18.08 %	17.42 %	-0.01	10.0 0%	33.3 3%	0.23
Citigroup Inc.	7.02 %	6.64 %	0.00	25.0 0%	29.4 1%	0.04
Boeing Company	44.21 %	136.8 0%	0.93	18.1 8%	15.3 8%	-0.03
Comcast Corporation Class A	13.63 %	16.37 %	0.03	0.00 %	0.00 %	0.00
AbbVie Inc.	105.1 1%	138.0 5%	0.33	11.1 1%	20.0 0%	0.09
Coca-Cola Company	26.03 %	26.85 %	0.01	26.3 2%	29.4 1%	0.03
DowDuPont Inc.	22.36 %	16.80 %	-0.06	0.00 %	0.00 %	0.00
PepsiCo Inc.	28.96 %	54.68 %	0.26	38.4 6%	28.5 7%	-0.10
Walt Disney Company	14.41 %	21.39 %	0.07	36.3 6%	27.2 7%	-0.09
Mastercard Incorporated Class A	43.27 %	69.48 %	0.26	18.1 8%	25.0 0%	0.07
Philip Morris International Inc.				16.6 7%	15.3 8%	
Merck & Co. Inc.	8.57 %	9.25 %	0.01	16.6 7%	30.7 7%	0.14
Oracle Corporation	24.74 %	18.55 %	-0.06	16.6 7%	14.2 9%	-0.02
3M Company	26.56 %	45.90 %	0.19	18.1 8%	18.1 8%	0.00
NVIDIA Corporation	12.54 %	13.82 %	0.01	0.00 %	16.6 7%	0.17
International Business Machines Corporation	79.15 %	73.04 %	-0.06	23.0 8%	21.4 3%	-0.02
General Electric Company	10.30 %	9.39 %	-0.01	29.4 1%	23.5 3%	-0.06
McDonald's Corporation	35.69 %	191.9 3%	1.56	30.7 7%	25.0 0%	-0.06
Amgen Inc.	24.69 %	26.65 %	0.02	13.3 3%	23.5 3%	0.10
Altria Group Inc.	124.4 7%	181.6 6%	0.57	18.1 8%	18.1 8%	0.00
Honeywell International Inc.	25.78 %	25.54 %	0.00	0.00 %	0.00 %	0.00
Netflix Inc.	10.82 %	7.61 %	-0.03	0.00 %	0.00 %	0.00
Medtronic plc	19.38 %	6.72 %	-0.13	25.0 0%	30.7 7%	0.06
Gilead Sciences Inc.	29.74 %	72.16 %	0.42	20.0 0%	20.0 0%	0.00

Bristol-Myers Squibb Company	17.81 %	29.28 %	0.11	18.1 8%	14.2 9%	-0.04
Union Pacific Corporation	21.35 %	20.83 %	-0.01	7.69 %	9.09 %	0.01
Texas Instruments Incorporated	19.86 %	35.21 %	0.15	36.3 6%	30.7 7%	-0.06
Correlation			-0.209			

Appendix 4: Correlation between women representation and ROI

<i>Company</i>	<i>ROI</i>			<i>Women in the board</i>		
	<i>2013</i>	<i>2016</i>	<i>Difference</i>	<i>2013</i>	<i>2016</i>	<i>Difference</i>
Apple Inc.	26.08 %	21.95 %	-0.04	10.00 %	20.00 %	0.10
Microsoft Corp	25.07 %	14.18 %	-0.11	36.36 %	36.36 %	0.00
Amazon.com Inc	2.55 %	8.42 %	0.06	18.18 %	27.27 %	0.09
Facebook Inc A	10.08 %	19.38 %	0.09	20.00 %	20.00 %	0.00
Berkshire Hathaway B				0.00 %	0.00 %	0.00
Johnson & Johnson	16.39 %	17.86 %	0.01	23.08 %	16.67 %	-0.06
JP Morgan Chase & Co			0.00	9.09 %	8.33 %	-0.01
Exxon Mobil Corp	17.42 %	3.94 %	-0.13	15.38 %	25.00 %	0.10
Alphabet Inc A	14.52 %	13.85 %	-0.01	27.27 %	28.57 %	0.01
Bank of America Corporation				26.67 %	28.57 %	
Wells Fargo & Company				28.57 %	35.71 %	
AT&T Inc.	12.73 %	6.57 %	-0.06	28.57 %	30.77 %	0.02
Home Depot Inc.	17.18 %	27.66 %	0.10	23.08 %	27.27 %	0.04
Chevron Corporation	13.46 %	0.20 %	-0.14	25.00 %	37.50 %	0.13
UnitedHealth Group Incorporated	12.53 %	11.16 %	-0.01	18.18 %	23.08 %	0.05
Visa Inc. Class A	18.28 %	14.21 %	-0.04	30.00 %	27.27 %	-0.03
Intel Corporation	14.27 %	12.24 %	-0.02	20.00 %	18.18 %	-0.02
Procter & Gamble Company	12.09 %	11.82 %	0.00	41.67 %	36.36 %	-0.05
Pfizer Inc.	19.65 %	7.63 %	-0.12	33.33 %	25.00 %	-0.08
Verizon Communications Inc.	12.49 %	12.38 %	0.00	35.71 %	33.33 %	-0.02

Cisco Systems Inc.	13.88 %	11.81 %	-0.02	10.00 %	33.33 %	0.23
Citigroup Inc.				25.00 %	29.41 %	
Boeing Company	23.88 %	38.13 %	0.14	18.18 %	15.38 %	-0.03
Comcast Corporation Class A	8.99 %	9.60 %	0.01	0.00 %	0.00 %	0.00
AbbVie Inc.	22.71 %	17.26 %	-0.05	11.11 %	20.00 %	0.09
Coca-Cola Company	12.58 %	9.53 %	-0.03	26.32 %	29.41 %	0.03
DowDuPont Inc.	13.20 %	11.01 %	-0.02	0.00 %	0.00 %	0.00
PepsiCo Inc.	14.07 %	15.51 %	0.01	38.46 %	28.57 %	-0.10
Walt Disney Company	11.02 %	15.26 %	0.04	36.36 %	27.27 %	-0.09
Mastercard Incorporated Class A	43.04 %	40.96 %	-0.02	18.18 %	25.00 %	0.07
Philip Morris International Inc.				16.67 %	15.38 %	
Merck & Co. Inc.	6.52 %	6.21 %	-0.003	16.67 %	30.77 %	0.14
Oracle Corporation	18.74 %	10.59 %	-0.082	16.67 %	14.29 %	-0.02
3M Company	20.05 %	23.22 %	0.03	18.18 %	18.18 %	0.00
NVIDIA Corporation	12.17 %	9.46 %	-0.03	0.00 %	16.67 %	0.17
International Business Machines Corporation	29.24 %	21.60 %	-0.08	23.08 %	21.43 %	-0.02
General Electric Company	4.79 %	5.09 %	0.003	29.41 %	23.53 %	-0.06
McDonald's Corporation	20.12 %	19.22 %	-0.01	30.77 %	25.00 %	-0.06
Amgen Inc.	10.18 %	12.44 %	0.02	13.33 %	23.53 %	0.10
Altria Group Inc.	29.26 %	69.27 %	0.40	18.18 %	18.18 %	0.00
Honeywell International Inc.	17.59 %	15.22 %	-0.02	0.00 %	0.00 %	0.00
Netflix Inc.	8.83 %	5.53 %	-0.03	0.00 %	0.00 %	0.00
Medtronic plc	12.58 %	5.00 %	-0.08	25.00 %	30.77 %	0.06
Gilead Sciences Inc.	18.56 %	33.19 %	0.15	20.00 %	20.00 %	0.00

Bristol-Myers Squibb Company	12.31 %	20.91 %	0.09	18.18 %	14.29 %	-0.04
Union Pacific Corporation	15.80 %	13.35 %	-0.02	7.69 %	9.09 %	0.01
Texas Instruments Incorporated	13.67 %	25.92 %	0.12	36.36 %	30.77 %	-0.06
Correlation			-0.19			

Appendix 5: Correlation between women representation and firm value

<i>Company</i>	<i>Total As-sets</i>		<i>Total lia-bilities</i>		<i>Firm value</i>			<i>Women in the board</i>
	<i>2013</i>	<i>2016</i>	<i>2013</i>	<i>2016</i>	<i>2013</i>	<i>2016</i>	<i>Dif-ference</i>	<i>Differ-ence</i>
Apple Inc.	207,000	321,686	83,451	193,437	123,549	128,249	0.04	0.10
Microsoft Corp	142,431	193,694	63,487	121,697	78,944	71,997	-0.09	0.00
Amazon.com Inc	40,159	83,402	30,413	64,117	9,746	19,285	0.98	0.09
Facebook Inc A	17,895	64,961	2,425	5,767	15,470	59,194	2.83	0.00
Berkshire Hathaway B	484,931	620,854	263,041	337,853	221,890	283,001	0.28	0.00
Johnson & Johnson	132,683	141,208	58,630	70,790	74,053	70,418	-0.05	-0.06
JP Morgan Chase & Co	2,415,689	2,490,972	2,204,511	2,236,782	211,178	254,190	0.20	-0.01
Exxon Mobil Corp	346,808	330,314	172,805	162,989	174,003	167,325	-0.04	0.10
Alphabet Inc A	110,920	167,497	23,611	28,461	87,309	139,036	0.59	0.01
Bank of America Corporation	2,102,273	2,187,702	1,869,588	1,920,862	232,685	266,840	0.15	0.02
Wells Fargo & Company	1527015	1930115	1356873	1730534	170,142	199,581	0.17	0.07
AT&T Inc.	277787	403821	186799	280686	90,988	123,135	0.35	0.02
Home Depot Inc.	41084	42549	23307	36233	17,777	6,316	-0.64	0.04
Chevron Corporation	253753	260078	104640	114522	149,113	145,556	-0.02	0.13
UnitedHealth Group Incorporated	81882	122810	49733	84536	32,149	38,274	0.19	0.05

Visa Inc. Class A	3595 6	6403 5	9086	3112 3	26, 870	32, 912	0.22	-0.03
Intel Corporation	9235 8	1133 27	3410 2	4710 1	58, 256	66, 226	0.14	-0.02
Procter & Gamble Company	1392 63	1271 36	7119 9	6979 5	68, 064	57, 341	-0.16	-0.05
Pfizer Inc.	1721 01	1716 15	9579 4	1120 71	76, 307	59, 544	-0.22	-0.08
Verizon Communica- tions Inc.	2740 98	2441 80	2352 62	2216 56	38, 836	22, 524	-0.42	-0.02
Cisco Systems Inc.	1011 91	1216 52	4207 1	5806 6	59, 120	63, 586	0.08	0.23
Citigroup Inc.	1880 382	1792 077	1676 043	1566 957	204 ,33 9	225 ,12 0	0.10	0.04
Boeing Company	9266 3	8999 7	7778 8	8918 0	14, 875	817	-0.95	-0.03
Comcast Corporation Class A	1588 13	1805 00	1081 19	1265 57	50, 694	53, 943	0.06	0.00
AbbVie Inc.	2919 8	6609 9	2470 6	6146 3	4,4 92	4,6 36	0.03	0.09
Coca-Cola Company	9005 5	8727 0	5688 2	6420 8	33, 173	23, 062	-0.30	0.03
DowDuPont Inc.	6950 1	7951 1	4260 3	5352 4	26, 898	25, 987	-0.03	0.00
PepsiCo Inc.	7747 8	7412 9	5319 9	6288 3	24, 279	11, 246	-0.54	-0.10
Walt Disney Company	8124 1	9203 3	3581 2	4876 8	45, 429	43, 265	-0.05	-0.09
Mastercard Incorpo- rated Class A	1424 2	1867 5	6758	1301 9	7,4 84	5,6 56	-0.24	0.07
Philip Morris Interna- tional Inc.	3816 8	3685 1	4593 4	4953 9	- 7,7 66	- 12, 688	0.63	-0.01
Merck & Co. Inc.	1056 45	9537 7	5588 0	5528 9	49, 765	40, 088	-0.19	0.14
Oracle Corporation	8181 2	1121 80	3716 4	6489 1	44, 648	47, 289	0.06	-0.02
3M Company	3355 0	3290 6	1604 8	2260 8	17, 502	10, 298	-0.41	0.00
NVIDIA Corporation	6412	7370	1585	2901	4,8 27	4,4 69	-0.07	0.17
International Business Machines Corporation	1262 23	1122 46	1034 31	9922 4	22, 792	13, 022	-0.43	-0.02
General Electric Com- pany	6565 60	3651 83	5259 94	2893 55	130 ,56 6	75, 828	-0.42	-0.06

McDonald's Corporation	3662 6	3102 4	2061 7	3322 8	16, 009	2,2 04	-1.14	-0.06
Amgen Inc.	6612 5	7762 6	4402 9	4775 1	22, 096	29, 875	0.35	0.10
Altria Group Inc.	3485 9	4593 2	3074 0	3316 2	4,1 19	12, 770	2.10	0.00
Honeywell International Inc.	4543 5	5414 6	2796 8	3477 7	17, 467	19, 369	0.11	0.00
Netflix Inc.	5413	1358 7	4079	1090 7	1,3 34	2,6 80	1.01	0.00
Medtronic plc	3484 1	9978 2	1617 0	4771 9	18, 671	52, 063	1.79	0.06
Gilead Sciences Inc.	2249 7	5697 7	1112 8	3809 0	11, 369	18, 887	0.66	0.00
Bristol-Myers Squibb Company	3859 2	3370 7	2343 8	1753 0	15, 154	16, 177	0.07	-0.04
Union Pacific Corporation	4973 1	5571 8	2850 6	3578 6	21, 225	19, 932	-0.06	0.01
Texas Instruments Incorporated	1893 8	1643 1	8131	5958	10, 807	10, 473	-0.03	-0.06
Correlation							0.128	

Appendix 6: Correlation between women representation and innovation

<i>Company</i>	<i>Innovation intensity (R&D ratio)</i>			<i>Women in the board</i>		
	<i>2013</i>	<i>2016</i>	<i>Differ- ence</i>	<i>201 3</i>	<i>201 6</i>	<i>Differ- ence</i>
Apple Inc.	2.62	4.66	0.78	10.0 0%	20.0 0%	0.10
Microsoft Corp	13.37	14.05	0.05	36.3 6%	36.3 6%	0.00
Amazon.com Inc	8.82	11.83	0.34	18.1 8%	27.2 7%	0.09
Facebook Inc A	17.98	21.42	0.19	20.0 0%	20.0 0%	0.00
Berkshire Hathaway B				0.00 %	0.00 %	
Johnson & Johnson	11.47	12.65	0.10	23.0 8%	16.6 7%	-0.06
JP Morgan Chase & Co				9.09 %	8.33 %	
Exxon Mobil Corp				15.3 8%	25.0 0%	
Alphabet Inc A	12.86	15.45	0.20	27.2 7%	28.5 7%	0.01
Bank of America Corporation				26.6 7%	28.5 7%	
Wells Fargo & Company				28.5 7%	35.7 1%	
AT&T Inc.				28.5 7%	30.7 7%	
Home Depot Inc.				23.0 8%	27.2 7%	
Chevron Corporation				25.0 0%	37.5 0%	
UnitedHealth Group Incorporated				18.1 8%	23.0 8%	
Visa Inc. Class A				30.0 0%	27.2 7%	
Intel Corporation	20.13	21.45	0.07	20.0 0%	18.1 8%	-0.02
Procter & Gamble Company				41.6 7%	36.3 6%	
Pfizer Inc.	12.95	14.9	0.15	33.3 3%	25.0 0%	-0.08

Verizon Communications Inc.				35.7 1%	33.3 3%	
Cisco Systems Inc.	12.22	12.78	0.05	10.0 0%	33.3 3%	0.23
Citigroup Inc.				25.0 0%	29.4 1%	
Boeing Company	3.55	4.89	0.38	18.1 8%	15.3 8%	-0.03
Comcast Corporation Class A				0.00 %	0.00 %	
AbbVie Inc.	16.99	17.81	0.05	11.1 1%	20.0 0%	0.09
Coca-Cola Company				26.3 2%	29.4 1%	
DowDuPont Inc.	3.06	3.29	0.08	0.00 %	0.00 %	0.00
PepsiCo Inc.				38.4 6%	28.5 7%	
Walt Disney Company				36.3 6%	27.2 7%	
Mastercard Incorporated Class A				18.1 8%	25.0 0%	
Philip Morris International Inc.				16.6 7%	15.3 8%	
Merck & Co. Inc.	17.04	25.43	0.49	16.6 7%	30.7 7%	0.14
Oracle Corporation	13.04	15.62	0.20	16.6 7%	14.2 9%	-0.02
3M Company	5.56	5.76	0.04	18.1 8%	18.1 8%	0.00
NVIDIA Corporation	26.8	26.57	-0.01	0.00 %	16.6 7%	0.17
International Business Machines Corporation	5.84	7.2	0.23	23.0 8%	21.4 3%	-0.02
General Electric Company				29.4 1%	23.5 3%	
McDonald's Corporation				30.7 7%	25.0 0%	
Amgen Inc.	21.86	16.7	-0.24	13.3 3%	23.5 3%	0.10
Altria Group Inc.				18.1 8%	18.1 8%	
Honeywell International Inc.				0.00 %	0.00 %	
Netflix Inc.	8.66	9.65	0.11	0.00 %	0.00 %	0.00
Medtronic plc	9.39	7.71	-0.18	25.0 0%	30.7 7%	0.06

Gilead Sciences Inc.	18.93	16.78	-0.11	20.0 0%	20.0 0%	0.00
Bristol-Myers Squibb Company	22.77	25.43	0.12	18.1 8%	14.2 9%	-0.04
Union Pacific Corporation				7.69 %	9.09 %	
Texas Instruments Incorporated	12.47	10.14	-0.19	36.3 6%	30.7 7%	-0.06
Correlation			0.10770			