The effect of CEO's gender and networks on M&A bid premiums

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Summary

This thesis examines the relationship between gender and bid premiums, with CEO network as a moderator. It fills a literature gap, as the joint effect of gender and networks and bid premiums has not been studied yet. Network is measured using network centrality, network diversity (in terms of gender and age), tie strength and density as proxies. All constructs use the links between CEOs to calculate the score on that variable. The sample consists of 2,314 links between CEOs of listed Western European firms who completed M&A deals during 2013-2017 and other CEOs. When using a significance level of 0.01, evidence can be found for the fact that gender is of influence on the size of the bid premium. Therefore, the study states that women CEOs pay lower bid premiums than men CEOs. Besides, with 95% confidence it can be stated that density, duration and diversity in terms of gender and age are moderating variables in the relationship between CEO gender and bid premiums. The coefficients of the interaction terms being positive do not show evidence for the fact that the richer is a women's network, the weaker is the effect of gender on bid premiums.

List of contents

Chapter 1: Introduction

Last March, a French assurance company named AXA bought XL group, a global insurance company, for €12.4 billion. AXA paid more for the company than the actual enterprise value; this is called a bid premium. In this case, AXA paid a bid premium of 33% to acquire XL group (Het Financieele Dagblad, 2018). The CEO of AXA, Thomas Buberl, had strategic reasons to overpay: there was a chance that other firms also wanted to acquire XL group. By bidding more than their competitors AXA succeeded in acquiring XL group. At around the same time as AXA's acquisition of XL group, Wolters Kluwer, a global information services company, acquired Firecracker. This time around, however, this acquisition did not include a bid premium. It is interesting to note that as opposed to AXA group, Wolters Kluwer has a female CEO. These two cases raise the question of whether the CEO of the acquiring firm plays a role in the bid premium that is paid and in particular whether the gender of this CEO is important in determining the size of the bid premiums paid.

While research in the effects of CEO gender on bid premiums remains confined to a single study[1], research to date has not yet determined the joint effect of gender and networks on bid premiums of mergers and acquisitions deals. CEO's networks may have a moderating effect in the relationship between gender and bid premiums, on which will be elaborated in the next paragraph. This leads to the following research question: *To what extent does a CEO's gender and its network affect the M&A bid premiums paid by the firm they manage?*

In recent years, many researchers have investigated the relationship between gender and corporate leadership. For example, gender diversity in corporate boards is widely studied, which shows its added value in science (Hillman, Shropshire & Cannella, 2007; Joecks, Pull & Vetter, 2013). So far, very little attention has been paid to the relationship between gender of the acquiring company's CEO and bid premiums. This is remarkable, as mergers and acquisitions are of strategic importance in any organization (Moeller, Schlingemann & Stulz, 2004). Levi, Li and Zhang (2014) published the only academic article about the relationship between gender of the acquiring firm's CEO and bid premiums. They found that if more women are involved in a bidder board, a lower bid premium is paid. This is due to the fact that less overconfident female CEOs overestimate merger gains less (Levi et al., 2014). Their study was performed in the United States, which leaves room to research this topic in the European setting. The situation could be different in Europe due to cultural differences. So, this thesis contributes to the literature about gender and corporate leadership by exploring the current relationship between bid premiums and gender in Europe. Noteworthy, the relationship between the gender of the target firm's CEO and bid premiums has not been studied yet. However, this relationship will not be taken into account as it will probably depend on negotiation techniques, whose are not relevant for the rest of the study. So, when speaking about gender and bid premiums, this concerns the gender of the

[1] See Levi, Li & Zhang (2014).

acquiring firm's CEO.

The network of CEOs - consisting of direct ties with other CEOs - could act as a moderator in the relationship between gender and bid premiums, as it provides social capital. This can be in the form of human capital, such as expertise, skills, knowledge, and reputation, or relational capital, which contains the resources available through a network of relationships (Hillman & Dalziel, 2003). The more network ties a CEO has, so the higher the centrality, the more social capital this person can gather from others in its network. As a result, CEOs with higher network centrality have access to more resources (Tsai, 2001). For example, they have more insight in whether a deal will create value for the company or not. When managers expect that a deal will be value-enhancing, they pay a higher premium (Gupta & Misra, 2007). Due to women being less overconfident than men, they have less optimistic predictions about the future (Malmendier & Tate, 2008). Therefore, they would less often consider a deal as value enhancing. As a result, they will pay lower bid premiums (Gupta & Misra, 2007). However, when female CEOs have a rich network, they have access to more resources (Tsai, 2001). Therefore, it is plausible that they will be better able to estimate whether a deal will be valuable and pay higher bid premiums than when they have a small network.

Because research to date has not yet determined the joint effect of gender and networks on bid premiums of mergers and acquisitions deals, it is of scientific relevance that research is performed into this topic. As mentioned, only one study has been performed that examines the difference in bid premiums between men and women (Levi et al., 2014). Therefore, this thesis uses articles that describe general determinants behind overbidding and links it to gender characteristics. For example, a reason behind overbidding is the joy of winning, the winning independently of the monetary value of the prize (Sheremeta, 2013; Cooper & Fang, 2008). This can be linked to gender characteristics: men are in general more eager to win than women (Niederle & Vesterlund, 2007). This leads to the assumption that women are less likely to overbid due to the joy of winning than men. So, in this manner, more insight will be gained into differences in overbidding behavior between male and female CEOs.

This research is of practical relevance as well, because it gives firms that want to employ a female CEO more insight in the differences in bid premiums paid based on gender and the effect of their network on this relationship. This is of great importance, because bid premiums can lead to an increase in likelihood of completion of the deal (Bessler & Schneck, 2015). When employing a female CEO that has a small network, the risk exists that too less deals are accomplished. When employing a female CEO that has a rich network, this risk probably disappears. In the latter case, firms will be more indifferent in the choice of employing a male or female CEO. Therefore, the main purpose of this thesis is to examine whether bid premiums are dependent on the gender of the acquiring firm's CEO and if networks operate as a moderating variable.

In chapter 2, the theoretical framework is outlined, in which gender, network and bid premiums are defined and their relationships to each other are discussed. In chapter 3, the methodology section, the thesis operationalizes variables and explains how they are measured. Chapter 4 contains the results. The discussion of the thesis is presented in chapter 5. Last, the conclusion in chapter 6 gives an overview of the thesis and its main findings.

Chapter 2: Theoretical framework

Bids paid during mergers and acquisitions often differ from the company's true valuation. The difference between the company's true value and the actual paid price is called a bid premium. Behavioral literature offers some explanations for the possible role of a CEO's gender on the bid premiums paid. This concerns theories about overconfidence, being ethical and the eagerness to win. By linking those theories to determinants behind overbidding, this thesis contributes to the existing literature about CEO's gender and bid premiums.

According to theory about overconfidence, men generally act more overconfident than women (Lichtenstein, Fischhoff & Phillips, 1982; Beyer, 1990; Croson & Gneezy, 2009). Overconfidence comes in two forms. The first concerns the precision of future prospects: women's beliefs are generally less precise than men's (Barber & Odean, 2001). The second form is about the optimism of expectations: women generally have less favorable expectations about the future (Malmendier & Tate, 2008). "In particular, the first form of overconfidence implies that female directors will apply a greater discount rate to future cash flows from an acquisition, while the second form implies that female directors will expect lower cash flows from an acquisition than their counterparts" (Levi et al., 2014, p. 188). So, in both cases women are expected to pay lower bid premiums due to their lower overconfidence. Levi et al. (2014) found evidence for this. Their study pointed out that each additional female on a bidder board reduces the bid premium by 15.4 percent.

Overconfidence operates as a mechanism that increases bid premiums in different ways. First, a reason for paying more than the actual value of a company is that acquirers overestimate synergies (DePamphilis, 2015). When managers expect that a deal will be value-enhancing, they pay a higher premium (Gupta & Misra, 2007). CEOs particularly overestimate synergies when they are overconfident (Malmendier & Tate, 2008). An important explanation for the difference in overestimating synergies between men and women could be that men are more overconfident (Levi et al., 2014). Therefore, it is plausible that men overestimate synergies more often. As a result, men will more often pay a bid premium than women. Thus, it can be hypothesized that women less overestimate synergies than men due to less overconfidence, which leads to lower bid premiums. Second, when offering an excess bid premium, the likelihood of completion of the deal increases (Bessler & Schneck, 2015). In the beginning phase of the mergers and acquisitions process, it may be the case that other firms possibly want to acquire a certain target too. In this case, the bid premium is more likely to be higher when bidders believe their competitors to bid considerable higher values (Coff, 2002). Multiple studies pointed out that both women and men act overconfident, where men act more often overconfident in risky situations (Lichtenstein et al., 1982; Deaux & Farris, 1977; Lundeberg, Fox & Punccohar, 1994). This situation can be seen as risky, because CEOs cannot fully estimate the value bidden by their competitors and therefore have a chance to lose. This could be the

reason why men will overbid more than women in this case. Third, bounded rationality - as defined by Simon (2000) as the limited ability of making choices that are fully based on relevant knowledge and consequences - causes overbidding. This is due to people being not always perfectly informed (Sheremeta, 2013). Because they have to deal with uncertainty and information asymmetry, choices are often partly based on assumptions (Simon, 2000). However, the future is rarely predictable, so people are likely to make mistakes (Potters, De Vries & Van Winden, 1998). Paying high bid premiums in this case happens mainly when firms have access to financial resources and therefore room to make mistakes (Sheremeta, 2013). When firms have limited access to financial resources, they cannot afford to make mistakes and its directors will be less likely to overbid. Now, it is the case that women in general are less overconfident (Levi et al., 2014). Therefore, it is plausible that - despite of the financial resources the company owns - women underestimate their ability not to make mistakes and their room to make mistakes more than men. Therefore, they are likely to be more careful and overbid less than men.

Moreover, according to theory about being ethical, paying a bid premium can be an attempt of CEOs to maximize their personal gains (Gupta & Misra, 2007). Because acquisitions increase the size of a firm, they often have a positive effect on the salary of CEOs and therefore enhance their power (Hitt et al., 2009). According to the literature, women – including business women - are more ethical than men and are less likely to act in their personal interest (Betz et al., 1989; Glover et al., 2002; Lane, 1995; Whipple & Swords, 1992). Therefore, men will more often pay a bid premium in order to maximize personal gains. As a consequence, firms with female directors pay lower bid premiums (Levi et al., 2014).

Finally, according to theory about the eagerness to win, joy of winning may cause overbidding, as people like the winning itself (Sheremeta, 2013; Cooper & Fang, 2008). This concerns winning independently of the monetary value of the prize. In general, men are more eager to win and always search for competition, where women try to avoid it (Niederle & Vesterlund, 2007). On top of that, the performance of men changes positively when competition increases. As a result, fewer women enter into competitions and win those (Niederle & Vesterlund, 2011; Vandegrift & Yavas, 2009). This leads to the assumption that women are less likely to overbid due to the joy of winning than men.

Thus, the reasons mentioned indicate that women are more likely to pay lower bid premiums during mergers and acquisitions than men. This leads to my first hypothesis:

H1: *Women CEOs pay lower bid premiums than men CEOs.*

Further, personal networks can play an important role in the mergers and acquisitions process. A network has been defined as: “a specific set of linkages among a defined set of actors, with the additional property that the characteristics of these linkages as a whole may be used to interpret the

social behavior of the actors involved"' (Seufert et al., 1999, p. 182). Personal networks provide an effective channel for the exchange of information, knowledge and ideas (El-Khatib, Fogel & Jandik, 2015). In this thesis, personal networks between CEOs are investigated, so connections between firms are not taken into account. Therefore, in the rest of the thesis, CEO network is assumed to cover the direct links between CEOs of acquiring companies with other CEOs.

CEO networks may operate as a moderator variable in the relationship between gender and bid premiums. This is depicted in figure 1. If it is proven that CEO network operates as a moderator in the relationship between gender and bid premiums, it is of importance that the direction and the strength of this moderator are defined. This study expects that the interaction term is negative, so that the more positive are CEO networks, the more negative the effect of gender on M&A bid premiums becomes. More specifically, when women CEOs have a richer network, they pay a higher premium than when their networks are less rich.

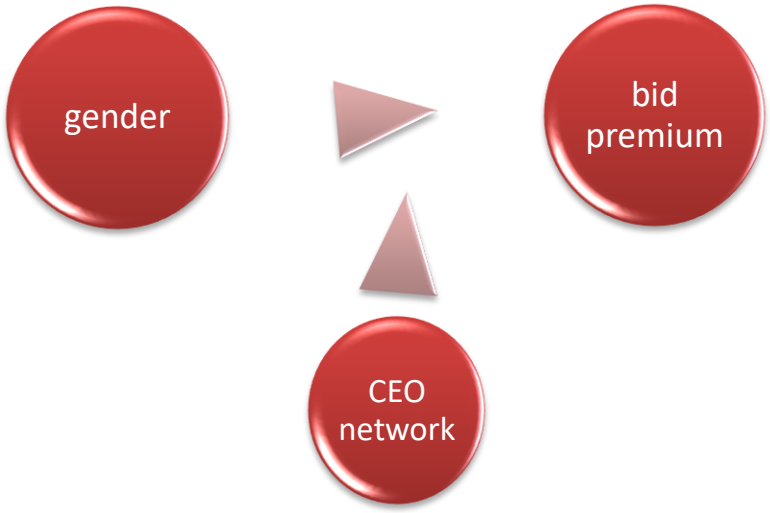

Figure 1. Conceptual model

For CEO network, to be a moderator, a relationship must exist between both CEO network and bid premiums and CEO networks and gender. Considering CEO networks and their relationship to bid premiums, actors in networks have to deal with bounded rationality, limited ability of making choices that are fully based on relevant knowledge and consequences (Simon, 2000). Bounded rationality leads to overbidding as people are not always perfectly informed (Sheremeta, 2013). In the beginning phase of the mergers and acquisitions process, it may be the case that other firms possibly want to acquire a certain target too. As CEOs often cannot fully estimate the bid that is going to be paid by their competitors, they have to set in high to reduce the chance of losing the auction (Coff, 2002). This phenomenon is referred to as the winner's curse, where CEOs often overestimate the value of their target (Hitt et al., 2009).

Considering CEO networks and their relationship to gender, actors in networks often search for homophily, also known as interpersonal similarity. “Homophily refers to the tendency of individuals who interact to be similar on given attributes such as gender or race” (Ibarra, 1997, p. 92). Due to the similarities between actors, their communication is easier, behavior is better predictable and relationships are more built on trust (Kanter, 1977; Lincoln & Miller, 1979). For this thesis, only the homophily in terms of gender will be taken into account, because other forms like homophily in terms of race or ethnicity are not relevant in this case. When women in firms search for homophily, they have to search in a broader range than men, because there are fewer women in their direct environment (Ibarra, 1993). Moreover, networks fulfill a role of creating and sharing knowledge among actors (Durbin, 2011). Due to the fact that women have a broader range of networks – they have to search in a larger geographic area and over more companies – women have a unique form of knowledge creation. Therefore, their social capital - the investment in social relationships through which the resources of other actors can be accessed and borrowed – is more diverse (Lin, 2001). This is why they are better able to deal with complex knowledge than men (Durbin, 2011). Also men prefer to communicate with others similar to themselves (Ibarra, 1993). This may result in the fact that women are excluded from men’s networks, and men excluded from women’s networks (Brass, 1985). A study performed by Burke, Rothstein & Bristor (1995) found evidence for this: the women’s networks in their sample contained more women than the men’s networks. From this, it can be concluded that women’s and men’s networks can at least be called different.

In order to find evidence for the fact that CEO network operates as a moderating variable in the relationship between gender and bid premiums, this study explains how the five determinants behind overbidding mentioned change when women have a rich network. First, overbidding is a consequence of acquirers overestimating synergies (DePamphilis, 2015). Women were expected to overbid less due to the fact that they act in general less overconfident (Levi et al., 2014). As a result, their beliefs are generally less precise than men’s and that they have less favorable expectations about the future (Barber & Odean, 2001; Malmendier & Tate, 2008). However, when women have a rich network in terms of diversity, their beliefs about the future will probably be more precise. In that case, they have more diverse information gained from others in their network (Lin, 2001). Further, due to increased information diversity women may have a better view of the future and will probably adjust their expectations to more positive ones.

Second, bid premiums are paid to increase the likelihood of completion of the deal (Bessler & Schneck, 2015). For this determinant, it was stated that both women and men act overconfident, where men act overconfident more often in risky situations (Lichtenstein et al., 1982; Deaux & Farris, 1977; Lundeberg et al., 1994). Bidding in mergers and acquisitions can be risky as acquirers do not know the bids of other potential acquirers. When a female CEO has high network centrality, their engagement in knowledge sharing is higher (Reinholt, Pedersen & Foss, 2011). As a result, the overall situation

becomes less risky, because women have gathered more information from within their network. Therefore, they will act more overconfident than when they have a small network.

Third, bounded rationality may cause overbidding when firms have access to financial resources and therefore room to make mistakes (Sheremeta, 2013). Linking this to CEO networks, actors with a high network centrality have a faster and more efficient exchange of information and other resources (Gnyawali & Madhavan, 2001). When women have more direct ties, more diverse knowledge and ideas are gained from others in their network (Lin, 2001). As a result, they are less bounded rational because they have more information. All the knowledge from others in the network make them better informed people, which will increase their confidence and therefore their overconfidence. They will no longer underestimate their room to make mistakes. This will, in its turn, probably lead to more overbidding. Besides, due to the network diversity, firm performance increases and firms will have better access to financial resources (Goerzen & Beamish, 2005). This is why the CEO has more room to make mistakes and is more likely to do overbidding.

Fourth, paying a bid premium may be an attempt of CEOs to maximize their personal gains (Gupta & Misra, 2007).Women were expected to maximize personal gains less often than men, because they are in general more ethical and therefore less likely to act in their own interest (Betz et al., 1989; Glover et al., 2002; Lane, 1995; Whipple & Swords, 1992). When women have more direct ties, they are likely to act more ethical. This is because actors in their network have a controlling function (Subrahmanyam, 2008). Likewise, when there are fewer ties, the director is controlled by a smaller amount of people. Besides, people in a network develop norms of conduct, so that actors are likely to act as ethical as the others in the network do (Brass, Butterfield & Skaggs, 1998). This reason behind overbidding will probably affect the relationship between gender and networks positively. In other words, the richer the network of women directors, the lower the bid premium they will pay.

Fifth, overbidding can be caused by the joy of winning (Sheremeta, 2013). Women were expected to overbid less due to the joy of winning, because they are in general less eager to win than men (Niederle & Vesterlund, 2007). This determinant behind overbidding is not expected to lead to changes in women's bidding behavior their networks change. Therefore, the theory of being eager to win will not be considered anymore from now on.

As a result, we propose a second hypothesis 2:

H2: *Network operates as a moderating variable in the relationship between gender and M&A bid premiums.*

Besides, we argue that *richer* CEO networks weaken the effect of gender on bid premiums. This leads to hypothesis 3: *Networks negatively affect the relationship between gender and M&A bid premiums.*

Chapter 3: Methodology

In the corporate restructuring process, there is a diversity of possible strategies in order to obtain ownership of another company. In this thesis, only restructuring activities that result from friendly takeovers are taken into account. This is the case because in friendly takeovers negotiations between boards take place. Therefore, networks of the CEOs of both companies may be of influence. With hostile takeovers, contact is at arm's length and then the influence does not apply.

A quantitative analysis is performed in order to test the hypotheses and to come to the conclusions. This is done in the form of panel data analyses, so the study incorporates changes over time for multiple units. Therefore, the same units are studied over time (Woolridge, 2013). However, for some panels some observations are missing, so the panel is unbalanced. For this thesis, the random effects model is most suitable, because the model contains a variable that is stable over time, namely gender. The following model depicts the relationship that is examined:

$$\text{Bid premium}_{it} = \beta_0 + \beta_1 \text{gender}_{it} + \beta_2 \text{ CEO's network}_{it} + \beta_7 \text{ gender*CEO's network}_{it} + \beta_{12} \text{ sales growth}_{it} + \beta_{13} \text{ Tobin's Q}_{it} + \beta_{14} \text{ ROA}_{it} + (u_{it} + a_i).$$

The dependent variable, bid premium, is calculated as the difference between the price paid for the deal and the enterprise value of the target. "The bid premium is defined as the ratio of the final offer price to the target stock price four weeks prior to the bid, minus one" (Levi et al., 2014, p. 196). This definition applies only to the acquisition of listed companies, not to private equity funds, family companies or divisions of firms. From the analysis performed by Levi et al. (2014) it becomes clear that bid premium can be negative, despite of the fact that a premium in finance is generally considered as a surplus, whereas a negative outcome would result in a discount. The decision whether to pay a bid premium and how much to pay excessively is a strategic one. The bid must be set high enough in order to compete against other potential acquirers, but not so high that the acquisition is too expensive relative to its advantages (Varaiya & Ferris, 1987). When less than 100 percent was acquired, the price that is paid for that part is converted to the price that would have been paid if 100 percent was acquired. Besides, the bid premium is presented as a percentage of the enterprise value of the target and is therefore controlled for firm size. When a firm acquired more than one firm during the period of 2013-2017, the average bid premium of those deals is calculated.

The variable gender, which measures the gender of the acquiring firm's CEO, is a binary and categorical variable. Therefore, it is added as dummy variable, so that it can be included in interval level analyses. In this case '0' stands for men and '1' stands for women.

Seufert et al. (1999) consider networks as a set of linkages among actors. Because this thesis studies networks of CEOs, the sum of the links between a CEO and the CEOs they know are used as CEO network. All CEOs of listed European firms that performed M&A deals during 2013-2017 are

incorporated in the analyses. A link between CEOs exists from the moment when they started to know each other. The links are professional cross-firm ties between CEOs. The links never end, when two certain CEOs are for example not working at the same company anymore, they still know each other. Therefore, the existence of the relationship does not change. However, the relationship is dynamic: the duration of each relationship changes each year. Besides, new relationships are built. As a result, the diversity and density of a CEO's network change from year to year.

CEO network is assumed to act as a moderator in this thesis. A moderator is a variable that affects the direction and/or strength of the relation between an independent variable and a dependent variable (Baron & Kenny, 1986). As CEO network is not easy to quantify, this thesis uses proxies for networks. Because there is no existing literature about CEO network being a moderator in the relationship between gender and networks, this thesis uses proxies that are used in existing network literature. Ibarra (1993), a prominent author in network literature, uses tie strength and density in her article about gender and networks. These proxies will be proper proxies for this thesis as well, as they are used in an article to examine gender differences in networks, which is also part of this thesis' theory. Network centrality is a common proxy for networks, as it is the easiest way to calculate networks. It is namely calculated by the number of direct ties between actors (Freeman, 1979). Network diversity is chosen because diversity of corporate boards is widely studied, which is therefore a plausible proxy (Blau, 1977).

So, CEO network is measured by four constructs: network centrality, network diversity, tie strength and density. The first construct that is used for network, network centrality, is measured by degree centrality: the number of direct ties between CEOs (Freeman, 1979). The more ties a person have, the higher the centrality (Gnyawali & Madhavan, 2001). Thus, centrality is actually the size of the CEO's network.

The second construct for networks is network diversity. This research consists of two forms of network diversity, namely diversity in terms of gender and age. Dallas (2002) stated that heterogeneous groups can provide a diversity of knowledge, perspective, creativity and judgment to people. This is probably also the case in diverse networks. Besides that, network diversity in alliances turned out to lead to higher multinational enterprise performance (Goerzen & Beamish, 2005). Network diversity may be of influence on M&A bid premiums too, because due to higher firm performance, turnover and profit increase. When a firm has more retained earnings, there is more room to pay the premium.

Network diversity is measured using Blau's index. This index measures how many categories a data set has and how individuals are distributed among those categories. Values range from zero to one: for example, zero means that there are no women in the network and one means that the network is equally distributed with respect to gender. According to Blau (1977), diversity is measured by

$$H = 1 - \sum_{c=1}^{k} Sc^2$$

where k stands for the number of categories (for example 2 for gender) and Sc is the part of the network of a CEO that has characteristic c. This model is also used in Joecks, Pull & Vetter (2013) to measure gender diversity among boards, so the model is expected to be valid.

For the diversity in age, four groups are identified. Table 1 gives an overview of the age ranges and the corresponding groups.

Age ranges	Group
< 40	1
40-50	2
50-60	3
> 60	4

Table 1. Age groups.

The third construct, tie strength, is measured as the number of years that a CEO of an acquiring company and another CEO have known each other, also called duration. When CEOs already knew each other before 2013 and their connection lasted till 2013-2017, this is also taken into account. When the duration of a connection was shorter than one year, this is changed into one year in order to make it suitable to run a regression with. This duration is measured from year to year, so when CEOs know each other from 2012-2017, the duration is 1 in 2013 and 5 in 2017. By including years in the analysis, it becomes visible if the effect changes over time.

"At an aggregate level, strength of ties refers to the balance of personal network relationships that are close, stable, and binding relative to weaker, more superficial links lacking in emotional investment" (Ibarra, 1993, p.62). The mechanism that makes tie strength leading to differences in the relationship between gender and bid premiums, is that when people know each other better, they exchange more (personal) knowledge (Lai & Wong, 2002). On top of that, when ties are strong, mainly tacit knowledge is exchanged (Hansen, 1999). Tacit knowledge helps to increase strategic know-how in order to respond to changes in the environment (Uzzi, 1996).

The fourth construct, density, is measured as the actual number of ties in the network of one person relative to the number it would have been when everyone in the network were connected to everyone else (Marsden, 1990). In other words, it indicates the presence of third party connections around a relationship (Reagans & McEvily, 2003). The more contacts in a person's network that have close network connections with each other, the higher is the density (Ibarra, 1993). High density leads to

easier knowledge transfer among actors. Besides, networks with high density provide social support and solidarity (Kadushin, 1982).

The network proxies will probably differ in their effect on the relationship between gender and bid premiums. Regarding the theory of overconfidence, overconfidence will probably mostly increase due to diversity in terms of age and gender. When women have a more diverse network, they have access to more diverse information from others in their network (Lin, 2001). Centrality, density and tie strength will probably have a smaller effect, because that is more about the quantity of information, not the quality. Regarding the theory of being ethical, actors in networks often have a controlling function (Subrahmanyam, 2008). Therefore, diversity in terms of age and gender will probably not have an effect. In this case it matters more by how much people CEOs are monitored instead of how diverse those people are.

Furthermore, to check whether CEO network acts as a moderating variable, five interaction terms between gender and CEO network are included. When these interaction terms are significant, the moderating effect exists.

To avoid omitted variable bias, three control variables for bid premium are included in the model[2]. Those variables are sales growth, Tobin's Q and return on assets (ROA). The data is retrieved from Orbis. Because bid premium is a stable variable in the analysis, the data for the control variables – ranging from 2013-2017 - are averaged into one observation per company. Table 2 gives definitions of those variables that are used in Levi et al. (2014).

Variable	Definition
Sales growth	The ratio of sales in the current fiscal year to sales in the last year minus one.
Tobin's Q	The market value of total assets divided by the book value of total assets. The market value of assets is calculated as the book value of total assets minus the book value of common equity plus the number of common shares outstanding times the stock price.
ROA	Income before extraordinary items divided by the book value of total assets at the beginning of the fiscal year.

Table 2. Control variables for bid premium and their definitions, retrieved from Levi et al. (2014, p.199)

[2] Levi et al. (2014) use more control variables for bid premium. They retrieved their data from Compustat, to which we do not have access. Unfortunately, neither Orbis nor Eikon has all this data.

The error terms, u_{it} and a_i, represent the random parts of respectively the normally distributed error and the economic entity specific variation (Woolridge, 2013). However, when the sample is large enough, the first source of variation will probably diminish (Borenstein, Hedges, Higgins & Rothstein, 2010).

For this research, data about networks of CEOs, their gender and age are used. This data is retrieved from BoardEx. The data that is relevant for this research consists of the data from listed companies in Western Europe between 2013 and 2017. According to the United Nations (2018), the countries that belong to Western Europe are Austria, Belgium, France, Germany, Liechtenstein, Luxembourg, Monaco, Netherlands and Switzerland. Only the countries from Western Europe are included in this research, because these countries are almost equally developed. When including all countries in Europe, several biases will exist due to differences in development between countries.

The data about what prices are paid for the deals and the value of the companies is found in ThomsonOne Mergers & Acquisitions. The data that is relevant for this research consists of the M&A deals that occurred in listed companies of countries in Europe between 2013 and 2017. Cross-border M&As between a company in Europe and the other outside Europe are not taken into account.

Chapter 4: Results

After filtering the network data to the countries in West Europe and the years 2013-2017, the data is merged with the bid premiums paid by firms in Europe in that time horizon. This resulted in 5,688 observations. The dataset contains 437 CEOs of 207 firms from all industries. The panels consist of 2,314 groups who represent the links between acquiring CEOs and their ties with other CEOs. Most panels have multiple observations, which represent the changes of their network characteristics from year to year. Table 3 presents the summary statistics of the sample.

Variable	N	Mean	Standard Deviation	Minimum	Maximum
Bid premium	5,688	-12.2447	36.7390	-93.8577	1129.1480
Gender	5,688	0.1064	0.3083	0	1
Density	5,688	0.0022	0.0019	0.0080	1.1552
Duration	5,688	3.2964	2.5726	1	20
Diversity in terms of gender	5,688	0.2856	0.1461	0	0.5
Diversity in terms of age	5,688	0.5099	0.1536	0	0.75
Centrality	5,688	35.9316	28.7750	1	142
Interaction term density	5,688	0.0293	0.1002	0	0.5207
Interaction term duration	5,688	0.2925	1.1201	0	15
Interaction term diversity in terms of gender	5,688	0.0349	0.1101	0	0.5
Interaction term diversity in terms of age	5,688	0.0573	0.1740	0	0.7222
Interaction term centrality	5,688	4.4406	15.2976	0	103
Sales growth	3,338	1.6631	17.2505	-0.3202	189.1712
Tobin's Q	4,362	0.9680	0.9889	0	5.528
Return on Assets	5,303	3.4290	6.1256	-60.5968	39.2532

Table 3. Summary statistics.

Table 4 presents the correlations between the multiple variables. Most of them are relatively low. However, some of them are really high. This is particularly the case for the interaction terms with gender. In this case it is logically that the correlation between an interaction term and one of the variables itself is high. So, this will probably not lead to any problems.

Table 4. Correlation Matrix.

	Bid premium	Gender	Density	Duration	Diversity in terms of gender	Diversity in terms of age	Centrality	Interaction term density	Interaction term duration	Interaction term diversity in terms of gender	Interaction term diversity in terms of age	Interaction term centrality	Sales growth	Tobin's Q	Return on assets
Bid premium	1														
Gender	0.1217	1													
Density	0.1259	0.3307	1												
Duration	0.0384	-0.0803	-0.2456	1											
Diversity in terms of gender	0.1050	0.1002	0.4305	-0.0911	1										
Diversity in terms of age	0.0931	0.1444	0.4208	-0.1095	0.3972	1									
Centrality	0.0991	0.2088	0.6806	-0.1349	0.0963	0.1440	1								
Interaction term density	0.1163	0.8938	0.4609	-0.0509	0.1646	0.2026	0.2971	1							
Interaction term duration	0.1258	0.8319	0.3198	0.0510	0.1321	0.1395	0.1741	0.7980	1						
Interaction term diversity in terms of gender	0.1175	0.9342	0.3910	-0.0502	0.1892	0.1936	0.2214	0.9348	0.8421	1					
Interaction term diversity in terms of age	0.1151	0.9746	0.3747	-0.0718	0.1359	0.1987	0.2237	0.9348	0.8275	0.9613	1				
Interaction term centrality	0.1129	0.8996	0.4194	-0.0720	0.1167	0.1613	0.3298	0.9524	0.7491	0.8758	0.9040	1			
Sales growth	-0.0090	-0.0355	-0.1107	0.0264	0.0468	-0.2861	-0.0937	-0.0317	-0.0295	-0.0332	-0.0345	-0.0319	1		
Tobin's Q	0.1348	0.0071	-0.1670	0.0690	-0.1108	-0.0139	-0.0632	-0.0235	-0.0351	-0.0270	0.0072	0.0041	0.0472	1	
Return on Assets	0.1212	0.0840	0.0608	0.0740	0.0234	0.0954	0.1598	0.0950	0.0634	0.0978	0.0903	0.1075	-0.3182	0.1149	1

A panel data regression is performed in order to test whether men pay higher bid premiums than women and whether networks operate as a moderating variable. Therefore, bid premium is used as dependent variable and gender, network and the interaction terms between gender and network are used as independent variables.

When performing panel data analyses, three models are possible: the pooled model, the fixed effects model and the random effects model. In this case, the random effects model is the single possible option, because it is the only model with the ability to incorporate values that are stable over time. That is necessary for this study, because the gender of each CEO separately remains stable over time. Besides, bid premium is assumed to be a stable variable in this case, because most companies only performed one deal in the period of 2013-2017.

Since all network measures are highly correlated, separate panel analyses are performed for each network measure. Tables 5 till 9 summarize the effects that are found. The significance is presented with stars: the significance levels of 0.1, 0.5 and 0.01 represent respectively *, ** and ***.

Variable	Coefficient	Standard Error	Significance
Gender	1.6004	0.8586	*
Density	-0.8424	1.0215	
Interaction term density	6.4074	2.5217	**
Sales growth	-0.0164	0.0457	
Tobin's Q	0.8441	0.2760	***
Return on Assets	-0.0952	0.0670	
Constant	-0.2525	0.8511	

Table 5. Outcomes of the random effects analysis with network density.

Variable	Coefficient	Standard Error	Significance
Gender	1.0278	0.8863	
Duration	-0.1901	0.0447	***
Interaction term duration	0.9484	0.2771	***
Sales growth	-0.0177	0.0457	
Tobin's Q	0.7811	0.2755	*** **
Return on Assets	-0.1346	0.0674	
Constant	0.4088	0.8493	

Table 6. Outcomes of the random effects analysis with network duration.

Variable	Coefficient	Standard Error	Significance
Gender	-5.0381	1.5450	***
Diversity in terms of gender	2.1501	0.6663	***
Interaction term diversity in terms of gender	21.0722	3.7537	***
Sales growth	-0.0139	0.0457	
Tobin's Q	1.2204	0.2786	***
Return on Assets	-0.0508	0.0667	
Constant	-1.3166	0.8578	

Table 7. Outcomes of the random effects analysis with network diversity in terms of gender.

Variable	Coefficient	Standard Error	Significance
Gender	-9.6357	2.1332	***
Diversity in terms of age	0.2928	0.5732	
Interaction term diversity in terms of age	21.3664	3.4302	***
Sales growth	-0.0135	0.0457	
Tobin's Q	1.0391	0.2750	***
Return on Assets	-0.0709	0.0666	
Constant	-0.6782	0.8838	

Table 8. Outcomes of the random effects analysis with network diversity in terms of age.

Variable	Coefficient	Standard Error	Significance
Gender	2.8469	0.72887	***
Centrality	-0.0196	0.0044	***
Interaction term centrality	0.0062	0.0139	
Sales growth	-00159	0.0457	
Tobin's Q	0.8612	0.2750	***
Return on Assets	-0.0680	0.0670	
Constant	0.1505	0.8393	

Table 9. Outcomes of the random effects analysis with network centrality.

When looking at the results of table 5 till 9, it can be stated that gender has a significant influence on bid premium at a significance level of 0.01. This is the case when centrality, diversity in terms of age and gender are used as network proxies. When using density as network proxy, gender has a significant influence on bid premium at a significance level of 0.1. For duration as network proxy, the influence is not significant. We expected that women pay lower bid premiums than men. This is the case when the coefficient of gender in the analyses is negative. That is the case for network diversity in terms of gender and age. Because of those coefficients being significant, the H0 hypothesis of hypothesis 1, stating that there are no differences between men and women regarding bid premiums, is rejected. Therefore, hypothesis 1, Women CEOs pay lower bid premiums then men CEOs, can be accepted for the mentioned network proxies.

Remarkably, the probability values for duration, centrality and diversity in terms of gender are truly significant, namely at a level of 0.01. This means a strong causal relationship between those variables

and bid premium. An interesting future study could therefore examine the relationship between the mentioned network proxies and bid premium.

Considering the interaction terms of network and gender, the interaction terms of density, duration, and diversity with respect to age and gender proved to be significant. The probability value for density is namely significant at a level of 0.05 and for the other three even at a level of 0.01. Because of that, the H0 hypothesis of hypothesis 2 assuming that network does not change the direction and/or the strength of the relationship between gender and bid premiums, is rejected for those variables. Thus, it can be stated that network operates as a moderating variable in the relationship between gender and M&A bid premiums. Herewith hypothesis 2 is accepted, assuming those proxies for networks.

The interaction term of centrality however, turned out to be not significant. This means that this network proxy in this case do not moderate the effect between gender and bid premiums. Because of this, it could be the case that CEO network as measured by centrality is not a good moderator or not a well-chosen proxy for networks.

To get back to the interaction terms of density, duration, centrality and diversity with respect to gender and age, the third hypothesis stated that networks negatively affect the relationship between gender and M&A bid premiums. Regarding the interaction term of density, which has a coefficient of 6.4074, it can be stated that the more positive is density, the more positive becomes the effect of gender on bid premiums. This result does not support the hypothesis, because in this case applies that the higher the density, the more positive the effect of gender on bid premiums becomes. In other words, the higher the density, the higher the bid premium paid by a female CEO. The same yields for the other interaction terms, whose are also positive. Therefore, hypothesis 3 cannot be accepted. Thus, it cannot be stated that network negatively affects the relationship between gender and bid premiums.

Chapter 5: Conclusion

This thesis examines the relationship between gender and bid premiums, with CEO network as a moderator. The sample of this thesis consists of 2,314 links between CEOs of listed West European firms who completed M&A deals during 2013-2017 and other CEOs. When using a significance level of 0.01, evidence can be found for the fact that gender is of influence on the height of the bid premium. Therefore, the study states that women CEOs pay lower bid premiums than men CEOs. Besides, with 95% confidence it can be stated that density, duration and diversity in terms of gender and age are moderating variables in the relationship between CEO gender and bid premiums. However, due to the coefficients being positive, we cannot find evidence for the fact that the richer is a women's network, the weaker is the effect of gender on bid premiums.

Levi et al. (2014) performed the only academic article about the relationship between gender and bid premiums, in which they found evidence for the fact that women pay lower bid premiums than men. The effect of gender on M&A bid premiums has not yet been researched in Europe. Besides that, the moderating effect of networks is a new element. This study therefore fills a literature gap.

In order to build upon the existing literature, this study links determinants behind overbidding to gender characteristics. The reasons behind overbidding used are overestimating merger gains, increasing the likelihood of completing the deal, let the target expect high merger gains, bounded rationality and the non-monetary utility of winning. Those determinants are linked to characteristics such as acting overconfident, being ethical and searching for competition. The overall expectation is that women pay lower bid premiums than men.

Another insight from the study is that networks could act as a moderating variable. Five proxies for networks were used: density, duration, centrality and diversity in terms of age and gender. This thesis hypothesizes that the richer the network of a woman CEO, the higher the bid premium paid. A network namely has the advantage of knowledge sharing: being better informed leads to less information asymmetry and making better choices.

Chapter 6: Discussion

A limitation of this thesis is that the data about M&A deals was not available for non-listed companies. Therefore, only information about deals performed by listed companies is incorporated. When information about non-listed companies is available, the effect of gender on bid premiums is probably stronger. This is due to the fact that in listed companies, mostly several others besides the CEO are involved in the bidding process, which are often males and therefore bias the outcomes. When smaller non-public companies are studied, the effect could be more significant as (women) directors are often the only person to make the decision. Future research could therefore perform a comparable study in non-listed companies.

Besides, further research could focus on other parts of the world. It is possible that in developing countries the relationship between gender, networks and bid premiums works out different from West Europe. For example in Asia, culture is truly different from West Europe, which could be translated into different bidding behaviour.

On top of that, as mentioned in the results section, studies could be performed examining duration, centrality and diversity in terms of gender and their effect on bid premiums. Those variables showed to be significant. Density and diversity in terms of age turned out to be not significant. However, these variables could be significant in other samples. Because the interaction terms of density and diversity in terms of age were significant, these variables are useful to include in the model.

All options mentioned could contribute to literature about gender, CEO networks and bid premiums on which remarkably little attention has been paid. The outcomes of this research being significant show favourable prospects for other research to be performed in this field.

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