Women on Corporate Boards: Good or Bad?☆

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Abstract

Prior literature shows that mandatory gender quotas are detrimental to firm value. However, little is known about causal effects of voluntarily appointed women. A large board dataset covering 53 countries and about 500,000 people enables us to identify exogenous retirements of board members due to death or illness. Long and short-run event studies yield evidence for a positive valuation effect of women. This is confirmed in panel regressions for the entire dataset. This positive impact is not driven by women per se, but a glass ceiling effect due to more rigorous selection. Thus, firms can benefit from a corporate culture that fosters the promotion of women.

Keywords: Female board representation, director deaths, exogenous retirements, gender quota, firm value
JEL: G32, G34, G38

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1. Introduction

The view that women on corporate boards are detrimental to firm value pervades academia since the seminal study of Ahern and Dittmar (2012). In this paper, Ahern and Dittmar analyze the introduction of a *mandatory* gender quota of 40% in Norway and find a decline in firm performance and less experienced boards in the aftermath of the quota. Similarly, Matsa and Miller (2013) show that Norwegian firms affected by the quota had increased relative labor costs as well as employment levels, resulting in lower short-term profits. Thus, there is strong evidence that mandatory gender quotas reduce firm value.

In contrast, empirical evidence on *voluntary* female board representation, i.e., female board representation that is not related to mandatory gender quotas, and firm value is less conclusive. Post and Byron (2014), for instance, infer from their meta-analysis that the empirical evidence is mixed. Among others, Adams and Ferreira (2009) argue that the voluntary appointment of female directors reduces the value of U.S. firms, while Dezso and Ross (2012) find that female representation in top management improves firm performance, especially in innovative firms. Contrary to studies exploiting the quota introduction as exogenous shock, identification is much more challenging for voluntary board representation as the selection of board members is highly endogenous (Hermalin and Weisbach, 1998).

In this paper, we provide causal evidence on the impact of female board members who have been appointed voluntarily and not due to mandatory quotas on firm value. For this, we analyze stock market reactions to exogenous retirements of female board members due to death and illness. In general, this approach is difficult to implement empirically due to the low number of women on boards and, thus, the availability of only few events. We overcome this problem by compiling a large board dataset of 35,000 listed firms across 53 countries with about 250,000 firm-year observations and 500,000 board members. This enables us to identify 2,931 retirements due to the death or illness of board members, of which 119 are related to women. Based on long-run and short-run event studies around these exogenous retirements, we find strong evidence that—compared to their male counterparts—the stock market reacts more negatively to the exogenous departure of female board members, the more so if departing women are replaced by men. This implies that voluntarily appointed women increase firm value. Further tests based on pooled OLS and firm fixed effects regressions for the entire board dataset confirm this finding, even after controlling for person-level characteristics such as education and networks.[1] Furthermore, the results hold true for both for

[1]The advantage of using panel regression for this sample compared to prior literature is that the firm coverage is very high. Thus, we do not only include the largest listed corporations in a country in our analyses, but also smaller firms. This increases the representativeness of the results and reduces concerns that the results are driven

directors as well as senior managers. These findings underline that negative valuation effects due to the introduction of mandatory gender quotas are not related to female board members per se. Rather, mandatory gender quotas may disturb the selection process for board members and lead to inefficient outcomes. Our results strongly indicate that firms can even benefit from appointing female board members in the absence of quotas.

We also exploit our international sample to shed light on the reasons for the positive valuation effect of voluntary female board representation. The average proportion of women on corporate boards increased slightly from an average of below 8% to about 9% between 1998 and 2010. However there are huge differences between countries with regard to female board representation. For instance, the proportion of women is only 3% in Japan, 8% in the U.S., and 20% in the Philippines. However, not only the proportion, but also the impact of female board members on firm value varies greatly between countries. We find the most positive effects in Belgium, Norway (before the quota), Spain, Switzerland, and New Zealand. The most negative effects occur in Chile, Turkey, Brazil, Argentina, and Egypt. Overall, the positive effect is more pronounced when the share of women who make it to the top is smaller in a country. By contrast, women who entered the boardroom due to family connections do not increase firm value. Thus, our results suggest that not women per se, but the fact that they have to traverse a more difficult path to the top leads to higher "quality" of female board members, which increases firm valuation. This indicates that the positive impact stems from a glass ceiling effect due to the more rigorous selection of female board members.

Thus, previously documented negative valuation consequences due to mandatory gender quotas cannot be transferred to female board members in general. Rather, our empirical evidence suggests that firms can benefit from voluntarily appointing women, at least if the appointment is based on objective reasons and not, for instance, due to family connections. Furthermore, firm value also suffers if the selection process of female board members is disturbed, e.g., due to mandatory gender quotas. Based on our results, firms would be well-advised to intensify their efforts reduce barriers which hinder opportunities for women to obtain board seats to increase the on average very low proportion of female board members. This may increase firm value and, as a side effect, reduce the threat of the introduction of possibly politically intended mandatory quotas, which may destroy firm value.

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by a country's largest firms, which are often very different from smaller firms because they are more internationally oriented or even cross-listed in other countries. There is also evidence that larger firms are more likely to appoint female board members (e.g., Adams and Funk, 2012; Huang and Kisgen, 2013). In our dataset, median total assets are about one-tenth of prior studies focusing on U.S. firms. Board data is available for more than 3,000 firms from the U.S and Japan, and more than 1,000 firms from Australia, Canada, China, India, and the U.K. Data for more than 100 firms is available for another 37 countries. Details about the yearly numbers of observations are provided in Table 1.

The remainder of this paper is structured as follows. In Section 2, we introduce the dataset, while Section 3 provides a short literature overview. Results based on event studies around the exogenous retirements of board members can be found in Section 4. Subsection 4.3 presents further tests for the full board dataset and sheds light on the reasons for the positive valuation impact of female board members. Section 6 summarizes the main results and discusses their implications.

2. Data

2.1. Sample selection

We first start with a large international board dataset, which will allow us to identify exogenous retirements due to death or illness in a second step. This dataset is obtained from the Officers and Directors database by Thomson Reuters via Thomson One Banker. As the data cannot be directly downloaded for multiple firms from this website, we download information on current past board members separately for each firm. This enables us to obtain board data for all public firms with a so-called Thomson Entity Key.[2] After that, we combine all the data on board members in a database to obtain yearly board structures for all firms. This large-scale dataset comprises public firms from 53 countries. Active and inactive firms covered by Thomson Reuters are included. We exclude all financial firms (SIC code between 6000 and 6999) and those without common stock. We also remove observations with negative sales, negative common stock, or negative cash dividends. We further drop observations for which losses exceed total assets and cash dividends exceed sales. Furthermore, in regressions, we exclude all firms from Norway after 2004 due to the introduction of the mandatory female board quota in 2008.[3]

2.2. Large-scale board data

The board dataset covers executive and non-executive directors as well as senior managers. It comprises information on current and past firm affiliations, education, as well as short biographies. To ensure the integrity of the data, some adjustments are made.[4] The final sample consists of

[2]For example, the Thomson Entity Key of Microsoft is C000003062.

[3]Norway is the only country with a binding gender quota for publicly traded firms during the sample period from 1998 to 2010. More details on gender quotas in different countries are, for example, provided by Ahern and Dittmar (2012) and Terjesen et al. (2015).

[4]Board data by Thomson Reuters can be biased by M&A transactions. We carefully screen the raw data and eliminate data errors related to M&A transactions. In some cases, Thomson Reuters replaces a target firm's board data with board data of the acquiring firm. Therefore, persons may be affiliated with an acquired firm, although they held no board seat in this firm prior to the acquisition. These observations can easily be identified because both the target and the acquiring firm exhibit the same affiliations consisting of a unique board member identification number,

about 35,000 publicly listed firms, 250,000 firm-years, and 500,000 board members over the 1998 to 2010 period. Even after the exclusion of financial firms, our board sample covers about 70% of the worldwide market capitalization, which totals $54 trillion in 2010 according to the World Bank. If we included financial firms, the board sample would cover about 89% of the worldwide market capitalization.

Table 1 shows the number of observations for each sample country. The U.S. account for only about one-sixth of our sample observations, which is quite low compared to other international corporate governance studies. This comprehensive worldwide coverage enables us to compare female board representation across countries.

Female board members

We measure female board representation as the fraction of female board members at the end of the fiscal year (WOMEN). To determine the gender of the people in the dataset, we follow a four-step procedure.[5] First, we extract gender-indicating titles from board members' biographies such as "Mr.", "Mrs." or "Ms.". We also search for equivalent Hindu honorific titles such as "Sri." ("Mr.") or "Smt." ("Mrs.") in biographies of Asian board members. In a second step, we search biographies for pronouns such as "he", "she", "him", or "her". Third, we match forenames with gender-specific lists of forenames, carefully paying attention to forenames that are not necessarily gender-specific (e.g., Kim) or whose gender differs across countries. Andrea, for instance, is a female forename in Germany and a male forename in Italy. Finally, we aggregate the results from the previous three steps and manually check differing classifications. We also manually search the gender for people who we could not classify with this approach. Overall, this procedure results in more than 16,000 manual adjustments.

In total, we are able to classify about 450,000 board members (90% of all people in the sample) either as male or female.[6] We then define the main variable WOMEN as the number of women on a firm's board at the fiscal year end date divided by the number of board members for which the gender could be identified. Furthermore, we create the dummy variable WOMEN [DUMMY], which equals one if at least one woman is present on the board at the fiscal year end date and zero otherwise.

the start and the end date related to the board position, and a short description of that position (e.g., "chief executive officer"). After the identification of these duplicate affiliations, we determine target firms with wrong affiliation data by using the company status footnote (WC00000) from Worldscope, merger data from SDC Platinum, and board member biography information, and remove these firms from the sample.

[5]A similar approach has been employed by Ahern and Dittmar (2012).

[6]We repeat all our main analyses and (i) remove all observations from countries where the gender for less than 90% of all board members could be identified or (ii) assume that gender is split 50:50 among the non-classified board members of a firm. The results are robust to these two alternative specifications.

Overall, we identify 41,000 female board members in the dataset. Thus, women constitute on average about 9% of all board members per firm-year (median value: 0.06). Table 2 shows the fraction of female board members for each sample country, while Panel A of Table 3 provides aggregate summary statistics. A graphical illustration is depicted in Figure 1. As can be seen, the sample covers the majority of countries in all continents, except for Africa and Antarctica. Furthermore, the figure demonstrates that the proportions of female board members varies greatly across countries. For instance, women on corporate boards are rather common in Eastern Europe and Russia. By contrast, their presence is very low in South, Middle, and North America. Europe is very heterogeneous, with low proportion of female board members in Austria, Germany, and the U.K. By contrast, Scandinavian countries exhibit comparably high figures.[7] Figure 2 provides a graphical illustration of the fraction of women in boards over time and shows that it increased slightly from below 8% to above 9% between 1998 and 2010. Thus, there is a small positive trend. Nevertheless, even in 2010, women constitute less than 10% of all board members.

We also provide evidence that female board representation is even lower as reported in previous studies, likely because these studies are tilted toward large firms. Based on data by the European Commission, McKinsey (2007) show that women held about 11% of the seats in the governing bodies of the top 50 listed companies in 13 European countries in 2006. Based on our dataset, which includes 5,480 firms in 11 European countries in 2006, we find that women represented only about 9% of all board members.[8] Thus, focusing on the largest firms may lead to an overestimation of overall female board representation.

Panel B of Table 3 reports mean firm characteristics for firms with no female board members and firms with at least one female board member. Firms with female board members are on average higher valued, larger, and less leveraged. Not surprisingly, female board members are more likely when firms and their boards are larger. The average board size of a firm with female board members is about 14, whereas the average board size of firms with only male board members is about 9. All these differences are highly significant with absolute t-values exceeding 10.

Person-level controls

To control for education, we construct education variables for each person for which data on the obtained study degree is available (about 110,000 board members). In particular, we determine

[7] In Norway, for instance, about 19% of all board members are women. This number is lower than the quota of 40%, because the quota was only binding as of 2008 and our sample period already starts in 1998. Furthermore, this effect is also driven by the design of the Norwegian quota, which only affects directors, while we consider both directors and senior managers.

[8] In contrast to the study by McKinsey (2007), we do not cover Latvian and Bulgarian firms. If one calculated the average female board representation based on single-country averages reported in McKinsey (2007), average female board representation amounts to 12% in the other 11 countries.

whether a board member holds a bachelor's or master's degree, a MBA, or a Ph.D. Based on that information, we construct an education index. This index equals one if a person has a bachelor's degree, two for a master's degree, three for a MBA, and four for a Ph.D. In addition to that, we construct BETWEENNESS as a proxy of network centrality. This variable measures the proportion of shortest paths between two board members in the network that pass through a certain board member. A high betweenness centrality indicates that a large flux of information may pass through a board member and that he or she may act as a broker connecting board members. Summary statistics for these variables can be found in Panel A of Table 3.

Panel C of Table 3 shows that male board members have higher levels of education compared to female board members. In unreported results, we also show that male board members are less likely to hold a master's degree, but are more likely to have a MBA degree or a Ph.D. We also document that male board members are significantly more central in their networks.

Directors vs. senior managers and data quality

Our main board definition takes both executive and non-executive directors as well as senior managers into account. Most prior studies on corporate boards in the U.S. focus on directors and ignore executives which are not director at the same time. The distinction between directors and managers is, however, often not straightforward in an international context as board structures differ heavily across countries. Nevertheless, we manually classify all board members in our dataset according to their role description as either directors or (non-director) senior managers.[9] After that, we re-calculate the fraction of female board members, but now consider only directors (WOMEN [DIRECTOR]). Panel A of Table 3 shows that female representation among directors is even lower than among all board members, with an average fraction of about 6.8%. Not surprisingly, average board size declines from about 12 to 6.5 if only directors are considered.

For the U.S., the average board of directors in our sample has 7.12 members. The median value is 7. These numbers are slightly lower compared to other U.S. studies such as Yermack (1996) and Coles et al. (2008), possibly because our sample also comprises smaller firms. In the U.K., a firm had on average 6.01 directors during our sample period. Again, these values are very close to other single-country studies such as Dahya et al. (2002) and Guest (2008).

To further check comparability with prior studies, we use similar sample criteria as Adams and Ferreira (2009) and find an average fraction of female directors in the largest U.S. firms of

[9] If a role description contains the term "director", we normally classify the affiliation as a director affiliation. An exception is, for example, the role "director of finance", which would be classified as manager. Similarly, a role description such as "general manager" would also be classified as manager. Other examples for managers are "managing director" or "director, Asia".

8.93%.[10] This is close to the 8.5% female directors as reported by Adams and Ferreira (2009) for a dataset of 1,939 U.S. firms over the 1996 to 2003 period. Overall, these comparisons suggest that, at least with respect to firms from the U.S. and the U.K., data quality is similar to previous studies based on other data sources such as Execucomp or RiskMetrics.

2.3. Exogenous retirements due to death or illness

Based on this large-scale board dataset, we identify board members who died in office or retired due to illness. To obtain this sample, we proceed in several steps. *First*, for the 35,000 firms in the international board dataset, we download 135,000 English annual reports from Thomson Reuters. We then search these annual reports for keywords such as "death", "passed away", "died", "accident", "deceased", "illness", etc. *Second*, we search the board member biographies reported in the Officers and Directors database by Thomson Reuters for these keywords. *Third*, we download all announcements related to CEO, CFO, or general board member changes reported in the Key Developments Database by Capital IQ (codes 101, 102, and 16) and also search these announcements for the above keywords. Next, we aggregate the events from these three data sources and drop duplicates. We then rely on databases such as Nexis or Factiva or perform web searches to obtain additional information for these events, such as announcement dates, age, and board member gender. We also carefully check the news around these events and drop events which refer to condolences on retired or honorary board members. We further drop instances where there are multiple events in a given firm at the same time (e.g., on September 11, 2001).

As reported in Table 4, we identify 2,583 exogenous retirements, which correspond to 2,931 events because some of the board members held multiple board positions when they passed away or retired due to illness. Thereof, 2,081 events are related to deaths. Overall, we find information on 106 women who passed away in office or retired due to illness (4% of all board members in the exogenous retirements sample), which results in 119 events. The average board member age in this sample is 65. About 20% of death events can be explicitly classified as sudden. In about two third of all events, the reason of death has not been stated clearly or cannot be identified.[11] In the sub-sample of board members who retired due to illness, the type of illness has also been rarely disclosed, potentially to protect the board members' privacy. When we perform our analysis, we take all events into account, irrespective of the nature of the death or illness. Otherwise,

[10] To ensure that our dataset is comparable to the one by Adams and Ferreira (2009), we end our sample period after 2003 and select only U.S. firms with sales exceeding $500 million so that we arrive at firms that are of about the same size as the firms in Adams and Ferreira (2009).

[11] We find four death events related to murder. As they might not be exogenous, we drop these observations from the sample and re-run our analysis. We find that the results are robust to this alternative specification.

the number of observations would decrease considerably, in particular for the subgroup of female board members. In line with Fracassi and Tate (2012) or Fee et al. (2013), we argue that these retirements, although they are not sudden and thus might have been anticipated by the firm or its shareholders, still reflect idiosyncratic shocks to the firm, which affect firm performance ultimately. Furthermore, the inclusion of non-sudden events biases our results against finding any effect. Thus, the true effect might be even larger than documented by our empirical tests.

The low number of female board members who die in office or retire due to illness highlights the need for an international sample. In general, a rather low number of observations is a common problem in studies on board member deaths. Johnson et al. (1985), for instance, perform their analyses based on 53 deaths and Nguyen and Nielsen (2010) rely on 108 sudden deaths of independent directors in their main tests. By compiling an international dataset, however, we are able to identify a reasonable number of events (2,931 events in total, thereof 119 related to women). For example, with a total of 38 exogenous retirements of female board members, the U.S. is the country with the highest number of events. However, event studies based on only 38 events may yield noisy results. Potential reasons for the rather low number of female board members in the exogenous retirements sample may be their on average younger age on the one hand and higher life expectancies of women on the other hand.

2.4. Other data

Firm-level accounting and capital market data comes from Thomson Reuters Worldscope. Summary statistics for firm financial variables are provided in Panel A of Table 3. The definitions of all variables as well as their sources can be found in Appendix A. All the variables based on financial data are winsorized annually at the 1% level to mitigate the effects of outliers.

3. Literature

Previous literature has extensively discussed valuation implications of female board representation. By and large, one view is that female board members have undergone more rigorous *selection* processes or face economic or cultural barriers (e.g., Guiso and Rustichini, 2011; Adams and Kirchmaier, 2014).[12] Thus, only relatively talented women might be appointed as board members, resulting in a (spurious) positive relation between women in the boardroom and firm performance. This is because, under this scenario, female board representation captures differences in board member selection processes for men and women and not necessarily gender-related effects. In addition, female board representation could (positively or negatively) affect performance due to

[12] See Guiso et al. (2015) for a recent study on valuation implications of corporate culture.

increased levels of board *diversity*. For example, women could bring alternative management styles or different degrees of risk aversion or overconfidence into male-dominated boardrooms, thereby affecting group-level dynamics and corporate decision-making (e.g., Niederle and Vesterlund, 2007; Anderson et al., 2011; Adams and Funk, 2012; Dezso and Ross, 2012; Huang and Kisgen, 2013). Another popular view is that board member gender reflects differences in *skills or experience* (e.g., Ahern and Dittmar, 2012).

Overall, there is mixed empirical evidence on the effects of voluntary female board representation on firm performance (Post and Byron, 2014). This is likely driven by omitted variables and simultaneity issues which make causal statements on gender problematic.[13] In this paper, we follow recent research such as Nguyen and Nielsen (2010), Fracassi and Tate (2012), and Fee et al. (2013) and exploit board member deaths as an exogenous variation in board composition. The advantage of using board member deaths is that these events are likely to appear relatively random over time and, thus, convey only little or no information on a firm's intention to change corporate policies, endogenous board member motivation, or private information of a retiring board member. For example, female board members might be more likely to anticipate future decreases in firm performance and, therefore, leave the firm, which could result in a spurious positive relation between women and performance. This, however, does not apply to exogenous departures due to death and at least not to some extent to those related to illness.

4. Empirical results

In this section, we shed light on the valuation impact of female board members. We first present causal evidence based on exogenous retirements due to death or illness. After that, we repeat the analysis for the large-scale board dataset to check the robustness of our results.

4.1. Exogenous retirements: Announcement effects

We first test short-term stock price reactions to exogenous retirements of board members. To this end, we obtain daily stock return data from Datastream. Following Ince and Porter (2006), we search the end of each return-series for zeros to remove inactive stocks, which are wrongly listed in Datastream. We also drop observations whose lagged stock price is lower than one in local currency to mitigate the effects of penny stocks. We further delete observations with three consecutive zero returns. We then convert all returns to USD using daily exchange rates obtained from Datastream. We calculate total as well as cumulative abnormal returns around the announcements

[13] For example, Angrist and Pischke (2008) state in the introduction of their econometrics textbook that questions on race or gender are among those that are most difficult to answer.

for two event windows ($[-1d; 1d]$ and $[-2d; 2d]$). Abnormal returns are based on a one-factor market model. The benchmark index is the MSCI World. The estimation period is set to the 250 trading days ending 30 trading days before the respective events.

Event returns are then regressed on a dummy variable, WOMAN, that is set to one if the announcement refers to a female board member. We exclude events if the announcement date is not within 10 days of the death date. We include firm-level controls measured at the fiscal year ending before the respective announcements as well as dummy variables to control for the year of the announcement, the geographic region, and industry.[14]

Regression results are presented in Panel A of Table 5. In Model I, we regress total returns on the WOMAN indicator. Overall, we find a negative return of -1.8% for the $[-1d; 1d]$ event window when the exogenous retirement of a female board member due to death or illness is announced. The coefficient is significant at the 5%-level. The market model in IIa confirms this result. The abnormal return for WOMAN is -1.6% (t-value: -2.12) for the same event window. The results are similar for the $[-2d; 2d]$ event window. To mitigate concerns that our results stem from systematic differences in the age of male and female board members, we also control for age in Model III. Introducing age to the specification changes the results only slightly. WOMAN is still negatively and significantly related to the event window stock return performance.

One concern with this finding is that firms may feel a necessity to appoint another female board member to replace the one who has left the firm, and the market may react negatively to the prospect of adding a woman to the board. Therefore, we examine how many women that left the firms due to death or illness have actually been replaced by women rather than men. Based on news searches, we are able to identify the successor in about half of the cases where a woman has left the firm. Of those, only one fifth are replaced by women. If we remove these observations from the sample, we find even stronger negative effects related to exogenous departures of female board members (results not reported). Thus, we conclude that the above result does not stem from negative reactions to the possible appointment of female board members. Furthermore, it could be that the results are driven by the fact that men are slightly more likely to be director in our sample (Table 4) and that capital markets might respond differently to the announcement of the retirement of a director or senior manager. However, the effect also remains robust when we control for the position of the retiring board member by interacting a director dummy with the WOMAN variable (results not reported). Thus, the effect holds both for directors as well as senior managers.

[14]The regions are North America, South America, Europe, Middle-East and Africa, Australia and Oceania, and Asia. Following the study by Nguyen and Nielsen (2010), the definitions of the industry indicators refer to Fama and French's five industry classification. The results are also robust to using country dummies and Fama and French's twelve industry classification.

Another concern with the above event study is that there are only about 4% female board members in the dataset (cf. Table 4), which might affect the regression results. We therefore use a nearest-neighbor matching estimator, which compares the stock return performance around the announcement of the departure of a female board member (treatment group) to that around the announcement of the departure of a male board member (control group).

In Panels B and C of Table 4, we first check whether the matching variables are similar across the treated and non-treated as well as treated and control samples, respectively. Across all the covariates, we do not find statistically significant differences between treated, non-treated, and control firms.[15]

Panel B of Table 5 reports the results for the nearest-neighbor matching estimator. Matching is performed along several firm characteristics prior to the announcement as well as board member age. Coefficients are bias-adjusted due to non-exact (continuous) matching along the covariates (cf. Abadie and Imbens, 2011). We also exact-match each treated firm to a control firm based on industry, region, and announcement year. Three matches are made per observation.[16] We also correct the standard errors for heteroskedasticity. In each specification, we obtain a negative coefficient of about -2% to -4% for WOMAN, although significance is reduced in some of the models compared to the regression specification in Panel A.[17]

4.2. Exogenous retirements: Long-run event study

In addition to the short-term announcement effects around exogenous retirements of board members, we also test long-run performance implications. In Panel A of Table 6, we regress TOBIN'S Q around exogenous retirements of board members on the dummy variable RETIREMENT, which is set to one in and after firm years in which a board member retires due to death or illness and zero otherwise. The sample is based on all firm-year observations in the time window around the exogenous retirements provided in the column titles. For firms with multiple events, each event is included individually with all firm-years during the sample period.[18] The models also include firm and year fixed effects. As can be seen in the table, we find negative long-run performance effects of exogenous board member retirements in general, as indicated by the negative coefficients

[15]Note that female board members are slightly, but not significantly, older when they die or retire due to illness, which is consistent with the fact that women have higher life expectancies. The mean values are slightly different compared to the statistics presented in the top part of Table 4 because some of the women enter the sample multiple times as we perform matching with replacement.

[16]The results are similar when we match to the two closest firms only.

[17]The reduction in significance likely stems from increased variance due to matching with replacement. Matching with replacement, however, ensures less biased coefficients.

[18]The results are also robust to excluding firms with multiple events.

for RETIREMENT for both the $[-1y; 1y]$ and $[-2y; 2y]$ event windows. However, the coefficient for RETIREMENT is only statistically different from zero at the 10%-level in Model IIa. Thus, there is no strong evidence of any long-term valuation implications of exogenous retirements in general.

In Models Ib and IIb, we interact RETIREMENT with WOMAN, a dummy variable that is set to one if a female board member retires due to death or illness. In doing so, we employ a standard differences-in-differences approach around exogenous retirements of female board members. The base effect of an exogenous retirement is statistically insignificant, casting even more doubt on the existence of general valuation consequences of exogenous board member departures. However, the coefficient for the interaction of RETIREMENT with WOMAN is negative and statistically different from zero in both models. This implies that women leaving the board room due to death or illness are detrimental to firm value. For example, the coefficient of -0.13 in Model Ib suggests that Tobin's Q decreases by -0.13 more in the year of the exogenous retirement and the two years after the exogenous retirement of a female board member relative to a male board member. This corresponds to a 7% decrease in Tobin's Q (mean value: 1.69). The result for the $[-1y; 1y]$ window is of similar magnitude.

In Panel B, we regress changes in TOBIN's Q on WOMAN. First differences are calculated based on the respective event windows around the retirements provided in the column titles. For firms with multiple events, each event is included individually with all firm-years during the sample period. In line with previous results, WOMAN exhibits a consistent negative and significant coefficient. The magnitude of the coefficients is also comparable to the ones found in Panel A.

In Panel C, we again use a nearest-neighbor estimator to test long-run effects of exogenous retirements of board members. The dependent variable is change in TOBIN's Q from the beginning of the year of treatment to the end of the full fiscal year after. Treatment is the exogenous retirement of a female board member (WOMAN). The results confirm prior findings. In the full specification in Model V, we find an decrease in Tobin's Q by about -0.16 or 8% from the mean when a female board member retires due to death or illness.

One concern with the evidence in this section may be that retirement due to illness reflects a choice variable and, therefore, might not be exogenous. To deal with this issue, we repeat all the analysis from this section, but look at board member deaths only. Regression results can be found in Appendix B. Although the number of observations is reduced, we still observe negative short-term and long-run effects of deceased female board members.

Overall, our results based on exogenous retirements of board members due to death or illness suggest that there is a causal impact of female board representation on firm valuation. Thus, prior evidence on mandatory gender quotas does not hold for women in general. One possible reason for this is that mandatory quotas disturb the selection process. In the next section, we will shed light on the reasons for the positive valuation impact of voluntarily appointed women.

4.3. Large-scale board dataset

Next, we analyze how female board representation affects firm valuation based on panel regressions for the large board dataset. Although causality is more difficult to establish in this setting, it helps to shed light on the generalizability of the prior results.

To test whether and how women on boards affect firm valuation in the large-scale board dataset, we apply pooled OLS and firm fixed effects regression. The main dependent variable is TOBIN's Q. Independent (control) variables are lagged by one year. OLS models also include year, industry, and country fixed effects.[19] In firm fixed effects models, we control for time effects. Since we use an international board dataset, we employ, in addition to country or firm fixed effects, country-year specific control variables. These are a country's GDP per capita and the ratio of a country's market capitalization to GDP, both obtained from the World Bank. Huber / White robust standard errors clustered by firms or countries are further employed in all models (Petersen, 2009; Cameron et al., 2011; Thompson, 2011). All variables used in interaction terms are demeaned in the respective models. The construction of all variables is explained in detail in Appendix A.

We start by presenting large-scale evidence on the women-performance relation for the full board dataset. Model Ia in Table 7 represents a pooled OLS regression with year, industry, and country fixed effects. Overall, we find a positive and significant coefficient for the WOMEN variable. The size of the coefficient suggests that in a firm with an average fraction of female board members of 8.5%, a one standard deviation increase in female board representation is associated with an increase in TOBIN's Q by 0.02 standard deviations or 0.03 in absolute values, which corresponds to 2% of the average TOBIN's Q in the sample. Model Ib shows the outcome of a firm fixed effects regression to control for time-invariant firm characteristics, while Model Ic also includes country-year fixed effects to capture time-variant country-specific unobservables. Again, women on boards are positively related to firm valuation. With regard to the control variables, profitability, growth, GDP per capita, and market capitalization to GDP are positively associated with TOBIN's Q, while the opposite is true for size, leverage, and tangibility. In Models IIa to IIc of Table 7, we redo all our analyses and only consider directors, as discussed in Section 2.2. The results are very similar to those obtained in Models Ia to Ic. Thus, different board definitions do not alter the results.

The descriptive analysis in Section 2.2 revealed differences in education and betweenness between male and female board members. Omitting these characteristics from regressions could lead

[19] Industry dummies are based on the 49 industry portfolios defined by Fama and French.

to biased results, for example, because female board members are mpre educated. As controlling for characteristics of individual people in firm-level regressions is not very intuitive, we perform person-level regressions in Table 8.[20] To this end, we observe each board member in each year and in each firm he or she is active.

In Model Ia, we report a person-level regression without controls for personal characteristics. In line with our previous findings, female board members are positively related to firm valuation, as indicated by the positive coefficient for the GENDER dummy variable, which is set to one for female board members and zero otherwise. If we include the controls for education and network centrality (Model Ib), the number of observations drops from about two million to 500,000, mainly because of missing data on board member education. Nevertheless, the results confirm prior findings. After the inclusion of person-level control variables, the GENDER dummy variable is still positive and significant. Furthermore, we find some evidence that higher levels of education and network centrality are positively associated with firm valuation. In the remainder of Table 8, Models IIa and IIb focus on directors only and confirm the positive relation between female board members and firm valuation. Overall, the results indicate that firm valuation is positively associated with women on corporate boards. This relation is robust to the inclusion of unobserved time-invariant firm characteristics, country-year fixed effects as well as person-level controls.

5. Underlying mechanism

In this section, we explore the underlying mechanism of the positive valuation impact of female board members. A large literature argues that it is more difficult for women to become board member (e.g., Norris and Inglehart, 2008; Croson and Gneezy, 2009; Bertrand et al., 2010). This so called glass ceiling effect may lead to a more rigorous selection process for women and, as a consequence, higher quality of female board members. Higher quality in this context is not related to gender per se, but the more difficult way of women to top management and director positions. Unfortunately, quality of board members is difficult to measure. Common proxies such as education or networks are not suitable in our context as they are unlikely to capture all aspects that distinguish women who had a harder way to the top from their male counterparts. To overcome this challenge, we exploit the internationality of the board dataset to analyze whether this glass ceiling effect drives our findings.

[20] Including average board education and betweenness in firm-level regressions confirms the findings in previous subsections. However, the results may still be driven by differences in education and betweenness *within* a given board even after controlling for average board characteristics.

5.1. Cross-country valuation differences

In a first step, we analyze whether there are valuation differences across the sample countries. To this end, we perform country-specific regressions of Model Ia, Table 7.[21] The results are shown in Table 9. Apparently, there is huge cross-country variation in the women-performance relation. The countries with the highest positive valuation impact of women on boards are Belgium, Norway (before the introduction of the quota), Spain, Switzerland, New Zealand, Canada, Austria, Finland, and the U.S. The most negative effects can be found in Chile, Turkey, Brazil, Argentina, and Egypt.[22]

5.2. Gender inequality and valuation

Using these cross-country differences, we now examine whether the positive valuation contribution of female board members is more pronounced in countries with higher gender inequality. If our findings are driven by a glass ceiling effect, we would expect that female board members are especially valuable in countries with high degrees of gender inequality. This is because higher degrees of gender inequality are likely to result in greater barriers that prevent women from entering the boardroom, thus demanding more skills or better abilities from women.

Our main empirical proxy for gender inequality is BOARD INEQUALITY. The variable is defined as the annual difference between the fraction of women in the total labor force in 1990 in a given country minus the average fraction of female board members in a given country and year, excluding the firm under consideration.[23] Higher values of BOARD INEQUALITY suggest that the process of becoming a board member is harder for women in a given country, as the fraction of female board members in a given country is low relative to the overall fraction of women in the workforce. In the sample, board inequality is very high in Switzerland, Canada, Austria, Denmark, and Japan, while it is lower in countries such as the Philippines, Malaysia, or India (Table 9). Interestingly, these countries are among those with the highest and lowest valuation contributions of female board members.

In Model I of Table 10, we regress TOBIN'S Q on WOMEN, the fraction of female board members, interacted with BOARD INEQUALITY. The positive and significant interaction term suggests that

[21] We only consider countries in which female board members are present in more than 200 firm-years.

[22] As the coefficient for WOMEN is highly negative for Chile, we repeat all our analysis without Chilean firms and find that the results are robust to this specification.

[23] We lag the fraction of women in the total labor force to the earliest year available in the World Bank database since becoming a board member during the 1998 to 2010 period is likely to be the result of a lengthy process. The results remain unchanged if we use contemporaneous values for the fraction of women in the total labor force. The results remain also unchanged if we control for the fraction of female board members who share the same surname with another board member (which have likely been appointed as a board member due to family relations).

the positive value contribution of women is predominantly present in countries where they face greater problems entering the boardroom, possibly demanding even greater skills from female board members, which results in a higher quality of female board members in these countries. This, in turn, may explain their positive valuation impact.[24]

In the remainder of Table 10, we test the robustness of this result by using two proxies of gender equality. First, we employ the average fraction of female board members in a given country and year, excluding the firm under consideration (AVG_WOMEN (COUNTRY)). Second, we determine the average fraction of female board members in all firms that are less than 100 kilometers away from a given firm (AVG_WOMEN (REGION)), excluding the firm under consideration.[25] The intuition behind these two variables is that lower fractions of female board members are suggestive of higher barriers to boardrooms, making selection processes more demanding for women. As expected, we now find a negative coefficient for WOMEN and the two measures of equality, which is in line with the result in Model I. The less women in the boardroom in a certain country or region, the more positive the impact on firm valuation. This is consistent with the view that in areas or countries with fewer women on the board only the best women could make it to the boardroom, and this may explain why we observe the positive relation between firm performance and female board representation.

5.3. Nepotism and valuation

So far we found evidence that the performance impact of women is stronger in countries with higher degrees of gender inequality. This is in line with a glass ceiling effect. To shed further light on this, we now analyze how women with family connections to other board members affect firm valuation. In this context, Terjesen et al. (2009), p. 324, state based on Singh (2008) that ”the majority of Jordan’s women directors are connected to the controlling or founding family, signaling the importance of ‘wasta’ (‘connections’)”. If the glass ceiling effects explained our findings, we would expect that women who obtain their board positions because of family connections—and not because of their skills and abilities—are not beneficial for firm valuation.

To capture family relations, we create a dummy variable, DOUBLE NAME, that equals one if another board member in the same firm shares the same surname and zero otherwise. We start with some descriptive analysis and find that the fraction of female board members with family connections is 13% in the sub-sample consisting of the ten countries in which women have the

[24]In a related context, Guiso and Rustichini (2011) also argue that women who face greater gender related obstacles show more masculine traits, as approximated by testosterone levels.

[25]The calculation is based on the “nearstat” Stata module developed by P. Wilner Jeanty. Firm address data is from the Worldscope database, which is then used to obtain geographic coordinates via the Google Maps API.

lowest performance impact (Table 9). By contrast, this fraction is only 5% in the subsample of the ten countries where women have the highest performance impact.

In Model I in Table 11, we test this more formally and regress DOUBLE NAME on GENDER, interacted with a dummy variable that is set to one (zero) if a country is among the ten countries with the highest (lowest) regression coefficients for the fraction of female board members. We find that women are more likely to share the boardroom with other family members. This effect, however, is only present in countries where women negatively contribute to firm valuation.

Next, we test whether women with a common surname in the boardroom have a smaller or no impact on firm valuation. Results are displayed in Model II of Table 11. Women who share the surname with another board member have no effect on firm valuation because the coefficients for the female dummy and the interaction term based on the female dummy and DOUBLE NAME cancel each other out (coefficients: +0.035 and -0.037).[26] To mitigate endogeneity concerns, we replace the firm-specific measure for double names with country-year averages. The results in Model III confirm prior findings.

Overall, the results show that women do not affect firm performance in general. When the board member selection process is influenced by family connections ("nepotism") and not necessarily skills or abilities, the positive valuation effect of female board members disappears. This is likely because women who have been appointed due to family relations need not pass through harder recruitment or promotion processes than their male counterparts, for example because cultural barriers might disappear in the presence of family connections. Interestingly, in Model Ib, education and betweenness are also negatively related to DOUBLE NAME, suggesting that family ties are indeed likely to substitute skills.

Figure 3 also summarizes the relationship between female board representation, family ties, and board inequality. The positive valuation effect of female board members is highest in countries where they face greater problems entering the boardroom and where fewer women have, on average, family ties in the boardroom. Thus, these findings are in line with a glass ceiling effect as the positive valuation of female board members only exists if women underwent a more rigorous selection process.

[26]It is important to note that the DOUBLE NAME variable is likely to capture fewer female than male family board members because women often change their surnames when marrying. Thus, there might actually be more female board members in the sample than we are able to document. The fact that the positive valuation contribution of female board members disappears once one controls for family ties also raises concerns about omitted variables in the event studies around the exogenous retirements of female board members in Section 4. However, no or a slightly negative valuation effect of female board members with family ties biases our results against finding positive valuation implications of women in the boardroom in general if we do not correctly identify all women with family ties in the sample.

6. Conclusion

Prior literature that focused on mandatory gender quotas like Ahern and Dittmar (2012) shows that such quotas are detrimental to firm value. For women in general (i.e., not women appointed because of mandatory gender quotas), the empirical evidence, however, is mixed (Post and Byron, 2014), possibly because the selection of board members is endogenous (Hermalin and Weisbach, 1998). In this paper, we provide causal evidence on the effect of female board members in general on firm value. To this end, we compile a large board dataset covering 53 countries, about 35,000 firms, and more than 500,000 people. This allows us to identify exogenous retirements of board members due to death or illness.

We find strong evidence that women in corporate boards increase firm value. Both long-run and short-run event studies show that the capital market reacts more negatively to exogenous retirements of female board members when compared to their male counterparts. The positive valuation impact is confirmed by pooled OLS and firm fixed effects regressions for the entire board dataset, even after controlling for person-level characteristics such as education or network centrality.

The internationality of the sample helps us to shed light on potential reasons for the overall positive impact of women on firm value. First of all, we find that the impact of female board members on firm value varies greatly between the sample countries. For instance, the most positive effect of female board members can be found in Belgium, Norway (before the quota), Spain, Switzerland, and New Zealand. The most negative effects occur in Chile, Turkey, Brazil, Argentina, and Egypt. Exploiting these cross-country differences, we find that the positive impact of women is more pronounced in countries with higher gender inequality. By contrast, the positive impact of women disappears when the selection process is influenced by family connections (nepotism). This indicates that not women per se, but the fact that they have to traverse a more difficult path to the top leads to a higher "quality" of female board members, which increases firm valuation. Thus, the positive impact stems from a glass ceiling effect due to more rigorous selection of female board members.

Our study also documents that the proportion of female board members is generally low and increased only slightly from about 8% to 9% during the 1998 to 2010 period. There is also a huge heterogeneity across different countries. For instance, the proportion of women is 3% in Japan, 8% in the U.S., and 20% in the Philippines. Especially in light of this low share of female board members, our study has an important implication. We find no evidence for generally negative impacts of voluntarily appointed women. By contrast, firms seem to profit from such appointments. This indicates that only appointments which are related to legal pressure, e.g., due to mandatory gender quotas, are detrimental to firm value. However, the low proportion of female board members causes society and politics to call for gender quotas in many countries. To avoid the introduction of value-destroying quotas, firms would be well-advised to intensify their efforts to reduce barriers for women to become board members. This may, for instance, include the creation of a corporate culture which fosters the promotion of women to the top. The importance of corporate culture to increase the proportion of female directors is also highlighted by a survey of McKinsey (2013), which concludes that "companies must also work hard to transform mindsets and culture. These are crucial elements in the achievement of gender diversity" (p. 17).

Furthermore, this study contributes to the literature on boards in general. Most importantly, we show that the previously documented negative valuation effect of mandatory gender quotas is not related to women per se. Rather, these results are likely related to a disturbed selection process of board members due to mandatory gender quotas. Similarly, we identify a negative valuation effect of (both male and female) board members who are appointed due to family connections. Thus, firms may benefit from more objective selection processes of board members that evaluate potential board members independently of their family relations or gender.

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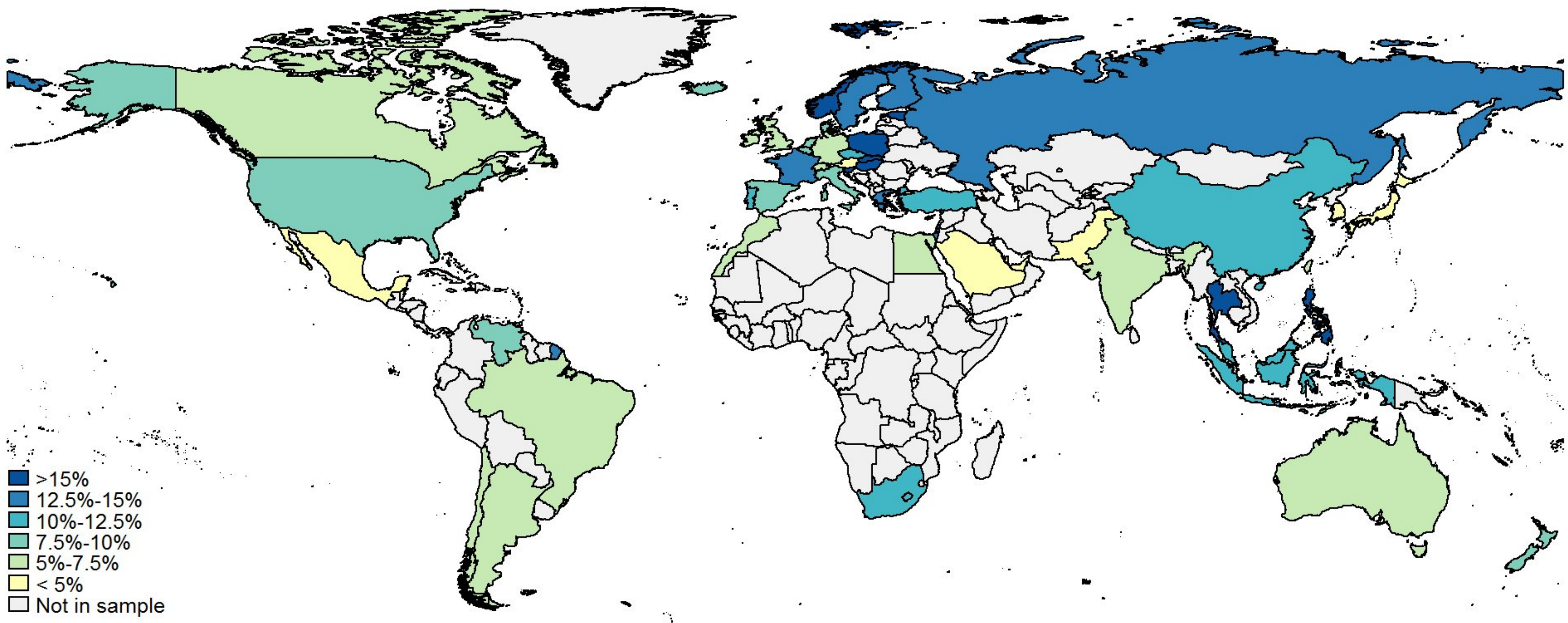

Figure 1: The figure shows the countries included in the sample and the average fraction of women on corporate boards (WOMEN) over the 1998-2010 period across all firms within that country.

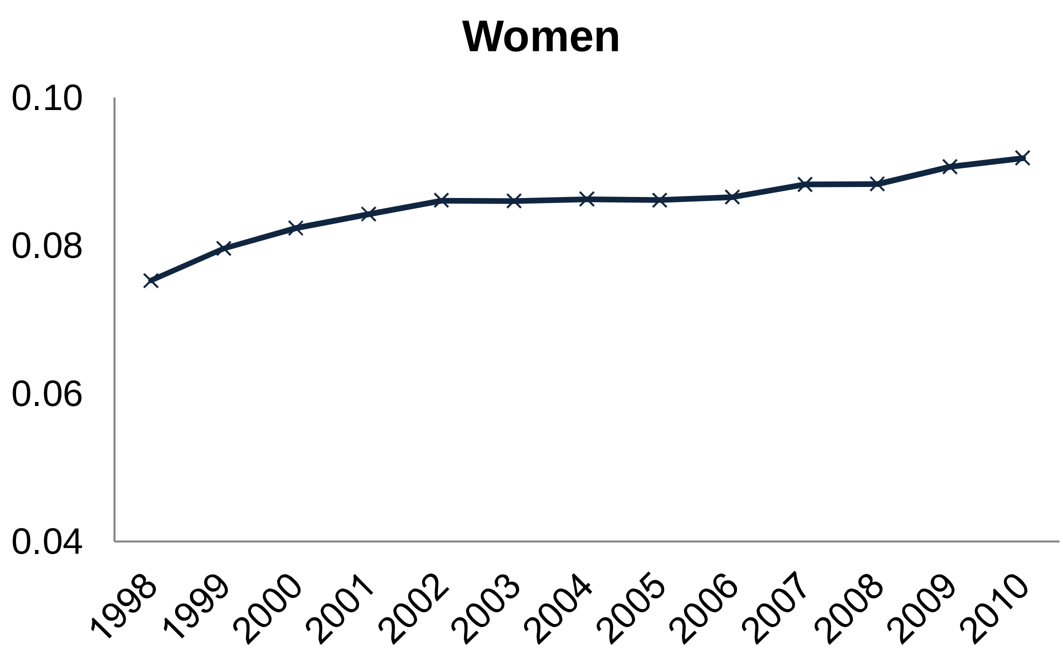

Figure 2: The figure shows the average fraction of women on corporate boards (WOMEN) over the 1998-2010 period across all sample firms.

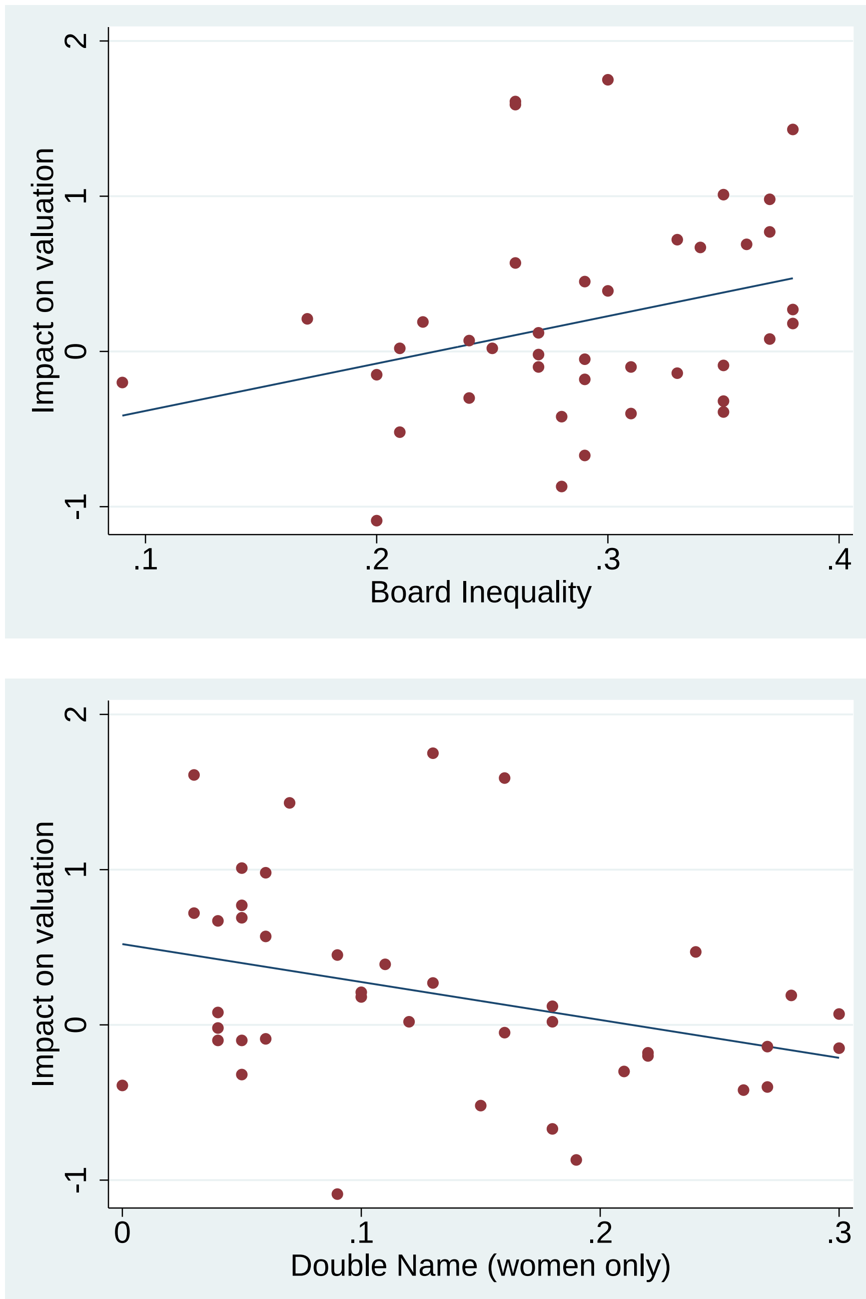

Figure 3: The two graphs show the average valuation effect of women on boards for different average levels of BOARD INEQUALITY and DOUBLE NAME (female board members only), obtained from regressions of Model Ia, Table 7. Each dot corresponds to a country. Only countries in which female board members are present in more than 200 firm-years are considered. A detailed description of all variables can be found in Appendix A.

Table 1: Number of board observations across countries and years.

Country	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	Total
Argentina	41	55	57	60	56	61	58	59	61	60	55	55	54	732
Australia	316	532	764	793	834	985	1,061	1,188	1,321	1,313	1,195	1,291	1,247	12,840
Austria	63	64	69	69	68	64	63	63	64	62	62	59	54	824
Belgium	74	73	72	76	80	84	97	100	105	104	95	94	90	1,144
Brazil	25	54	56	55	58	78	97	100	105	108	106	107	106	1,055
Canada	361	487	540	585	703	804	908	987	1,061	1,105	997	969	920	10,427
Chile	78	113	116	116	127	135	139	143	142	138	137	135	132	1,651
China	132	964	1,021	1,062	1,286	1,423	1,500	1,497	1,561	1,724	1,832	1,991	2,008	18,001
Czech Republic	15	16	18	18	18	20	28	21	20	16	13	13	12	228
Denmark	90	92	98	94	97	93	102	113	111	113	112	100	100	1,315
Egypt	5	6	12	17	25	31	54	91	100	106	106	102	89	744
Estonia					1	6	7	8	9	9	9	9	9	67
Finland	94	97	106	104	105	107	110	112	109	109	110	107	105	1,375
France	517	548	558	553	569	576	578	613	623	622	589	557	519	7,422
Germany	503	532	568	544	529	545	565	598	604	585	552	532	495	7,152
Greece	150	190	224	241	244	245	256	252	252	255	241	234	210	2,994
Hong Kong	278	372	586	635	678	713	738	744	759	781	755	756	768	8,563
Hungary	18	20	21	21	20	23	25	27	30	30	29	29	29	322
Iceland					4	6	8	8	8	7	4	3	3	51
India	265	318	347	358	446	593	663	1,709	1,829	1,856	1,850	1,844	1,763	13,841
Indonesia	97	136	172	185	205	220	229	244	253	277	285	286	283	2,872
Ireland	42	43	45	42	46	47	49	58	59	60	52	52	46	641
Israel	39	52	78	85	102	138	141	151	170	176	169	163	158	1,622
Italy	136	157	165	173	179	189	205	215	216	214	210	198	192	2,449
Japan	2,274	2,384	2,645	2,783	2,930	3,101	3,249	3,318	3,350	3,371	3,345	3,312	3,270	39,332
Luxembourg	14	14	18	16	19	17	19	22	23	23	24	21	22	252
Malaysia	271	359	531	567	667	762	813	847	853	849	829	817	796	8,961
Mexico	82	90	94	93	93	95	93	94	98	93	89	89	88	1,191
Morocco	3	7	9	11	13	15	19	20	29	28	29	28	27	238
Netherlands	81	86	83	85	86	89	92	97	95	92	86	83	81	1,136
New Zealand	43	57	72	75	80	92	100	102	108	114	103	101	95	1,142
Norway	78	82	89	99	105	115	137	162	177	185	172	158	154	1,713
Pakistan	73	78	76	76	84	86	94	104	109	103	97	100	93	1,173
Philippines	66	84	109	112	113	113	114	123	124	130	131	123	127	1,469
Poland	37	42	49	49	78	140	188	252	281	302	300	293	288	2,299
Portugal	47	52	53	52	52	48	49	50	47	46	43	45	44	628
Qatar						7	12	16	16	17	17	17	17	119
Russia	18	20	26	30	44	70	107	213	258	259	252	244	222	1,763
Saudi Arabia					4	46	55	69	83	85	89	88	89	608
Singapore	148	207	323	359	438	474	482	488	518	535	524	514	514	5,524
Slovakia	5	5	5	5	7	6	9	12	12	11	10	10	9	106
Slovenia			1	2	9	10	10	11	24	25	24	24	24	164
South Africa	226	234	237	233	216	220	232	230	251	267	257	249	233	3,085

Continued on next page.

Table 1: Number of board observations across countries and years (continued).

Country	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	Total
Spain	80	82	89	90	95	95	102	101	104	101	101	100	97	1,237
Sweden	148	192	201	210	218	236	280	325	351	369	344	337	329	3,540
Switzerland	129	142	147	149	152	160	168	177	178	173	169	167	160	2,071
Taiwan	24	64	75	84	86	89	96	104	111	115	115	114	117	1,194
Thailand	175	188	227	249	291	343	381	390	397	399	394	397	394	4,225
Turkey	83	107	124	127	152	168	178	182	179	184	184	185	181	2,034
United Arab Emirates					1	9	23	28	37	37	38	39	39	251
United Kingdom	725	807	920	952	952	1,064	1,177	1,267	1,310	1,327	1,187	1,137	1,073	13,898
USA	3,346	3,432	3,337	3,195	3,168	3,306	3,400	3,477	3,544	3,564	3,244	3,156	3,022	43,191
Venezuela	14	18	21	18	19	19	19	19	20	19	17	15	9	227
Total	11,529	13,754	15,254	15,607	16,652	18,181	19,379	21,401	22,259	22,653	21,779	21,649	21,006	241,103

This table shows the number of observations for the fraction of women on a firm's board (WOMEN) across the 53 countries in the sample. The sample period is from 1998 to 2010.

Table 2: Average fraction of female board members.

Country	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	Total
Argentina	0.06	0.06	0.07	0.07	0.07	0.07	0.07	0.08	0.07	0.07	0.07	0.06	0.06	0.07
Australia	0.05	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.07	0.07	0.07	0.06
Austria	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.05	0.05	0.04	0.05	0.05	0.04
Belgium	0.08	0.08	0.08	0.08	0.09	0.09	0.11	0.11	0.10	0.10	0.09	0.09	0.09	0.09
Brazil	0.06	0.08	0.08	0.08	0.08	0.08	0.07	0.07	0.07	0.07	0.07	0.06	0.07	0.07
Canada	0.08	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.08	0.07	0.07	0.07	0.07	0.07
Chile	0.04	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.06	0.05	0.05	0.05	0.05
China	0.11	0.11	0.11	0.11	0.11	0.11	0.12	0.11	0.11	0.12	0.12	0.12	0.12	0.12
Czech Republic	0.13	0.12	0.10	0.10	0.10	0.08	0.12	0.10	0.10	0.12	0.13	0.15	0.18	0.12
Denmark	0.07	0.07	0.07	0.07	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08
Egypt	0.03	0.04	0.05	0.04	0.03	0.05	0.05	0.05	0.06	0.06	0.06	0.06	0.06	0.05
Estonia					0.13	0.13	0.16	0.16	0.14	0.17	0.15	0.19	0.16	0.16
Finland	0.14	0.14	0.14	0.13	0.13	0.13	0.14	0.15	0.14	0.14	0.15	0.16	0.16	0.14
France	0.15	0.15	0.15	0.15	0.15	0.15	0.14	0.14	0.14	0.14	0.13	0.13	0.14	0.14
Germany	0.05	0.05	0.06	0.05	0.05	0.05	0.06	0.06	0.05	0.05	0.06	0.06	0.05	0.05
Greece	0.13	0.14	0.15	0.15	0.15	0.15	0.14	0.14	0.14	0.15	0.16	0.16	0.16	0.15
Hong Kong	0.13	0.13	0.14	0.15	0.14	0.15	0.14	0.14	0.14	0.14	0.14	0.15	0.14	0.14
Hungary	0.16	0.17	0.21	0.17	0.19	0.17	0.17	0.17	0.17	0.16	0.16	0.16	0.18	0.17
Iceland					0.08	0.07	0.09	0.08	0.06	0.07	0.11	0.10	0.13	0.08
India	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.08	0.08	0.08	0.07	0.07	0.07	0.07
Indonesia	0.11	0.11	0.12	0.13	0.13	0.13	0.12	0.10	0.12	0.13	0.12	0.13	0.12	0.12
Ireland	0.04	0.04	0.04	0.04	0.06	0.05	0.06	0.05	0.05	0.05	0.06	0.06	0.06	0.05
Israel	0.08	0.11	0.12	0.12	0.12	0.12	0.14	0.14	0.14	0.16	0.16	0.16	0.16	0.14
Italy	0.08	0.09	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.09	0.09	0.09	0.10	0.08
Japan	0.04	0.04	0.04	0.04	0.04	0.04	0.03	0.03	0.02	0.02	0.02	0.02	0.02	0.03
Luxembourg	0.03	0.03	0.03	0.03	0.04	0.04	0.06	0.05	0.06	0.06	0.07	0.08	0.08	0.05
Malaysia	0.10	0.10	0.11	0.10	0.11	0.11	0.11	0.10	0.11	0.11	0.11	0.11	0.11	0.11
Mexico	0.05	0.05	0.05	0.05	0.05	0.05	0.04	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Morocco	0.07	0.09	0.08	0.06	0.06	0.05	0.06	0.06	0.08	0.08	0.07	0.07	0.06	0.07
Netherlands	0.09	0.09	0.08	0.09	0.08	0.07	0.08	0.07	0.07	0.07	0.08	0.08	0.09	0.08
New Zealand	0.07	0.06	0.07	0.07	0.07	0.08	0.07	0.08	0.09	0.09	0.09	0.09	0.09	0.08
Norway	0.11	0.12	0.13	0.14	0.14	0.15	0.16	0.17	0.20	0.23	0.24	0.24	0.25	0.19
Pakistan	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.04	0.04	0.04	0.04	0.04	0.04
Philippines	0.18	0.17	0.19	0.19	0.19	0.19	0.20	0.21	0.21	0.19	0.21	0.21	0.21	0.20
Poland	0.09	0.11	0.11	0.12	0.11	0.13	0.15	0.17	0.16	0.17	0.16	0.16	0.16	0.15
Portugal	0.15	0.15	0.15	0.15	0.13	0.11	0.13	0.12	0.12	0.09	0.09	0.09	0.09	0.12
Qatar						0.00	0.00	0.01	0.01	0.00	0.02	0.01	0.01	0.01
Russia	0.10	0.10	0.11	0.10	0.10	0.12	0.11	0.14	0.15	0.14	0.13	0.14	0.14	0.13
Saudi Arabia					0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Singapore	0.14	0.15	0.16	0.16	0.16	0.15	0.15	0.15	0.15	0.14	0.14	0.14	0.14	0.15
Slovakia	0.10	0.10	0.10	0.12	0.12	0.09	0.18	0.16	0.18	0.21	0.22	0.23	0.23	0.17
Slovenia			0.41	0.32	0.23	0.22	0.20	0.20	0.24	0.25	0.24	0.21	0.25	0.23
South Africa	0.09	0.09	0.09	0.10	0.09	0.09	0.10	0.10	0.11	0.11	0.12	0.14	0.15	0.11

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Table 2: Average fraction of female board members (continued).

Country	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	Total
Spain	0.06	0.07	0.07	0.07	0.08	0.08	0.08	0.08	0.08	0.08	0.09	0.10	0.11	0.08
Sweden	0.11	0.11	0.11	0.11	0.11	0.12	0.14	0.14	0.14	0.14	0.15	0.15	0.16	0.13
Switzerland	0.05	0.05	0.04	0.04	0.04	0.04	0.05	0.05	0.06	0.05	0.06	0.06	0.06	0.05
Taiwan	0.07	0.04	0.05	0.06	0.06	0.06	0.06	0.07	0.06	0.07	0.08	0.09	0.09	0.07
Thailand	0.15	0.16	0.17	0.18	0.19	0.19	0.19	0.19	0.19	0.20	0.19	0.20	0.20	0.19
Turkey	0.10	0.10	0.11	0.10	0.10	0.11	0.11	0.10	0.11	0.11	0.11	0.11	0.11	0.11
United Arab Emirates					0.00	0.00	0.01	0.01	0.02	0.02	0.02	0.03	0.03	0.02
United Kingdom	0.06	0.06	0.06	0.06	0.06	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07
USA	0.07	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.09	0.09	0.09	0.10	0.10	0.08
Venezuela	0.10	0.08	0.09	0.09	0.08	0.09	0.09	0.09	0.09	0.10	0.11	0.11	0.12	0.09
Total	0.08	0.08	0.08	0.08	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09

This table shows the average fraction of women on a firm's board (WOMEN) across the 53 countries in the sample. The sample period is from 1998 to 2010.

Table 3: Descriptive statistics for large-scale board sample.

Panel A: Summary statistics						
Variable	N	Mean	1^{st} Quartile	Median	3^{rd} Quartile	SD
Firm-level board variables						
Women	239,958	0.0856	0.0000	0.0455	0.1429	0.1156
Women [Dummy]	239,958	0.5109	0.0000	1.0000	1.0000	0.4999
Women [Director]	236,512	0.0680	0.0000	0.0000	0.1250	0.1217
Board Size	240,714	11.9122	7.0000	10.0000	15.0000	7.0348
Board Size [Director]	236,512	6.4901	4.0000	6.0000	8.0000	3.3619
Other firm- and country-level variables						
Tobin's Q	218,904	1.6938	0.9182	1.1997	1.8224	1.5621
Size	240,094	1,054	33	123	469	3,517
Leverage	239,568	0.2082	0.0279	0.1771	0.3383	0.1875
Profitability	233,382	0.0298	0.0022	0.0554	0.1083	0.1671
Retained Earnings	217,906	-0.1728	-0.0796	0.0811	0.2478	1.1128
Tangibility	239,058	0.3118	0.1085	0.2688	0.4689	0.2386
Growth	214,011	0.1262	-0.0399	0.1013	0.2510	0.3881
GDP per Capita	241,316	23,166	5,169	25,620	36,539	14,286
Market Cap to GDP	241,280	1.1055	0.6630	1.0223	1.3655	0.7750
Person-level variables						
Director	2,862,912	0.5711	0.0000	1.0000	1.0000	0.4949
Gender	2,606,433	0.0927	0.0000	0.0000	0.0000	0.2900
Education	748,613	2.1835	1.0000	2.0000	3.0000	1.1139
Betweenness [10^{-3}]	2,862,912	0.0305	0.0000	0.0000	0.0000	0.2036

Panel B: Firm characteristics			
Variable	Female board	Male board	p-value
Tobin's Q	1.70	1.63	0.00
Size	1,374.35	649.75	0.00
Board Size	14.13	9.35	0.00
Leverage	0.22	0.20	0.00

Panel C: Person characteristics			
Variable	Women	Men	p-value
Education	2.00	2.17	0.00
Betweenness [10^{-3}]	0.0191	0.0314	0.00

Panel A provides summary statistics over the 1998-2010 period. All other firm-level variables are winsorized annually at the 1%-level. Panel B reports mean firm characteristics for firms with no female board members and firms with at least one female board member. Panel C reports person-level differences between male and female board members. A detailed description of all variables can be found in Appendix A.

Table 4: Descriptive statistics for the exogenous retirements sample.

Panel A: General summary statistics				
	Women	Men	Total	Fraction Women
People	106	2,477	2,583	0.04
thereof related to deaths	*53*	*1,684*	*1,737*	*0.03*
Events	119	2,812	2,931	0.04
thereof related to deaths	*67*	*2,014*	*2,081*	*0.03*
Age at retirement	61.77	65.32	65.17	
Director	0.73	0.77	0.77	

Panel B: Balancing of covariates: Treated and non-treated firms				
	Treated (Woman)	Non-treated (Man)	*t*-value	p-value
Leverage	0.18	0.22	-1.19	0.23
Profitability	0.06	0.05	0.61	0.54
Tangibility	0.31	0.32	-0.20	0.84
Growth	0.09	0.09	0.11	0.91
Size	12.74	12.75	-0.04	0.97
Age	67.26	66.93	0.19	0.85

Panel C: Balancing of covariates: Treated and control firms				
	Treated (Woman)	Control (Man)	*t*-value	p-value
Leverage	0.18	0.19	-0.23	0.82
Profitability	0.06	0.08	-0.70	0.48
Tangibility	0.31	0.30	0.30	0.76
Growth	0.09	0.11	-0.40	0.69
Size	12.74	12.79	-0.11	0.91
Age	67.26	65.95	0.49	0.63

Panel A provides general summary statistics for the subsample of board members with exogenous retirements. Panel B exhibits the balancing of covariates across the treatment group (female board member) and non-treatment group (deceased male board member). Panel C exhibits the balancing of covariates across the treatment group (female board member) and control group (matched male board member). A description of all variables can be found in Appendix A.

Table 5: Exogenous retirements: Announcement effects.

Panel A: Regression analysis						
Dep. Variable	Raw Return		Abnormal Return			
Window [*d*]	[-1;1]	[-2;2]	[-1;1]	[-2;2]	[-1;1]	[-2;2]
Model	Ia	Ib	IIa	IIb	IIIa	IIIb
Growth	0.0020	-0.0100	0.0012	-0.011*	0.0017	-0.0048
	(0.43)	(-1.64)	(0.26)	(-1.89)	(0.28)	(-0.71)
Size	0.0011	0.00038	0.0011	0.00016	0.00097	0.00066
	(1.30)	(0.36)	(1.42)	(0.16)	(1.03)	(0.60)
Leverage	-0.022**	-0.025*	-0.018*	-0.021	-0.014	-0.016
	(-2.05)	(-1.76)	(-1.80)	(-1.63)	(-1.07)	(-1.02)
Profitability	-0.0080	0.025	-0.018	0.0093	-0.027*	0.00058
	(-0.62)	(1.48)	(-1.51)	(0.60)	(-1.90)	(0.034)
Tangibility	0.015**	0.020**	0.015**	0.019**	0.0097	0.016*
	(2.06)	(2.01)	(2.13)	(2.12)	(1.21)	(1.66)
Age					0.00044***	0.00055***
					(2.96)	(3.14)
Woman	**-0.018****	**-0.027****	**-0.016****	**-0.027*****	**-0.011***	**-0.020****
	(-2.34)	**(-2.57)**	**(-2.12)**	**(-2.69)**	**(-1.74)**	**(-2.15)**
Observations	1,075	1,075	1,075	1,075	786	786
R-squared	0.031	0.041	0.028	0.034	0.042	0.044
Year fixed effects	yes	yes	yes	yes	yes	yes
Industry fixed effects	yes	yes	yes	yes	yes	yes
Region fixed effects	yes	yes	yes	yes	yes	yes

Continued on next page.

Table 5: Exogenous retirements: Announcement effects (continued).

Panel B: Nearest-neighbor matching						
ATT	Raw Return		Abnormal Return			
Window [*d*]	[-1;1]	[-2;2]	[-1;1]	[-2;2]	[-1;1]	[-2;2]
Model	Ia	Ib	IIa	IIb	IIIa	IIIb
Woman	**-0.0252****	**-0.0388*****	**-0.0232****	**-0.0377*****	**-0.0130***	**-0.0236***
	(-2.55)	**(-2.80)**	**(-2.52)**	**(-3.04)**	**(-1.66)**	**(-1.92)**
Leverage	X	X	X	X	X	X
Profitability	X	X	X	X	X	X
Tangibility	X	X	X	X	X	X
Growth	X	X	X	X	X	X
Size	X	X	X	X	X	X
Age					X	X
Industry	Exact	Exact	Exact	Exact	Exact	Exact
Region	Exact	Exact	Exact	Exact	Exact	Exact
Year	Exact	Exact	Exact	Exact	Exact	Exact
Observations	1,042	1,042	1,042	1,042	759	759

The dependent variables are different types of returns around the announcements of exogenous retirements of board members. Raw returns are cumulative returns around the event date. Abnormal returns are estimated based on a 250-day market model using the MSCI World as the benchmark. WOMAN is a dummy that is set to one if the announcement refers to a female board member and zero if it refers to a male board member. In Panel A, we employ OLS regressions. In Panel B, we perform nearest-neighbor matching. Treatment is the exogenous retirement of a female board member (WOMAN). Information regarding the balancing of covariates can be found in Table 4. Three matches are made per observation. Coefficients are bias-adjusted due to non-exact matching along some of the covariates (cf. Abadie and Imbens, 2011). Robust t-($z-$)statistics are presented in parentheses for Panel A (Panel B). ***, **, and * indicate significance at the 1%-, 5%-, and 10%-levels, respectively. A detailed description of all variables can be found in Appendix A.

Table 6: Exogenous retirements: Long-run event study.

Panel A: Regression analysis (full sample)				
TOBIN'S Q	[−1; 1]		[−2; 2]	
Model	Ia	Ib	IIa	IIb
Leverage	0.094	0.090	0.21	0.20
	(0.54)	(0.52)	(1.54)	(1.49)
Profitability	-0.081	-0.080	0.29*	0.29*
	(-0.41)	(-0.41)	(1.94)	(1.93)
Tangibility	-0.24	-0.25	-0.24	-0.25
	(-1.29)	(-1.31)	(-1.41)	(-1.44)
Growth	0.012	0.012	0.041	0.040
	(0.28)	(0.28)	(1.15)	(1.13)
Size	-0.48***	-0.48***	-0.55***	-0.55***
	(-7.30)	(-7.28)	(-8.71)	(-8.68)
Retirement	**-0.027**	**-0.024**	**-0.041***	**-0.036**
	(-1.28)	**(-1.14)**	**(-1.75)**	**(-1.53)**
Retirement * Woman		**-0.13***		**-0.15****
		(-1.74)		**(-2.02)**
Observations	5,290	5,290	8,277	8,277
R^2	0.143	0.143	0.158	0.159
Firm fixed effects	yes	yes	yes	yes
Year fixed effects	yes	yes	yes	yes

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Table 6: Exogenous retirements: Long-run event study (continued).

Panel B: Regression analysis (retirements sample)						
Δ TOBIN'S Q [*y*]	[−1; 1]			[−2; 2]		
Model	Ia	Ib	Ic	IIa	IIb	IIc
Δ Leverage	-0.17	-0.19	-0.37*	-0.46*	-0.46*	-0.17
	(-0.65)	(-0.72)	(-1.84)	(-1.70)	(-1.70)	(-0.58)
Δ Profitability	-0.099	-0.085	0.020	0.54**	0.53**	0.58*
	(-0.41)	(-0.37)	(0.10)	(2.01)	(1.99)	(1.95)
Δ Tangibility	-0.49*	-0.48*	-0.15	0.081	0.094	-0.27
	(-1.86)	(-1.85)	(-0.64)	(0.20)	(0.23)	(-0.59)
Δ Growth	0.13**	0.12**	0.11**	0.13	0.13	0.15
	(2.10)	(2.02)	(2.57)	(1.27)	(1.29)	(1.27)
Δ Size	-0.13	-0.13	-0.14	-0.31***	-0.31***	-0.38***
	(-1.42)	(-1.41)	(-1.26)	(-3.22)	(-3.11)	(-3.06)
Age			-0.000054			-0.0019
			(-0.037)			(-0.95)
Woman	**-0.15*** **	**-0.15*** **	**-0.15** **	**-0.15** **	**-0.15** **	**-0.14* **
	(-2.94)	**(-2.78)**	**(-2.44)**	**(-2.12)**	**(-2.08)**	**(-1.96)**
Observations	2,032	2,031	1,344	1,859	1,854	1,232
R^2	0.106	0.115	0.131	0.103	0.110	0.121
Industry fixed effects	no	yes	yes	no	yes	yes
Region fixed effects	no	yes	yes	no	yes	yes
Year fixed effects	yes	yes	yes	yes	yes	yes

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Table 6: Exogenous retirements: Long-run event study (continued).

Panel C: Nearest-neighbor matching					
ATT	Change in Q	Change in Q	Change in Q	Change in Q	Change in Q
Model	I	II	III	IV	V
Woman	**-0.26***** **(-3.28)**	**-0.20***** **(-2.64)**	**-0.27***** **(-3.69)**	**-0.16**** **(-2.27)**	**-0.16*** **(-2.28)**
Δ Leverage	X	X	X	X	X
Δ Profitability	X	X	X	X	X
Δ Tangibility	X	X	X	X	X
Δ Growth	X	X	X	X	X
Δ Size	X	X	X	X	X
Age	X	X	X	X	X
Industry		Exact		Exact	Exact
Region			Exact	Exact	Exact
Year					Exact
Observations	1,334	1,229	1,229	1,229	1,229

In Panels A and B, we employ OLS regressions. In Panel A, the dependent variable is TOBIN's Q around exogenous retirements of board members in general. The sample is based on all firm-year observations in the time window around the exogenous retirements provided in the column titles. For firms with multiple events, each event is included individually with all firm-years during the specified time window. RETIREMENT is a dummy variable set to one in and after firm years in which a board member retires due to death or illness and zero otherwise. WOMAN is a dummy variable set to one if a female board member retires due to death or illness and zero otherwise. T-statistics based on Huber/White robust standard errors clustered by firm are presented in parentheses. In Panel B, the dependent variable is the change in TOBIN's Q. First differences are calculated based on the respective event windows around the retirements provided in the column titles. Robust t-statistics are presented in parentheses. In Panel C, we perform nearest-neighbor matching. The dependent variable is the change in TOBIN's Q from the beginning of the year of treatment to the end of the full fiscal year after. Treatment is the exogenous retirement of a female board member (WOMAN). Information regarding the balancing of covariates can be found in Table 4. Three matches are made per observation. Coefficients are bias-adjusted due to non-exact matching along some of the covariates (cf. Abadie and Imbens, 2011). Robust z-statistics are presented in parentheses. ***, **, and * indicate significance at the 1%-, 5%-, and 10%-levels, respectively. A detailed description of all variables can be found in Appendix A.

Table 7: Large-scale dataset: Firm-level valuation analysis.

	Extended board definition			Directors only		
Model	Ia	Ib	Ic	IIa	IIb	IIc
Size	-0.047***	-0.54***	-0.56***	-0.037***	-0.54***	-0.56***
	(-10.2)	(-32.6)	(-32.0)	(-8.84)	(-32.4)	(-31.9)
Board Size	0.086***	-0.048***	0.011			
	(7.95)	(-3.74)	(0.83)			
Board Size [Dir]				0.051***	-0.047***	0.010
				(5.09)	(-4.31)	(0.83)
Leverage	-0.67***	-0.079*	-0.0042	-0.69***	-0.077*	-0.00041
	(-21.9)	(-1.80)	(-0.094)	(-22.4)	(-1.73)	(-0.0091)
Profitability	1.25***	0.70***	0.64***	1.24***	0.70***	0.64***
	(18.8)	(14.5)	(13.4)	(18.5)	(14.4)	(13.3)
Retained Earnings	-0.25***	-0.016	-0.0066	-0.25***	-0.016	-0.0060
	(-19.9)	(-0.91)	(-0.38)	(-19.9)	(-0.90)	(-0.34)
Tangibility	-0.30***	-0.096**	-0.11**	-0.31***	-0.10**	-0.12**
	(-10.7)	(-2.08)	(-2.47)	(-10.8)	(-2.15)	(-2.55)
Growth	0.26***	0.17***	0.18***	0.26***	0.17***	0.18***
	(19.5)	(14.4)	(15.2)	(19.4)	(14.4)	(15.2)
GDP per Capita	1.40***	1.77***		1.43***	1.78***	
	(24.0)	(30.0)		(24.3)	(29.8)	
Market Cap to GDP	0.025*	0.024*		0.021	0.025**	
	(1.84)	(1.86)		(1.50)	(1.99)	
Women	**0.23*** **	**0.17** **	**0.14** **			
	(4.21)	**(2.33)**	**(1.99)**			
Women [Director]				**0.19*** **	**0.15** **	**0.13* **
				(3.86)	**(2.10)**	**(1.81)**
Observations	157,090	157,406	157,428	155,410	155,725	155,747
R^2	0.19	0.61	0.64	0.19	0.61	0.64
Year fixed effects	yes	yes	yes	yes	yes	yes
Firm fixed effects	no	yes	yes	no	yes	yes
Industry fixed effects	yes	no	no	yes	no	no
Country fixed effects	yes	no	no	yes	no	no
Country-year fixed effects	no	no	yes	no	no	yes

The dependent variable is tobin's q. Estimation models are pooled OLS regressions or firm fixed effects regressions. Models I refer to the sample related to the extended board definition, while Models II are estimated based on directors only. All independent variables are lagged by one period. T-statistics based on Huber/White robust standard errors clustered by firm are presented in parentheses. ***, **, and * indicate significance at the 1%-, 5%-, and 10%-levels, respectively. A detailed description of all variables can be found in Appendix A.

Table 8: Large-scale dataset: Person-level valuation analysis.

Sample	All board members		Directors only	
Model	Ia	Ib	IIa	IIb
Size	-0.036***	-0.032***	-0.041***	-0.037***
	(-6.97)	(-4.21)	(-7.93)	(-5.20)
Board Size	0.13***	0.15***	0.14***	0.16***
	(8.50)	(5.57)	(8.93)	(6.56)
Leverage	-0.74***	-0.96***	-0.73***	-0.88***
	(-22.1)	(-16.8)	(-22.3)	(-16.7)
Profitability	1.56***	1.13***	1.44***	1.05***
	(21.4)	(11.9)	(20.8)	(11.7)
Retained Earnings	-0.26***	-0.19***	-0.26***	-0.19***
	(-21.0)	(-13.1)	(-20.9)	(-13.1)
Tangibility	-0.25***	-0.29***	-0.26***	-0.29***
	(-8.21)	(-6.63)	(-9.08)	(-7.34)
Growth	0.24***	0.30***	0.22***	0.28***
	(17.2)	(14.2)	(17.1)	(14.7)
GDP per Capita	0.94***	0.77***	1.01***	0.77***
	(19.3)	(8.78)	(20.6)	(9.27)
Market Cap to GDP	0.067***	0.098***	0.065***	0.084***
	(5.02)	(5.27)	(5.02)	(4.69)
Gender	**0.029***	**0.040***	**0.032***	**0.055***
	(4.63)	**(3.47)**	**(4.04)**	**(3.84)**
Education		**0.034***		**0.027***
		(8.31)		**(5.91)**
Betweenness		**27.8**		**35.1***
		(2.43)		**(2.91)**
Observations	2,006,503	529,757	1,152,112	330,305
R^2	0.205	0.211	0.204	0.208
Year fixed effects	yes	yes	yes	yes
Industry fixed effects	yes	yes	yes	yes
Country fixed effects	yes	yes	yes	yes

The dependent variable is TOBIN'S Q. Estimation models are pooled OLS regressions at the person-level, i.e., for each firm-year, there is one observation for each board member. All independent variables are lagged by one period. T-statistics based on Huber/White robust standard errors clustered by firm and person are presented in parentheses. ***, **, and * indicate significance at the 1%-, 5%-, and 10%-levels, respectively. A detailed description of all variables can be found in Appendix A.

Table 9: Large-scale dataset: Valuation effect across the sample countries.

Country	Valuation effect	Board Inequality	Double Name (women)
Belgium	1.75	0.30	0.13
Norway	1.61	0.26	0.03
Spain	1.59	0.26	0.16
Switzerland	1.43	0.38	0.07
New Zealand	1.01	0.35	0.05
Canada	0.98	0.37	0.06
Austria	0.77	0.37	0.05
Finland	0.72	0.33	0.03
USA	0.69	0.36	0.05
Sweden	0.67	0.34	0.04
Israel	0.57	0.26	0.06
Taiwan	0.47		0.24
Ireland	0.45	0.29	0.09
Poland	0.39	0.30	0.11
Japan	0.27	0.38	0.13
Philippines	0.21	0.17	0.10
Hong Kong	0.19	0.22	0.28
Denmark	0.18	0.38	0.10
Indonesia	0.12	0.27	0.18
United Kingdom	0.08	0.37	0.04
Singapore	0.07	0.24	0.30
Greece	0.02	0.21	0.12
Mexico	0.02	0.25	0.18
South Africa	-0.02	0.27	0.04
Thailand	-0.05	0.29	0.16
Germany	-0.09	0.35	0.06
Netherlands	-0.10	0.31	0.04
Hungary	-0.10	0.27	0.05
China	-0.14	0.33	0.27
India	-0.15	0.20	0.30
France	-0.18	0.29	0.22
Pakistan	-0.20	0.09	0.22
Malaysia	-0.30	0.24	0.21
Australia	-0.32	0.35	0.05
Russia	-0.39	0.35	0.00
Portugal	-0.40	0.31	0.27
Italy	-0.42	0.28	0.26
Egypt	-0.52	0.21	0.15
Argentina	-0.67	0.29	0.18
Brazil	-0.87	0.28	0.19
Turkey	-1.09	0.20	0.09
Chile	-3.19	0.25	0.19

This table shows the coefficients for WOMEN, obtained from regressions of Model Ia, Table 7, for each country (column (2)). Only countries in which female board members are present in more than 200 firm-years are considered. BOARD INEQUALITY (column (3)) is the annual difference between the fraction of women in the total labor force in 1990 in a given country minus the average fraction of female board members in a given country and year, excluding the firm under consideration. DOUBLE NAME (female board members only) (column (4)) is the proportion of female board members who share the same surname with another board member in the same firm.

Table 10: Large-scale dataset: Gender inequality.

Model	Ia	Ib	IIa	IIb	IIIa	IIIb
Size	-0.047***	-0.54***	-0.047**	-0.54***	-0.045**	-0.55***
	(-2.70)	(-10.1)	(-2.63)	(-10.1)	(-2.44)	(-9.62)
Board Size	0.085***	-0.044	0.085***	-0.043	0.087***	-0.041
	(3.07)	(-0.93)	(3.07)	(-0.91)	(2.83)	(-0.91)
Leverage	-0.67***	-0.080	-0.67***	-0.080	-0.71***	-0.087
	(-2.80)	(-0.59)	(-2.80)	(-0.59)	(-2.79)	(-0.55)
Profitability	-0.25***	-0.015	-0.25***	-0.015	-0.24***	-0.00072
	(-7.46)	(-0.75)	(-7.47)	(-0.74)	(-8.21)	(-0.048)
Retained Earnings	-0.30***	-0.094**	-0.30***	-0.094**	-0.29***	-0.12**
	(-5.58)	(-2.05)	(-5.61)	(-2.05)	(-4.97)	(-2.44)
Tangibility	0.26***	0.17***	0.26***	0.17***	0.28***	0.18***
	(4.05)	(5.40)	(4.05)	(5.40)	(4.05)	(5.02)
Growth	1.41***	1.75***	1.40***	1.75***	1.39***	1.69***
	(5.55)	(8.49)	(5.53)	(8.46)	(5.51)	(8.38)
GDP per Capita	0.026	0.027	0.025	0.027	0.072	0.075
	(0.85)	(0.83)	(0.82)	(0.82)	(1.38)	(1.20)
Market Cap to GDP	1.25***	0.70***	1.26***	0.70***	1.27***	0.71***
	(4.89)	(5.57)	(4.88)	(5.57)	(4.99)	(5.28)
Women	0.18*	0.066	0.22*	0.093	0.29**	0.19***
	(1.91)	(0.73)	(1.91)	(1.15)	(2.34)	(2.70)
Board Inequality	0.38	-0.62				
	(0.26)	(-0.28)				
Women * Board Inequality	**4.10*** **	**3.60***				
	(2.85)	**(1.91)**				
AVG_Women (Country)			-0.30	0.63		
			(-0.20)	(0.28)		
Women * AVG_Women (Country)			**-3.20*** *	**-4.76***		
			(-2.16)	**(-1.80)**		
AVG_Women (Region)					0.32	0.46
					(1.58)	(1.03)
Women * AVG_Women (Region)					**-2.79*** **	**-4.07*** *
					(-2.92)	**(-2.10)**
Observations	157,090	157,406	157,090	157,406	138,821	139,123
R^2	0.194	0.610	0.194	0.610	0.199	0.612
Year fixed effects	yes	yes	yes	yes	yes	yes
Firm fixed effects	no	yes	no	yes	no	yes
Industry fixed effects	yes	no	yes	no	yes	no
Country fixed effects	yes	no	yes	no	yes	no

The dependent variable is TOBIN's Q. Estimation models are pooled OLS regressions or firm fixed effects regressions. All independent variables are lagged by one period. Variables used in interaction terms are centered. T-statistics based on Huber/White robust standard errors clustered by country are presented in parentheses. ***, **, and * indicate significance at the 1%-, 5%-, and 10%-levels, respectively. A detailed description of all variables can be found in Appendix A.

Table 11: Large-scale dataset: Nepotism.

Dep. Variable	DOUBLE NAME		TOBIN'S Q			
Model	Ia	Ib	IIa	IIb	IIIa	IIIb
firm-level control variables not reported						
GDP per Capita	0.010	-0.018	0.94***	0.77***	1.05***	0.79***
	(0.64)	(-0.48)	(19.4)	(8.78)	(19.2)	(8.02)
Market Cap to GDP	0.0015	-0.0065	0.067***	0.098***	0.058***	0.096***
	(0.60)	(-1.36)	(5.00)	(5.24)	(4.21)	(4.91)
Education		-0.0054***		0.033***		0.034***
		(-5.39)		(8.20)		(8.27)
Betweenness		-9.33*		27.0**		27.1**
		(-1.82)		(2.37)		(2.38)
Gender	0.028***	0.059***	0.035***	0.046***	0.054***	0.069***
	(3.99)	(3.52)	(5.21)	(3.70)	(5.29)	(3.64)
Gender * Country Group	**-0.020*** **	**-0.056*** **				
	(-2.67)	**(-3.28)**				
Double Name			**-0.061*** **	**-0.056*** **		
			(-8.71)	**(-4.27)**		
Gender * Double Name			**-0.037** **	**-0.042**		
			(-2.49)	**(-1.47)**		
Double Name [Avg]					**-2.12*** **	**-0.36**
					(-4.00)	**(-0.41)**
Gender * Double Name [Avg]					**-0.22*** **	**-0.25** **
					(-3.30)	**(-2.07)**
Observations	996,456	338,785	2,006,503	529,757	2,006,503	529,757
R^2	0.052	0.064	0.205	0.211	0.205	0.211
Year fixed effects	yes	yes	yes	yes	yes	yes
Industry fixed effects	yes	yes	yes	yes	yes	yes
Country fixed effects	yes	yes	yes	yes	yes	yes

The dependent variable is DOUBLE NAME in Models I and TOBIN'S Q in all other models. Estimation models are pooled OLS regressions at the person-level, i.e., for each firm-year, there is one observation for each board member. Country Group is a dummy variable that is set to one (zero) if a country is among the ten countries with the highest (lowest) regression coefficients for the fraction of female board members (Table 9). Independent variables are lagged by one period. Variables used in interaction terms are centered. T-statistics based on Huber/White robust standard errors clustered by firm and person are presented in parentheses. ***, **, and * indicate significance at the 1%-, 5%-, and 10%-levels, respectively. Descriptions of all variables can be found in Appendix A.

Appendix

Appendix A: Definition of variables.

Variable	Description
Firm-level board variables	
Women	Fraction of women on a firm's board at the fiscal year end date (source: Thomson Reuters).
Women [Dummy]	Dummy variable that equals one if at least on female board member is present at the fiscal year end date and zero otherwise (source: Thomson Reuters).
Women [Director]	Fraction of women on a firm's board at the fiscal year end date; only directors are considered. (source: Thomson Reuters).
Board Size	Board Size is the number of both executive and non-executive directors as well as senior managers at a firm's fiscal year end date (source: Thomson Reuters).
Board Size [Director]	Board Size [Director] is the number of both executive and non-executive directors at a firm's fiscal year end date (source: Thomson Reuters).
Other firm- and country-level variables	
Tobin's Q	Tobin's Q is total assets (WC02999) minus common stock (WC03501) plus the market value of equity (WC08001) deflated by total assets (source: Worldscope).
Size	Size is total assets in millions of $US. When performing regressions, we employ the natural logarithm of the variable (source: Worldscope).
Leverage	Leverage is book leverage defined as total debt (WC03255) deflated by total assets (source: Worldscope).
Profitability	Profitability is earnings before interest and taxes (WC18191) to total assets (source: Worldscope).
Retained Earnings	Retained earnings is retained earnings (WC03495) deflated by total assets (source: Worldscope).
Tangibility	Tangibility is defined as net property, plant, and equipment (WC02501) deflated by total assets (source: Worldscope).
Growth	Growth is the one-year logarithmic sales growth (WC01001) (source: Worldscope).
GDP per Capita	GDP per Capita is a country's GDP per capita in constant 2005 $US. When performing regressions, we employ the natural logarithm of the variable (source: World Bank).
Market Cap to GDP	Market Cap to GDP is the share price times the number of shares outstanding in percent of a country's GDP (source: Worldbank).
Board Inequality	Annual difference between the fraction of women in the total labor force in 1990 in a given country minus the average fraction of female board members in a given country and year, excluding the firm under consideration (source: World Bank, Thomson Reuters).
AVG_Women (Country)	Average fraction of female board members in a given country and year, excluding the firm under consideration (source: Thomson Reuters).
AVG_Women (Region)	Average fraction of female board members in all firms that are less than 100 kilometers away from a given firm, excluding the firm under consideration. Values are calculated using the "nearstat" Stata module developed by P. Wilner Jeanty. Firm address data is from the Worldscope database, which is then used to obtain geographic coordinates via the Google Maps API (source: Thomson Reuters, Worldscope, Google Maps).

Continued on next page.

Appendix A: Definition of variables (continued).

Variable	Description
Person-level variables	
Director	Director is a dummy variable set to one if a board member is a director and zero otherwise (source: Thomson Reuters).
Gender	Dummy variable that equals one for female board members and zero for men.
Education	Board member-specific index that equals one for a bachelor's degree, two for a master's degree, three for a MBA, and four for a Ph.D. (source: Thomson Reuters).
Betweenness	Betweenness centrality is the proportion of shortest paths between two board members in the network that pass through a certain board member. A high betweenness centrality indicates that a large flux of information may pass through a board member and that he or she may act as a broker connecting board members (source: own calculations based on data by Thomson Reuters).
Double Name	Dummy variable that equals one if another board member in the same firm shares the same surname and zero otherwise (source: Thomson Reuters).
Age	Age refers to the age of a board member in a given year (source: Thomson Reuters).

Appendix B: Board member deaths only.

Panel A: Short-run event study						
Dep. Variable	Raw Return		Abnormal Return			
Window [d]	[-1;1]	[-2;2]	[-1;1]	[-2;2]	[-1;1]	[-2;2]
Model	Ia	Ib	IIa	IIb	IIIa	IIIb
Growth	0.0056	-0.0053	0.0035	-0.0070	0.0048	-0.0030
	(0.83)	(-0.62)	(0.56)	(-0.93)	(0.67)	(-0.35)
Size	0.00062	0.00052	0.00087	0.00036	0.00099	0.00042
	(0.58)	(0.41)	(0.81)	(0.29)	(0.79)	(0.31)
Leverage	-0.025**	-0.029*	-0.024**	-0.033**	-0.021	-0.020
	(-2.11)	(-1.74)	(-2.09)	(-2.10)	(-1.51)	(-1.13)
Profitability	-0.0020	0.024	-0.018	-0.00064	-0.022	0.0036
	(-0.12)	(1.14)	(-1.05)	(-0.031)	(-1.23)	(0.17)
Tangibility	0.019**	0.025**	0.018**	0.023**	0.023***	0.026**
	(2.19)	(2.04)	(2.24)	(2.19)	(2.60)	(2.33)
Age					0.00021	0.00021
					(1.17)	(1.03)
Woman	**-0.015****	**-0.024**	**-0.014****	**-0.029****	**-0.014****	**-0.021***
	(-2.30)	**(-1.64)**	**(-2.41)**	**(-2.22)**	**(-2.18)**	**(-1.79)**
Observations	625	625	625	625	490	490
R-squared	0.065	0.068	0.057	0.058	0.076	0.076
Year fixed effects	yes	yes	yes	yes	yes	yes
Industry fixed effects	yes	yes	yes	yes	yes	yes
Region fixed effects	yes	yes	yes	yes	yes	yes

Continued on next page.

Appendix B: Board member deaths only (continued).

Panel B: Long-run event study						
Δ TOBIN'S Q [y]	[−1; 1]			[−2; 2]		
Model	Ia	Ib	Ic	IIa	IIb	IIc
Δ Leverage	-0.33	-0.34*	-0.40	-0.41	-0.42	-0.36
	(-1.64)	(-1.72)	(-1.60)	(-1.55)	(-1.56)	(-0.98)
Δ Profitability	0.12	0.13	0.15	0.73**	0.74**	0.72**
	(0.61)	(0.63)	(0.57)	(2.48)	(2.47)	(2.12)
Δ Tangibility	-0.042	-0.026	-0.025	-0.18	-0.16	-0.34
	(-0.19)	(-0.11)	(-0.070)	(-0.54)	(-0.46)	(-0.60)
Δ Growth	0.11**	0.10**	0.085	0.20**	0.20**	0.22*
	(2.21)	(2.16)	(1.58)	(2.26)	(2.25)	(1.95)
Δ Size	-0.17*	-0.18*	-0.21	-0.44***	-0.44***	-0.54***
	(-1.84)	(-1.88)	(-1.38)	(-3.94)	(-3.92)	(-3.43)
Age			-0.0013			-0.0039*
			(-0.67)			(-1.65)
Woman	**-0.13****	**-0.13****	**-0.11***	**-0.13***	**-0.12***	**-0.10**
	(-2.23)	**(-2.20)**	**(-1.76)**	**(-1.82)**	**(-1.76)**	**(-1.44)**
Observations	1,487	1,486	1,005	1,417	1,412	955
R^2	0.118	0.125	0.137	0.137	0.143	0.158
Industry fixed effects	no	yes	yes	no	yes	yes
Region fixed effects	no	yes	yes	no	yes	yes
Year fixed effects	yes	yes	yes	yes	yes	yes

This table provides the results of short-run (Panel A) and long-run (Panel B) event studies around the death of board members. Thus, in contrast to Tables 5 and 6, the analysis excludes retirements due to illness. Both panels are based on OLS regressions. In Panel A, the dependent variables are different types of returns around the announcements of the deaths of board members. Raw returns are cumulative returns around the event date. Abnormal returns are estimated based on a 250-day market model using the MSCI World as the benchmark. WOMAN is a dummy that is set to one if the announcement refers to a deceased female board member and zero if it refers to a deceased male board member. Robust *t*-statistics are presented in parentheses. In Panel B, the dependent variable is the change in TOBIN'S Q from the beginning of the year of treatment to the end of the full fiscal year after. Treatment is the exogenous retirement of a female board member due to death (WOMAN). First differences are calculated based on the respective event windows around the deaths provided in the column titles. For firms with multiple events, each event is included individually. *T*-statistics based on Huber/White robust standard errors clustered by firm are presented in parentheses. ***, **, and * indicate significance at the 1%-, 5%-, and 10%-levels, respectively. A detailed description of all variables can be found in Appendix A.