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Gender and Board Activeness: The Role of a Critical Mass

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Abstract

This study analyzes detailed minutes of board meetings of business companies in which the Israeli government holds a substantial equity interest. Boards with at least 3 directors of each gender are found to be at least 79% more active at board meetings than those without such representation. This phenomenon is driven by women directors in particular; they are more active when a critical mass of at least 3 women is in attendance. Gender-balanced boards are also more likely to replace underperforming chief executive officers (CEOs) and are particularly active during periods when CEOs are being replaced.

I. Introduction

In recent years, companies have been pressured, and at times required, to compose gender-balanced boards. For example, in the United States and other

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countries, organizations such as Catalyst, Spencer Stuart, and Ernst & Young continuously track and publish statistics on the representation of women on boards. These statistics are used by the media and legislators, among others, to pressure companies to add more women to their boards.[1] In addition, several countries, including Norway, the Netherlands, France, Spain, and Malaysia, have already created laws enforcing gender quotas for boards.

Matsa and Miller (2012) and Ahern and Dittmar (2012) take a closer look at the case of Norway. Their research reveals that introducing a 40% gender quota for boards of directors led, in the short term, to the appointment of younger and less experienced female directors and to decreased firm value (Matsa and Miller (2012)) and profitability (Ahern and Dittmar (2012)).

This paper seeks to contribute to the discussion on whether gender-balanced boards are more active than nongender-balanced boards. This question is addressed using a novel data set of minutes that document the board and board-committee meetings of 11 government business companies (GBCs) in which the Israeli government holds a substantial equity interest. The GBCs are for-profit companies that are explicitly required by law to maximize their profits. Their minutes are confidential but were made available to the author ex post.

The recorded minutes document the details of the meetings, including the statements made by every participant in each meeting. For each company, I examine minutes for 1 year between 2007 and 2009, for a total of 155 board meetings and 247 board-committee meetings altogether. In these minutes, 2,459 issues were discussed. Hence, although the number of companies examined in this study is limited, the data are rich (see, e.g., Koplovitz (2015)).

This database is used to evaluate the extent to which the gender composition of a board catalyzes the actions it takes. Minutes data are ideal for examining the effect of gender on board dynamics for at least 3 reasons. First, unlike studies based on publicly available information, the minutes, which are quasi-transcripts, allow us to observe the actions of directors at their meetings, most of which are unobservable to outsiders. Second, using data on the attendance and the actions taken at each meeting, while controlling for firm-level characteristics, allows us to observe *within-firm* variation across meetings. Third, the GBCs whose minutes are examined have relatively gender-balanced boards, with roughly 37% women on average, and they have included a large proportion of women for almost 2 decades. This diversity is unique, as women directors average only 5%–19% of most boards of directors (Catalyst (2014)).[2] Such boards are ill-suited to study the effects of diversity beyond very low levels of female participation.

As a point of departure, I assume that the impact of gender most closely resembles a step function, meaning that once a certain minimal threshold of gender balance is crossed, gender balance will increase the productivity of a team or, in this case, a board. The step-function modeling is based on the critical mass theory introduced by Kanter (1977), who argues that only once the minority gender comprises at least 35% of a team, thereby creating a gender-balanced team, will

[1] See Schwartz-Ziv and Weisbach (2013) on the board dynamics documented in this database.

[2] For example, in the United States, in 2013, 16.9% of the directors of Fortune 500 companies were women (Catalyst (2014)).

gender diversity enhance team performance. The critical mass theory argues that the minority gender members are not as productive as they could be when they comprise less than 35% of a team because they are reduced to symbolic representatives, or tokens, of their social category. Based on the critical mass theory, Rosener (1995), Shrader, Blackburn, and Iles (1997), and Kramer, Konrad, and Erkut (2006) argue that in board meetings, a critical mass of at least 3 women directors (which constitutes approximately one-third of most boards) will catalyze board activeness and performance.

Following the critical mass theory, I examine whether the existence of a critical mass of at least 3 women directors, and also one of at least 3 men directors, does, indeed, catalyze boards' and directors' activeness. I also study how it relates to observable outcomes, such as turnover of the chief executive officer (CEO). Although the critical mass theory emphasizes the importance of a critical mass of women, I choose to address how a critical mass of *both* genders relates to board activeness in order to understand (to the extent possible given the variation in the data) whether the critical mass effect applies to both genders.

Board activeness is measured using 2 variables: Based on the minutes data, for each of the 2,459 issues discussed, I document whether the board i) requested to receive further information or an update and ii) took an initiative, such as proposing which steps should be taken. These two actions reflect the intensity of the boards' work, both in monitoring (as measured by the first variable) and in being involved in managing the company (as measured by the second variable). I examine how the gender composition of the directors attending a meeting relates to the likelihood of a board taking each of these actions. The empirical results indicate that boards are most active when they are relatively gender balanced, that is, when at least 3 men and 3 women directors are in attendance, a condition I term a *dual critical mass*. Boards with a dual critical mass are found to be at least 79% more likely to request further information or an update or to take an initiative than boards without a dual critical mass.

One potential concern is that defining a gender-balanced board as one that includes at least 3 directors of each gender in attendance at a board meeting means that any board that has less than 6 members will not be defined as gender balanced. To address this concern, I reestimate the results using an alternative definition for critical mass, which also follows the critical mass theory but is not sensitive to the board's size. This alternative definition defines boards as gender balanced if 35%–65% of the attending directors are women. The results remain robust and significant when this alternative definition is used, further supporting the conclusion that gender-balanced boards are more active than nongender-balanced boards.

An additional potential concern is that nonrandom attendance might be driving the results. Perhaps one gender (or both) is particularly likely to attend meetings in which a high (low) level of activeness is expected to be required. This concern is addressed using instrumental variables (IVs) that account for the likelihood of a critical mass of women and/or a critical mass of men attending a given board meeting. Specifically, I use 2 IVs that document the number of women directors and men directors who were invited to at least one board-committee meeting scheduled on the same day as a particular board meeting at which a particular issue was discussed. These instruments exploit the reality that GBC directors have a higher incentive to attend board meetings held on days when they also have a board-committee meeting scheduled because the compensation GBC directors receive depends only on the number of board and committee meetings they attend. When using these IVs, I still find that boards are most active when they are gender-balanced.

Next, I examine whether the increased board activeness documented occurs especially because the men (women) directors are more active when boards are gender balanced. To do this, I attribute all actions taken by a single director to that specific director and, thereby, also to the gender of that director. Consistent with the critical mass theory, which argues that a member of the minority gender will be more active if a critical mass of his or her own gender is present, I find that women directors, in particular, are likely to be more active at board meetings if a critical mass of at least 3 women directors is in attendance.

Finally, I examine, on both the typically observable and the typically unobservable levels, how critical masses relate to the board's work during periods when CEOs are being replaced. The analysis of the generally observable level is based on a panel data set of the universe of the 34 GBCs for the 2000–2009 period. This analysis reveals that GBCs that have weak financial performance and whose boards include a dual critical mass are significantly more likely to experience CEO turnover. Consistent with these patterns, also on the generally unobservable level (i.e., at the board's meetings), boards are found to be particularly active during periods in which GBCs are in the process of replacing their CEOs if a dual critical mass is in attendance.

To conclude, the findings of this study document that boards with a dual critical mass are more active than boards that do not have a dual critical mass, particularly because the minority gender (women) is more active when the board includes a critical mass of that gender. Gender-balanced boards are also particularly active during crucial times, such as CEO turnover. These results suggest that gender-balanced boards may be invaluable, particularly when a board's involvement is needed.

II. Literature Review

A. Gender Composition and the Outcome of the Work of Teams and Boards

Why should gender affect how a board or a team operates? Prior studies have documented three potential channels. The first channel is the critical mass channel, which emphasizes that the minority gender (in practice, women directors) may feel more comfortable expressing opinions if a sufficient number of the minority gender is present. Kanter (1977), who proposed the critical mass theory, argues that when women are "tokens," comprising only a marginal fraction of a team or an organization, they are treated as female representatives rather than as individuals. Kanter contends that this increases the pressure on "tokens," hindering their ability to perform optimally. She suggests that once women comprise at least 35% of a team, thereby creating a relatively gender-balanced group, gender diversity will enhance team performance.

Following Kanter (1977), Rosener (1995) and Shrader et al. (1997) argue that a critical mass of 3 women directors is necessary in order to enhance boards' work (this critical mass equals approximately 35% of an average board). Indeed, based on interviews with directors, Kramer et al. (2006) find that once a board includes at least 3 women directors, the women directors no longer represent the "woman's point of view," and directors notice the women directors' opinions rather than their gender.[3]

The second channel through which gender may relate to the decision-making process of boards is peer monitoring between genders (a phenomenon documented, e.g., by Hoxby (2000) and Lavy and Schlosser (2011)). With respect to boards, Adams and Ferreira (2009) find that men directors have fewer attendance problems as the fraction of women directors increases, which suggests that women directors monitor the men directors. Consistent with this channel, Allmendinger and Hackman (1995), Woolley, Chabris, Pentland, Hashmi, and Malone (2010), Bear and Woolley (2011), Hoogendoorn, Oosterbeek and van Praag (2013), and Apesteguia, Azmat, and Iriberri (2012) document that gender-balanced teams generally outperform nongender-balanced teams.

The third channel through which the gender of directors may relate to the working of boards is the specialization, or relative advantage, channel. One gender of directors may be different from the other (Adams and Funk (2012)) and, accordingly, may specialize in certain types of tasks or be particularly good at certain types of tasks (Huang and Kisgen (2013)).

In sum, prior studies have frequently demonstrated that assembling teams or boards that include critical masses of each gender, which may monitor each other and specialize in different types of tasks, may help boost the output of teams and boards.

B. Gender Composition of Boards and Financial Performance

The most common approach to understanding the relation between board composition and board performance and, ultimately, firm performance is to examine the association between board composition and firm performance. However, this approach is subject to significant endogeneity concerns (Hermalin and Weisbach (2003)).[4] In addition, prior studies have also documented inconsistent

[3]Tuggle, Sirmon, and Bierman (2011) find evidence in support of this channel. In examining the minutes of board meetings of American public companies, they observe that the larger the fraction of women directors present, the more the women directors participate in board meetings. Torchia, Calabro, and Huse (2011) also disclose evidence in support of the critical mass theory in their 2005–2006 study of Norwegian boards. They find that boards with a critical mass of 3 women directors are significantly more innovative. Similarly, Joecks, Pull, and Vetter (2013) examine 151 German companies between the years 2000 and 2005. They find a negative correlation between the percentage of women directors and firm performance (measured by return on equity (ROE)) when women directors comprise less than 40% of a board; however, once women make up more than 40% of a board, this correlation is reversed. Finally, Gupta and Raman (2014) establish that the larger the percentage of women directors, the more likely they are to support other women: The larger the percentage of women directors, the greater the likelihood of a female CEO/executive being selected.

[4]For example, if a positive association between the fraction of women directors and firm performance is documented, this could be interpreted as an indication that women enhance firm performance. However, it is also possible that firms with strong firm performance are those that are able to attract the best women directors.

findings on the relation between boards' gender composition and financial performance (see Rhode and Packel (2014), who survey many of these studies).[5] However, most studies of gender and boards examine boards that have, on average, less than 10% women directors because this is the most common gender composition of boards.

In one unique setting, boards did become gender balanced. Norwegian legislation required that at least 40% of the directors of Norwegian firms be women as of 2008. Ahern and Dittmar (2012) establish that as a result of this quota, younger and less experienced women directors were appointed, and the profitability of these firms decreased (Matsa and Miller (2012)), as did their firm value (Ahern and Dittmar (2012)). In sum, the literature shows that the relation between boards' gender composition and their financial performance is not always consistent.

III. Backgrounds of GBCs and Their Directors

Thirty-four GBCs operate in Israel in various fields, including infrastructure, military technology, construction/housing, and services. Table 1 provides a list of the universe of the GBCs. All GBCs are overseen by the Government Companies Authority (GCA), which represents the government in its role as a shareholder. The size of these companies varies greatly; some companies employ dozens of employees, whereas others employ more than 10,000. The annual income of the smaller GBCs is just a few million USD; the corresponding figure for the larger firms is 1–4 billion USD.

Israel's Corporation Law of 1999 applies to all corporations in Israel, including government-owned firms. The Government Companies Law (GCL) of 1975 applies only to government-owned firms. Both laws stress that the board must determine the company's policy and monitor the CEO. Concerning GBCs, which are the firms examined in this study, the GCL explicitly requires that "the firm operate according to business considerations just as firms with no government shareholder do."[6] Furthermore, the GCL specifies additional tasks for which the board is responsible, which include determining the company's budget, discussing its financial reports, and determining its long-term strategic plan, as well as choosing, appointing, and monitoring the CEO.

The bylaws of each GBC generally require that the board must be made up of 8 to 12 directors, with 7 to 10 serving directors being most common. The bylaws of each of the companies also specify which government minister appoints the directors of the company; in most cases, this is the Minister of Finance and one additional minister, the minister most relevant to the industry of each GBC. The only compensation GBC directors receive is a fixed payment for each board or board-committee meeting they attend, which ranges between \$200 and \$300

[5]For example, some studies find a positive association between the percentage of women directors and financial performance (e.g., Carter, Simkins, and Simpson (2003), Erhardt, Werbel, and Shrader (2003), and Farrell and Hersch (2005)), some studies find no relationship (e.g., Shrader et al. (1997), Carter, D'Souza, Simkins, and Simpson (2010)), and other studies find a negative one (e.g., Adams and Ferreira (2009)).

[6]Here, as elsewhere in this paper, translation from Hebrew was done by the author.

TABLE 1
GBCs in Which the Israeli Government Holds Shares

Table 1 reports 2007 figures for all government business companies (GBCs). The data were taken from the annual reports of the Government Companies Authority (GCA) (2007). "NA" indicates that data are not available. Data for Israeli public companies were obtained from the Super Analyst database.

Company Name	Annual Revenue ($000s)	No. of Employees	Field	% Held by the Gov.
AT Communication Channels	940	8	Transportation and Communication	100
Agrexco Agricultural Export Co. Ltd.	868,460	365	Agriculture	50
Arim Urban Development Ltd.	13,040	28	Building, Housing, and Development	100
Ashdod Port Company Ltd.	263,670	1,275	Transportation and Communication	100
Ashot-Ashkelon Industries Ltd.	56,120	399	Defense	88
Ashra the Israel Export Insurance Corporation	12,440	18	Industry and Commerce	100
Atarim Tourist Development Corp. Tel Aviv Jaffa Ltd.	6,140	23	Industry and Commerce	50
EMS Ltd.	83,130	NA	Electricity and Water	100
Eilat Port Company Ltd.	27,380	112	Transportation and Communication	100
Elta Systems Ltd.	918,750	3,407	Defense	100
Haifa Port Company Ltd.	210,950	1,064	Transportation and Communication	100
Industrial Development Bank of Israel Ltd.	26,580	43	Industry and Commerce	49
Insurance Fund for Natural Risks in Agriculture Ltd.	46,000	69	Agriculture	50
Isorad Ltd.	12,250	20	Industry and Commerce	100
Israel Aircraft Industries	3,292,110	12,939	Defense	100
Israel Bank of Agriculture	9,780	25	Agriculture	92
Israel Government Coins and Medals Corporation Ltd.	4,560	39	Industry and Commerce	100
Israel Military Industries Ltd.	571,440	2,966	Defense	100
Israel Natural Gas Lines Company Ltd.	7,970	69	Energy and Petroleum	100
Israel Ports Development and Assets Company Ltd.	172,030	105	Transportation and Communication	100
Israel Postal Company Ltd.	421,930	4,860	Transportation and Communication	100
Israel Railways Ltd.	222,770	2,107	Transportation and Communication	100
Life Science Research Israel Ltd.	4,820	47	Industry and Commerce	100
Maatz—The Israel National Roads Company Ltd.	606,470	296	Industry and Commerce	100
Mekorot Water Co. Ltd.	708,070	2,211	Electricity and Water	100
Oil Products Pipeline Ltd.	20,050	0	Energy and Petroleum	100
Petroleum and Energy Infrastructures Ltd.	75,750	383	Energy and Petroleum	100
Pi-Gliloth Petroleum Terminals and Pipelines Ltd.	9,990	76	Energy and Petroleum	50
Postal Bank Company Ltd.	NA	0	Transportation and Communication	100
Rafael Advanced Defense Systems	1,286,160	5,213	Defense	100
Rotem Industries Ltd.	14,890	95	Industry and Commerce	100
The Israel Electric Corporation Ltd.	4,689,390	12,212	Electricity and Water	100
The Marine Trust Ltd.	6,240	8	Building, Housing, and Development	50
The National Coal Supply Corporation Ltd.	1,069,140	26	Electricity and Water	99
Average				
All 34 GBCs	476,952	1,531		91%
11 GBCs whose minutes are examined (rounded)	700,000	2,300		90%
743 companies listed on Tel Aviv Stock Exchange (in 2007)	284,753	624		0%

per meeting, with the exact amount being a function of the company's size.[7] The bylaws of each company also specify the quorum required to hold a board meeting. All GBCs examined have a quorum that is equal to or larger than 5 directors. Internet Appendix A (available at www.jfqa.org) provides additional information on GBCs and their directors.

Since 1993, the Israeli GCL requires that boards of GBCs in which the government holds at least 50% of the shares be composed in a way that "gives appropriate representation to women." This law is enforced by a designated committee that oversees the directorship appointment process. In practice, women directors constituted 34% of GBC boards during the years 2000–2009.

Table 2 examines the representativeness of the GBC directors in the sample. Specifically, it explores the differences between the backgrounds of the GBC men directors and those of the GBC women directors in comparison with other benchmark boards (public Israeli, public Norwegian, public Swiss, and American Standard & Poor's (S&P) 500 companies; sources are specified in Table 2). This table shows that the backgrounds of the GBC directors, and the difference between the backgrounds of the men versus that of the women GBC directors, are similar to those documented for boards in other countries. Namely, the table shows that the male directors serving on the boards of the 11 GBCs examined i) were older than their female counterparts, a phenomenon that has also been documented for the other 4 benchmark boards for which data are available; ii) possessed more executive experience, which is also documented for all other benchmark boards mentioned previously; and iii) were less educated than the women, which is also documented for the Israeli and Norwegian directors, although not for the Swiss directors.

To conclude, the Israeli GBC directors examined in the present study have backgrounds similar to those of directors in other countries, and the differences in the backgrounds of male and female directors of GBCs are consistent with those reported for boards in other countries. In addition, the legal requirements and responsibilities of GBC boards are very similar to those of boards in other countries, including the United States. For all of these reasons, the gender dynamics of Israeli GBC boards may well reflect those of other boards around the world.

IV. Data and Methods

I have been given access to unique data: detailed minutes of 11 GBCs' board and board-committee meetings for a period of 1 year.[8] The calendar years studied were 2007 (2 companies), 2008 (8 companies), and 2009 (1 company). Of those

[7]Until 2008, the compensation GBC directors received was similar to the compensation outside directors of Israeli public companies were permitted to receive: a fixed annual income no larger than $3,500 plus an additional $180 per meeting. Since 2008, a change in the Rules Applying to Directors of Public Companies standard has allowed outside directors of Israeli public companies to receive substantially higher compensation: They are permitted to receive a fixed annual compensation ranging between $5,000 and $35,000 plus an additional $280–$1,300 per meeting, with the exact amount depending on the size of the firm and the directors' experience. See the Ynet article by Lavi (2007).

[8]The minutes obtained are substantially more detailed than the minutes of the meetings of American boards of directors, which rarely document the board's discussions in detail. I thank the GCA for graciously providing access to the minutes data, both during my employment period and subsequently.

TABLE 2
Representativeness of Sample

Table 2 compares the backgrounds of the directors serving on the boards of the 11 GBCs for which minutes were examined to those of directors serving on boards of other types of companies. "NA" indicates that data are not available. [a]In most studies, executive experience is defined as having been a CEO or having held an executive position previously in an organization (e.g., head of a functional unit, partner/principal, or vice president). However, definitions vary among studies. [b]Figures pertain only to directors whose primary occupation is serving as directors. [c]Figure from Peterson and Philpot (2007); pertains to 2002 Fortune 500 boards.

	GBCs		Public Israeli		Public Norwegian		Public Swiss		American S&P 500	
	Women Directors	Men Directors	Women Directors	Men Directors	Women Directors	Men Directors	Women Directors	Men Directors	Women Directors	Men Directors
Average age	49.3	52.5	51	59	48	55	NA	NA	56[c]	60[c]
Have executive experience[a]	52%	62%	79%	94%	51%	61%	4%	28%	56%	67%
Have undergraduate degree	100%	94%	90%	86%	56%	46%	91%	95%	NA	NA
Have an MA/MBA	56%	44%	85%	78%	24%	22%	79%	84%	NA	NA
Served or are serving on other boards	45%	44%	NA	NA	NA	NA	NA	NA	NA	NA
Of these: nongovernment/ nongovernmental organization (NGO) boards	18%	22%	NA	NA	NA	NA	NA	NA	NA	NA
Currently on a board of a listed company	NA	NA	17%	18%	17%[b]	19%[b]	18%	31%	24%[c]	21%[c]
Number of directors	50	86	684	3,020	249	383	50	1,628	NA	NA
Percentage of each gender	37%	63%	18%	82%	39%	61%	3%	97%	16%	84%
Year examined	2008		2009		2009		2003		2011	
Number of companies examined	11		100		113		269		500	
Source from which data were obtained/used to calculate figure	GCA database		Israeli Stock Exchange Authority (2010)		Ahern and Dittmar (2012)		Ruigrok, Peck, and Tacheva (2007)		Spencer Stuart (2011)	

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examined, 9 of the 11 companies provided minutes of both board meetings and board-committee meetings; the other 2 companies supplied only the former. These minutes amount to 4,758 pages, which document 402 board and board-committee meetings (155 and 247, respectively), in which, according to my tabulation, 2,459 issues were discussed. Confidentiality agreements preclude identification of the specific firms in the sample. However, all 11 firms are among those listed in Table 1, and they tend to reflect the different fields in which the GBCs operate. They are of different sizes, as measured by annual income. As reflected in the bottom section of Table 1, the 11 GBCs studied are among the larger GBCs in Israel.

To allow a structured analysis of the data, I coded the minutes according to the principles of content-analysis methodology (Lieblich, Tuval-Mashiach, and Zilber (1998), Krippendorff (2004)). Content-analysis methodology is a "systematic replicable technique for comprising many words of text into fewer content categories, based on explicit rules of coding" (Stemler (2001)). All coding was done manually (by the author) because the coding guidelines defined required a comprehensive understanding of the contents of the meetings. The coded data were reviewed several times to assure consistency. The following guidelines and categories were used to code the data (further details are given in Internet Appendix B):

1. *General Information*. For each issue discussed, the type of meeting (board/board committee) at which it was discussed was recorded.

2. *Topic Subjects*. Each topic discussed or decision made was coded under one of 23 topic subjects.

3. *Further Updates*. The board requested to receive further information or an update on the subject discussed. When only one director requested the update, this director's name was recorded.

4. *Taking an Initiative*. The board took an action or an initiative. For example, the board approved a lease it was asked to approve, yet it decided to introduce a few revisions of details; it took an active part in defining the steps that should be taken; or it delved into an issue presented to it, discussed the issue, and, finally, formulated and adopted a new alternative policy. When only one director took the initiative, this director's name was recorded. Internet Appendix C provides further illustrative examples for "taking an initiative" and also for the category "further updates" (see previous item 3).

5. *Board Composition*. For each meeting, the total number of attending directors was coded, as were the numbers of attending women directors and outside directors (i.e., directors not employed by the government or the company).

6. *Supervision*. The 23 topic subjects were divided according to whether they were supervisory or managerial in nature. Supervisory issues include the issues for which boards are expected to oversee senior management but not to make managerial decisions themselves. Managerial issues include the type of issues boards are expected (e.g., by law) to act upon.

V. Gender Diversity and Actions Taken by the Board

A. Descriptive Statistics

Because most board actions are unobservable, it is challenging to find good empirical measures of the intensity with which boards both monitor and advise the CEO (see Adams and Ferreira (2007) and Schwartz-Ziv and Weisbach (2013) on these 2 roles boards carry out). Fortunately, in this study, the actual actions directors take can be observed. Accordingly, this study uses a board's request for an update to proxy for the extent to which boards monitor the CEO, and it uses boards taking an initiative (e.g., proposing that the CEO take a specific action) as a proxy for the extent to which boards advise the CEO. Panel A of Table 3 reports summary statistics on these actions.

Graphs A and B of Figure 1 offer an initial indication of how critical masses relate to the frequency with which boards i) request an update and ii) take an initiative, based on the 1,313 issues discussed by the GBC boards at the 155 board meetings examined. These figures reveal that the likelihood of an update being requested or an initiative being taken jumps once the board includes at least 3 directors of each gender.

Panel B of Table 3 provides summary statistics on the critical mass phenomenon. This panel documents that when no more than 2 women directors attend a board meeting, the likelihood of an action being taken is within the 9.56%–10.95% range. When 3 or more women directors are in attendance, that likelihood increases to the 13.06%–16.98% range. Similarly, when no more than 2 men directors are in attendance, the likelihood of an action being taken is within the 4.0%–4.44% range; that likelihood increases sharply to the 12.55%–13.33% range if 3 or more men directors are in attendance. Hence, these figures document that board activeness is more frequent when at least 3 men and/or at least 3 women directors are in attendance.

FIGURE 1

Actions Taken by Boards at Board Meetings

Graphs A and B of Figure 1 examine the 1,313 issues discussed by the 11 GBC boards studied at the 155 board meetings they held. Graphs A and B report the average fraction of cases in which the boards examined i) requested to receive further information or an update or ii) took an initiative. The figures are broken down by the number of women directors in attendance (Graph A) and the number of men directors in attendance (Graph B).

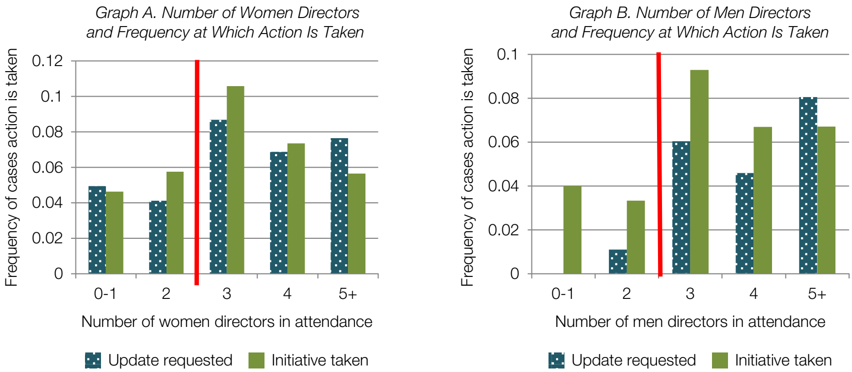

TABLE 3
Representativeness of Sample

Panel A of Table 3 presents summary statistics on the minutes of the 11 GBCs studied. Panel B reports the frequency with which an action was taken at board meetings by the 11 GBC boards examined, given the number of directors of each gender in attendance.

Panel A. Summary Statistics on Minutes Data

	Board Meetings	Committee Meetings	Board and Committee Meetings
Panel A1. Sample Size			
No. of companies examined	11	9	
Total number of meetings examined	155	247	402
Total number of issues discussed	1,313	1,146	2,459
Total number of pages of minutes	2,204	2,554	4,758
Average number of meetings per company	14.1	27.4	
Average number of issues discussed per meeting	8.5	4.6	
Average number of lines in minutes per issue discussed	65	90	
Average number of pages of minutes per meeting	14.2	10.3	
Panel A2. Frequency of Actions Taken by Boards			
Average % of issues discussed for which an update was requested	6.4	17.1	
Average % of issues discussed for which an initiative was taken	6.8	12.1	
Average % of issues discussed for which an update was requested or an initiative was taken	12.4	25.7	
Panel A3. Frequency of Actions Taken by Individual Directors			
Average % of issues discussed for which an action (request or initiative) was taken by a man or a woman director	0.89	4.18	
Average % of issues discussed for which an action was taken by a woman	0.8	4.56	
Average % of issues discussed for which an action was taken by a man	0.91	4.05	
Panel A4. Board Composition in Attendance			
Average number of directors in attendance	8.1	4.3	
Average % of attending directors who are women	36	37	

Panel B. Frequency of Actions Taken at Board Meetings

No. of Women in Attendance	% of Cases in Which Action Was Taken by Board	*N*	No. of Men in Attendance	% of Cases in Which Action Was Taken by Board	*N*
≤1	9.56	324	≤1	4.00	25
2	10.95	219	2	4.44	90
3	16.98	265	3	12.55	215
≥4	13.06	505	≥4	13.33	744

B. Basic Econometric Model

In each meeting, the board is composed of somewhat different members. This variation exists because i) a natural turnover of directors throughout the year examined exists, and ii) not all directors are able to attend all meetings. The varying gender composition of the directors in attendance facilitates the examination of how that composition relates to board activeness. This analysis is executed at the board-meeting-issue level using the following model:

$$A_{bmi} = \alpha_b + \beta_t + B'_{bm}\lambda_1 + I'_{bmi}\lambda_2 + \varepsilon_{bmi}. \quad (1)$$

In equation (1), board is denoted by b, meeting is denoted by m, and issue is denoted by i. A_{bmi} is a binary variable that equals 1 if the board took an action (requested an update and/or took an initiative as defined previously). In most specifications, this action pertains to the board i) requesting to receive further information or an update and/or ii) taking an initiative. B'_{bm} is a vector that documents the independent variables at the board-meeting level: the fraction of women directors in attendance, the square of the fraction of women directors in attendance, a dummy variable that equals 1 if a critical mass of at least 3 women directors is in attendance, a dummy variable that equals 1 if a critical mass of at least 3 men directors is in attendance, the fraction of attending outsiders, the total number of attending directors, a dummy variable that equals 1 if the company is in the process of replacing its CEO at the time the issue is discussed, the fraction of attending directors with executive experience, and the fraction of attending directors with an MA or an MBA.

I'_{bmi} controls for the type of issue discussed using 22 dummy variables that control for the 23 topic subjects. I'_{bmi} includes a dummy variable that equals 1 if the issue discussed is of a supervisory nature rather than a managerial nature, as defined in Section IV. For those analyses including observations from both board and board-committee meetings, I'_{bmi} also includes a dummy that equals 1 if the observation occurred in a board meeting as opposed to a board-committee meeting. All regressions are ordinary least squares (OLS) regressions, unless noted otherwise. α_b controls for company fixed effects. β_t controls for the year for which the minutes were examined (2007, 2008, or 2009). Standard errors are clustered at the meeting level.

C. Are Gender-Balanced Boards More Active?

Table 4 starts by examining how the gender composition of boards relates to board activeness. Columns 1 and 2 of Table 4 examine whether a linear or a U-shaped relation exists between the fraction of women directors in attendance and the likelihood of boards either requesting an update or taking an initiative. The dependent variable in these regressions is equal to 1 if the board took an action (i.e., either requested an update or took an initiative), and 0 otherwise. Column 1 examines only observations from board meetings, whereas column 2 examines only observations from board-committee meetings. Both regressions fail to establish a significant linear or U-shaped relation between gender composition and board activeness. For both specifications, such nonsignificant results are obtained (in unreported specifications) when including only the fraction of women directors in attendance and excluding its square and also when defining a binary dependent variable that equals 1 only if an update is requested or, alternatively, only if an initiative is taken. Perhaps this suggests that a linear or U-shaped function is not the ideal model for characterizing the relation between gender and board activeness.

The regressions in columns 3–7 of Table 4 explore the main hypothesis of this paper, namely, that a critical mass of at least 3 directors of one, or both, genders catalyzes board activeness. Indeed, the results show that a critical mass of at least 3 women directors (THREE_OR_MORE_WOMEN_DIRECTORS_IN_ATTENDANCE) significantly increases the likelihood of the board requesting an update (column 3) and taking an initiative (column 4). The coefficient in columns 3–4 that controls for the presence of a critical mass of at

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TABLE 4
Gender Composition and Board Activeness

Table 4 reports regressions that analyze the issues discussed at the board-meeting-issue level. These issues were discussed at board and board-committee meetings held by the 11 GBCs examined. The dependent variable in columns 1–2 and 5–7 is a binary variable that equals 1 if the board either requested to receive further information or an update or if it took an initiative (e.g., suggested which action should be taken). In column 3, the dependent variable equals 1 if the board requested an update; in column 4, the dependent variable equals 1 if the board took an initiative. The primary independent variables are as follows: the fraction of attending women directors and its square, a dummy that equals 1 when at least 3 women directors were in attendance, a dummy that equals 1 when at least 3 men directors were in attendance, a dummy that equals 1 if at least 3 directors of each gender were in attendance, a dummy that equals 1 if the board included a small critical mass (3 directors of both genders or 3 directors of one gender and 4 of the other), and a dummy that equals 1 if the board included a large critical mass (a dual critical mass that is larger than a small critical mass). In addition, the regressions control for the fraction of attending outside directors, the total number of directors in attendance, the average number of years of executive experience of the attending directors, the fraction of attending directors with an MA/MBA, whether the firm was in the process of replacing the CEO (using a dummy that equals 1 if this is the case), and whether the issue discussed was one of a supervisory nature, as described in Section IV (using a dummy that equals 1 if this is the case). For each variable, the first row in columns 1–5 and 7 reports the coefficient, and the first row in column 6 reports the odds ratio. For all variables and regressions, the second line (in parentheses) reports clustered errors at the meeting level. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

	Action Taken		Update	Initiative	Action Taken		
	1	2	3	4	5	6	7
FRACTION_OF_WOMEN_DIRECTORS_IN_ATTENDANCE	−0.268	−0.083					
	(0.226)	(0.250)					
SQUARE_OF_FRACTION_OF_WOMEN_DIRECTORS_IN_ATTENDANCE	0.302	0.106					
	(0.255)	(0.307)					
THREE_OR_MORE_WOMEN_DIRECTORS_IN_ATTENDANCE			0.044**	0.092***			
			(0.019)	(0.029)			
THREE_OR_MORE_MEN_DIRECTORS_IN_ATTENDANCE			0.031	0.035			
			(0.021)	(0.025)			
AT_LEAST_THREE_DIRECTORS_OF_EACH_GENDER					0.098***	2.832***	
					(0.032)	(0.315)	
SMALL_CRITICAL_MASS							0.075*
							(0.040)
LARGE_CRITICAL_MASS							0.123***
							(0.040)
FRACTION_OF_OUTSIDERS	−0.059	−0.062	−0.003	0.007	−0.033	0.419	−0.04
	(0.046)	(0.088)	(0.039)	(0.033)	(0.047)	(0.752)	(0.049)
NUMBER_OF_DIRECTORS_IN_ATTENDANCE	0.003	−0.012	−0.007	0.001	−0.006	0.948	−0.01
	(0.007)	(0.017)	(0.004)	(0.004)	(0.006)	(0.065)	(0.007)
FRACTION_WITH_EXECUTIVE_EXPERIENCE	0.006	−0.002	0.003	−0.002	0.001	1.04	0.002
	(0.007)	(0.005)	(0.006)	(0.005)	(0.008)	(0.084)	(0.008)
FRACTION_WITH_MA_OR_MBA	0.088	−0.163**	−0.043	0.166***	0.078	2.157	0.069
	(0.088)	(0.077)	(0.062)	(0.049)	(0.078)	(0.831)	(0.080)
DUMMY_SUPERVISORY_ISSUE	−0.031	0.387***	−0.086**	0.140***	0.027	0.000***	0.036
	(0.045)	(0.056)	(0.040)	(0.031)	(0.049)	(1.185)	(0.053)
BETWEEN_CEOS	0.053	0.052	0.009	0.049*	0.06	1.577	0.047
	(0.051)	(0.057)	(0.033)	(0.025)	(0.044)	(0.347)	(0.046)
Company, year, and topic-subject dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Meetings examined	Board	Committee	Board	Board	Board	Board	Board
Type of regressions	OLS	OLS	OLS	OLS	OLS	Logit	OLS
R^2	0.075	0.141	0.059	0.077	0.084		0.084
N	1,313	1,145	1,313	1,313	1,313	1,313	1,313

least 3 men directors is positive, yet its impact is statistically insignificant. However, this insignificant result may derive from the limited variation concerning a critical mass of men directors: In only 9% of the observations did the boards examined not include a critical mass of men directors.

Column 5 in Table 4 supports the aforementioned hypothesis and reports that if at least 3 directors of both genders are in attendance, the board is significantly (at the 1% level) more likely to take an action (i.e., to request an update or to take an initiative). The economic magnitude documented is quite substantial: Compared with the average percentage of cases in which boards took an action at board meetings when no critical mass was in attendance (9.8%), column 5 estimates an increase of 100% (0.098/0.098). A more conservative estimate would be based on the average percentage of issues for which an action was taken at a board meeting, which is equal to 12.4% (as documented in Panel A of Table 3). Compared with this average, having a critical mass of both genders is expected to increase the likelihood of the board taking an action by 79% (0.098/0.124). In this paper, when interpreting the magnitudes of subsequent findings, I will follow the latter conservative estimate; accordingly, I will estimate the economic magnitudes using the average frequency with which an action was taken.

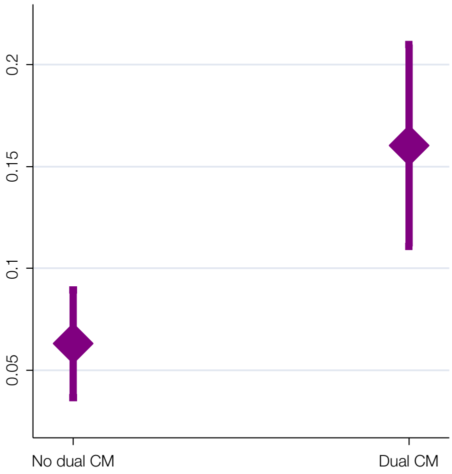
The regression in column 6 of Table 4 is the logit version of the regression in column 5. Similar to the results for column 5, column 6 shows that a critical mass of at least 3 directors of each gender significantly increases (at the 1% level) the likelihood of the board either requesting an update or taking an initiative. The odds ratio reported in column 6 for the variable AT_LEAST_THREE_DIRECTORS_OF_EACH_GENDER equals 2.83. To allow a clear understanding of the latter magnitude, based on this logit model, Figure 2 reports the predicted probabilities that an action is taken if a dual critical mass is or is not present. These probabilities are evaluated at the mean of the covariates of the control variables included in this regression. Figure 2 estimates that when no dual critical mass is in attendance, the probability of a board taking an action is 6.2%; this probability jumps to 16% when a dual critical mass is in attendance. Put differently, columns 5–6 of Table 4 show that boards that include a dual critical mass are at least 79% more active, with the precise magnitude depending on the econometric method and benchmark used.

In the regression in column 7 of Table 4, I examine whether the results are driven by both large critical masses and small ones. A small critical mass is defined as a board with exactly 3 directors of each gender or 3 directors of one gender and 4 of the other gender. A large critical mass is defined as a board whose critical mass is larger than a small critical mass. Essentially, column 7 compares each of these critical masses to the base group (i.e., boards that do not have the critical masses defined). The results in column 7 indicate that both a small critical mass and a large one significantly increase the likelihood of an action being taken by the board (results are significant at the 10% and 1% levels, respectively). This finding shows that the results are driven by both types of critical masses.

One may wonder if a jump in board activeness also is observed when the board includes at least 2 directors of each gender in attendance. Column 1 of Table 5 documents that having at least 2 directors of each gender is not associated with a significant increase in board activeness.

FIGURE 2
Predictive Likelihood of an Action Being Taken

For the 11 GBCs examined, Figure 2 reports the predictive likelihood of an action being taken at a board meeting (i.e., the board requested to receive further information/update, or the board took an initiative) given that a dual critical mass (CM) is or is not present. The prediction reported is based on the logit model reported in column 6 of Table 4, using the mean of the covariates of the control variables included in this regression. The error bars indicate the 95% confidence interval.



A potential concern is that the results pertaining to the activeness of gender-balanced boards are driven by large boards. Specifically, large boards may be particularly likely to be defined as gender balanced because they include more directors, and therefore they are also more likely to have at least 3 directors of each gender. To address this concern, I reestimate the results using an alternative definition for gender-balanced boards, one that is not sensitive to the board's size: a board in which 35%–65% of the attending directors are women. The latter definition follows, once again, the critical mass theory, which argues that in a team/board, each gender should comprise at least 35% of the team/board (implying that no more than 65% of the directors should be women).

Accordingly, the regression in column 2 of Table 5 includes the dummy variable 35%_TO_65%_WOMEN_DIRECTORS, which equals 1 if 35%–65% of the directors attending are women. Column 2 of Table 5 documents that boards in which 35%–65% of the attending directors are women are, indeed, significantly more likely to take an action than are boards in which 0%–35% or 65%–100% of the attending directors are women. The coefficient for the dummy variable 35%_TO_65%_WOMEN_DIRECTORS is equal to 0.0685. This coefficient is somewhat smaller than the parallel one estimated when a dual critical mass is defined as a board that includes at least 3 directors of each gender (0.098 according to column 5 of Table 4). Nevertheless, the results estimate a substantial increase of 69.9% (0.0685/0.098) in the likelihood of an action being taken when 35%–65% of the board members are women (this result is significant at the 1% level).

TABLE 5

Gender Composition and Board Activeness Using Alternative Measures for Critical Masses

Table 5 reports OLS regressions that analyze, at the board-meeting-issue level, the issues discussed at board meetings of the 11 GBCs examined. The dependent variable is a binary variable that equals 1 if the board requested to receive an update or further information or if it took an initiative (e.g., suggested which action should be taken). The primary independent variables are as follows: a dummy that equals 1 if at least 2 women directors were in attendance; a dummy that equals 1 if at least 2 men directors were in attendance; and dummies that equal 1 if the fraction of attending women directors was between 35% and 65%, 25% and 35% or 65% and 75%, or 45% and 55%. In addition, the regressions control for the fraction of attending outside directors, the total number of attending directors, the average number of years of executive experience of the attending directors, the fraction of attending directors with an MA/MBA, whether the firm was in the process of replacing the CEO (using a dummy that equals 1 if this is the case), and whether the issue discussed was one of a supervisory nature, as described in Section IV (using a dummy that equals 1 if this is the case). For each variable, the coefficient and the clustered errors (in parentheses) are reported at the meeting level. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

	Action Taken			
	1	2	3	4
TWO_OR_MORE_WOMEN_DIRECTORS_IN_ATTENDANCE	−0.0318 (0.503)			
TWO_OR_MORE_MEN_DIRECTORS_IN_ATTENDANCE	0.0108 (0.831)			
35%_TO_65%_WOMEN_DIRECTORS		0.0685** (0.033)	0.0740** (0.033)	0.0808** (0.015)
25%_TO_35%_OR_65%_TO_75%_WOMEN_DIRECTORS			−0.025 (0.553)	
45%_TO_55%_WOMEN_DIRECTORS				−0.0403 (0.235)
FRACTION_OF_OUTSIDERS	−0.0745 (0.146)	−0.0232 (0.639)	−0.0196 (0.691)	−0.0316 (0.521)
NUMBER_OF_DIRECTORS_IN_ATTENDANCE	0.0038 (0.589)	0.0015 (0.794)	0.0016 (0.775)	0.000 (0.998)
FRACTION_WITH_EXECUTIVE_EXPERIENCE	0.0051 (0.486)	−0.0007 (0.921)	−0.0001 (0.987)	0.0005 (0.945)
FRACTION_WITH_MA_OR_MBA	0.0866 (0.310)	0.0804 (0.329)	0.0927 (0.292)	0.0846 (0.305)
DUMMY_SUPERVISORY_ISSUE	−0.0091 (0.860)	0.0191 (0.708)	0.0016 (0.977)	0.0136 (0.784)
BETWEEN_CEOS	0.0418 (0.440)	0.0595 (0.186)	0.0575 (0.204)	0.0605 (0.183)
Company, year, and topic-subject dummies	Yes	Yes	Yes	Yes
R^2	0.075	0.081	0.08	0.081
N	1,313	1,313	1,313	1,313

The regressions in columns 3 and 4 of Table 5 examine the robustness of the 35%_TO_65%_WOMEN_DIRECTORS range defined previously. Regression 3 includes the dummy 25%_TO_35%_OR_65%_TO_75%_WOMEN_DIRECTORS, which equals 1 if the percentage of women directors in attendance is in those ranges. This variable is included to examine whether widening the range defined as gender balanced from 35%–65% women in attendance to 25%–75% women in attendance further increases board activeness. Once again, in column 3, the 35%_TO_65%_WOMEN_DIRECTORS dummy enters the regression significantly, but the 25%_TO_35%_OR_65%_TO_75%_WOMEN_DIRECTORS dummy variable does not (and it has a negative coefficient). This indicates that expanding the range of 35%–65% to a range of 25%–75% does not further increase board activeness compared with a nongender-balanced board.

Column 4 of Table 5 examines whether having a particularly gender-balanced board, defined as 45%_TO_55%_WOMEN_DIRECTORS, further increases board activeness. Once again, the 35%_TO_65%_WOMEN_DIRECTORS variable is found to increase board activeness significantly, whereas the coefficient for 45%_TO_55%_WOMEN_DIRECTORS is negative and insignificant. This indicates that having an extremely gender-balanced board does not further increase board activeness.

Last, in unreported specifications, I examine whether the relation between the gender composition of board committees and their activeness also follows a step function at board-committee meetings (which, as reported in Panel A of Table 3, are attended by 4.3 directors on average). These specifications examine whether having at least one director of each gender or, alternatively, at least 2 directors of each gender significantly increases the likelihood that the board committee take an action (i.e., request an update and/or take an initiative). No such significant relation is found. These results imply that the critical mass effect is particularly pronounced at board meetings (as larger teams) rather than at board-committee meetings (as small teams). Overall, the analysis in this section documents that boards are particularly active when at least 3 men and 3 women directors are in attendance.

D. Gender-Balanced Boards and Board Activeness: 2-Stage Least Squares Analysis

I next address the possibility that one or both genders prefer to attend meetings that are expected to require low or, alternatively, high levels of activeness. A director may develop such expectations based on the agenda and materials he or she receives (usually at least several days) prior to each meeting. If this is indeed the case, the existence of a critical mass of each gender may be endogenous.[9] This section addresses this possibility by introducing a model similar to the one presented in Section V.B, with one difference: The model in this section assumes that the presence of a critical mass of at least 3 women directors or at least 3 men directors is endogenous.

Accordingly, the model includes exogenous IVs that control for the likelihood of a critical mass of women directors and a critical mass of men directors attending a particular board meeting in which a particular issue is discussed. Exogenous variables exist as a result of the customary ways in which meetings are scheduled. Committee meetings are frequently scheduled on the same day as board meetings, just before or immediately after the board meeting. Because different directors sit on different board committees, a variation exists in the total number of meetings to which each individual director is invited on a day on which a board meeting takes place. Correspondingly, both genders of directors will also have a different number of meetings to which they are invited.

If a director is a member of a board committee that meets before or after the board meeting, he or she has a stronger incentive to attend (both) meetings because the only compensation GBC directors receive is a fixed amount for each meeting they attend (as described in Section III). Hence, a director who has a board meeting and a board-committee meeting scheduled on the same day must

[9]The attendance rates of GBC men and women directors examined are similar: On the level of the individual directors, the average percentage of meetings a director was invited to but did not attend equals 20% for women directors and 19% for men directors.

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commute only once (because the meetings are held at the same location) but receives compensation that corresponds to the number of meetings he or she attends. In addition, regardless of the financial compensation, directors usually want to be involved; therefore, they may prefer to attend meetings on days in which they have an increased opportunity to do so (i.e., the days when they have more than one meeting scheduled).

Thus, using the number of women who were invited to at least one board-committee meeting scheduled on the same day as a board meeting at which a particular issue was discussed instruments for the likelihood that a critical mass of women attends the board meeting. A parallel variable is constructed to instrument for the presence of a critical mass of men directors.

These instruments conform to the requirements of an IV: As will be shown, these IVs are positively and significantly (at the 1% level) related to the attendance of critical masses of both men and women directors. In addition, because in the vast majority of cases the meetings are scheduled well in advance (6–12 months), and almost all meetings are held on their scheduled dates, the IVs have no direct impact on the likelihood of boards taking an action (i.e., requesting to receive an update or taking an initiative) at a given board meeting. The meetings' agendas are determined only *after* they are scheduled, usually 1–3 weeks prior to the meeting. It follows that the scheduling of a board-committee meeting on a particular day should not be correlated with the directors' expectations that the board meeting held on the same day will require a high (low) level of board activeness.

Moreover, Internet Appendix D addresses potential exclusion restriction concerns. This Appendix confirms that firms do not seem to modify the types of issues brought up for discussion at board meetings depending on whether a board-committee meeting is also being held or whether the board includes a dual critical mass. Accordingly, the following 2-stage least squares (2SLS) model is defined (using the notations introduced in Section V.B):

$$(2)\qquad A_{bmi} = \alpha_b + \beta_t + \mathrm{CMW}_{bmi} + \mathrm{CMM}_{bmi} + B'_{bm}\lambda_1 + I'_{bmi}\lambda_2 + \upsilon_{bmi}.$$

The difference between the OLS model, specified in equation (1) in Section V.B, and the 2SLS model, specified here in equation (2), is that the primary variables in the latter equation documenting the gender composition in attendance are assumed to be endogenous. These endogenous variables are denoted in equation (2) by CMW_{bmi}, which is a dummy variable that equals 1 if at least 3 women directors are in attendance, and CMM_{bmi}, which is a parallel variable for men directors. As described previously, 2 exogenous variables are used to solve this equation: CoW_{bmi}, which is an instrument that equals the number of women directors who were invited to at least one board-committee meeting held on the same day issue i was discussed at a board meeting, and CoM_{bmi}, which is a parallel variable for men directors. Accordingly, the 2SLS model includes the following 2 first-stage equations:

$$(3)\qquad \mathrm{CMW}_{bmi} = \mathrm{CoW}_{bmi} + \mathrm{CoM}_{bmi} + \alpha_b + \beta_t + B'_{bm}\lambda_1 + I'_{bmi}\lambda_2 + \varepsilon a_{bmi},$$

and

$$(4)\qquad \mathrm{CMM}_{bmi} = \mathrm{CoW}_{bmi} + \mathrm{CoM}_{bmi} + \alpha_b + \beta_t + B'_{bm}\lambda_1 + I'_{bmi}\lambda_2 + \varepsilon b_{bmi}.$$

Each of these 2 first-stage regressions predicts the likelihood of a critical mass of a certain gender attending the board meeting, given the number of directors of the same gender that were invited to a board-committee meeting held on the same day.

Columns 1–2 of Table 6 record the first-stage equations (equations (3) and (4), respectively). Indeed, column 1 documents that the number of women directors who were invited to at least one board-committee meeting held on the same day that issue i was discussed is positively and significantly (at the 1% level) related to the likelihood of a critical mass of at least 3 women directors being present at a board meeting. Similarly, column 2 establishes parallel results for men directors. Both columns 1 and 2 of Table 6 report that the Angrist and Pischke (2009) multivariate F-test is larger than the $F = 10$ threshold suggested by Stock, Wright, and Yogo (2002) as the minimal threshold required to conclude that the instruments used are strong.

The results of the second stage of the 2SLS analysis (equation (2)) are reported in columns 3–6 of Table 6. The dependent variable in these regressions is a binary variable that equals 1 if the board requested to receive further information or an update (column 3), took an initiative such as suggesting which action should be taken (column 4), or either requested an update or took an initiative (columns 5–6). Consistent with the results presented in Section V.C, the results of the 2SLS analysis reported in Table 6 indicate that the presence of a critical mass of women directors and to some extent a critical mass of men directors (columns 3–5), or a dual critical mass (regression 6), is associated with a significant increase in the likelihood of the board requesting an update and/or taking an initiative. Hence, the 2SLS analysis confirms the results obtained in the OLS regressions.

The economic magnitudes documented for the critical mass effect reported in the 2SLS analysis (Table 6) are substantially larger than those obtained in the OLS analysis (Table 4). To examine whether the 2SLS model is indeed required to address endogeneity concerns in this case and, accordingly, whether the economic magnitude of the 2SLS model is more reliable, the Anderson (1951) canonical correlation statistic is reported for the regressions in column 5 of Table 6. This figure, which tests the relevance of the instruments, is large, and its p-value is small, indicating that the 2 instruments are jointly valid.

However, the Hausman (1978) test indicates that for each of the regressions in columns 3–6 of Table 6, the Hausman test fails to reject, at the 1% level, the null hypothesis that no difference exists between the 2SLS and the OLS estimates. Put differently, the results of the Hausman test imply that no systematic difference exists between the OLS and the 2SLS estimates. Therefore, given that the 2SLS results are biased and inconsistent in finite samples, in this case, the estimates of the OLS model provide the most accurate estimation of the magnitude of the critical mass effect. The contribution of the 2SLS analysis is that it demonstrates that the significant and positive effect of a critical mass of women directors is not driven by nonrandom attendance. In sum, the results in this section reinforce the conclusion that appointing gender-balanced boards catalyzes board activeness.

TABLE 6

Gender Composition and Board Activeness: 2SLS Analysis

Table 6 reports results of a linear 2SLS model that analyzes, at the board-meeting-issue level, the 1,313 issues discussed. These issues were discussed at board meetings held by the 11 GBCs examined. The model instruments for the likelihood of a critical mass of at least 3 women directors attending a particular board meeting in which a particular issue is discussed using an instrumental variable that equals the number of women directors invited to at least one board-committee meeting held on the same day when a particular issue was discussed at the board meeting. A parallel instrumental variable is constructed to predict the likelihood of the board including at least 3 men directors. Columns 1–2 report the first-stage regressions of the 2SLS analyses. In columns 3–6, which report the second stage of the 2SLS analysis, the dependent variable is a binary variable that equals 1 if the board requested to receive further information or an update (column 3); took an initiative, such as suggesting which action should be taken (column 4); or either requested an update or took an initiative (columns 5–6). The regressions include the following control variables (not reported): the fraction of attending outside directors, the total number of attending directors, the average number of years of executive experience of the attending directors, the fraction of attending directors with an MA/MBA, a dummy that equals 1 if the firm was in the process of replacing the CEO, and a dummy that equals 1 if the issue discussed was one of a supervisory nature, as described in Section IV. For each variable, the coefficient and the standard errors (in parentheses) are reported. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

	3 or More Women in Attendance	3 or More Men in Attendance	Update	Initiative	Update or Initiative	
	1	2	3	4	5	6
NUMBER_OF_WOMEN_INVITED_TO_BOARD_COMMITTEE	0.061*** (0.006)	−0.015*** (0.005)				
NUMBER_OF_MEN_INVITED_TO_BOARD_COMMITTEE	−0.017*** (0.005)	0.017*** (0.004)				
THREE_OR_MORE_WOMEN_DIRECTORS_IN_ATTENDANCE			0.241** (0.122)	0.338*** (0.128)	0.561*** (0.201)	
THREE_OR_MORE_MEN_DIRECTORS_IN_ATTENDANCE			0.576 (0.370)	0.659* (0.389)	1.401** (0.611)	
AT_LEAST_THREE_DIRECTORS_OF_EACH_GENDER						0.558*** (0.160)
Board control variables	Yes	Yes	Yes	Yes	Yes	Yes
Year and firm dummies	Yes	Yes	Yes	Yes	Yes	Yes
Topic-subject dummies	Yes	Yes	Yes	Yes	Yes	Yes
2SLS equation estimated	First stage	First stage	Second stage	Second stage	Second stage	Second stage
No. of observations	1,313	1,313	1,313	1,313	1,313	1,313
R^2	0.712	0.369				
Angrist–Pischke F-test	66.38	10.01				
Hausman p-value			2.55 0.999	2.45 0.999	3.81 0.999	8.02 0.999
Anderson canonical correlations p-value					10.39*** 0.001	

VI. Gender Composition and Activeness of Individual Directors

This section examines how a board's gender composition relates to the extent to which *individual* directors are active. Put differently, this section examines, on the level of the individual director, whether a man or a woman director took an action (i.e., requested an update or took an initiative) when an issue was brought up for discussion. Accordingly, the observations in this section are at the board-meeting-issue-director level.

To facilitate this level of analysis, for each case in which a single director either requested to receive further information/an update or took an initiative, the action taken was attributed to the specific director taking the action and thereby also to a specific gender. If more than one director took the action, the action was not attributed to a specific director. I am able to attribute 69% of the actions taken to one specific director. The remaining actions were taken by more than one director, and are therefore not linked to a specific director and gender. These observations are not included in the analysis presented in this section.[10]

To estimate how the gender of the director relates to the extent to which he or she is active, given the gender composition in attendance, the following econometric model is defined, at the board-meeting-issue-director level (using the notations from Section V.B):

$$(5) \qquad A_{bmid} \quad = \quad \alpha_b + \beta_t + B'_{bm}\lambda_1 + D'_{bmd}\lambda_2 + I'_{bmi}\lambda_3 + \varepsilon_{bmid}.$$

Equation (5) contains an additional vector that is not included in equation (1): D'_{dbm}. This controls for the director-level variables (the subscript d denotes director). This vector includes a dummy variable that equals 1 if the observation pertains to a woman director, a dummy that equals 1 if the director holds an MA or MBA, and the number of years of executive experience the director has. Standard errors are clustered at the director level.

Table 7 examines how the gender of directors relates to the frequency with which they take an action. Accordingly, the dependent variable in the specifications reported in Table 7 is a binary variable that equals 1 if a given director took an action, and 0 otherwise. Column 1 of Table 7 documents an insignificant relation between WOMAN_DIRECTOR and the likelihood of an action being taken at a board meeting, indicating that one gender is not clearly more active than the other at board meetings. In contrast, column 2 documents a positive and significant relation between WOMAN_DIRECTOR and the likelihood of an action being taken in board-committee meetings. This indicates that women directors are more active at board-committee meetings than are men directors. Perhaps women directors are particularly comfortable being active in small teams such as board committees.

Columns 3–5 of Table 7 explore how critical masses of each gender relate to directors' activeness at board meetings. Consistent with the findings reported in Table 4, column 3 of Table 7 confirms that when boards include at least 3 women directors, directors are significantly more likely to take an action at board meetings.

To estimate the effect of critical masses on the activeness of each gender of directors, Table 7 examines the observations pertaining to each gender separately. Column 4 includes only the observations pertaining to women directors, whereas column 5 includes those that pertain to men directors. Column 4 reveals that women directors are significantly more active when a critical mass of women directors is in attendance. A woman director is likely to take an action at board meetings in 0.8% of the cases on average (as documented in Panel A of Table 3); column 4 estimates that having a critical mass of at least 3 women directors increases the likelihood of a woman director taking an action by 180%

[10]Due to the limited size of the sample, it is not possible to conduct a detailed analysis of the cases in which an action was taken by 2 or more directors by further breaking down the gender of those taking the action into more refined categories (e.g., action taken by only men directors, by only women directors, or by both genders).

TABLE 7

Women and Men Directors Taking Action

Table 7 examines whether or not a director took an action (either requesting an update or taking an initiative) at the board-meeting-issue-director level; the analysis refers to the 11 GBCs examined. The dependent binary variable in the OLS regressions equals 1 if the director took an action, and 0 otherwise. The primary independent variables are as follows: a dummy that equals 1 in cases in which the director taking the action was a woman, the fraction of all women directors in attendance and its square, a dummy that equals 1 if at least 3 women directors were in attendance, and a dummy that equals 1 if at least 3 men directors were in attendance. In addition, the regressions control for the fraction of outsiders, number of directors in attendance, number of years of executive experience of the director taking the action, whether the director taking the action has an MA or an MBA (using a dummy that equals 1 if he or she does), whether the company was in the process of replacing the CEO at the time the issue was discussed (using a dummy that equals 1 if this is the case), and whether the issue discussed is one of a supervisory nature, as described in Section IV (using a dummy that equals 1 if this is the case). For each variable, the coefficient and the clustered errors (in parentheses) are reported at the director level. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

	Action Taken by Director				
	1	2	3	4	5
WOMAN_DIRECTOR	−0.0011 (0.002)	0.0468** (0.020)	−0.0018 (0.002)		
FRACTION_OF_WOMEN_DIRECTORS_IN_ATTENDANCE	−0.0586** (0.026)	−0.1236** (0.055)			
SQUARE_OF_FRACTION_OF_WOMEN_DIRECTORS_IN_ATTENDANCE	0.0624** (0.032)	0.1751** (0.068)			
THREE_OR_MORE_WOMEN_DIRECTORS_IN_ATTENDANCE			0.0072** (0.004)	0.0144** (0.006)	0.0044 (0.005)
THREE_OR_MORE_MEN_DIRECTORS_IN_ATTENDANCE			0.0048 (0.004)	0.0033 (0.005)	0.006 (0.008)
FRACTION_OF_OUTSIDERS	−0.0034 (0.004)	−0.0301* (0.018)	−0.0032 (0.004)	0.0042 (0.007)	−0.0039 (0.005)
NUMBER_OF_DIRECTORS_IN_ATTENDANCE	−0.0009* (0.001)	−0.0105*** (0.003)	−0.0015*** (0.001)	−0.0002 (0.001)	−0.0022*** (0.001)
FRACTION WITH_MA_OR_MBA	0.0057*** (0.002)	−0.0162** (0.007)	0.0055*** (0.002)	0.0064* (0.003)	0.0062** (0.003)
FRACTION_WITH_EXECUTIVE_EXPERIENCE	0.0003*** (0.000)	−0.0002 (0.000)	0.0003*** (0.000)	0.0001 (0.000)	0.0003** (0.000)
BETWEEN_CEOS	0.0048 (0.004)	0.0005 (0.014)	0.005 (0.004)	0.0250*** (0.007)	−0.0031 (0.005)
DUMMY_SUPERVISORY_ISSUE	−0.0069 (0.034)	0.0723 (0.065)	0.0007 (0.034)	0.003 (0.089)	−0.0005 (0.038)
Meetings examined	Board	Committee	Board	Board	Board
Gender examined	Both	Both	Both	Women	Men
Company, year, and topic-subject dummies	Yes	Yes	Yes	Yes	Yes
R^2	0.006	0.017	0.006	0.004	0.011
N	10,588	5,047	10,588	3,865	6,723

(0.0144/0.008). This finding provides support for the board version of the critical-mass theory (Rosener (1995), Shrader et al. (1997), and Kramer et al. (2006), as discussed in Section II.A), which argues that women directors are more active at board meetings once the board includes at least 3 women directors.

Columns 4 and 5 of Table 7 both present a positive relation between the critical masses of one gender and activeness of the other gender. For example, column 4 documents that when a critical mass of men directors is in attendance, the likelihood of a woman director taking an action increases by 0.33%. Such patterns are consistent with the peer-monitoring theory discussed in Section II.A, which proposes that one gender monitors the other, which in turn catalyzes the activeness of individual team members. However, these cross-gender coefficients are insignificant, and therefore it is not possible to conclude with confidence that peer monitoring between genders indeed occurs.

Internet Appendix E explores how directors' genders relate to the types of issues about which men and women directors choose to be active. This Appendix reveals that women directors are more likely to be active with respect to supervisory issues, whereas men directors are more likely to be active with respect to managerial issues. However, the presence of a critical mass of one's own gender is found to mitigate these tendencies. It increases the likelihood of a director taking an action on a type of issue that the other gender is typically active about (e.g., women directors are more likely to take an action pertaining to a managerial issue when a critical mass of women directors is in attendance). In sum, the analysis in this section documents that the presence of a critical mass of women directors significantly increases the likelihood of women directors being active at board meetings.

VII. The Gender of Directors at Times of CEO Turnover

Firing and hiring the CEO and bridging the gaps between CEOs are among a board's most important functions (Mace (1971), Weisbach (1988), and Adams and Ferreira (2009)). I focus on this transitional time to gain a better understanding of how the gender composition of boards relates to the working of boards during periods when boards are particularly needed.

A. Gender Composition and CEO Turnover

This section examines the relation between the gender composition of boards and CEO turnover, given the financial performance of GBCs. This analysis is conducted using a panel data set for the universe of the 34 GBCs for the years 2000–2009. These data were obtained from an internal database of the GCA and from the annual reports it publishes. Since 1993, Israeli GBCs have been legally required to maintain gender-balanced boards. For this reason, during the period examined, women directors constituted 34% of GBC boards on average (which is a relatively large percentage).

Table 8 examines how the gender composition of boards, given the financial performance, relates to the likelihood that CEO turnover occurs. The regressions reported are at the company-year level. The dependent variable in the regressions is a binary variable that equals 1 if CEO turnover occurred in a given company in a given year.[11] The primary independent variables examined are the ones that control for gender composition and those that control for financial performance (measured by ROE). Year and firm dummies are included, and standard errors are clustered at the company level.

Column 1 of Table 8 starts by examining whether, given the financial situation of the company, a linear relation exists between the gender composition of the board and CEO turnover. The regression does not document such a significant relation. Column 2 of Table 8 documents (via the FRACTION_OF_WOMEN $\times$ ROE coefficient) that when women constitute a small fraction of the board, and performance is weak, CEO turnover is less likely to occur. However, once the fraction of women directors increases in weak companies (as indicated by the

[11]During the 2000–2009 period examined, 59 CEO turnovers occurred in the 34 GBCs.

TABLE 8
Gender Composition and CEO Turnover

Table 8 reports OLS regressions that analyze a panel data set at the company-year level for the universe of the 34 GBCs in the years 2000–2009. The dependent variable is a binary variable that equals 1 if CEO turnover occurred in a given company in a given year. The primary independent variables are the fraction of women directors serving on a board and its square, the fraction of women directors serving on a board times ROE (ROE is expressed in decimals), the square of the fraction of women directors serving on a board times ROE, a dummy that equals 1 if at least 3 women were serving on the board, that dummy times ROE, a dummy that equals 1 if at least 3 men were serving on the board, and that dummy times ROE. In addition, the regressions control for the ROE, the fraction of outside directors, the total number of directors, the tenure of the CEO, and whether the CEO was female or male (using a dummy variable that equals 1 if the CEO is a woman). For each variable, the coefficient and the clustered errors (in parentheses) are reported at the firm level. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

	CEO Turnover				
	1	2	3	4	5
FRACTION_OF_WOMEN_DIRECTORS	0.259	−0.77			
	(0.272)	(0.505)			
FRACTION_OF_WOMEN × ROE	−0.591	11.065**			
	(1.691)	(4.194)			
SQUARE_OF_FRACTION_OF_WOMEN_DIRECTORS		1.579**			
		(0.618)			
SQUARE_OF_FRACTION_OF_WOMEN × ROE		−18.284***			
		(5.737)			
THREE_OR_MORE_WOMEN_DIRECTORS_APPOINTED			0.088	0.128*	
			(0.067)	(0.070)	
THREE_OR_MORE_WOMEN × ROE				−1.752*	
				(0.913)	
THREE_OR_MORE_WOMEN_DIRECTORS_APPOINTED			0.005	0.018	
			(0.133)	(0.134)	
THREE_OR_MORE_MEN × ROE				−0.695	
				(0.852)	
AT_LEAST_THREE_DIRECTORS_OF_EACH_GENDER					0.172**
					(0.084)
AT_LEAST_THREE_DIRECTORS_OF_EACH_GENDER × ROE					−2.027**
					(0.883)
ROE	0.052	−1.494*	−0.225	0.628	0.389
	(0.641)	(0.805)	(0.358)	(0.861)	(0.301)
FRACTION_OF_OUTSIDERS	−0.14	−0.092	−0.108	−0.136	−0.191
	(0.168)	(0.170)	(0.171)	(0.171)	(0.134)
CEO_TENURE	0.049**	0.052***	0.050**	0.049**	0.050**
	(0.018)	(0.018)	(0.019)	(0.019)	(0.018)
NUMBER_OF_DIRECTORS	−0.004	−0.001	−0.009	−0.014	−0.014
	(0.013)	(0.014)	(0.017)	(0.018)	(0.020)
WOMAN_CEO	0.451**	0.434**	0.465**	0.480**	0.455***
	(0.187)	(0.186)	(0.182)	(0.181)	(0.135)
R^2	0.193	0.21	0.181	0.188	0.009
N	222	222	244	244	244

SQUARE_OF_FRACTION_OF_WOMEN × ROE coefficient), weak companies are more likely to experience CEO turnover.

Columns 3–5 of Table 8 further examine the latter pattern by investigating how, given the financial performance of the company, a critical mass of women or men directors relates to CEO turnover. Column 3 does not document a significant relation between critical masses of at least 3 directors of a certain gender and CEO turnover. This may indicate that critical masses do not catalyze CEO turnover. However, these results change once interaction variables between critical masses and financial performance are introduced. Column 4 establishes that when boards include a critical mass of women directors, and firm performance is weak (THREE_OR_MORE_WOMEN × ROE), CEO turnover is significantly (at the 10% level) more likely to occur. In other words, when firm performance is weak, CEOs are more likely to find their way out if the board includes a critical mass of women directors.

Finally, column 5 of Table 8 highlights that companies that have a dual critical mass and also weak financial performance (AT_LEAST_THREE_DIRECTORS_OF_EACH_GENDER × ROE) are significantly more likely to experience CEO turnover. The magnitude noted implies that a 1% decrease in the ROE is expected to increase the likelihood of CEO turnover occurring by 2.02% if the board includes a dual critical mass. This result suggests that when boards include a dual critical mass, CEOs are likely to be held accountable if they underperform, and, one way or the other, they are likely to leave the firm. These findings are consistent with those of Adams and Ferreira (2009), who examine American public firms and find that firms with weak financial performance that have a higher fraction of women directors are particularly likely to experience CEO turnover.

B. Board Activeness When Companies Are between CEOs

This section explores how the gender of directors relates to board activeness during a particularly delicate period, when the CEO is being replaced. The analysis in this section is based on the minutes data described in Section IV. Of the 11 firms for which minutes were examined, 4 replaced their CEOs during the year studied, and all of these firms had periods during which they were literally "between" CEOs, with no serving CEO. Those periods lasted between several weeks and several months. Such periods occurred for one or more of the following reasons: The board asked the incumbent CEO to resign his or her position at very short notice, the process of selecting the new CEO continued for at least 3 months,[12] legal issues complicated and extended the selection process, and/or the newly selected CEO was not able to leave his or her former position immediately.

The board is expected to step in immediately once it fires the CEO or once it learns that the current CEO will not continue serving in his or her position. Accordingly, I define a "gap period" between CEOs as starting when the minutes document for the first time that the board is aware that the current CEO will not continue serving in this position and as ending when the new CEO first attends a meeting of the board or of a board committee. Based on this definition, the gap periods experienced by the 4 companies that replaced their CEOs lasted between 3 and 7 months. This gap period is longer than the period noted in the previous paragraph because the gap period defined typically starts before the incumbent CEO leaves the company and ends after the new CEO is selected.

Table 4 (which is discussed in Section V.C) does not show that boards are significantly more active when their companies are in a gap period (BETWEEN_CEOS). However, gender-balanced boards may be particularly active during gap periods. Table 9 explores this possibility by analyzing how critical masses of women and men directors relate to board activeness during gap periods.

[12]It can take several months for a GBC to hire a CEO. This is because GBC boards are required to publish an advertisement in the newspapers inviting candidates to apply for the CEO position. This is usually followed by several rounds of interviews. In addition, in most cases, the board refers at least the final candidates to an external company that specializes in evaluation of executives for placement.

TABLE 9

Gender Composition and Board Activeness in the Absence of a CEO

Table 9 reports OLS regressions analyzing issues discussed at the board-meeting-issue level; these were discussed at the board and board-committee meetings of the 11 GBCs examined. The dependent variable is a binary variable that equals 1 if an action was taken (i.e., the board requested to receive either further information/update, or the board took an initiative). The primary independent variables are the fraction of women directors attending and its square, interaction variables for the latter 2 variables with a dummy documenting if the company was between CEOs (i.e., the board was in the process of replacing a CEO), a dummy that equals 1 if at least 3 women directors were in attendance, a dummy that equals 1 if at least 3 men directors were in attendance, and interaction variables for the latter 2 variables with a dummy that equals 1 if the company was between CEOs. In addition, the regressions control for (but do not necessarily report) the fraction of outside directors in attendance, the total number of directors in attendance, the average number of years of executive experience of the attending directors, the fraction of attending directors with an MA/MBA, and whether the issue discussed was one of a supervisory nature (using a dummy that equals 1 if this is the case). For each variable, the coefficient and the clustered errors (in parentheses) are reported at the meeting level. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

	Action Taken			
	1	2	3	4
FRACTION_OF_WOMEN_DIRECTORS_IN_ATTENDANCE	−0.278 (0.272)	0.057 (0.229)		
FRACTION_OF_WOMEN_DIRECTORS_AND_BETWEEN_CEOS	0.373 (0.415)	−0.56 (0.370)		
SQUARE_OF_FRACTION_OF_WOMEN_DIRECTORS_IN_ATTENDANCE	0.255 (0.359)	−0.019 (0.270)		
SQUARE_OF_FRACTION_OF_WOMEN_DIRECTORS_AND_BETWEEN_CEOS	−0.245 (0.504)	0.472 (0.430)		
THREE_OR_MORE_WOMEN_DIRECTORS_IN_ATTENDANCE			0.077* (0.041)	
THREE_OR_MORE_WOMEN_DIRECTORS_AND_BETWEEN_CEOS			0.112* (0.058)	
THREE_OR_MORE_MEN_DIRECTORS_IN_ATTENDANCE			0.024 (0.043)	
THREE_OR_MORE_MEN_DIRECTORS_AND_BETWEEN_CEOS			0.160* (0.094)	
AT_LEAST_THREE_DIRECTORS_OF_EACH_GENDER				0.067** (0.032)
AT_LEAST_THREE_DIRECTORS_OF_EACH_GENDER_AND_BETWEEN_CEOS				0.120** (0.052)
FRACTION_OF_OUTSIDE_DIRECTORS	−0.066 (0.054)	−0.09 (0.069)	−0.036 (0.053)	−0.05 (0.050)
NUMBER_OF_DIRECTORS_IN_ATTENDANCE	0.004 (0.006)	−0.011 (0.012)	−0.005 (0.006)	−0.005 (0.006)
FRACTION_WITH_EXECUTIVE_EXPERIENCE	0.005 (0.007)	−0.002 (0.004)	0.002 (0.007)	0.002 (0.007)
BETWEEN_CEOS	−0.033 (0.083)	0.149* (0.079)	−0.146 (0.107)	0.007 (0.041)
Firm and year dummies	Yes	Yes	Yes	Yes
Company, year, and topic-subject dummies	Yes	Yes	Yes	Yes
Meetings examined	Board	Committees	Board	Board
R^2	0.075	0.148	0.087	0.089
N	1,313	1,145	1,313	1,313

This analysis follows the econometric model presented in Section V.B, and the observations are at the board-meeting-issue level. Columns 1–2 of Table 9 examine whether a linear or a U-shaped relation exists between the gender composition of the board and board activeness during gap periods as compared with nongap periods. These regressions do not find a significant relation for board meetings (column 1) or for board-committee meetings (column 2).

Column 3 of Table 9 examines whether a critical mass of women and/or men directors increases the likelihood of the board taking an action at a board meeting, particularly during a gap period as opposed to a nongap period. Column

3 shows that having a critical mass of women directors when a company is in a gap period (THREE_OR_MORE_WOMEN_DIRECTORS_AND_BETWEEN_CEOS) increases the likelihood of the board taking an action by 11.2% (this result is significant at the 10% level). Similarly, column 3 documents that having at least 3 men directors in attendance when a company is in a gap period increases the likelihood of the board taking an action by 16% (this result is significant at the 10% level).

In column 4 of Table 9, the coefficient for AT_LEAST_THREE_DIRECTORS_OF_EACH_GENDER_AND_BETWEEN_CEOS documents that boards with a dual critical mass are significantly (at the 5% level) more active during gap periods. The average percentage of cases in which boards took an action at board meetings during gap periods is 24.8%. Column 4 estimates that having a dual critical mass during gap periods increases the likelihood of boards taking an action by 75.4% ([6.7%+12.0%]/24.8%) compared with this average. This result emphasizes that not only are gender-balanced boards more active (as documented by the positive and significant coefficients for AT_LEAST_THREE_DIRECTORS_OF_EACH_GENDER), but gender-balanced boards are particularly active during gap periods, as documented by the coefficient for AT_LEAST_THREE_DIRECTORS_OF_EACH_GENDER_AND_BETWEEN_CEOS. Thus, perhaps gender-balanced boards are particularly likely to be involved and step in at crucial times, such as those in which the CEO is replaced.

VIII. Summary

This study finds that boards are more active at board meetings when they are gender-balanced, meaning that they include at least 3 directors of each gender. This phenomenon is particularly driven by women directors, who are more active when a critical mass of at least 3 women directors is in attendance. The research also reveals that gender-balanced boards are particularly active around CEO turnover periods, which are periods in which a board's involvement is particularly needed. These findings suggest that gender-balanced boards may be valuable particularly when a company is in need of the board's involvement.

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