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Female directors and earnings management in high-technology firms

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Abstract

Purpose – This study, based on a merger of gender and accounting theories, aims to explore whether and how earnings management is affected by the presence of female directors on the board of directors and on the audit committee.

Design/methodology/approach – The study employs both a univariate and multivariate analysis approach to explore the relation between female directors and earnings management in high-technology firms. In the analysis, two contemporary *ex-post* measures of earnings management, discretionary accruals and nonoperating accruals, as well as two *ex-ante* measures of earnings management, Big4 auditor and financial leverage are applied.

Findings – The paper finds evidence for a negative relation between the presence of female directors and earnings management. The findings indicate that accounting aggressiveness is affected by the proportion of women on the board of directors as well as on the audit committee. Furthermore, the paper find evidences indicating that earnings management is lower when either the CEO or the CFO is a woman. Notably, in firms with a higher female representation in corporate governance and/or in top management, external monitoring by auditors and creditors seems to be weaker, yet earnings quality is higher. Additional analysis suggests that the gender of directors has value implications for analysts and investors; specifically, there is a positive relation between the proportion of female directors and the firm's value. The findings are supported by several gender theories and findings regarding women's motivation and achievement, moral values, social stereotypes and the relation between task performance and self-confidence.

Originality/value – This study associates the gender of directors with earnings management by firms. The study contributes to the growing body of literature on earnings management. It should be useful to researchers, regulators, investors, analysts and creditors as well as other players in the capital markets, as it presents a new and important aspect that needs to be accounted for when assessing the quality of firms' accounting information.

Keywords Earnings management, Earnings quality, Gender, Women's motivation, Boards of directors, Corporate governance

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1. Introduction

Revelations of massive accounting frauds involving large corporations (e.g. Enron) have drawn growing academic attention to the incentives of managers to manage earnings. While the evidence on capital market motives for earnings management is abundant, the academic literature on the relationship between earnings management and the gender of the firm's directors is scarce. Notably, such research requires gender theories to be incorporated into the accounting discipline. The gender perspective may increase understanding of the motives for and the extent of engaging in accounting manipulation. The claim at the heart of this perspective is that gender has implications for engaging in certain behaviors and abstaining from others due to role expectations associated with gender. Markedly, a gender-based explanation will clarify the socio-cultural context against which decisions are made within the organization.

In this study, we associate earnings management by high-technology firms with the gender of its directors. Specifically, we seek to explore the effect of the presence of female directors on the board of directors (henceforth BOD) and on the audit committee on earnings management. This allows us to corroborate evidence from the BOD setting with evidence from the audit committee setting, both of which are instrumental in overseeing management in order to control opportunistic management behavior such as earnings management. In an additional analysis, we test the effect of chief executive officer (CEO)/chief financial officer (CFO) gender on earnings management. We differentiate between independent directors and executive managers because earnings management may be conducted by executive managers (CFO and CEO in particular), but it should be detected and deterred by independent directors.

The study uses a sample of Israeli high-technology firms listed in the USA (traded on the NYSE or the NASDAQ) between 2002 and 2009. The Israeli case is particularly interesting since up until only a few years ago, women in Israel were virtually unrepresented on company boards[1]. Currently, the proportion of women on the boards of public companies in Israel is around 15 percent, similar to that in the USA. For comparison, the proportion of women on the boards of public companies around the world is: 7.8 percent in Germany, 10 percent in Spain[2], 11.5 percent in the UK, 12 percent in The Netherlands, 13 percent in Canada, 18 percent in Denmark, 26 percent in Finland, 27 percent in Sweden, and 44 percent in Norway (Bermig and Frick, 2010; Adams and Ferreira, 2009; Catalyst, 2009). The high percentage of female board members in Norway is due to its quota system. Thus, the issue of the impact of female directors on earnings quality, and whether female representation on company boards should be increased in general, and by law in particular, is also relevant for the USA as well as most European countries (Srinidhi *et al.*, 2011).

The Israeli Government is currently promoting a bill that will increase the representation of women on the BODs of public companies. The purpose is to force companies to appoint a specific number of women to their BODs, such that women would constitute approximately 50 percent of board members[3]. Furthermore, companies will be obligated to publish information related to the integration of women in the company[4].

In the study, we focus on high-technology firms. Sample homogeneity is particularly germane in the context of our study, as firms are subject to different earnings-management incentives due to regulation or other industry-specific factors. For example, financial firms are subject to earnings-management incentives that are

more complex due to regulation and other factors (Burgstahler and Eames, 2003; De Franco *et al.*, 2011). Additionally, different industries differ in key attributes such as R&D intensity, profit margins, growth prospects, financial risks, reliance on collaboration with other companies and lifecycle stage, which also potentially affect earnings-management incentives and value implications of earnings management. Hence, our study, dealing with management intent and inadequate oversight in reporting biased earnings results, requires a homogeneous group of firms. The restriction to high-technology companies ensures that our sample consists of a sufficiently large and fairly homogeneous sample.

The high-tech sector also makes an interesting case for studying female directors' behavior, as this sector is characterized by challenges, frequent change and ongoing uncertainty. According to gender literature, we are dealing with women who have shattered the "glass ceiling" and worked their way into positions that require skills, behavior and a degree of risk-taking that was previously related to men (Jenkins, 1987; Morrison *et al.*, 2004). The literature indicates that these women have broken down the cultural barriers by proving that women can also serve in high-ranking positions. Notably, in the study we show that the representation of female directors on the boards of Israeli high-tech firms has reached the average level in Israel – about 15 percent.

In the analysis, we apply two contemporary measures of earnings management: discretionary accruals and nonoperating accruals. Discretionary accruals are from the widely applied modified Jones (1991) model, augmented to control for the impact of firm performance on accruals (Kothari *et al.*, 2005) and for growth (McNichols, 2002). Nonoperating accruals are as described by Givoly and Hayn (2000). This measure serves as an alternative proxy for earnings management, which avoids empirical concerns regarding the Jones model (Dechow *et al.*, 1995; Erickson and Wang, 1999). Following prior research (Aboody *et al.*, 2005; Raman and Shahrur, 2008), we use the absolute value of discretionary, as well as nonoperating, accruals to estimate the magnitude of earnings management. We define our calculated abnormal accruals measures to be *ex-post* measures of earnings management. Next, we identify the existence of a Big4 auditor and the degree of firm leverage as *ex-ante* measures of earnings management, based on the conjecture that improved external monitoring will reduce both the bias and noise in reported earnings (Francis *et al.*, 1999; Yu, 2007).

Employing both a univariate and multivariate analysis approach, we find evidence for a negative relation between the proportion of female directors and earnings management. The effect of the presence of women on the audit committee is similar to that on the BOD. The findings imply that female directors improve board monitoring as they constrain earnings management more than their male counterparts[5]. Alternatively, it may be that firms employing a larger number of women in top management and/or governance positions are, at the outset, firms with a higher awareness of the need for balance in business, they maintain higher social, environmental, legal and ethical standings, and they care about how they are perceived by the public. In these firms, higher quality earnings may be a direct result of the higher standards the firm holds as an entity. Nonetheless, the relation between the social, environmental, legal, ethical and moral standings of a firm, and the presence of women in high positions, together with the quality of earnings, need to be further explored in future research.

We also find evidence indicating that earnings management is significantly lower when either the CEO or the CFO is a woman[6]. Furthermore, we find that in firms with

a higher female representation in corporate governance and/or in top management, external monitoring by auditors and creditors is weaker, yet earnings management is lower. A possible interpretation of this seeming conundrum is that the presence of women serves as internal monitoring. Finally, additional analysis suggests that the gender of directors has value implications for analysts and investors; specifically, there exists a positive relation between the proportion of female directors and the firm's value.

Our findings are supported by the gender literature, which indicates a tendency towards conciliatory behavior by women in high-pressure situations compared to dictatorial-type behavior by men. These studies claim that, in fact, women complement men in management and bring a healthy balance to business (Malach Pines, 1989; Morrison *et al.*, 2004). The findings are also consistent with studies showing that female managers tend to take fewer risks than male managers (Powel and Ansic, 1997; Barber and Odean, 2001). Gender theory also suggests that women will not undertake a task – even if they anticipate success at it – unless they value it morally (Eccles, 1994). Furthermore, studies relating gender to ethical values theorize women to be more ethical in their judgments and behaviors than men (O'Fallon and Butterfield, 2003; Vermeir and Van Kenhove, 2007), and thus more likely to report illegal acts (Miethe and Rothschild, 1994) and fraudulent financial reporting (Kaplan *et al.*, 2009). Additional studies, focusing on female directors, show that the presence of women improves the functioning and efficiency of the BOD as well as the firm's performance and value (Huse and Solberg, 2006; Adams and Ferreira, 2009; Campbell and Minguez-Vera, 2008). Hence, gender-based differences, fear of negative results due to misrepresentation of earnings and moral considerations, among other things, may offer an explanation for the findings that female executives abstain from, and female directors constrain and deter, earnings management more than do men. If female directors have an effect on their male counterparts, as documented in the gender literature, the overall reaction of the board can be affected by the women present, who will "raise the flag" of morality, strengthening the firm's internal monitoring by putting a heavier weight on the ethical considerations in the board's decisions.

The economic implication of our findings is that a regulatory move to increase the representation of women on corporate BODs may lead to a business world where the levels of fair disclosure and quality of earnings are higher. Furthermore, our study has a practical implication in that if the issue of the appropriate representation of women on BODs is related to the quality of financial reporting of companies, then it is part of the public interest; as such, it merits the oversight of the regulator.

The study contributes to the growing body of literature on earnings management. It should be useful to researchers, regulators, investors, analysts and creditors as well as other players in the capital markets, as it presents a new and important aspect that needs to be accounted for when assessing the quality of firms' accounting information.

The paper proceeds as follows. Section 2 contains our literature review. Section 3 describes our sample and presents our earnings management metrics. Section 4 discusses our research methods and results. Section 5 presents some additional analysis of the valuation implications of the presence of female directors. Section 6 concludes.

2. Literature review

2.1 Earnings management literature

Earnings management is the practice of making discretionary accounting choices to achieve a desired level of reported earnings. A vast body of literature exists

on the incentives for earnings management. Nonetheless, it is only during the last decade that a strand of earnings management literature has developed, linking corporate governance and accrual manipulation. These studies generally document that the magnitude of accrual management is negatively associated with proxies of effective corporate governance such as board independence and audit committee independence (Klein, 2002; Xie *et al.*, 2003; Benkraiem, 2009; Lin and Hwang, 2010). Additional studies present a negative relationship between earnings management and the BODs as well as the audit committee's size, expertise and the number of meetings; and a positive relationship between earnings management and the audit committee's share ownership (Lin and Hwang, 2010).

The few studies that relate earnings management to gender focus mainly on the gender of executive managers rather than on the gender of independent directors. For example, Krishman and Parsons (2008) show that the higher the proportion of female managers in a firm's executive management, the higher earnings quality is. Peni and Vahamma (2010) focus on CEOs and CFOs and find that female CFOs in US firms tend to be more conservative with respect to choice of accounting techniques and strategies. Nonetheless, they do not find evidence for a relationship between earnings management and the gender of the firm's CEO. Consistent with Peni and Vahamma (2010) and Wei and Xie (2009) show that female CFOs in Chinese firms are less aggressive in earnings management. Jiang *et al.* (2010) find evidence that a firm's CFO has a bigger influence on the extent to which earnings are managed than does the CEO. Schrand and Zechman (2011) relate a manager's propensity to commit fraud in financial reporting to managerial overconfidence. With respect to gender, Schrand and Zechman indicate that men are expected to be more over-confident than women in general, and in investment decisions in particular. However, they find limited evidence that gender is associated with the likelihood of committing fraud. In contrast to these studies, our study focuses on the role of board members critical to the governance of a firm, which is very different to that of a manager[7].

2.2 Gender literature

Gender literature discusses the unique attributes of women in senior executive positions (Offermann and Armitage, 1993). It primarily asserts that the behaviors of women and men in the workplace are the result of social learning and are no different than the general cultural norms. The social norms with respect to women are different than those for men, and this is reflected in the workplace. Therefore, women in managerial positions often experience ambivalence and conflicts that men do not have to face. For example, studies (Hyde and Kling, 2001; Powell, 1988) have shown that women have different expectations of work; women view work as a source of personal development and self-fulfillment, while men are educated to view a career as a means of moving up in the hierarchy and a means of securing compensation. Powell (1988) argues that the gender differences found in management are based on stereotypes. He found that female managers are highly motivated managers and are just as dedicated as men. However, women are less concerned with economic profit (Betz *et al.*, 1989). Additional studies (Malach Pines, 1989; Morrison *et al.*, 2004) show that in high-pressure situations men may behave in a more dictatorial manner, while women tend to be more conciliatory. As opposed to men, the more senior their managerial position, the less support women have in the workplace, and they therefore tend to avoid high-pressure events at work.

Morrison *et al.* (2004) claim that the currently accepted assertion is that differences between men and women contribute to the organization, as women complement men in management and bring a healthy balance to business.

Unique gender characteristics can be seen in decision-making and risk-taking. The literature indicates that women tend to take fewer risks than men (Powel and Ansic, 1997; Barber and Odean, 2001), as women are given less room to err and express weakness. Another important aspect in this regard is the motivation to achieve. According to McClelland (1966, p. 481), "Clearly we need a differential psychology of motivation for men and women". Studies have shown that compared to men, women fear or avoid success (Mednick, 1989)[8]. Eccles (1994) also points to gender differences in expectations for success. An important factor in Eccles' model is the subjective value of the task. This parameter indicates that even if women expect to succeed, they will not undertake a task if they do not value it morally. Recent literature relating gender to ethical values theorizes females to be more ethical in their judgments and behaviors than males (Collins, 2000; O'Fallon and Butterfield, 2003; Vermeir and Van Kenhove, 2007; Kaplan *et al.*, 2009). Miethe and Rothschild (1994) contend that females feel greater public responsibility to speak out against wrongdoing and are thus likely to report questionable or illegal acts more frequently than males. Kaplan *et al.* (2009) find that females are more likely to report fraudulent financial reporting. Based on these findings, in the context of the current study, the presence of women on the BOD as well as on the audit committee will constrain manipulation in earnings due to the moral/ethical issues involved.

The findings in the literature with respect to female directors indicate that female directors improve a board's functioning and efficiency as well as a firm's performance. For example, Fondas and Sassalos (2000), Huse and Solberg (2006), and Srinidhi *et al.* (2011), argue that female directors may improve a board's decision-making, behavior and effectiveness. This is due to women bringing different perspectives and opinions into a discussion (Fondas and Sassalos, 2000); women being exposed to different experiences than men due to different socialization processes (Srinidhi *et al.*, 2011; Hillman *et al.*, 2007; Ambrose and Schminke, 1999); or because female directors tend to be better prepared for the board meetings than men (Huse and Solberg, 2006). Adams and Ferreira (2009) find that female directors have a significantly positive impact on "board inputs and firm outcomes." They show that female directors have better attendance records at board meetings than men, and that they improve the attendance record of male directors as well. Additional studies examined the relation between gender diversity on the board and firm performance. These studies generally indicate that gender diversity is associated with improved financial performance and higher firm value (Erhardt *et al.*, 2003; Carter *et al.*, 2003; Farrell and Hersch, 2005; Campbell and Minguez-Vera, 2008). Erhardt *et al.* (2003), for example, relate these findings to gender diversity leading to a wider knowledge base. Srinidhi *et al.* (2011) present evidence that female directors improve earnings quality. The inferences from the literature on female directors seem to be consistent with those found for female managers with respect to women having higher ethical standards and greater risk aversion than men, playing more by moral considerations than by considerations of self-achievements, complementing men in management and bringing a healthy balance to business. All of these are consistent with the expectation that the presence of female directors will improve board monitoring and oversight (Terjesen *et al.*, 2009) in terms of preventing or correcting opportunistic behavior such as earnings management.

We point out that the findings from the gender literature which indicate that women have a tendency towards conciliatory behavior in high-pressure situations do not necessarily imply that female directors will automatically agree with the majority of male directors. Rather, the presence of women on the board can create a conciliatory atmosphere and increase the sense for moral considerations and ethical standings; hence, female directors may influence – rather than be influenced by – their male counterparts, again consistent with the findings that demonstrate that women complement their male counterparts and bring a healthy balance to business.

3. Data and earnings management metrics

We obtain financial as well as non-financial information for Israeli high-technology firms listed in the USA between 2002 and 2009. All firms report their financial statements in accordance with US Generally Accepted Accounting Principles. The case of the Israeli high-tech sector is unique and germane, as Israel is ranked among the leading countries to go IPO on NASDAQ (Avnimelech and Teubal, 2006). Previous studies have found that the emergence of the venture investment industry in Israel is considered to be the most successful instance of diffusion of the Silicon Valley model of venture capital outside of North America (Avnimelech and Teubal, 2004a, b; Bresnahan *et al.*, 2001; Carmell and De Fontaenet, 2004). Notably, the portion of venture investments as a share of GNP in Israel is the highest in the world (Avnimelech, 2008; NVCA, 2007; EVCA, 2007) (NVCA – National Venture Capital Association, www.nvca.org; EVCA – European Venture Capital Association, www.evca.com). The Israeli context is also germane with regard to the representation of women on BODs. Specifically, Israel is undergoing a legislative process designed to increase the proportion of women on the BODs of public companies to about 50 percent, acknowledging the positive correlation between female presence on the BODs and the quality of business results and financial reporting.

The list of Israeli high-technology firms during the sample period is obtained from the Israel Venture Capital (IVC) online database. The IVC online database is a comprehensive database on Israel's high-tech industry created by the IVC Research Center. We extract market prices as well as analysts' target prices for the firms' shares from The Marker database. The following information was extracted from the Yif'at Capital Disk Co. database: accounting information from the firm's financial statements, the company's audit firm, management and corporate governance information required for our analyses, and the firm's industrial affiliation. Although the Yif'at Capital Disk provides a comprehensive set of selected information to satisfy the needs of researchers and practitioners, in cases where data were missing, we complemented it from the databases of Dun and Bradstreet (D&B) and from the SEC filings of the firms[9]. Our sample is composed of firms from four high-technology industries:

(1) software systems and devices;

(2) electronics;

(3) electrics and optics; and

(4) chemicals and pharmaceuticals.

In our analysis, we apply two contemporary measures of earnings management, discretionary accruals measure and nonoperating accruals measure (Geiger *et al.*, 2005).

We require that minimum discretionary accruals and minimum nonoperating accruals for our sample firms be higher than 1 percent of total assets, the same scale of managed accruals required in Balsam *et al.*'s (2002) study, in order to exclude firms that are less likely to have managed earnings[10]. We define our calculated abnormal accruals measures to be *ex-post* measures of earnings management. Next, we identify the existence of a Big4 auditor[11] and the degree of firm leverage as *ex-ante* measures of earnings management, based on the conjecture that improved external monitoring will reduce earnings management. Studies documenting the role of large audit firms in enhancing earnings quality show that firms audited by larger audit firms have lower abnormal accruals (Francis *et al.*, 1999). A standard explanation for the positive relationship between the size of an audit firm and the quality of the auditee's reported earnings is that larger audit firms provide higher-quality audits to reduce the risk of litigation and to protect their brand name reputation (De Franco *et al.*, 2011; DeAngelo, 1981; Becker *et al.*, 1998). Financial leverage may proxy for the extent to which earnings are managed, given that creditors demand high-quality and conservative financial information. These creditors could be monitoring the firm and its accrual process and reducing information asymmetries, resulting in higher quality and conservative reported earnings (Fama, 1985; Berlin and Loeys, 1988; Yu, 2007). In all, we expect that earnings management should be less (more) prevalent in firms audited by a (non-) Big4 auditor as well as in more (less) leveraged firms.

3.1 Discretionary accruals measure

The discretionary accruals component of reported earnings is proxied by unexpected accounting accruals identified by the modified Jones (1991) model. Following Kothari *et al.* (2005), we include return on assets (ROA, a proxy for performance) as an independent variable in the modified Jones model to account for the impact of firm performance on accruals (Raman and Shahrur, 2008). We add external financing matches based on recent research suggesting that changes in external financing activities lead to economic and statistical measurement errors in unexpected accruals (Shan *et al.*, 2010). We further add to the model the number of years from IPO listing as a proxy for firm age, another firm characteristic which may have a significant influence on earnings management activities[12]. Prior research also suggests that firms with higher growth opportunities tend to have higher accruals (McNichols, 2002; Cohen *et al.*, 2008). We thus control for growth options in the modified Jones model by including a book-to-market ratio (Raman and Shahrur, 2008).

For each firm in our sample, we estimate the following model:

$$\frac{TACC_t}{TA_{t-1}} = \alpha^*\left(\frac{1}{TA_{t-1}}\right) + \beta_1^*\left(\frac{\Delta REV_t}{TA_{t-1}} - \frac{\Delta AR_t}{TA_{t-1}}\right) + \beta_2^*\frac{GPPE_t}{TA_{t-1}} + \beta_3^* ROA_t + \beta_4^*\frac{\Delta EXFIN_t}{TA_{t-1}} + \beta_5^* AGE_t + \beta_6^* BM_t + \varepsilon_t \quad (1)$$

where $TACC$ is total accruals, TA is total assets, ΔREV is the change in revenues from previous year, ΔAR is the change in accounts receivable, $GPPE$ is gross fixed assets, ROA is net income before extraordinary items scaled by lagged total assets, $\Delta XFIN$ is net external financing measured as the sum of net cash proceeds received from equity holders (equity issuances less dividends and repurchases) and net cash inflow received

from debt holders (debt issuances less debt repayments), *AGE* is the number of years from IPO listing, and *BM* is the ratio of total assets to total assets minus book value of equity plus market value of equity. Consistent with prior research, total accruals are net income minus cash flows from operations. The regression is estimated using panel data (same companies in successive years) with industry[13] and year fixed effects. Thus, we include intercept dummies for industry and year to capture constant industry-specific and year-specific factors. The residual in the regression model (ε) is the measure of unexpected – discretionary – accruals, which indicate the extent to which a firm manages its earnings (Dechow and Skinner, 2000).

As a robustness check, we also apply an alternative matching approach proposed by Kothari *et al.* (2005). Specifically, we match each firm-year observation in our sample with that observation in a control sample from the same industry and year with the closest performance, net external financing and firm age. Again, external financing and age matches are added to the original performance matching approach as per Kothari *et al.* We then adjust each firm's estimated discretionary accruals by subtracting the corresponding estimated discretionary accruals of a matched firm. The use of a performance-matched firm approach in our analyses provides inferences similar to those obtained when using a regression-based approach, where performance, age and external financing are controlled for by adding their respective measures as independent variables in the modified Jones model.

3.2 Nonoperating accruals measure

As a second measure of earnings management, we employ Givoly and Hayn's (2000) nonoperating accruals measure. Geiger *et al.* (2005, p. 7) advocate use of a nonoperating accruals measure in addition to the discretionary accruals measure "to address empirical concerns regarding the Jones model [...]". Nonoperating accruals are calculated as net income plus depreciation and amortization minus cash flows from operations minus operating accruals. Operating accruals are defined as:

$$\Delta\text{Accounts receivables} + \Delta\text{Inventories} + \Delta\text{Prepaid expenses} - \Delta\text{Accounts payable} - \Delta\text{Taxes payable}.$$

To control for size effects, we scale nonoperating accruals by beginning-of-year total assets (consistent with the scaling of the modified Jones model). Given that nonoperating accruals consist of items which are under the discretion of management (e.g. loss and bad debt provisions, the effect of changes in estimates, gains or losses on the sale of assets, asset write-downs, capitalization of expenses), they are used to indicate whether firms actively engage in earnings management.

In our analyses, we use absolute abnormal accruals rather than signed abnormal accruals, as we are interested in capturing the extent or intensity of earnings management (Aboody *et al.*, 2005; Raman and Shahrur, 2008), rather than in the chosen direction of manipulation[14]. We point out that use of signed rather than absolute accruals does not alter the inferences from the analyses.

We restrict our sample to firms with positive book value of equity (Collins *et al.*, 1997; Brown *et al.*, 1999; Core *et al.*, 2003; De Franco *et al.*, 2011). We require enough data to estimate the variables used in our tests, hence firms with insufficient data are excluded from the analysis. To reduce the effect of outliers in our tests, we winsorize all continuous variables at the 1st and 99th percentiles. We winsorize outliers instead

of deleting them to conserve data. The results do not change qualitatively when outliers are deleted. After applying all the restrictions discussed above, our sample consists of 60 firms between 2002 and 2009, resulting in 478[15] firm-years.

In Table I we present our earnings management measures throughout the sample period. Our sample period starts in 2002, the year the Sarbanes-Oxley Act (SOX, July 30, 2002) was passed into law, and thus the requirement for CEO/CFO certification and attestation of internal control. As shown in Table I, throughout the years 2002-2009, our earnings management metrics did not change significantly. Abnormal accruals (both *ex-post* measures) throughout the period were in the range of ten-15 (four to seven) percent of total assets on average (median). As for our *ex-ante* measures of earnings quality, throughout the entire period, in 87-92 percent of firm-years the auditor was Big4[16]. Leverage ranged from 22 to 25 (seven to ten) percent of total assets on average (median). We point out that in 2001, prior to the introduction of SOX, the levels of abnormal accruals were about 10-15 percent higher (untabulated), implying that SOX had an immediate impact on our sample firms expressed in a significant reduction in earnings management; however, in the years that followed, the extent of earnings management seems to have remained on a fairly similar level. This finding notwithstanding, in each of our multivariate regression analyses we include intercept dummies for each year to capture constant year-specific factors.

4. Tests and results

4.1 Univariate analyses of the relation between female directors and earnings management

Table II contains descriptive statistics for our sample firms. The sample firms' BODs are composed of ten independent directors, on median. On these boards, the median proportion (number) of women is about 14 percent (1). The median proportion (number)

	2002	2003	2004	2005	2006	2007	2008	2009
Abs. discretionary accruals								
Mean	0.121	0.110	0.114	0.108	0.110	0.096	0.133	0.142
Median	0.075	0.049	0.069	0.054	0.074	0.054	0.069	0.066
Abs. nonoperating accruals								
Mean	0.120	0.117	0.146	0.116	0.099	0.104	0.150	0.134
Median	0.052	0.038	0.051	0.071	0.055	0.045	0.067	0.056
Big4 auditor								
Mean	0.87	0.91	0.91	0.92	0.90	0.91	0.91	0.87
Leverage								
Mean	0.240	0.219	0.235	0.219	0.234	0.215	0.252	0.252
Median	0.094	0.069	0.088	0.069	0.100	0.099	0.103	0.104
No. of observations	60	60	60	60	60	60	60	58

Notes: This table reports the mean and median of our earnings management metrics, by year; absolute discretionary accruals are from the modified Jones (1991) model, performance-matched as per Kothari *et al.* (2005); absolute nonoperating accruals are as described by Givoly and Hayn (2000); both measures are taken as a percentage of previous year-end total assets; Big4 auditor is an indicator variable that equals 1 if the auditor is a Big4 audit firm and 0 otherwise; leverage is the ratio of total liabilities less current liabilities to total assets; extreme values (top and bottom 1 percent) of continuous variables are winsorized

Table I.
Measures of earnings management by year

	Mean	Median	SD	Minimum	Maximum
No. of independent directors on BOD	10.210	10.000	3.037	7	15
No. of female directors on BOD	0.930	1	0.628	0	5
Percentage of female directors on BOD	0.148	0.143	0.124	0.000	0.500
No. of female directors on audit committee	0.640	1	0.581	0	3
Percentage of female directors on audit committee	0.192	0.250	0.180	0.000	0.750
Percentage of director holdings	0.165	0.108	0.194	0.000	0.770
Percentage of insider holdings	0.414	0.423	0.263	0.000	0.970
Percentage of institutional holdings	0.186	0.112	0.235	0.000	0.880
Female director holding	0.330	0.000	0.471	0.000	1.000
Female CEO/CFO	0.246	0.000	0.421	0.000	1.000
CEO/Chairperson duality	0.440	0.000	0.496	0.000	1.000
No. of directors with financial literacy	3.720	3	2.099	1	9
Big4 auditor	0.905	1.000	0.262	0.000	1.000
Sales growth	0.226	0.098	0.852	−0.870	5.770
Firm size	554	112	1,351	1.8	9,632
MV	3,212	125	12,984	1.3	69,381
Leverage	0.232	0.103	0.287	0.000	0.890
ROA	−0.065	0.001	0.247	−0.960	0.450
ROE	−0.178	0.017	0.843	−4.760	0.970
R&D intensity	0.791	0.671	0.380	0.501	1.910
Profit margin	−0.368	0.024	1.201	−4.730	0.820
Abs. discretionary accruals	0.117	0.062	0.148	0.000	0.837
Abs. nonoperating accruals	0.122	0.056	0.187	0.000	1.140

Notes: This table reports descriptive statistics for our sample of 60 Israeli firms listed in the USA from 2002 to 2009 (478 firm-year observations); number of independent directors on BOD measures the size of BOD; number of (percentage) female directors on BOD is the number (percentage) of female directors on our sample firms' BODs; number of (percentage) female directors on audit committee is the number (percentage) of female members on our sample firms' audit committees; percentage of director (insider, institutional) holdings is the proportion of shares held by the firm directors (insiders, institutional investors); female director holding is an indicator variable that equals 1 if at least one female director holds the company's shares and 0 otherwise; female CEO/CFO is an indicator variable that equals 1 if one of these top two positions in the organization is held by a woman, 0 otherwise; CEO/Chairperson duality is an indicator variable that equals 1 in case of a CEO/Chairperson duality and 0 otherwise; Big4 auditor is an indicator variable that equals 1 if the auditor is a Big4 audit firm and 0 otherwise; sales growth is the percentage change in annual sales; firm size is the firm's total assets in $ million; MV is the market value of equity in $ million; leverage is the ratio of total liabilities less current liabilities to total assets; *ROA* is the firm's operating profit scaled by its net operating assets; *ROE* is net income before extraordinary items divided by book value of equity; R&D intensity is the firm's research and development expense divided by sales; profit margin is profit margin calculated as operating profit divided by sales; absolute discretionary accruals are from the modified Jones (1991) model, performance-matched as per Kothari *et al.* (2005); absolute nonoperating accruals are as described by Givoly and Hayn (2000); both measures are taken as a percentage of previous year-end total assets; extreme values (top and bottom 1 percent) of continuous variables are winsorized

Table II.
Descriptive statistics

of women on the firms' audit committees is 25 percent (1). We point out that with the introduction of SOX and throughout the sample period the proportion of women on BODs as well as their proportion on the audit committee has not changed significantly.

Additional corporate governance factors indicate that our sample firms have a relatively concentrated ownership structure, with insiders holding about 42 percent

of the firms' shares. In 44 percent of the firm-years there is a CEO/Chairperson duality. We also find that independent directors hold 10.8 percent of the firms' shares, and that in 33 percent of our sample firm-years at least one female director holds shares in the firm. The median proportion of the firms' shares held by institutional investors is 11.2 percent. In 25 percent of our sample firm-years, either the CEO or the CFO was a woman. Female CEO/CFOs are further analyzed in Section 4.2.

Table II also presents descriptive statistics for various financial data for the sample firms. The median firm's total assets are $112 million, and the median market value of the firm's equity is $125 million. The rate of annual sales growth is about 10 percent. Firms' leverage is 10.3 percent of total assets. GAAP-based profitability measures (ROA, ROE and operating profit margin) are, as expected for high-technology firms, low (0.1, 1.7 and 2.4 percent, respectively). On the other hand, annual economic profits based on the change in the market price of the firm's shares are around 53 percent (untabulated). The low accounting profits are attributed primarily to the immediate expensing of R&D under GAAP (Callen *et al.*, 2010). R&D intensity (the firm's research and development expense divided by sales) for our sample firms is 67.1 percent.

We now examine whether and how the extent of earnings management is affected by the presence of female directors, as measured by the proportion of women on the firms' BODs. Specifically, we compare the mean and the median of our earnings management metrics in firms with a proportion of women on the BOD higher than the sample firms' median of 14 percent, versus firms with a proportion lower than 14 percent[17]. The results, displayed in Table III, indicate that both measures of abnormal accruals are significantly lower when the proportion of female directors on the BOD is higher[18]. Similarly, we examine how the presence of women on the firm's audit committee affects the extent to which earnings are managed. Again we differentiate between audit committees where the proportion of women is higher than the median in our sample – 25 percent – and those with a proportion of less than 25 percent (the median audit committee size is three members). The effect of the presence of women on the audit committee is similar to that found on the BOD as shown in Table III. Hence, our *ex-post* measures of earnings management imply that earnings are managed to a lower extent when there are more women on the BOD and when there are more women on the audit committee. We point out that the correlation between the proportion of women on the BOD and their proportion on the audit committee (untabulated) is around 0.5 (according to Pearson's as well as Spearman's ρ, $p = 0.000$).

The *ex-ante* proxies for earnings management – audit firm size and leverage – provide interesting results. While both groups of firms are generally audited by a Big4 auditor, the proportion of firm-year observations with "high" ("low") female representation audited by a Big4 auditor is significantly lower (higher). Given that the majority of our sample firms are audited by a Big4 auditor, we need our second *ex-ante* measure to corroborate the inference from our Big4 auditor variable. Indeed, we find that firms with more women on their boards are significantly less leveraged, possibly because women are more risk averse. Thus, both *ex-ante* measures point towards a lower degree of external monitoring in firms with a high degree of female representation which, according to the literature, could lead to lower earnings quality. Nonetheless, earnings quality seems to be higher in these firms as per the *ex-post* measures of earnings management. A possible interpretation of this conundrum is that the presence of women on the BOD and on the audit committee serves as internal monitoring.

	Percentage of female directors on BOD			Percentage of female members on audit committee		
	>14%	≤14%	Difference	>25%	≤25%	Difference
Abs. discretionary accruals						
Mean	0.096	0.138	−0.042 (0.020)	0.096	0.138	−0.042 (0.020)
Median	0.049	0.075	−0.026 (0.058)	0.044	0.068	−0.024 (0.034)
Abs. nonoperating accruals						
Mean	0.105	0.139	−0.034 (0.048)	0.105	0.139	−0.034 (0.055)
Median	0.041	0.071	−0.030 (0.006)	0.045	0.067	−0.022 (0.036)
Big4 auditor						
Mean	0.84	0.97	−0.13 (0.000)	0.86	0.95	−0.09 (0.050)
Median	1	1	0	1	1	0
Leverage						
Mean	0.155	0.309	−0.154 (0.001)	0.176	0.288	−0.112 (0.010)
Median	0.050	0.157	−0.107 (0.001)	0.061	0.136	−0.075 (0.055)
No. of observations	239	239		239	239	

Notes: *p*-values are in parentheses (two-tailed); this table presents the mean and median of our earnings management metrics as well as the difference between the means and the medians for firms with a proportion of women on the BOD (audit committee) higher than the sample median of 14 percent (25 percent) versus firms with a proportion lower than 14 percent (25 percent); absolute nonoperating accruals are as described by Givoly and Hayn (2000); absolute discretionary accruals are from the modified Jones (1991) model, performance-matched as per Kothari *et al.* (2005); both measures are taken as a percentage of previous year-end total assets; Big4 auditor is an indicator variable that equals 1 if the auditor is a Big4 audit firm and 0 otherwise; leverage is the ratio of total liabilities less current liabilities to total assets; the differences in the means and the medians are tested using a *t*-test and a Mann-Whitney test, respectively

Table III.
Univariate analysis of the relation between earnings management and the proportion of female directors

Notably, this interpretation supports the inference that the representation of women on the firms' boards is related to an enhanced quality of book earnings.

We further estimate Pearson's as well as Spearman's correlations between our measures of earnings management and the proportion of female directors on the BOD, as well as on the audit committee. The results (untabulated) show that both accrual measures are significantly negatively correlated with the proportion of women on the BOD (about −0.15), as well as with the proportion of women on the audit committee (about −0.13). Moreover, consistent with the findings above, a negative correlation exists between the proportion of women on the boards and the size of the audit firm (about −0.18) as well as the degree of financial leverage (about −0.11). All correlations are significant at the 5 percent level. The results thus far indicate that, even if external monitoring by auditors and creditors is weaker, in firms with a high presence of women in corporate governance, the extent of earnings management is lower.

4.2 Does the gender of CEO/CFO matter?

In this subsection, we focus on the highest-ranked management positions accountable for the quality of reported earnings and thus to the actual management of earnings – CEO and CFO[19]. Specifically, we explore how earnings management is affected by the CEO and/or CFO being female rather than male. Neither of our sample firms had both a female CEO and a female CFO at the same time. In all, in 15 (103) firm-year observations, the CEO (CFO) was a woman.

In Table IV we compare the extent of earnings management in firms with a female CEO or CFO to that in firms with a male CEO as well as CFO. Using the discretionary accrual measure, the results indicate that earnings management is significantly lower when either the CEO or the CFO is a woman. The difference in nonoperating accruals between firms with a female CEO/CFO and firms with a male CEO as well as CFO is also negative, however, insignificant. Prior studies provide evidence for a significant effect of CFO gender on earnings management (Peni and Vahamma, 2010; Wei and Xie, 2009; Jiang *et al.*, 2010), but no effect of the gender of CEO. Finally, the occurrence of a Big4 audit firm in companies with a female CEO/CFO is significantly lower (80 percent compared with 94 percent). Moreover, with women in these top positions, the extent of financial risk taken, as proxied by financial leverage, is also significantly lower (a difference of 8.8 percent (4.5 percent) of total assets on average (median), $p = 0.001$ (0.028)). Thus, the inferences from the analysis of the directors' gender apply to the gender of the top executive managers as well. The results point towards women being accountable for less earnings management when bearing either direct or indirect liability for misrepresentations in financial statements.

The proportion of female directors on the BOD is not significantly different between firms with a female CEO/CFO and firms with male CEO/CFO. In contrast, we find that the average proportion of women on the audit committee is significantly higher (lower) in firms with a female (male) CEO/CFO (around 22 percent (18 percent), $p = 0.061$). Notwithstanding this finding, the effect of a female CEO/CFO on the extent of earnings management remains significant after controlling for the proportion of women on the audit committee. This incremental effect of the presence of women in top management (audit committee) over and above the effect of the presence of women on the audit

	Female CEO/CFO	Male CEO/CFO	Difference
No. of observations	118	360	
Abs. discretionary accruals			
Mean	0.090	0.126	− 0.036 (0.028)
Median	0.043	0.069	− 0.026 (0.030)
Abs. nonoperating accruals			
Mean	0.117	0.124	− 0.007 (0.264)
Median	0.055	0.056	− 0.001 (0.101)
Big4 auditor			
Mean	0.80	0.94	− 0.14 (0.006)
Median	1	1	0
Leverage			
Mean	0.166	0.254	− 0.088 (0.001)
Median	0.069	0.114	− 0.045 (0.028)

Notes: *p*-values for the difference between the means and the medians are in parentheses (two-tailed); this table presents the mean and median of our earnings management metrics, as well as the difference between the means and the medians, for firms with a female CEO or CFO versus firms with a male CEO as well as CFO; absolute nonoperating accruals are as described by Givoly and Hayn (2000); absolute discretionary accruals are from the modified Jones (1991) model, performance-matched as per Kothari *et al.* (2005); both measures are taken as a percentage of previous year-end total assets; Big4 auditor is an indicator variable that equals 1 if the auditor is a Big4 audit firm and 0 otherwise; leverage is the ratio of total liabilities less current liabilities to total assets

Table IV.
Univariate analysis of the relation between earnings management and CEO/CFO gender

committee (top management) is demonstrated in the following multivariate analysis, among other things.

4.3 Multivariate analysis of the relation between female directors and earnings management

We move from a univariate to a multivariate analysis of the relation between directors' gender and earnings management. The multivariate approach allows us to control for other determinants of abnormal accruals and obtain an estimate for the direct effect of the presence of female directors on earnings management. We thus estimate the following regression model:

$$\begin{aligned} AbAcc = {} & \alpha_0 + \alpha_1 Big4Auditor + \alpha_2 Leverage + \alpha_3 Size + \alpha_4 SalesGr \\ & + \alpha_5 BoardSize + \alpha_6 \%FemBOD + \alpha_7 AuditCom + \alpha_8 \%FemAudCom \\ & + \alpha_9 \%DirHold + \alpha_{10} FemDirHold + \alpha_{11} \%InsHold + \alpha_{12} \%InstHold \\ & + \alpha_{13} NoDirFin + \alpha_{14} CEO/ChairDual + \alpha_{15} FemCEO/CFO \\ & + \alpha_{16} CEOAge + \alpha_{17} CEOTenure + \alpha_{18} CEOFounder + \varepsilon \end{aligned} \tag{2}$$

where *AbAcc* is absolute abnormal accruals measured either as performance-matched discretionary accruals or as nonoperating accruals. *Big4Auditor* equals 1 if the company is audited by a Big4 audit firm and zero otherwise. *Leverage* is the ratio of total liabilities less current liabilities to total assets. *Size* is the log of total assets. *SalesGr* is the percentage change in annual sales. *Big4Auditor* and *Leverage* control for accrual quality. We predict that abnormal accruals decrease in *Big4Auditor* and *Leverage*. When abnormal accruals are measured by nonoperating accruals, which are not *ROA*-matched, we add *ROA* as another explanatory variable to proxy for profitability. Sales growth and *ROA* are expected to be positively related to the extent of earnings management. We have no prediction for the coefficient on size.

Based on previous corporate governance literature, we supplement our multivariate analysis with variables that control for board characteristics and corporate governance mechanisms, which have been shown to have a potential impact (the results from the literature are inconclusive) on earnings management. For example, Garcia-Meca and Sanchez-Ballesta (2009) show that board independence, board size and audit committee independence can improve investor confidence by constraining earnings management. While some studies suggest that larger boards are less effective in monitoring accruals due to coordination problems (Yemark, 1996), others suggest that large boards are associated with low levels of accrual management (Xie *et al.*, 2003; Ghosh *et al.*, 2010[20]). Furthermore, while some studies show that firms with larger boards have lower firm value as well as lower performance (Yemark, 1996; Eisenberg *et al.*, 1998), others show that board size is positively associated with firm performance (Dalton *et al.*, 1999). Xie *et al.* (2003) show that the composition of the BOD and of the audit committee is related to the likelihood that a firm will engage in earnings management, and that BOD and audit committee members with financial backgrounds are associated with smaller discretionary accruals. Osma and Noguer (2007) find that independent directors do not play a main role in constraining earnings manipulation as suggested by prior studies, but that institutional directors do. Furthermore, they show that the existence of an independent audit committee does not affect earnings management.

The variables that we add to our regressions are as follows. *BoardSize* is total number of independent directors on BOD; *%FemBOD* is the percentage of women on the BOD; *AuditCom* is the number of members on the firm's audit committee; *%FemAudCom* is the percentage of women on the audit committee; *%DirHold* is the percentage of director holdings in the company's shares; *FemDirHold* is a dummy variable equal to 1 if at least one female director holds the company's shares; *%InsHold* is the percentage of insider holdings in the company; *%InstHold* is the percentage of institutional holdings in the company; *NoDirFin* is the number of directors with financial literacy[21]; *CEO/ChairDual* is a dummy variable equal to 1 in case of a CEO/Chairperson duality; *FemCEO/CFO* is a dummy variable equal to 1 if one of these top two positions in the organization is held by a woman. A director with financial literacy is one whose education or background includes at least one of the following degrees: MBA, Master of Accounting and/or Finance, CPA, current or past position as an executive in a financial institution (Xie *et al.*, 2003; Schrand and Zechman, 2011). In our sample, the number of directors with financial literacy is on average (median) 3.72 (3) (Table II). Board independence implies that the majority of the members of a company's board must be independent, that is, they are not associated with the company except for sitting on its BOD. Specifically, independent directors have no relations with the management of the firm and must not be affiliated with the firm in any extent (e.g. through insurance companies, accounting, legal or other type of consulting, investment bank. See for example, Hermalin and Weisbach, 1988; Shivdasani, 1993; Huang *et al.*, 2008)[22]. In our sample, on all of the companies' boards, the requirement for board independence is met.

Based on Schrand and Zechman (2011) who document a positive relation between CEO overconfidence and the propensity to commit a financial reporting fraud, we also add to the regressions proxies for overconfidence: *CEOAge*, *CEOTenure* measured by the number of years from the CEO start date at the firm, and *CEOFounder* which is an indicator variable that equals 1 if the CEO is a founder, co-founder or part of the founding family[23]. Finally, to capture industry and year fixed effects, we include intercept dummies for each industry and year.

Table V presents the results of estimating equation (2) for both accrual measures of earnings management. The coefficient on the Big4 auditor indicator is significantly negative as expected, implying that the presence of a Big4 auditor is associated with lower manipulation of earnings by management. For our second control for accrual quality – *Leverage* – we find a significantly negative relation with abnormal accruals, implying that creditors also constrain accrual manipulation. The coefficient on *Size* is (in)significantly negative using discretionary (nonoperating) accruals measure, and the coefficients on sales growth and ROA are, as expected, significantly positive as per both accrual measures of earnings management.

The coefficients on the variables that control for board characteristics and corporate governance mechanisms are all with the expected sign. A significant negative impact on earnings management is found for the proportion of women on the board, the size of the audit committee, the proportion of women on the audit committee, the number of directors with financial literacy, the percentage of director holdings and the percentage of institutional holdings in the company. Additionally, earnings management is lower in firms with a female CEO/CFO and in firms where at least one female director is also a shareholder. In contrast, earnings management increases in concentration

	Abnormal accruals measured by	
	Discretionary accruals	Nonoperating accruals
Intercept	0.024 (0.709)	−0.139 (0.081)
Big4Auditor	−0.061 (0.016)	−0.069 (0.017)
Leverage	−0.658 (0.023)	−0.443 (0.101)
Size	−0.031 (0.000)	−0.007 (0.303)
SalesGr	0.104 (0.055)	0.102 (0.085)
ROA		0.236 (0.000)
BoardSize	−0.001 (0.762)	−0.004 (0.409)
%FemBOD	−0.417 (0.021)	−0.451 (0.049)
AuditCom	−0.031 (0.006)	−0.051 (0.000)
%FemAudCom	−0.452 (0.001)	−0.443 (0.005)
%DirHold	−0.125 (0.001)	−0.050 (0.278)
FemDirHold	−0.040 (0.005)	−0.029 (0.083)
%InsHold	0.068 (0.013)	0.094 (0.004)
%InstHold	−0.146 (0.092)	−0.165 (0.078)
NoDirFin	−0.102 (0.099)	−0.107 (0.065)
CEO/ChairDual	0.042 (0.008)	0.032 (0.075)
FemCEO/CFO	−0.041 (0.064)	−0.037 (0.044)
CEOAge	0.020 (0.010)	0.010 (0.017)
CEOTenure	−0.001 (0.228)	0.001 (0.335)
CEOFounder	−0.007 (0.704)	−0.052 (0.014)
Adj. R^2	0.276	0.236
F-value	6.962 (0.000)	6.433 (0.000)
No. of observations	478	478

Notes: *p*-values of the coefficients are presented in parentheses; this table presents a multivariate analysis of the relation between female directors and earnings management; the dependent variable *Ab*Acc is absolute abnormal accruals measured either as performance-matched discretionary accruals or as nonoperating accruals; *Big4Auditor* equals one if the company is audited by a Big4 audit firm and zero otherwise; *Leverage* is the ratio of total liabilities less current liabilities to total assets; *Size* is the log of total assets; *SalesGr* is the percentage change in annual sales; *BoardSize* is total number of board directors; *%FemBOD* is the percentage of female directors on the board; *AuditCom* is the number of members in the firm's audit committee; *%FemAudCom* is the percentage of female members in audit committee; *%DirHold* is the percentage of director holdings in the company's shares; *FemDirHold* is a dummy variable equal to 1 if at least one female director holds the company's shares; *%InsHold* is the percentage of insider holdings in the company; *%InstHold* is the percentage of institutional holdings in the company; *NoDirFin* is the number of directors with financial literacy; *CEO/ChairDual* is a dummy variable equal to 1 in case of a CEO/Chairperson duality; *FemCEO/CFO* is a dummy variable equal to 1 if one of these top two positions in the organization is held by a woman; *CEOTenure* is the number of years from the CEO start date at the firm and *CEOFounder* is an indicator variable that equals 1 if the CEO is a founder, co-founder or part of the founding family; when abnormal accruals are measured by nonoperating accruals, we add *ROA* as another explanatory variable to proxy for profitability; *ROA* is the firm's operating profit scaled by its net operating assets; to deal with outliers, we winsorize extreme observations for all continuous variables (top and bottom 1 percent); the regressions are estimated using panel data (same companies in successive years) with industry and year fixed effects; namely, we include intercept dummies for each industry and year to capture constant industry-specific and year-specific factors

Table V.
Multivariate analysis of earnings management and the effect of female directors

of ownership, as measured by the percentage of insider holdings (which is over 40 percent on average and median in our sample, see Table II), as well as of governance, proxied by a CEO-chairperson duality. It is possible that the monitoring role of the BOD is impaired when the chair of the BOD is the very person whose performance needs to be monitored – the CEO. Finally, measures of CEO overconfidence indicate that earnings management increases with the age of the CEO, however, when the CEO is the founder of the firm, earnings management – as measured by nonoperating accruals – is lower. Although a CEO founder may be regarded as overconfident, it is possible that if he is more committed to quality performance than a non-founder CEO, then this commitment will be expressed in higher quality earnings.

The Variance Inflation Factor (VIF) measures, as well as the correlations between the explanatory variables in regression model (2) (untabulated), indicate the absence of multicollinearity that could challenge the inferences obtained from the regression specification.

We conclude that the extent of earnings management is affected by the presence of women in corporate governance and in management. All of our female representation variables point in the same direction – earnings management is lower with more women on the BOD, on the audit committee, and in top management as CEOs and CFOs. It seems that women working with men create an atmosphere of reduced accounting aggressiveness.

4.4 Discussion

Our findings seem to be consistent with gender literature that indicates that female directors improve the board's functioning, efficiency and decision-making. Our results may also be explained by findings from the gender literature that show that female managers, in fact, tend to take fewer risks than male managers, as women are given less room for error than men. The finding that women are more risk averse can be applied to female directors, and in practice means they will prefer to abstain from the risk in earnings management, moreso than men. Thus, in case earnings manipulation has been detected by the board, female directors' inclination to avoid the potential negative consequences that may result due to misrepresentation of earnings will be higher than that of their male counterparts. Those who are willing to take the risk inherent in earnings management are highly motivated to demonstrate success and be regarded as successful. Our findings strengthen the claim that differences exist in the achievement motivation between men and women in management positions. Achievement is a personality trait characterized by an attempt to succeed in any situation where there are success indicators. In light of the gender issues presented in the literature review, fear of negative results for presenting falsified earnings – as well as moral considerations – may explain the findings that show that women abstain from the risk inherent in earnings management. Our findings are also supported by studies that found that while women view work as a source of personal development and self-fulfillment, men are more focused on advancement and compensation – elements that create incentive for earnings management. Moreover, our results can be explained by the dictatorial behavior in high-stress situations among male managers as opposed to conciliatory behavior by female managers, and by the fact that women complement men in management and bring a healthy balance to business.

Male and female directors do not necessarily differ in their ability to detect earnings management; the ability to detect accounting irregularities in general is affected more

by the director's financial background than by his/her gender[24]. However, once an accounting manipulation has been detected, it seems that female directors respond differently than male directors, via their diligence and ethical standing, as well as other characteristics documented in the gender literature. That is, even though they may not be the ones who detect the earnings management, female directors seem to have an effect on the outcome of the board meeting in which accounting irregularities have been detected, putting a heavier weight on the ethical considerations in the board's decisions[25].

An alternative interpretation of our findings may suggest that firms employing a larger number of women in top management and/or governance positions are at the outset firms with a higher awareness of the need for balance in business; they maintain higher social, environmental, legal and ethical standings, and care about how they are perceived by the public. Further, it is possible that such firms recognize the positive and important contribution female managers and directors have to firm performance as documented in the literature. In these firms, higher quality earnings may be a direct result of the higher standards the firm holds as an entity rather than a direct result of the proportion of women in the firm. That is, the probability that the firm engages in manipulations in general, and in earnings manipulations in particular, is lower to begin with. The relation between the social, environmental, legal, ethical, moral standings of a firm and the presence of women in high positions (e.g. top management and BOD) together with the quality of earnings need to be further explored in future research.

5. Additional analysis: are analysts and investors in the stock market influenced by directors' gender? A valuation multiples approach

In this phase of the study, we seek to interpret our findings of the relation between directors' gender and the quality of earnings in terms of the impact on firm value, if such exists. We frame the analysis in terms of valuation multiples, using either analyst target price-to-book or market-to-book equity ratio, where the value estimated by analysts and the market value are subsequent to the release of financial statements. We focus on full financial disclosure, rather than on earnings announcements, to ensure that analysts and investors are provided with the essential information required to assess the extent of earnings management, e.g. by disaggregating accruals into their discretionary and nondiscretionary components. Balsam *et al.* (2002) for example, show that both sophisticated investors and unsophisticated investors are unable to recognize earnings management around earnings announcement date. Target prices for the firms' shares are extracted from analyst valuations, issued in response to the publication of financial statement[26].

In the analysis, we account for the interaction between gender differences and quality of financial reporting by including both gender proxies and earnings management proxies in the regression equations. The multivariate model also includes various additional variables that capture firm performance, risk and growth, which are expected to be related to analyst and investor valuations and have been shown in previous studies (Kothari *et al.*, 2005) to be related to the levels of (abnormal) accruals (i.e. to earnings management). We added to the model our proxies for female representation in the firm. No study thus far has entertained the notion that analysts and/or investors may either discount or attach a premium to a firm's value due to the inclusion of women on the board and/or in top management.

The estimated regression model is:

$$\frac{P}{B} = \alpha_0 + \alpha_1 Big4Auditor + \alpha_2 Leverage + \alpha_3 Size + \alpha_4 SalesGr + \alpha_5 ROE + \alpha_6 R\&D + \alpha_7 PM + \alpha_8 AbAcc + \alpha_9 \%FemBOD + \alpha_{10} \%FemAudCom + \alpha_{11} FemCEO/CFO + \varepsilon. \quad (3)$$

P/B is either median analyst target price for the firm's share, or the market price on the day following financial statement disclosure, scaled by book value of equity per share. Analyst target prices are restricted to those issued within one month of a firm's annual financial statement disclosure. We focus on the one month period after full financial disclosure, because at this time, analysts have not yet adapted their predictions for the next year's earnings (Gavious, 2007). Thus, their recommendations and target prices are expected to reflect their direct reaction – as opposed to forecast – to the reported earnings. *ROE* is net income before extraordinary items divided by book value of equity; *R&D* is the firm's research and development expense divided by sales; *PM* is profit margin calculated as operating profit divided by sales. All other explanatory variables are as defined in regression equation (2). To control for industry and year effects, we include intercept dummies for each industry and year.

Table VI presents the regressions' results. As expected, analyst price-to-book ratio is significantly positively associated with controls for earnings quality (*Big4Auditor and Leverage*), performance (measured by *PM*), growth (proxied by sales growth and *R&D*) and *Size*. *ROE* is, as expected, positively associated with analyst valuations, however, the coefficient is statistically insignificant. The coefficient on *AbAcc* is significantly positive, indicating that firms with a higher extent of earnings management receive higher analyst valuations. This result implies that analysts are misled by managements that manipulate earnings[27]. As for the gender of directors, the significantly positive coefficients on the proportion of female directors on BODs as well as on the audit committee imply that analysts attribute positive value implications to the presence of women on the firms' boards. The coefficient on *FemCEO/CFO* is also positive, though insignificant. Analysts are seemingly affected not only by objective factors such as firm performance; notably, they do not seem to miss out on a qualitative factor that potentially affects this performance – the gender of the firm's directors.

As for market price-to-book ratio, we find it is significantly positively associated with performance, growth, profitability (as measured by *ROE*) and *Size*. Our two *ex-ante* controls for earnings quality, *Big4Auditor* and *Leverage*, are insignificantly positively associated with market value. In contrast, the coefficient on *AbAcc* is significantly positive. It seems that investors, like analysts or following analysts, are misled by earnings manipulation. The results do not change qualitatively when we use the market price:

- on the day of financial statement disclosure;
- three days thereafter; and
- ten days following the disclosure.

Finally, like analysts, investors in the market seem to be positively affected by the presence of female directors[28]. The VIF measure as well the correlation matrix (untabulated) for the explanatory variables in equation (3) do not imply that a multicollinearity issue exists in our model.

Abnormal accruals measured by	Analysts' valuations Discretionary accruals	Analysts' valuations Nonoperating accruals	Market valuations Discretionary accruals	Market valuations Nonoperating accruals
Intercept	5.473 (0.010)	6.906 (0.041)	1.349 (0.653)	3.214 (0.307)
Big4	1.806 (0.035)	1.580 (0.063)	0.441 (0.835)	0.260 (0.908)
Leverage	3.337 (0.039)	6.252 (0.018)	− 1.106 (0.598)	− 1.766 (0.428)
Size	1.384 (0.000)	1.914 (0.002)	1.175 (0.021)	1.218 (0.072)
Sales Growth	2.435 (0.015)	4.430 (0.005)	2.028 (0.002)	1.932 (0.004)
ROE	0.080 (0.918)	0.772 (0.563)	1.452 (0.000)	1.581 (0.000)
R&D	2.151 (0.027)	2.570 (0.045)	2.797 (0.034)	2.120 (0.081)
PM	2.710 (0.070)	2.235 (0.031)	2.493 (0.069)	2.118 (0.023)
AbAcc	5.361 (0.094)	9.281 (0.041)	3.624 (0.000)	3.522 (0.000)
%FemBOD	3.618 (0.017)	4.093 (0.000)	2.437 (0.024)	2.337 (0.016)
%FemAudCom	1.413 (0.671)	6.217 (0.003)	2.425 (0.052)	1.607 (0.254)
FemCEO/CFO	0.142 (0.915)	2.484 (0.314)	− 0.349 (0.792)	− 0.862 (0.546)
F-value	10.731 (0.000)	9.349 (0.000)	8.578 (0.000)	9.285 (0.000)
Adj. R^2	0.529	0.427	0.245	0.287
No. of observations	478	478	478	478

Notes: *p*-values of the coefficients are presented in parentheses; this table presents an analysis of the relationship between analyst and market valuation multiples and proxies for earnings quality, performance, risk and growth, as well as measures of the presence of female directors; the dependent variable is either the median analyst's target price for the firm's share, issued within one month of a firm's annual financial statement disclosure, or the market share price on the day following financial statement disclosure, scaled by the book value of equity per share; *ROE* is net income before extraordinary items divided by book value of equity; *R&D* is the firm's research and development expense divided by sales; *PM* is profit margin calculated as operating profit divided by sales; all other explanatory variables are as defined in Table V; to control for industry and year effects, we include intercept dummies for each industry and year; we winsorize the top and bottom 1 percent of the dependent variables as well as of continuous independent variables

Table VI.
Female directors and earnings management effect on analyst and market valuations

6. Summary and conclusion

This study merges accounting and gender theories to explore whether earnings management by a firm is affected by the gender of its directors. We find that the presence of women on the BOD as well as on the audit committee is related to a lower extent of earnings management. Furthermore, we find evidence indicating that earnings management is lower when either the CEO or the CFO is a woman. Notably, in firms with a higher female representation in corporate governance and/or in top management, external monitoring by auditors and creditors seems to be weaker, yet earnings quality is higher. Additional analysis suggests that firm valuations by analysts as well as by investors in the market are positively affected by the presence of female directors. That is, investment decisions do not seem to miss out on this important qualitative factor, but acknowledge its affect on the firm's portrayed performance.

Our findings are supported by gender theories on the unique characteristics of women in business. The distinctive meaning of gender in business is marked in decision-making and risk-taking. Gender literature reports a higher level of morality in judgments and behaviors among women than men, as well as a higher level of anxiety among women than among men. Women tend to blame themselves for failures, whereas men tend to display self-confidence, be certain of their success and explain

failure through lack of desire and motivation. Men expect to perform well, moreso than women. As men have higher expectations and greater self-confidence, they may take risks to realize those expectations. The findings of our study imply that these characteristics apply not only to women in executive management positions, but also to women in governance positions. Application of our findings to other industries that are subject to different earnings-management incentives, due to regulation or other industry-specific factors, should be further explored in future research.

Notes

1. The definition of the BOD as per the Israeli Companies Law includes directors appointed by the firm's owners, who engage in formalizing and consolidating the firm's strategy and supervising the CEO's operations and performance. The directors do not run the company; the executive management with the CEO on top does. The directors, *inter alia*, oversee the management and monitor their operations. As such, they are supposed to detect and constrain earnings management, among other things.
2. Spain requires a future female board representation of 40 percent (Srinidhi *et al.*, 2011; Burke and Vinnicombe, 2008).
3. For example, a BOD with two to three members must include both female and male director/s. On a board with nine members, at least four male and four female directors are required. It should be noted that a law passed in Israel in 1993 that stipulates that "appropriate representation" must be given to both sexes in the composition of the boards of state-owned companies. Following the enactment of this law, the percentage of women on the boards of government companies grew from about 7 to 33 percent. The new bill does not suffice with the definition included in the existing law in Israel with respect to state-owned companies – "appropriate representation" – but stipulates that publicly traded companies have a minimum number of women on their boards, based on board size. (www.knesset.gov.il/privatelaw/data/18/1999.rtf).
4. According to the bill, public companies will be forced to adopt a policy of "adopt and disclose" and to publish in their financial statements for their investors, the number of women on the BOD – and not just the names of the members – along with additional information about the number of women in the company. As such, the Authority for the Advancement of the Status of Women submitted a database with the CVs of more than 1,500 women in executive positions, to counter the expected opposition to the bill in advance.
5. Independent directors on the BOD and on the audit committee are not involved in conducting earnings manipulations. Rather, they are expected to detect and deter earnings management that may have been conducted by executive managers.
6. According to the Israeli law, the CEO can be chairperson of the BOD for a period that does not exceed three years, and requires the BOD approval. The CEO is present at the board meetings even if he is not the chairperson.
7. We thank an anonymous referee for this observation.
8. According to Horner (1969), achievement-oriented women tend to avoid success, as achievement situations provoke more anxiety for women than for men. While men generally indicate happiness and feelings of satisfaction over achievement, women's responses are far more negative, indicating fear of social rejection and concerns about maintaining femininity.
9. We check and find that, with very few exceptions (which were excluded from the analysis), all databases match with each other.

10. The requirement that minimum discretionary accruals and minimum nonoperating accruals for our sample firms be higher than one percent of total assets leads to 30 firm-years being excluded from the analysis due to being less likely to manage earnings. The results are qualitatively similar if these firms are included, though statistically weaker.
11. Big4 auditor refers to the largest international accounting firms that existed over our sample period.
12. We thank an anonymous referee for this observation. When we define firm age as the number of years from establishment rather than years from IPO, the qualitative results remain similar.
13. We reran our regressions for each industry. All inferences remain qualitatively similar.
14. Use of signed abnormal accruals captures the direction of earnings management, i.e. whether the firm managed earnings upwards or downwards. For example, managers of a firm in financial distress may choose to manage earnings downwards, if they are engaged in contract negotiations (for example, with lenders; see, DeAngelo *et al.*, 1994). Alternatively they may choose to manage earnings upwards prior to an attempt to raise capital or to avoid reporting losses and earnings decreases (Burgstahler and Dichev, 1997). Hence, the direction of earnings management depends on specific circumstances in a specific time period for the specific firm.
15. Two of our sample firms were acquired and went public in 2009.
16. For dichotomous variables with frequencies of 1 and 0, the mean value indicates the percentage of observations that take on the value "1".
17. We repeat the analyses, categorizing firms based on the median number of women on the BOD (one woman is the median, see Table II), i.e. comparing firm-years with at least one woman on the BOD (347 firm-years) and those with none (131 firm-years). The inferences from the analyses remain similar to those reported in the text and tabulated.
18. To examine whether there is an "independent nature" of female directors that may constrain earnings management (rather than the gender itself constraining earnings management), we compare the presence of female directors and that of female executive managers in our sample firms. In other words, are female directors often independent directors? We find that the proportion of female executive managers in our sample is 15.4 percent (14.5 percent) on average (median), compared with 14.8 percent (14.3 percent) female directors on the companies' BOD, respectively, (Table II). Hence, we cannot make a conjecture as to whether there is an independent nature of female directors in our sample, as the presence of women among executive directors is the same or higher than their presence on the BOD.
19. A CEO is on the board of our sample firms if s/he is a chairperson as well (CEO/Chairperson duality); otherwise, CEOs and CFOs are not members of BOD, and would formally be invited to join board meetings as necessary.
20. In addition to board size, Ghosh *et al.* (2010) find that audit committee size, activity and tenure are associated with earnings management. In contrast, they find that earnings management does not vary with board composition and structure, audit committee composition, expertise and ownership.
21. Similar qualitative results are obtained when using the proportion, rather than the number, of financially literate directors on the BOD.
22. This is the requirement in Israel as it is in the USA.
23. Another proxy for overconfidence as per Schrand and Zechman (2011) is CEO compensation; however, we could not obtain sufficient information on compensation. We recognize this as a limitation of our model.

24. As directors with financial literacy and expertise are more likely to be able to detect earnings management, we inquire about the qualifications of the female directors on the sample firms' boards. We find that in about 30 percent of our sample firms there was at least one female director with financial literacy and expertise (between one and two such female directors, on average). Given this relatively low occurrence of female directors with financial literacy, it seems that our findings with regards to the relation between director gender and earnings management cannot be explained by a financial background or qualifications of these directors.
25. In Israel, the BOD of a company that is listed on the exchange is required to determine the minimum number of directors with financial literacy. Hence, no requirement exists that the BOD will consist of some large number of financially literate directors or a number that is considered "sufficient" to enable detection of earnings management. Still, the BOD is required to detect and deter earnings management when reviewing financial statements, even though most of the BOD members may not have a financial background or literacy.
26. We use target prices issued by US-based analysts, as taken from The Marker database.
27. Prior studies investigating analysts' ability to detect earnings management provide mixed results. For example, Burgstahler and Eames (2003) show that analysts anticipate earnings management to avoid small losses and small earnings decreases, and incorporate the anticipated earnings management in their earnings forecasts. However, analysts appear to be unable to anticipate which firms will engage in such earnings management and which firms will not. Another growing body of literature finds "analysts are unable or unmotivated to anticipate fully firms' earnings management in forecasts" (Abarbanell and Lehavy, 2003). Gavious (2007) shows that analysts react negatively to firms that artificially inflate earnings and that this negative reaction is followed by an even stronger negative reaction by the market.
28. Measures of CEO overconfidence were not found to be related either to analyst or to market valuations.

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