

# DOES FEMALE REPRESENTATION IN AUDIT COMMITTEES AFFECT AUDIT FEES?

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**SUMMARY:** This paper examines the association between female audit committee representation and audit fees. We hypothesize that gender diversity in audit committees has implications for external auditing, and thus affects audit fees. Using a sample of S&P 500 firms, we find considerable evidence to suggest that firms with female audit committee representation have significantly lower audit fees. These findings may indicate that female representatives in audit committees serve as substitutes for external auditors, thereby reducing the demand for external audit services. Alternatively, gender diversity may affect the auditor's assessment of the integrity of the financial reporting process. If female representation reduces the inherent risk of misstatements, gender diversity in audit committees may lead to lower audit fees.

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**Data Availability:** The data are available from public sources.

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## INTRODUCTION

Women and men often act and behave somewhat differently. Psychology and management literature have long acknowledged the existence of significant gender differences, for instance, in cognitive functioning, communicative skills, decision-making, and leadership styles. Given these differences, the recent corporate finance literature has examined the effects of female representation in the board of directors, and noted that gender diversity may have important implications for corporate governance (see e.g., Carter et al. 2003; Erhardt et al. 2003; Adams and Ferreira 2004; Huse and Solberg 2006; Rose 2007). Nevertheless, the issue of gender diversity has so far been largely ignored in accounting and auditing literature.

In this paper, we examine the role of gender diversity in corporate audit committees in relation to external auditing. In particular, we attempt to assess whether and how female audit committee representation affects the fees paid to the external auditors. Given that recent legal reforms impose strict requirements on the composition of the audit committee and emphasize the committee's monitoring responsibilities in ensuring the integrity of the financial reporting process (Sarbanes-Oxley Act 2002; SEC 2003), it is important to consider the potential effects of gender diversity on the functioning and effectiveness of audit committees. To our best knowledge, this study is the first attempt to address the role of gender diversity in audit committees. Thus, by focusing on the association between female audit committee representation and audit fees, this paper provides novel insights into empirical audit pricing literature.

Over the past few years, the relationship between audit committee characteristics and audit fees has been examined in Abbott et al. (2003), Lee and Mande (2005), Goodwin-Stewart and Kent (2006), and Vafeas and Waagelein (2007). In brief, these studies indicate that audit committee characteristics are important determinants of audit fees. Consistent with demand-side argumentation, the findings reported in previous studies suggest that audit fees are positively related to audit committee size, expertise, independence, and meeting activity. The present paper aims to extend the existing literature by considering the potential effects of audit committees' gender diversity on audit fees.

Our empirical findings demonstrate that female representation in audit committees affects audit fees. In particular, using a sample of S&P 500 firms, we find considerable evidence to suggest that female audit committee representation is negatively related to the fees paid to the external auditors. Consistent with previous studies, our control variables for audit committee characteristics (size, expertise and activity level) are positively associated with audit fees. Overall, these findings may indicate that female representatives in audit committees serve as substitutes for external auditors, and thereby diminish the demand for external audit services. Alternatively, gender diversity may affect the auditor's assessment of the integrity of financial reporting process. If female representation reduces the inherent risk of misstatements, gender diversity in audit committees may lead to lower audit fees.

The remainder of this paper is organized as follows. The next section reviews the related literature and presents our research hypothesis. The third section describes the data on the S&P 500 firms, while the fourth section presents the methodology used in the analysis. The empirical findings on the relationship between female audit committee

representation and audit fees are reported in the fifth section. Finally, the last section provides concluding remarks.

## **RELATED LITERATURE AND HYPOTHESIS**

### **Audit Committees and External Auditing**

The importance of audit committees within corporate governance has received increasing emphasis from regulatory authorities in the last ten years. The current regulations emphasize the role of the audit committee's monitoring activities in ensuring the integrity of the financial reporting process (BRC 1999; Sarbanes-Oxley Act 2002; SEC 2003). Among other requirements, the Sarbanes-Oxley Act and the new SEC rules require that audit committees are directly responsible for the appointment and compensation of external auditors. Following the increased regulatory interest, a considerable body of empirical auditing literature has recently focused on the relationship between audit committees and external auditing. In brief, this literature indicates that audit committees may have a critical role in enhancing audit quality.

Lee et al. (2004) argue that audit committees may affect the quality of auditing in several respects. First, the audit committee may demand that the firm appoints a more knowledgeable auditor with a better reputation (see e.g., Abbott and Parker 2000; Chen et al. 2005). Second, the audit committee may improve audit quality by demanding a greater quantity of audit effort from the incumbent auditor (e.g., Goodwin-Stewart and Kent 2006;

Abbott et al. 2003; Carcello et al. 2002). Furthermore, the audit committee may increase the independence of external auditors by providing support for the auditor in potential disputes with the firm's management (see e.g., Knapp 1987; DeZoort and Salterio 2001; DeZoort et al. 2003). Finally, audit committees may enhance the integrity of audit reports by mitigating the potential threat of auditor replacement based on managerial motives (see e.g., Carcello and Neal 2000; Lee et al. 2004).

Over the past few years, empirical studies have addressed the association between audit committee characteristics and audit fees. These studies use observable audit committee characteristics to measure effectiveness, and assume that effectiveness increases with the committee's size, financial expertise, independence, and meeting activity. Moreover, prior research notes that the relation between audit committees and audit fees is affected by both the auditee's demand for audit services and the supply of these services by the external auditor (see e.g., Abbott et al. 2003; Goodwin-Stewart and Kent 2006). According to the demand-side argumentation, effective audit committees may be expected to demand more audit effort and greater assurance in order to achieve higher audit quality. These demands obviously lead to higher audit fees. The supply-side arguments, on the other hand, suggest that the involvement of an effective audit committee is bound to strengthen the internal controls of the firm. Because of the audit committee's monitoring activities, the external auditor may reduce the assessed level of control risk and decrease the number of auditing hours. Thus, the supply-side story implies lower audit fees.

In general, the empirical findings in previous studies provide more support for the demand-side argumentation, as audit fees seem to increase with the effectiveness of the

audit committee. Carcello et al. (2002), using data from 1992-1993, find that board characteristics, rather than audit committee characteristics, are associated with audit fees. However, as noted by Abbott et al. (2003), the findings of Carcello et al. (2002) are affected by the fact that boards were the main corporate governance mechanisms in the early 1990s. Since then, the regulatory environment has emphasized the audit committee's role in financial monitoring (BRC 1999; Sarbanes-Oxley Act 2002; SEC 2003). Accordingly, using more recent data, Abbott et al. (2003), Lee and Mande (2005), Goodwin-Stewart and Kent (2006), and Vafeas and Waagelein (2007) find a positive association between audit committee characteristics and audit fees. Abbott et al. (2003), Lee and Mande (2005) and Vafeas and Waagelein (2007) document that audit fees increase with audit committee's independence and financial expertise. Moreover, Lee and Mande (2005) and Goodwin-Stewart and Kent (2006) find a positive relationship between audit fees and audit committee's meeting activity, while Vafeas and Waagelein (2007) report that audit fees increase with the size of the committee. Finally, Goodwin-Stewart and Kent (2006) show that the mere existence of the audit committee tends to increase audit fees.

### **Gender Diversity and Corporate Governance**

It is widely acknowledged in the psychology and management literature that gender differences exist e.g. in cognitive functioning, communicative skills, decision-making, and leadership style. Considerable evidence suggests that women have better communicative capabilities, and may thereby have a comparative advantage over men in tasks that require

communication within and among different groups (see e.g., Wood et al. 1985; Maznevski 1994; Fondas 1997; Schubert 2006). Because women communicate and listen more effectively, they tend to perform better than men on group problem-solving and decision-making tasks requiring discussion and consensus (Wood et al. 1985, Robinson and Dechant 1997; Dallas 2002). Moreover, gender diversity in decision-making groups obviously provides greater diversity of opinions and interests, which in turn may lead to better decisions. Thus, the recent corporate governance literature has recognized that gender diversity may enhance the functioning and efficiency of corporate boards and committees (see e.g., Fondas and Salsalos 2000; Erhardt et al. 2003; Adams and Ferreira 2004; Huse and Solberg 2006; Rose 2007).

Besides the potential improvements in group dynamics, at least two additional features of gender differences merit discussion in corporate governance context. First, as noted by Fondas and Salsalos (2000), women tend to have higher expectations regarding their responsibilities as directors, which may induce them to expend more effort on their tasks. In a similar vein, Huse and Solberg (2006) argue that women in corporate boards are better prepared for board meetings than men, and female representation may thus improve board behavior and effectiveness. Further, given the glass ceiling phenomenon, women have to demonstrate extra competence in order to reach managerial positions and corporate boards (Eagly and Carli, 2003). Consequently, gender diversity may improve the efficiency of corporate boards and committees simply because the female representatives, in general, are presumably highly competent and hard-working.

Second, a vast body of literature suggests that women are more conservative and risk averse than men (see e.g., Levin et al. 1988; Johnson and Powell 1994; Powell and Ansic 1997; Jianakoplos and Bernasek 1998; Byrnes et al. 1999). According to Schubert (2006), women try to avoid losses and are less inclined to take extreme risks. This suggests that gender diversity in corporate boards and committees may help to prevent excessive risk-taking. Although willingness to bear risk is a managerial necessity for creating shareholder value, gender differences in risk aversion may be good news from the perspective of corporate governance, as female representation may, for instance, help to better perceive potential biases in strategy formulation and risk assessments. Therefore, it may be argued that gender diversity in the board of directors and audit committee should improve corporate governance.

Although the issue of gender diversity has so far been largely neglected in the accounting and auditing literature, female board representation has received considerable attention in the corporate finance literature over the past few years. In brief, these empirical studies indicate that gender diversity may have positive effects on financial performance and firm value. Carter et al. (2003) use a sample of Fortune 1000 firms to examine whether gender diversity on the board of directors affects firm value, and find a significant positive association between female board representation and firm value. Rose (2007), however, using data on Danish firms, finds no evidence of any systematic relationships between firm value and gender diversity. Erhardt et al. (2003) examine the effects of female board representation on financial performance, and document that firms with more diverse boards have higher profitability. Similar findings on a positive association between gender

diversity and financial performance are also reported in Farrell and Hersch (2005). Finally, Adams and Ferreira (2004) focus on the effects of gender diversity on variability of stock returns and the structure of managerial compensation. Their results demonstrate that firms with highly volatile stock returns have fewer women on their boards, and moreover, that firms with more diverse boards have more incentive features in their executive compensation plans. In general, these findings suggest that gender diversity may enhance the effectiveness of the board, thereby improving corporate governance.

## **Hypothesis**

Given that audit committee characteristics are associated with audit fees (Abbott et al. 2003; Lee and Mande 2005; Goodwin-Stewart and Kent 2006; Vafeas and Waagelein 2007), and moreover that gender diversity presumably affects the functioning of corporate boards and committees (Carter et al. 2003; Erhardt et al. 2003; Adams and Ferreira 2004; Huse and Solberg 2006), it is of interest to examine whether female representation in audit committees affects audit fees. Thus, the hypothesis to be examined in this paper is:

H1: There exists a relation between female audit committee representation and audit fees.

The association between the audit committee's gender diversity and audit fees, if it exists, may be positive or negative. Based on the recent corporate governance literature, we

presume that female representation improves the functioning and effectiveness of the audit committee. However, as discussed above, the relationship between the effectiveness of the audit committee and audit fees is rather complex. The demand-side argumentation suggests that audit fees increase with the effectiveness of the audit committee, while the supply-side arguments imply a negative relation between the committee's effectiveness and audit fees. Therefore, the question of whether and how female audit committee representation affects audit fees is ultimately addressed empirically.

## **DATA**

The initial sample used in the empirical analysis consists of the S&P 500 firms as of the end of 2006. Following prior research, we exclude financial institutions (SIC codes 6000-6900) from the sample due to unique aspects of their regulation. This leaves us with a sample of 407 firms, which are classified by industry in Table 1. These firms are audited by Big 4 auditors, except for one firm audited by BDO Seidman. It should be noted that the S&P 500 firms are listed on the major U.S. stock exchanges, and are thus required to maintain an audit committee. Under recently adopted exchange rules, audit committees must be composed of at least three independent, financially literate directors of whom at least one is a "financial expert" as defined by the SEC.

(insert Table 1 about here)

Our data on audit fees for the fiscal year 2006 are obtained from Audit Analytics database, and comprise the total amount of fees paid to external auditors for performing audit services. The data on female audit committee representation and other audit committee characteristics is collected mainly from Audit Analytics. Since these data were not available from Audit Analytics for some of the S&P 500 firms, we completed our sample by gathering the missing values from proxy statements. For each firm, we determine the gender and potential financial expertise of each audit committee member, and quantify the size and the meeting frequency of the audit committee.

We define six binary variables for female audit committee representation as follows: (i) female chair (*FCHAIR*) is set to one if the chair of the audit committee is female, (ii) female experts (*FEXPERT*) equals one if the committee has at least one female expert, (iii) female members (*FMEMB*) equals one if the committee has at least one female member, (iv) female chair and experts (*FCE*) is set to one if the committee has a female chair and at least one female expert, (v) female chair and members (*FCM*) is one if the committee has a female chair and at least one additional female member, and (vi) several females (*FTOM*) equals one if the committee has at least two female members. Committee's financial expertise (*CEXP*), size (*CSIZE*), and meeting frequency (*CMEET*) are used as control variables in the analysis. We measure committee's financial expertise by the ratio of expert members to the total number of committee members, while size and meeting frequency are simple defined as the number of committee members and the number of meetings held by the committee during the fiscal year.

Following previous studies on audit fees (see e.g., Simunic 1980; Carcello et al. 2002; Abbott et al. 2003; Mitra et al. 2007; Vafeas and Waagelein 2007), we use several firm-specific control variables to account for the effects of auditee size, complexity, and audit risk. In particular, we expect audit fees to be positively associated with the natural log of total assets (*TA*), receivable and inventory intensity (*INVREC*), proportion of foreign sales to total sales (*FOROPR*), financial leverage (*LEV*), and whether the auditee has incurred loss during the fiscal year (*LOSS*). The data on these firm-specific control variables are obtained from Thomson Financial Worldscope.

(insert Table 2 about here)

Table 2 presents descriptive statistics for the firm-specific and the audit committee related control variables. Panel A contains the statistics for the complete sample of 407 firms. As can be noted from the table, the sample is quite heterogeneous in terms of auditee size and the level of audit fees. Panel A demonstrates that auditee size, as measured by the amount of total assets, varies from \$938 million to about \$697 billion, with a mean of \$20,780.3 million. Similarly, the level of audit fees paid to external auditors appears to vary considerably, with a mean fee of \$7.628 million, and a minimum and maximum of \$0.493 and \$90.200 million, respectively. Turning the focus to the audit committee controls, Panel A shows that an average audit committee holds about nine meetings per fiscal year, and has four members of whom two are typically financial experts.

Panel B of Table 2 reports the descriptive statistics for three sub-samples of firms with female representation in the audit committee. Several interesting features can be noted from these statistics. First, Panel B indicates that firms with female audit committee chairs have somewhat lower audit fees, as both the mean and median figures for this sub-sample of firms are lower than for the complete sample of firms. Furthermore, it should be noted that although the audit fees are lower for this sub-sample of firms, all the control variables seem quite similar to those reported in Panel A. Second, Panel B shows that the expert to member ratio is higher in firms with female experts. This indicates that female experts are seldom the only financial experts in the audit committee. Finally, Panel B suggests that firms with female audit committee members are larger than other firms, and moreover, have slightly larger audit committees.

(insert Table 3 about here)

Table 3 provides pairwise correlations among the variables used in the analysis. As expected, our dependent variable *AFEE* is strongly positively correlated with *TA*, and also statistically significantly positively correlated with control variables *FOROPR*, *LEV*, *CSIZE*, and *CMEET*. The only female representation variable that is significantly correlated with *AFEE* is the dummy for at least two female members (*FTOM*), with a correlation coefficient of  $-0.083$ . Regarding our control variables, Table 3 shows that *INVREC* and *CSIZE* are strongly correlated with *TA*, *FOROPR* with *LEV*, and *LOSS* with *CMEET*. The latter highly positive correlation indicates that audit committees of firms reporting losses

hold meetings more frequently during the fiscal year. Not surprisingly, our female representation variables are highly positively correlated with each other. Finally, it may be seen in Table 3 that *FEXPERT* is strongly positively correlated with *CEXP*, *FMEMB* with *TA* and *CSIZE*, and *FTOM* with *CSIZE*.

## METHODOLOGY

We examine the relationship between audit fees and female audit committee representation with cross-sectional regressions. Consistent with the literature on audit fees (see e.g., Simunic 1980; Carcello et al. 2002; Abbott et al. 2003; Mitra et al. 2007), our model includes several firm-specific variables to control for the effects of auditee size, complexity, and audit risk on audit fees. Furthermore, given that recent studies by Abbott et al. (2003), Goodwin-Stewart and Kent (2006), and Vafeas and Waagelein (2007) document a relation between audit fees and audit committee characteristics, we include three audit committee related variables in our analysis as additional controls. We presume that this set of control variables will enable us to examine the potential incremental effect of female audit committee representation on audit fees. Thus, we estimate the following cross-sectional model to examine the association between audit fees and female representation in the audit committee:

$$\begin{aligned}
 AFEE = & \alpha + \beta_1 TA + \beta_2 INVREC + \beta_3 FOROPR + \beta_4 LEV + \beta_5 LOSS \\
 & + \beta_6 CSIZE + \beta_7 CEXP + \beta_8 CMEET + \beta_9 FEMALE + \varepsilon_t
 \end{aligned}
 \tag{1}$$

where *AFEE* denotes the natural log of audit fees, *TA* is the natural of log total assets, *INVREC* is inventory and receivables to total assets, *FOROPR* is the proportion of foreign sales to total sales, *LEV* is total debt to total assets, *LOSS* is a dummy variable that equals one if the firm has incurred loss during the fiscal year, *CSIZE* is the number of audit committee members, *CEXP* is the proportion of experts to committee members, and *CMEET* is the number of audit committee meetings. The first five independent variables control for auditee size, complexity, and audit risk, while the next three variables control for audit committee characteristics.

The test variable of interest in our regression specification is *FEMALE*, which is defined as one of the following six binary variables: *FCHAIR* equals one if the chair of the committee is a female, *FEXPERT* is one if the committee has at least one female expert, *FMEMB* is one if the committee has at least one female member, *FCE* is one if the committee has a female chair and at least one female expert, *FCM* is one if the committee has a female chair and at least one additional female member, and *FTOM* is one if the committee has at least two female members. These female representation variables are used in the regressions one at a time in order to avoid problems with multicollinearity.

Based on prior research (see e.g., Francis and Simon 1987; Simon and Francis 1988; Carcello et al. 2002; Abbott et al. 2003; Knechel and Willekens 2006; Mitra et al. 2007), we expect the level of audit fees to be positively associated with the control variables for auditee size, complexity, and audit risk (*TA*, *INVREC*, *FOROPR*, *LEV*, and *LOSS*). Moreover, to be consistent with the recent findings of Abbott et al. (2003), Lee and Mande (2005), Goodwin-Stewart and Kent (2006) and Vafeas and Waagelein (2007), we expect

audit fees to increase with the size, expertise, and meeting frequency of the audit committee. As discussed in Abbot et al. (2003), the positive relationship between audit committee characteristics and audit fees relies on demand-side arguments. It should be noted, however, that these audit committee characteristics may also enhance the effectiveness of internal monitoring, thereby reducing the perceived audit risk, which then in turn may decrease the fees paid to external auditors.

## **RESULTS**

### **Regression Results**

Table 4 reports the estimation results of the alternative cross-sectional regressions used to test the relation between audit fees and female representation in the audit committee. We begin our analysis with Model 1 by regressing audit fees (*AFEE*) on firm-specific control variables (*TA*, *INVREC*, *FOROPR*, *LEV*, *LOSS*) and the controls for audit committee characteristics (*CSIZE*, *CEXP*, *CMEET*). As can be seen from the table, all control variables have expected signs and are statistically significant. Moreover, our control variables seem to have good explanatory power for audit fees, as the adjusted  $R^2$  of the regression is 66.6 % and the  $F$ -statistic is significant at the 1 % level. Consistent with Abbott et al. (2003) and Vafeas and Waegelien (2007), the coefficient estimates for the control variables related to audit committee characteristics are positive, suggesting that companies with large audit committees with a high degree of financial expertise and

frequent meetings have higher audit fees. These results may be interpreted to provide further support for the demand-side argumentation of Abbott et al. (2003).

(Insert Table 4 about here)

In Models 2-7, we examine the relationship between female representation and audit fees by regressing audit fees on a set of dummy variables for female representation and the controls for firm specific factors and audit committee characteristics. The female representation dummy in Model 2 is *FCHAIR*, which equals one if the chair of the audit committee is female. The estimation results of Model 2 indicate that audit fees are lower in companies with female audit committee chairs, as the coefficient estimate for *FCHAIR* is negative and statistically significant at the 5 % level. All the control variables in Model 2 appear statistically significant, except for *CSIZE*. The explanatory power of this specification for audit fees is relatively high, with adjusted  $R^2$  of 67.0 %. Finally, the incremental *F*-statistic (not reported) associated with testing the restricted Model 1 against Model 2 is 4.66 and significant at the 5 % level, thereby suggesting that female audit committee representation helps to explain the cross-sectional variation in audit fees.

Models 3 and 4 in Table 4 regress audit fees on dummy variables for female experts (*FEXPERT*) and female members (*FMEMB*), respectively. As can be noted from the table, the coefficients for both *FEXPERT* and *FMEMB* are negative, albeit statistically insignificant. The adjusted  $R^2$  of both models is 66.5 %. In Model 5, we use a dummy variable that is set to one if the audit committee has a female chair and at least one female

expert (*FCE*). Consistent with Model 1, the estimate for *FCE* is negative and significant at the 5 % level, and the *F*-statistic and adjusted  $R^2$  indicate good fit of the specification. Moreover, the incremental *F*-statistic (not reported) testing Model 1 against Model 5 is statistically significant.

The female representation variable used in Model 6 (*FCM*) identifies firms that have female chairs and at least one additional female member in their audit committee. Again, the estimation results suggest that female representation is negatively related to audit fees. The coefficient for *FCM*, however, is not significant at conventional levels (p-value = 0.120). Finally, in Model 7 we use a female dummy that equals one if the audit committee has at least two female members (*FTOM*). Our estimations indicate that *FTOM* is negatively and statistically significantly related to the level of audit fees, and thus provides further evidence suggesting that companies with female audit committee representation pay lower audit fees. The *F*-statistic of Model 7 is significant at the 1 % level, and the adjusted  $R^2$  is 66.7 %. Finally, it may be noted from Table 4 that the firm-specific and the audit committee related control variables are consistently positive and significant in Models 3 through 7.

Overall, the results reported in Table 4 suggest that female audit committee representation is negatively related to audit fees. The coefficient estimates for the female representation variables are all negative and statistically significant in three out of six regression specifications. This finding obviously merits further discussion. From the demand-side perspective, female representation may reduce audit fees by affecting the audit committee's assessment of the required level of external audit work. Because females tend

to expend more time and effort to gather information and are generally better prepared for meetings (Huse and Solberg 2006), the women in audit committees may be less dependent than the men on the assurance provided by external auditors. In a similar vein, the diligence and effort of women may be expected to inherently serve as a substitute for external auditing.

Considering the supply-side perspective, female representation in audit committees may decrease audit fees by reducing the assessment of audit risk. Female representation could affect the auditor's assessment of audit risk, for instance, by improving the effectiveness of internal auditing and/or by generally enhancing the integrity of the financial reporting process. Moreover, the psychology and management literature suggests that women tend to be more conservative and risk averse than men (see e.g., Powell and Ansic 1997; Jianakoplos and Bernasek 1998; Byrnes et al. 1999). These gender differences in risk aversion may also directly and indirectly affect the auditor's judgment on audit risk. Finally, given the better communicative capabilities and meetings preparations of women, female audit committee representation may reduce audit fees simply by reducing the hours spent by the auditor (Goodwin-Stewart and Kent 2006; Stewart and Munro 2007).

### **Robustness Checks**

We examine the robustness of our findings by conducting several additional tests. First, in order to ascertain that the results are not affected by extreme observations or few outliers, we winsorize audit fees and the firm-specific control variables at the 0.5 % and 99.5 % levels and then re-estimate all the models reported in Table 4. The estimation

results with the winsorized data are reported in Table 5. In general, these estimations are consistent with those reported in Table 4. The coefficients for all control variables are positive, while the coefficients for the female representation variables are all negative. However, it should be noted that in contrast to Table 4, the estimates for the audit committee controls *CSIZE* and *CEXP* appear statistically insignificant. Moreover, in contrast to Table 4, the coefficient for *FCHAIR* in Model 2 is now significant at the 1 % level and the coefficient for *FCM* in Model 6 at the 5 % level. Thus, the regressions based on winsorized data further confirm that female audit committee representation is associated with lower audit fees, and suggest that this finding is not driven by outliers.

(Insert Table 5 about here)

Given that manufacturing firms constitute a major part of our sample (see Table 1), we next examine whether our empirical findings are induced by industry-related factors. In particular, we divide the total sample of S&P 500 firms into manufacturing firms (215 firms with SIC codes 2000-3900) and non-manufacturing firms (192 firms with SIC codes 100-1700 & 4000-8900), and re-estimate all regressions. The estimates for the sample of manufacturing firms (not tabulated) are generally similar to the results reported in Table 4. Considering the variables of interest, the estimated coefficients for all female representation dummies are again negative, and statistically highly significant for *FCHAIR*, *FCE*, *FCM*, and *FTOM*. In the sample of non-manufacturing firms, the coefficients for all female representation variables are also consistently negative. However, in this subsample of firms, only the coefficient for *FCHAIR* remains significant, and even that only at the 10 % level.

Thus, the estimates indicate that our findings may at least to some extent pertain to manufacturing firms.

So far, financial institutions (SIC codes 6000-6900) have been excluded from the analysis. To further examine the sensitivity of our results to industry effects, we re-estimate the regressions using the complete sample of S&P 500 firms. These estimations (not tabulated) once again suggest that female audit committee representation is negatively related to audit fees, as the estimated coefficients for the female representation dummies are all negative, and as in Table 5, statistically significant for *FCHAIR*, *FCE*, *FCM*, and *FTOM*. Finally, we test the robustness of our results by omitting the audit committee control variables from the regressions. With these specifications, the female representation variables also remain negative, and the estimates for *FCHAIR*, *FCE*, *FCM*, and *FTOM* are significant. To conclude, the results of the sensitivity tests seem to be largely consistent with our main analysis. Perhaps the most noteworthy distinction is that the coefficient estimate for *FCM*, which appears insignificant in Table 4, is statistically highly significant in most of the sensitivity tests.

## CONCLUSIONS

This paper examines the relationship between audit fees and female representation in corporate audit committees. Motivated by the gender differences in human behavior, and recent findings in the corporate finance literature, we hypothesize that gender diversity in audit committees affects the level of fees paid to the external auditors. Given that recent

legal reforms set strict requirements for the composition of the audit committee and emphasize the committee's monitoring responsibilities in ensuring the integrity of financial reporting process (Sarbanes-Oxley Act 2002; SEC 2003), it is important to consider the potential effects of gender diversity on the functioning and effectiveness of audit committees. Moreover, by focusing on the association between female audit committee representation and audit fees, this paper adds novel insights into audit pricing literature.

Our empirical findings demonstrate that female representation in audit committees affects audit fees. In particular, using a sample of S&P 500 firms, we find considerable evidence to suggest that female audit committee representation is negatively associated with audit fees. Consistent with previous studies, the control variables related to audit committee characteristics (size, expertise and activity level) are positively associated with audit fees. Overall, our findings may indicate that female representatives in audit committees serve as substitutes for external auditors, and thereby reduce the demand for external audit services. Alternatively, gender diversity may affect the auditor's assessment of the integrity of the financial reporting process. If female representation reduces the inherent risk of misstatements, gender diversity in the audit committee may lead to lower audit fees.

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**Table 1.** Number of firms by SIC codes.

SIC code	Industry description	Firms in industry	Firms with female AC chair	Firms with female AC experts	Firms with female AC members
1000-1400	Mining	22	3	9	11
1500-1700	Construction	6	0	1	3
2000-3900	Manufacturing	215	16	46	112
4000-4900	Transportation, communications, electric, gas, and sanitary services	62	4	12	34
5000-5100	Wholesale trade	11	1	5	8
5200-5900	Retail trade	42	7	12	28
7000-8900	Services	49	4	13	24

The table presents the number of firms by standard industry classification (SIC) codes. The sample consists of 407 S&P 500 firms. Financial institutions (SIC codes between 6000 and 6900) are excluded from the sample.

**Table 2.** Descriptive statistics.

## Panel A. Summary statistics for all firms (n=407)

Variable	Mean	Median	Std.dev.	Max	Min
Audit fees (in \$ millions)	7.617	4.895	9.216	90.200	0.493
Total assets (in \$ millions)	20,780.3	9,384.6	46,611.8	697,239.0	937.7
Inventory and receivables to total assets	0.224	0.206	0.145	0.826	0.013
Foreign sales to total sales	0.326	0.327	0.246	1.000	0.000
Total debt to total assets	0.228	0.220	0.154	0.710	0.000
Loss	0.047	0.000	0.211	1.000	0.000
Committee size	4.143	4.000	0.928	6.000	3.000
Committee expertise	0.508	0.400	0.307	1.000	0.000
Committee meetings	9.477	9.000	3.171	22.000	2.000

## Panel B. Summary statistics for firms with female AC representation

Variable					
<i>Firms with female AC chair (n=35)</i>					
Audit fees (in \$ millions)	6.321	4.642	5.227	23.700	1.171
Total assets (in \$ millions)	17,676.3	13,145.0	14,890.7	58,844.0	1,737.7
Inventory and receivables to total assets	0.210	0.179	0.121	0.463	0.023
Foreign sales to total sales	0.322	0.252	0.284	0.869	0.000
Total debt to total assets	0.242	0.230	0.154	0.710	0.000
Loss	0.057	0.000	0.236	1.000	0.000
Committee size	4.143	4.000	0.912	6.000	3.000
Committee expertise	0.486	0.500	0.309	1.000	0.000
Committee meetings	9.121	9.000	2.859	15.000	5.000
<i>Firms with female AC experts (n=98)</i>					
Audit fees (in \$ millions)	7.250	5.136	5.922	28.200	0.967
Total assets (in \$ millions)	18,267.8	9,114.5	26,574.2	188,804.0	1,576.9
Inventory and receivables to total assets	0.232	0.190	0.161	0.826	0.023
Foreign sales to total sales	0.322	0.282	0.264	0.869	0.000
Total debt to total assets	0.231	0.234	0.163	0.710	0.000
Loss	0.061	0.000	0.241	1.000	0.000
Committee size	4.235	4.000	0.822	6.000	3.000
Committee expertise	0.691	0.750	0.309	1.000	0.167
Committee meetings	9.438	9.000	3.201	20.000	4.000

**Table 2. Continued.**

Panel B. *Continued*

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Variable					
<i>Firms with female AC members (n=220)</i>					
Audit fees (in \$ millions)	7.491	5.048	7.069	50.000	0.493
Total assets (in \$ millions)	21,463.9	11,906.0	34,062.2	275,337.0	1,414.1
Inventory and receivables to total assets	0.217	0.187	0.150	0.826	0.000
Foreign sales to total sales	0.310	0.282	0.251	0.881	0.000
Total debt to total assets	0.226	0.224	0.155	0.710	0.000
Loss	0.041	0.000	0.199	1.000	0.000
Committee size	4.345	4.000	0.880	6.000	3.000
Committee expertise	0.492	0.400	0.306	1.000	0.000
Committee meetings	9.375	9.000	2.987	20.000	4.000

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Panel A reports descriptive statistics for the sample of 407 S&P 500 firms. Financial institutions (SIC codes between 6000 and 6900) are excluded from the sample. Panel B reports descriptive statistics for firms with female representation in the audit committee. Loss is a dummy variable that equals one if the firm has incurred loss, committee size is the number of audit committee members, committee expertise is the proportion of financial experts to committee members, and committee meetings is the number of audit committee meetings per year.

**Table 3.** Correlations.

Variable	TA	INVREC	FOROPR	LEV	LOSS	CSIZE	CEXP	CMEET	FCHAIR	FEXPERT	FMEMB	FCE	FCM	FTOM
AFEE	0.700	-0.025	0.344	0.116	0.078	0.117	0.079	0.179	-0.030	0.030	0.064	-0.018	-0.063	-0.083
TA		-0.225	-0.037	0.204	-0.055	0.185	-0.063	0.026	0.075	0.033	0.165	0.028	-0.028	-0.008
INVREC			0.106	-0.141	0.019	-0.046	0.082	-0.049	-0.031	0.066	-0.050	-0.002	0.009	0.086
FOROPR				-0.221	0.032	-0.155	0.111	0.083	-0.012	-0.008	-0.071	0.044	-0.049	-0.096
LEV					0.078	0.143	0.005	-0.104	0.020	-0.014	-0.002	0.030	0.015	0.039
LOSS						-0.039	-0.005	0.191	0.038	0.017	-0.024	0.071	0.113	0.070
CSIZE							-0.160	-0.045	-0.043	0.025	0.206	-0.059	-0.018	0.155
CEXP								0.091	-0.038	0.303	-0.055	0.015	-0.014	-0.137
CMEET									-0.032	-0.042	-0.037	-0.005	-0.026	-0.099
FCHAIR										0.321	0.292	0.812	0.638	0.326
FEXPERT											0.529	0.448	0.237	0.214
FMEMB												0.237	0.186	0.325
FCE													0.577	0.301
FCM														0.573

The table reports pairwise correlations for the variables used in the regressions. (i) The dependent variable *AFEE* is the natural log of audit fees. (ii) Firm-specific control variables are defined as follows: *TA* is the natural of log total assets, *INVREC* is inventory and receivables to total assets, *FOROPR* is the proportion of foreign sales to total sales, *LEV* is total debt to total assets, and *LOSS* is a dummy variable that equals one if the firm has incurred a loss. (iii) Audit committee control variables are defined as follows: *CSIZE* is the number of audit committee members, *CEXP* is the proportion of experts to committee members, and *CMEET* is the number of audit committee meetings. (iv) The dummy variables for female representation in the audit committee are defined as follows: *FCHAIR* equals one if the chair of the committee is a female, *FEXPERT* equals one if the committee has at least one female expert, *FMEMB* equals one if the committee has at least one female member, *FCE* equals one if the committee has a female chair and at least one female expert, *FCM* equals one if the committee has a female chair and at least one additional female member, and *FTOM* equals one if the committee has at least two female members.

**Table 4.** Regression results.

Variable	Exp. sign	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Constant		1.285** (2.06)	1.224** (1.98)	1.261** (2.00)	1.230* (1.94)	1.267** (2.05)	1.307** (2.09)	1.300** (2.08)
<i>Control variables:</i>								
TA	+	0.561*** (21.89)	0.566*** (22.36)	0.562*** (21.68)	0.564*** (21.50)	0.563*** (22.23)	0.561*** (21.87)	0.561*** (21.98)
INVREC	+	0.665** (2.35)	0.659** (2.31)	0.672** (2.36)	0.663** (2.34)	0.666** (2.34)	0.666** (2.34)	0.696** (2.38)
FOROPR	+	1.255*** (9.56)	1.252*** (9.60)	1.252*** (9.46)	1.251*** (9.44)	1.264*** (9.70)	1.250*** (9.49)	1.243*** (9.42)
LEV	+	0.004** (2.10)	0.004** (2.08)	0.004** (2.05)	0.003** (2.02)	0.004** (2.15)	0.004** (2.09)	0.004** (2.11)
LOSS	+	0.322** (2.45)	0.336** (2.58)	0.325** (2.46)	0.322** (2.44)	0.339** (2.58)	0.337** (2.55)	0.341*** (2.60)
<i>Audit committee control variables:</i>								
CSIZE	+	0.052* (1.76)	0.048 (1.61)	0.054* (1.80)	0.057* (1.86)	0.049* (1.66)	0.052* (1.75)	0.058* (1.95)
CEXP	+	0.208** (2.11)	0.200** (2.05)	0.227** (2.19)	0.207** (2.10)	0.209** (2.14)	0.207** (2.10)	0.193* (1.94)
CMEET	+	0.031*** (3.34)	0.030*** (3.26)	0.031*** (3.28)	0.031*** (3.29)	0.031*** (3.30)	0.031*** (3.30)	0.030*** (3.21)
<i>Female representation variables:</i>								
FCHAIR	?		-0.225** (-2.41)					
FEXPERT	?			-0.040 (-0.59)				
FMEMB	?				-0.045 (-0.78)			
FCE	?					-0.217** (-1.97)		
FCM	?						-0.143 (-1.56)	
FTOM	?							-0.142** (-2.01)
Adjusted $R^2$		0.666	0.670	0.665	0.665	0.668	0.665	0.667
$F$ -stat.		82.946***	75.278***	73.617***	73.718***	74.656***	73.820***	74.293***

The table reports the estimates of alternative versions the following regression specification:

$$AFEE = \alpha + \beta_1 TA + \beta_2 INVREC + \beta_3 FOROPR + \beta_4 LEV + \beta_5 LOSS \\ + \beta_6 CSIZE + \beta_7 CEXP + \beta_8 CMEET + \beta_9 FEMALE + \varepsilon_t$$

where *AFEE* is the natural log of audit fees, *TA* is the natural of log total assets, *INVREC* is inventory and receivables to total assets, *FOROPR* is the proportion of foreign sales to total sales, *LEV* is total debt to total assets, *LOSS* is a dummy variable that equals one if the firm has incurred a loss, *CSIZE* is the number of audit committee members, *CEXP* is the proportion of experts to committee members, and *CMEET* is the number of audit committee meetings. The female representation dummy variables are defined as follows: *FCHAIR* equals one if the chair of the committee is female, *FEXPERT* equals one if the committee has at least one female expert, *FMEMB* equals one if the committee has at least one female member, *FCE* equals one if the committee has a female chair and at least one female expert, *FCM* equals one if the committee has a female chair and at least one additional female member, and *FTOM* equals one if the committee has at least two female members. The *t*-statistics (reported in parentheses) are based on White's heteroskedasticity consistent standard errors. \*\*\*, \*\*, and \* denote significance at the 0.01, 0.05, and 0.10 levels, respectively.

**Table 5.** Sensitivity test results.

Variable	Exp. sign	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Constant		1.813*** (3.39)	1.775*** (3.32)	1.808*** (3.36)	1.797*** (3.33)	1.787*** (3.36)	1.843*** (3.46)	1.831*** (3.44)
<i>Control variables:</i>								
TA	+	0.544*** (23.96)	0.547*** (24.23)	0.544*** (23.82)	0.544*** (23.63)	0.545*** (24.26)	0.543*** (24.08)	0.543*** (24.09)
INVREC	+	0.753*** (3.49)	0.746*** (3.44)	0.751*** (3.50)	0.753*** (3.49)	0.753*** (3.47)	0.760*** (3.51)	0.786*** (3.60)
FOROPR	+	1.340*** (12.20)	1.342*** (12.38)	1.339*** (12.13)	1.338*** (12.04)	1.346*** (12.44)	1.330*** (12.17)	1.326*** (12.16)
LEV	+	0.004** (2.30)	0.004** (2.24)	0.004** (2.27)	0.004** (2.27)	0.004** (2.32)	0.004** (2.29)	0.004** (2.31)
LOSS	+	0.273** (2.28)	0.283** (2.39)	0.276** (2.28)	0.274** (2.28)	0.287** (2.40)	0.296** (2.46)	0.295** (2.49)
<i>Audit committee control variables:</i>								
CSIZE	+	0.043 (1.56)	0.039 (1.45)	0.043 (1.58)	0.044 (1.59)	0.041 (1.52)	0.042 (1.53)	0.051* (1.86)
CEXP	+	0.115 (1.37)	0.109 (1.31)	0.123 (1.43)	0.115 (1.37)	0.120 (1.44)	0.116 (1.40)	0.100 (1.20)
CMEET	+	0.024*** (2.94)	0.024*** (2.91)	0.024*** (2.91)	0.024*** (2.93)	0.024*** (2.95)	0.023*** (2.83)	0.023*** (2.75)
<i>Female representation variables:</i>								
FCHAIR	?		-0.207*** (-2.75)					
FEXPERT	?			-0.016 (-0.28)				
FMEMB	?				-0.015 (-0.28)			
FCE	?					-0.209** (-2.49)		
FCM	?						-0.228** (-2.43)	
FTOM	?							-0.178** (-2.57)
Adjusted $R^2$		0.673	0.677	0.672	0.672	0.676	0.675	0.676
$F$ -stat.		94.380***	85.688***	83.680***	83.686***	85.121***	84.772***	85.321***

The table reports the estimates of alternative versions the following regression specification with winsorized control variable data:

$$AFEE = \alpha + \beta_1 TA + \beta_2 INVREC + \beta_3 FOROPR + \beta_4 LEV + \beta_5 LOSS \\ + \beta_6 CSIZE + \beta_7 CEXP + \beta_8 CMEET + \beta_9 FEMALE + \varepsilon_t$$

where *AFEE* is the natural log of audit fees, *TA* is the natural log of total assets, *INVREC* is inventory and receivables to total assets, *FOROPR* is the proportion of foreign sales to total sales, *LEV* is total debt to total assets, *LOSS* is a dummy variable that equals one if the firm has incurred a loss, *CSIZE* is the number of audit committee members, *CEXP* is the proportion of experts to committee members, and *CMEET* is the number of audit committee meetings. The female representation dummy variables are defined as follows: *FCHAIR* equals one if the chair of the committee is female, *FEXPERT* equals one if the committee has at least one female expert, *FMEMB* equals one if the committee has at least one female member, *FCE* equals one if the committee has a female chair and at least one female expert, *FCM* equals one if the committee has a female chair and at least one additional female member, and *FTOM* equals one if the committee has at least two female members. Firm-specific control variable data are winsorized at the 0.5 % and 99.5 % levels. The *t*-statistics (reported in parentheses) are based on White's heteroskedasticity consistent standard errors. \*\*\*, \*\*, and \* denote significance at the 0.01, 0.05, and 0.10 levels, respectively.