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Women leading the audit process and audit fees: A European study

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ABSTRACT

This study investigates if a gender effect exists on the audit fees associated with the presence of women in roles closely related to the audit process. The analysis is based on the largest European corporations studied between 2016 and 2018. The results show that firms with female chief financial officers and more female directors on the audit committee pay significantly lower audit fees than other firms. However, the results for the remaining gender variables (audit partner, chair of the audit committee, and chief executive officer) do not show any association. Additionally, we find that accounting expertise drives the association between female directors and audit fees. Therefore, neither non-expert female directors nor, more surprisingly, female directors who are labelled as financial experts, have any significant effects on audit fees. Another interesting finding is that the gender variables provide significant results when they are observed in more gender egalitarian contexts, though not in less egalitarian settings. These results have interesting implications at various levels.

1. Introduction

The accounting profession is usually viewed as particularly gendered (Almer et al., 2012; Carmona & Ezzamel, 2016; Haynes, 2017). This study continues a well-established line of research on the relationship between gender and audit fees. It investigates how the presence of women in roles more closely related to the audit function (engagement audit partner, member and chair of the audit committee (AC), chief executive officer (CEO), and chief financial officer (CFO)) impacts the level of audit fees. According to agency theory (Jensen & Meckling, 1976), principals (shareholders) and agents (managers) are likely to have conflicting goals. In this context, an external audit reduces incentive problems that may arise when the firm's managers are not the owners of the residual claims generated by the firm. Both the supply- and demand-side theories of the audit function provide arguments for a significant impact of the appointment of women to these positions on audit fees. As in previous studies (e.g., Hardies et al., 2015; Lai et al., 2017), we focus on audit fees because (i) they are the direct outcomes of decisions made by the AC (Lai et al., 2017); (ii) they are expected to differ across audit partners based on their respective characteristics and reputations (Hardies et al., 2015; Zerni, 2012), and (iii) there is evidence that managers participate in these decisions (Cohen et al., 2010; Dao et al., 2012;

Dickins et al., 2008; KPMG, 2004). The empirical analysis relies on the constituents of Standard and Poor's Europe 350 (S&P 350) stock market index for the period between 2016 and 2018.

This study's primary motivation is the real-world relevance of the topic under investigation. Gender inequality in leadership positions has become a major contemporary concern for governments and international institutions, with many countries (e.g., Norway, France, Italy, and Spain) enacting gender quotas to guarantee gender diversity on the board of directors. The relevance of the audit function in ensuring the effectiveness of this monitoring role implies that examining how the presence of women impacts the audit process becomes particularly meaningful. Further, the lack of consensus in the extant literature necessitates further research. While most previous studies conclude that appointing women to the positions examined in this study has a positive impact on audit fees (Aldamen et al., 2018; Hardies et al., 2015; Huang et al., 2014; Ittonen & Peni, 2012; Lai et al., 2017), Ittonen et al., 2010) conclude otherwise. Moreover, Burke et al. (2019) find that the female audit fee premium is observed for companies audited by a Big 4 auditor, but not for other firms. Sellami and Cherif (2020) conclude that the gender effect is driven by the professional experience of the female directors rather than just their representation. Nekhili et al. (2019) and Sultana et al. (2019) posit that the observed gender differences in audit fees largely depend upon the period investigated. The final motivation for this is study is that the accelerated process of incorporating women into top accounting positions in recent years (Haynes, 2017) makes it necessary to update the available evidence.

This study makes two general and two specific contributions to the literature. First, while prior studies are country-specific, our cross-country sample allows us to examine the influence that the institutional setting has on shaping the relationship between gender and audit fees. The principal driver of the impact of gender on audit fees is the proposition that women seem to have stricter ethical standards than men (Lai et al., 2017). Hence, the fact that gender differences in ethics and values depend on the dimension of gender equality (Chen et al., 2016; Schwartz & Rubel-Lifschitz, 2009) should mediate the impact that gender has on audit fees based on the level of gender equality in the firm's home country. The second general contribution is that even though the audit roles studied in this study have been investigated in previous studies, none of them have addressed all roles simultaneously. The broader approach adopted here provides a more detailed representation of the impact that gender has on audit fees and reduces the possibility of spurious results. Given the likely significant correlation between gender variables (e. g., between the number of female directors on the AC and the gender of the AC chair), the omission of one of these variables in the model may lead to its effects being captured by the included variables. Additionally, we are able to address the interaction effects associated with the presence of women in several of these positions. As for specific contributions, the first refers to the analysis of gender diversity in the AC. Although Ittonen et al. (2010) and Sellami and Cherif (2020) have addressed the joint effect of gender and financial expertise on audit fees, they do not differentiate between accounting and financial expertise. We expect accounting expertise to be a stronger determinant than financial expertise because accountants are typically knowledgeable about accounting standards (part of their ethical requirements for professional competence and due care), while this is not a requirement for finance professionals. This analysis will be of interest to the accounting profession and to corporate governance practitioners. The last contribution relates to the analysis of the auditor's gender. The fact that more than 40% of the audit reports examined in this research are signed by more than one audit partner allows us to address the impact of the auditor's gender on audit fees more thoroughly than in previous studies. Hence, our gender variable is the percentage of female audit partners who sign the audit report, rather than the usual dichotomous 0/1 variable, thus allowing us to capture richer information about the auditor's gender.

The results provide sound and consistent evidence of a negative association between gender diversity in the AC and audit fees; the same holds for female CFOs. However, the results are insignificant for the auditor's gender. This evidence is robust to several checks, particularly to endogeneity. The results are less conclusive regarding the gender of the AC chairs and CEOs. Furthermore, as anticipated, the association between gender variables and audit fees is stronger in more gender egalitarian contexts than in less gender egalitarian ones. Finally, the results indicate that while accounting expertise is the main driver of the results for the gender composition of the AC, financial expertise alone appears to be irrelevant.

The remainder of this study is organised as follows. Section 2 reviews the related literature and develops the hypotheses. Section 3 summarises the design of the empirical research and defines the sample. Sections 4 and 5 present the results, while Section 6 discusses their implications. Section 7 concludes the study.

2. Background and hypothesis development

The study's theoretical framework is based on the supply- and demand-side theories of the audit function. Summarising the supply-side arguments in Simunic's (1980) seminal paper, the amount of audit fees depends on the risk and effort associated with the client's audit. However, according to the demand-side view of the audit process, different types of companies are expected to have different quality related demands for audit services. According to Anderson et al. (1993), external auditing is one of the main monitoring mechanisms used for corporate governance. Thus, while managers decide how the outcomes of their decisions are to be revealed through financial statements, the external auditor monitors the application of accounting methods and accounting standards. Firms with stronger agency conflicts need more external monitoring and are therefore expected to demand high-quality audit services (Francis & Wilson, 1988). Next, we use this framework to develop the hypotheses to be tested through empirical analysis.

2.1. Gender of the engagement auditor

Both the supply- and demand-side theories of the audit function provide arguments supporting a female audit fee premium. From the supply-side perspective, this premium is explained by the greater audit effort involved compared to that of male auditors due to gender differences in risk aversion and overconfidence. According to Hardies et al. (2015), there is evidence that women tend to be more risk-averse than men — both generally (Croson & Gneezy, 2009) and, more importantly, in the specific audit context (Hardies et al., 2013). Since the auditor's effort in an audit engagement depends on the client's risk (Houston et al., 2005), more risk-averse (female) auditors are associated with more audit effort. Similarly, women are also viewed as less overconfident than men (Croson & Gneezy, 2009); this also holds for female auditors in comparison to male auditors (Ittonen & Peni, 2012; Messier et al., 2008). Owhoso and Weickgenannt (2009) point out that an overconfident audit partner would generally underestimate the audit risk and/or overstate his/her own ability and the sufficiency of the audit procedures, thus devoting less effort to the audit engagement. On the other hand, from the demand-side perspective, clients of the audit firm who are more concerned with the quality of audit services should be willing to pay a premium to hire a female auditor. Some studies have reported direct benefits in terms of increased financial reporting quality associated with hiring female auditors (e.g., Garcia-Blandon et al., 2019; Hardies et al., 2016, Hardies et al., 2015; Ittonen et al., 2013). Therefore, the appointment of female auditors conveys a signalling effect, indicating the client's stronger commitment to financial reporting quality. Finally, the female audit fee premium may also be justified by the benefits it provides to the client in terms of reputation and legitimacy as a result of corporate commitment to diversity (Farrell & Hersch, 2005; Hardies et al., 2015).

Some studies have empirically investigated the relationship between the auditor's gender and audit fees. Ittonen and Peni (2012) examine the issue in Scandinavia during 2005 and 2006, finding evidence of a female audit fee premium. More recently, Sellami and Cherif (2020) conclude similarly for the Swedish audit market over the period 2013–2017. Outside Scandinavia, Hardies et al. (2015) observe that between 2008 and 2011, Belgian firms paid higher audit fees when the signing audit partner was a woman. Lee et al. (2019) find higher audit fees associated with female auditors in the US for the period from 2004 to 2015. However, the evidence in this case is rather weak as significance is reported only at marginal levels (p-value < 0.10). Similarly, Burke et al. (2019) also provide evidence of a female audit fee premium in the US for the years 2015 and 2016, which is driven by firms with auditors among the Big 4 auditors. On the other hand, Cahan and Sun (2015) do not observe any gender differences in audit fees in China from 2007 to 2010, while Sultana et al. (2019) conclude similarly for the Australian audit market for the period between 2001 and 2015. Finally, there is also evidence that audit fees may even be lower when the engagement audit partner is a woman, as shown by Cameran et al. (2017)) in their study of the UK from 2009 to 2015.

After examining both the theoretical arguments supporting a female audit fee premium and the available evidence, we expect female auditors to be associated with higher audit fees. Therefore, the first hypothesis is as follows:

Hypothesis 1 (H1): Firms with female auditors pay higher audit fees than other firms.

2.2. Gender of the members and chairs of the AC

Based on Hay et al. (2006), the link between gender diversity in the AC and audit fees is corporate governance. The importance of the AC within the firm's corporate governance structure became more evident after the enactment of the Sarbanes-Oxley Act (SOX Act) in the US and similar regulations worldwide,[1] which established the AC as formally responsible for the appointment, compensation, and oversight of external auditors. According to the supply-side theory of the audit function, female directors should be associated with lower audit fees. This is because they are expected to strengthen the monitoring role of the AC (Srinidhi et al., 2011) as they tend to be more independent (Adams & Ferreira, 2009) and are more committed to ethical behaviour (Bernardi & Arnold, 1997; Pierce & Sweeney, 2010; Ruegger & King, 1992) and transparency (Liao et al., 2015) than male directors. Therefore, the stronger corporate governance practices and structures that are associated with female directors would lead to more effective internal control environments, reducing both the effort and risk of the auditor. However, according to the demand-side theory of the audit function, two opposite effects can be expected. First, female directors would reduce the need for monitoring provided by the external auditor, making high-quality audit services less necessary. On the other hand, the same characteristics discussed above, which make female directors perform the monitoring role more diligently, also indicate that they will be expected to demand high-quality audit services to a greater extent than male directors, thus making them willing to pay higher audit fees.

The available evidence on the association between female AC members and audit fees is inconclusive. For the US, Kalelkar and Khan (2016) and Lai et al. (2017) find a positive relationship between both variables using similar research periods (2004−2013 and 2001 −2011, respectively). However, both Harjoto et al. (2015), examining the years between 2000 and 2010, and Ittonen et al. (2010), examining the period between 2006 and 2008, report insignificant results. Aldamen et al. (2018) and Sultana et al. (2019) have investigated the Australian setting and observed a positive association between female representation on the AC and audit fees. Interestingly, Sultana et al. (2019), who investigated a much longer period (from 2001 to 2015) than Aldamen et al. (2018) (only the year 2011), have also found that the relationship between gender and audit fees weakened after the introduction of gender diversity guidelines in 2010. In the European region, the evidence is mixed. While Nekhili et al. (2019) found a negative association between female AC members and audit fees in their study of the French audit market between 2002 and 2017, Sellami and Cherif (2020) have reported the opposite result for the Swedish setting from 2013 to 2017. Regarding the situation of firms whose AC is chaired by a female director, both Ittonen et al. (2010) and Harjoto et al. (2015) observe that firms with female AC chairs pay lower audit fees than other firms.

In summary, the supply-side perspective of the audit process suggests a negative impact of the presence of female directors and female AC chairs on the AC on audit fees, respectively. By contrast, the demand-side view predicts that both positive and negative effects can be expected. Additionally, although the extant evidence is not conclusive, we propose the following two hypotheses:

Hypothesis 2 (H2): Firms with more female directors on the AC pay lower audit fees than other firms.

Hypothesis 3 (H3): Firms with the AC chaired by female directors pay lower audit fees than other firms.

2.3. Gender of the CEO and the CFO

The former discussion on female AC members can be adapted to explain the expected effect of female CEOs and CFOs on audit fees. This is because managers participate jointly with the AC in the selection and compensation of external auditors (Cohen et al., 2010; Dao et al., 2012; Dickins et al., 2008; KPMG, 2004). Additionally, the CEO and CFO are also responsible for the quality of the firm's accounting information. This is acknowledged by the SOX Act, which requires the accuracy of financial statements to be personally certified by the top managers and accounting scholars, who have investigated the role of the CEO in the accounting outcomes (Kalelkar & Khan, 2016). Since audit fees are negatively related to accounting conservatism (DeFond et al., 2016) and positively associated with the client firm's business risk (Bell et al., 2001) and perceived risk of the CEO (Kim et al., 2015; Wysocki, 2010), the same supply-side arguments developed above (justifying lower audit fees when the AC has more female directors) should also explain lower audit fees when the firm has a female CEO and/or CFO. Regarding the demand-side perspective, the same arguments that predict female directors or AC chairs to be willing to pay higher audit fees, also hold true for female CEOs and CFOs. Hence, since female CEOs and CFOs are expected to be more committed to financial reporting quality than male CEOs and CFOs (Peni & Vähämaa, 2010), they would be more willing to pay higher audit fees to ensure the provision of high-quality audit services by the incumbent audit firm. Therefore, as in the discussion on the gender composition of the AC, there is a contradiction for female CEOs and CFOs; they are likely to be more willing to pay higher audit fees, while making these high-quality audit services less necessary at the same time.

Evidence of the impact of the gender of the CEO and/or CFO on audit fees is scarce. Examining the US setting from 2003 to 2010, Huang et al. (2014) find that firms with female CEOs pay higher audit fees than other firms, although the results become insignificant for firms with female CFOs. Additionally, Harjoto et al. (2015) focus on the joint effect of gender and ethnicity for the US with a similar research period (2000−2010). They observe that firms with female and ethnic minority CEOs pay significantly higher audit fees than firms with male Caucasian CEOs. Outside the US setting, Nekhili et al. (2019) find no association between the gender of the CEO and audit fees in France for the time period from 2002 to 2017.

According to the above discussion, despite the available evidence being inconclusive, we anticipate a positive association between the gender of the CEO and CFO and audit fees. Thus, we propose the following two hypotheses:

Hypothesis 4 (H4): Firms with female CEOs pay higher audit fees than other firms.

Hypothesis 5 (H5): Firms with female CFOs pay higher audit fees than other firms.

3. Research design and sample

3.1. Research design

The empirical analysis rests on the estimation of Eq. (1) below. The dependent variable (AUDFEES) captures the annual fees paid to an external auditor for audit services. The model includes five variables of interest that allow the assessment of the previously developed hypotheses. Hence, FEMAUD, FEMDIR, FEMCHAIR, FEMCEO, and FEMCFO account for the gender of the audit partner, members of the AC, AC chair, CEO, and CFO, respectively.

$$AUDFEES_{i,t} = \beta_0 + \beta_1 \cdot FEMAUD_{i,t} + \beta_2 \cdot FEMDIR_{i,t}$$
$$+ \beta_3 \cdot FEMCHAIR_{i,t} + \beta_4 \cdot FEMCEO_{i,t}$$
$$+ \beta_5 \cdot FEMCFO_{i,t} + \sum \beta_k \cdot CONTROLS_{i,t} + \varepsilon_{i,t} \qquad (1)$$

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[1] At the European level, see for example the 2006 Statutory Audit Directive or the new EU regulatory framework for statutory audit adopted in April 2014.

Following Simunic (1980), the control variables in Eq. (1) have been widely used in prior studies as the main determinants of audit fees (Hardies et al., 2015; Ittonen and Peni, 2011; Kalelkar and Khan, 2019; Nekhili et al., 2019; Sellami & Cherif, 2020; Sultana et al., 2019). Hence, the size of the client (SIZE), number of business segments (SEGNUM), number of subsidiaries (SUBS), and percentage of these subsidiaries located outside the European region (FORSUBS) account for the client complexity. Moreover, as in Sultana et al. (2019), the level of inventories and receivables (INVREC) provides an indicator of the client's inherent audit risk; similarly, the return on assets (ROA), reporting of negative net income (LOSS), and degree of financial leverage (FINLEV) should capture the client's financial risk. The model also considers the change of the audit firm (AUDCH), as a new audit engagement involves negotiating the terms of the new contract, including audit fees. Additionally, the model controls for situations of CEO duality (CEOCHAIR) and some characteristics of the AC, such as its size (ACSIZE) and expertise (ACEXP). As a significant number of audit reports in our sample were signed by more than one auditor of the same audit firm (TWOAUD), we control for this fact as this could be associated with greater audit effort and, consequently, higher audit fees.[2] Following Sellami and Cherif (2020), we do not include the Big4 variable in Eq. (1), as the very few firms with non-Big4 auditors are removed from the sample. This is justified to avoid any potential confounding effects of the audit firm's size (Big4 vs. non-Big4) in the audit fee models (Eshleman & Guo, 2014).

Finally, country, industry, and year fixed effects are also included in Eq. (1). Based on previous related studies (e.g., Ittonen & Peni, 2012; Sultana et al., 2019), we predict positive coefficients for SIZE, SEGNUM, SUBS, FORSUBS, INVREC, LOSS, FINLEV, ACSIZE, ACEXP, and TWOAUD, and negative coefficients for ROA, AUDCH, and CEOCHAIR. Table 1 provides the definitions of the variables.

3.2. Sample

The sample for the empirical study is relatively homogeneous as it consists of the largest European corporations that were members of the stock market index S&P350 by the end of 2016. The research period is relatively short and runs from 2016 to 2018. Nekhili et al. (2019) and Sultana et al. (2019) indicate that the accelerated incorporation of women into senior management positions has changed the relationship between gender variables and audit fees. This advocates the use of short periods in empirical studies to minimise the likelihood of misleading results due to the lack of homogeneity in the research period. Similar to previous studies (e.g., Abbot, et al., 2003; Hardies et al., 2015; Ittonen & Peni, 2012; Lee et al., 2019), we remove the following from the sample: financial institutions (249 firm-year observations) due to their unique features; firms with a non-Big4 auditor (seven firm-year observations) with the aim of achieving a more homogeneous sample; and observations with missing data for at least one of the variables in Eq. (1) (130 firm-year observations[3]). After these adjustments, the final sample comprises 664 observations. The information for constructing the variables (AUDFEES, FEMAUD, AUDCH and TWOAUD) is obtained from the Audit Analytics database, whereas the remaining variables, including data on the gender of CEOs, CFOs, and AC members, as well as the expertise of the AC members are sourced from the Capital IQ database.[4]

Table 2 presents the country and industry composition of the sample. According to the figures in Panel (A), the UK is the best represented country with a quarter of the final sample, followed by France

Table 1
Variable definitions.

Variable	Definition
AUDFEES	the natural logarithm of audit fees.
FEMAUD	the percentage of women among the audit partners who sign the audit report.
FEMDIR	the percentage of female directors in the audit committee.
FEMCHAIR	1 if the chair of the AC is a woman, and 0 otherwise.
FEMCEO	1 if the CEO of the audited firm is a woman, and 0 otherwise.
FEMCFO	1 if the CFO of the audited firm is a woman, and 0 otherwise.
ONEFEMAUD	1 if at least one of the auditors who sign the audit report is a woman, and 0 otherwise.
FEMDIR>50%	1 if female directors represent more than 50% of the AC members, and 0 otherwise
FSTFEMAUD	1 if the first auditor who signs the audit report is a woman, and 0 otherwise.
ALLFEMAUD	1 if all the auditors who sign the audit report are women, and 0 otherwise.
TWOFEMDIR	1 if there are at least two female directors on the AC, and 0 otherwise.
NUMFEMDIR	the number of female directors on the AC.
NOFEMDIR	1 if all the members of the AC are men and 0 otherwise.
FEMDIRNEXP	the number of female directors on the AC who are not labelled as experts.
FEMDIREXP	the number of female directors on the AC labelled as experts.
FEMDIREXPF	the number of female directors on the AC labelled as experts in finance.
FEMDIREXPAC	the number of female directors on the AC labelled as experts in accounting.
AUDCH	1 if there was a change of audit firm, and 0 otherwise.
TWOAUD	1 if the audit report is signed by two or more auditors, and 0 otherwise.
ACSIZE	the number of members of the audit committee.
ACEXP	the number of members of the audit committee who are labelled as experts.
CEOCHAIR	1 if the CEO is also the chair of the board of directors, and 0 otherwise.
SIZE	the natural logarithm of the total assets of the firm.
SEGNUM	the number of business segments of the firm.
SUBS	the square root of the number of subsidiaries of the firm.
FORSUBS	the percentage of subsidiaries that are located outside Europe.
INVREC	inventories and receivables over total assets.
ROA	earnings before interest and taxes over total assets.
LOSS	1 if the net income of the year is negative and 0 otherwise.
FINLEV	total debt over total assets.

and Germany. Portugal, Austria, and Ireland have the fewest observations. Regarding industry composition, Table 2 (Panel B) shows a strong concentration of the manufacturing industry, roughly representing half the sample.

Table 3 provides descriptive statistics for the sample. The most interesting results refer to the presence of women as auditors, members and chairs of the AC, CEOs, and CFOs. Hence, female auditors represent only 10% of all the auditors. A similar percentage is observed for the number of women appointed as the CFO, whereas the figures are lower for CEOs (less than 5%). Conversely, women's participation in the AC is considerably higher, representing one-third of the members and over 20% of chairs. The relatively higher presence of women on ACs compared to the roles of auditor, CEO, or CFO is likely explained by the introduction of gender diversity recommendations in corporate governance codes as well as the imposition of gender quotas on the board of directors by a growing number of countries.[5]

Table 4 displays the Pearson correlation coefficients between the variables included in Eq. (1). Focusing on the dependent variable AUDFEES, neither the presence of female directors on the AC (FEMDIR) nor the gender of AC chairs (FEMCHAIR) are significantly correlated

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[2] French public firms are mandated to conduct joint audits. According to the information provided by Audit Analytics, French firms are the only firms in our sample that have conducted joint audits.

[3] In most of these cases, the lack of information refers to the identity of the audit partner, the CFO and AC members.

[4] Audit Analytics provides the names of the audit partners, and Capital IQ the names of the CEOs, CFOs and AC members.

[5] Since 2003 Norway requires that female directors should represent at least 40% of the members of the board; a similar situation holds in France since 2017. Italy and Belgium passed a one-third quota law, effective from 2015 (Italy) and 2017 (Belgium), and Germany established a 30% gender quota for the largest listed firms effective in 2016 (Ferreira et al., 2018).

Table 2
Number of firm-year observations by country and industry.

Panel (A). Country classification	
Austria	3
Belgium and Luxemburg	29
Denmark	31
Finland	21
France	87
Germany	77
Ireland	11
Italy	30
Netherlands	41
Norway	15
Portugal	3
Spain	41
Sweden	46
Switzerland	60
United Kingdom	169
TOTAL	**664**
Panel (B). Industry classification	
Mining and construction	48
Manufacturing	337
Transportation, communications, electric, gas and sanitary service	135
Wholesale trade and retail trade	59
Services	78
Non-classifiable	7
Total	**664**

with audit fees; the same holds for the gender of the auditor (*FEMAUD*). However, we observe that female CEOs and, to a lesser extent female CFOs, are negatively associated with audit fees. Additionally, we find the predicted positive correlation of audit fees with the firm's size (*SIZE*), complexity (*SEGNUM, SUBS* and *FORSUBS*) and financial risk (*LOSS* and *FINLEV*). Beyond *AUDFEES*, Table 4 documents that larger (*SIZE*) and more complex firms (*SEGNUM*) have more women on the AC. We also observe the expected negative correlation between female directors and financial leverage. Interestingly, *FEMAUD* and *FEMCFO* are positively correlated, indicating that the

Table 3
Summary statistics.

	Mean	St. Dev.	p25	Median	p75	Min.	Max.
AUDFEES	15.242	1.022	14.585	15.232	16.013	13.305	17.125
FEMAUD	.101	.301	0	0	0	0	1
FEMDIR	.337	.239	.2	.333	.5	0	1
FEMCHAIR	.224	.417	0	0	0	0	1
FEMCEO	.045	.208	0	0	0	0	1
FEMCFO	.102	.303	0	0	0	0	1
AUDCH	.086	.28	0	0	0	0	1
TWOAUD	.419	.494	0	0	1	0	1
ACSIZE	4.011	1.265	3	4	5	1	9
ACEXP	1.387	1.058	1	1	2	0	5
CEOCHAIR	.324	.468	0	0	1	0	1
SIZE	9.999	1.273	9.012	9.765	10.81	8.058	13.455
SEGNUM	21.625	11.896	13	20	29	1	75
SUBS	11.149	6.214	7.28	9.874	12.61	1.732	48.58
FORSUBS	.345	.183	.206	.358	.479	0	.889
INVREC	.248	.135	.141	.244	.34	.021	.521
ROA	.091	.073	.042	.074	.118	.003	.297
LOSS	.077	.266	0	0	0	0	1
FINLEV	.295	.267	.127	.24	.373	.007	1.244

Variables:.

AUDFEES (the natural logarithm of audit fees); *FEMAUD* (female auditor); *FEMDIR* (female directors); *FEMCHAIR* (female audit committee chair); *FEMCEO* (female CEO); *FEMCFO* (female CFO); *AUDCH* (auditor change); *TWOAUD* (two auditors); *ACSIZE* (audit committee size); *ACEXP* (audit committee expertise); *CEOCHAIR* (CEO chair of the board); *SIZE* (size of the firm); *SEGNUM* (number of business segments); *SUBS* (number of subsidiaries); *FORSUBS* (foreign subsidiaries); *INVREC* (inventories and receivables); *ROA* (return on assets); *LOSS* (negative net income); and *FINLEV* (financial leverage). See Table 1 for further information about the definitions of these variables.

appointment of a female auditor is more likely for firms with female CFOs. Conversely, female auditors are less likely in larger firms (*SIZE*) and when a woman chairs the AC. Finally, as only one of the pairwise correlations for the independent variables is larger than 0.5 (in absolute values), we do not anticipate serious multicollinearity problems in the dataset.

4. Results of the study

4.1. Univariate analysis

Table 5 summarises the results of the univariate analysis of differences in audit fees by the gender of the auditor, AC members, CEO, and CFO. To conduct this analysis, we define the new variables *ONEFEMAUD* (equals 1 if at least one of the auditors who signs the audit report is a woman, and 0 otherwise) and *FEMDIR>50%* (equals 1 if female directors represent more than 50% of the AC members, and 0 otherwise), which are categorical transformations of *FEMAUD* and *FEMDIR*. The table displays the mean and median values of *AUDFEES* according to the scores of the gender variables. Furthermore, we use the *t*-test and Mann-Whitney test to assess the statistical significance of the mean and median differences, respectively. The results in Table 5 show significant gender differences in audit fees for *FEMDIR>50%, FEMCEO* and *FEMCFO*. The sign of these differences indicates that firms with female CEOs, CFOs, or with women holding most of the AC seats pay significantly lower mean and median audit fees than other firms. In contrast, the reported mean and median differences are insignificant for *ONEFEMAUD* and *FEMCHAIR*. Finally, the results of the *t*-test and Mann-Whitney test are consistent in all cases.

4.2. Multivariate analysis

Table 6 presents the estimation results of Eq. (1). To avoid the negative effects of outliers, the continuous variables are winsorised at the 5th and 95th percentile levels. The estimations are performed using panel data linear regression with panel-corrected standard errors. Column (1) summarises the results for the full sample, whereas the remaining columns ((2)–(6)) provide estimates for the regressions conducted with matched samples. All estimations are globally significant at the usual statistical levels (*p*-value < 0.01), with *R*-squared values ranging between 69% and 78%. After the estimations, we compute the variance inflation factors (VIFs) to assess the possible impact of multicollinearity on the estimates. The average value of the VIFs is 1.46 with a maximum of 3.13 for the variable *SUBS*. Overall, these values and the relatively low correlations in Table 4 do not suggest serious multicollinearity problems in the estimations.

The figures in Table 6 (Column (1)) show significant coefficients for *FEMDIR* and *FEMCFO* (*p*-value < 0.05) with a negative sign in both cases. Moreover, *FEMCHAIR* has a positive and significant coefficient (*p*-value < 0.10), whereas *FEMAUD* and *FEMCEO* have insignificant coefficients. Although anticipated in Table 5, the result for *FEMAUD* indicates that the auditor's gender is not a driver of audit fees. With regard to *FEMDIR*, the univariate analysis anticipated that female directors are negatively related to audit fees, and the results are consistent with this expectation. Conversely, firms with female AC chairs (*FEMCHAIR*) pay higher audit fees than other firms do, although this result is only marginally significant. Finally, regarding the top management team, the insignificant coefficient for *FEMCEO* shows that firms with female CEOs do not pay significantly different audit fees than firms with male CEOs. However, female CFOs are significantly associated with lower audit fees. The latter result was also anticipated by the univariate analysis (Table 5).

The results for the control variables are generally consistent with expectations and thus, provide proof of the soundness of the entire analysis. As for the variables that control for the characteristics of the

Table 4
Pairwise correlations with levels of significance.

Variables	AUDFEES	FEMAUD	FEMDIR	FEMCHAIR	FEMCEO	FEMCFO	AUDCH	TWOAUD	ACSIZE
AUDFEES	1.000								
FEMAUD	−0.041	1.000							
FEMDIR	−0.044	0.034	1.000						
FEMCHAIR	0.052	−0.086**	0.349***	1.000					
FEMCEO	−0.108***	−0.025	0.039	0.126***	1.000				
FEMCFO	−0.070*	0.065*	−0.019	−0.039	0.022	1.000			
AUDCH	−0.034	−0.059	0.000	0.016	−0.015	0.021	1.000		
TWOAUD	0.133***	0.060	−0.120***	0.005	−0.067*	−0.035	−0.107***	1.000	
ACSIZE	0.206***	−0.012	−0.141***	0.084**	0.027	0.033	−0.007	0.075*	1.000
ACEXP	0.052	−0.018	0.027	0.052	0.030	0.003	−0.026	−0.166***	0.089**
CEOCHAIR	0.147***	0.020	−0.077**	−0.040	−0.058	−0.064*	0.006	0.391***	0.142***
SIZE	0.495***	−0.063*	0.066*	0.029	−0.051	−0.025	0.041	0.124***	0.153***
SEGNUM	0.638***	−0.041	0.090**	0.067*	−0.043	−0.051	0.013	0.087**	0.151***
SUBS	0.689***	−0.019	−0.004	0.024	−0.075*	−0.072*	−0.015	0.177***	0.134***
FORSUBS	0.285***	0.001	−0.014	−0.011	−0.199***	−0.018	0.001	0.109***	−0.066*
INVREC	0.057	−0.005	0.009	0.020	0.001	0.011	−0.047	0.153***	−0.008
ROA	−0.053	0.048	−0.053	0.026	−0.001	0.041	−0.034	0.016	−0.033
LOSS	0.067*	−0.028	−0.031	−0.047	−0.063*	−0.041	0.033	−0.027	−0.025
FINLEV	0.163***	0.020	−0.089**	−0.029	0.019	0.011	−0.038	0.060	−0.105***	0.048

Variables	ACEXP	CEOCHAIR	SIZE	SEGNUM	SUBS	FORSUBS	INVREC	ROA	LOSS	FINLEV
ACEXP	1.000									
CEOCHAIR	−0.177***	1.000								
SIZE	0.072*	0.235***	1.000							
SEGNUM	−0.033	0.160***	0.400***	1.000						
SUBS	0.024	0.213***	0.416***	0.746***	1.000					
FORSUBS	−0.009	−0.073*	−0.000	0.026	0.271***	1.000				
INVREC	−0.096**	−0.016	−0.327***	0.040	0.068*	0.042	1.000			
ROA	−0.008	−0.133***	−0.496***	−0.136***	−0.016	0.123***	0.234***	1.000		
LOSS	0.060	−0.030	0.040	−0.013	0.003	−0.041	−0.031	−0.136***	1.000	
FINLEV	0.084**	−0.015	−0.227***	0.112***	0.132***	0.004	−0.011	0.468***	0.034	1.000

*** $p<0.01$, ** $p<0.05$, * $p<0.1$.
Variables:.
AUDFEES (the natural logarithm of audit fees); FEMAUD (female auditor); FEMDIR (female directors); FEMCHAIR (female audit committee chair); FEM-CEO (female CEO); FEMCFO (female CFO); AUDCH (auditor change); TWOAUD (two auditors); ACSIZE (audit committee size); ACEXP (audit committee expertise); CEOCHAIR (CEO chair of the board); SIZE (size of the firm); SEGNUM (number of business segments); SUBS (number of subsidiaries); FORSUBS (foreign subsidiaries); INVREC (inventories and receivables); ROA (return on assets); LOSS (negative net income); and FINLEV (financial leverage). See Table 1 for further information about the definitions of these variables.

board and AC beyond gender (*ACSIZE, ACEXP* and *CEOCHAIR*), the results are significant for *ACSIZE* in the predicted direction. Additionally, firms with higher financial leverage or negative net income pay

Table 5
Mean and median differences in audit fees by gender.

Variable	Obs.	Mean	Median
ONEFEMAUD =1	108	15.282	15.281
ONEFEMAUD =0	556	15.234	15.220
Sig. Level			
FEMDIR>50% =1	105	15.032	15.169
FEMDIR>50% =0	559	15.282	15.255
Sig. Level		**	**
FEMCHAIR=1	149	15.34	15.32
FEMCHAIR=0	515	15.21	15.22
Sig. Level			
FEMCEO=1	30	14.733	14.301
FEMCEO=0	634	15.266	15.255
Sig. Level		***	***
FEMCFO=1	68	15.032	15.189
FEMCFO=0	596	15.266	15.233
Sig. Level		*	*

*** $p<0.01$, ** $p<0.05$, * $p<0.1$.
The *t*-test and the Mann-Whitney test are used for the assessment of statistical significance of means and medians, respectively.
Variables:.
ONEFEMAUD (at least one female auditor); FEMDIR>50% (female directors over 50% of the audit committee); FEMCHAIR (female audit committee chair); FEMCEO (female CEO); and FEMCFO (female CFO). See Table 1 for further information about the definitions of these variables.

higher audit fees (*p*-value < 0.01 in both cases) than other firms. These findings show that clients' inherent audit risk (*INVREC*) is positively associated with audit fees. The results also provide strong support for the predicted positive relationship between clients' size (*SIZE*) and complexity (*SEGNUM, SUBS* and *FORSUBS*), and audit fees (*p*-value < 0.01 in all four cases). Interestingly, the figures indicate that changes in the audit firm (*AUDCH*) involve a reduction of the audit fees (*p*-value < 0.01), providing support for low-balling behaviour.

As with prior studies, potential endogeneity in the variables of interest may have conditioned the above results. Hence, the decision to appoint a woman to any of the roles examined may not be exogenous. We address this issue using a two-fold approach. First, we conduct the Durbin−Wu−Hausman test (augmented regression test) for endogeneity for the continuous variables of interest — *FEMAUD* and *FEMDIR*. In both cases, the null hypothesis that the regressor is exogenous cannot be rejected (*p*-value = 0.3574 for *FEMAUD*, and *p*-value = 0.2226 for *FEMDIR*). Accordingly, endogeneity does not seem to affect estimations.

Second, as in Hardies et al. (2015), our sample may be biased by the different characteristics of firms with men and women in the examined roles. Thus, as is usual in accounting research (Dyreng & Markle, 2016; Lennox et al., 2013), we use the propensity score method to produce one-to-one matched samples with more homogenous characteristics. We run the matching procedure using a logistic regression with *ONEFEMAUD* as the dependent variable and the control variables included in Eq. (1) (*AUDCH, TWOAUD, ACSIZE, ACEXP, CEOCHAIR, SIZE, SEGNUM, SUBS, FORSUBS, INVREC, ROA, LOSS,* and *FIN-LEV*). Similarly, we run propensity score matching procedures with logistic regressions for the remaining dummy variables indicating

Table 6
Results of the multivariate analysis.

VARIABLES	(1) Full sample	(2) Matched-sample (*ONEFEMAUD*)	(3) Matched-sample (*FEMDIR>50%*)	(4) Matched-sample (*FEMCHAIR*)	(5) Matched-sample (*FEMCFO*)	(6) *Ad hoc* Matched-sample (*ONEFEMAUD*)
FEMAUD	0.0746	0.0692	0.0593	0.0678	0.314	−0.0994
	(0.0820)	(0.102)	(0.166)	(0.115)	(0.220)	(0.109)
FEMDIR	−0.282**	−0.653***	−0.542***	0.114	−0.204	−0.521***
	(0.118)	(0.172)	(0.161)	(0.174)	(0.224)	(0.158)
FEMCHAIR	0.105*	0.161	0.129	0.00125	0.0728	0.0420
	(0.0608)	(0.122)	(0.0879)	(0.0654)	(0.132)	(0.0965)
FEMCEO	−0.0376	−0.380**	0.0563	0.158	−0.407*	0.0699
	(0.127)	(0.167)	(0.212)	(0.142)	(0.209)	(0.142)
FEMCFO	−0.190**	−0.177	−0.229*	−0.186**	−0.228**	−0.214**
	(0.0744)	(0.109)	(0.133)	(0.0908)	(0.0924)	(0.100)
AUDCH	−0.205***	−0.0324	−0.441***	−0.00306	−0.286*	−0.207
	(0.0779)	(0.307)	(0.155)	(0.113)	(0.161)	(0.235)
TWOAUD	−0.0378	−0.179	−0.146	0.000113	0.244	−0.308
	(0.106)	(0.259)	(0.118)	(0.130)	(0.255)	(0.189)
ACSIZE	0.0872***	0.106***	0.0706	0.0350	0.0384	0.0772**
	(0.0221)	(0.0392)	(0.0463)	(0.0266)	(0.0499)	(0.0367)
ACEXP	0.00839	0.0333	0.0314	−0.000746	0.00667	0.00156
	(0.0253)	(0.0409)	(0.0391)	(0.0342)	(0.0483)	(0.0350)
CEOCHAIR	0.0772	0.00977	−0.109	0.229***	0.146	0.223
	(0.0669)	(0.157)	(0.103)	(0.0855)	(0.170)	(0.148)
SIZE	0.344***	0.396***	0.384***	0.412***	0.326***	0.438***
	(0.0285)	(0.0543)	(0.0505)	(0.0369)	(0.0570)	(0.0413)
SEGNUM	0.0314***	0.0310***	0.0377***	0.0249***	0.0288***	0.0314***
	(0.00353)	(0.00549)	(0.00605)	(0.00454)	(0.00806)	(0.00554)
SUBS	0.0359***	0.0229	0.00580	0.0337***	0.0332	−0.00209
	(0.00840)	(0.0145)	(0.0123)	(0.00882)	(0.0207)	(0.0126)
FORSUBS	0.716***	0.655	1.113***	0.859***	0.161	0.249
	(0.177)	(0.407)	(0.331)	(0.252)	(0.464)	(0.373)
INVREC	0.955***	1.272***	0.428	0.963***	0.0893	1.465***
	(0.213)	(0.357)	(0.342)	(0.306)	(0.392)	(0.294)
ROA	1.112**	2.999***	1.182	1.070	0.445	1.183**
	(0.456)	(0.885)	(0.962)	(0.665)	(1.000)	(0.568)
LOSS	0.301***	−0.0949	0.170	0.364***	−0.260	0.0551
	(0.0988)	(0.215)	(0.171)	(0.140)	(0.208)	(0.180)
FINLEV	0.704***	0.155	0.994***	0.842***	1.150***	0.912***
	(0.120)	(0.208)	(0.247)	(0.167)	(0.265)	(0.165)
Constant	9.658***	8.340***	9.705***	9.566***	9.576***	8.950***
	(0.316)	(0.727)	(0.693)	(0.436)	(0.752)	(0.554)
Country FE	YES	YES	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES
Observations	664	216	210	298	136	216
R-squared	0.699	0.688	0.752	0.776	0.763	0.779

*** $p<0.01$, ** $p<0.05$, * $p<0.1$.
Variables: ONEFEMAUD (at least one female auditor); FEMDIR>50% (female directors over 50% of the audit committee); FEMAUD (female auditor); FEMDIR (female directors); FEMCHAIR (female audit committee chair); FEMCEO (female CEO); FEMCFO (female CFO); AUDCH (auditor change); TWOAUD (two auditors); ACSIZE (audit committee size); ACEXP (audit committee expertise); CEOCHAIR (CEO chair of the board); SIZE (size of the firm); SEGNUM (number of business segments); SUBS (number of subsidiaries); FORSUBS (foreign subsidiaries); INVREC (inventories and receivables); ROA (return on assets); LOSS (negative net income); and FIN-LEV (financial leverage). See Table 1 for further information about the definitions of these variables.

gender diversity on the AC (*FEMDIR>50%*), the gender of the AC chair (*FEMCHAIR*), and the gender of the CFO (*FEMCFO*).[6] Subsequently, we re-estimate the model with the resulting matched samples, the results of which are shown in Table 6 (Columns (2) to (5)). The results for *FEMAUD* are consistent with the evidence reported in Table 6 (Column (1)). Similar situations hold for *FEMDIR* in Column (3) and *FEMCFO* in Column (5). The only case in which the results with the matched sample do not support those obtained with the full sample is *FEMCHAIR* (marginally significant in Column (1), although insignificant in Column (4)).

While most continuous variables present a standardised percentage bias above the conventional value of 5 in the unmatched sample, the corresponding percentage is below this value in the matched

sample for *FEMDIR* (with mean and median bias of 4.5 and 3.4, and Rubin's B of 21.4, below the conventional value of 25). The biases are also substantially reduced in the matching procedure for *FEMCHAIR* (mean and median bias of 4.6 and 4.2, and Rubin's B of 22.8, respectively). However, the bias is not as substantially reduced in the remaining two matching procedures (ONEFEMAUD and FEMCFO). Consequently, we can guarantee that the estimations in Columns (3) and (4) are performed with unbiased samples; however, this is not the case for the estimations in Columns (2) and (5). Therefore, we perform ad hoc propensity score matching procedures for *ONEFEMAUD* and *FEMCFO*, starting with the independent continuous control variables and removing those that provide an increasing bias in the matching procedure. Although we do not obtain a substantially unbiased matched sample for *FEMCFO*, the matching procedure for *ONEFEMAUD* depending on *AUDCH, TWOAUD, ACSIZE, CEOCHAIR, SUBS, ROA* and *FINLEV* provides a mean and median bias of 5 and 3.7,

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[6] We do not conduct this analysis for *FEMCEO*, because the few firms with female CEOs in the full sample would lead to a too small matched sample.

respectively, for the matched sample. These values are substantially below the corresponding values for the unmatched sample (13.8 and 10.1, respectively). The re-estimation of Eq. (1) with this unbiased sample, with more reliable results than those in Column (2), is shown in Column (6). The results are similar to those in Columns (1) and (2).

Overall, the results in Table 6 show that female directors on the AC are negatively associated with audit fees. This result seems robust, as it holds in the estimations conducted with the full sample and the estimation performed with the matched sample for *FEMDIR>50%* (in Column (3)). As discussed in the literature review section, most prior studies have found a positive association between both variables (e. g., Kalelkar & Khan, 2016; Lai et al., 2017). However, when we restrict the comparison to studies conducted in a European setting, the prior evidence is somewhat mixed. Hence, while Sellami and Cherif (2020) have found a positive association between female directors and audit fees in Sweden, the evidence reported for France by Nekhili et al. (2019) is in line with our results. Table 6 also indicates that female CFOs are associated with lower audit fees. As in the case of *FEMDIR*, this seems to be a sound result that holds in the estimations conducted using the full sample (Column (1)) and the corresponding matched sample (Column (5)). To the best of our knowledge, only Huang et al. (2014) have investigated the association between CFO gender and audit fees in their analysis of the US context, reporting insignificant results. Taken together, the results for *FEMDIR* and *FEMCFO* are consistent with the supply-side perspective of the audit function (the presence of women in these positions would reduce the effort and risk of the auditor), as well as the demand-side perspective (female directors and CFOs reduce the need for high-quality audit services). The third robust result in Table 6 shows the insignificant effects of *FEMAUD* in all six estimations conducted and, in particular, those in Columns (1) and (6). This is consistent with the lack of consensus in the literature (e.g., Cahan & Sun, 2015; Cameran et al.,

2017; Hardies et al., 2015; Ittonen & Peni, 2012; Sultana et al., 2019), which suggests that the sign and strength of the effect largely depend on the institutional context examined. On the other hand, the results are less sound for *FEMCHAIR* and *FEMCEO*. The marginally positive effects for *FEMCHAIR* in Column (1) can be considered spurious as it neither holds in the estimation conducted with the corresponding matched sample (results reported in Column (4)), nor in any of the remaining estimations with matched samples. For *FEMCEO*, while the results in Column (1) are insignificant, in two of the estimations with matched samples (Columns (2) and (5)), the coefficient is significant with a negative sign. The scarce extant evidence suggests a weakly positive or insignificant impact of female CEOs on audit fees. Hence, the results for the female CEO variable in Huang et al.'s (2014) study for the US are on the edge of being insignificant (*p*-value = 0.091) after controlling for the gender of the CFO; on the contrary, Nekhili et al. (2019) report insignificant results for France. In any case, the negative and significant coefficients of *FEMCEO* in Columns (2) and (5) are consistent with the reported results for *FEMCFO* in Columns (3) to (6), as female CEOs and female CFOs show the same sort of relationship with audit fees.

Table 7 summarises the results of the sensitivity analysis which aims to further explore the impact of the auditor's gender on audit fees. While prior studies (Hardies et al., 2015; Lee et al., 2019; Sultana et al., 2019) measure auditor gender using a single dichotomous 0/1 variable, we consider several possibilities, similar to Ittonen and Peni (2010): 1) at least one female auditor signs the audit report; 2) the first signing partner is a woman; and 3) all the auditors who sign the report are women. However, although the research design used by Ittonen et al. (2010)) would, in theory, allow a more thorough examination of the impact of female auditors on audit fees than other studies, the fact that only 7.7% of the examined audit reports were signed by more than one audit partner makes it difficult to take

Table 7
Sensitivity analysis for auditor gender.

VARIABLES	(1)At least one female auditor	(2)First auditor female	(3)All auditors females
ONEFEMAUD	0.0653		
	(0.0658)		
FSTFEMAUD		0.0405	
		(0.0779)	
ALLFEMAUD			0.0520
			(0.0885)
FEMDIR	−0.282**	−0.278**	−0.279**
	(0.118)	(0.118)	(0.118)
FEMCHAIR	0.106*	0.102*	0.102*
	(0.0610)	(0.0606)	(0.0606)
FEMCEO	−0.0368	−0.0391	−0.0385
	(0.127)	(0.128)	(0.127)
FEMCFO	−0.192**	−0.187**	−0.185**
	(0.0747)	(0.0743)	(0.0739)
Controls	YES	YES	YES
Constant	9.665***	9.656***	9.649***
	(0.316)	(0.316)	(0.317)
Country FE	YES	YES	YES
Industry FE	YES	YES	YES
Year FE	YES	YES	YES
Observations	664	664	664
R-squared	0.699	0.699	0.699

Standard errors in parentheses.
*** $p<0.01$, ** $p<0.05$, * $p<0.1$.
Variables:.
ONEFEMAUD (at least one female auditor); *FSTFEMAUD* (first auditor female); *ALLFEMAUD* (all auditors females); *FEMDIR* (female directors); *FEMCHAIR* (female audit committee chair); *FEMCEO* (female CEO); and *FEMCFO* (female CFO). See Table 1 for further information about the definitions of these variables.

Table 8
Sensitivity analysis for the gender composition of the AC.

VARIABLES	(1) At least two female directors	(2)Female directors over 50% of the AC members	(3)Number of female directors	(4)No female directors
FEMAUD	0.0682	0.0551	0.0746	0.0744
	(0.0825)	(0.0824)	(0.0824)	(0.0828)
TWOFEMDIR	−0.111**			
	(0.0544)			
FEMDIR>50%		−0.164**		
		(0.0710)		
NUMFEMDIR			−0.0751**	
			(0.0309)	
NOFEMDIR				0.123*
				(0.0691)
FEMCHAIR	0.0917	0.0809	0.109*	0.0786
	(0.0601)	(0.0583)	(0.0616)	(0.0573)
FEMCEO	−0.0456	−0.0255	−0.0406	−0.0328
	(0.128)	(0.126)	(0.128)	(0.128)
FEMCFO	−0.188**	−0.187**	−0.191**	−0.193**
	(0.0753)	(0.0753)	(0.0746)	(0.0751)
Controls	YES	YES	YES	YES
Constant	9.570***	9.611***	9.562***	9.523***
	(0.314)	(0.317)	(0.313)	(0.313)
Country FE	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
Observations	664	664	664	664
R-squared	0.698	0.699	0.699	0.698

Standard errors in parentheses.
*** $p<0.01$, ** $p<0.05$, * $p<0.1$.
Variables:.
FEMAUD (female auditor); TWOFEMDIR (at least two female directors); FEMDIR>50% (female directors over 50% of the audit committee); NUMFEMDIR (number of female directors); NOFEMDIR (no female directors); FEMCHAIR (female audit committee chair); FEMCEO (female CEO); and FEMCFO (female CFO). See Table 1 for further information about the definitions of these variables.

advantage of this research design. Conversely, this percentage increases to 42% in our sample. Therefore, we are in a better condition to undertake this analysis. With this aim, we use the previously defined ONEFEMAUD and define new variables — FSTFEMAUD (first auditor woman), which equals 1 if the first auditor who signs the audit report is a woman, and 0 otherwise; and ALLFEMAUD (all auditors women), which equals 1 if all the auditors who sign the audit report are women, and 0 otherwise. Subsequently, we conduct sequential estimations of Eq. (1), substituting the original variable FEMAUD with the new variables. Table 7 presents the results. For simplicity, the estimates of the control variables are untabulated. The results are insignificant for all new variables, thus providing further support for the lack of significant effects of FEMAUD in Table 6. Therefore, regardless of how the participation of female auditors in the client audit is measured, there are no significant differences in audit fees based on the auditor's gender.

Table 8 presents the results of the re-estimation of Eq. (1) with the new measures of AC gender diversity. Hence, we use the previously defined variable FEMDIR>50%, and define new variables as follows: TWOFEMDIR (at least two female directors), which equals 1 if there are at least two female directors on the AC, and 0 otherwise; NUMFEMDIR (number of female directors), which is the number of female directors on the AC; and NOFEMDIR (no female directors), which equals 1 if all members of the AC are men, and 0 otherwise.[7] As Table 7 shows, the estimates for the control variables are untabulated for simplicity. The primary result is that all the new variables present significant effects (p-value < 0.10 for NOFEMDIR and p-value < 0.05 in all remaining cases). The sign of the coefficient is consistent with

the negative effect observed for FEMDIR in Table 6, with no exceptions. Hence, an AC with either two or more female directors or with a majority of female directors pay lower audit fees than other firms. Similarly, more female directors on the AC are associated with lower audit fees, while firms whose ACs are formed exclusively by male directors pay significantly higher audit fees than other firms. These results reinforce the evidence reported in Table 6 for the gender composition of the AC.

5. Additional analysis

5.1. Female directors' expertise

As the effectiveness of the AC partially depends on the knowledge and experience of its members in accounting and auditing, the SOX Act mandates disclosing if at least one member of the AC is a financial expert. Most prior studies on how gender diversity in the AC impacts audit fees ignore the role of directors' expertise as a mediating factor (e.g., Aldamen et al., 2018; Lai et al., 2017; Sultana et al., 2019). However, Ittonen et al. (2010) and Sellami and Cherif (2020) do consider this, but conclude that the impact of female directors on audit fees is not driven by financial expertise. With the accelerated incorporation of women into the board of directors, analysing the expertise of female directors is even more important today. Additionally, the need to increase the presence of women on boards is a usual recommendation in the codes of good governance (Spain, Sweden, and the UK), with a growing number of countries establishing policies for board gender quotas (e.g., Norway, France). This situation has potentially important effects on the relationship between female directors and audit fees. Hence, some companies may decide to appoint a female director, not for their level of competence, but simply for reasons of public image or to meet a required or suggested gender quota.

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[7] In 15% of the firms, female directors hold more than half of the AC seats. Similarly, 39% of firms have two or more female directors and 20% of the firms have no women on the AC.

Furthermore, according to Sultana et al.'s (2019) limited supply view of female directors, the enactment of board gender quotas and recommendations may have increased the demand for qualified female directors without a concurrent increase in their supply. These authors argue that some firms may be compelled to appoint women who are less qualified in terms of accounting and finance expertise or less committed to governance roles. Supporting this view, Sultana et al. (2019) have found that the positive association between the number of female AC members and audit fees weakened in Australia after the introduction of gender diversity guidelines. Therefore, the new institutional context demands differentiation between female directors who are experts in the field of finance (and, more importantly, accounting) and non-expert female directors, as the latter might be suspected of having been hired to improve the public image of the firm or to meet gender equality guidelines or quotas.

Following Ittonen et al. (2010) and Sellami and Cherif (2020), we re-estimate Eq. (1) after substituting FEMDIR with the new variables: FEMDIREXP (expert female directors), defined as the number of female directors on the AC who are labelled as experts; and FEMDIR-NEXP (non-expert female directors), defined as the number of female directors on the AC who are not labelled as experts.[8] In 35% of the firms, there is at least one female director on the AC who is labelled as an expert. Furthermore, in almost 70% (30%) of the cases, such experts are categorised as accounting (financial) experts. The results of the new estimation are presented in Table 9 (Column (1)). For simplicity, the results for the control variables are untabulated. FEMDIR-NEXP presents an insignificant coefficient, while the coefficient of FEMDIREXP is negative and statistically significant (p-value < 0.01). This indicates that the negative impact of female directors on audit fees, as reported in Table 6, is driven by female directors who are labelled as experts. Although neither Ittonen et al. (2010) nor Sellami and Cherif (2020) differentiate between accounting and financial expertise, we share the view of Ghafran and O' Sullivan (2017) that this distinction is pertinent. For example, the classification standard by the Journal of Economic Literature (JEL) labels "Financial Economics" as a main category (F) of "Economics", whereas auditing forms a joint subcategory with accounting ("M4. Accounting and Auditing") within the broader category "M. Business Administration and Business Economics, Marketing, Accounting and Personnel Economics." Additionally, accountants are typically knowledgeable about accounting standards (part of their ethical requirements for professional competence and due care), while this is not a requirement for finance professionals. Thus, we expect the negative impact of female directors' expertise on audit fees to be driven more by accounting than financial expertise. Hence, Column (2) in Table 9 shows the estimates of the same model as Column (1) but substituting FEMDIREXP with the new variables — FEMDIREXPF, defined as the number of female directors on the AC who are labelled as experts in finance; and FEMDIREXPAC, defined as the number of female directors on the AC who are labelled as experts in accounting.[9] The results of the new estimation document that neither female non-expert directors nor female directors with financial expertise have any significant impact on audit fees. Conversely, the presence of female directors with accounting expertise is statistically significant with the predicted negative sign (p-value < 0.01), confirming our expectations that accounting expertise is the principal driver of the gender effect of female directors on audit fees.

Table 9
The importance of female directors' expertise.

VARIABLES	(1) Expert vs. non-expert directors	(2) Accounting experts vs. financial experts
FEMAUD	0.0802	0.0930
	(0.0815)	(0.0822)
FEMDIRNEXP	−0.0509	−0.0407
	(0.0320)	(0.0321)
FEMDIREXP	−0.159***	
	(0.0581)	
FEMDIREXPF		0.0203
		(0.0803)
FEMDIREXPAC		−0.251***
		(0.0625)
FEMCHAIR	0.157**	0.175***
	(0.0657)	(0.0658)
FEMCEO	−0.0285	−0.0773
	(0.129)	(0.126)
FEMCFO	−0.194***	−0.185**
	(0.0751)	(0.0750)
Controls	YES	YES
Constant	9.551***	9.601***
	(0.312)	(0.306)
Country FE	YES	YES
Industry FE	YES	YES
Year FE	YES	YES
Observations	664	664
R-squared	0.701	0.707

Standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1.
Variables:.
FEMAUD (female auditor); FEMDIRNEXP (non-expert female directors); FEMDIREXP (expert female directors); FEMDIREXPF (female directors with financial expertise); FEMDIREXPAC (female directors with accounting expertise); FEMCHAIR (female audit committee chair); FEMCEO (female CEO); and FEMCFO (female CFO). See Table 1 for further information about the definitions of these variables.

5.2. Interaction effects between gender variables

While most previous studies on gender differences in audit fees focus on a single position — engagement auditors, AC members, CEOs, or CFOs — there are a few exceptions to this rule. Huang et al. (2014) study the positions of the CEO and CFO. Sellami and Cherif (2020) investigate the gender of the auditor and AC members. Similarly, while Sultana et al. (2019) focus on the members of the AC, they also address the gender of the auditor. However, only Sellami and Cherif (2020) have studied the interaction effects of the two positions examined in their study. The authors justify this analysis on the grounds of the important interaction between the AC members and the engagement auditor, taking into account that the degree of this interaction might depend on specific attributes of the people involved (Lee et al., 2019). Sellami and Cherif (2020) observe a stronger effect of female representation in the AC on audit fees when the firm's auditor is also a woman.

The same explanation supports the potential interaction effects between female directors and female CFOs and may, therefore, justify a stronger effect on audit fees when women hold these positions. The results in Table 6 show that both FEMDIR and FEMCFO have a significant negative impact on audit fees. Based on these results, we define the interaction variable FEMCFO*FEMDIR and re-estimate Eq. (1) after including the new interaction variable among the regressors. The results of the estimation, presented in Table 10, show insignificant results for the interaction variable, while the remaining gender variables present similar effects as in Table 6 (Column (1)). Therefore, we discard any significant interaction effects associated with the presence of women in the positions under study.

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[8] As prior studies (e.g., Lisic et al., 2016), we adopt the US Security Exchange Commission (SEC) criteria to classify a director as an expert: persons with experience in the preparation or audit of financial statements, as well as with experience in the supervision of financial reports (SEC, 2003). This information is obtained from Capital IQ.

[9] According to prior studies (e.g., Krishnan and Visvanathan, 2009; Lee and Park, 2018), accounting experts are persons with experience as certified public accountants, auditors, controllers or chief accounting officers, while finance experts have experience in financial management and supervision, as a chief financial officer, finance manager, financial analyst or finance inspector. This information is obtained from Capital IQ.

Table 10
Analysis of the interaction effects between gender variables.

VARIABLES	Interaction effects
FEMAUD	0.0750
	(0.0820)
FEMDIR	−0.279**
	(0.120)
FEMCHAIR	0.106*
	(0.0613)
FEMCEO	−0.0372
	(0.127)
FEMCFO	−0.185**
	(0.0835)
FEMCFO*FEMDIR	−0.0340
	(0.177)
Controls	YES
Constant	9.658***
	(0.316)
Country FE	YES
Industry FE	YES
Year FE	YES
Observations	664
R-squared	0.699

Standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1.
Variables:.
FEMAUD (female auditor); FEMDIR (female directors); FEMCHAIR (female audit committee chair); FEMCEO (female CEO); and FEMCFO (female CFO). See Table 1 for further information about the definitions of these variables.

5.3. The importance of gender equality in the firm's home country

One major advantage of working with a cross-country sample of firms is that it allows us to examine the importance of a firm's home country in the association between gender variables and audit fees. In accordance with the theoretical framework developed in prior studies to justify differences in audit fees by gender, we should not necessarily expect the same relationship between gender variables and audit fees in all countries. Consequently, if the principal driver of the gender effect on audit fees is that women seem to have stricter ethical standards than men (Lai et al., 2017), the level of gender equality in the firm's home country would appear to be a potential mediator of this effect. Hence, Schwartz and Rubel-Lifschitz (2009) argue that as gender equality increases, gender-based differences in values also increase. More specifically, Chen et al. (2016) point out that gender differences in ethics are more pronounced under the cultural dimension of gender egalitarianism. According to these authors, differences in values and ethical behaviour between men and women are greater in more gender-egalitarian countries, and hence, the impact of gender on audit fees should be stronger in these countries. Therefore, we expect the significant results reported for FEMDIR and FEMCFO in all previous analyses to be principally driven by firms from more gender egalitarian contexts.

To conduct this analysis, we define two subsamples of firms based on the level of gender equality in their home countries. However, to minimise the risk of confounding effects, we impose the condition that the countries included in each subsample must form relatively homogeneous regions. Gender literature agrees that Scandinavia is one of the world's most gender egalitarian areas (e.g., Kjeldstad, 2001; Plantenga et al., 2009). This view is further supported by the gender equality index released by the European Institute for Gender Equality (EIGE, 2019). Therefore, the subsample of firms from more gender equalitarian countries consists of firms based in Denmark,

Table 11
The gender effect in audit fees in more and less gender egalitarian countries.

VARIABLES	(1) More gender egalitarian countries	(2) Less gender egalitarian countries
FEMAUD	0.120	−0.0193
	(0.171)	(0.177)
FEMDIR	−0.405*	−0.218
	(0.215)	(0.344)
FEMCHAIR	−0.0905	0.0555
	(0.167)	(0.145)
FEMCEO	0.293	
	(0.354)	
FEMCFO	−0.259*	−0.149
	(0.138)	(0.263)
Controls	YES	YES
Constant	9.637***	9.392***
	(0.608)	(0.954)
Country FE	YES	YES
Industry FE	YES	YES
Year FE	YES	YES
Observations	113	140
R-squared	0.757	0.754

Standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1.
Variables: FEMAUD (female auditor); FEMDIR (female directors); FEMCHAIR (female audit committee chair); FEMCEO (female CEO); and FEMCFO (female CFO). See Table 1 for further information about the definitions of these variables.

Sweden, Norway, and Finland. The decision on which countries should form the less gender egalitarian subsample is less evident. Based on the scores of the gender equality index and considering the objective of homogeneity in the subsample, we group firms from Austria, Germany, and Switzerland in this category.[10]

Table 11 provides the estimates of Eq. (1) for both firm subsamples. Due to the smaller sizes of the subsamples, these results cannot be considered as robust as those reported in Table 6. However, it should be noted that the explanatory power of the proposed model, as measured by the R-squared value, is similar in both estimations and slightly higher than that conducted in Table 6 (Column (1)). The results for the more gender egalitarian subsample, as displayed in Column (1), support the main result of the negative effect of FEMDIR and FEMCFO on audit fees, although the level of statistical significance drops in both cases (to p-value < 0.10). However, the results for the less gender egalitarian subsample in Column (2) are insignificant for all gender variables, including FEMDIR and FEMCFO. These results support our view that the impact of gender variables on audit fees should be stronger in more egalitarian settings than in other contexts.[11]

6. Discussion

The results of this study show that gender diversity in the AC is associated with lower audit fees. This result is robust to several checks and is driven by female directors with accounting expertise. We consider this to be an important result because this is the first time in the literature on audit fees that accounting and financial expertise are separately considered. Conversely, financial expertise

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[10] Because the gender equality index provides scores only for EU member states, the score for Switzerland is not available. However, based on the similarities of Switzerland with Germany and Austria, and also because Switzerland is usually considered a low gender egalitarian country (e.g., Ray et al., 2009), we have also included Swiss firms in this subsample.

[11] In the case of French firms, the variable equals 1 when there is more than one signing partner of at least one audit firm, and 0 otherwise.

alone is not associated with any significant gender differences in audit fees. The results also show that firms with female CFOs pay significantly lower audit fees than firms with male CFOs. As in the case of female directors, this finding seems robust as it holds across several sensitivity checks. Jointly considered, the evidence reported for female directors and CFOs suggests that higher financial reporting quality is associated with the presence of women, either as the firm's top financial executive or within the committee specifically created to promote audit quality. Therefore, this seems to reduce both the effort and risk of the external auditor with the client, leading to lower audit fees. However, the results are insignificant for the gender of the audit partner, chair of the AC, and CEO. Although we find weakly significant coefficients for these variables in some estimations, we do not consider this evidence to be robust. Similarly, we observe insignificant interaction effects for the gender variables. Finally, gender studies literature provides support for a different relationship between the gender variables and audit fees, depending on the level of gender equality in the auditor client's country of origin. Thus, our finding that the negative association between female directors or CFOs and audit fees is driven by firms headquartered in countries with greater gender equality, is consistent with the predictions of these gender studies.

The above findings have interesting implications at various levels. For accounting and audit literature, which does not usually distinguish between financial and accounting expertise, the results emphasise the importance of differentiating between both types of expertise when investigating the impact of the demographic characteristics of AC members on audit fees. Moreover, the results show that the association between gender and audit fees is conditioned by the level of gender equality in the firm's country of origin, highlighting the need for contextualisation when interpreting the evidence reported by previous related studies. Beyond the accounting and audit literature, the latter finding is also of interest for gender studies literature as it provides support for the relevance of gender equality in explaining gender differences in performance. At a more practical level, as the audit partner's gender does not have a significant effect on audit fees, this may have some interesting implications for the audit profession as it raises questions about the signalling effects of female auditors in terms of higher audit quality. Finally, the results suggest that the appointment of female directors to the AC should be based on accounting expertise rather than financial expertise.

7. Conclusions

The accelerated process of incorporating women into senior management positions over the last few years has made it necessary to update the evidence on the relevance of gender in audit fees. As a result of gender quota regulations enacted in a growing number of countries, companies are forced to appoint female directors to their boards (as well as their ACs) to meet gender quotas. This is contrary to the situation before these regulations were passed, where women were voluntarily appointed to these positions. Again, as some prior studies have shown, these gender quota regulations do condition the relationship between gender variables and audit fees and, consequently, updated evidence is welcome.

This study finds that the presence of female directors on the AC is negatively associated with audit fees, with a similar result observed for female CFOs. In the case of female directors, this result is driven by individuals with accounting expertise, whereas the presence of female directors with financial expertise alone is not associated with audit fees. On the other hand, results for audit partners and CEOs are negligible. However, there are some limitations that should be considered when interpreting these findings. First, the relatively small sample size of the study reduces the soundness of the analysis examining the importance of gender equality as a conditioning factor in the association between gender and audit fees. The second limitation

derives from the meagre presence of women in some of the examined positions, most notably as CEOs. However, it should be noted that the accelerated incorporation of women into senior management positions over the last few years has diminished the importance of this problem in comparison with earlier studies.

We anticipate some interesting avenues for further studies to explore, such as whether the reported differences in the respective impacts of accounting and financial expertise on audit fees hold with regard to other outcomes of the audit function. Additionally, a more exhaustive analysis of the incidence of country-specific issues in the association between gender and audit fees might extend, refute, or refine the results reported here. Finally, as the number of female CEOs continues to increases over the years, a more thorough analysis of the association between the CEO's gender and audit fees could be conducted.

Declaration of interests

none.

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