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Do women in board represent less corporate tax avoidance? A moderation analysis

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Abstract

Purpose – The purpose of this paper is to empirically examine how women in board represent moderates the relationship between audit quality and corporate tax avoidance.
Design/methodology/approach – The study is based on a sample consisting of 270 UK firms over the 2005–2017 period. This study is motivated by moderating regression analysis.
Findings – The results show that audit quality influences the corporate tax avoidance. Audit quality measured by two proxies audit specialization and audit fees has a negative effect on corporate tax avoidance. Board gender diversity "BGD" moderates the relationship between audit quality and tax avoidance. The impact of the BGD level increases as the presence of woman in the board escalated from 40 to 60 percent but, then, weakens at 10 percent level.
Practical implications – The findings may be of interest to the academic researchers, practitioners and regulators who are interested in discovering relation between audit quality and tax avoidance with the presence of woman in the board. This study should be of interest to tax policymakers concerned about declining corporate tax revenues.
Originality/value – This paper extends the existing literature by examining the moderating effect of BGD on the relation between audit quality and corporate tax avoidance using the sensitivity analysis.

Keywords Governance, Tax avoidance, Audit quality, Feminine behaviour, Gender and diversity
Paper type Research paper

1. Introduction

Tax plays an important role in the maintenance of firm operating costs and engaging in tax avoidance can reduce firm tax bearing. Corporate tax avoidance is defined broadly as the reduction in explicit taxes paid and measure tax avoidance using the three-year average ratio of current taxes paid over pre-tax income (e.g. Hanlon and Heitzman 2010; Atwood *et al.*, 2012).

Tax avoidance has been studied by many researchers, in this area Shackelford and Shevlin (2001) called for research on the determinants of tax aggressiveness. Corporate tax planning may not be illegal, but some aggressive tax plannings for the purpose of tax avoidance are illegal tax schemes (Lee and Kao, 2018).

In recent years, there has been an increasing interest in the relationship between audit quality and corporate tax avoidance. Maydew and Shackelford (2005) indicated that the degree of reducing the taxes and fees of tax avoidance is, in essence, a kind of function between financial accounting standards and tax laws. Lee and Kao (2018) explicated that auditors need to conduct the risk assessment in audit according to the audit client's tax

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management activities, so as to assess the misstatement risk in financial statements possibly produced by firms to reduce the tax burden and liability. Recently, investigators have examined the effects of auditors on tax avoidance. McGuire *et al.* (2012) focused on how auditors influence tax aggressiveness in the US through the provision of auditor-provided tax services. Francis and Wang (2008) argued that auditors have stronger incentives to enforce higher financial reporting quality, which will indirectly dampen tax aggressiveness when investor protection is strong. External audit is a governance mechanism that performs several functions: reducing informational asymmetry, limiting discretion (Antle, 1982; Whittington, 1993) and ensuring better regulation of stakeholders. Indeed, an external audit is an important instrument for shareholders to ensure the transparency and credibility of financial reports (Habbash and Alghamdi, 2017). In this context, Zeng (2019) have found that firms resident in countries with stronger country-level governance engage in less tax avoidance.

However, research has consistently shown that these students lack on how auditor quality relates to tax avoidance. The extent of auditors' influence on tax aggressiveness likely depends on each firm's board gender diversity (BGD). Our study attempts to shed some light on these issues. No previous study has investigated the effect of BGD on the relationship between auditors and tax avoidance. In this context, on one hand, this paper focuses on the impact of audit quality on tax avoidance and, on the other hand, the effect of BGD on this relation. In this study, we investigate the role of audit in taxation by investigating how BGD moderates the relationship between audit quality and corporate tax avoidance. In doing so, we help reconcile the differences between existing studies. We empirically test how BGD affects the relationship between audit quality and tax avoidance. Hence, we also examine the relationship between audit quality and tax avoidance on sub-samples based on the BGD level.

We examine the relation between audit characteristics and tax avoidance using a large non-financial UK sample of 3,510 firm-year observations across 270 firms spanning the years 2005–2017.

Our study makes several important contributions to the literature. First, it adds to the audit literature on the effects of audit quality. We contribute to this research by documenting that audit quality is associated with a lower tax avoidance across firms, and this result holds after controlling for the BGD level. Second, we contribute to prior research by documenting that the association between audit quality and the tax avoidance varies with different levels of the BGD. This evidence is important as most of the research on tax avoidance is conducted primarily in the UK. We exploit the differences in the level of BGD to examine how this moderates the relationship between audit quality and the corporate tax avoidance. Third, our study should be of interest to tax policymakers concerned about declining corporate tax revenues. Our findings suggest that firms employing high audit quality exhibit a lower tax avoidance; however, this relation is more accentuated with a level's BGD.

The rest of this paper is organized as follows. Section 2 presents the theoretical background. In Section 3, we discuss related research on tax avoidance and develop our predictions on the relation between audit quality and corporate tax avoidance, and how that relation may vary with the BGD level. We describe the measures of our main variables of interest and the research design in Section 4. We discuss the main results in Section 5 and the results of robustness checks in Section 6 and additional analysis in Section 7. We provide our conclusions in Section 8.

2. Theoretical background

Previous studies (Chen and Chu, 2005; Crocker and Slemrod, 2005; Desai and Dharmapala, 2006; Desai *et al.*, 2007) explain the agency theory, such as companies define their strategies about tax evasion which is based on the employment contract between the shareholder and

the company tax manager. Slemrod (2004) and Chen and Chu (2005) laid the theoretical foundation for understanding corporate tax avoidance within an agency framework. They adopted perspective that tax avoidance emphasizes the interaction between tax avoidance activities and agency problems between managers and investors. In this situation, the quality of audit decreases. This sign motivates the opportunist managers for great tax planning (Khan and Chen, 2017).

Previous study like (Adams and Ferreira, 2009; Francoeur *et al.*, 2008; Huse and Solberg, 2006) explain the relationship between female directors and agency theory. In this context, agency theory argues that female directors may act as a mechanism of supervision and control of a board's activity. Female directors have acquired high levels of education, such as master's and other postgraduate degrees and, therefore, are considered highly professional and experienced (Solimene *et al.*, 2017) in making important decisions on the boards. Goyal *et al.* (2019) have found that board members consider the diversity of functional experience to be a critical requirement for board role-effectiveness. Functionally diverse boards can improve corporate governance.

3. Literature review and hypotheses development

3.1 Audit quality and tax avoidance

The primary role of auditors is to express an opinion on whether the financial statements and related disclosures present fairly, in all material respects, the client firm's financial condition in conformity with generally accepted accounting principles (Kanagaretnam *et al.*, 2016). Hanlon (2005) revealed that auditors indirectly reduce firm abilities and incentives to avoid tax because a large book-tax difference can be a potential red flag which increases the probability of detection by the tax authorities. In fact, firms that engage in aggressive tax behavior have a higher likelihood of misstatements and restatements because managers can use various accounts, such as valuation allowances, tax contingency reserves and estimates of accrued taxes, to manage earnings (Dhaliwal *et al.*, 2004; Frank and Rego, 2006; Hanlon and Heitzman, 2010; Gupta and Lynch, 2015). According to previous study, if the audit is of a high quality, managers are less motivated to engage in corporate tax avoidance. Omer *et al.* (2006) found that higher fees paid by clients to their external auditors are associated with lower future marginal and effective tax rates (ETRs). Richardson *et al.* (2013) showed that, if a firm is audited by a BIG4 and the services of the external auditor have a low proportion of non-audit services, it is less likely to be tax aggressive. Dhaliwal *et al.* (2004) suggested that tax expense is difficult for auditors to evaluate because of the complexity of the tax laws and that the substantial judgment that must be exercised in estimating the various components of tax expense. Kinney *et al.* (2004) showed that higher tax fees paid to auditors are associated with fewer earnings restatements. More recently, using a sample of Norwegian firms from 2000 to 2014, Langli and Willekens (2017) found that high audit quality improves the credibility of financial information, which will reduce agency costs, allowing them to avoid tax without adopting aggressive tax strategies. In this context, Kanagaretnam *et al.* (2016) found strong evidence that auditor quality is negatively associated with the likelihood of tax aggressiveness, even after controlling for other institutional determinants such as home-country tax system characteristics and this association is more pronounced in countries where investor protection is stronger, auditor litigation risk is higher, the audit environment is better, and capital market pressure is higher. McGuire *et al.* (2012) also documented that auditors who are overall industry experts (i.e. have a large market share of both audit and tax services within an industry) are also associated with lower client book and cash ETRs. They extend this line of research by examining whether auditor expertise is an additional determinant of the tax savings associated with auditor provided tax services. If auditors have the position of industry specialists, it is indicated that the

audit firms of industry specialists can better increase the earnings quality of audit client than the audit firms of non-industry specialists (Lee and Kao, 2018). A recent study by Lestari and Nedya (2019) involved that audit quality by audit size and audit fee has negative effect on tax avoidance.

O'Reilly and Reisch (2002) published a paper in which they described that the auditing market becomes more competitive. So auditors develop industry specialization strategy of either using the market share, establishing the market segmentation, increasing the competitiveness beyond the price or even achieving the scale economies effect based on the control of costs. A study by Johnson *et al.* (1991) involved that industry experience can help auditors improve the debugging capability and detect the financial statement error. Also, Nikkar (2018) found that the impact of audit size and auditor tenure is negative and significant on the index of tax avoidance.

Previous studies have used modified auditor opinion as an attribute of audit quality (e.g., Chow and Rice, 1982; Craswell *et al.*, 2002; Lennox, 2000). Dedman and Kausar (2012) showed that unaudited accounts are associated with less conservative financial reporting and this explains why such companies earn higher profits and yet receive lower credit ratings. Kinnunen *et al.* (2017) argued that if the audit report is unqualified (thereby providing no cause for concern regarding financial statement credibility), they posit that opting for voluntary audit reduces the likelihood of tax adjustments by the tax authority. Their study finds that having a voluntary audit with an unqualified audit opinion decreases the likelihood of the tax authority not accepting taxable income as reported. Other prior empirical studies that document a negative relationship between audit report qualification and the quality of financial statement information. In China, Chen *et al.* (2001) are consistent with the notion that the likelihood of a qualified audit report increases with earnings management.

Dopuch *et al.* (2001) and Wang and Tuttle (2009) found improvement in audit quality in the mandatory audit firm rotation as compared to non-mandatory rotation. Khan and Chen (2017) revealed that when audit firms follow the mandatory audit firm rotation rule, it provides the less of a chance for great tax planning strategies. If the firm does not follow the mandatory audit firm rotation rule, then companies have chance for great tax planning:

H1. Audit quality is negatively related to corporate tax avoidance.

3.2 Women in board represent less corporate tax avoidance: a moderation analysis

Recent research has emphasized the practical value of gender diversity. Lai *et al.* (2017) found that firms with gender-diverse boards pay higher audit fees and are more likely to choose specialist auditors compared to their peers. Their findings suggest that boards with female directors are likely to demand higher audit quality. Previous studies (Fama and Jensen, 1983; Gilson, 1990; Sahlman, 1990) reveal that the boards with female directors may demand higher audit effort and choose high quality specialist auditors in order to protect the firm reputation capital and avoid legal liability. Based on resource dependency theory, auditor selection depends on the various attitudes of board of directors. Female directors improve the efficiency of board monitoring functions. In fact, they have strong tendency to hire high-quality auditor to protect their reputation. Gul *et al.* (2011) analyzed the data from sample of US firms spanning the year 2001–2008 and concluded that firms whose boards exhibit gender diversity pay higher audit fees and choose specialist auditors compared to their peers. Their findings suggest that boards with female directors are more likely to demand more monitoring in the form of more audit effort and higher audit quality, ceteris paribus.

Carcello *et al.* (2002) explained that diversity in board expertise induces greater demand for audit. This is consistent with the female directors self-selecting into monitoring roles in audit and governance committees (Adams and Ferreira, 2009). Gull *et al.* (2017) found that female chairs and audit committee members demand incremental audit effort from external auditors to

ensure audit quality which translates in higher audit fee. Miglani and Ahmed (2019) suggested that audit committees with women financial experts are likely to demand higher audit quality.

Compared to men, women show less tolerance to opportunism in their decision making (Ambrose and Schminke, 1999; Schminke and Ambrose, 1997). In this context, Kastlunger *et al.* suggested that the differences between men and women can be detected at the level of the tax compliance and the strategies of payments of tax burdens. The women on boards are likely to reduce the risk of manipulated financial statements, as women are more inclined toward truthfulness, cautiousness and conservatism (Nehme and Jizi, 2018). In an analysis of BGD, Mustafa and Che-Ahmad (2018) found that female directors improve monitoring mechanism for some firms.

Hoseini *et al.* (2019) showed that the presence of women on corporate boards reduces corporate tax avoidance. In 2016, Richardson *et al.* (2016) published a paper in which they investigated the impact of women's presence on corporate boards on reducing tax avoidance. In this context, Lanis *et al.* (2017) argued that a negative and statistically significant association between female representation on the board and tax aggressiveness.

These factors support the hypothesis that the board's gender diversity results in greater demand for audit quality and, in turn, reduces corporate tax avoidance:

H2. The relation between auditor quality and tax avoidance is more accentuated when the level of BGDs in the firm is higher.

Figure 1 summarizes our hypotheses on the effect of audit quality on tax avoidance in firms with BGD level.

4. Research methods

4.1 Sample data

The sample contains 300 firms spanning the period 2005–2017. We exclude firms operating in financial and highly regulated industries because of their particular accounting practices. Also, we exclude firms of which the data of audit variables are incomplete.

Table I presents the distribution of the listed firms of our sample. Thus, 270 firms and 3,510 observations will make up our sample construct, as depicted in Table I our database has been collected from DataStream database and Table II presents the distribution of firms by industry and year.

4.2 Variables measures

4.2.1 Tax avoidance. The dependent variable in this analysis is the extent of corporate tax avoidance. Tax avoidance is measured by Cash Effective Tax Rate (Cash ETR). Thus, ETR

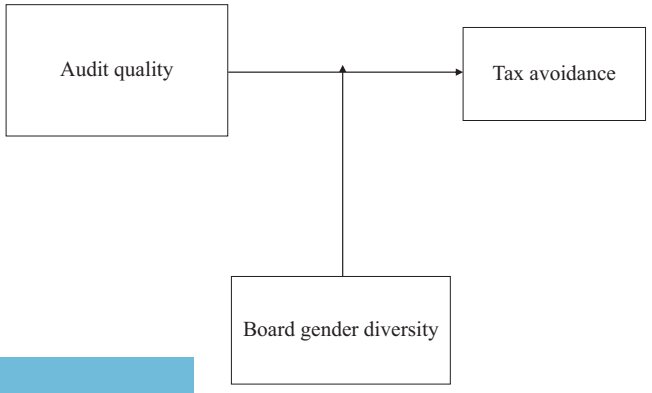

Figure 1.
The moderating effect of BGD on the relation between audit quality and corporate tax avoidance

helps to estimate the effectiveness in companies tax planning activities (Mills, 1998; Phillips, 2003). Lee and Kao (2018) defined cash ETR as the proportion of cash taxes paid to the accounting income before tax. Dyreng *et al.* (2008) explained that the cash amount of tax paid help us to minimize the likely effects of items such as valuation allowance and tax cushions. Lanis and Richardson (2012) argued that ETR measures the ability of a company to reduce its tax payments relative to its pre-tax income. In this study, we follow Watson (2015) who indicates that Cash ETRs are widely accepted in the accounting literature to proxy for tax avoidance in part because they capture both permanent and temporary tax avoidance strategies.

4.2.2 Audit quality. The independent variable in this study is the audit quality that measured by audit fees and auditor industry specialization:

- Audit fees: according to Kanagaretnam *et al.* (2011), audit fees are more likely to reflect auditor effort. Bing *et al.* (2014) explained that high audit fee is assumed to be more efforts in audit process and higher audit quality. In this context, Yasina and Nelson (2012) pointed out that a higher amount of audit fees indicates that auditors provide more efficient audit services to the firm compared to lower audit fees.

  In this study, we measure audit fees by the natural logarithm of audit fees. It is rated "1" if the total audit fees are greater than the median sample of the company during the study period and the value of "0" otherwise.

- Auditor specialization[1]: this study considers industry specialization auditors to be another proxy for audit quality. Previous research studies provide solid evidence in

Sample	Number of firms
Initial sample	400
Financial firms	(100)
Less: the data of variables are incomplete	(30)
Final sample	270
Duration of study	13
Total observations	3,510

Table I.
Sample selection

Industry	*n*	%
Aerospace and Defence	14	5.18
Business Support Services	13	4.48
Chemicals	15	5,56
Computer Software and Services	20	7.40
Construction and Building Materials	19	7.04
Distributors	14	5.18
Electronic and Electrical Equipment	19	7.04
Engineering and Machinery	15	5.56
Food Producers and Processors	20	7.40
General Retailers	19	7.04
Health	14	5.18
Leisure Entertainment & Hotels	16	5.92
Media and Photography	18	6.67
Support Services	18	6.67
Transport	16	5.92
Restaurants Pubs and Breweries	20	7.40
Total	270	100

Table II.
Sample distribution across

support of using industry specialization to proxy audit quality (Francis, 2004; Watkins *et al.*, 2004; Breesch and Branson, 2009; Clinch *et al.*, 2010). Krishnan supposed that auditors with skills and expertise are associated with less earnings management. Industry specialization is recognized if an auditor firm maintains at least a 10 percent market share for the industry (Hakim and Omri, 2010). In the study of Carcello and Nagy (2004), market share calculation is based on total client sales audited within each industry, based on the two-digit SIC code. It is also measured on the percentage of client assets audited within an industry (Bing *et al.*, 2014). In this study, we measure sector specialization as a dummy variable equal to 1 if audit firms have a 10 percent threshold or more of audit market share in a particular industry and 0 otherwise (Hsu *et al.*, 2018; Lai *et al.*, 2017).

4.2.3 Board gender diversity. Board gender diversity: BGD was measured by calculating the percentage of female directors serving on a company's board, as in Adams and Ferreira (2009) and Campbell and Mínguez-Vera (2008), Galbreath (2018) and Ye *et al.* (2019). For this variable, data were derived from the DataStream database.

4.2.4 Control variables

- Firm size (SIZE): Lanis and Richardson (2012) found that firm having larger size would be more aggressive in its tax policy rather than small firms. Furthermore, Gupta and Newberry (1997) argued that in some cases size affects the tax avoidance. Therefore, we take size (SIZE) as a control variable in our analysis, measured by the log of total assets.
- Leverage (LEV): Lanis and Richardson (2012), Stickney and McGee (1982), and Chasbiandani and Martani (2012) used leverage as a control variable. They found that firms having debts would be more aggressive in gaining an opportunity to apply tax reduction as consequence of interest payment (Sari and Tjen, 2017). LEV is measured by total debts divided by total assets.
- Return on Assets (ROA): we control for firm performance because profitable firms have greater incentives to be tax aggressive. Lanis and Richardson (2012) argued that firm having high profitability would tend to be aggressive in its tax policy. Lisowsky (2010) showed that tax aggressiveness is positively associated with performance. This variable is measured by pre-tax income divided by total assets.
- Sales growth (GROWTH): we control for sales growth because firms with higher sales growth enjoy greater marginal benefits from tax planning and, hence, have greater incentives to avoid taxes (Edwards *et al.*, 2012). This variable is measured by percentage change in sales (Table III).

4.3 Models and estimation method

We have specified five econometric models for estimation. The following equation summarizes the first panel data model.

Model 1:

$$\mathrm{CETR}_{it} = \beta_0 + \beta_1 \mathrm{AQ}_{it} + \beta_2 \mathrm{SIZE}_{it} + \beta_3 \mathrm{LEV}_{it} + \beta_4 \mathrm{ROA}_{it} + \beta_5 \mathrm{GROWTH}_{it} + \text{year fixed effect}_{it} + \text{firm fixed effect}_{it} + \varepsilon_{it}. \quad (1)$$

Equation (1) allows the estimation of the main effects of audit quality measured by two proxy (audit fees, audit specialization) on corporate tax avoidance. According to *H1*, we expect that β_1 is negative in model (1).

Variable	Symbols	Definition	Authors
Dependent variable			
Tax avoidance	CETR	Cash taxes paid/ Pre-tax accounting income	Hanlon and Heitzman (2010), Dyreng *et al.* (2008), Chen *et al.* (2010), McGuire *et al.* (2014), Goh *et al.* (2016)
Independent variable: Audit quality proxy			
Audit fees	AuditFees	Dummy variable equal to 1 if the total audit fees are greater than the median sample of the company during the study period and the value of "0" otherwise	Yang *et al.* (2019), Lai *et al.* (2017), Hanlon *et al.* (2012)
Audit specialization	AuditSPEC	Dummy variable equal to 1 if audit firms has a 10% threshold or more of audit market share in a particular industry and 0 otherwise	Hsu *et al.* (2018), Lai *et al.* (2017), Palmrose (1986), Krishnan (2003), Balsam *et al.* (2003), Gul *et al.* (2011)
Moderating variable			
Board gender diversity	BGD	The percentage of female directors serving on a company's board	Ye *et al.* (2019), Galbreath (2018), Adams and Ferreira (2009), Campbell and Minguez-Vera (2008), Liao *et al.* (2015)
Control variables			
Firm size	SIZE	Natural logarithm of total assets	Lanis and Richardson (2012), Gupta and Newberry (1997)
Leverage	LEV	Total debt/Total equity	Lanis and Richardson (2012), Stickney and McGee (1982)
Return on Asset	ROA	Pre-tax income divided by total assets	Lanis and Richardson (2012), Lisowsky (2010)
Sales growth	GROWTH	The percentage change in sales	Edwards *et al.* (2012)

Table III. Variables measurement

To examine the proposed hypothesis that the impact of audit quality on the corporate tax avoidance is more important in firms with BGD level, we estimate four equations, which includes BGD. According to *H2*, we estimate the model (2) as described below.

Model 2:

$$\mathrm{CETR}_{it} = \beta_0 + \beta_1 \mathrm{AQ}_{it} + \beta_2 \mathrm{BGD}_{it} + \beta_3 \mathrm{AQ}_{it} \times \mathrm{BGD}_{it} + \beta_4 \mathrm{SIZE}_{it} + \beta_5 \mathrm{LEV}_{it} + \beta_6 \mathrm{ROA}_{it} + \beta_7 \mathrm{GROWTH}_{it} + \text{year fixed effect}_{it} + \text{firm fixed effect}_{it} + \varepsilon_{it}. \quad (2)$$

Equations are estimated using a panel data methodology, applying the generalized least squares regression (GLS).

5. Empirical results

5.1 Descriptive statistics

Table IV presents the summary descriptive statistics of the dichotomous variables used in this study. This table provides summary statistics for the firms in this sample.

The average percentage audit fees paid by the companies is 95.53 percent, indicating that most fees paid by companies are high and greater than the median sample, whereas 4.47 percent of the sample companies paid for non-audit fees. Finally, the variable of sector specialization shows that 86.70 percent of companies are audited by a specialist auditor and 13.30 percent are audited by non-specialist auditor.

Also, Table IV provides descriptive statistics for the regression variables such as the dependent variable and the independents variables. The panel presents descriptive statistics for the entire sample, including the mean, minimum, median, maximum and standard deviation.

Variables	Mean	Min.	Median	Max.	SD	P^{er} 25	P^{er} 75
CETR	0.237	0	0.23	11.59	0.501	0.16	0.28
BGD	13.840	0	12.3	62.3	11.512	0	22.20
Size	6.942	4.822	6.722	8.412	1.650	5.09	8.29
LEV	0.257	0	0.241	0.858	0.141	0.162	0.33
ROA	0.075	0.002	0.095	0.110	0.019	0.049	0.089
GROWTH	0.098	0.013	0.081	0.112	0.255	0.016	0.110

Variables	Modality	Frequencies	Percentage
AuditFees	0	157	4.47
	1	3,353	95.53
AuditSPEC	0	467	13.30
	1	3,043	86.70

Notes: CETR, cash effective tax rate; BGD, board gender diversity: the percentage of female directors serving on a company's board; SIZE is the natural logarithm of total assets; LEV is the ratio total debt to total equity; ROA is measured by pre-tax income divided by total assets; GROWTH is measured by percentage change in sales. Where AuditFEES is audit fees, AuditSPEC is audit specialization

Table IV.
Descriptive statistics

The mean value of CETR is (0.237), the 25th (0.16), 50th (0.23) and 75th (0.28) percentiles as well as the standard deviation is 0.501, are closely to Hoi *et al.* (25.3 percent). In fact, Hoi *et al.* reported descriptive statistics of the remainder of their variables in a larger sample that includes loss firms, they are difficult to compare; however, the proximity of the cash ETR descriptive statistics indicates a closely matching sample.

Regarding the BGD, the mean value is 13.840 and the standard deviation is 11.512. The 25th percentile is still 0, whereas the median is 12.3 and the 75th percentile 22.20. This is higher than the number given in, for instance, Adams and Ferreira (2009), who reported a value of 8.5 percent.

5.2 Correlation analysis

Based on the reading of the Spearman Correlation Matrix, this analysis aims to check the relationship between dependent (tax avoidance) and independent variables (audit characteristics) as well as the independent variables among each other and helps to check for the multicollinearity problem. Our research finds that this coefficient varies from one variable to another.

Based on (Soliman and Ragab (2014), cited in Bryman and Cramer 1997), to decide on a serious problem of multicollinearity between the independent variables, Pearson's correlation between independent variables should exceed 0.8.

As shown in Table V, there is no multicollinearity problem between the independent variables used in this research model, as it does not exceed the 0.8.

5.3 Regression results

We run regressions using panel data models in order to control for unobserved firm heterogeneity that remains constant over the time period we study. Thus, we test the validity of the fixed effects estimator by using the Hausman test. The result shows that the Hausman test rejects the random effects estimator and thus fixed effect models are preferred in the paper. Then, residuals are tested for normality, autocorrelation and homoscedasticity to ensure that the robustness of the errors are independently, identically and normally distributed for the fixed effects model.

5.3.1 Test of H1. In this section, we report the results for the test of *H1*, which examines the association between audit quality and tax avoidance measured by CETR. Table VI reports the results of the tax avoidance regression on the explanatory variables.

	CETR	AuditFEES	AuditSPEC	LEV	SIZE	ROA	GROWTH	VIF
CETR	1.000							
AuditFEES	−0.025**	1.000						1.32
AuditSPEC	−0.023***	0.119***	1.000					1.25
LEV	0.236*	−0.211	−0.113	1.000				1.43
SIZE	−0.322**	0.046***	0.072***	0.042	1.000			1.66
ROA	0.045***	0.354	0.256	0.123	0.089**	1.000		1.54
GROWTH	0.221***	0.053	0.034**	0.231	0.162*	0.258	1.000	1.39

Notes: CETR, cash effective tax rate; AuditFEES is audit fees; AuditSPEC is audit specialization; SIZE is the natural logarithm of total assets; LEV is the ratio total debt to total equity; ROA is measured by pre-tax income divided by total assets; GROWTH is measured by percentage change in sales. *,**,***Significant at the 0.10, 0.05 and 0.01 levels, respectively

Table V.
Pearson correlations for independent variables in UK firms

	Dependent variable: CETR Model 1			
Variables	Coeff.	$P > Z$	Coeff.	$P > Z$
AQ (proxy:AuditFEES)	−1.028	0.001***		
AQ (proxy:AuditSPEC)			−0.075	0.034**
LEV	0.258	0.038**	0.247	0.036**
SIZE	−0.012	0.361	−0.013	0.148
ROA	0.143	0.035**	0.125	0.032**
GROWTH	0.235	0.002***	0.147	0.003***
Firm fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
R^2	0.561		0.518	
No. of Observation	3,510		3,510	

Notes: CETR, cash effective tax rate; AQ, audit quality measured by two proxies namely audit fees and audit specialization; BGD, board gender diversity: the percentage of female directors serving on a company's board; SIZE is the natural logarithm of total assets; LEV is the ratio total debt to total equity; ROA is measured by pre-tax income divided by total assets; GROWTH is measured by percentage change in sales. *,**,***Significant at the 0.10, 0.05 and 0.01 levels, respectively

Table VI.
Relation between auditor quality and tax avoidance

Testing *H1*, Table VI presents evidence of negative and significant coefficient of audit quality measured by audit fees at the level of 1 percent. The empirical result still supports *H1*, meaning the higher the auditor quality is, the lower of the audit client's tax avoidance will be. In the current study, we found that a negative and statistically significant coefficient on AUDITFEES, which is consistent with the notion that auditor quality is negatively related to the corporate tax avoidance. This finding corroborates the ideas of Kanagaretnam *et al.* (2016), who suggested that auditor quality is negatively associated with the likelihood of tax aggressiveness, even after controlling for other institutional determinants such as home-country tax system characteristics.

These findings further support the idea of Omer *et al.* (2006) and Lestari and Nedya (2019) who have found that higher fees paid by clients to their external auditors are associated with lower future marginal and ETRs. Our findings are consistent with Kinney *et al.* (2004) who showed that higher tax fees paid to auditors are associated with fewer earnings restatements.

Also, the results show a negative and significant relationship between auditor industry specialization (second proxy of audit quality) and corporate tax avoidance ($\beta = -0.075$, $P > Z = 0.034$). This study produced results which corroborate the findings of a great deal of

the previous work in this field. However, the findings of the current study do not support the previous research. Lee and Kao (2018) found that the auditor industry specialization has the positive assisting impact on clients' tax avoidance; if the relative importance of audit client to auditor is higher, the auditor will alleviate the clients' tax avoidance. The empirical results show that if the degree of auditor industry specialization is higher, it will have the helping effect on audit client's tax avoidance.

The coefficients of the control variables are consistent with expectations. Contrary to Lanis and Richardson (2012), we find larger (SIZE) firms are less likely to be tax aggressive, possibly due to additional political scrutiny of such firms. We also find that firms with higher leverage (LEV) and sales growth (GROWTH) are more likely to be tax aggressive, consistent with greater opportunities to avoid taxes for firms with more debt and greater marginal benefits of avoiding taxes for growth firms.

5.3.2 Test of H2. In this section, we are interested in whether the presence of woman in the board affects the relationship between audit quality and corporate tax avoidance. In *H2*, we examine the moderating role of BGDs. The results of our tests are presented in Table VII.

The results indicate that the negative association between audit quality (measured by audit fees) and the corporate tax avoidance is accentuated in firms with higher BGD level (at the level of 1 percent). Our results are consistent with Lai *et al.* (2017) who found that firms with gender-diverse boards (audit committees) choose industry-specialist auditors and demand higher audit effort from them, after controlling for self-selection bias and other variables that are known to affect audit fees or auditor choice as the case may be. In this area, the presence of woman in the board encourages the demand of higher audit quality which help to reduce the opportunistic behavior of managers.

The results presented in Table VII indicate that the coefficient on the interaction between BGDs × AQ (measured by audit specialization) is negative and significant at conventional level. This result may be explained by the fact that woman in the board demand an audit specialization to ensure the transparency and credibility of financial reports which will indirectly dampen tax avoidance. Firms with gender-diverse boards pay higher audit fees and are more likely to choose specialist auditors compared to their peers (Lai *et al.*, 2017).

	Dependent variable: CETR			
	Model 2			
Variables	Coeff.	$P > Z$	Coeff.	$P > Z$
AQ (proxy:AuditFEES)	−0.012	0.015**		
AQ (proxy:AuditSPEC)			−0.026	0.035**
BGDs	−0.083	0.003***	−0.096	0.005***
BGDs × AQ (proxy:AuditFEES)	−0.001	0.004***		
BGDs × AQ (proxy:AuditSPEC)			−0.021	0.000***
LEV	0.132	0.085*	0.126	0.042**
SIZE	−0.042	0.087*	−0.141	0.264
ROA	0.025	0.088*	0.024	0.041**
GROWTH	0.033	0.155	0.012	0.421
Firm fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
R^2	0.622		0.653	
No. of observations	3,510		3,510	

Table VII.
Relation between auditor quality and tax avoidance: the role of board gender diversity

Notes: CETR, cash effective tax rate; AQ, audit quality measured by two proxies namely audit fees and audit specialization; BGD, board gender diversity: the percentage of female directors serving on a company's board; SIZE is the natural logarithm of total assets; LEV is the ratio total debt to total equity; ROA is measured by pre-tax income divided by total assets; GROWTH is measured by percentage change in sales. *,**,***Significant at the 0.10, 0.05 and 0.01 levels, respectively

Overall, the results presented in Table VII indicate that the negative association between audit quality and the corporate tax avoidance is more accentuated when BGD is higher.

6. Robustness test

To check the robustness of our main results, we verify whether the moderating role of BGD remains intact if we replace the CETR with the effective tax rate Differential (DETR) which is measured by the difference of between the statutory tax rate and the firm's ETR[2]. Following Hanlon and Heitzman (2010), we re-estimate regressions (1) and (2) using the effective tax rate Differential (DETR) as proxy for the tax avoidance. Table VIII show that the results are similar to those previously reported, as displayed in Tables VI and VII.

7. Additional test

To further assess how BGD may influence the relationship between audit quality and tax avoidance, we subdivide the total sample into five subsample of low and high BGD level group. In this study, we use the sensitivity level analysis for examine the important woman role in the board for reducing opportunistic behavior essentially tax aggressiveness by choosing a high audit quality. Especially, we test the audit fees and audit specialization (proxy of audit quality) to prove their significant effect on corporate tax avoidance in firms with BGD level (Figure 2).

Results of panels D and E were consistent with the preceding findings. Panel D clearly demonstrated that BGD moderates the relationship between audit specialization and corporate tax avoidance and its influence is strong at the higher level of BGD. The results presented in Table IX indicates that the coefficients on the interaction between AuditFEES × BGD and AuditSPEC × BGD are all negative and significant at conventional levels. The evidence indicates that the negative relation between audit quality and the tax avoidance is more pronounced in firms with higher BGD level (panel D

Variables	Model (1) DETR Coeff.	$P > Z$	Model (2) DETR Coeff.	$P > Z$	Model (1) DETR Coeff.	$P > Z$	Model (2) DETR Coeff.	$P > Z$
AQ(proxyAuditFEES)	−0.257	0.002***	−0.013	0.002**				
AQ(proxyAuditSPEC)					-0.014	0.026**	−0.042	0.023**
BGDs			−0.083	0.003***			−0.029	0.012**
AuditFEES × BGDs			−0.001	0.004***				
AuditSPEC × BGDs							−0.021	0.000***
LEV	0.258	0.038**	0.132	0.085*	0.126	0.042**	0.422	0.095*
SIZE	−0.012	0.361	−0.042	0.077*	−0.141	0.264	−0.113	0.067*
ROA	0.121	0.027**	0.087	0.057*	0.117	0.044**	0.258	0.097*
GROWTH	0.014	0.147	0.035	0.037**	0.147	0.158	0.114	0.075*
Year fixed effect	Yes		Yes		Yes		Yes	
Firm fixed effect	Yes		Yes		Yes		Yes	
R^2	0.557		0.611		0.537		0.547	
No. of observations	3,510		3,510		3,510		3,510	

Notes: Dependent variable: DETR, deferential effective tax rate; Independent variables: Audit quality measured by two proxies such as audit fees and audit specialization; Moderating variable: BGD: board gender diversity: the percentage of female directors serving on a company's board; Control variables: SIZE is the natural logarithm of total assets; LEV is the ratio total debt to total equity; ROA is measured by pre-tax income divided by total assets; GROWTH is measured by percentage change in sales. *,**,***Significant at the 0.10, 0.05 and 0.01 levels, respectively

Table VIII. Robustness test

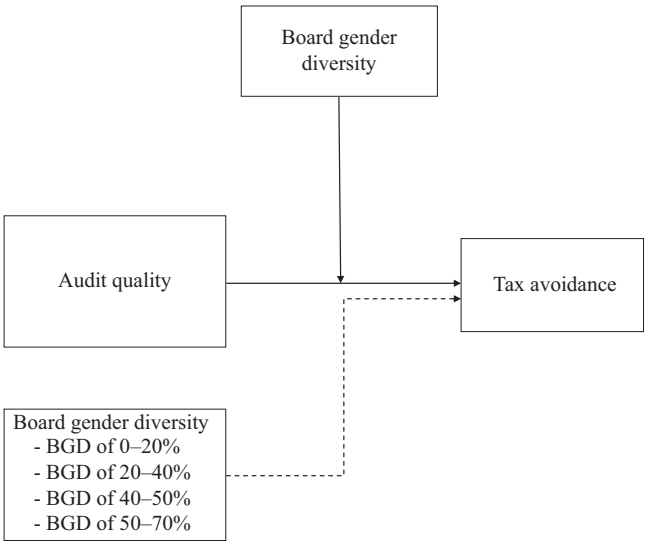

Figure 2.
Relation between audit quality and corporate tax avoidance with board gender diversity level

and E). We find that firms with higher percentage of woman presence in the board are more likely to employ specialist auditors, and this relation is more accentuated.

We show that as the percentage of woman presence increases, the role of audit fees and audit specialization are more pronounced in influencing tax avoidance.

The impact of the BGD level on the relation between audit characteristics and corporate tax avoidance strengthened at a BGD level of 40, 50 and 60 percent but weakened at a BGD level of 20 percent or less.

8. Conclusion

The present study was designed to determine whether audit quality, proxies by audit fees and audit specialization relates to corporate tax avoidance. This study examined the effect of audit quality on tax avoidance moderated by BGD level companies. Moderating regression analysis was used in this study to examine the impact of BGD on the relationship between audit quality and tax avoidance. The examination was conducted on sub-samples based on the level of BGD, i.e. 10, 20, 40, 50 and 60 percent.

Using a large sample of firm-year observations from 270 UK firms and estimation, we find that audit quality affects negatively the corporate tax avoidance. We also show that the negative relationship between audit quality and corporate tax avoidance is more accentuated with higher BGD level. The impact of the BGD level increases as the presence of woman in the board escalates from 40 to 60 percent, but then weakens at 10 percent level. In additional analyses, we find that the negative relationship between audit quality and corporate tax avoidance is more accentuated when BGD level is higher. The negative impact of the audit quality on the corporate tax avoidance strengthened at a BGD level of 40, 50, 60 percent, but weakened at a BDG level of 20 percent or less. This allows us to show the role of women in board in reducing tax avoidance. The current findings add to a growing body of literature on the interaction between the audit quality with the BGD should be able to detect opportunistic tax management practices.

This study presents the theoretical implications, practices and policies. The findings are interested in discovering relation between audit quality and tax avoidance with the presence of woman in the board. There is anecdotal evidence claiming the pivotal role of women and

Variables	Panel A Sample > 10% Coeff.	Panel A Sample > 10% $P > Z$	Panel B Sample > 20% Coeff.	Panel B Sample > 20% $P > Z$	Panel C Sample > 40% Coeff.	Panel C Sample > 40% $P > Z$	Panel D Sample > 50% Coeff.	Panel D Sample > 50% $P > Z$	Panel E Sample > 60% Coeff.	Panel E Sample > 60% $P > Z$
AQ(proxyAuditFEES)	−0.012	0.034**	−0.125	0.024**	−0.463	0.015**	−0.567	0.004***	−0.546	0.000***
BGDs	−0.254	0.097*	−0.227	0.025**	−0.364	0.036**	−0.547	0.049**	−0.352	0.004***
AQ*BGDs	−0.012	0.036**	−0.114	0.022**	−0.115	0.018**	−0.113	0.012**	−0.147	0.002***
LEV	0.321	0.125	0.364	0.030**	0.114	0.003***	0.344	0.003***	0.574	0.015**
SIZE	−0.234	0.226	−0.017	0.226	−0.114	0.524	−0.127	0.034**	−0.125	0.088*
ROA	0.125	0.065**	0.047	0.022**	0.547	0.451	0.411	0.087*	0.085	0.111
GROWTH	0.421	0.145	0.025	0.016**	0.125	0.177	0.028	0.088*	0.055	0.003***
Year fixed effect		Yes		Yes		Yes		Yes		Yes
Firm fixed effect		Yes		Yes		Yes		Yes		Yes
R^2		0.521		0.491		0.511		0.592		0.621
AQ(proxyAuditSPEC)	−0.324	0.097*	−0.247	0.088*	−0.361	0.001***	−0.521	0.002***	−0.361	0.002***
BGDs	−0.257	0.043**	−0.647	0.033**	−0.156	0.033**	−0.634	0.033**	−0.463	0.007***
AQ*BGDs	−0.155	0.045**	−0.154	0.030**	−0.118	0.007***	−0.253	0.001***	−0.443	0.004***
LEV	0.247	0.147	0.364	0.027**	0.114	0.004***	0.147	0.002***	0.147	0.018**
SIZE	−0.117	0.547	−0.017	0.423	−0.114	0.472	−0.157	0.036**	−0.228	0.089*
ROA	0.125	0.065**	0.047	0.022**	0.547	0.451	0.411	0.087*	0.085	0.111
GROWTH	0.421	0.145	0.025	0.016**	0.125	0.177	0.028	0.088*	0.055	0.003***
Year fixed effect		Yes		Yes		Yes		Yes		Yes
Firm fixed effect		Yes		Yes		Yes		Yes		Yes
R^2		0.511		0.487		0.523		0.547		0.614

Notes: Dependent variable: CETR, cash effective tax rate; Moderating variable: BGDs: board gender diversity: the percentage of female directors serving on a company's board; Independent variables: Audit quality is measured by Audit fees; Control variables: SIZE is the natural logarithm of total assets; LEV is the ratio total debt to total equity; ROA is measured by pre-tax income divided by total assets; GROWTH is measured by percentage change in sales. Split Sample: Panel A: BGD1 (cutoff 10%), Panel B: BGD2 (cutoff 20%), Panel C: BGD3 (cutoff 40%), Panel D: BGD4 (cutoff 50%), Panel E: BGD5 (cutoff 60%); Independent variables: Audit quality is measured by audit specialization; Split Sample: Panel A (cutoff 10%), Panel B (cutoff 20%), Panel C (cutoff 40%), Panel D (cutoff 50%), Panel E (cutoff 60%). *,**,***Significant at the 0.10, 0.05 and 0.01 levels, respectively

Table IX.
Results of analysis model moderation with different BGD levels

auditor in the reduction of corporate tax avoidance in the progressive dynamic market. This study should be of interest to tax policymakers concerned about declining corporate tax revenues. Also, this study shows that firms with higher BGD level reduce agency conflicts between managers and shareholders.

Our study also paves the way for interesting future research issues. The present work can be extended internationally by using two comparative samples that have two different systems (e.g. UK and French sample).

Notes

1. According to Krishnan, this research adopted the ratio of clients in specific industries in the client portfolio of audit firms as one of the measurement methods of industry specialist auditor.
2. Hanlon and Heitzman's (2010) list 12 measures of tax avoidance commonly used in the literature.

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