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Article

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Does auditing multiple clients affiliated with the same business group reduce audit quality? Evidence from an emerging market

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Abstract

The aim of the study is to examine the association between audit quality and individual auditors providing independent audit service to the firms affiliated with the same business group. We used Turkish Listed firms traded in Borsa İstanbul between 2010 and 2016. These auditors have been associated with lower audit quality in terms of discretionary accruals, modified audit opinion and audit report aggressiveness. Our main results are robust to different specifications and the results remain unchanged regardless of the specification. Moreover, we created some interaction variables to test that such a relationship would be reversed when the audit firm where the individual auditor works, was one of the Big4. We found that individual auditors providing independent audit service to the firms affiliated with the same business group in the Big4 audit firms do not influence audit quality negatively. In addition, we found that individual auditors providing independent audit service to the firms affiliated with the same business group audit the financial statements of them in timelier manner. Overall, this paper highlights and emphasizes the importance of auditing the firms affiliated with the same business group by different individual auditors to audit quality.

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Keywords: Individual auditors; Group affiliated firms; Turkey; Auditor-specific characteristics; Big4 audit firms; Audit quality; Discretionary accruals; Modified audit opinion; Audit reporting aggressiveness

1. Introduction

There is extensive literature on the association between auditor independence and audit quality. In this comprehensive literature, researchers generally discuss the auditor independence issue along with both emphasizing the importance of individual auditor-related factors [such as individual auditor tenure (e.g. Chi & Huang, 2005; Ye et al., 2011), the client importance at individual auditor level (e.g. Chen et al., 2010; Chen et al., 2018; Chi et al., 2012), the non-audit service

-NAS- provided by individual auditors (e.g. Hardies et al., 2016)], and highlighting the importance of audit firm-related factors [such as audit firm size (e.g. Boone et al., 2010; Reynolds & Francis, 2000), audit firm tenure (e.g. Chi & Huang, 2005; Johnson et al., 2002), non-audit service provided by audit firms (e.g. Blay & Geiger, 2013; Cahan et al., 2008; Callaghan et al., 2009; DeFond et al., 2002; Svanström, 2013), client importance at audit firm level & office level (e.g. Chung & Kallapur, 2003; Hunt & Lulseged, 2007; Li, 2009; Reynolds & Francis, 2000)].

The major tension of the current study can also be found in the recent works by Fang et al. (2017), Chang et al. (2019), Muttakin et al. (2017), Kim and Yi (2006), Chang et al. (2008), Fan and Wong (2005). These studies investigate whether a firm is affiliated with any business group and whether an individual auditor (or audit firm) is independent of

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these firms when he/she performs audit work of these firms. Apart from the above studies, two important papers by Carson et al. (2016) and Sun et al. (2020) try to answer the similar research question in this paper. Carson et al. (2016) investigate whether a firm is affiliated with the same business group and investigate the audit quality of multinational group affiliated firms (or group affiliated firms) conducted wholly by principal auditors or they evaluate the influence of implementation of ISA 600 (International Standard on Auditing 600). Sun et al. (2020) investigate whether the independence of audit firms impair when they audit the firms affiliated with the same business group. There is little attention paid to whether auditor independence is impaired and audit quality decreases when an individual auditor providing independent audit service to the firms is affiliated with the same business group. It is still debated whether the firms affiliated with the same business group should be audited by the same individual auditor or by a different individual auditor and there is a need to crack open the 'black box' of that complex issue.

In the current study, the influence of individual auditors providing independent audit service to the firms with the same business group on audit quality in terms of discretionary accruals, audit opinion, audit report aggressiveness is examined. Kothari et al. (2005)'s performance matched model is adopted to measure discretionary accruals and Gul et al. (2013)'s reporting aggressiveness model is employed to assess the aggressiveness level of an auditor when they issue an opinion. Also, audit opinion is regarded as whether a firm's audit opinion is modified or not. We used Turkish listed firms and a seven-year period from 2010 to 2016. We employed three variables of interest to test our hypotheses. The first one is the individual auditors providing independent audit service to the firms affiliated with the same business group. Second one is the total number of the clients affiliated with the same business group audited by the same individual auditor in Borsa İstanbul. Third variable is a continuous and fractional one and is measured as the total number of the clients affiliated with the same business group audited by the same individual auditor divided by the total number of the clients of that individual auditor. These test variables were used in the main estimation methods (OLS and Logistic) as well as the other estimation procedures (PSM and Heckman) which were used to strengthen the main estimation results. Besides, we created an alternative test variable and the results of the alternative test variable were also presented. Moreover, since the Big4 audit firms are more independent and reputable (Choi et al., 2010; DeAngelo, 1981; DeFond & Zhang, 2014; Francis, 2004; Francis & Wilson, 1988; Gul et al., 2013), we thought that such a relationship would be reversed when the audit firm where the individual auditor works, was one of the Big4 audit firms. Thus we created interaction variables using audit firm size (Big4 or not) and test variables, and presented the related results. Auditing the financial statements of the firms affiliated with the same business group in a timelier manner is generally associated with the individual auditors providing independent audit service to the firms affiliated with the same business group (Carson et al., 2016; Sunderland & Trompeter, 2017).

Therefore, we tested that and presented the results in Table S2 (available online).

Several methodologies were adopted to test the hypotheses. First, we used ordinary least square (OLS) and logistic regression to test the hypotheses and then propensity score matching (PSM) and Heckman Two-Stage estimation procedures were employed to address the possible endogeneity. Using different estimation approaches is important to strengthen the validity of the results. The results indicate that endogeneity is not a major problem in the current study and the results remained unchanged regardless of the specification. The main results and additional results (PSM & Heckman) show that individual auditors providing independent audit service to the firms affiliated with the same business group provide low qualified audit work as manifested in higher discretionary accruals, the issuance of more favorable audit opinion and the higher degrees of audit report aggressiveness. Clearly, they seem more aggressive; are less likely to render a modified audit opinion and detect discretionary accruals. Further, the results of alternative test variable are in accordance with the overall results. The results of the interaction variables show that if an individual auditor providing independent audit service to the firms affiliated with the same business group works in one of the Big4 audit firms, they are less likely to compromise their independence, thus providing qualified audit work in terms of modified audit opinion and reporting aggressiveness. Working in Big4 audit firms moderates the negative influence of individual auditors providing independent audit service to the firms affiliated with the same business group. We also found a negative but insignificant relationship between discretionary accruals and individual auditors providing independent audit service to the firms with the same business group in Big4 audit firms as expected. Additionally, we found that the individual auditors providing independent audit service to the firms affiliated with the same business group audit the financial statements in a timelier manner.

Our paper contributes to the literature in several ways. This paper contributes to the existing literature by examining the influences of individual auditors providing independent audit service to the firms affiliated with the same business group on audit quality with respect to discretionary accruals, audit report aggressiveness and modified audit opinion, particularly in Turkey. Although Fang et al. (2017), Chang et al. (2019), Muttakin et al. (2017), Kim and Yi (2006), Chang et al. (2008), Fan and Wong (2005) have focused on the group affiliated firms, they have never discussed whether providing independent audit service to the firms affiliated with the same business group reduces audit quality. Even though Carson et al. (2016) and Sun et al. (2020) have investigated the similar topic, the firms that Carson et al. (2016) focuses on in their study are international firms (i.e. multinational group firms). Sun et al. (2020) researched the association between the sharing same audit firm in group affiliated firms and audit quality however their research is at audit firm level. This paper differs from the papers by Carson et al. (2016) and Sun et al. (2020) and examine individual auditors and Turkish listed firms. In addition to the audit quality measures they used; audit

reporting aggressiveness is employed in the current study. This study also considers and controls the personal characteristics of the individual auditors unlike the aforementioned papers. We suggest that providing independent audit service to the firms affiliated with the same business group reduces the audit quality and the findings of the current study are consistent with the conjecture.

The rest of this study is organized as follows: the second section presents the institutional settings regarding the audit environment in Turkey, Turkish listed firms and group firms. The third section includes literature review and hypotheses development. In the fourth section the research design, the estimation model, the variables used are discussed. The fifth section presents the estimation results and the final section concludes the paper with some implications.

2. Turkish Listed firms and audit environment in Turkey

According to the annual statistics of Public Oversight, Accounting and Auditing Standards Authority of Turkey (KGK, 2019), there are 277 authorized audit firms as of March 2019. The same statistics reported that there are 16,261 registered auditors operating at individual level in the Turkish audit market. As claimed by Ocak (2018), only 63 of the authorized audit firms and only 151 individual auditors audit the financial statements of firms quoted in Borsa İstanbul. Another paper by Ocak and Özden (2018) documented that although there are many registered auditors and authorized audit firms in Turkey, only a small number of these auditors and auditing firms audited the financial statements of firms quoted in the stock exchange of Turkey, Borsa İstanbul, from 2008 to 2013.

As of August 2019, as reported by Public Disclosure Platform of Turkey (KGK, 2019), the number of the firms traded in Borsa İstanbul are 514 (It should be noted that the figure of previous years is lower, but, the number of firms traded in Borsa İstanbul has increased since then). The number of firms operate in manufacturing industry are 179, the remaining operate in main sectors such as services, finance, wholesale & retail, transport, technology, and telecommunication. These figures are much lower compared to the total number of the firms (3125 firms as of August 2019) traded in New York Stock Exchange (Nasdaq, 2019) or the total number of the firms (2109 firms as of June 2019) quoted in London Stock Exchange (Statista, 2019).

The review of the ownership structures of the listed firms in Turkey revealed that some of the firms traded in Borsa İstanbul have been affiliated with some business groups. According to Gonenc et al. (2007), Turkish business groups are typically structured as a pyramid with a holding company which is generally at the top of it. Ararat et al. (2014) reported that there were 18 major business groups¹ in Turkey as of 2011 and

stated that the controls of these groups (i.e. group controller) are under some families. Therefore, Ararat et al. (2014) stated that the number of the families and business groups that own the listed firms ranged from 2 to 12. In addition, Çolpan and Hikino (2008) determined that 50 business groups² in Turkey. Gonenc et al. (2007) found that 123 firms which traded in Borsa İstanbul were affiliated with a business group as of 2000. Dirlik and Kızıltuğ (2016) also revealed that 221 firms of the Turkey's top 500 industrial firms are affiliated with a business group. In the current study, some of the business groups mentioned by Ararat et al. (2014) and Çolpan and Hikino (2008) are also affiliated with some of the listed firms in our sample.

In the light of the above information, the small number of the listed firms in Borsa İstanbul and the small proportion of registered individual auditors is one of the reasons that some individual auditors provide independent audit service to the firms affiliated with business groups in Turkey. Besides, the audit firms of all the firms affiliated with the same business group are generally appointed by the business groups in Turkey because of time and cost advantages. At international level, the Institute of Chartered Accountants in England and Wales (ICAEW) published a practical guide to auditing the groups based on the International Standard on Auditing 600: *Special Considerations, Audits of Group Financial Statements* (ICAEW, 2014). The International Auditing and Assurance Standards Board (IAASB) issued a standard regarding the audit of group financial statements (IAS 600, 2006). Which is translated into Turkish (BDS 600, 2016) by Public Oversight, Accounting and Auditing Standards Authority of Turkey (KGK) to help individual auditors & audit firms with the rules & instructions to be followed when they perform a group audit. Of course, as in the rest of the world, there are legal arrangements or auditing standards restricting individual auditors to provide independent audit service to the firms affiliated with the same business group in Turkey. Unlike the rest of the world, Teen (2013) stated that an issuer in Singapore must engage in the same audit firm in order to audit its financial statements, the financial statements of its Singapore-incorporated subsidiaries and the financial statements of significantly associated firms. Based on the paper by Teen (2013), the estimated percentages of the firms audited by its parent firm's auditor ranged from 45 percent to 100 percent in Singapore. On the contrary, Chang et al. (2008) reported that 59.71 percent of all the firms affiliated with same business group were audited by different audit firms in Taiwan.

¹ These are Sabancı, Anadolu, Akfen, Akkök, Alarko, Borusan, Çukurova, Doğan, Doğuş, Eczacıbaşı, Enka, İhlas, İş Bankası, Koç, Oyak, Yaşar, Yıldız, Zorlu.

² These are Koç, Türk Telekom, Sabancı, TCDD, Zorlu, Tedaş, PTT, Oyak, Çukurova, Ülker, Ziraat, Tekel, İş Bankası, Doğuş, Türkiye Şeker Fabrikaları, Anadolu, Sanko, Ciner, Türkiye Taş Kömürü, Tekfen, Türkiye Kömür İşletmeleri, Şahinler, Doğan, THY, Boydak, Halk Bankası, EUAŞ, Çay İşletmeleri, Fiba, Eczacıbaşı, TRT, Vakıflar Bankası, Yaşar, Devlet Hava Meydanları, Alarko, Makine ve Kimya, BİM, Profilo, Enka, Güriş, Kale, Metro, Nergis, STFA, Türkiye Petrolleri, Tarım İşletmeleri, Borusan, Çelebi, Sodexho, Kibar.

3. Literature review and hypothesis development

Although it is of utmost importance in the field of accounting, there is still no clear definition of ‘auditor independence’ (Antle, 1984). According to IESBA (2016) and ICAEW's (2013) code of ethics, independence refers to an auditor's ability to express a conclusion (such as when rendering an audit opinion) in public practice without bias, posing a conflict of interest and undue influence of others. Watts and Zimmerman (1979) and Karim (1990) defined auditor independence as the ability to be independent of the managers of the firms to whom they provide audit service. Auditor independence is directly and indirectly described as the probability that an auditor will report a discovered breach in the financial reports (DeAngelo, 1981; DeFond et al., 2002; Watts & Zimmerman, 1983). Mautz and Sharaf (1961) divided auditor independence into two main sub-headings, which are the real independence of individual practitioners in the performance of their work and the apparent independence of auditors as a professional group. While the apparent independence is about the image of the auditor, real independence is about the absence of mental bias in the conduct of an audit (Bartlett, 1991; Karim, 1990; Mautz & Sharaf, 1961). Most importantly, auditor independence is the ability to withstand client pressure as stated by DeFond et al. (2002).

Whenever a client is economically important for an individual auditor or an audit firm (i.e. a client carries greater weight in an auditor's portfolio), it may be difficult to resist the pressure from the client (Tepalagul & Lin, 2015). According to Li (2009), auditors should be independent because of the litigation risk and reputation concerns, however some incentives, such as client importance which is quite significant for auditors, compromise auditor independence. Recent studies regarding client importance at individual auditor & audit firm level³ investigated the relation between auditor independence and client importance in relation to the economic theory of auditor independence and showed that there is a negative association between client importance and audit quality (Chen et al., 2010, 2018; Chi et al., 2012). Reynolds and Francis (2000) stated that important clients create an economic dependence for auditors, particularly when an auditor have only one client. Li (2009) suggested that having economic dependence on an important client cause auditors to treat this client more favorably. Hunt and Lulseged (2007) claimed that larger clients of auditors pay huge fees, thereby, auditors are more dependent on their larger clients and they may be less likely to detect earnings management practices of larger clients. Chen et al. (2010) mentioned that incumbent auditors may not be perfectly independent, because

they have cost advantage over their counterparts. The client can impose real costs on the auditor by terminating the relationship. Thus, the independence of an auditor is compromised to retain larger (more important) clients. According to Chi et al. (2012), as it provides some benefits, such as job security and promotion opportunities for individual auditors the auditor may not maintain the independence in order to retain an important client. Teen (2013) have approached auditor independence from an unusual perspective and stated that having the same auditors for the firms affiliated with the same business group increases the mutual dependence between auditors and clients despite the cost advantage from the business group's standpoint.

Most recently, Fang et al. (2017), Chang et al. (2019), Muttakin et al. (2017), Kim and Yi (2006), Chang et al. (2008), Fan and Wong (2005) published some work that may be related to the major tension underlying our research. They studied the auditor choice for the group affiliated firms, the magnitudes of discretionary accruals and discretionary revenues of the firms affiliated with any business group. Carson et al. (2016) and Sun et al. (2020) researched that the audit quality (in terms of discretionary accruals, modified audit opinion, restatements and fraudulent financial reporting) is impaired when audit firms provide independent audit service to the firms affiliated with the same business group or the same multinational group.

Although Fan and Wong (2005) found no associations between being a member of any business group and choosing the Big 5 audit firms, Fang et al. (2017) found that group affiliated firms (i.e. firms affiliated with any business group) are more likely to appoint high quality audit firms (top 10 audit firms) because of positive economic outcomes, such as higher valuation, cheaper equity financing, and constrained accounting discretion. They also indicated that the financial statements of the firms affiliated with any business group are more transparent than the standalone firms. On the contrary, Kim and Yi (2006) stated that the magnitude of discretionary accruals of the firms affiliated with any business group is greater than the magnitude of discretionary accruals of the standalone firms and that business group-affiliation provides controlling shareholders with more incentives and opportunities for earnings management because controlling shareholders in the firms are business groups and these shareholders take advantage of flexibility and discretion over accounting choice. Besides, business groups have enough complex structure for self-dealing transactions, which makes it difficult for outside investors to monitor earnings management-based transactions. Muttakin et al. (2017) also investigated the earnings management practices among the business group-affiliated firms in Bangladesh and found evidence suggesting that business group-affiliated firms manage earnings to a greater extent. Chang et al. (2019) stated that an affiliated client is more important for an auditor than a non-affiliated client due to the potential loss of a client within the same group. Hence, auditor independence may be compromised when an auditor audits a business group-affiliated firm.

³ The studies regarding the influences of client importance on audit quality used the percentage of a client's total fees (or a client's non-audit fees) to audit firm's total revenues, or the percentage of a client's sales to sum of sales of all public firms, or the percentage of a client's total assets to sum of sales of all public firms as the measures of client importance. (Chen et al., 2010, 2018; Chi et al., 2012; Chung & Kallapur, 2003; Hunt & Lulseged, 2007; Li, 2009; Reynolds & Francis, 2000).

Carson et al. (2016) used a sample of Australian listed firms with more than one foreign subsidiary. They examine differences in the audit quality of multinational group audits across different group auditor combinations [(1) all components audited by the principal auditor, (b) components audited by principal auditor and other members of principal auditor's network, (c) components audited by principal auditor and by unaffiliated auditors]. They find some differences in the magnitude of discretionary accruals and the propensity to issue going-concern opinions, when the audit work of multinational group performs by the affiliated of the global audit firm network. Carson et al. (2016) also find that the audit quality enhanced after the implementation of ISA 600. Besides, they find that the quality of group audits decreases where other auditors from the same network are involved. Sun et al. (2020) used a sample of Chinese listed firms and their sample consist of the firms in the same business group audited by same audit firm and consist of the firms in the same business group audited by unaffiliated audit firm. They find that choosing the same network audit firm among group affiliated firms is associated with more sanctions, higher discretionary accruals, lower likelihood of receiving a modified audit opinion, and higher likelihood of a downward restatement.

Certainly, an auditing firm of a firms affiliated with the same business group may generally be appointed by that business group, and although not required, particularly the audit of the firms in the business group may be conducted by that audit firm or the audit firms that are part of a global audit firm (Sunderland & Trompeter, 2017). That offers some advantages for the firms in a business group but does not guarantee audit quality. For instance, appointing the same auditor for all the firms in a business group will provide cost advantage for firms as stated by Teen (2013) and Sunderland and Trompeter (2017) because the more firms in the business group audited by same auditor, the more discount they will receive from that auditor (audit firm). Besides, auditing multiple clients affiliated with the same business group may provide an advantage for the timeliness of the audit reports, such as timely information presentation for the current and potential investors or third parties. An individual auditor providing independent audit service to firms affiliated with the same business group may be more familiar with the intragroup transactions and the structures of the firms within that business group. Thus, the auditor may become faster at the financial statements of the firms in the business group (Fang & Chang, 2018) (Please see Table S2, available online). Furthermore, according to Sunderland and Trompeter (2017), particularly in multinational group audit, the completion of the audit work of the firms in the multinational group may be facilitated by a global audit firm or a part of that global audit firm network because a global audit firm or the parts of that global audit firm network prescribe a worldwide global methodology.

An auditing firm of the firms affiliated with the same business group might also pose some disadvantages. Sunderland and Trompeter (2017) and Carson et al. (2016) stated that, in some cases, an audit firm may not have local offices in a specific area where one of the firms affiliated with

a business group has material operations and operates in a distant location, which will increase the cost of audit work.

Leaving aside the pros and cons of auditing multiple clients affiliated with the same business group, individual auditors providing independent audit service to the firms affiliated with the same business group are considered a threat to auditor independence which decreases audit quality within the framework of the study. The reasons for such a problematic relationship are summarized under three headings. In fact, the first and the second one are interconnected. First, let us suppose that an individual auditor audits two firms within the same business group. The financial statements of the first one affiliated with the same business group involve material misstatement, or there are many earnings management practices in the financial statement of that. However, the financial statements of the other firm affiliated with that business group completely give a fair and true view and are in accordance with the standards. The auditors also may not maintain their independence in this case because when they render a modified audit opinion to the firm whose financial statements have a material misstatement affiliated with the same business group, they may be faced with the risk of losing the other firm (or all the other firms) affiliated with that business group or it may reduce the possibility of auditing other firms affiliated with that business group. Previous research has shown that even firms that are not affiliated with any business groups did change their audit firms when they received a modified audit opinion on their financial statements (Chow & Rice, 1982; Lennox, 2000). Second, being more familiar with the intragroup transactions and with the structures of the firms affiliated with the same business group may be negatively related to audit quality. Fang et al. (2017) stated that when the firms affiliated with the same business group are audited by different auditors, these auditors do not fully understand the nature, content and the characteristics of the related party transactions. Individual auditors providing independent audit service to the firms affiliated with the same business group may have more knowledge about the extent to which managed transactions in intragroup are acceptable for the boundaries of the accounting rules in order to manage earnings and they may use this knowledge (tricks) to adjust the items on behalf of their clients as they receive their fee from the clients (Allen & Siegel, 2002). Individual auditors may derive most of their fee from the firms in the same business group they audit especially when they provide independent service to the firms affiliated with that business group and their portfolio is small. This creates an economic dependence for individual auditors as stated in previous research on client importance (Tepalagul & Lin, 2015; Li, 2009; Chen et al., 2010, 2018; Chi et al., 2012; Reynolds & Francis, 2000; Hunt & Lulseged, 2007), which suggests the impossibility of auditor independence. Third, even if individual auditors maintain their independence in all these cases, they will still work under an independent audit firm where senior partners (managers) may put pressure on them to treat the clients more favorably because managers may tend to be more opportunistic and more focused on short-term interests while thinking of their interests more (Doh &

Stumpf, 2005; Fama & Jensen, 1983; Greenwood & Empson, 2003; Guzak & Rasheed, 2014; Jensen & Meckling, 1976; Sharma, 1997). Thus, individual auditors may treat the clients who are affiliated with the same business group more favorably in order not to lose their jobs or not to resist the pressure of managers as stated by Chi et al. (2012). Therefore, taking the researches by Carson et al. (2016) and Sun et al. (2020) into account, the following hypotheses are proposed:

H1. Individual auditors providing independent audit service to the firms affiliated with the same business group provide low qualified audit work.

H2. Increasing the total number of the clients affiliated with the same business group audited by the same individual auditor(s) decreases audit quality.

H3. Increasing the percentage of the clients affiliated with the same business group audited by the same individual auditor(s) in the independent auditor portfolio decreases audit quality.

4. Research design

4.1. Sample selection

In the current study, the listed firms on Borsa İstanbul, and their individual auditors were used to test the hypotheses. The sample of this study was made up of 1165 firms covering a seven-year period from 2010 to 2016. The number of the total observations between 2010 and 2016 was 3595. Financial firms, such as banks, firms operating in extractive sector, investment trust & funds, leasing firms, factoring firms, firms having different reporting periods, such as tourisms, and sports were excluded because discretionary accruals estimation model, which is one of the methods of measuring the quality of audit, is not appropriate for these sectors. The final sample and the sample distribution by year and sector are given in Table 1.

Data regarding individual auditor-specific attributes, such as gender, experience, educational background, client importance, auditor tenure and independent audit opinion was manually collected. First, independent audit reports were accessed manually from the website of Public Disclosure

Platform of Turkey (PDP, 2019) (<http://www.kap.org.tr>). The names of the individual auditors were retrieved from the independent audit reports of the firms. Then, the profiles of auditors in LinkedIn (<http://www.linkedin.com>) were checked for gender, experience, educational background. When they were unavailable, audit firms' websites were visited to collect the data. Information regarding client importance at auditor level was calculated manually using the independent audit reports and the financial reports of the firms. Client importance was calculated following the steps of Karjalainen et al. (2013) as client firm's total assets divided by aggregated client total assets in the audit partner's client portfolio. The researchers manually checked the independent audit reports of the firms and the total number of the clients of each individual auditor. First, the individual auditor of each firm was detected using independent audit reports and then the number of the clients for each individual auditor was calculated one by one. Firm-specific control variables (Size, leverage, return on asset, growth, etc.) were obtained from Finnet Database (2019), which is one of the most popular service & information providers in Turkey (<http://www.finnet.net.tr>).

The data regarding the variables that were used to estimate discretionary accruals and estimate audit reporting aggressiveness were obtained from Finnet database (2019) (<http://www.finnet.net.tr>). Audit opinions were retrieved from the audit reports of the firms.

4.2. Estimation model

Ordinary least square (OLS) and logistic regression were mainly used to test the hypotheses. Estimation model (Equation (1)) is as follows.

$$\text{AuditQuality}_{it} (\text{AbsDA}_{it} \text{ or } \text{Aggressive}_{it} \text{ or } \text{Modified}_{it}) = \beta_0 + \beta_1 (\text{ApsoD}_{it} \text{ or } \text{ApsoN}_{it} \text{ or } \text{ApsoP}_{it}) + \beta_2 \text{AuditorExp}_{it} + \beta_3 \text{AuditorGender}_{it} + \beta_4 \text{AuditorEduLevel}_{it} + \beta_5 \text{AuditorTenure}_{it} + \beta_6 \text{AuditorBusy}_{it} + \beta_7 \text{AuditorCI}_{it} + \beta_8 \text{AuditFirmSize}_{it} + \beta_9 \text{ClientSize}_{it} + \beta_{10} \text{ClientLeverage}_{it} + \beta_{11} \text{ClientROA}_{it} + \beta_{12} \text{ClientGrowth}_{it} + \beta_{13} \text{ClientAge}_{it} + \beta_{14} \text{ClientMTB}_{it} + \beta_{15} \text{ClientLoss}_{it} + \text{Sector Fixed} + \text{Year Fixed} + \varepsilon \quad (1)$$

All the variables regarding auditor-specific characteristics, such as gender, educational background, busyness at individual auditor level, experience, tenure, client importance at individual auditor level were controlled in all tests regarding

Table 1
Sample selection procedures and the final sample.

Panel B. Final Sample								
Sector/Year	2010	2011	2012	2013	2014	2015	2016	Total
Electric	3 (11.11)	4 (14.81)	5 (18.51)	5 (18.51)	4 (14.81)	4 (14.81)	2 (7.40)	27 (100)
Manufacturing	94 (10.70)	113 (12.87)	132 (15.03)	125 (14.00)	140 (15.94)	138 (15.71)	136 (15.48)	878 (100)
Technology	12 (13.04)	14 (15.21)	15 (16.30)	14 (15.21)	12 (13.04)	13 (14.13)	12 (13.04)	92 (100)
Trading	11 (8.39)	16 (12.21)	23 (17.55)	22 (16.79)	22 (16.79)	19 (14.50)	18 (13.74)	131 (100)
Transport	5 (13.51)	4 (10.81)	5 (13.51)	5 (13.51)	6 (16.21)	6 (16.21)	6 (16.21)	37 (100)
Total	125 (10.72)	151 (12.96)	180 (15.45)	171 (14.67)	184 (15.79)	180 (15.45)	174 (14.93)	1165 (100)

Percentages in parentheses.

audit quality, because, individual auditor-specific characteristics may be more important than audit firm-specific characteristics (Kilgore et al., 2011; Prasad & Chand, 2017). Besides, the steps by DeFond and Zhang (2014) and Gul et al. (2017) and Gul et al. (2013) were followed to determine the control variables at firm-specific level. DeFond and Zhang (2014) listed firm-specific control variables that are typically used in audit quality models and stated that each control variable must be carefully selected for each audit quality model. Thus, we selected the most commonly used control variables at firm-specific level based on the work of DeFond and Zhang (2014) for both discretionary accruals model and audit opinion model (These control variables are firm size, leverage and loss). Besides, the firm-specific control variables in the papers by Gul et al. (2013) and Gul et al. (2017) were taken into account about the influences of individual auditor-specific characteristics on audit quality. They used firm growth, firm age, firm's market to book value and ROA as firm specific-control variables in addition to the firm-specific control variables that were used by DeFond and Zhang (2014). Thus, the control variables recommended by DeFond and Zhang (2014) and employed by Gul et al. (2013) and Gul et al. (2017) were taken into account. Detailed information regarding individual auditor-specific and firm-specific control variables and the reasons for using these control variables were presented in the sub-section 4.5 with reference to the related research.

We expect that *ApsoD*, *ApsoN*, *ApsoP* are positively associated with the absolute value of discretionary accruals (*AbsDA*), audit reporting aggressiveness (*Aggressive*) while *ApsoD*, *ApsoN*, *ApsoP* are negatively associated with modified audit opinion (*Modified*) if the hypotheses are supported.

4.3. Dependent variables

The recommendations of Francis (2011), DeFond and Zhang (2014), Maijor and Vanstraelen (2012) were followed in the current study. They stated that there are different types of audit quality measures at input and output levels, so researchers should use many different audit quality measurements in their research. Output-based audit quality measurements, such as discretionary accruals (*AbsDA*), audit report aggressiveness (*Aggressiveness*), audit opinion (*Modified*) were used in the current study.⁴

4.3.1. Discretionary accruals

Discretionary accruals are the first measure of audit quality in the current study. Performance matched model by Kothari et al. (2005) was adopted to estimate discretionary accruals. Discretionary accruals are a sign of the extent to which auditors enforce accounting standards (Lawrence et al., 2011). A higher value for discretionary accruals indicates that an auditor spends less effort to constrain managers' discretionary

behaviors and provides less qualified audit work (Chen et al., 2011; Francis & Yu, 2009). Estimation procedures of discretionary accruals are as follows:

$$TA_{it} = \alpha_1 (1/Assets_{it-1}) + \alpha_2 (\Delta Sales_{it} - \Delta AR_{it}) + \alpha_3 PPE_{it} + \alpha_4 ROA_{it-1} + \varepsilon_{it} \quad (2)$$

In the second equation, total accruals (*TA*) were regressed with property plant, and equipment (*PPE*) and the changes in sales ($\Delta Sales$) and the lagged value of client *ROA*. The residuals obtained from equation (2) are used as the measure of audit quality. The absolute value of discretionary accruals (*AbsDA*) was used as the measure of audit quality in the current study.

4.3.2. Audit opinion

Audit opinion was employed as one of the measures of audit quality in the current paper. Audit opinion (*Modified*) is coded 1 if auditor renders a modified audit opinion (Adverse, Qualified and Disclaimer), 0 otherwise. According to Gul et al. (2017), for rendering an audit opinion other than clean opinion,⁵ auditors should exert more effort and gather more evidence about their clients, thus modified audit opinion may be used as a measure of audit quality.

4.3.3. Audit report aggressiveness

'Higher audit reporting aggressiveness indicates that the propensity of the auditor to issue modified audit opinions is lower' (Chen et al., 2017; Gul et al., 2013). Audit report aggressiveness is calculated with the third equation. Firstly, opinion was predicted using logistic regression and the difference between predicted opinion and actual opinion was considered as audit report aggressiveness (Chen et al., 2017; Gul et al., 2013):

$$Aggressive_{it} = \beta_0 + \beta_1 Quick_{it} + \beta_2 Receivable_{it} + \beta_3 ROA_{it} + \beta_4 Loss_{it} + \beta_5 Leverage_{it} + \beta_6 LogSize_{it} + \beta_7 LogAge_{it} + \text{Sector Fixed} + \varepsilon_{it} \quad (3)$$

LogAge is the natural logarithm of firm age. *LogSize* is the natural logarithm of firm's total assets. *ROA* is the return on assets of firm. *Leverage* is calculated as total debts divided by total assets. *Loss* is equal to 1 if firm reports a loss. *Quick* is calculated as the total amount of current assets minus inventory divided by current liabilities. In the aggressiveness model, sector was fixed because of its unobservable effect.

4.4. Test variables

Three test variables were used to determine the association between the individual auditors providing independent audit service to the firms affiliated with the same business group and audit quality. The reason why we used three test variables in

⁴ Recent archival research in auditing (e.g. Cahan & Sun, 2015; Chen et al., 2017) were employed audit fees as the measure of audit quality. In this study, we are not able to employ audit fees as the measure of audit quality because, audit fees do not disclose in Turkey.

⁵ Gul et al. (2017) employed going concern opinion as the measure of audit quality in their study.

the current study is that each variable may be insufficient in itself to explain the influences of individual auditors providing independent auditor services to the firms affiliated with the same business group. For example, each individual auditor with a value of 1 (dummy variable) may have a different number of clients affiliated with the same business group. An individual auditor has five clients affiliated with the same business group, but these five clients may have a little importance in the individual auditor's portfolio. Thus, we employed a set of test variables in addition to the dummy variable.

The first test variable (*ApsoD*) is set to one if an individual auditor provides independent audit service to the firms affiliated with the same business group in Borsa İstanbul, zero otherwise. The second one, the total number of the clients affiliated with the same business group audited by the same individual auditor in Borsa İstanbul were employed (*ApsoN*) as the test variable. The third variable, (*ApsoP*) is continuous and is measured as the total number of the clients affiliated with the same business group audited by the same individual auditor divided by the total number of the clients of the auditor. Thus, it indicates the fractions of the clients affiliated with same business group in the portfolio of an individual auditor.

It is not important whether an individual auditor provides independent audit service to only one firm which is affiliated with any business group when measuring the variables of interest. For instance, the individual auditor -A- provides independent audit service to the firm -Z-. The firm -Z- is affiliated with the business group -G-. In this case, the individual auditor is probably be coded as -0- because what matters is that an individual auditor provides independent audit service to at least two firms affiliated with the same business group when measuring the variables of interest.

The same business group shows whether the firms are in the same business group or not. We checked out that whether a firm traded in Borsa İstanbul is affiliated with a business group or not and which business group the firms are affiliated with. As stated by [Gonenc et al. \(2007\)](#), it is difficult to determine the form of the firms because there are no databases regarding group affiliation in Turkey. The ownership structures of firms for each year (regardless of the sector in which the firm is) and the annual activity reports of the firms were obtained from their websites or KAP's (Public Disclosure Platform of Turkey) website. The percentages of each ownership in the firms were checked. Then, we followed the procedures of [Gonenc et al. \(2007\)](#) in order to find out the major shareholders of the firms. If the major owners of a firm are a holding company, it is regarded as an affiliated firm. Finally, the names of the individual auditors of the firms affiliated with the same business group were obtained and the above-mentioned measuring procedures were followed for the coding of the variables.

As an example for the coding concerning test variables (Please see [Fig. S1](#), available online) the major owner of Aslan, Hektaş and Tukaş and Oyyat in the sample were the same legal entity 'Oyak Grubu' in 2013. Aslan, Hektaş and Tukaş were audited by the same individual auditor 'Kaan

Birdal'. (The individual auditor of Oyyat was 'Damla Harman'. *Damla Harman* was coded as 0 for the firm 'Oyyat' in 2013). The individual auditor –*Kaan Birdal*– (*ApsoD*) was coded as 1 for these firms (Hektaş, Tukaş and Aslan) in 2013. Second test variable was coded as follows, the number of the clients affiliated with the same business group (*Ordu Yardımlaşma Kurumu*) audited by the same individual auditor (*Kaan Birdal*) were 3. *ApsoN* is coded as the total number of the clients affiliated with the same business group (3). Third test variable was coded as follows. *Kaan Birdal* audited five firms, which were Aslan, Hektaş, Tukaş, Maalt and Fener in 2013. The total number of the clients of Kaan Birdal was 5. The major owner of the three of them (*Aslan, Hektaş and Tukaş*) is the same (*Oyak Grubu*), thus *ApsoP* was equal to 0.6 (3/5).

4.5. Control variables

Previous studies in accounting & auditing, with respect to various individual auditor-specific characteristics and firm-specific characteristics were reviewed in the current study. Individual auditor experience (*AuditorExperience*), individual auditor gender (*AuditorGender*), individual auditor education level (*AuditorEduLevel*), individual auditor busyness (*AuditorBusy*), client importance at individual auditor level (*AuditorCI*) and individual auditor tenure (*AuditorTenure*) are the control variables at individual auditor-specific level. Auditor experience in audit professional or related fields may influence audit quality because they may have gained audit-related knowledge through experience and may have more audit knowledge to provide more qualified audit service ([Moroney & Carey, 2011](#); [Sonu et al., 2019](#)). Auditor experience (*AuditorExperience*) is calculated as the natural logarithm of the total experience of an individual auditor in accounting, finance and auditing. Female auditors may provide more qualified audit work because they are more conservative and risk-averse than male counterparts ([Garcia-Blandon et al., 2019](#); [Gul et al., 2013](#); [Ittonen et al., 2013](#); [Karjalainen et al., 2013](#)). Auditor gender (*AuditorGender*) is equal to 1 if an individual auditor is female, 0 otherwise. Auditors holding Bachelor's, masters or Ph.D. degrees in business are more competent than their counterparts ([Che et al., 2018](#); [Li et al., 2017](#); [Ocak & Kurt, 2019](#)). Educational background (*AuditorEduLevel*) is equal to 1 if individual auditor holds a master's or Ph.D. in accounting, auditing or related fields, 0 otherwise. Auditors with large client portfolios may provide less qualified audit service because busy auditors tend to spend less time per client ([Sundgren & Svanström, 2014](#)), and exert less effort ([Lai et al., 2018](#)). Individual auditor busyness (*AuditorBusy*) is calculated as the natural logarithm of the total number of the clients of an individual auditor. Auditors that are more dependent are less likely to provide qualified audit service ([Chen et al., 2010](#)), thus client importance at individual auditor level (*AuditorCI*) is calculated as the client firm's total assets divided by aggregated client total assets in the audit partner's client portfolio. Tenure is controlled at individual auditor level because auditor independence may be

compromised in a longer time between clients and auditors (Chi & Huang, 2005; Garcia-Blandon & Argiles-Bosch, 2017; Ye et al., 2011). *AuditorTenure* is calculated as the total length of the individual auditor and client relationship.

The steps by DeFond and Zhang (2014) and Gul et al. (2017) were followed as much as possible when selecting firm-specific level control variables. Large firms may be less risky and healthier than small firms because they have strong internal control systems, which makes them less likely to manipulate earnings, and receive a modified audit opinion (Monroe & Teh, 1993; Carey & Simnett, 2006; Chan et al., 2006). *ClientSize* is calculated as the natural logarithm of the total assets. High leveraged firms are more likely to manage earnings and are receive a modified audit opinion due to debt covenant constraints (Butler et al., 2004; DeFond & Jambalvo, 1994; Herbohn & Ragunathan, 2008; Lai et al., 2018). *ClientLeverage* is calculated as the total liabilities divided by total assets. Firms with poor performance tend to manage earnings to mask true performance (Burgstahler & Dichev, 1997; Healy & Wahlen, 1999). Besides, firms with modified audit opinion are less profitable because firms that are more profitable are less likely to engage in questionable accounting practices (Chen et al., 2001). Return on assets (*ClientROA*) is calculated as the net profit/loss divided by total assets and *ClientLoss* is equal to 1 if the firm reports a loss. Market to book value (*ClientMTB*) is equal to market value to book value ratio. *ClientGrowth* is equal to the change in sales. Market to book value ratio and growth ratio are used to control a client's operating and financing risks (Gul et al., 2017). Auditors are more likely to issue a modified audit opinion to the financial statements of young firms because they are more likely to experience financial distress (Dopuch et al., 1987). Young firms are examined by regulatory bodies; thus, they are less likely to manage earnings (Burns & Kedia, 2003). *ClientAge* is the natural logarithm of the number of years since formation. Big audit firms provide more qualified audit work because of their resources; they detect earnings management practices efficiently because of their experience & reputation and conservative environment (Chen & Zhang, 2010; Chi & Huang, 2005; DeAngelo, 1981; Francis & Yu, 2009; Gul et al., 2013; Imam et al., 2001; Ng & Tai, 1994). Big audit firms are more likely to issue a modified audit opinion because they are more independent and able to resist client pressure to issue a clean audit opinion (Boone et al., 2010). Audit firm size (*AuditFirmSize*) is equal to 1 if the firm was audited by one of the big audit firms (PWC, Deloitte, KPMG, E&Y), 0 otherwise. Year and sector dummies are included because of the unobservable effects of them. We robust standard errors by clustering firms (clients) to control heteroscedasticity. Finally, continuous variables are winsorized to control outliers.⁶

⁶ Building on the archival research in auditing, we decided to focus on partner fixed effects, audit firm level or office level fixed effects (Gul et al., 2013; Lennox and Wu, 2018). We did not use the AF or auditor fixed effects approaches because we do not have enough observations, as stated Gul et al. (2013)'s paper.

5. Results

Following subheadings present descriptive statistics and univariate analysis, correlation matrix and OLS & Logistics regression results. Then, the interaction variables were created, and the results of interaction variables are presented in [sub-section 5.4.](#), Heckman estimation and propensity score matching procedures were conducted to bolster main estimation results.

5.1. Descriptive statistics and univariate analysis

Table 2 provides descriptive statistics for the sample. The mean values for the discretionary accruals (Absolute value) (*AbsDA*), modified audit opinion (*Modified*), audit-reporting aggressiveness (*Aggressive*) are 0.048, 0.078 and 0.0002, respectively. The percentage of receiving a modified audit opinion is 7.81.

Of the firms, 26.86 percent were audited by an individual auditor providing independent audit service to the firms affiliated with the same business group (*ApsoD*). The mean value of total number of firms affiliated with same business group audited by the same individual auditors is 0.717 (*ApsoN*). Maximum value of total number of firms affiliated with same business group audited by same individual auditor is 6. The mean value of percentage of clients affiliated with

Table 2
Descriptive statistics.

Variables	Observation	Mean	Std. Dev.	Min.	Max.
<i>Dependent Variables</i>					
AbsDA	1165	0.048	0.041	0.00006	0.198
Modified	1165	0.078	0.268	0	1
Aggressive	1165	0.0002	0.258	−0.981	0.535
Lag (Raw)	1165	65.37	15.70	21	133
LnLag	1165	4.151	0.240	3.044	4.890
<i>Test Variables</i>					
ApsoD	1165	0.268	0.443	0	1
ApsoN	1165	0.717	1.346	0	6
ApsoP	1165	0.126	0.241	0	1
Apso_imp	1165	0.119	0.267	0	1
<i>Control Variables at Individual Auditor Level</i>					
AuditorExp (Raw)	1165	21.61	7.889	10	59
AuditorExp (Log)	1165	3.016	0.328	2.302	4.077
AuditorGender	1165	0.187	0.309	0	1
AuditorEduLevel	1165	0.205	0.403	0	1
AuditorEduType	1165	0.537	0.499	0	1
AuditorTenure	1165	2.307	1.408	1	9
AuditorBusy (Raw)	1165	5.389	3.509	1	20
AuditorBusy (Log)	1165	3.193	1.308	0	4.454
AuditorCI	1165	0.401	0.372	0.001	1
<i>Control Variables at Client Level</i>					
AuditFirmSize	1165	0.596	0.490	0	1
ClientSize	1165	19.69	1.674	15.05	24.89
ClientLeverage	1165	0.485	0.219	0.021	0.899
ClientROA	1165	0.033	0.083	−0.387	0.429
ClientGrowth	1165	0.124	0.251	−1	1.656
ClientAge (Raw)	1165	36.93	14.73	2	105
ClientAge (Log)	1165	3.508	0.493	0.693	4.653
ClientMTB	1165	2.085	2.952	0	74.6
ClientLoss	1165	0.265	0.441	0	1

same business group in the total number of clients of individual auditor (*ApsoP*) is 12.68.

The percentage of the firms audited by a female auditor (*AuditorGender*) were 18.7. The percentage of firms audited by an auditor who has a masters or Ph.D. degree (*AuditorEduLevel*) were 20.5. The mean value for the total experience of the auditors -*AuditorExp (Raw)*- is 21.61 years (Logarithmic value -*AuditorExp (Log)*-: 3.016). On average, auditors have about 5 clients (*AuditorBusy*) (Logarithmic value: 3.193). Auditor tenure (*AuditorTenure*) is 2.307. The percentage of the firms audited by the Big4 audit firms (*AuditFirmSize*) (Deloitte, E&Y, PwC and KPMG) were 59.64. The mean value for the client importance (*AuditorCI*) is 0.401. Other values regarding *ClientROA*, *ClientLeverage*, *ClientGrowth*, *ClientAge*, *ClientLoss*, size at client level (*ClientSize*) are shown in Table 2.

Table 3 presents the univariate analysis for the subsamples (One -*ApsoD* = 1- is the auditor providing independent audit service to the firms affiliated with the same business group, zero -*ApsoD* = 0- is the auditor not providing independent audit service to the firms affiliated with the same business group). The subsample of the auditors providing independent audit service to the firms affiliated with the same business group has higher values for the absolute value for the discretionary accruals (*AbsDA*) and the audit reporting aggressiveness (*Aggressive*). However, this subsample has lower values for modified audit opinion (*Modified*). Auditors providing independent audit service to the firms affiliated with the same business group are generally females (*AuditorGender*), they do not have a master's or Ph.D. degrees (*AuditorEduLevel*), they

Table 3
Univariate analysis of with-vs-without *ApsoD*.

Variables	<i>ApsoD</i> = 0	<i>ApsoD</i> = 1	T Test	P value
<i>Dependent Variables</i>				
<i>AbsDA</i>	0.046	0.051	-1.566	0.055
<i>Modified</i>	0.095	0.031	3.575	0.000
<i>Aggressive</i>	-0.018	0.046	-3.783	0.000
<i>Lag (Raw)</i>	66.56	62.17	4.256	0.000
<i>LnLag</i>	4.170	4.099	4.497	0.000
<i>Control Variables at Individual Auditor Level</i>				
<i>AuditorExp (Raw)</i>	21.80	21.10	1.327	0.092
<i>AuditorExp (Log)</i>	3.024	2.993	1.443	0.074
<i>AuditorGender</i>	0.170	0.233	-2.449	0.007
<i>AuditorEduLevel</i>	0.241	0.105	5.162	0.000
<i>AuditorEduType</i>	0.557	0.447	3.353	0.000
<i>AuditorTenure</i>	2.321	2.268	0.571	0.283
<i>AuditorBusy (Raw)</i>	4.962	6.552	-6.995	0.000
<i>AuditorBusy (Log)</i>	1.355	1.782	-9.669	0.000
<i>AuditorCI</i>	0.458	0.247	8.827	0.000
<i>AuditFirmSize</i>	0.562	0.690	-3.967	0.000
<i>Control Variables at Client Level</i>				
<i>ClientSize</i>	19.66	19.74	-0.700	0.242
<i>ClientLeverage</i>	0.507	0.427	5.581	0.000
<i>ClientROA</i>	0.031	0.039	-1.365	0.086
<i>ClientGrowth</i>	0.130	0.109	1.296	0.097
<i>ClientAge (Raw)</i>	35.38	41.14	-6.003	0.000
<i>ClientAge (Log)</i>	3.458	3.643	-5.762	0.000
<i>ClientMTB</i>	0.021	0.020	0.472	0.318
<i>ClientLoss</i>	0.269	0.252	0.601	0.273
Obs.	852	313		

are busier (*AuditorBusy*) and they work in Big4 audit firms (*AuditFirmSize*). The mean value for the client importance for these kinds of auditors (*AuditorCI*) are lower than the opposing subsample. The clients of the auditors providing independent audit service to the firms affiliated with the same business group are more profitable (*ClientROA*), older (*ClientAge*) and less leveraged (*ClientLeverage*). The growth rate (*ClientGrowth*) is lower for the auditors providing independent audit service to the clients affiliated with the same business group.

Table 4 provides the distributions of the firms (clients) affiliated with the same business group audited by the same auditor (*ApsoD*) at whole sample level, Big4 audit firm level and non-Big4 audit firm level. For instance; the panel A in Table 4 shows that the auditors in 28 observations have two clients affiliated with the same business group in 2010; while the auditors in 5 observations have six clients affiliated with the same business group in 2016. The panel B and panel C in

Table 4
Distributions of the number of the clients affiliated with the same business group audited by the same individual auditor.

Panel A: Whole Observation								
<i>ApsoD/Year</i>	2010	2011	2012	2013	2014	2015	2016	Total
<i>ApsoD</i> = 0	93	114	131	123	129	132	131	852
<i>ApsoD</i> = 1	33	37	49	48	55	48	43	313
<i>ApsoN/Year</i>	2010	2011	2012	2013	2014	2015	2016	Total
0	92	114	131	123	129	132	131	852
2	28	22	28	25	42	34	30	209
3	3	8	15	17	8	5	8	64
4	0	2	0	0	0	4	0	6
5	2	0	0	0	0	0	0	2
6	0	5	6	6	5	5	5	32
Total	125	151	180	171	184	180	174	1165
Panel B: Big4 Sample, <i>AuditFirmSize</i> = 1								
<i>ApsoD/Year</i>	2010	2011	2012	2013	2014	2015	2016	Total
<i>ApsoD</i> = 0	54	60	73	65	75	75	77	479
<i>ApsoD</i> = 1	27	29	34	34	33	30	29	216
<i>ApsoN/Year</i>	2010	2011	2012	2013	2014	2015	2016	Total
0	54	60	73	65	75	75	77	479
2	24	16	15	18	26	22	16	137
3	3	8	13	16	7	4	8	59
4	0	0	0	0	0	4	0	4
6	0	5	6	0	0	0	5	16
Total	81	89	107	99	108	105	106	695
Panel C: Non-Big4 Sample, <i>AuditFirmSize</i> = 0								
<i>ApsoD/Year</i>	2010	2011	2012	2013	2014	2015	2016	Total
<i>ApsoD</i> = 0	38	54	58	58	54	57	54	373
<i>ApsoD</i> = 1	6	8	15	14	22	18	14	97
<i>ApsoN/Year</i>	2010	2011	2012	2013	2014	2015	2016	Total
0	38	54	58	58	54	57	54	373
2	4	6	13	7	16	12	14	72
3	0	0	2	1	1	1	0	5
4	0	2	0	0	0	0	0	2
5	2	0	0	0	0	0	0	2
6	0	0	0	6	5	5	0	16
Total	44	62	73	72	76	75	68	470

Table 4 also demonstrate that the individual auditors in the Big4 audit firms have more clients affiliated with the same business group.

5.2. Correlation matrix

The correlation coefficients are presented in Table S1 (available online). This table shows that there is multicollinearity problem among *ApsoD*, *ApsoN*, *ApsoP* (Exceeded 70 percent). Thus, we did not run the variables – *ApsoD*, *ApsoN*, *ApsoP*– in the same estimation models. The signs of the variables of interests are in the expected direction.

5.3. Main estimation results: ordinary least square (OLS) and logistic regression

Table 5 presents the main results regarding the influences of *ApsoD*, *ApsoN*, and *ApsoP* on audit quality. We ran OLS to test the influences of *ApsoD*, *ApsoN*, and *ApsoP* on audit quality with respect to the discretionary accruals (*AbsDA*) and audit reporting aggressiveness (*Aggressive*). Logistic regression was employed to test the influences of *ApsoD*, *ApsoN*, and *ApsoP* on audit quality with respect to audit opinion (*Modified*).

In Table 5, all columns indicate that individual auditors providing independent audit service to the firms affiliated with the same business group (*ApsoD*) are more aggressive (*Aggressive*) and less likely to render a modified audit opinion (*Modified*). They are not likely to detect earnings management practices (*AbsDA*). Besides, we found that as the total number of clients affiliated with the same business group in the auditor portfolio (*ApsoN*) or the percentage of the clients affiliated with the same business group in the auditor portfolio (*ApsoP*) increases, individual auditors tend to become more aggressive (*Aggressive*) and less likely to issue a modified audit opinion (*Modified*). They are also less likely to detect discretionary accruals (*AbsDA*), which shows that our prediction is supported by empirical evidence. One of the probable explanations may be that an individual auditor providing independent audit service to the firms affiliated with the same business group may have more knowledge about the limits of managed transactions in intragroup in accordance with the accounting rules to manage earnings and they may use this knowledge (tricks) to adjust the items on behalf of their clients. As previous studies have shown that even firms that are not affiliated with any business group did change their audit firms when they received a modified audit opinion on their financial statements (Chow & Rice, 1982; Lennox, 2000). So, individual auditors consider their self-interest as a result of being paid by the clients (Allen & Siegel, 2002). Moreover, auditors may not maintain their independence when they audit firms affiliated with the same business group because they may be faced with the risk of losing all the other firms affiliated with the same business group or it may lower the possibility of auditing the potential firms affiliated with the same business group. Even if an individual auditor maintains his/her independence in all these cases, they will still work in an independent audit

firm where the senior partners (managers) in the firm may put pressure on them to treat the clients more favorably because managers tend to be more opportunistic thinking of their interests more and more focused on short-term interests (Doh & Stumpf, 2005; Fama & Jensen, 1983; Greenwood & Empson, 2003; Guzak & Rasheed, 2014; Jensen & Meckling, 1976; Sharma, 1997). Thus, individual auditors may treat the clients who are affiliated with the same business group more favorably in order not to lose their job or may not resist to the pressure of the managers in audit firms according to Chi et al. (2012) who worked on client importance.

In terms of auditor-specific characteristics, we expected a negative association between auditor gender & education level (*AuditorGender* & *AuditorEduLevel*) and discretionary accruals (*AbsDA*) and audit report aggressiveness (*Aggressive*). Furthermore, a positive association between auditor gender & education level (*AuditorGender* & *AuditorEduLevel*) and modified audit opinion (*Modified*) was expected. Although the signs of the variable for each model is consistent with our expectation, there are only two significant associations between discretionary accruals (*AbsDA*) and auditor gender & education level (*AuditorGender* & *AuditorEduLevel*) due to the fact that female auditors are more conservative and risk-averse than their male counterparts (Gul et al., 2013; Ittonen et al., 2013; Karjalainen et al., 2013; Garcia-Blandon et al., 2019) and that more educated auditors are more competent than their counterparts (Che et al., 2018; Li et al., 2017; Ocak & Kurt, 2019). Thus, female auditors and more educated auditors detect discretionary accruals efficiently. Besides, the results indicated that experienced auditors (*AuditorExp*) are less likely to render a modified audit opinion (*Modified*) and they are more aggressive, although it is only significant in the column 4 of Table 5. This is because experienced auditors are more aware of the negative consequences of modified audit opinion (Abdolmohammadi & Wright, 1987; Wang et al., 2015). Furthermore, the findings revealed that auditor tenure (*AuditorTenure*) is negatively (positively) and significantly associated with modified audit opinion (*Modified*) (Discretionary accruals- *AbsDA*). One of the reasons may be that auditor independence may be compromised in a relatively longer relationship between client and auditor (Chi & Huang, 2005; Garcia-Blandon & Argiles-Bosch, 2017; Ye et al., 2011), so an auditor with a long tenure (*AuditorTenure*) is less likely to issue a modified audit opinion (*Modified*) and may have a higher threshold to tolerate discretionary accruals (*AbsDA*). Busy auditors (*AuditorBusy*) are more aggressive (*Aggressive*) because they spent less time per client (Sundgren & Svanström, 2014), spend less effort (Lai et al., 2018). Increasing client importance at auditor level (*AuditorCI*) leads to an increase in discretionary accruals (*AbsDA*). The signs of audit firm size (*AuditFirmSize*) are consistent with our expectations for all audit quality measures. However, audit firm size negatively and significantly associated with both discretionary accruals (*AbsDA*) and audit report aggressiveness (*Aggressive*). The results of control variables at client-specific level are presented in Table 5.

Table 5
Main estimation results (OLS and logistic regression).

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	AbsDA	AbsDA	AbsDA	Aggressive	Aggressive	Aggressive	Modified	Modified	Modified
Constant	0.365*** (0.116)	0.365*** (0.116)	0.359*** (0.116)	0.309*** (0.100)	0.311*** (0.101)	0.310*** (0.100)	7.592*** (2.660)	7.573*** (2.650)	7.992*** (2.691)
<i>Test Variables</i>									
ApsoD	0.006* (0.003)			0.0215** (0.009)			−1.187*** (0.345)		
ApsoN		0.002* (0.001)			0.005* (0.003)			−0.401*** (0.140)	
ApsoP			0.013** (0.006)			0.035** (0.017)			−1.820** (0.723)
<i>Control Variables at Individual Auditor Level</i>									
AuditorGender	−0.113*** (0.018)	−0.113*** (0.018)	−0.114*** (0.018)	−0.006 (0.010)	−0.005 (0.010)	−0.005 (0.010)	0.101 (0.326)	0.113 (0.326)	0.078 (0.325)
AuditorEduLevel	−0.059*** (0.011)	−0.059*** (0.011)	−0.058*** (0.011)	−0.011 (0.010)	−0.011 (0.010)	−0.011 (0.010)	0.156 (0.271)	0.172 (0.270)	0.177 (0.268)
AuditorTenure	0.098*** (0.018)	0.098*** (0.018)	0.098*** (0.018)	0.032 (0.094)	0.032 (0.094)	0.033 (0.094)	−0.190** (0.075)	−0.191** (0.074)	−0.180** (0.074)
AuditorExp	−0.003 (0.035)	−0.002 (0.035)	−0.002 (0.036)	0.023* (0.014)	0.021 (0.014)	0.022 (0.014)	−0.778** (0.374)	−0.735** (0.374)	−0.753** (0.372)
AuditorCI	0.004*** (0.001)	0.004*** (0.001)	0.004*** (0.001)	0.017 (0.014)	0.015 (0.014)	0.015 (0.014)	0.092 (0.086)	0.102 (0.086)	0.130 (0.087)
AuditorBusy	−0.003 (0.005)	−0.003 (0.005)	−0.003 (0.005)	0.025*** (0.008)	0.026*** (0.008)	0.026*** (0.008)	−0.093 (0.179)	−0.096 (0.178)	−0.125 (0.179)
AuditFirmSize	−0.152*** (0.033)	−0.154*** (0.033)	−0.153*** (0.033)	−0.041** (0.019)	−0.041** (0.019)	−0.043** (0.019)	0.110 (0.460)	0.137 (0.456)	0.233 (0.450)
<i>Control Variables at Client Level</i>									
ClientROA	0.285*** (0.037)	0.285*** (0.037)	0.283*** (0.037)	0.095 (0.063)	0.091 (0.063)	0.093 (0.063)	−1.193 (2.085)	−1.198 (2.085)	−1.148 (2.081)
ClientLeverage	0.005 (0.009)	0.005 (0.009)	0.005 (0.009)	0.040* (0.021)	0.037* (0.021)	0.038* (0.021)	−0.395 (0.604)	−0.331 (0.604)	−0.235 (0.597)
ClientGrowth	0.012** (0.004)	0.0120** (0.004)	0.011** (0.004)	−0.001*** (0.001)	−0.001*** (0.001)	−0.001*** (0.001)	0.025*** (0.007)	0.025*** (0.007)	0.025*** (0.007)
ClientSize	−0.008*** (0.001)	−0.008*** (0.001)	−0.008*** (0.001)	−0.019*** (0.003)	−0.019*** (0.003)	−0.019*** (0.003)	−0.564*** (0.128)	−0.564*** (0.127)	−0.590*** (0.129)
ClientLoss	0.032*** (0.004)	0.032*** (0.004)	0.032*** (0.004)	0.028** (0.012)	0.027** (0.012)	0.027** (0.012)	0.955*** (0.348)	0.953*** (0.349)	0.944*** (0.349)
ClientMTB	0.205** (0.089)	0.205** (0.089)	0.205** (0.089)	0.120 (0.096)	0.116 (0.097)	0.121 (0.097)	−0.624*** (0.229)	−0.627*** (0.228)	−0.625*** (0.228)
ClientAge	−0.001 (0.003)	−0.001 (0.003)	−0.0009 (0.003)	−0.010 (0.009)	−0.009 (0.009)	−0.010 (0.009)	0.313 (0.250)	0.280 (0.247)	0.305 (0.246)
Year Fixed	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sector Fixed	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Clustered by Firm	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1165	1165	1165	1165	1165	1165	1165	1165	1165
R ² & Pseudo R ²	0.498	0.498	0.498	0.122	0.121	0.122	0.245	0.242	0.239
F Value & Wald Chi ²	5.28***	5.28***	5.28***	5.64***	5.55***	5.60***	129.5***	125.0***	123.6***

Continuous variables are winsorized to control outliers.

Robust standard errors in parenthesis.

*p < 0.10; **p < 0.05; ***p < 0.01.

5.4. Does Working in Big4 audit firms make a difference for audit quality?

DeAngelo (1981) stated that audit quality cannot be independent of audit firm size. Recent studies emphasized that the Big4 audit firms are more independent and reputable than non-Big4 audit firms, which influences the service quality of the Big4 audit firms (Choi et al., 2010; DeAngelo, 1981; DeFond & Zhang, 2014; Francis, 2004; Francis & Wilson, 1988; Gul

et al., 2013). A single client is not economically important and is not likely to create an economic bond for the BigN audit firms because of their much larger client portfolios (Choi et al., 2010; Francis, 2004; Francis et al., 2013; Francis & Wilson, 1988). In addition, they are less likely to succumb to client influence. Therefore, they maintain higher audit independence and they do not lose their established brand name reputation by providing bad service quality (Abu Bakar et al., 2005; Chi et al., 2012; DeFond & Zhang, 2014; Ettredge et al.,

2017). According to Francis (2004) a higher audit fee implies higher audit quality because more audit effort and auditor greater expertise depend on higher audit fees, as in the BigN audit firms (Comprix & Huang, 2015). Big4 audit firms spend more effort and present greater expertise providing more qualified audit work. According to Gul et al. (2013), there is a conservative environment in the BigN audit firms affecting auditors' professional judgements, while attracting conservative auditors to work in the BigN audit firms. Moreover, Francis et al. (2013) and Francis and Yu (2009) stated that Big4 audit firms have their own set of internal working rules which makes them distinct in approaches and mitigates inter-office variation in audit quality.

The results for the interaction variables are shown in Table 6. *ApsoD*AuditFirmSize*, *ApsoN*AuditFirmSize*, and *ApsoP*AuditFirmSize* are included in the models. As discussed above, previous studies (DeAngelo, 1981; DeFond & Zhang, 2014; Francis, 2004; Francis & Wilson, 1988; Gul et al., 2013) indicated that Big4 audit firms are more independent and have a conservative environment, which help them provide more qualified audit work. In our opinion, individual auditors providing independent audit service to the firms affiliated with the same business group in Big4 audit firms do not lose their independence. They are more likely to detect discretionary accruals effectively and render a modified audit opinion while being less aggressive. The results in Table 6 show that *ApsoD*AuditFirmSize*, *ApsoN*AuditFirmSize*, and *ApsoP*AuditFirmSize* are associated with *Aggressive* negatively and significantly. Individual auditors providing independent audit service to the firms affiliated with the same business group in Big4 audit firms (*ApsoD*AuditFirmSize*) are less aggressive. Although the total number of the clients affiliated with the same business group audited by the same individual auditor in Big4 audit firms (*ApsoN*AuditFirmSize*) or the fraction of number of the clients affiliated with the same business group audited by the same individual auditor in Big4 audit firms (*ApsoP*AuditFirmSize*) increase, individual auditors in big 4 audit firms are less aggressive providing more qualified audit work with respect to audit reporting aggressiveness. The results in Table 6 also show that *ApsoD*AuditFirmSize*, *ApsoN*AuditFirmSize* and *ApsoP*AuditFirmSize* are positively and significantly associated with *Modified*. Individual auditors providing independent audit service to the firms affiliated with the same business group in Big4 audit firms (*ApsoD*AuditFirmSize*) are more likely to issue a modified audit opinion. When the total number of the clients affiliated with the same business group audited by the same individual auditor in Big4 audit firms (*ApsoN*AuditFirmSize*) or the fraction of the number of the clients affiliated with the same business group audited by the same individual auditor in Big4 audit firms increase, they are more likely to issue a modified audit opinion, providing more qualified audit work. The results indicate that there is, as expected, a negative but insignificant association between *ApsoD*AuditFirmSize* (or *ApsoN*AuditFirmSize* or *ApsoP*AuditFirmSize*) and *AbsDA*.

5.5. Control for potential endogeneity: propensity score matching

Propensity score matching method (PSM) was employed to control potential endogeneity (Semba & Kato, 2019; Ma et al., 2019; Chen et al., 2017; Shipman et al., 2017) and to tackle the potential problems caused by the differences in clients' characteristics between firms with and those without an individual auditor providing independent audit service to the firms affiliated with the same business group. OLS and Logistic regression results were repeated with the PSM sample to enhance the validity of this paper. First, propensity scores were generated using a logit regression to estimate the likelihood of having an individual auditor providing independent audit service to the firms affiliated with the same business group (This is the dependent variable of the logistic regression). The logit model regresses an individual auditor providing independent audit service to the firms affiliated with the same business group (*ApsoD*) on the set of auditor characteristics, including auditor gender (*AuditorGender*), auditor experience (*AuditorExp*), auditor education level (*AuditorEduLevel*), auditor tenure (*AuditorTenure*), client importance at auditor level (*AuditorCI*), auditor busyness (*AuditorBusy*), as well as client-specific characteristics, including size (*ClientSize*), leverage (*ClientLeverage*), age (*ClientAge*), growth (*ClientGrowth*), ROA (*ClientROA*), loss (*ClientLoss*), MTB (*ClientMTB*). Auditor-specific characteristics⁷ were used in addition to the client-specific characteristics in the logistic model because auditor-specific characteristics may be decisive in case of having multiple clients, particularly having multiple clients affiliated with the same business group. [For instance, experienced auditors, more educated auditors or female auditors may have more clients affiliated with the same business group because experienced auditors and educated auditors are more competent and capable (Bröcheler et al., 2004; Chen et al., 2015; Ye et al., 2014) and they are more familiar with financial statements (Sutaryo & Lase, 2015) and spend more effort (Che et al., 2018). Furthermore, female auditors are more conservative and risk averse (Garcia-Blandon et al., 2019; Gul et al., 2013; Ittonen et al., 2013; Karjalainen et al., 2013). Hence, female auditors, experienced auditors or more educated auditors may deal with adverse situations, such as lack of concentration or inconsiderable effort caused by multiple clients (Please see the papers by Lai et al., 2018; Suzuki & Takada, 2016; Ocak, 2018). More specifically, this may minimize the negative influences of multiple clients affiliated with the same business group. Big4 audit firms have enough staff resources (Ng & Tai, 1994), such as more partners and employees compared to non-Big4 audit firms. So, they may assign different partners to clients affiliated with the same business group. The probability of having the clients

⁷ In many studies, researchers focus on only client-specific characteristics such as firm size, firm performance, and firm leverage when they employ PSM method into their research. However, some researchers (Cai et al., 2019; Hardies et al., 2015) used the characteristics of persons when they run logistic regression (first stage) in PSM method.

Table 6
Interactions with audit firm size.

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	AbsDA	AbsDA	AbsDA	Aggressive	Aggressive	Aggressive	Modified	Modified	Modified
Constant	0.362*** (0.117)	0.362*** (0.117)	0.358*** (0.116)	0.353*** (0.100)	0.333*** (0.101)	0.338*** (0.101)	6.688*** (2.561)	6.677*** (2.557)	7.298*** (2.501)
<i>Test and Interaction Variables</i>									
ApsoD	0.007* (0.003)			0.072*** (0.015)			−2.211*** (0.677)		
ApsoD*AuditFirmSize	−0.003 (0.007)			−0.075*** (0.019)			1.656** (0.749)		
ApsoN		0.002* (0.001)			0.013*** (0.004)			−0.851** (0.338)	
ApsoN*AuditFirmSize		−0.001 (0.002)			−0.014** (0.005)			0.678* (0.356)	
ApsoP			0.013* (0.008)			0.086*** (0.025)			−4.062** (1.959)
ApsoP*AuditFirmSize			−0.001 (0.015)			−0.089*** (0.033)			3.428* (2.064)
<i>Control Variables at Individual Auditor Level</i>									
AuditorGender	−0.114*** (0.018)	−0.114*** (0.018)	−0.114*** (0.018)	−0.003 (0.010)	−0.003 (0.010)	−0.0038 (0.010)	0.079 (0.324)	0.089 (0.326)	0.020 (0.312)
AuditorEduLevel	−0.059*** (0.011)	−0.059*** (0.011)	−0.058*** (0.011)	−0.009 (0.010)	−0.010 (0.010)	−0.011 (0.010)	0.107 (0.276)	0.117 (0.275)	0.104 (0.270)
AuditorTenure	0.097*** (0.018)	0.097*** (0.018)	0.098*** (0.018)	0.040 (0.094)	0.036 (0.094)	0.038 (0.094)	−0.197*** (0.074)	−0.198*** (0.074)	−0.172** (0.073)
AuditorExp	−0.003 (0.035)	−0.003 (0.035)	−0.002 (0.035)	0.023* (0.014)	0.022 (0.014)	0.021 (0.014)	−0.789** (0.379)	−0.749** (0.378)	−0.756** (0.367)
AuditorCI	0.004*** (0.001)	0.004*** (0.001)	0.004*** (0.001)	0.022 (0.014)	0.018 (0.014)	0.018 (0.014)	0.067 (0.087)	0.076 (0.088)	0.122 (0.086)
AuditorBusy	−0.003 (0.005)	−0.003 (0.005)	−0.003 (0.005)	0.022*** (0.008)	0.025*** (0.008)	0.026*** (0.008)	−0.069 (0.178)	−0.070 (0.177)	−0.137 (0.177)
AuditFirmSize	−0.149*** (0.034)	−0.151*** (0.034)	−0.152*** (0.034)	−0.010 (0.020)	−0.027 (0.020)	−0.029 (0.020)	−0.246 (0.469)	−0.222 (0.467)	0.013 (0.457)
<i>Control Variables at Client Level</i>									
ClientROA	0.285*** (0.037)	0.284*** (0.037)	0.283*** (0.037)	0.097 (0.063)	0.090 (0.063)	0.090 (0.063)	−1.329 (2.081)	−1.351 (2.069)	0.105 (0.330)
ClientLeverage	0.0053 (0.009)	0.0052 (0.009)	0.004 (0.009)	0.047** (0.021)	0.040* (0.021)	0.040* (0.021)	−0.482 (0.624)	−0.438 (0.624)	−0.029 (0.610)
ClientGrowth	0.012** (0.004)	0.0121** (0.004)	0.011** (0.004)	−0.001*** (0.0006)	−0.001*** (0.0006)	−0.001*** (0.0006)	0.026*** (0.007)	0.026*** (0.007)	0.025*** (0.007)
ClientSize	−0.008*** (0.001)	−0.008*** (0.001)	−0.008*** (0.001)	−0.022*** (0.003)	−0.020*** (0.003)	−0.021*** (0.003)	−0.513*** (0.125)	−0.514*** (0.124)	−0.554*** (0.120)
ClientLoss	0.032*** (0.004)	0.032*** (0.004)	0.032*** (0.004)	0.021* (0.012)	0.024* (0.012)	0.023* (0.012)	1.019*** (0.350)	1.020*** (0.350)	1.261*** (0.305)
ClientMTB	0.205** (0.089)	0.206** (0.089)	0.205** (0.089)	0.119 (0.096)	0.120 (0.096)	0.124 (0.096)	−0.658*** (0.233)	−0.660*** (0.232)	−0.700*** (0.229)
ClientAge	−0.001 (0.003)	−0.001 (0.003)	−0.0009 (0.003)	−0.010 (0.009)	−0.009 (0.009)	−0.011 (0.009)	0.332 (0.260)	0.298 (0.255)	0.267 (0.250)
Year Fixed	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sector Fixed	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Clustered by Firm	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1165	1165	1165	1165	1165	1165	1165	1165	1165
R ² & Pseudo R ²	0.498	0.498	0.498	0.134	0.125	0.127	0.253	0.250	0.245
F Value & Wald Chi ²	5.24***	5.24***	5.24***	6.06***	5.57***	5.69***	138.3***	132.1***	134.0***

Continuous variables are winsorized to control outliers.

Robust standard errors in parenthesis.

*p < 0.10; **p < 0.05; ***p < 0.01.

affiliated with the same business group may be higher for individual auditors with large client portfolios. Besides, an individual auditor having a client with higher importance may be less likely to audit clients affiliated with the same business group because it requires more effort. Furthermore, we used a standard set of client-specific characteristics variables in the

logistic model of propensity score matching method following the methodology by [Chang et al. \(2019\)](#), [Fang et al. \(2017\)](#), [Shipman et al. \(2017\)](#) and [Lennox et al. \(2012\)](#).

We matched, without replacement, each firm with an individual auditor providing independent audit service to the firms affiliated with the same business group ($ApsoD = 1$) or

with an individual auditor not providing an independent audit service to the firms affiliated with the same business group ($ApsoD = 0$) who has the closest propensity score from the logistic regression. Table 7 shows that the differences between the two groups are insignificant after matching. Consistent with our expectation, the mean values for the discretionary accruals (*AbsDA*), audit opinion (*Modified*) and audit report aggressiveness (*Aggressive*) are higher for the subsample with $Apso = 1$ compared to the subsample with $Apso = 0$. Table 8 documents that the tests of effectiveness of the propensity score matching, in other words, pre-match and post-match logistic regression results. The estimation results of propensity score matching are shown in Table 9, which suggests that the results do not change with the application of Propensity Score Matching procedure.

5.6. Control for potential endogeneity: Heckman Two-Stage procedure

Heckman Two-Stage Model was employed to confirm the OLS and logistic estimation results because auditor selection was not randomly distributed (Chaney et al., 2004; Heckman, 1979). Firm-specific characteristics and individual auditor-specific characteristics may be decisive in the selection of individual auditors providing independent audit service to the firms affiliated with the same business group. Auditor selection was considered as a function of the firm-specific and individual auditor-specific characteristics. Thus, the first stage of Heckman Two-Stage estimation model was carried out as below.

$$ApsoD_{it} = \beta_0 + \beta_1 AuditorExp_{it} + \beta_2 AuditorGender_{it} + \beta_3 AuditorEduLevel_{it} + \beta_4 AuditorTenure_{it} + \beta_5 AuditorBusy_{it}$$

$$+ \beta_6 AuditorCI_{it} + \beta_7 AuditFirmSize_{it} + \beta_8 ClientSize_{it} + \beta_9 ClientLeverage_{it} + \beta_{10} ClientROA_{it} + \beta_{11} ClientGrowth_{it} + \beta_{12} ClientAge_{it} + \beta_{13} ClientMTB_{it} + \beta_{14} ClientLoss_{it} + Sector Fixed + Year Fixed + \varepsilon \quad (6)$$

In the first stage of Heckman estimation procedure, we determined not only the firms that are more likely to work with individual auditors providing independent audit service to the firms affiliated with the same business group but also the individual auditor specific-characteristics that are more important to independent audit service. We took individual auditor specific-characteristics into account as well as the firm-specific characteristics in the first stage of Heckman procedure as in the procedure of Propensity Matching Score. (The reasons for using auditor-specific characteristics in the selection model were explained in section 5.5.) After calculating Inverse Mills Ratio (IMR), OLS models we rerun with the addition of IMR and the second stage of Heckman Two Stage estimation was carried out as described below:

$$AuditQuality_{it} (AbsDA_{it} \text{ or } Aggressive_{it} \text{ or } Modified_{it}) = \beta_0 + \beta_1 (ApsoD_{it} \text{ or } ApsoN_{it} \text{ or } ApsoP_{it}) + \beta_2 AuditorExp_{it} + \beta_3 AuditorGender_{it} + \beta_4 AuditorEduLevel_{it} + \beta_5 AuditorTenure_{it} + \beta_6 AuditorBusy_{it} + \beta_7 AuditorCI_{it} + \beta_8 AuditFirmSize_{it} + \beta_9 ClientSize_{it} + \beta_{10} ClientLeverage_{it} + \beta_{11} ClientROA_{it} + \beta_{12} ClientGrowth_{it} + \beta_{13} ClientAge_{it} + \beta_{14} ClientMTB_{it} + \beta_{15} ClientLoss_{it} + IMR + Sector Fixed + Year Fixed + \varepsilon \quad (7)$$

Table 10 shows the results of Heckman Two-Stage estimation procedure. The results of the first stage of Heckman selection procedure (Column 10 in Table 10) indicate that female auditors are more likely to be appointed to the clients

Table 7
Comparing the main sample with the propensity score matched (PSM) sample.

Variables	Main Sample (Pre-Match)			PSM Sample (Post-Match)		
	ApsoD = 0	ApsoD = 1	T Test	ApsoD = 0	ApsoD = 1	T Test
<i>Dependent Variables</i>						
AbsDA	0.046	0.051	−1.566*	0.047	0.053	1.38*
Modified	0.095	0.031	3.575***	0.105	0.033	−3.55***
Aggressive	−0.018	0.046	−3.783***	−0.025	0.044	3.64***
<i>Control Variables at Individual Auditor Level</i>						
AuditorExp (Log)	3.024	2.993	1.443*	2.995	2.994	−0.07
AuditorGender	0.170	0.233	−2.449***	0.227	0.217	0.29
AuditorEduLevel	0.241	0.105	5.162***	0.107	0.108	0.02
AuditorTenure	2.321	2.268	0.571	2.316	2.250	−0.58
AuditorBusy (Log)	1.355	1.782	−9.669***	1.772	1.728	−1.15
AuditorCI	0.458	0.247	8.827***	0.224	0.249	1.16
AuditFirmSize	0.562	0.690	−3.967***	0.722	0.699	−0.63
<i>Control Variables at Client Level</i>						
ClientSize	19.66	19.74	−0.700	19.78	19.78	0.00
ClientLeverage	0.507	0.427	5.581***	0.468	0.452	−0.92
ClientROA	0.031	0.039	−1.365*	0.038	0.039	0.05
ClientGrowth	0.130	0.109	1.296*	0.116	0.113	−0.18
ClientAge (Log)	3.458	3.643	−5.762***	3.622	3.634	0.33
ClientMTB	0.021	0.020	0.472	0.024	0.022	−0.66
ClientLoss	0.269	0.252	0.601	0.267	0.264	−0.09

*p < 0.10; **p < 0.05; ***p < 0.01.

Table 8
Tests of effectiveness for propensity score matching (first stage of PSM).

VARIABLES	Pre-Match	Post-Match
	(1)	(2)
	ApsoD	ApsoD
Constant	−8.615*** (1.658)	1.429 (1.938)
<i>Control Variables at Individual Auditor Level</i>		
AuditorGender	0.274 (0.185)	−0.305 (0.227)
AuditorEduLevel	−0.897*** (0.224)	0.0521 (0.301)
AuditorTenure	−0.0248 (0.0390)	0.0217 (0.0498)
AuditorExp	0.248 (0.163)	−0.0250 (0.206)
AuditorCI	−0.374*** (0.0668)	−0.00746 (0.0912)
AuditorBusy	0.257 (0.159)	−0.323 (0.243)
AuditFirmSize	−0.501 (0.366)	0.831 (0.522)
<i>Control Variables at Client Level</i>		
ClientLeverage	−1.911*** (0.398)	−0.0356 (0.519)
ClientGrowth	−0.276 (0.243)	0.245 (0.408)
ClientLoss	0.0335 (0.233)	−0.135 (0.295)
ClientROA	−1.814 (1.307)	0.124 (1.708)
ClientSize	0.252*** (0.0713)	−0.0285 (0.0886)
ClientMTB	−0.229 (0.154)	−0.209 (0.196)
ClientAge	0.452** (0.210)	0.0450 (0.231)
Year Fixed	Yes	Yes
Sector Fixed	Yes	Yes
Pseudo R ²	0.1047	0.0147
Chi ²	137.56***	0.9785
Observations	1165	525

Continuous variables are winsorized to control outliers.

Robust standard errors in parenthesis.

*p < 0.10; **p < 0.05; ***p < 0.01.

affiliated with the same business group while educated auditors and individual auditors having a client with a higher importance are less likely to audit the clients affiliated with the same business group. Profitable firms and high leveraged firms (larger firms and older firms) are less (more) likely to choose an individual auditor who provides independent audit service to the firms affiliated with the same business group. The findings in Table 10 show that the results remain unchanged with the application of Heckman Two-Stage estimation procedure.

5.7. Alternative measure of test variable

Alternative variable (*Apso_Imp*) is also a continuous variable and is measured as the total assets of the clients affiliated

with the same business group divided by aggregated clients' total assets in the audit partner's client portfolio. It was coded as follows. Total assets of Kaan Birdal's clients are 1,078,087,174 (327,883,824 + 133,305,456 + 218,887,648 + 52,248,722 + 345,811,524). Total assets of the clients affiliated with the same business group audited by Kaan Birdal are 680,076,928 (327,883,824 + 133,305,456 + 218,887,648). *Apso_Imp* is equal to 0.63 (680,076,928/1,078,087,174). These variables indicate the dependency of an individual auditor on the firms affiliated with same business group, which may be detrimental to audit quality (Please see Fig. S1, available online).

The mean value for the percentage of the total assets of clients affiliated with the same business group in the individual auditor portfolio (*Apso_Imp*) is 11.90 percent (Please see descriptive statistics). The results in Table 11 show that *Apso_Imp* is also negatively associated with audit quality. Increasing the total assets of the clients affiliated with the same business group divided by aggregated clients' total assets in the audit partner's client portfolio let the auditor to spend less effort to detect discretionary accruals, get more aggressive while reducing the likelihood of a modified audit opinion to be issued.

5.8. Additional analysis: audit reporting lag

As stated in the literature review, auditing multiple clients affiliated with the same business group may provide an advantage for the timeliness of audit reports, timely information presentation for the current and potential investors or third parties because individual auditors providing independent audit service the firms affiliated with the same business group may be more familiar with the intragroup transactions and the structures of the firms, therefore with the financial statements of the firms in a business group (Fang & Chang, 2018), which was also tested in addition to the main analyses of the current paper. Audit reporting lag (*LnLag*) is measured as the logarithmic value of the total number of the days following the fiscal year-end until the date of the audit report. Reporting lags were retrieved from the website of Public Disclosure Platform of Turkey (KAP) (<http://www.kap.org.tr>). The control variables used for the main analyses were employed. The mean value for the audit-reporting lag [raw form *-Lag (Raw)-*] is 65.37 days. The maximum and minimum value for the audit-reporting lag [raw form *-Lag (Raw)-*] are 21 and 133 days, respectively. The mean difference of audit reporting lag (logarithmic form *-LnLag-*) for ApsoD with 0 and ApsoD with 1 is 4.497, which is significant (Please see Tables 2 and 3). The results in Table S2 (available online) show that individual auditor providing independent audit service to firms with the same business group present and audit the financial statements in a timelier manner.

6. Conclusion and implications

In this paper, we investigated the association between individual auditors providing independent audit service to the

Table 9
Propensity score matching results.

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	AbsDA	AbsDA	AbsDA	Aggressive	Aggressive	Aggressive	Modified	Modified	Modified
Constant	0.374*** (0.078)	0.374*** (0.078)	0.361*** (0.078)	0.297** (0.133)	0.319** (0.133)	0.303** (0.133)	10.23* (5.411)	9.962* (5.372)	11.17** (5.430)
<i>Test Variables</i>									
ApsoD	0.009** (0.004)			0.024** (0.010)			−1.361*** (0.426)		
ApsoN		0.004*** (0.001)			0.005* (0.003)			−0.461*** (0.168)	
ApsoP			0.024** (0.009)			0.043** (0.017)			−2.171*** (0.826)
<i>Control Variables at Individual Auditor Level</i>									
AuditorGender	−0.123*** (0.045)	−0.121*** (0.044)	−0.125*** (0.045)	0.006 (0.012)	0.005 (0.012)	0.007 (0.012)	−0.128 (0.506)	−0.104 (0.501)	−0.187 (0.507)
AuditorEduLevel	0.047 (0.047)	0.036 (0.047)	0.027 (0.048)	−0.018 (0.017)	−0.017 (0.017)	−0.017 (0.017)	0.377 (0.562)	0.394 (0.558)	0.295 (0.554)
AuditorTenure	0.0001 (0.001)	0.0001 (0.001)	0.0001 (0.001)	0.004 (0.002)	0.004* (0.002)	0.004* (0.002)	−0.313* (0.160)	−0.305* (0.158)	−0.297* (0.160)
AuditorExp	−0.004 (0.010)	−0.005 (0.010)	−0.005 (0.010)	0.0309* (0.018)	0.029 (0.018)	0.031* (0.018)	−0.863 (0.657)	−0.791 (0.647)	−0.847 (0.642)
AuditorCI	0.011 (0.009)	0.013 (0.009)	0.010 (0.009)	−0.001 (0.005)	−0.0005 (0.005)	−0.0007 (0.005)	0.244 (0.153)	0.239 (0.153)	0.279* (0.155)
AuditorBusy	−0.027** (0.013)	−0.028** (0.013)	−0.025* (0.013)	0.005 (0.011)	0.006 (0.012)	0.011 (0.011)	0.046* (0.025)	0.045* (0.025)	0.041* (0.025)
AuditFirmSize	−0.226*** (0.078)	−0.226*** (0.077)	−0.217*** (0.078)	−0.005 (0.014)	−0.007 (0.014)	−0.007 (0.014)	2.811* (1.674)	2.723* (1.637)	2.420 (1.611)
<i>Control Variables at Client Level</i>									
ClientROA	0.274*** (0.034)	0.276*** (0.034)	0.272*** (0.034)	0.141 (0.097)	0.142 (0.097)	0.140 (0.097)	0.730 (5.379)	1.071 (5.334)	0.918 (5.348)
ClientLeverage	0.002 (0.012)	0.001 (0.012)	0.0008 (0.012)	0.006 (0.029)	0.005 (0.029)	0.005 (0.029)	−0.154 (1.066)	−0.042 (1.053)	−0.072 (1.054)
ClientGrowth	0.011 (0.008)	0.010 (0.008)	0.0101 (0.008)	0.031 (0.024)	0.030 (0.024)	0.030 (0.024)	−1.333* (0.748)	−1.342* (0.740)	−1.340* (0.743)
ClientSize	−0.006*** (0.002)	−0.006*** (0.002)	−0.006** (0.002)	−0.017*** (0.005)	−0.017*** (0.005)	−0.018*** (0.005)	−0.779*** (0.206)	−0.764*** (0.204)	−0.805*** (0.207)
ClientLoss	0.036*** (0.006)	0.037*** (0.006)	0.036*** (0.006)	0.045*** (0.016)	0.045*** (0.016)	0.044*** (0.016)	1.175* (0.675)	1.194* (0.672)	1.179* (0.671)
ClientMTB	0.010** (0.004)	0.009** (0.004)	0.010** (0.004)	0.057 (0.136)	0.045 (0.137)	0.055 (0.136)	−0.224 (0.417)	−0.224 (0.416)	−0.266 (0.414)
ClientAge	0.001 (0.006)	0.001 (0.006)	0.001 (0.006)	−0.008 (0.013)	−0.008 (0.013)	−0.007 (0.013)	0.388 (0.589)	0.324 (0.583)	0.360 (0.588)
Year Fixed	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sector Fixed	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Clustered by Firm	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	525	525	525	525	525	525	525	525	525
R ² & Pseudo R ²	0.547	0.550	0.549	0.140	0.134	0.141	0.333	0.326	0.323
F Value & Wald Chi ²	4.37***	4.43***	4.41***	3.30***	3.15***	3.32***	104.4***	102.2***	101.4***

Continuous variables are winsorized to control outliers.

Robust Standard errors in parenthesis.

*p < 0.10; **p < 0.05; ***p < 0.01.

firms affiliated with the same business group and audit quality. We employed three test variables, which are (1) whether an individual auditor provides independent audit service to the firms affiliated with the same business group; (2) the total number of clients affiliated with the same business group audited by the same individual auditor in Borsa İstanbul, and (3) the total number of the clients affiliated with the same business group audited by the same individual auditor divided by the total number of clients of an individual auditor. Three audit quality measures were employed as dependent variables,

which are discretionary accruals, modified audit opinion, and audit reporting aggressiveness. OLS and Logistic regressions were mainly used to test our hypotheses followed by propensity score matching and Heckman two-stage estimation procedures to support the main results and control potential endogeneity. The influences of an individual auditor providing independent audit service to the firms affiliated with the same business group on audit reporting lag were also presented. We found that individual auditors providing independent audit service to the firms affiliated with the same business group is

Table 10
Heckman estimation results.

Stages of Heckman	Second Stage	Second Stage	Second Stage	Second Stage	Second Stage	Second Stage	Second Stage	Second Stage	Second Stage	First Stage
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
VARIABLES	AbsDA	AbsDA	AbsDA	Aggressive	Aggressive	Aggressive	Modified	Modified	Modified	ApsoD
Constant	0.498*** (0.140)	0.499*** (0.140)	0.489*** (0.140)	−0.242** (0.104)	−0.144* (0.086)	−0.218** (0.087)	26.95*** (8.104)	26.74*** (8.052)	27.40*** (8.080)	−6.872*** (0.931)
<i>Test Variables</i>										
ApsoD	0.006* (0.003)			0.016* (0.009)			−1.224*** (0.359)			
ApsoN		0.002* (0.001)			0.003* (0.002)			−0.421*** (0.146)		
ApsoP			0.014** (0.007)			0.030** (0.013)			−1.933** (0.765)	
<i>Control Variables at Individual Auditor Level</i>										
AuditorGender	−0.118*** (0.017)	−0.117*** (0.017)	−0.118*** (0.017)	0.009 (0.011)	0.002 (0.007)	0.007 (0.008)	−0.398 (0.386)	−0.379 (0.387)	−0.426 (0.386)	0.179* (0.107)
AuditorEduLevel	−0.048*** (0.013)	−0.048*** (0.01)	−0.048*** (0.013)	−0.055*** (0.015)	−0.028** (0.012)	−0.048*** (0.014)	1.918*** (0.670)	1.927*** (0.666)	1.959*** (0.664)	−0.574*** (0.121)
AuditorTenure	0.093*** (0.018)	0.094*** (0.018)	0.094*** (0.018)	0.045 (0.094)	0.036** (0.017)	0.036** (0.018)	−0.132* (0.072)	−0.134* (0.072)	−0.124* (0.071)	−0.060 (0.071)
AuditorExp	−0.015 (0.036)	−0.014 (0.036)	−0.014 (0.036)	0.031** (0.014)	0.026* (0.015)	0.029* (0.015)	−0.874** (0.406)	−0.839** (0.405)	−0.874** (0.403)	0.077 (0.150)
AuditorCI	0.050*** (0.018)	0.051*** (0.018)	0.049*** (0.018)	−0.093*** (0.026)	−0.007 (0.005)	−0.080*** (0.026)	4.750*** (1.713)	4.751*** (1.705)	4.911*** (1.716)	−1.499*** (0.164)
AuditorBusy	−0.004 (0.005)	−0.005 (0.005)	−0.005 (0.005)	0.026*** (0.008)	0.024* (0.013)	0.025* (0.013)	−0.135 (0.193)	−0.138 (0.192)	−0.166 (0.194)	0.009 (0.106)
AuditFirmSize	−0.148*** (0.034)	−0.150*** (0.034)	−0.149*** (0.034)	−0.049** (0.019)	−0.050* (0.028)	−0.050* (0.028)	0.644 (0.524)	0.663 (0.521)	0.750 (0.514)	−0.170 (0.232)
<i>Control Variables at Client Level</i>										
ClientROA	0.331*** (0.044)	0.331*** (0.044)	0.328*** (0.043)	−0.223** (0.108)	0.036 (0.094)	−0.018 (0.097)	4.781 (3.286)	4.696 (3.279)	4.772 (3.280)	−2.089*** (0.660)
ClientLeverage	0.031** (0.015)	0.031** (0.015)	0.030** (0.015)	−0.045* (0.025)	0.003 (0.026)	−0.023 (0.028)	2.754** (1.390)	2.769** (1.384)	2.875** (1.381)	−1.162*** (0.222)
ClientGrowth	0.006** (0.003)	0.006** (0.003)	0.006** (0.003)	−0.021*** (0.004)	−0.009** (0.003)	−0.018*** (0.005)	0.779*** (0.280)	0.775*** (0.279)	0.791*** (0.278)	−0.210 (0.139)
ClientSize	−0.012*** (0.002)	−0.012*** (0.002)	−0.012*** (0.002)	−0.022* (0.013)	−0.042*** (0.011)	−0.029*** (0.010)	−1.268*** (0.302)	−1.260*** (0.300)	−1.284*** (0.302)	0.269*** (0.040)
ClientLoss	0.032*** (0.004)	0.032*** (0.004)	0.032*** (0.004)	0.001 (0.014)	0.022 (0.014)	0.019 (0.014)	1.070*** (0.363)	1.065*** (0.363)	1.056*** (0.364)	−0.040 (0.131)
ClientMTB	0.205** (0.088)	0.205** (0.088)	0.205** (0.088)	0.143 (0.096)	0.120 (0.077)	0.122 (0.076)	−0.715*** (0.237)	−0.722*** (0.237)	−0.731*** (0.237)	0.434 (0.120)
ClientAge	−0.010* (0.006)	−0.010* (0.006)	−0.009 (0.006)	0.036*** (0.013)	0.014 (0.013)	0.030** (0.014)	−0.975* (0.563)	−1.000* (0.557)	−1.025* (0.556)	0.554*** (0.107)
IMR	−0.028* (0.014)	−0.028* (0.014)	−0.027* (0.014)	0.094*** (0.023)	0.036** (0.018)	0.080*** (0.023)	−3.655*** (1.354)	−3.635*** (1.346)	−3.712*** (1.345)	
Year Fixed	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sector Fixed	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Clustered by Firm	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1165	1165	1165	1165	1165	1165	1165	1165	1165	1165
R ² & Pseudo R ²	0.501	0.502	0.502	0.121	0.113	0.118	0.254	0.252	0.249	0.159
F Value & Wald Chi ²	5.32***	5.33***	5.33***	22.68***	21.52***	22.24***	122.3***	119.1***	120.8***	252.1***

Continuous variables are winsorized to control outliers.

Robust Standard errors in parenthesis.

*p < 0.10; **p < 0.05; ***p < 0.01.

less likely to provide qualified audit work. Moreover, increasing the total number of the clients affiliated with the same business group and the percentage of the clients affiliated with the same business group in an individual auditor's portfolio lead to a low qualified audit work. However, such a relationship was reversed when the audit firm where the individual auditor works was one of the Big4 audit firms.

Individual auditors providing independent audit services to the firms affiliated with the same business group in Big4 audit firms are less aggressive and are more likely to issue a modified audit opinion. We found, as expected, a negative but insignificant relationship between discretionary accruals and individual auditor providing independent audit service to the firms with affiliated with the same business group.

Table 11
Results regarding alternative test variables.

VARIABLES	(1) AbsDA	(2) Aggressive	(3) Modified
Constant	0.338*** (0.118)	0.452*** (0.061)	6.613** (2.848)
Apso_Imp	0.009* (0.005)	0.021* (0.011)	−1.855** (0.828)
AuditorGender	−0.111*** (0.017)	−0.001 (0.008)	0.055 (0.317)
AuditorEduLevel	−0.063*** (0.012)	0.001 (0.008)	0.163 (0.264)
AuditorTenure	0.0006 (0.001)	0.001 (0.002)	−0.187*** (0.072)
AuditorExp	−0.018 (0.037)	0.011 (0.007)	−0.780** (0.365)
AuditorCI	0.013** (0.006)	0.003 (0.011)	0.106 (0.087)
AuditorBusy	−0.003 (0.003)	0.011* (0.006)	−0.177 (0.180)
AuditFirmSize	−0.121*** (0.027)	−0.027* (0.015)	0.179 (0.443)
ClientROA	0.322*** (0.039)	0.023 (0.056)	−1.607 (1.956)
ClientLeverage	0.003 (0.010)	0.079*** (0.020)	−0.320 (0.604)
ClientGrowth	0.011** (0.005)	−0.0004 (0.0005)	0.026*** (0.007)
ClientSize	−0.007*** (0.001)	−0.023*** (0.003)	−0.499*** (0.139)
ClientLoss	0.036*** (0.005)	0.035*** (0.010)	0.997*** (0.360)
ClientMTB	0.006** (0.003)	0.006 (0.006)	−0.597*** (0.224)
ClientAge	0.001 (0.004)	−0.004 (0.008)	0.269 (0.313)
Year Fixed	Yes	Yes	Yes
Sector Fixed	Yes	Yes	Yes
Clustered by Firm	Yes	Yes	Yes
Observations	1165	1165	1165
R ² & Pseudo R ²	0.508	0.223	0.226
F Value & Wald Chi ²	5.50***	9.42***	135.90***

Continuous variables are winsorized to control outliers.

Robust Standard errors in parenthesis.

*p < 0.10; **p < 0.05; ***p < 0.01.

The findings of the paper may be useful for audit firms and regulatory bodies. Regulatory bodies should make arrangements and restrain individual auditors from providing independent audit service to multiple firms in the same business group. At least, audit firms may appoint different individual auditors to the firms within the same business group.

The paper has some limitations. The sample size of the current study was quite small because accessing the data related to subject of study is very difficult and there are no data providers regarding the individual auditors and group firms in Turkey. Most of the data used in the paper is hand-collected. Second, we employed only three measures of audit quality, which are discretionary accruals, modified audit opinion and audit reporting aggressiveness because of the problems with data access. Third, the research covers a seven-year period because of the difficulties with the classification of the firms

that are affiliated with a business group and the ones that are not. Future research may use alternative audit quality measures, such as audit fees, material misstatements, meat & beat, conservatism. Time interval can be expanded in future research. Using firms in different countries may enhance the results of the current paper.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.bir.2020.06.001>.

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