

Analyzing Determinants of Auditor Choice: Evidence from Borsa İstanbul

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ABSTRACT

The auditor choice is a vital decision in the competitive economies and the management of firms should analyze the benefits and costs of selection of independent auditors. This study examines the auditor choices in 2017 for a sample of 94 firms listed on Borsa İstanbul. Turkish Commercial Code requires all firms to have an audit of financial statements, regardless of public or private firms. Discriminant analysis is used to identify factors that may affect auditor choice. The results of discriminant analysis reveal that ownership concentration, foreign ownership, leverage, size, the percentage of outside board members and firm complexity have prominent impacts on the auditor choice. The constructed discriminant model enables us to analyze firm-specific factors underlying the auditor choice.

Keywords: Audit Firm Choice, Audit Firms, Discriminant Analysis

Jel Classification: M41, M42, M49.

Denetçi Seçimine Etki Eden Faktörlerin Analizi: Borsa İstanbul'dan Bulgular

ÖZET

Rekabetin yüksek olduğu ekonomilerde denetim firması seçimi önemli bir karardır. Firma yönetimlerinin bağımsız denetim firması seçimini detaylı bir şekilde analiz etmesi gerekmektedir. Bu çalışma, Borsa İstanbul'a kote olan 94 firmanın 2017 yılındaki bağımsız denetim şirket seçimini analiz etmektedir. Türk Ticaret Kanunu'na göre kamu ve özel sektörde faaliyet gösteren firmalar, gerekli şartları taşıması durumunda bağımsız denetime tabidir. Denetim şirketi seçimine etki eden faktörler diskriminant analizi yardımıyla araştırılmıştır. Diskriminant analizi sonuçlarına göre; sahiplik yoğunluğu, yabancı sahipliği, finansal kaldıraç, firma büyüklüğü, bağımsız yönetim kurulu üyelerinin oranı ve firma karmaşıklığının denetim şirketi seçiminde önemli etkilerinin olduğu tespit edilmiştir. Diskriminant model, Borsa İstanbul'a kote olan firmaların denetim firması seçimine etki eden faktörleri analiz etmemize yardımcı olmaktadır.

Anahtar Kelimeler: Denetim Firması Seçimi, Denetim Firmaları, Diskriminant Analizi.

JEL Sınıflandırması: M41, M42, M49.

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1. INTRODUCTION

The auditing process is one of the multi-faceted issues that receive a great deal of focus from public and private firms. The well-established auditing process has positive impacts on the financial market participants' decisions. The Statement of Financial Accounting Concepts No. 1 (SFAC No. 1, Paragraph No. 8, p. 9) states that "financial statements are often audited by independent accountants for the purpose of enhancing confidence in their reliability". The financial statements of firms should be prepared in compliance with International Financial Reporting Standards (IFRS) by the firms' management.

Audit services play a prominent role in decreasing the information asymmetry (Willenborg, 1999). Watts and Zimmerman (1986) and Jensen and Meckling (1976) argued that audit reports are useful tools in mitigation of agency costs. Yang et al. (2016) stated that the agency problems that threat firms' operational efficiency can be eliminated through accurate and reliable financial statements. Audit firms can help firms' management increase the operational efficiency and eliminate misstatements in financial statements.

Many governments around the world have attempted to regulate audit industry through laws due to the fact that the rapid globalization of the world economy has positioned auditors as one of the key players of business environment. Knechel (2002) posited that auditors have strong abilities and precious knowledge to identify problems though they are not directly involved in the financial reporting processes.

The audit quality influences auditor choice of firms. According to Davidson and Neu (1993), audit quality is the ability of auditors to uncover and deter accounting irregularities and frauds that may occur in the financial statements. Firms ask a high level of audit quality due to concerns about financial losses that may be caused by governmental sanctions. Many firms pay close attention to the specialized area of auditors in choosing an audit firm. In the current business climate, auditors who have deep knowledge in the client's industry are believed to conduct more effective an audit process than do auditors who have no deep knowledge in the client's industry.

Surely, there are numerous organizational and non-organizational factors that may affect the firms' audit firm choice. The identifying factors that influence the audit firm choice enables investors, creditors and other stakeholders to figure out the motivation behind firms' choice of the audit firm. Beattie and Fernley (1995) support the assertion that the characteristics of the client and audit environment are among primary factors affecting audit firm choice. Additionally, the increasing competition in the audit industry has massive impacts on audit firm selection. In the current business climate, the firms' auditor choice decisions appears to be a tradeoff between costs and benefits of selecting more costly but higher-quality independent auditors.

The selection of audit firm in the developed countries has been well- documented in the literature, yet there are few studies that analyze the factors associated with the selection of audit firm in the emerging markets. The major goal of this study is to empirically analyze the relationship that exists between the selection of audit firm and client firm characteristics in

Turkey. In this study, linear discriminant analysis is conducted by using a sample of 94 firms listed on Borsa İstanbul.

The rest of the study is organized as follows. In the Section 1, audit industry in Turkey is presented. Section 2 provides the prior literature on the relation between firm characteristics and the selection of audit firm. Section 3 presents the research hypotheses. Section 4 reveals research methodology and sample characteristics. The results of empirical analysis are discussed in Section 5. Finally, the conclusions are presented in Section 6.

2. AUDIT INDUSTRY IN TURKEY

Certified auditors in Turkey have to follow International Standards on Auditing and Turkish Auditing Standards. All certified auditors in Turkey must have a deep knowledge and expertise in auditing to effectively perform audit tasks. Public Oversight, Accounting and Auditing Standards Authority is the main authority that sets standards regarding auditing process in Turkey. The legislation and regulation in Turkey, a candidate for European Union membership, should comply with the European Union requirements. There are significant differences among national legal systems that influence the auditing process (Margerison and Moizer, 1996).

In Turkey, there are two important events that contributed to the development of audit industry: the foundation of Borsa İstanbul in 1986 and the adoption of International Financial Reporting Standards (IFRS) in 2005. The foundation of Borsa İstanbul is one of the key factors contributing to the economic development in Turkey. The activities of Borsa İstanbul are controlled by Capital Markets Board to build secure investment opportunities. Capital Markets Board requires the filing of audited financial statements to mitigate financial reporting risks, thereby creating a safe investment climate. The independent audit requirements imposed by Capital Markets Board have soared the number of audit firms.

In 2002, European Union adopted the legislation that mandates firms listed in stock exchanges to prepare their financial statements under IFRS. This legislation came into effect in 2005 and influences more than 30 countries including Turkey. The mandatory adoption of IFRS has prominently impacted the auditing process in Turkey. Firms listed on Borsa İstanbul are expected to make significant efforts to comply with IFRS. A well-designed auditing process facilitates IFRS compliance.

At the end of December 2017, there are currently 249 firms providing independent audit services to firms listed on Borsa İstanbul. Big 4 auditors (PricewaterhouseCoopers, Ernst and Young, KPMG and Deloitte) have prominent effects on Turkish business environment. According to the Turkish Commercial Code, auditing activities are divided into three areas: operational auditing, special auditing and independent auditing. In Turkey, the firms satisfying at least two of following criterion are subject to independent audit.

- a) Minimum 200 employees or more
- b) Net sales revenue of 80 million Turkish Lira
- c) Total asset size of 40 million Turkish Lira

Turkey, one of the European's emerging economies, has achieved to grab the interests of global investors within last decades. The audit process plays a prominent role in ensuring well-functioning markets in Turkey.

3. LITERATURE REVIEW ON AUDITOR CHOICE

In this section of the paper, prior studies that analyzed the factors associated with firms' audit firm choice are presented. Auditor selection decisions are complex choices. Previous studies used agency theory to clarify the auditor choice (Chen and Zhou, 2007; DeFond, 1992). Francis (2004) analyzed the previous studies regarding audit quality and concluded that audit reports disclosed by Big Four audit firms have greater accuracy than those disclosed by non-Big 4 auditors.

DeFond (1992) employed principal component analysis to analyze firms' auditor choices and concluded that larger firms and firms issuing debt and equity securities are more likely to select larger audit firms. Leventis and Dimitropoulos (2010) stated that firms tend to select the high quality auditors to disseminate more reliable accounting information to their creditors and investors.

Citron and Manalis (2001) stated that the audit service provided by Big 6 auditors boosts the credibility of firms' financial statements in the eyes of international investors and creditors. Knechel et al. (2008) analyzed the auditor choices of Finnish firms. They concluded that auditor choice is significantly related with firms' size and level of debt financing.

It is stressed that banks and other creditors rely more on firms' financial statements audited by high-quality auditors. DeAngelo (1981) claimed that firms' financial statements audited by a large audit firm give much more confidence to the market compared to the financial statements audited by a small audit firm.

Abbott and Parker (2000) posited that audit firms that specialize in the client's industry yield a higher level of audit quality than do non-specialized audit firms. Ettredge et al. (2009) stated that the selection of specialized auditors is more common in countries in which economic development, financial reporting quality and investor protection is relatively higher. Generally speaking, Big 4 auditors have specialized auditors.

Audit fees also play a critical role in the selection of auditors. Big 4 auditors charge higher fees than other audit firms (Chaney et al., 2004). Therefore, some firms that suffer from financial distress can choose non-Big 4 auditors to reduce costs.

Beasley and Petroni (2001) analyzed the association between board composition and audit firm choice of property liability insurers. They found that the percentage of outside board members has significant effects on the auditor choice and firms with a high percentage of outside board members choose audit firms that supply high-quality auditing service and meticulously analyze the firm management and operations.

Independent auditors play a vital role in corporate governance mechanisms as they certify the accuracy of firms' financial statements (Watts and Zimmerman, 1986). Thus agency costs may be mitigated by subjecting the financial statements to audit confirmation

before disclosing financial statements to the investors and creditors. Using a large sample of firms operating in eight Asian economies, Fan and Wang (2005) found that firms facing agency problems are more likely to select Big 5 auditors.

As can be seen from the previous studies, firm- specific factors may influence the firms' auditor choice. Based on a sample that includes 384 Italian firms, Matonti et al. (2016) found that family ownership, leverage, accounts payable growth, degree of internationalization proxied by foreign ownership and foreign sales concentration have massive effects on auditor choice.

4. RESEARCH HYPOTHESES

Previous studies use agency theory to clarify firms' auditor choice (Carey et al., 2000). The separation of firms' management and ownership can lead agency problems within firms (Fama and Jensen, 1983). Agency theory explains the necessity of independent auditing and the nature of independent audit function. According to the agency theory, the assigning of independent auditors is one of the most cost-effective monitoring strategy that can decrease conflicts of interest between firms' management and owners (Gray and Manson, 2007).

Hsu et al. (2015) postulated that the ownership structure of firms can affect the auditor choice. Ownership structure influences firms' auditor choice in highly complex ways. Narrowly held firms are likely to suffer from agency problems since the controlling shareholders have dominant effects on the firm operations and it would be relatively easy for the controlling shareholders to expropriate the minority shareholders (Fama and Jensen, 1983). Francis et al. (2009) and Niskanen et al. (2010) stated firms with a low ownership concentration demand high-quality auditing services. The controlling owner of the firm can exercise strong control over the auditor choice (Lin and Liu, 2009). Narrowly held firms have weak corporate governance mechanisms so the controlling shareholders may prevent other shareholders from participation in decision making process. Therefore, a firm dominated by a large controlling shareholders is likely to select non-Big 4 audit firms to sustain monopolist gains resulted from weak corporate governance. In this study, a dummy variable (OWN) that takes 1 if one of the shareholders of the firm holds at least 50% of the voting rights and takes the value of 0 otherwise is used. Consequently, the following hypothesis is proposed:

Hypothesis 1: The firm controlled by a large controlling shareholder is likely to select non-Big 4 audit firms.

Guedhami et al. (2009) analyzed the auditor choice of privatized firms by using a sample of 176 firms from 11 countries. They found that foreign owners of privatized firms that suffered from information asymmetry are likely to choose Big 4 auditors to decrease agency costs. Their findings are consistent with those of Dyck (2001) and Coffee (1999). Over the last two decades, the foreign investors' interest to firms listed on Borsa İstanbul has tremendously increased, thus it is worth investigating whether foreign ownership influences the auditor choice of firms listed on Borsa İstanbul. Foreign investors give importance high-quality financial statements. Van Zijl and Karim (2010) claim that foreign shareholders concern about the reliability and accuracy of the firm's financial statements and so have more incentive to choose high quality auditors. Hence, it is expected the high percentage of foreign shareholders (FOWN) raises the probability of selecting a Big 4 audit firm.

Hypothesis 2: Higher percentage of foreign ownership increases the probability of choosing Big 4 audit firms.

Debt financing has overwhelmingly become popular in today's ever changing business world. The capital structure of the firm influences firms' operations in so many ways. The debt financing provides creditor with prior claims if the firm suffers from financial distress (Damadoran, 2001). Fama and Miller (1972) and Jensen and Meckling (1976) state that the level of agency conflicts is positively related with the leverage of the firms. A firm demanding debt financing wants to boost the credibility of its financial statements by assigning Big 4 audit firms. Gul et al. (2010), Beasley and Petroni (2001) and Reed et al. (2000) support the assertion that highly leveraged firms are likely to assign Big 4 audit firms to increase the reliability of their financial statements. Generally speaking, the assignment of Big 4 audit firms facilitates debt financing for firms. Therefore, it is expected that there is a positive relationship between the level of leverage and the selection of Big 4 audit firms. In this study, leverage (LEV) is measured as the ratio of total debts to total assets. The following hypothesis is formulated:

Hypothesis 3: The management of the highly leveraged firms is likely to choose Big 4 audit firms.

The size of firms is considered an important factor affecting the firm's auditor choice. Hsu et al. (2015) state that large audit firms are chosen by large clients since large audit firms are more experienced and provide additional professional services such as tax and management consulting to their clients. According to Kinney and McDaniel (1989), as firms grow, the control of firms' operational activities becomes more difficult. Abbott and Parker (2000), Jensen and Meckling (1976), Simunic and Stein (1987) hypothesize that there is a positive association between agency costs and firm size. Size (SIZE) is measured by the logarithm of the firms' total assets. Consistent with previous literature, the following hypothesis is proposed.

Hypothesis 4: Large-sized firms are likely to choose Big 4 audit firms.

The existence of outside board members can mitigate agency problems in the business environment. Outside board members can more effectively monitor financial reporting process than non-independent members can (Sun and Liu, 2011). Additionally, outside board members can help firms to adopt new technology, improve the public image of the firm and facilitate access to new markets and capital. In Turkey, there was no regulation that requires the presence of outside board members until in 2011. New Turkish Commercial Code that entered into force in 2011 mandated firms listed on Borsa Istanbul to employ outside board members. Jaggi, Leung and Gul (2009) state that board independence significantly decreases earnings management. It is expected that outside board members (% of OUTSIDERS) demand high audit quality to effectively monitor the activities of the firm's management. Beasley and Petroni (2001) argued that outside board members direct firms to choose Big 4 audit firms. Consistent with the previous literature, the following hypothesis is proposed.

Hypothesis 5: Higher percentage of outside board members increases the probability of selecting Big 4 audit firms.

The organizational complexity of firms has tremendously increased with the advent of the globalization of the world economy. It is expected that the high level of organizational complexity causes firms to face serious agency problems. Kinney and McDaniel (1989) state that as a firm becomes more complex, it will inevitably become more difficult to control. According to Knechel et al. (2008), Simunic and Stein (1987) and Abdel-Khalik (1993), firms with a high level of organizational complexity are likely to choose Big 4 audit firms. Consistent with Knechel et al. (2008) and Stice (1991), organizational complexity (COMPLEX) is measured as the ratio of sum of property, plant, inventory and receivables to total assets. The following hypothesis is proposed.

Hypothesis 6: A high level of organizational complexity increases the probability of selecting Big 4 audit firms.

5. RESEARCH METHODOLOGY AND SAMPLE CHARACTERISTICS

This section is devoted to research methodology and the characteristics of sample firms. The use of correct research methods significantly increases the reliability of empirical results. In this study, discriminant model is developed to determine factors affecting firms’ auditor choice. Empirical variables that are believed to distinguish groups should be selected (Brown et al., 2000). The empirical model used in this study has six discriminating variables and two groups. The objective of discriminant model is to establish a model that effectively distinguishes among groups. Discriminant model is estimated, as given equation (1), with dependent variable AUDIT_FIRM described as a binary variable that equals 1 if the auditor is a Big 4, and zero otherwise.

$$AUDIT_FIRM = \alpha_1 + \beta_1 OWN + \beta_2 FOWN + \beta_3 LEV + \beta_4 SIZE + \beta_5 \% \text{ of } OUTSIDERS + \beta_6 COMPLEX + \varepsilon \tag{1}$$

where;

- AUDIT_FIRM* a binary variable that equals 1 if the auditor is one of the Big 4 auditors, and zero otherwise
- OWN* a dummy variable (OWN) that takes 1 if one of the shareholders of the firm holds at least 50% of the voting rights and takes the value of 0 otherwise
- FOWN* a dummy variable that takes 1 if the foreign ownership is greater than 50% and takes value of 0 otherwise.
- LEV* the leverage ratio measured by the ratio of total debts to total assets
- SIZE* the logarithm of the firm’s total assets
- % of OUTSIDERS* the percentage of outside board members
- COMPLEX* the ratio of sum of property, plant, inventory and receivables to total assets
- ε* error term

The empirical data was retrieved from the public disclosure platform that contains operating review and financial statements disclosed in 2017 for all sample firms quoted on Borsa Istanbul. Firms that do not present operating review and financial statements in the public disclosure platform and prepare financial statements under International Financial Reporting Standards are excluded from the sample. Financial institutions are not included in the sample due to different accounting rules and policy they should follow.

Table 1 presents industry breakdowns of sample firms. The sample is comprised of 94 firms. According to table 1, industrial firms dominate the sample representing 23% of sample firms. Industrial firms are followed by food firms. The least represented industry in the sample is telecommunication industry (2%). The sample used in the discriminant analysis can be regarded as being representative of all firms operating in Turkey.

Table 1. Sample Classification by Industry

Industry	Number	Percentage
Industrials	22	0.24
Food	17	0.18
Utilities	12	0.13
Information Technology	12	0.13
Textiles	11	0.12
Construction	7	0.07
Transport	6	0.06
Energy	5	0.05
Telecommunication Industry	2	0.02
Total	94	100

Table 2 reports the number of firms audited by Big 4 audit firms and firms audited by non-Big 4 audit firms. Of the 94 sample firms, 52 (55%) were audited by Big 4 auditors and 42 (45%) were audited by non-Big auditors.

Table 2. Audit Firm Type

Audit Firm Type	Number of Firms	Percentage
Big - 4 Auditors	52	55%
Non-Big 4 Auditors	42	45%

Table 3 reports the descriptive statistics and univariate analysis. The univariate tests provide vital information regarding research variables employed in the discriminant analysis. Univariate test is conducted to get information about the mean of each groups.

Table 3. Descriptive Statistics and Univariate Analysis

Variable	Non-Big 4 Auditors' Clients		Big-4 Auditors' Clients		Univariate Test	
	Mean	SD	Mean	SD	t-test	p-value
<i>OWN</i>	0.714	0.457	0.250	0.437	5.014	0.000
<i>FOWN</i>	0.047	0.215	0.192	0.397	-2.117	0.036
<i>Leverage</i>	0.478	0.198	0.584	0.219	-2.419	0.017
<i>Size</i>	7.868	0.633	8.695	0.638	-6.263	0.000
<i>% of Outsiders</i>	0.244	0.119	0.324	0.074	-3.962	0.000
<i>Complex</i>	0.483	0.258	0.685	0.213	-4.155	0.000

Notes: Leverage represents the leverage ratio measured by the ratio of total debts to total assets, Size represents the logarithm of the firm's total assets, % of Outsiders represents the percentage of outside board members, complex represents the ratio of sum of property, plant, inventory and receivables to total assets. OWN is a dummy variable (OWN) that takes 1 if one of the shareholders of the firm holds at least 50% of the voting rights and takes the value of 0 otherwise. FOWN is a dummy variable that takes 1 if the foreign ownership is greater than 50% and takes value of 0 otherwise.

The results of univariate tests indicate that leverage, size, complex, % of outsiders, ownership and foreign ownership are statistically significant at the 0.05 level. The t test for ownership is statistically significant ($t= 5.014$, $p < 0.001$), suggesting that the ownership concentration of firms audited by non-Big 4 auditors is higher than firms audited by Big 4 auditors. Confirming the results of Francis et al. (2009) and Niskanen et al. (2010), hypothesis 1 that the firm controlled by a large controlling shareholder is likely to select non-Big 4 audit firms is accepted. This result reveals that firms controlled by a large shareholder may want to maintain opaqueness gains by selecting audit firms that provide low-quality audit. As the ownership concentration of firms decreases, firms are becoming more aware of agency problems, driving these firms to select Big 4 audit firms that provide high-quality audit. Namely, high quality auditors play a prominent role in reducing agency problems that may exist between controlling and minority shareholders.

According to the results of univariate test, there is a statistically significant difference in the means of Big 4 auditors' clients and non-Big 4 auditors' clients for foreign ownership ($t=-2.117$, $p < 0.001$). Hypothesis 2 that higher percentage of foreign ownership increases the probability of selecting Big 4 audit firms is accepted. This result is consistent with the findings of Guedhami et al. (2009), Dyck (2001) and Coffee (1999). This result indicates that foreign shareholders of firms are concerned about the reliability and accuracy of financial statement and wish to keep their investment secure. This result corroborates the opinion that firms with a high level of foreign ownership select Big 4 auditor to increase the accuracy and reliability of financial statements.

The pairwise comparison reveals that Big 4 auditors' clients are higher leveraged than non- Big 4 auditors' clients. The mean leverage of Big 4 auditors' clients and non-Big 4 auditors' clients is 0.584 and 0.478, respectively. This is consistent with the findings of Gul et al. (2010), Beasley and Petroni (2001) and Reed et al. (2000). Hypothesis 3 is accepted. Agency problems can increase as the firms rely more on debt capital. Highly leveraged firms

select Big 4 auditors in order to decrease agency problems that may exist between the firm management and creditors.

Table 3 indicates there is a statistically significant difference in the means of Big- 4 auditors' clients and non-Big 4 auditors' clients for size. The size of firms audited by Big 4 auditors are greater than that of firms audited by non-Big 4 auditors. It can be inferred that an increase in size measured by the logarithm of the firm's total assets increases the likelihood of assigning financial auditing to a Big 4 audit firm. Hypothesis 4 is accepted. Due to having more complex operations, large-sized firms may face serious agency problems. Therefore, a high-quality auditor is demanded. Generally speaking, auditors in Big 4 audit firms are better-trained and experienced. Hence, Big 4 auditors audit large-sized firms more effectively.

Firms audited by Big 4 auditors have a higher percentage of outside board members than firms audited by non-Big 4 auditors have. In other words, firms that have greater board independence tend to employ Big 4 auditors. The average percentage of outside board members in firms audited by Big 4 auditors and firms audited by non-Big 4 auditors is 0.324 and 0.244, respectively. This result supports the findings of Beasley and Petroni (2001). Hypothesis 5 is accepted. Board of directors are responsible for monitoring the financial reporting processes and creating key controls to the strategic risks. This result may imply that independent board members demand high-quality auditing to safeguard themselves from the possible damage caused by financial statement fraud.

The result of univariate analysis reveals that there is a statistically significant difference in the means of Big- 4 auditors' clients and non-Big 4 auditors' clients for organizational complexity. As firms' complexity measured by the ratio of sum of property, plant, inventory and receivables to total assets increases, firms tend to select a Big 4 audit firm. High level of organizational complexity can lead to information asymmetry. There is a positive relationship between client firms' organizational complexity and audit risk. This result suggests that firms that have higher organizational complexity are more likely to select a Big 4 audit firm in order to mitigate audit risk, therefore hypothesis 6 is accepted. This result indicates that firms with a high degree of organizational complexity are more likely to select high-quality auditors that can minimize audit risk arising from high level of organizational complexity.

6. THE RESULTS OF EMPIRICAL ANALYSIS

In this part of the study. The results of discriminant analysis are presented. Discriminant analysis is a strong classificatory technique created by R.A. Fisher in 1936. Discriminant analysis, one of most popular method used in the accounting research, enables us to identify variables that best discriminate among groups. In the discriminant analysis, the empirical model is linear; namely, the dependent variable and independent variables have a constant relationship with each other (Marcoulides and Hershberger, 1997). Undoubtedly, no functions yield perfect discrimination, but it may provide important insights into auditor selection process. There are four primary assumptions for discriminant analysis (Verma, 2013).

- Independent variables are normally distributed
- Independent variables are not correlated with each other
- The error terms are normally distributed
- Group covariance matrices are equal across groups

Shapiro-Wilk test is used to test for normality. According to the results of Shapiro-Wilk tests, alternative hypothesis is rejected, thus leverage, size, % of outsiders, complex, ownership concentration and foreign ownership have normal distribution.

Table 4. Shapiro-Wilk Test for Normality

Variable	W-Statistic	Z-statistic	P-value
Ownership	0.98423	0.470	0.31919
Foreign Ownership	0.97773	1.233	0.10884
Leverage	0.98716	-1.044	0.85165
Size	0.97579	1.418	0.07814
% of Outsiders	0.99303	-1.244	0.89333
Complex	0.98249	0.701	0.24177

A variance inflation factor greater than 10 can cause a multicollinearity problem (Tattar et al., 2016). If there is multicollinearity among variables, the reliability and accuracy of empirical analysis results may decrease (Padgett, 2016). Table 5 shows that all variance inflation factors are less than two, implying that there is no collinear relationship among predictor variables.

Table 5. Variance Inflation Factors

Variable	VIF	1/VIF
Ownership	1.15	0.867006
Foreign Ownership	1.08	0.926841
Leverage	1.01	0.985533
Size	1.02	0.977299
% of Outsiders	1.09	0.914620
Complex	1.06	0.945798
Mean VIF	1.07	

In the discriminant analysis, it is assumed that variance-covariance matrices in the groups are homogenous among groups (Khattree and Naik, 2000). Box's M test is used to test the equality of variance-covariance matrices in the groups. According to the result of Box's M test, p-value for Box's M test is greater than 0.05, thus the null hypothesis that covariance matrices of the predictor variables are equal among groups is accepted.

Table 6. Box's M Test of Equality of Covariance Matrices

Box's M	p-value
6.76	0.081

Table 7 gives the results of eigenvalue and canonical correlations. In the discriminant analysis, two groups are used, namely 'firms audited by non-Big 4 auditors' and 'firms audited by Big 4 auditors', so only one function is shown. The size of eigenvalue is strongly associated with the discriminating power of the empirical model (Klecka, 1980). Eigenvalues reveal the discriminating power of the functions (Carlberg, 2014). A greater eigenvalue is related with a strong function. The eigenvalue, greater than 1.00, aids in identifying the number of factors (Ray and Mahavidyalaya, 2017). Table 7 indicates that eigenvalue is more than 1.00.

Canonical correlation value is used to evaluate the importance of discriminant function. A high value of canonical correlation implies a function that effectively discriminates. The present canonical correlation of 0.73 is moderately high.

Table 7. Eigenvalues and Canonical Correlations

Function	Eigenvalue	% of variance	Cumulative %	Canonical Correlation
1	1.13914	1.000	1.000	0.73

Wilks' Lambda statistic is used to analyze the discriminant functions' significance (Verma, 2013). According to the table 8, the value of Wilks' Lambda (λ) statistic is 0.4674, indicating that the empirical model has strong discriminating power. The p-value is highly significant (p-value<0.0000).

Table 8. Wilks' Lambda

Test of Functions	Wilks' Lambda	df	Sig.
1	0.4674	6	0.0000

The canonical structure coefficients are used to measure the correlation between independent variables and discriminant function. The canonical structure coefficients give information about the power of independent variables in discriminating firms. The variables with larger coefficients improve the discriminating power of the functions much more than do variables with lower coefficients. Therefore, *OWN*, *SIZE*, and *% of OUTSIDERS* contribute the most to the empirical model in discriminating between firms audited by Big 4 auditors and firms audited by non-Big 4 auditors. As a result of discriminant analysis, the following discriminant function is created;

$$Z = (0.678 \text{ OWN}) + (-0.168 \text{ FOWN}) + (-0.179 \text{ LEV}) + (-0.588 \text{ SIZE}) + (-0.292 \% \text{ of OUTSIDERS}) + (-0.288 \text{ COMPLEX})$$

Table 9. Standardized Canonical Discriminant Function Coefficients

Variables	Function 1
OWN	0.678
FOWN	-0.168
LEV	-0.179
SIZE	-0.588
% of OUTSIDERS	-0.292
COMPLEX	-0.288

Table 10 presents the classification results of discriminant analysis. Classification results reveal that 86.1% of the sample firms are correctly classified. The discriminant function inaccurately classifies only five out of 42 firms audited by a non-Big 4 auditor and eight out of 52 firms audited by a Big 4 audit firm. The classification results indicate that the constructed discriminant model can prominently help to develop a reliable model that identifies factors affecting firms' auditor choice.

Table 10. Classification Results

True auditor	Classified		Total
	0	1	
0	37	5	42
	88.10%	11.90%	100%
1	8	44	52
	15.38%	84.62%	100%
Total	45	49	94
	47.87%	52.13%	100%

7. CONCLUDING REMARKS

In the last two decades, with the acceleration of economic globalization, the audit firms have grown tremendously. Audit firms are expected to play a more noticeable role in the development of emerging economies. The primary function of audit firms is to enhance the quality of financial statements, thus high quality of financial reporting process may mitigate agency problems between the firm management and creditors. Additionally, the auditing activity may decrease the cost of capital and expand capital availability (Pitman and Fortin, 2004).

With a sample of 94 firms operating in Turkey, this study aims to investigate the factors that may influence the firms' auditor choice. Out of 94 firms sampled for the study, 52 firms are audited by Big 4 auditors, whereas 42 firms select a non-Big 4 auditor. This study

uses univariate analysis and discriminant model to identify factors affecting firms' auditor choice. In the discriminant model; ownership concentration, leverage, size, percentage of outsiders, foreign ownership and organizational complexity are used. The results of discriminant analysis support all six hypotheses employed to test the determinants of the auditor choice of firms listed on Borsa İstanbul. Taken together, ownership concentration, leverage, percentage of outside board members, foreign ownership, firm size and complexity have discernible effects on auditor choice of firms listed on Borsa İstanbul. The results of discriminant analysis indicate that the likelihood that a Big 4 auditor is selected is increasing in the percentage of outside board members, organizational complexity, foreign ownership, leverage and size. Additionally, the likelihood that a firm chooses a Big 4 auditor rises as ownership concentration decreases.

Firms with a low level of ownership concentration are more exposed to agency problems. For this reason, firms with a low level of ownership concentration are more likely to select more prestigious audit firms to mitigate agency problems. Firms listed on Borsa İstanbul are more likely to select Big 4 auditors, as the proportion of foreign shareholdings rises. Foreign owners of firms tend to select a high quality auditor that protect them from the likelihood of financial statement fraud. Empirical evidence appears to suggest that highly leveraged firms are more likely to select Big 4 auditors that provide a stronger protection of firms' creditors and higher disclosure requirements drive firms listed on Borsa İstanbul to select a Big 4 auditor. It is difficult to audit large-sized firms that have complex operations. The audit of large-sized firms requires deep expertise and experience. Large-sized firms are more likely to select Big 4 auditors that have extensive experience in dealing with complex business operations. The large-sized firms may demand additional professional services that are more likely to be provided by Big 4 auditors. Greater board independence leads to the selection of Big 4 auditors, suggesting that firms with greater board independence rely on more auditing services provided by Big 4 auditors for constraining earnings management and mitigating agency problems. Firms with a high degree of organizational complexity are more likely to select Big 4 auditors. It is more difficult to audit client firms with a high degree of complexity. Big 4 auditors that are more experienced and trained can effectively deal with complex issues.

The classification table reveals that the percentage of correct classification, provided by the discriminant model, is 86.1%. The discriminant model inaccurately classifies five out of 42 firms audited by non-Big 4 auditors and eight out of 52 firms audited by Big 4 auditors. The classification results reveals that the discriminant model significantly sheds light on the factors affecting the firms' auditor choice. Policymakers can use the results of empirical analysis in designing audit environment that fosters economic development. It is worth mentioning that it is possible to construct a more efficient and reliable model with more sophisticated multivariate models.

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