Decomposing Fees paid to Audit Firms
- Assessing Knowledge Spillovers and Independence

Claus Holm
Professor, PhD
Department of Economics and Business
Aarhus University
Fuglesangs Alle 4
DK-8210 Aarhus V
Denmark
hoc@asb.dk

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Abstract: We extend prior studies (e.g., Whisenant et al., 2003; Krishnan and Yu, 2011; Chan et al., 2012) by explicitly utilizing a stringent decomposition of total fee paid for audit services and other services in a sample of listed non-financial Danish companies. When controlling for the joint determination of fees pertaining to the statutory audit and non-audit services, we find support for the existence of positive knowledge spillover *from* non-audit *to* audit and the possible independence problems related to this economic bonding. In terms of the non-audit components, the knowledge spillover argument holds for tax services provided. Some support is also found for other services provided, but not for the provision of audit-related services. We also consider the implication of new regulation of the provision of non-audit services in EU countries. From the perspective of maintaining independence, there will be no apparent conflict with continued allowance to provide audit-related services. Prohibiting most tax services and a wide array of other services could have detrimental effect on potential knowledge spillover benefits, while our findings also suggest that the potential for economic bonding could be constrained.

Keywords: Knowledge spillover, independence, audit fees, non-audit fees, 2SLS

1. Introduction

A major conflict is at the heart of the provision of non-audit services to public-interest entities (PIEs). In addition to the statutory audit, the audit firms have traditionally provided an array of services to corporations based on their experience and expertise within business-related matters. The value of knowledge spillovers between various services provided by audit firms have been argued by both corporations and the accounting profession to make considerable contributions to economic growth of the companies and wealth of the society. Audit market regulators have taken the opposite stance advocating the better interest of the financial statement users. Regulators overseeing the major financial markets (including the US and European Union) have strenuously questioned the possibility of audit firms to retain independence from especially the large PIE clients when paying fees for both the statutory audit and non-audit services. The purpose of our study is to examine and discuss possible implications arising from this underlying conflict. We aim to qualify the discussion of non-audit services by entertaining the importance of non-audit fee decomposition.

Our study provides two main contributions. The first contribution relates to previous research knowledge on the association between audit and non-audit fees. Consistent with a majority of prior audit fee studies (Hay et al., 2006b; Hay, 2013), we find a positive significant relationship between audit fees and the total of non-audit fees when the fee determinants model is based on single equation (OLS) regression. It is the contention that the fee components proxy for the level of services provided and as such follow the physical flow of knowledge, e.g., the execution of the statutory audit will benefit from other services provided to the company such as accounting consultations and tax advice (Simunic, 1984). Our finding seems to hold when we control for the effect of joint determination of audit and non-audit fees applying two-stage testing. When controlling for the joint determination of fees using strong instrumental variables we find that a positive relationship between audit fee and the total of non-audit fee can be inferred from the

Danish sample of non-financial listed companies. Thus the implications are the existence of positive knowledge spillover *from* non-audit *to* audit and the possible independence problems related to the economic bonding. We extend prior studies (e.g., Whisenant et al., 2003; Krishnan and Yu, 2011; Chan et al., 2012) by explicitly utilizing a stringent decomposition of total fee paid for audit services and other services by PIEs. Due to regulatory disclosure requirements for companies within the European Union we have access to fee composition data on a homogeneous reporting scheme over several years. Listed companies in Denmark adhere to the PIE classification and, thus, disclose the fee composition paid to the audit firm appointed as the statutory auditor for the financial year. As such the total fee can be broken down into four components, namely the fee for the statutory audit, fee for audit-related services, fee for tax services and fee for other services. When controlling for the joint determination of fees pertaining to the statutory audit and the individual non-audit fee components, the knowledge spillover argument holds for tax services provided. We find some support for the knowledge spillover argument for other services provided, but not for the provision of audit related services.

The second contribution relates to policy implications for new audit market legislation and subsequent implications for companies and audit firms. The recent amendment of the statutory audit Directive (EC, 2014a) and the associated Regulation 537/2014 (EC, 2014b) by the European Commission will prohibit a number of non-audit services for firms auditing public-interest entities. The implementation of the amended Directive and associated Regulation into national legislation in the individual EU countries will likely have a considerable effect in many audit markets where the provision of non-audit services previously has differed from a total ban in France to no restrictions beyond requiring necessary safeguard in a client by client case (Quick, 2012). The individual EU countries such as Denmark face the option to ban additional non-audit services or under specific conditions to allow certain tax and valuation services. The implication of the findings in our study is

that the extent of total non-audit services provided of audit firms responsible for the statutory audit will have to be diminished extensively in the future. Our findings suggest that fee for audit-related services are determined independently from audit fees, hence from the perspective of maintaining independence, there will be no apparent conflict with the continuing allowance for audit firms to provide this type of service. Prohibiting most tax services as well as a wide array of other services could, however, have notable detrimental effect on such knowledge spillover benefits that we identified for the pre-regulation period considered in this study. In turn, the positive association between fees for these non-audit services and the audit fee illuminates the potential existence of economic dependency which the new regulation likely will have the ability to constrain.

The remainder of this paper is organized as follows. In section 2 we consider extant literature on fee composition leading to the development of our hypotheses. In section 3 we present the research design. Section 4 presents the main analyses and in section 5 we consider further robustness results. Section 6 concludes with discussion, summary of contributions and limitations of the study.

2. Literature review and hypotheses development

Fee composition has been a central key in prior studies examining multiple audit phenomena such as auditor independence, knowledge spillover in the supply of auditor provided services, auditor specialization and audit firm competition. Non-audit services provided by auditors to their clients are the subject of continuing controversy reflected in political and economic debate on the appropriate level of audit market regulation as well as seemingly conflicting research findings. This reflects that the relationship between audit fees and non-audit services fees is complicated. Some recent studies have shown that there is a positive relationship when OLS is used, but this relationship disappears when simultaneous-equation estimation is used, implying that audit fees and

non-audit fees are jointly determined by factors related to the client company (Hay et al., 2006a; Whisenant et al., 2003). Other recent studies provide contrary results (e.g., Krishnan and Yu, 2011; Antle et al., 2006), i.e., finding significant relationships between audit fees and non-audit fees, with the suggested implication of knowledge spillovers both from audit to non-audit services and vice versa. Towards developing hypotheses, we first review prior fee literature from each of the vantage points of (a) auditor independence and (b) knowledge spillover in the supply of auditor provided services – in order to clarify possible implications of seemingly related and potentially conflicting research findings based on fee models.

2.1 Fee studies, audit regulation and auditor independence

Ample prior research have considered the auditors ability to restrain the non-audit services provided to clients (e.g., Firth, 1997; Canning and Gwilliam, 1999; Dopuch et al., 2003; Larcker and Richardson, 2004; Hay et al., 2006a; Lim and Tan, 2008; Quick and Warming-Rasmussen, 2009). In the company-auditor relationship the extent of non-audit services provided by the audit firm may be considered a threat to independence in appearance (e.g, Quick and Warming-Rasmussen, 2009; Larcker and Richardson, 2004; Ruddock et al., 2006; Khurana and Raman, 2006). It is notable that prior studies provide inconsistent findings on a link between non-audit fees and auditor independence (see DeFond et al., 2005; Francis, 2006). In the literature review of NAS studies reported by Beattie and Fearnley (2002, 45), they summarize that the comparability of previous studies are hampered by differences in applied measures and methodology, as well as, the fact that economic and regulatory environment is likely to vary both between countries and over time.

Most prior studies considering independence by examining the relationship between audit and non-audit fees have been conducted in the US setting (see also Alexander and Hay, 2013). In the US, the Sarbanes-Oxley Act of 2002 led to a ban on many auditor-provided non-audit services.[1] Divergence

of findings in US-based studies conducted under different regulatory regimes is considered in section 2.2. In Europe, the relationship between audit and non-audit fees have primary been examined in studies from UK (e.g., Zaman et al., 2011; Basioudis et al., 2008; Antle et al., 2006) and Germany (e.g., Dobler, 2014; Fleischer and Goettsche, 2012; Köhler and Ratzinger-Sakel, 2012). For EU countries Regulation 537/2014 (EC, 2014b) will prohibit a number of non-audit services for firms auditing public-interest entities. Based on the argument that certain services other than the statutory audit *may compromise the independence of the auditor*, the Regulation state that it is 'appropriate to prohibit the provision of certain non-audit services such as specific tax, consultancy and advisory services' (EC, 2014b, (8)). Article 5 of the Regulation 537/2014 provides an extensive list of non-audit services which should be considered as prohibited.[2] In the implementation of the amended Directive and associated Regulation into national legislation the individual EU countries face the option to ban additional non-audit services. Despite the explicit list of prohibited services the countries also have the option to allow certain tax and valuation services conditional on the set up of appropriate independence safeguards supervised by the audit committees of the clients and on the ability of the auditors to document that the services provided are of immaterial effect on the financial statements (EC, 2014b, article 5).

The decomposition of NAS has been considered in previous studies on auditor independence. In the study by Antle et al. (2006) in the UK setting "taxes paid" was used as proxy variable to capture the tax component of NAS. The study by Alexander and Hay (2013) examined the effects of recurring and non-recurring NAS on auditor independence. In this study it is argued that the threat of economic bonding may differ depending on the type of NAS and they observe that tax services have a more recurring nature than consultancy services in the New Zealand setting. However, they find that neither recurring nor non-recurring NAS are associated with audit fees when controlling for

joint determination using 2SLS. In the study by Dobler (2014), the decomposition of NAS into fee for audit-related services, fee for tax services and fee for other services is examined for German private firms. He report on the distinction between fee composition of both private family firms and listed family firms (using IFRS reporting as indicator for listing or private) in the first year of decomposed fee disclosure (2009). Based on NAS fee proportions he finds that auditors provide more audit-related services and other services to the listed family firms, while the fee proportions for tax services are similar for the two types of family firms. When controlling for joint determination of total NAS and audit fees, he finds that only the private family firms exhibit a positive association between the fees, thus indicating that the possibility of economic bonding and perceived threat to perceived independence is more prevalent for the non-listed firms (Dobler, 2014, 440).

2.2 Fee studies and knowledge spillover

The joint provision of audit and non-audit services may provide the audit client with benefits arriving from knowledge spillover from non-audit services provided by the statutory auditor to the audit and/or knowledge spillover from the audit to non-audit services. Such synergies could be client-specific or general in nature (Simunic, 1984, 681). The benefit of knowledge spillover for the specific client may be related to both quality of the services provided and the pricing of these. In terms of pricing, both law-balling on the delivery of audit (loss-leader argument to accommodate the demand side) and audit firm efficiency obtained by joint provision of audit and non-audit services (cost argument from the supply side) would suggest a negative relationship between the pricing of the two services. If economies of scope results from the joint provision of services this would allow the auditor to lower the price, e.g., in order to retain clients in a price-competitive audit market. In his analytical paper on auditing, consulting and auditor independence Simunic (1984) entertains the possibility that the auditor will retain part (or most) of the cost savings from the

knowledge spillover. Hence, when audit and non-audit services are jointly provided by the auditor a positive association between client specific audit fees and non-audit fees could also be interpreted as consistent with knowledge spillover effects. A number of single-equation estimation models have supported that a positive relationship between client specific audit fees and non-audit fees is common (Hay, 2013; Hay et al., 2006b). The interpretation of knowledge spillover effects have been made by previous studies, but further reexamined testing for joint determination of fees using simultaneous-equation models (see Whisenant et al., 2003; Antle et al., 2006; Krishnan and Yu, 2011; Dobler, 2014).

Joint provision of services may constitute an independence problem as stated in section 2.1. In addition, it has been questioned whether the client actually benefit from the joint provision of audit and non-audit services. Whisenant et al (2003) examine data from US companies which suggest that previous findings of a positive relationship between audit and non-audit fees may be explained as resulting from estimation-biases in miss-specified fee-models. In effect, when using simultaneous-equation models containing the relationship between audit fee and non-audit fee, no significant relationship between the two is found. Hence, they infer that the claimed benefits of joint provision of audit and non-audit services cannot be supported (to the same extent) when the relationship is estimated by models allowing for the joint determination of fees (Whisenant et al., 2003, 742). Their finding is supported by Hay et al. (2006a) which suggest that audit fees and non-audit fees also are jointly determined in a smaller sample of New Zealand companies when the issue is controlled for in a simultaneous-equation model. Other studies applying simultaneous-equation fee models have found support for the existence of knowledge spillover effects (Antle et al., 2006; Krishnan and Yu, 2011; Chan et al., 2012). The findings by Antle et al. (2006) suggests positive significant relationships in both directions between audit and non-audit fees for a sample of UK companies. The findings by Krishan and Yu (2011) also infer knowledge spillover in both

directions, i.e., finding negative relationships between audit and non-audit fees for a large US sample of companies, which in contrast to the study by Whisenant et al. was considered for the post-SOX regulation period. The extended list of prohibited non-audit services introduced as part of the SOX regulation (see section 2.1) could also help explain the differences in findings between these two US-based studies conducted under different regulatory regimes. In the study by Chan et al. (2012), the simultaneous-equation models were further probed for robustness by considering the econometric requirements of the models. In effect, a main concern has been the use of appropriate instrumental variables (IVs) in the application of two-stage models in the previous research on joint determination of fees. Their study also consider US data and find that when the instruments are inappropriate (weak) no relationship between audit and non-audit fees are found, however knowledge spillover may be inferred by a positive relationship between audit and non-audit fees when appropriate (strong) instruments are applied in simultaneous-equation estimations (Chan et al., 2012, 320).

In the study by Antle et al. (2006) they also control for joint determination of audit quality measured as abnormal accruals and find that NAS decreases abnormal accrual. Consistent with this finding, more recent studies examining the nature of knowledge spillover from NAS to the audit in US (Knechel and Sharma, 2012) and in New Zealand (Knechel et al., 2012) suggest that the provision of NAS does not compromise the quality of the audit; rather it enables the efficiency of the audit (measured as audit reporting lag).

2.3 Hypotheses

We state our hypotheses in the form of null-hypotheses, suggesting that audit fee is determined independently of non-audit fee (joint determination), thus inferring absence of an independence problem and absence of knowledge spillover from non-audit service to audit services. Our first

hypothesis addresses the possible relationship between audit fees and the total of non-audit fees, while our second hypothesis addresses the possible relationship between audit fees and the individual non-audit fee components:

H1: Audit fees are not associated with total non-audit fees, controlling for the effect of joint determination of audit and non-audit fees.

H2: Audit fees are not associated with the individual non-audit fee components of audit related services, tax services and other services, controlling for the effect of joint determination of audit and non-audit fee components.

3. Methodology and research design

3.1 Sample data

The dataset is derived from the Orbis database by Bureau van Dijk, plus manually collected information from annual reports in relation to fee data. In addition information needed to calculate the reporting measure AUDITLAG (see Table 1 for variable definitions) has been manually collected from the Copenhagen OMX online Newsclient. For each of the years 2010 to 2012 we have 117 observations related to non-financial companies listed at the Nasdaq OMX Copenhagen stock-exchange. The dataset is almost balanced for the three years from 2010 to 2012 with a total of 351 usable firm-year observations. The dataset also include fee data from 2009 in order to apply one year lagged observations into fee variables needed for the full pooled sample estimations.

<Insert Table 1 Variable Definitions about here>

3.2 Models and variables

Listed companies in Denmark disclose the fee composition paid to the audit firm appointed as the statutory auditor for the financial year. We initial consider the possible implications of different fee

classifications. In Denmark, the fee disclosure requirement instituted by the EC directive on statutory audits (EC, 2006) with effect for the financial reporting directive (EC, 1978) has been implemented such that the listed companies have to disclose the total fee as well as specify the fees for the statutory audit of the financial statements, fees for assurance engagements, fees for tax advice and fees for other services (DBA, 2013, paragraph 96, item 2). The fee for the statutory audit does not include other mandatory attestation services which contrast the US fee composition scheme where the audit fee category consists of all fees necessary to perform the audit or review in accordance with GAAS. According to classification scheme of the American data-provider "Audit Analytics", the audit fee category also include services that generally only the independent accountant reasonably can provide such as comfort letters, statutory audits, attest services, consents and assistance with and review of documents filed with the SEC (Audit Analytics, 2011). This is based on the contention that the latter services are expected to be provided by the independent accountant (aka the appointed auditor) and not by other service providers. This has led to diverse practices in extant academic literature. The pragmatic solution favored by a number of studies has been to use the sum of audit fees and audit-related fees as a proxy for audit fees. That is non-audit fees in such studies does not include audit-related fees even though the services provided for this category may reflect both recurring and non-recurring items. Hence, we also examine the robustness of the fee determinants models to alternative specifications (see section 5). Consistent with the majority of prior fee studies (see Hay, 2013; Hay et al., 2006b), all our fee measures are transformed using the natural logarithm to annual fees measured in thousand Euros. We start out with a core audit fee determinants model, which has evolved from the seminal study by Simunic (1980). The control variables included reflects key determinants considered in prior studies examining the joint determination of audit and non-audit fees (Whisenant et al., 2003; Antle et al., 2006; Krishnan and Yu, 2011) and additional controls for "audit-market concentration" (HERF) and

"auditor expertise" (AUDITSPEC) as suggested by the study of knowledge spillovers by Wu (2006). First we specify two single-equation fee composition models:

$$\text{LnFSA} = \beta_0 + \beta_1 \text{LnFNSA1} + \beta_4 \text{BIG4} + \beta_5 \text{JOINT} + \beta_6 \text{INITIAL} + \beta_7 \text{SIZE} + \beta_8 \text{LEVERAGE} + \beta_9 \text{LOSS} + \beta_{10} \text{CAtoCL} + \beta_{11} \text{INVREC} + \beta_{12} \text{ROA} + \beta_{13} \text{SQRTSUB} + \beta_{14} \text{FOROPS} + \beta_{15} \text{MJSH} + \beta_{16} \text{BUZYSEASON} + \beta_{17} \text{LARGECAP} + \beta_{18} \text{SMALLCAP} + \beta_{19} \text{AUDITLAG} + \beta_{20} \text{AUDITSPEC} + \beta_{21} \text{HERF} + \varepsilon \quad (1)$$

$$\text{LnFSA} = \beta_0 + \beta_1 \text{LnFARS1} + \beta_2 \text{LnFTAX1} + \beta_3 \text{LnFOS1} + \beta_{4\text{-}21} \text{CONTROL VARIABLES} + \varepsilon \quad (2)$$

In equation (1) and (2) the dependent variable is the fee for the statutory audit (FSA). In equation (1) the fee for the statutory audit is specified as a function of FNSA (fee for non-statutory audit services), that is the sum of all fees which are not related directly to the statutory audit. In equation (2) the fee components are fully specified in accordance to the available fee disclosures (fee for audit-related services (FARS), fee for tax services (FTAX) and fee for other services (FOS). Both models hold the same set of control variables as specified in equation (1). In order to keep observations of companies with no purchase of non-audit services, the logged variable LnFNSA1 is measured as the natural logarithm to 1 + non-audit fees, thus providing the minimum observation of 0 in the cases involving logged transformation of no non-audit fees (ln 1=0), see also Hay (2013). This approach is applied consistently for measures of all non-audit fee components.

In order to examine whether audit fees and non-audit fees are joint determined in the Danish audit market (H1) we test whether the data provide consistent results from a single-equation and a simultaneous-equation specification of the relationship between the two. Following Whisenant et al. we specify the following simultaneous-equations audit fee model:

First stage

$$PLnFNSA1 = \alpha_0 + \alpha_{4\text{-}21}\ CONTROL\ VARIABLES + \alpha_{22}\ IV + \varepsilon \quad (3a)$$

Second stage

$$LnFSA = \beta_0 + \beta_1\ PLnFNSA1 + \beta_{4\text{-}21}\ CONTROL\ VARIABLES + \varepsilon \quad (3b)$$

In the simultaneous-equation audit fee model we first estimate the model for non-audit fee (equation 3a) and then use the predicted variable (PLnFNSA) as determinant in estimating LnFSA (equation 3b) instead of the observed proxy LnFNSA in the single-equation model (equation 1). The purpose of the instrumental variables (IVs) applied is to avoid the bias that OLS suffers if the potential endogenous non-audit fee variable is correlated with the regression's disturbance term (ε).

In order to examine H2, we extend the simultaneous-equations audit fee model such that the fee components are fully specified in accordance to the available fee disclosures (FARS1, FTAX1 and FOS1 respectively):

First stage

$$PLnFARS1 = \alpha_0 + \alpha_{4\text{-}21}\ CONTROL\ VARIABLES + \alpha_{23}\ IV + \varepsilon \quad (4a)$$

$$PLnFTAX1 = \alpha_0 + \alpha_{4\text{-}21}\ CONTROL\ VARIABLES + \alpha_{24}\ IV + \varepsilon$$

$$PLnFOS1 = \alpha_0 + \alpha_{4\text{-}21}\ CONTROL\ VARIABLES + \alpha_{25}\ IV + \varepsilon$$

Second stage

$$\text{LnFSA} = \beta_0 + \beta_1 \text{PLnFARS1} + \beta_2 \text{PLnFTAX1} + \beta_3 \text{PLnFOS1} + \beta_{4\text{-}21} \text{CONTROL VARIABLES} + \varepsilon \quad (4b)$$

In all equations a shared set of control variables are applied. The CONTROL VARIABLES identified in equations (1) to (4) correspondents to the variables described in the following. We subdivide the description in three types of attributes consistent with the typology used in the meta-analysis of prior fee studies by Hay (2013). First, we include a number of variables which can be identified as *client attributes* related to size, complexity and risk (Hay, 2013; Hay et al., 2006b). As in the majority of prior fee studies, we expect client size to be positively related to audit fees. The variable SIZE is measured as the natural logarithm of total assets in th. Euros. Complexity is also expected to increase audit fees. We include SQRTSUB and FOROPS as complexity measures. SQRTSUB is the square root of the number of subsidiaries. FOROPS is an indicator variable with the value of one if the company has foreign operations, and zero otherwise. The level of audit fee typically increases with level of inherent risk. We proxy inherent risk by the clients' inventory and receivables. INVREC is the ratio of the sum of inventory and receivables to total assets. We apply two measures for profitability, i.e., we expect audit fees to be negatively associated with ROA and positively associated with LOSS. ROA is the ratio of EBIT to total assets. LOSS is an indicator variable with a value of one if net income is negative, and zero otherwise. In terms of leverage and liquidity, we include the variables LEVERAGE (expectation of positive association with fees) and CAtoCL (expectation of negative association). LEVERAGE is the ratio of debt to total assets. CAtoCL is the ratio of current assets to current liabilities. In terms of form of ownership and industry, we do not have specific expectations on the direction of association with audit fees. We include the ownership variable MJSH which is an indicator variable with the value of one if major

shareholders hold more than 25% of direct total ownership, and zero otherwise. We include a set of 10 industry dummies in order to control for industry fixed effects. The industry dummies are based on the industry classification ICB applied in the Orbis database. In addition we include indicator variables capturing elements of size and demand for transparency and accountability. Using MIDCAP as the reference category, we expect a positive association between LARGECAP and audit fees and a negative association between SMALLCAP and audit fees. LARGECAP is an indicator variable with the value of one if the company is registered as Large Cap on the OMX Copenhagen Stock Exchange, and zero otherwise. SMALLCAP is an indicator variable with the value of one if the company is registered as Small Cap on the OMX Copenhagen Stock Exchange, and zero otherwise.

Second, we include several *auditor attributes* related to auditor quality and tenure. Based on previous research (e.g., Kallunki et al., 2007; Zerni et al., 2012), we expect a positive association to BIG4 and JOINT and negative association to INITIAL. BIG4 is an indicator variable with the value one if a Big Four audit firm conduct the audit, and zero otherwise. JOINT is an indicator variable with the value of one if the audit is conducted by two audit firms (joint audit), and zero otherwise. INITIAL is an indicator variable with the value of one if the audit is in the initial two years of an audit engagement, and zero otherwise. We have considered control variables suggested in an analytic study by Wu (2006), who examines a model which presumes two interrelated market places for audit services and non-audit services, both characterized as having oligopolistic competition. The analyses suggest that it would be difficult to find empirical support for knowledge spillover benefits unless two types of control variables are included in audit fee regressions, namely proxies for "audit-market concentration" and proxies for "auditor expertise" (Wu, 2006, 549). In order to consider this explicitly, we include the variables HERF and AUDITSPEC for which we expect a positive association with audit fees. HERF is the Herfindahl index which is measured as

the sum of squares of the percentages of audit firm market shares in each industry (e.g., Bigus and Zimmermann, 2008; Boone et al., 2012). We calculate market shares on the basis of square-roots of total assets. AUDITSPEC is an indicator variable with the value of one if the company is audited by an audit firm with the largest market share in the industry or by an audit firm with a market share above 15 percent, and zero otherwise (e.g., Lim and Tan, 2008).

Third, we include several *engagement attributes* in addition to the non-audit fees related to our hypotheses. Based on prior research (Hay, 2013; Hay et al., 2006b), we expect a positive association between audit fees and BUZYSEASON and a negative association to AUDITLAG (see also Knechel and Sharma, 2012; Knechel et al., 2012). BUZYSEASON is an indicator variable with the value of one if the company uses the calendar year as the financial year, and zero otherwise. AUDITLAG is measured as the number of days between year-end and the date of the auditors' report accompanying the annual report.

Finally, we consider different candidates for instrumental variables. We include the variable NEWEMS which is an indicator variable with the value of one if the company issues new stock equity, and zero otherwise. The variable has been used in the first-stage estimations of non-audit fees in previous studies examining joint determination of audit fees and non-audit fees (Krishnan and Yu, 2011; Antle et al., 2006; Whisenant et al., 2003). For all fee components, we have also collected the corresponding fees in the year before (LAG1) and two years before (LAG2). We use this information to derive lagged values in order to control for recurring nature of the services provided (e.g., Causholli et al., 2014; Alexander and Hay, 2013). The possibility of critical thresholds or levels of non-audit fees have been considered in prior studies (e.g., Dobler, 2014; Knechel et al., 2012). In order to control for possible fee dependence on the individual client, we provide measures for "important" non-audit fees for each of the components (IMPARS1, IMPTAX1 and IMPOS1) measured by indicator variables with value of one if client specific fee

component is above the average of fee component for all clients of the individual audit firm in the current year. We apply these measures as alternative IVs in the 2SLS estimations.

4. Analyses

4.1 Descriptive statistics

We provide descriptive statistics in table 2. For each of the years 2010-2012 we have 117 observations, although the sample is not perfectly balanced. Panel A provides an overview of the distribution of the continuous variables for the three years and for the total pooled sample. The company characteristics SIZE, LEVERAGE, INVREC, CAtoCL and ROA remain relatively stable over the period. There is an increase in the number of subsidiaries, that is, the proxy for technical complexity of the audit SQRTSUB increases an average from 4.0 to 4.4. Over the period the reporting lag decreases, that is AUDITLAG drops from average of 72.5 (median 74 days) in 2010 to 68.4 (median 71 days) in 2012. For the full period the minimum observed AUDITLAG is 19 days while the maximum is 114. The 90 percentile of 90 days for the full set of observations corresponds with the three months maximum rule of the Nasdaq OMX Copenhagen Stock Exchange for companies filing audited annual financial statements. Hence, the extent of late filers is identified by the 90 percentile.

<Insert Table 2. Descriptive Statistics about here>

Panel B provides an overview of the fee variable statistics. Over the three years both the audit fees and the non-audit fees have diminished slightly. In Denmark the proportion of non-audit fees has traditionally been relatively high, see also Holm and Thinggaard (2014) reporting on the fee development for the period 2005-2008 following the abolition of the mandatory joint audit requirement in Denmark. The indicator variables included in the study are shown in panel C. Most of the listed companies are audited by BIG4 audit firms (for 2012 a total of 104 of 117 companies).

A joint audit (two audit firms) requirement for listed companies was abolished in 2005, however a small group of companies still apply the use of two audit firms for the statutory audit on a voluntary basis (diminishing from 8 in 2010 to 4 in 2012). The proportion of companies with an audit in the initial two years of an audit engagement is about 8 percent on average over the three years. In terms of the use of auditor specialists (AUDITSPEC) there seems to be an increase in 2012, i.e., the increase from 85 to 96 companies audited by an audit firm with the largest market share in the industry or by an audit firm with a market share above 15 percent. Panel C also show the number of observations with positive indicators for LOSS, BUZYSEASON, MJSH, NEWEMS, FOROPS, LARGECAP and SMALLCAP. The LARGECAP index holds 18 individual companies and the SMALLCAP 74. The third OMX index MIDCAP holds the remaining 25 non-financial companies (difference between the total of 117 and 74+18) examined in this study.

4.2 Correlations

In table 3 the Pearson and Spearman correlations between variables in the fee models are provided. It is noticeable that Pearson correlations are found between the audit fee measure LnFSA and most control variables. Exceptions are INITIAL, MJSH, AUDITSPEC and NEWEMS for both Pearson and Spearman correlations. For Spearman correlations the relationship between LnFSA and CAtoCL is not significant either. Further most of the control variables are correlated with the non-audit fee measure LnFNSA1 with the exceptions of JOINT, INITIAL, LOSS and MJSH for both Pearson and Spearman correlations. Overall, this suggests that the majority of determinants in the audit fee and non-audit fee models are shared.

<Insert Table 3. Pearson and Spearman correlations about here>

4.3 Audit fee models

We control for time-fixed effects and company specific clusters when we analyze the pooled data set (Petersen, 2009; Williams, 2000; Froot, 1989). We report results based on robust standard errors (clustered by company). In table 4 we provide an overview of alternative single-equation audit fee models. The different specifications of audit fee models based on OLS estimation all have a high explanatory power (R-squared from 0.89 to 0.90), thus providing support for the variables included as key determinants for audit fee (see also Hay et al., 2006b; Hay, 2013). We do not report adjusted R-squares because this makes no sense statistically when using robust standard errors. In table 4, we also consider the possible effect of industry on the determination of audit fee. In the tests reported in column 3 and 4 we use industry dummies to control for industry fixed effects. Because the concentration measure HERF is strongly related to the underlying subdivision of companies into industries, simultaneous control for HERF and industry fixed effects seem to cause very high VIF scores. We therefore exclude the HERF variable from the audit fee model specifications when controlling for industry fixed effects. The reported VIF factors reported in table 4 suggest that the OLS models presented have no serious problems with multi-collinarity.

The equation (1) model suggests a significant relationship between the fee for the statutory audit and the non-audit fee measured as the total of all other fees (table 4, column 1). This result holds when controlling for industry fixed effects (table 4, column 3). The equation (2) model specify the non-audit fee components applying the logged transformation for fees for audit-related services (LnFARS1), fee for tax services (LnFTAX1) and fee for other services (LnFOS1). We find significant positive relationships between the fee for the statutory audit and (i) fee for tax services (at the 1 percent level) and (ii) fee for other services (at the 5 percent level), but not for fee for audit-related services (table 4, column 2). When controlling for industry fixed effects, we only find a significant relationship between fee for the statutory audit and fee for tax services at the 1 percent level (table 4, column 4).

Across the single equation audit fee models, the key determinants for audit fee are SIZE, INVREC and SQRTSUB (the latter two proxies for audit effort). These models also suggest a positive significant relationship between audit fees and the measure for audit firm concentration (HERF) and a negative significant relationship with the SMALLCAP stock-liquidity measure (and positive relationship with LARGECAP).

<insert Table 4. Single equation (OLS) audit fee models about here>

We now examine the possible endogenous nature of the audit fee model. We report the second stage estimations of the audit fee models in table 5. We do not report the results of the first stage estimations (3a and 4a) which are used to estimate the predicted values for the non-audit fee variables (PLnFNSA1 and the decomposed PLnFARS1, PLnFTAX1 and PLnFOS1 respectively). At the bottom of table 5, we report the Wooldridge (1995) post-estimation statistic for 2SLS estimations with a robust VCE (variance–covariance matrix of the estimator). For each of the columns 1-3, the test statistic is significant thus suggesting that the fee variables being tested must be treated as endogenous.

As a first step, we have chosen to apply the same IV (the variable NEWEMS) which has been used in the first-stage estimations in previous studies examining joint determination of audit fees and non-audit fees (Krishnan and Yu, 2011; Antle et al., 2006; Whisenant et al., 2003). We apply one IV corresponding to the one potential endogenous variable FNSA1, hence the model is just-identified in terms of instruments. The significant control variables of the simultaneous-equation model reported in table 5, column 1 are consistent with the single-equation estimations reported in table 4. However, it is noticeable that the non-audit fee variable is insignificant thus suggesting that how audit fee is determined is unaffected by the level of non-audit fees. This result would be in line with the previously discussed findings by Whisenant et al. (2003) and by Hay et al. (2006a).

However, as indicated in our literature review, the question of the possible effect of weak instruments applications has been raised as an important rebuttal (e.g., Chan et al., 2012). That is, whether the results are robust to the application of specific instruments (Murray, 2006). Post-estimation test of the explanatory power of the IV suggest that in our sample NEWEMS is a weak instrument. We infer this from the suggestion by Stock et al. (2002) that the first stage regression F-statistic should exceed 10 for inference based on the 2SLS estimator to be reliable when there is one endogenous variable, i.e., we find $F(1, 117) = 5.72$ and a very low partial R-square for the instrument NEWEMS (first stage tests not shown in table).

As a second step, we have chosen a standard alternative in the identification of "good" instruments, namely the use of lagged observations (Murray, 2006). Hence, we apply one year lagged observations of non-audit fees as IV for the first-stage estimations in table 5, column 2 and 3 (LAG1LnFNSA1 and for the decomposed non-audit fees LAG1LnFARS1, LAG1LnFTAX1 and LAG1LnFOS1 respectively). It is possible to argue that the time relationship between previous non-audit fees and current non-audit fees is more detached than the time relationship of fees for the mandatory statutory audit in the individual company. As another alternative, we apply measures for "important" non-audit fees for each of the components. Thus in the first-stage estimations corresponding to the second-stage results provided in table 5, column 4, the IVs IMPARS1, IMPTAX1 and IMPOS1 control for the difference between client specific fee and average for all clients of the individual audit firm. The post-estimation tests suggest that these alternative IVs are appropriate and not weak (first stage tests not shown in table).

Overall, the results reported in column 2, 3 and 4 suggest that replacing weak with stronger IVs will result in consistent model estimations for the single equation and simultaneous equation estimations

of the relationship between audit fee and non-audit fee. The latter models suggest that a positive relationship between audit fee and non-audit fees can be inferred from the Danish sample of non-financial listed companies. This result is consistent with the single-equation OLS estimation and support that the nul-hypothesis H1 of joint determination is rejected (see table 5, column 2). That is, previous findings of significant relationships for the combined non-audit fee specification are supported (Antle et al., 2006; Krishnan and Yu, 2011; Chan et al., 2012). The strongest finding in relation to fee decomposion is that our nul-hypothesis H2, that audit fees are not associated with the individual non-audit fee components, is rejected for tax services (see table 5, column 3 and 4). In their study, Krishnan and Yu also tried to partition their sample to infer on the importance of the tax services component of non-audit fees. Consistent with our finding, they found support for knowledge spillover effect between tax services and the auditing (Krishnan and Yu, 2011, 243).

Our H2 is not rejected for audit related services and only rejected for other services when using lagged fees as IV (see table 5, column 3). In order to further control for the possible recurring nature of the services provided (e.g., Causholli et al., 2014; Alexander and Hay, 2013), we repeat the 2SLS estimation of the decomposed audit fee model on fee determinants lagged one period. That is, we replace current year fee components specified in equation 4a and 4b with prior year components. In the first stage estimations we use two years lagged observations as IVs (table 6, column 1) and lagged measures of fee component importance (table 6, column 2). The findings shown in table 6 are parallel to the findings shown in table 5, columns 3 and 4. Following Chan et al. (2012), we further examine the robustness of these findings across alternative instruments, see section 5. Overall, our findings reflecting the decomposition into the non-audit fee components suggest that knowledge spillover effects are more prevalent for services related to the same underlying accounting matter as exemplified by the statutory audit and tax services.

<insert Table 5. Simultaneous-equation audit fee models about here>

<insert Table 6. Simultaneous-equation (2SLS) Decomposed audit fee model with fee determinants lagged one period about here>

5. Robustness

In order to ascertain that our findings are robust we have performed a number of additional tests. In this section we summarize the thoughts and results from these further robustness analyses. First, we examine the robustness of the fee determinants models to alternative specifications of the fee components. Second, we report on the implications of applying alternative simultaneous equation estimation models.

5.1 Alternative audit fee model specifications

In the analyses reported above, the total fee has been broken down into four components namely the fee for the statutory audit (FSA), fee for audit-related services (FARS), fee for tax services (FTAX) and fee for other services (FOS). In the audit fee models, the dependent variable LnFSA has been used as proxy for audit fee. However as discussed above, an alternative proxy for audit fees seems to comprise the sum of audit fees and audit-related fees. The implication is that non-audit fees in some prior studies does not include audit-related fees even though the services provided for this category may reflect both recurring and non-recurring items. Hence, we have examined the robustness of the fee determinants models to an alternative specification where the dependent variable is "audit fee" proxied by the sum of FSA and FARS (labelled FSAARS). When audit fee is measured as logged transformation of the sum of fees for the statutory audit and for audit related services (LnFSAARS) only two non-audit components remains (parallel to the three components in equation (2)). In the single equation OLS estimation of this model (n=351, F=79.01, R-squared

0.90) audit fee is significantly related to fee for tax services (at the 1 percent level), but not with fee for other services (findings not shown in table). In the simultaneous-equation audit fee model parallel to equation (4b), the 2SLS estimation of LnFSAARS (n=348, F=64.25, R-squared=88.41) suggest that both fee for tax services (at 1 percent level) and fee for other services (at 5 percent level) are significant in explaining the audit fee level (not shown in table). The post-estimation test of endogeneity suggests that the non-audit fee components together can be considered endogenous variables in the audit fee model. Similar to the previous analyses, the main control variables for both the OLS and the 2SLS estimations are SIZE, INVREC, SQRTSUB and SMALLCAP. When the non-audit fee is not decomposed into the separate components (parallel to equations (1) and (3b)), the same implications are retained as well. Overall, we find that our findings are robust to the alternative specifications (measured proxies) for audit fees and non-audit fee components.

5.2 Alternative simultaneous equation models

In the simultaneous equation estimations reported in table 5, the 2SLS procedure was applied. For robustness, we have run alternative two-stage estimation procedures GMM (Generalized Method of Moments) and LIML (Limited Information Maximum Likelihood) on the same set of regressions reported in table 5. We have also run parallel post-estimation procedures to entertain whether the presumed endogenous variables in the model are in fact exogenous. GMM generates efficient estimates in the presence of heteroskedasticity of unknown form and the LIML estimator is considered to be more efficient and consistent than 2SLS for smaller sample sizes. However, we find consistent results when we apply the three different procedures 2SLS, GMM and LIML. In effect, it is a robust finding that the non-audit fees both combined (FNSA1) and decomposed (for FTAX1, FOS1, but not for FARS1) is positively associated with the level of audit fee, thus suggesting the possibility of knowledge spillover effects.

As further tests of robustness, we have considered implications of using alternative IVs in the first-stage regressions of the audit fee models. We have entertained substituting the one year lagged observations with two year lagged observations, thus further detaching the time relationship of previous non-audit fees with current non-audit fees. In the equation (3a) 2SLS estimation, a two years lagged LnFNSA1 provides a "non-weak" instrument and the second stage estimation provides a consistent significant relationship between non-audit fee and the audit fee (model test statistics; n=232, F=52.69, R=0.78 not shown in table). However, for the decomposed equation (4a), the post-estimation tests suggest that the two years lagged non-audit fee components constitute weak instruments. See also the discussion in Murray (2006, 128) which suggests that applying "long-lagged" IVs can be less compelling. Following Chan et al. (2012), we further examine additional instruments such as industry-based average measures for non-audit fees. For each of the industries we have calculated the year-specific mean (and median) and as IV we use the industry-based measure as observation for each company belonging to the particular industry. However, we find that industry-based average measures applied as IV alone, or in combination with any of the IVs we have addressed above, does not produce convincing instruments for the first-stage estimations. Hence, we defer from further reporting on the resulting second-stage estimations.

5. Conclusion

In this study, we have addressed the importance of examining the non-audit fee decomposition for the purpose of qualifying the discussion of positive and negative implications of the provision of non-audit services to public-interest entities. Fee composition has been a central key in prior studies examining multiple audit phenomena such as auditor independence, knowledge spillover in the supply of auditor provided services, auditor specialization and audit firm competition. Non-audit

services provided by auditors to their clients are the subject of continuing controversy reflected in political and economic debate on the appropriate level of audit market regulation as well as seemingly conflicting research findings. The value of knowledge spillovers between various services provided by audit firms have been argued by both corporations and the accounting profession to positively affect the ability of companies to create value. Audit market regulators have taken the opposite stance advocating that audit firms should maintain independence. The argument is, that it is at the better interest of the financial statement users that the provision of non-audit services to public-interest entities to a wide extent is banned.

Overall our study contributes both to current research knowledge and considers implications for new audit market legislation with subsequent implications for public-interest entities and audit firms. First, our findings contribute to research knowledge on the association between audit and non-audit fees. Consistent with a majority of prior audit fee studies (Hay et al., 2006b; Hay, 2013), we find a positive significant relationship between audit fees and the total of non-audit fees when the fee determinants model is based on single equation (OLS) regression. We control for a wide number of determinants including variables representing client attributes, auditor attributes and engagement attributes. An overall contention in line with Simunic (1984) is that the fee components proxy for the level of services provided and as such follow the physical flow of knowledge, e.g., the execution of the statutory audit will benefit from other services provided to the company.

Our finding seems to hold when we control for the effect of joint determination of audit and non-audit fees applying two-stage testing. We have examined the effect of controlling for the joint determination of fees using the same instrumental (the variable NEWEMS) which has been used in the first-stage estimations in previous studies examining joint determination of audit fees and non-audit fees (Krishnan and Yu, 2011; Antle et al., 2006; Whisenant et al., 2003). We find that this instrument is weak in the context of our sample, thus suggesting the importance of applying

appropriate instruments in the simultaneous–equations estimations. Under the assumption that our instrumental variables are strong and appropriate, we find that a positive relationship between audit fee and the total of non-audit fee can be inferred from the Danish sample of non-financial listed companies. Our H1 of joint determination of audit fee and total non-audit fee is rejected, thus suggesting the existence of positive knowledge spillover *from* non-audit *to* audit and the possible independence problems related to the economic bonding. In our study we further extend prior studies (e.g., Whisenant et al., 2003; Krishnan and Yu, 2011; Chan et al., 2012) by explicitly utilizing a stringent decomposition of total fee paid for audit services and other services by public-interest entities. We find mixed support for our H2 of joint determination. When controlling for the joint determination of fees pertaining to the statutory audit and the individual non-audit fee components, the knowledge spillover argument holds for tax services provided (thus rejecting H2 of joint determination). We find mixed support for the knowledge spillover argument for other services provided, but no support for the provision of audit related services (suggesting joint determination).

The second contribution of our study relates to policy implications for new audit market legislation and subsequent implications for companies and audit firms. The recent amendment of the statutory audit Directive (EC, 2014a) and the associated Regulation 537/2014 (EC, 2014b) by the European Commission will prohibit a number of non-audit services for firms auditing public-interest entities. The implementation of the amended Directive and associated Regulation into national legislation in the individual EU countries will likely have a considerable effect in many audit markets. The individual EU countries such as Denmark face the option to ban additional non-audit services or under specific conditions to allow certain tax and valuation services. The implication of the findings in our study is that the extent of total non-audit services provided of audit firms responsible for the statutory audit will have to be diminished extensively in the future. Our findings suggest that fee for

audit-related services are determined independently from audit fees, hence from the perspective of maintaining independence, there will be no apparent conflict with the continuing allowance for audit firms to provide this type of service. We have identified a positive association between audit and non-audit services consistent with the presence of knowledge spillover benefits for the pre-regulation period. From the perspective of the public-interest entities, one direct implication of prohibiting the simultaneous provision the statutory audit and (most) tax services, as well as, a wide array of other services, would be the negative effect on the corporate value creation. From the perspective of establish value by increasing trust in an independent audit function, our finding of a positive association between fees for these non-audit services and the audit fee illuminates the potential existence of economic dependency which the new regulation likely will have the ability to constrain.

It is questionable whether future studies addressing the issue of auditor independence by looking into the extent of non-audit services provided by the statutory auditor will vanish entirely, but we expect that the association will likely be reduced considerably. However, we expect that the independence issue will continue to be a matter of strong concern in the public debate of the role of the auditor. In light of our findings, we propose that fruitful future research avenues could be tied to role of audit committees in establishing and supervising appropriate independence safeguards.

[1] Section 201 of the Sarbanes Oxley Act (2002) lists other services considered impermissible contemporaneously with the audit, namely (1) bookkeeping or other services related to the accounting records or financial statements of the audit client, (2) financial information systems design and implementation, (3) appraisal or valuation services, fairness opinions, or contribution-in-kind reports, (4) actuarial services, (5) internal audit outsourcing services, (6) management functions or human resources, (7) broker or dealer, investment adviser, or investment banking services, (8) legal services and expert services unrelated to the audit and (9) any other service that the Board determines, by regulation, is impermissible.

[2] Article 5 of the Regulation 537/2014 (EC, 2014b) provides an extensive list of non-audit services which should be considered as prohibited. In short form, the list includes: (a) tax services, (b) services that involve playing any part in the management or decision-making of the audited entity, (c) bookkeeping and preparing accounting records and financial statements, (d) payroll services, (e) designing and implementing internal control, risk management procedures or financial information technology systems, (f) valuation services, (g) legal services, (h) services related to the audited entity's internal audit function, (i) services linked to the financing, capital structure and allocation, and investment strategy of the audited entity, except providing assurance services in relation to the financial statements, such as the issuing of comfort letters in connection with prospectuses issued by the audited entity, (j) promoting, dealing in, or underwriting shares in the audited entity and (k) human resources services.

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Table 1 Variable definitions

Variable	Definitions
LnFSA	Natural logarithm of fees for statutory audit in th. Euros (PLnFSA is predicted fees for the statutory audit)
LnFNSA1	Natural logarithm of 1+ fees for all other services than statutory audit in th. Euros (PLnFNSA1 is predicted fees for all other services than the statutory audit)
LnFARS1	Natural logarithm of 1+ fees for audit related services in th. Euros
LnFSAARS	Natural logarithm of 1+ fees for statutory audit and audit related services in th. Euros
LnFTAX1	Natural logarithm of 1+ fees for tax services in th. Euros
LnFOS1	Natural logarithm of 1+ fees for other services in th. Euros
LnFTOTAL	Natural logarithm of total fees in th. Euros
SIZE	Natural logarithm of total assets in th. Euros
LEVERAGE	Ratio of debt to total assets
CAtoCL	Ratio of current assets to current liabilities
INVREC	Ratio of the sum of inventory and receivables to total assets
ROA	Ratio of EBIT to total assets
SQRTSUB	Square root of the number of subsidiaries
AUDITLAG	Number of days between year end and the date of the auditors report accompanying the annual report
HERF(SQRTASSETS)	Herfindahl index is measured as the sum of squares of the percentages of audit firm market shares in each industry. Market shares are calculated on the basis of squareroots of total assets.
LAG1LnFNSA1	One year lagged LnFNSA1 (measuring fees for all other services than statutory audit in the year before)
LAG1LnFARS1	One year lagged LnFARS1 (measuring fees for audit related services in the year before)
LAG1LnFTAX1	One year lagged LnFTAX1 (measuring fees for tax services in the year before)
LAG1LnFOS1	One year lagged LnFOS1 (measuring fees for other services in the year before)
LAG2LnFARS1	Two years lagged LnFARS1 (measuring fees for audit related services two years before)
LAG2LnFTAX1	Two years lagged LnFTAX1 (measuring fees for tax services two years before)
LAG2LnFOS1	Two years lagged LnFOS1 (measuring fees for other services two years before)
IMPARS1	An indicator variable with the value of one if client specific audit related fee is above the average of audit related fees for all clients of the individual audit firm in the current year, and zero otherwise.

IMPTAX1	An indicator variable with the value of one if client specific tax fee is above the average of tax fees for all clients of the individual audit firm in the current year, and zero otherwise.
IMPOS1	An indicator variable with the value of one if client specific other fee is above the average of other fees for all clients of the individual audit firm in the current year, and zero otherwise.
BIG4	An indicator variable with the value one if a Big Four audit firm conduct the audit, and zero otherwise
JOINT	An indicator variable with the value of one if the audit is conducted by two audit firms (joint audit), and zero otherwise
INITIAL	An indicator variable with the value of one if the audit is in the initial two years of an audit engagement, and zero otherwise
AUDITSPEC	An indicator variable with the value of one if the company is audited by an audit firm with the largest market share in the industry or by an audit firm with a market share above 15 percent, and zero otherwise
LOSS	An indicator variable with a value of one if net income is negative, and zero otherwise
INDUSTRY	An indicator variable with a value of one if the company is classified as industrial company, and zero otherwise
BUZYSEASON	An indicator variable with the value of one if the company uses the calendar year as the financial year, and zero otherwise
MJSH	An indicator variable with the value of one if major shareholders hold more than 25% of direct total ownership, and zero otherwise
NEWEMS	An indicator variable with the value of one if the company issues new stock equity, and zero otherwise
FOROPS	An indicator variable with the value of one if the company has foreign operations, and zero otherwise
LARGECAP	An indicator variable with the value of one if the company is registered as Large Cap on the OMX Copenhagen Stock Exchange, and zero otherwise
MIDCAP	An indicator variable with the value of one if the company is registered as Mid Cap on the OMX Copenhagen Stock Exchange, and zero otherwise
SMALLCAP	An indicator variable with the value of one if the company is registered as Small Cap on the OMX Copenhagen Stock Exchange, and zero otherwise

Table 2 Descriptive statistics

Panel A: Continuous control variables

Year	variable	mean	sd	min	p10	p50	p90	max	N
2010	SIZE	12.061	1.932	5.878	9.758	11.876	14.428	17.726	117
	LEVERAGE	0.516	0.232	0.004	0.227	0.535	0.783	1.339	117
	CAtoCL	1.848	1.746	0.000	0.194	1.386	3.692	10.073	117
	INVREC	0.210	0.180	0.000	0.000	0.180	0.475	0.710	117
	ROA	-0.001	0.186	-0.882	-0.148	0.025	0.155	0.327	117
	SQRTSUB	4.040	3.617	0.000	1.000	3.000	9.327	18.221	117
	AUDITLAG	72.573	16.664	19.000	52.800	74.000	90.000	109.000	117
	HERF(SQRTASSETS)	0.410	0.092	0.287	0.290	0.380	0.470	0.685	117
2011	SIZE	12.018	1.955	6.175	9.710	11.691	14.437	17.813	117
	LEVERAGE	0.532	0.320	0.003	0.171	0.538	0.768	2.645	117
	CAtoCL	2.095	2.475	0.000	0.255	1.484	4.963	15.992	117
	INVREC	0.225	0.187	0.000	0.000	0.192	0.475	0.747	117
	ROA	0.014	0.176	-1.012	-0.122	0.035	0.165	0.410	117
	SQRTSUB	4.007	3.611	0.000	1.000	3.000	8.426	19.900	117
	AUDITLAG	70.282	17.554	26.000	46.000	73.000	89.200	114.000	117
	HERF(SQRTASSETS)	0.405	0.070	0.300	0.300	0.390	0.480	0.575	117
2012	SIZE	11.926	2.064	4.751	9.409	11.695	14.395	17.847	117
	LEVERAGE	0.525	0.248	0.000	0.207	0.521	0.810	1.236	117
	CAtoCL	1.849	2.225	0.000	0.369	1.424	3.256	16.585	117
	INVREC	0.221	0.188	0.000	0.000	0.192	0.466	0.778	117
	ROA	-0.017	0.317	-2.839	-0.184	0.035	0.162	0.454	117
	SQRTSUB	4.384	4.306	0.000	1.000	3.464	9.899	29.698	117
	AUDITLAG	68.368	16.964	23.000	42.200	71.000	87.000	102.000	117
	HERF(SQRTASSETS)	0.409	0.071	0.300	0.300	0.400	0.480	0.568	117

Total	SIZE	12.002	1.979	4.751	9.679	11.695	14.412	17.847	351
	LEVERAGE	0.524	0.269	0.000	0.204	0.527	0.791	2.645	351
	CAtoCL	1.931	2.166	0.000	0.356	1.423	3.692	16.585	351
	INVREC	0.219	0.185	0.000	0.000	0.192	0.469	0.778	351
	ROA	-0.001	0.235	-2.839	-0.148	0.031	0.160	0.454	351
	SQRTSUB	4.144	3.851	0.000	1.000	3.000	9.381	29.698	351
	AUDITLAG	70.407	17.103	19.000	47.200	72.000	90.000	114.000	351
	HERF(SQRTASSETS)	0.408	0.078	0.287	0.300	0.390	0.480	0.685	351

See Table 1 for variable definitions.

Panel B: Continuous fee variables

Year	variable	mean	sd	min	p10	p50	p90	max	N
2010	LnFSA	5.071	1.436	2.597	3.360	4.770	6.980	9.687	117
	LnFNSA1	4.464	1.911	0.000	1.850	4.640	6.720	8.483	117
	LnFARS1	2.019	2.058	0.000	0.000	1.590	5.510	6.693	117
	LnFTAX1	2.972	2.148	0.000	0.000	3.070	6.000	7.991	117
	LnFOS1	3.511	1.928	0.000	0.000	3.810	5.730	7.385	117
	LnFTOTAL	5.624	1.487	3.002	3.560	5.580	7.640	9.949	117
2011	LnFSA	5.031	1.420	2.537	3.410	4.720	6.990	9.611	117
	LnFNSA1	4.386	1.912	0.000	2.010	4.370	6.760	9.045	117
	LnFARS1	1.745	1.808	0.000	0.000	1.310	4.910	6.513	117
	LnFTAX1	2.888	2.129	0.000	0.000	2.830	5.740	8.269	117
	LnFOS1	3.694	1.880	0.000	0.840	3.720	6.000	8.303	117
	LnFTOTAL	5.554	1.494	2.537	3.670	5.380	7.580	10.061	117
2012	LnFSA	5.005	1.430	2.596	3.410	4.740	6.980	9.617	117
	LnFNSA1	4.187	2.112	0.000	0.000	4.390	6.720	9.523	117
	LnFARS1	1.485	1.861	0.000	0.000	0.730	4.910	6.883	117
	LnFTAX1	2.907	2.167	0.000	0.000	2.790	6.000	8.333	117
	LnFOS1	3.464	2.037	0.000	0.000	3.720	5.790	9.073	117
	LnFTOTAL	5.515	1.527	2.596	3.610	5.470	7.620	10.264	117
Total	LnFSA	5.036	1.425	2.537	3.420	4.730	6.980	9.687	351
	LnFNSA1	4.346	1.978	0.000	1.850	4.470	6.690	9.523	351
	LnFARS1	1.750	1.919	0.000	0.000	1.270	4.910	6.883	351
	LnFTAX1	2.922	2.142	0.000	0.000	2.860	5.890	8.333	351
	LnFOS1	3.557	1.946	0.000	0.000	3.760	5.900	9.073	351
	LnFTOTAL	5.564	1.499	2.537	3.610	5.470	7.600	10.264	351

See Table 1 for variable definitions.

Panel C: Indicator variables

Year	stats	BIG4	JOINT	INITIAL	AUDITSPEC	LOSS	BUZYSEASON	MJSH	NEWEMS	FOROPS	LARGECAP	SMALLCAP
2010	N	117	117	117	117	117	117	117	117	117	117	117
	n	102	8	9	85	43	85	53	4	89	18	74
2011	N	117	117	117	117	117	117	117	117	117	117	117
	n	102	7	12	85	42	86	52	12	84	18	74
2012	N	117	117	117	117	117	117	117	117	117	117	117
	n	104	4	7	96	43	85	55	5	80	18	74
Total	N	351	351	351	351	351	351	351	351	351	351	351
	n	308	19	28	267	128	256	160	21	253	54	222

"N" is the number of sample observations for the variable, "n" is the number of positive indicators for the variable (1:0).
See Table 1 for variable definitions.

Table 3. Pearson and Spearman correlations for variables in audit fee models (n=351)

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U
A: LnFSA		0.8240*	0.3282*	0.1514*	0.0406	0.7502*	0.2179*	-0.2279*	-0.0599	0.3714*	0.4527*	0.7807*	0.4704*	-0.041	0.2419*	0.5676*	-0.5788*	-0.3423*	-0.0654	0.3041*	-0.0094
B: LnFNSA1	0.7803*		0.4155*	0.0613	0.0622	0.6427*	0.1368*	-0.1109*	0.0299	0.2472*	0.3136*	0.6178*	0.4430*	-0.0804	0.3533*	0.5345*	-0.5207*	-0.4034*	-0.1177*	0.3122*	0.1079*
C: BIG4	0.3009*	0.4692*		0.0894	-0.0503	0.042	-0.0701	0.0845	0.1852*	0.2852*	0.1095*	0.2647*	0.3098*	-0.1989*	0.3200*	0.1593*	-0.0505	-0.2605*	0.0959	0.3298*	0.0576
D: JOINT	0.1773*	0.0877	0.0894		-0.0704	0.0852	-0.0112	-0.0505	0.1248*	-0.0098	0.0336	0.1917*	0.0366	-0.0167	-0.0243	0.0027	0.0257	0.024	0.1342*	-0.0601	-0.0073
E: INITIAL	0.018	0.0491	-0.0503	-0.0704		-0.0038	0.0575	-0.0483	-0.086	-0.0023	0.0849	0.1776*	0.0192	0.0261	0.0847	-0.009	0.0063	-0.0208	-0.1306*	-0.0536	0.0144
F: SIZE	0.8016*	0.5882*	0.0407	0.1192*	-0.0103		0.2956*	-0.3461*	-0.2575*	0.0208	0.3985*	0.5856*	0.2346*	0.0058	0.1582*	0.5946*	-0.7284*	-0.2879*	-0.015	0.0572	0.0289
G: LEVERAGE	0.1727*	0.1343*	-0.0745	-0.0074	0.0718	0.1998*		0.1439*	-0.5606*	0.0729	-0.1139*	0.1881*	-0.0209	-0.0049	0.1563*	-0.0136	-0.0314	0.1503*	-0.0658	-0.2273*	0.0889
H: LOSS	-0.2547*	-0.0687	0.0845	-0.0505	-0.0483	-0.3508*	0.1775*		0.0098	-0.2134*	-0.7318*	-0.1939*	-0.1222*	0.0553	0.2217*	-0.2738*	0.3320*	0.2490*	-0.0051	-0.1066*	0.1333*
I: CAtoCL	-0.2505*	-0.1348*	0.0548	0.0964	-0.0942	-0.2860*	-0.4649*	0.0335		0.1897*	0.1021	-0.1329*	0.2007*	-0.0513	-0.0546	-0.0107	0.0836	-0.1871*	0.0228	0.2413*	-0.0114
J. INVREC	0.2573*	0.2288*	0.2662*	-0.006	-0.0207	0.000	0.0712	-0.1883*	-0.0565		0.3348*	0.2514*	0.3052*	-0.0959	-0.0807	0.036	-0.008	-0.1261*	-0.0115	0.3161*	-0.1575*
K: ROA	0.3421*	0.1571*	-0.0219	0.0792	0.0606	0.4350*	-0.0115	-0.4909*	-0.1275*	0.1165*		0.3643*	0.2564*	-0.1393*	0.0014	0.4548*	-0.3952*	-0.4315*	-0.1055*	0.2427*	-0.1309*
L: SQRTSUB	0.8002*	0.5782*	0.2136*	0.2710*	0.1143*	0.6502*	0.1811*	-0.2069*	-0.1901*	0.1256*	0.2502*		0.4382*	0.0891	0.2084*	0.4506*	-0.3803*	-0.2386*	-0.0634	0.2026*	0.0272
M: FOROPS	0.4328*	0.4508*	0.3098*	0.0366	0.0192	0.2346*	0.0274	-0.1222*	-0.0146	0.2619*	0.1799*	0.3509*		-0.0042	0.1069*	0.2654*	-0.1978*	-0.2547*	-0.1258*	0.4878*	0.0231
N. MJSH	-0.0381	-0.1039	-0.1989*	-0.0167	0.0261	-0.0387	-0.0388	0.0553	-0.0404	-0.0971	-0.0509	0.1141*	-0.0042		-0.0862	-0.0573	-0.0023	0.1022	-0.09	0.0113	-0.0138
O.:BUZYSEASON	0.2390*	0.3688*	0.3200*	-0.0243	0.0847	0.1623*	0.1766*	0.2217*	0.0021	-0.0845	0.0058	0.1888*	0.1069*	-0.0862		0.1531*	-0.0654	-0.2706*	-0.1313*	0.018	0.0996
P: LARGECAP	0.6630*	0.5144*	0.1593*	0.0027	-0.009	0.6463*	-0.0257	-0.2738*	-0.0769	-0.0129	0.2693*	0.5752*	0.2654*	-0.0573	0.1531*		-0.5594*	-0.4221*	-0.094	0.2159*	-0.0743
Q: SMALLCAP	-0.6140*	-0.4553*	-0.0505	0.0257	0.0063	-0.7067*	0.0087	0.3320*	0.0938	0.0201	-0.2733*	-0.4224*	-0.1978*	-0.0023	-0.0654	-0.5594*		0.4013*	0.0433	-0.2413*	0.0179
R: AUDITLAG	-0.3458*	-0.3656*	-0.2317*	0.0341	-0.0052	-0.2954*	0.1585*	0.2460*	-0.1102*	-0.0632	-0.2206*	-0.2281*	-0.2321*	0.0783	-0.2551*	-0.4258*	0.3901*		0.0589	-0.3157*	0.0826
S: AUDITSPEC	-0.0398	-0.1451*	0.0959	0.1342*	-0.1306*	-0.0272	-0.0546	-0.0051	0.0347	-0.0124	-0.089	-0.0278	-0.1258*	-0.09	-0.1313*	-0.094	0.0433	0.0431		0.0883	-0.0274
T: HERF	0.1914*	0.1698*	0.2510*	0.003	-0.0658	0.0184	-0.2053*	-0.0745	0.1125*	0.1542*	0.1469*	0.0515	0.4068*	0.0364	0.0044	0.1488*	-0.1636*	-0.2114*	0.1314*		-0.0285
U: NEWEMS	-0.0265	0.1024	0.0576	-0.0073	0.0144	0.0093	0.072	0.1333*	0.002	-0.1434*	-0.1037	-0.0012	0.0231	-0.0138	0.0996	-0.0743	0.0179	0.0777	-0.0274	-0.0267	

Pearson (below diagonal) and Spearman (above diagonal) correlation coefficients are shown. * Significant at 5 percent level. See Table 1 for variable definitions.

Table 4 Single equation (OLS) audit fee models

Dep.Var. = LnFSA		(1)		(2)		(3)		(4)	
Fee variables	**predicted sign**	Coef.	t	Coef.	t	Coef.	t	Coef.	t
LnFNSA1	?	0.195	4.21***			0.170	3.50**		
LnFARS1	?			0.009	0.38			0.011	0.51
LnFTAX1	?			0.132	3.28**			0.124	2.93**
LnFOS1	?			0.074	2.26*			0.053	1.60
Control variables									
BIG4	+	-0.016	-0.12	0.033	0.23	-0.051	-0.44	-0.030	-0.27
JOINT	+	0.216	1.17	0.198	1.10	0.182	1.17	0.169	1.10
INITIAL	-	-0.127	-1.00	-0.140	-1.03	-0.199	-1.48	-0.218	-1.61
SIZE	+	0.196	4.84***	0.189	4.67***	0.197	4.38***	0.193	4.28***
LEVERAGE	+	-0.061	-0.35	-0.092	-0.54	-0.106	-0.62	-0.141	-0.84
LOSS	+	0.086	0.98	0.130	1.55	0.062	0.65	0.089	0.95
CAtoCL	-	-0.043	-1.54	-0.047	-1.78†	-0.044	-1.59	-0.050	-1.87†
INVREC	+	1.094	4.51***	1.005	4.28***	0.856	3.61***	0.780	3.53**
ROA	-	0.151	0.98	0.156	1.09	0.071	0.46	0.073	0.49
SQRTSUB	+	0.122	5.39***	0.118	4.80***	0.120	5.61***	0.118	5.16***
FOROPS	+	0.083	0.78	0.095	0.93	0.106	0.98	0.104	1.01
MJSH	?	-0.057	-0.81	-0.092	-1.39	-0.044	-0.59	-0.076	-1.08
BUZYSEASON	+	0.081	0.75	0.096	0.88	-0.003	-0.03	0.002	0.02
LARGECAP	+	0.337	2.01*	0.303	1.68†	0.359	2.02*	0.314	1.71†
SMALLCAP	-	-0.292	-2.27*	-0.314	-2.30*	-0.348	-2.78**	-0.341	-2.64**
AUDITLAG	-	0.001	0.30	0.000	0.17	0.000	0.04	0.000	0.01
AUDITSPEC	+	0.079	0.87	0.018	0.20	0.149	1.55	0.087	0.94
HERF(SQRTASSETS)	+	1.172	2.24*	1.068	2.23*				
Constant	?	0.614	1.01	1.001	1.69†	1.991	3.45**	1.991	3.45**
Year fixed effects	?	Y	Y	Y	Y	Y	Y	Y	Y
Industry fixed effects	?	N	N	N	N	Y	Y	Y	Y

N	351	351	351	351
F-value	85.32***	76.80***	73.27***	76.87***
R-squared	0.8939	0.8949	0.9041	0.9063
VIF Max (Mean)	4.83 (1.85)	5.06 (1.88)	5.48 (2.54)	5.77 (2.54)

Ordinary least squares coefficients and t-statistics are shown. Robust standard errors are used.

Two-tailed p-values are indicated by *** 0.001, **0.01, *0.05, † 0.10. See Table 1 for variable definitions.

Table 5. Simultaneous-equation (2SLS) audit fee models

Dep. Var. = LnFSA		(1)		(2)		(3)		(4)	
Fee variables	**predicted sign**	Coef.	t	Coef.	t	Coef.	t	Coef.	t
PLnFNSA1	?	-0.238	-1.19	0.468	6.24***				
PLnFARS1	?					-0.007	-0.08	0.006	0.190
PLnFTAX1	?					0.205	2.28*	0.107	2.74**
PLnFOS1	?					0.162	2.71**	-0.021	-0.450
Control variables									
BIG4	+	0.418	1.26	-0.384	-2.59*	-0.166	-1.60	0.034	0.250
JOINT	+	0.390	1.71†	0.005	0.02	0.072	0.43	0.221	1.320
INITIAL	-	-0.146	-0.79	-0.240	-1.90†	-0.271	-2.15*	-0.188	-1.310
SIZE	+	0.388	3.07**	0.053	1.12	0.123	2.47*	0.234	4.01***
LEVERAGE	+	-0.045	-0.22	-0.136	-0.64	-0.214	-1.14	-0.122	-0.720
LOSS	+	0.190	1.20	-0.020	-0.19	0.032	0.33	0.128	1.250
CAtoCL	-	-0.046	-1.91†	-0.042	-1.20	-0.054	-1.81†	-0.049	-1.94†
INVREC	+	1.058	3.29**	0.690	2.39*	0.599	2.32*	0.858	3.64***
ROA	-	-0.304	-1.11	0.448	1.40	0.176	0.49	0.010	0.060
SQRTSUB	+	0.148	5.58***	0.099	3.68***	0.101	3.68***	0.125	6.16***
FOROPS	+	0.337	1.70†	-0.059	-0.51	0.011	0.11	0.158	1.330
MJSH	?	-0.071	-0.68	-0.020	-0.23	-0.060	-0.80	-0.100	-1.350
BUZYSEASON	+	0.162	0.98	-0.121	-1.13	-0.057	-0.50	0.037	0.340
LARGECAP	+	0.367	1.54	0.346	1.75†	0.248	1.20	0.320	1.77†
SMALLCAP	-	-0.377	-2.08*	-0.331	-2.61*	-0.367	-2.72**	-0.318	-2.39*
AUDITLAG	-	-0.002	-0.38	0.001	0.51	0.001	0.40	-0.001	-0.190
AUDITSPEC	+	-0.077	-0.44	0.316	2.88**	0.120	1.15	0.054	0.50
Constant	?	0.479	0.41	2.491	4.14***	2.567	3.95***	1.684	2.40*
Year fixed effects	?	Y	Y	Y	Y	Y	Y	Y	Y
Industry fixed effects	?	Y	Y	Y	Y	Y	Y	Y	Y

N	351	349	348	351
F-value	41.09***	61.71***	66.86***	61.77***
R-squared	0.82	0.85	0.88	0.90
Test of endogeneity				
Robust Regression F-value	9.01**	30.52***	6.13***	1.52

2-stage least squares coefficients and small sample t-statistics are show. Cluster robust standard errors are used.
Two-tailed p-values are indicated by *** 0.001, **0.01, *0.05, † 0.10.
IVs in firststage estimations are: (1) NEWEMS, (2) LAG1LnFNSA1 and (3) LAG1LnFARS1, LAG1LnFTAX1, LAG1LnFOS1,
(4) IMPARS1, IMPTAX1, IMPOS1. See Table 1 for variable definitions.

Table 6. Simultaneous-equation (2SLS) Decomposed audit fee model with fee determinants lagged one period

Dep. Var. = LnFSA		(1)		(2)	
Fee variables	**predicted sign**	Coef.	t	Coef.	t
PLAG1LnFARS1	?	-0.028	-0.29	-0.012	-0.38
PLAG1LnFTAX1	?	0.162	1.96†	0.117	2.27*
PLAG1LnFOS1	?	0.135	2.13*	-0.045	-0.85
Control variables					
BIG4	+	0.010	0.07	0.070	0.43
JOINT	+	0.030	0.14	0.143	0.74
INITIAL	-	-0.285	-1.84†	-0.241	-1.45
SIZE	+	0.156	2.67**	0.237	4.15***
LEVERAGE	+	-0.204	-1.14	-0.154	-0.93
LOSS	+	0.075	0.60	0.231	1.65
CAtoCL	-	-0.049	-1.94†	-0.042	-1.62
INVREC	+	0.571	2.19*	0.822	3.43**
ROA	-	0.174	0.61	0.187	0.58
SQRTSUB	+	0.102	3.82***	0.125	5.8***
FOROPS	+	0.013	0.11	0.150	1.11
MJSH	?	-0.027	-0.36	-0.082	-1.08
BUZYSEASON	+	-0.043	-0.34	0.026	0.21
LARGECAP	+	0.251	1.20	0.269	1.45
SMALLCAP	-	-0.430	-3.02**	-0.368	-2.42*
AUDITLAG	-	0.001	0.20	-0.001	-0.22
AUDITSPEC	+	0.094	0.88	0.044	0.40
Constant	?	2.364	3.16**	1.805	2.44*
Year fixed effects	?	Y	Y	Y	Y
Industry fixed effects	?	Y	Y	Y	Y

N	231	233
F-value	62.61***	52.26***
R-squared	0.89	0.90
Test of endogeneity		
Robust Regression F-value	1.11	2.57 †

2-stage least squares coefficients and small sample t-statistics are show. Cluster robust standard errors are used.
Two-tailed p-values are indicated by *** 0.001, **0.01, *0.05, † 0.10.
IVs in firststage estimations are: (1) LAG2LnFARS1, LAG2LnFTAX1, LAG2LnFOS1,
(2) LAG1IMPARS1, LAG1IMPTAX1, LAG1IMPOS1. See Table 1 for variable definitions.