Auditor Choice and Cost of Debt Financing for Private SMEs

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Abstract

This study examines relation of the auditor choice and cost of debt financing for private SMEs (small and medium sized enterprises). In particular, it examines whether choice of a certified auditor or reputable international audit firm provides economic value to private SMEs as a factor lowering firms' information problems and cost of debt financing in the capital markets. Using time-series cross-sectional data of 832 Finnish private and limited SMEs, results indicate that the choice of an international brand name audit firm is negatively related to estimated cost of debt finance for SMEs. Results are shown to be robust to effects of relevant firm-specific characteristics, and to possible self-selection bias related to firm's auditor choice. The reported relation between the choice of a certified auditor and cost of debt financing is negative as expected, but lacks statistical significance.

1. Introduction

Limited and conflicting empirical evidence that links characteristics of firm's audit quality to investors motivates purpose of this study to examine relation between the auditor choice and cost of debt financing for private SMEs.

Prior empirical research focusing on public firms have found evidence of fee premium related to audit service of international brand name audit firms (e. g. Craswell, Francis, and Taylor (1995)). Prior studies also report that the choice of a brand name auditor has mitigating effect on public firms' earnings management behavior (e. g. Becker, DeFond, Jiambalvo, and Subramanyam (1998)). Further, the choice of a brand name auditor is shown to be related to favorable stock market reactions (e. g. Beatty (1989); Eichenseher, Hagigi, and Shields (1989)), and decreasing cost of debt financing for public firms (e. g. Pittman and Fortin (2004), and Mansi, Maxwell, and Miller (2004)). These results indicate that firm's auditor choice is valued by capital markets due reputation of brand name auditors providing higher quality audit service that improves the credibility of firms' audited financial information.

It can be expected that firm's audit and financial information quality are particularly relevant for investors of private SMEs, since asymmetric information problems in the capital markets are inherent to smaller private firms. Prior studies document evidence that borrowing

cost in general tends to be higher for private firms because of uncertainty and information asymmetry (Pagano, Panetta, and Zingales (1998); Fenn (2000)). There is also evidence that quality of reported earnings tends to be lower within private compared to public firms (Ball & Shivakumar (2004); Burgstahler, Hail and Leuz (2006)). Prior research also reports, that within public firms, value investors place on firm's auditor choice is decreasing with firm's age ((Pitman and Fortin (2004)). These results imply that firm's auditor choice signaling quality of audited financial information should be valued by investors of private firms.

However, Fortin and Pittman (2007) couldn't find evidence of the expected negative relation between the choice of a brand name auditor and debt pricing for private firms. In addition, Chaney, Jeter, and Shivakumar (2004) didn't find evidence of fee premium related to audit service of brand name auditors within private firms. These results imply that there could be differences in firms' demand for audit quality or investors' valuation of firms' auditor choice between private and public firms. On the other hand, Hyytinen and Väänänen (2007) found that use of a statutory certified auditor is reducing private firms' borrowing costs and improving their commercial credit ratings in the regulated audit market. This limited and conflicting evidence of the relation between firm's auditor choice and cost of debt financing motivates this study to further examine, whether choice of a brand name audit firm or a certified auditor is related to cost of debt financing for private SMEs.

By analyzing unbalanced panel data of 832 Finnish private and limited SMEs this study finds support for the hypothesis that the choice of a high quality brand name auditor is related to increased credibility of financial information and reduced cost of debt financing for private SMEs. In particular, results of multivariate regression analysis indicate negative and statistically robust relation between firm's choice of a brand name auditor and estimated cost of debt financing. Similarly, results indicate negative but statistically insignificant relation between firm's use of a certified auditor and cost of debt financing. This study contributes to existing literature by reporting evidence, in contrast to prior research findings, that the choice of a high quality auditor can be relevant for private firms in signaling quality of their financial information and providing them economic value through reduced borrowing costs.

The rest of the paper is organized as follows. Section 2 develops theoretical framework and testable hypotheses, and describes legal environment related to context of this study. Section

3 reviews prior research literature related to firm's auditor choice. Section 4 describes sample formation and data. Section 5 presents empirical results, and final sixth section summarizes main findings and concludes.

2. Background

According to the agency theory developed by Jensen and Meckling (1976), conflicts of interest resulting from principal–agent relationships between firm's owners and management, and between firm's creditors and owners, are incurring agency costs to firms as risk of these agency conflicts is transferred to cost of external capital. Agency conflict between firm's management and owners is expected to arise from separation of firm's ownership and control, when management's incentive to act in its own interest, instead of in interests of firm's owners, is increasing. Jensen (1986) argue that agency costs of external equity are further increasing with firm's free cash flows, when more resources are available for management's discretion. Therefore, empirically severity of agency conflict between firm's owners and management and related agency costs of external equity can be jointly determined by firm-specific characteristics such as ownership diffusion, free cash flows and profitability.

Agency theory predicts that in addition to agency costs of outside equity, conflicts of interest in the principal-agent relationship between firm's creditors and owners are causing agency costs of outside debt. The risk of conflict of interest between firm's owners and creditors is expected to increase with firm's dependence on debt capital, when firm's owners have an incentive to increase firm's operational risk through risky investments (referred to risk-shifting or asset substitution problem). Assuming limited liability, owners of highly levered firms are able to gain most of the benefits from success of these risky investments, but because of owner's limited liability, risk of failure of these investments is completely borne by firm's creditors. The risk of this agency conflict is expected increase with firm's leverage and increasing probability of bankruptcy, and it is exposing firms to costly monitoring and contracting by creditors that is further transferred to costs of external debt.

Empirically firm's leverage can indicate severity of owner-creditor agency conflict and related agency costs of debt. Meyers (1977) argue that firm's growth opportunities can further

increase agency costs of debt, since owners of firms with more growth and investment opportunities have better possibilities to increase firm's operational risk through risky investments. As Myers (1977) emphasize, firm's owners have more discretion in management of firm's investments in intangible compared to tangible assets. In addition, firm's creditors have better possibilities to recover their potential capital losses from firms by collateral requirements related to firm's tangible assets in place. Therefore, empirically severity of agency problems between firm's owners and creditors and the level of resulting agency costs of debt, can be jointly determined by firm's leverage, growth opportunities and assets structure.

Agency theory assumes that in the presence of information asymmetries between principals and agents, agents have always tendency to act in their own self-interest. Principals are expected to anticipate this and lack trust on agents' behavior. In the owner-management agency relationship, this inherent lack of trust raises need for management prepared financial statements as mechanism for owners to monitor management's performance. However, because of information asymmetries and differing motives this financial information could be opportunistically biased by management, and firm's owners have also need for independent verification of this management prepared financial information by engagement in external auditing. In general, severity of firm's overall agency costs is expected to depend on asymmetric information between principal and agent. Empirically firm size and age can proxy severity firm's asymmetric information problems.

In the capital markets for informationally opaque private firms external auditing and characteristics of firm's audit quality can have an important information role. As private firms mainly rely on external debt finance in their capital needs, firms' audit quality can solve problems related to information asymmetry and improve credibility of firms' financial information in the capital markets of external debt (Berger and Udell 2006). DeAngelo (1981) argue that size of the audit firm is likely to be related to quality of audit service, as larger and more reputable audit firms are expected to lose more in the event of audit failure and have therefore reputational incentives to assure high quality of their audit service. In addition, Watts and Zimmerman (1981) predict that larger audit firms supply higher quality audit service because of better monitoring ability. Therefore, the first tested prediction of this study is that the

choice of a large international brand name audit firm improves credibility of financial information and reduces cost of debt financing for private SMEs.

H_1: *The choice of a large international brand name audit firm is negatively related to cost of debt financing for private SMEs.*

The data of Finnish SMEs analyzed in this study relates to period 2001−2005, when the old Finnish Auditing Act (936/1996) was at force. This law obligated all firms regardless of size to have their financial statements audited by independent auditor. In addition, the old law stated that firms exceeding a pre-specified size threshold must have their accounts audited by a professional (certified) auditor. Particularly, firms were obligated to appoint a HTM or KHT qualified auditor when they met at least two of the following three conditions in the past completed financial year: the balance sheet total exceeds 340 000 Euros, turnover exceeds 680 000 Euros, or average number of employees exceeds 10. Firms that didn't meet these criteria were instead entitled to appoint a non-certified auditor, who was expected to possess sufficient knowledge and experience related auditing. Since the certification of an external auditor can signal quality of audit, the second tested prediction is that the use of a certified auditor is reducing cost of debt financing for private SMEs.

H_2: *The choice of a certified (professional) auditor is negatively related to cost of debt financing for private SMEs.*

3. Prior empirical research

Prior empirical research related to firm's auditor choice can be classified into (1) research papers attempting to establish link between firm's auditor choice and quality of received audit service, or resulting quality of firm's financial information, (2) research papers studying relation between firm-specific agency problems and firm's choice of external auditor, and (3) research papers focusing on value of firm's auditor choice to investors of external equity or debt capital. These

issues have been studied internationally and most extensively in the context of large public firms, but recently within small private firms as well.

Becker et al. (1998), and Francis, Maydew, and Sparks (1999) represent evidence that the use of a brand name audit firm is related to decreased levels of discretionary accruals of public firms. Krishnan (2003), Balsam, Krishnan, and Young (2003), and Jenkins, Kane, and Velury (2006) report evidence that within brand name auditors expertise of client's industry further improves client's earnings quality proxied with discretionary accruals and earnings response coefficient. These empirical studies reporting positive relation between use of a brand name auditor and firm's earnings quality interpret results as evidence that brand name auditors provide higher quality audit service by mitigating opportunistic earnings managements of client-firms, and as a result improving credibility of firm's financial information. By comparing private and public firms Ball and Shivakumar (2004), and Burgstahler et al. (2006) report evidence that quality of financial information tends to be lower within private firms.

By analyzing determinants of audit pricing in the market of public firms Craswell et al. (1995) report evidence of fee premium related to audit service of brand name auditors, and industry specialization within these auditors. In addition, Palmrose (1986) document evidence that besides charging higher audit fees brand name auditors spend more hours on their audit work. Abbot, Parker, and Peters (2006) report further evidence from the market of public firms that audit fee charged by brand name auditors is positively related to risk of client's income-increasing earnings management. These results of positive relation between audit fee premium and quality attributes of audit service offered by brand name auditors imply that higher audit fees charged by brand name auditors could be related to higher quality of their audit service. However, Chaney et al. (2004) couldn't find supporting evidence of relationship between audit fee and auditor reputation from audit markets of private firms.

By assuming that firm's demand for audit quality is determined by firm-specific agency problems, some studies examine link between firm's auditor choice and firm-specific characteristics proxying severity of firm's agency problems. Piot (2001) and Piot (2005) report evidence that public firms with more debt and investment opportunities are more likely to appoint a brand name auditor. In addition Chaney et al. (2004) found that larger and more highly levered private firms are also more likely to choose a brand name auditor. Similarly, Carey,

Simnett, and Tanewski (2000) found that family businesses' likelihood to voluntarily choose an external auditor in the unregulated audit markets was increasing with firm's leverage and separation of firm's ownership and control. These results imply that firms with more severe agency problems of external equity or debt may want to increase quality of external monitoring and/or signal credibility of their financial information by the auditor choice.

Many former studies present evidence that capital markets react positively to firm's choice of a brand name auditor. Beatty (1989) document evidence that initial returns earned by IPO investors are positively related to the appointment of a brand name audit firm by IPO firms. Jang and Lin (1993) report that trading volumes of stocks offered to IPOs are larger for client-firms of brand name auditors. In addition, Eichenseher et al. (1989), Johnson and Lys (1990), and Kluger and Shields (1991) present evidence of positive market reactions surrounding firms' announcements to change in a brand name auditor. Knechel, Naiker, and Pacheco (2007) presented further evidence of positive stock market reactions related to firms' change from non-industry specialist to industry-specialist within brand name auditors. These results are implying that capital markets are valuing firm's choice of a higher quality brand name auditor.

Some recent studies focus on relation between firm's auditor choice and costs of debt capital. Pittman and Fortin (2004), and Mansi et al. (2004) report evidence that the use a brand name auditor is reducing costs of debt for public firms. Mansi et al. (2004) report results that are robust to potential self-selection bias of firm's auditor choice. However, when controlling a rich set of firm-specific audit quality and corporate governance factors Piot and Missonier-Piera (2007) didn't find supporting evidence of relationship of auditor choice and cost of debt for public firms. Some studies (e.g. Hillison and Pacini (2004); Mansi et al. (2004); Lenz and Ostrowski (2005); O'Reilly, Leitch, and Tuttle (2006); Fortin and Pittman (2007)) have made efforts to distinguish between information and insurance value of firm's auditor choice to external investors. Dhaliwal, Gleason, Heitzman, and Melendrez (2008), provide further evidence that among client-firms of brand name auditors, costs of debt finance are decreasing (increasing) with audit (non-audit) fees paid to brand name auditors.

Fortin and Pittman (2007) analyze empirical relevance of the auditor choice in determining cost of debt capital for private firms. They applied treatment effects approach proposed by Heckman (1979) to overcome potential self-selection problem related to auditor

choice models as addressed by Chaney et al. (2004). Fortin and Pittman (2007) couldn't find evidence that the choice of a brand name auditor is related to cost of debt for private firms. Results of the study didn't either indicate that self-selection problem of firm's auditor choice is evident and biasing estimates of the specified regression model. On the other hand, by analyzing large panel data of Finnish small firms Hyytinen and Väänänen (2007) found evidence that the appointment of a certified auditor is related to improved commercial credit ratings, increased direct taxes paid and reduced cost of debt within small private firms.

4. Methodology

In empirical analysis of this study data of Finnish private and limited SMEs is used to examine effects of the choice of a certified auditor or an international brand name audit firm on cost of external debt financing for private SMEs. The data is an unbalanced panel data comprising of SMEs' financial and auditing information covering fiscal years 2001−2005. Initial sample is collected from Voitto^{+} -database compiled by Suomen Asiakastieto Oy. Initial sampling made from the database includes limited SMEs (by EU-definition: independent, employees < 250, and turnover ≤ 50 M€ or assets ≤ 43 M€) that have financial statement information available from fiscal years 2001−2005. Following earlier studies finance and insurance companies, and firms with non-comparable financial statement information are excluded from the sample (e. g. Carey et. al. (2000); Piot (2007)). These restrictions results initial sample size of 1110 firms.

Observations for firm's cost of debt capital is not available in the database, and following prior studies it is estimated based on firm's financial statement information (Pittman and Fortin (2004); Hyytinen and Väänänen (2004); Piot (2007)). Estimation of proxy variable for firm's interest rate requires further adjustments on the data. As firm's interest rate is proxied by ratio of annual interest expenses to average liabilities subject to interest during fiscal year, all firm-year observations when firms don't report interest expenses in their income statement, or liabilities subject to interest in their balance sheet, must be excluded from the analysis. As Hyytinen and Väänänen (2004) point out, firms that don't report interest expenses or liabilities subject to interest could avoid using debt capital either because they don't have capital needs, or because of

restricted availability or high cost related to this source financing. Therefore, treating these firm-year observations as estimated zero percent interest rate wouldn't be appropriate.

Furthermore, the use this proxy variable for firm's interest rate results extreme observations to the distribution of the variable. Therefore, following earlier studies extreme observations are excluded from data by dropping all firm-year observations that are outside the 5^{th} and 95^{th} percentiles of the pooled distribution of the variable (Hyytinen and Väänänen (2004); Pittman and Fortin (2004); Piot (2007)). In addition, despite of available financial statement information initial data set contains firm-year observations with missing data on experimental variables related to auditor choice, and these observations are also excluded from final data. These restrictions result the final unbalanced panel data consisting of 832 firms and 2377 firm-year observations. Table 1 reports industry distribution of firms in the final sample, and indicates that it is representative of overall industry distribution of Finnish firm population.

To examine relation between firm's auditor choice and estimated cost of debt multivariate regression analysis is used in this study. Estimated regression models include indicator variables for firm's auditor choice and control variables for firm's industry classification, fiscal year and relevant firm-specific risk factors considered as determinants of debt pricing based on prior research. Specified regression models are estimated with pooled ordinary least squares and panel data fixed effects (within) estimation methods. The benefit related to applying fixed effects estimation method is that it controls for all relevant firm-specific time-invariant effects that are not observable and therefore omitted from specification of OLS regression model. Therefore, effects of auditor choice estimated with fixed effects method are not biased by these omitted firm-specific and time-invariant factors that could be related to debt pricing and firm's auditor choice.

It has been pointed out in the prior literature that in regression specifications self-selection problem and resulting endogeneity could be related to explanatory variable indicating firm's auditor choice (Chaney et al. (2004)). Firms may jointly consider costs and benefits related to auditor choice when making auditor choice decision. Therefore, auditor choice may not be randomly distributed between firms, but can depend on firm-specific characteristics. In the presence of this self-selection problem standard linear regression can produce biased estimates for effects of auditor choice on debt pricing. Therefore, following Fortin and Pittman

(2007) two-stage treatment effects approach proposed by Heckman (1979) is applied in this study as robustness test, whether self-selection is biasing the results. Regardless of applied estimation method, standard errors of individual coefficients are corrected for heteroskedasticity and intra-firm serial-correlation by applying cluster robust estimation of standard errors.

Table 2 reports specification of the variables used in the regression models. As mentioned before, dependent variable *Interest Rate* is determined as ratio of firm's interest expenses divided by average liabilities subject to interest during fiscal year. Experimental variables of interest are dummy variable *Big Four* indicating firm's choice of one of the international brand name audit firms (referred to Big Four audit firms), and dummy variable *Certified* indicating firm's choice of a certified HTM or KHT auditor. Because of expected overlap between variables *Big Four* and *Certified* their effects on *Interest Rate* are estimated in separate regressions. Because during study period firm's obligation to appoint a certified auditor is determined by firm's size threshold specified in law, following Hyytinen and Väänänen (2004) dummy variable *Law* indicating whether firm exceeds this size threshold is included in regression model to control for legal obligation to appoint a certified auditor.

Control variables indicating firm-specific risk of bankruptcy and agency problems are included into regression models explaining debt pricing. Firm's age and size can proxy level of asymmetric problems and risk of bankruptcy, so following Mansi et al. (2004) logarithmic variables *LnAssets* and *LnAge* are included to control for these effects on *Interest Rate*. In addition, following Fortin and Pittman (2007) possible nonlinear effects of firm's size and age are controlled by quadratic specification of these variables by including variables $LnAssets^2$ and $LnAge^2$ in the regression models. Leverage and debt maturity structure can proxy risks of bankruptcy and creditor-owner agency conflict. Myers (1977) argues that agency problems between creditors and owners are particularly related to long term debt. Therefore, variable *Leverage* defined as ratio of total debt to total assets, and variable *Maturity* defined as ratio of long-term debt to total debt, are included as control variables.

Following Piot (2007) and Fortin and Pittman (2007) variable *Current Ratio* defined as ratio of current assets to current liabilities, and variable *Interest Coverage* defined as ratio of interest expenses to EBIT are included as controls for firm's liquidity risk. Variable *Tangible Assets* defined as ratio of net book value of firm's fixed tangible asset to total assets, is included

to control for collateral value of assets. Variable *ROA* defined as ratio of EBIT to total assets is included as control for firm's operational profitability. To control for increased risk of creditor-owner agency conflict related to risk-shifting variable *Growth* defined as relative annual change in total assets is included. Following Friend and Lang (1988) to control for volatility of firm's operational cash flows, variable *Volatility* defined as ratio of standard deviation of EBIT to average total assets during fiscal years 2001−2005 is included. In addition, dummy variables indicating firm's industry and fiscal year are included to control for industry-specific and time-varying macroeconomic effects on debt pricing.

The specifications of the regression models for pooled OLS and fixed effects estimation are described below. The specification of the model 2 replaces variable *Big Four* with variable *Certified*. Because fixed effects method estimates coefficients for individual variables based on time-series variation, coefficients of time-invariant variables cannot be estimated with this method, and time-invariant variables have to be excluded from regression specifications. Therefore, time-invariant variable *Volatility* and industry dummy variables are excluded from the regression model specifications for fixed effects estimation method. However, experimental variables of interest *Big Four* and *Certified* can be estimated consistently with fixed effects method, so that estimated coefficients are robust to all time-invariant firm-specific effects. In the context of this study, latent effects of potentially relevant factors related to firm's ownership structure and other governance characteristics can be controlled with fixed effects method to the extent that these effects are time-constant.

Pooled OLS regression models:

Model 1: $$\textit{Interest Rate}_{it} = \alpha_0 + \beta_1\, \textit{Big Four}_{it} + \beta_2\, \textit{Law}_{it} + \beta_3\, \textit{LnAssets}_{it} + \beta_4\, \textit{LnAssets}^2_{it} + \beta_5\, \textit{LnAge}_{it} + \beta_6\, \textit{LnAge}^2_{it} + \beta_7\, \textit{Leverage}_{it} + \beta_8\, \textit{Maturity}_{it} + \beta_9\, \textit{Current Ratio}_{it} + \beta_{10}\, \textit{Interest Coverage}_{it} + \beta_{11}\, \textit{Tangible Assets}_{it} + \beta_{12}\, \textit{ROA}_{it} + \beta_{13}\, \textit{Growth}_{it} + \beta_{14}\, \textit{Volatility}_{it} + \gamma\, \textit{Industry}_{it} + \delta\, \textit{Year}_{it} + \varepsilon_{it}$$

Model 2: $$\textit{Interest Rate}_{it} = \alpha_0 + \beta_1\, \textit{Certified}_{it} + \beta_2\, \textit{Law}_{it} + \beta_3\, \textit{LnAssets}_{it} + \beta_4\, \textit{LnAssets}^2_{it} + \beta_5\, \textit{LnAge}_{it} + \beta_6\, \textit{LnAge}^2_{it} + \beta_7\, \textit{Leverage}_{it} + \beta_8\, \textit{Maturity}_{it} + \beta_9\, \textit{Current Ratio}_{it} + \beta_{10}\, \textit{Interest Coverage}_{it} + \beta_{11}\, \textit{Tangible Assets}_{it} + \beta_{12}\, \textit{ROA}_{it} + \beta_{13}\, \textit{Growth}_{it} + \beta_{14}\, \textit{Volatility}_{it} + \gamma\, \textit{Industry}_{it} + \delta\, \textit{Year}_{it} + \varepsilon_{it}$$

Fixed effects (within) regression models:

Model 1: $Interest\ Rate_{it} = \alpha_0 + \beta_1\ Big\ Four_{it} + \beta_2\ Law_{it} + \beta_3\ LnAssets_{it} + \beta_4\ LnAssets^2_{it} + \beta_5\ LnAge_{it} + \beta_6\ LnAge^2_{it} + \beta_7\ Leverage_{it} + \beta_8\ Maturity_{it} + \beta_9\ Current\ Ratio_{it} + \beta_{10}\ Interest\ Coverage_{it} + \beta_{11}\ Tangible\ Assets_{it} + \beta_{12}\ ROA_{it} + \beta_{13}\ Growth_{it} + \delta\ Year_{it} + \varepsilon_{it}$

Model 2: $Interest\ Rate_{it} = \alpha_0 + \beta_1\ Certified_{it} + \beta_2\ Law_{it} + \beta_3\ LnAssets_{it} + \beta_4\ LnAssets^2_{it} + \beta_5\ LnAge_{it} + \beta_6\ LnAge^2_{it} + \beta_7\ Leverage_{it} + \beta_8\ Maturity_{it} + \beta_9\ Current\ Ratio_{it} + \beta_{10}\ Interest\ Coverage_{it} + \beta_{11}\ Tangible\ Assets_{it} + \beta_{12}\ ROA_{it} + \beta_{13}\ Growth_{it} + \delta\ Year_{it} + \varepsilon_{it}$

To address the potential self-selection problem and resulting endogeneity bias related to auditor choice variables in the regression specifications, two-stage treatment effects estimation procedure following Fortin and Pittman (2007) is applied in this study. In the first stage of this estimation procedure pooled probit models explaining firm's auditor choice are estimated by using full maximum likelihood estimation. Firm's auditor choice is modeled as a function of firm-specific factors that prior research has shown to be determinants of firm's auditor choice. These factors include firm's size, age, leverage, liquidity, profitability, growth and risk (e. g. Jonhson and Lys (1990); Mansi et al. (2004); Chaney et al. (2004); Piot (2005)). In addition, firm's legal obligation to appoint a certified auditor in expected to determine firm's auditor choice in context of this study. Therefore, variables *Law, LnAssets*, *LnAssets*^{2}, *LnAge*, *LnAge*^{2}, *Leverage*, *Current Ratio*, *ROA*, *Growth* and *Volatility* are included in probit models as explanatory variables of firm's auditor choice.

Chaney et al. (2004) report empirical evidence that firm's recently experienced losses, and complexity of firm's operations and required audit service determine firm's auditor choice. Therefore, following Chaney et al. (2004) variable *Asset Turnover* defined as a ratio of turnover to total assets, and variable *Current Assets* defined as a ratio of current assets to total asset, are included in probit regressions as controls for complexity and scope of required audit service for client-firms. In addition, following Fortin and Pittman (2007) dummy variable *Loss* indicating whether the firm experienced loss in the current or preceding fiscal year, is included as an additional control variable. In the second stage of this treatment effects estimation, consistent estimates free of self-selection bias for auditor choice variables *Big Four* and *Certified* can be obtained by pooled OLS estimation of regression model explaining *Interest Rate* with inclusion

of *Inverse Mills Ratio* as an additional explanatory variable derived from first-stage probit regression (Fortin and Pittman (2007)).

1. Stage probit regression models:

Model 1: $Big\ Four_{it} = \varphi_0 + \varphi_1 Law_{it} + \varphi_2 LnAssets_{it} + \varphi_3 LnAssets^2_{it} + \varphi_4 Asset\ Turnover_{it} + \varphi_5 LnAge_{it} + \varphi_6 LnAge^2_{it} + \varphi_7 Leverage_{it} + \varphi_8 Current\ Assets_{it} + \varphi_9 Current\ Ratio_{it} + \varphi_{10} ROA_{it} + \varphi_{11} Loss_{it} + \varphi_{12} Growth_{it} + \varphi_{13} Volatility_{it} + \mu_{it}$

Model 2: $Certified_{it} = \varphi_0 + \varphi_1 Law_{it} + \varphi_2 LnAssets_{it} + \varphi_3 LnAssets^2_{it} + \varphi_4 Asset\ Turnover_{it} + \varphi_5 LnAge_{it} + \varphi_6 LnAge^2_{it} + \varphi_7 Leverage_{it} + \varphi_8 Current\ Assets_{it} + \varphi_9 Current\ Ratio_{it} + \varphi_{10} ROA_{it} + \varphi_{11} Loss_{it} + \varphi_{12} Growth_{it} + \varphi_{13} Volatility_{it} + \mu_{it}$

2. Stage pooled OLS regression models:

Model 1: $Interest\ Rate_{it} = \alpha_0 + \beta_1 Big\ Four_{it} + \beta_2 LnAssets_{it} + \beta_3 LnAssets^2_{it} + \beta_4 LnAge_{it} + \beta_5 LnAge^2_{it} + \beta_6 Leverage_{it} + \beta_7 Maturity_{it} + \beta_8 Current\ Ratio_{it} + \beta_9 Interest\ Coverage_{it} + \beta_{10} Tangible\ Assets_{it} + \beta_{11} ROA_{it} + \beta_{12} Growth_{it} + \beta_{13} Volatility_{it} + \beta_{14} Inverse\ Mills\ Ratio_{it} + \gamma Industry_{it} + \delta Year_{it} + \varepsilon_{it}$

Model 2: $Interest\ Rate_{it} = \alpha_0 + \beta_1 Certified_{it} + \beta_2 LnAssets_{it} + \beta_3 LnAssets^2_{it} + \beta_4 LnAge_{it} + \beta_5 LnAge^2_{it} + \beta_6 Leverage_{it} + \beta_7 Maturity_{it} + \beta_8 Current\ Ratio_{it} + \beta_9 Interest\ Coverage_{it} + \beta_{10} Tangible\ Assets_{it} + \beta_{11} ROA_{it} + \beta_{12} Growth_{it} + \beta_{13} Volatility_{it} + \beta_{14} Inverse\ Mills\ Ratio_{it} + \gamma Industry_{it} + \delta Year_{it} + \varepsilon_{it}$

5. Empirical results

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6. Conclusion

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TABLE 1

Industry Distribution of the Final Sample

Industry (TOL2002 Classification)		Sample		Population
		Frequency	Percent	Percent
D	Manufacturing	189	22,72	13,96
E	Electricity, gas and water supply	2	0,24	0,66
F	Construction	132	15,87	14,35
G	Wholesale and retail trade	214	25,72	23,10
H	Hotels and restaurants	16	1,92	4,33
I	Transport, storage and communication	55	6,61	7,04
K	Real estate, renting and business services	188	22,6	29,69
N	Health and social work	17	2,04	3,19
O	Other community, social and personal service activities	19	2,28	3,67
Total		832	100,00	100,00

The population distribution is based on Business Register data from year 2005 maintained by Statistics Finland

TABLE 2

Definition of the Variables

Variable		Definition
Interest Rate	=	Annual interest expenses / average liabilities subject to interest during fiscal year
Big Four	=	Dummy coded 1, if Big Four audit firm (PriceWaterhouseCoopers, Ernst & Young, KPMG, or Deloitte & Touche) has been appointed as external auditor
Certified	=	Dummy coded 1, if certified HTM or KHT auditor has been appointed as external auditor
Law	=	Dummy coded 1, if legally determined size threshold (at least two of the following criteria: employees > 10, turnover > 680 000 euros, and total assets > 340 000 euros) is exceeded, so that the firm is obligatory to appoint a certified HTM or KHT auditor
LnAssets	=	Natural logarithm of total assets
Asset Turnover	=	Turnover / total assets
LnAge	=	Natural logarithm of number of years since firm's registration plus 0,5
Leverage	=	Total debt / total assets
Maturity	=	Debt maturity structure: long term debt / total debt
Current Assets	=	Current assets / total assets
Current Ratio	=	Current assets / current liabilities
Interest Coverage	=	Interest coverage ratio: Interest expenses / EBIT
Tangible Assets	=	Net book value of tangible fixed assets / total assets
ROA	=	Return on assets: EBIT / total assets
Loss	=	Dummy coded 1, if the firm incurred a loss in the current or preceding fiscal year
Growth	=	Relative annual change of total assets
Volatility	=	Standard deviation of EBIT / average total assets during 2001-2005
Y2003 − Y2004	=	Dummy variables (3) to control for fixed time-effects and time-varying macro-economic factors
IndD – IndO	=	Dummy variables (8) to control for fixed industry effects based on TOL2002 top level industry classification

TABLE 3

Summary Statistics

Variable	Obs	Mean	Std. Dev.	Median	Min	Max
Interest Rate	2377	0,0480	0,0360	0,0396	0,0038	0,2000
Big Four	2377	0,1994	0,3996	0,0000	0,0000	1,0000
Certified	2377	0,7951	0,4037	1,0000	0,0000	1,0000
Law	2377	0,4994	0,5001	0,0000	0,0000	1,0000
LnAssets	2377	6,0419	1,5165	6,0093	1,2809	10,5693
Asset Turnover	2377	2,4443	1,6078	2,1203	0,0016	16,5932
LnAge	2377	2,5631	0,6712	2,6027	−0,6931	4,6681
Leverage	2377	0,5373	0,2353	0,5395	0,0151	0,9994
Maturity	2377	0,2759	0,2686	0,2271	0,0000	0,9948
Current Assets	2377	0,1892	0,2243	0,1047	0,0000	0,9887
Current Ratio	2377	2,5909	4,2513	1,7000	0,0000	109,9000
Interest Coverage	2377	0,1427	1,8180	0,0540	−47,7250	42,2692
Tangible Assets	2377	0,2699	0,2532	0,1842	0,0000	0,9741
ROA	2377	0,1544	0,1840	0,1313	−2,6389	1,1020
Loss	2377	0,2217	0,4155	0,0000	0,0000	1,0000
Growth	2377	0,1445	0,8130	0,0266	−0,9668	26,9769
Volatility	2377	0,1219	0,1017	0,0913	0,0015	0,9351

TABLE 4

Distribution of Interest Rate by Classified Explanatory Variables

		Interest Rate		
	Value	Median	Mean	t-statistic
Big Four	= 1	0,0346	0,0406	5,58***
	= 0	0,0413	0,0498	
Certified	= 1	0,0383	0,0457	5,50***
	= 0	0,0476	0,0570	
Law	= 1	0,0370	0,0432	6,46***
	= 0	0,0435	0,0527	
LnAssets	≥ 6,0093 (=Median)	0,0369	0,0427	7,27***
	< 6,0093	0,0435	0,0533	
Asset Turnover	≥ 2,1203	0,0400	0,0509	−3,97***
	< 2,1203	0,0394	0,0451	
LnAge	≥ 2,6027	0,0386	0,0459	2,62***
	< 2,6027	0,0404	0,0497	
Leverage	≥ 0,5395	0,0426	0,0502	−2,98***
	< 0,5395	0,0362	0,0458	
Maturity	≥ 0,2271	0,0418	0,0461	2,58**
	< 0,2271	0,0352	0,0499	
Current Assets	≥ 0,1047	0,0402	0,0471	1,26
	< 0,1047	0,0385	0,0489	
Current Ratio	≥ 1,7000	0,0353	0,0439	5,80***
	< 1,7000	0,0445	0,0524	
Interest Coverage	≥ 0,0540	0,0485	0,0570	−12,56***
	< 0,0540	0,0298	0,0390	
Tangible Assets	≥ 0,1842	0,0440	0,0515	−4,74***
	< 0,1842	0,0345	0,0445	
ROA	≥ 0,1313	0,0380	0,0477	0,36
	< 0,1313	0,0413	0,0482	
Loss	= 1	0,0439	0,0517	−2,56**
	= 0	0,0389	0,0469	
Growth	≥ 0,0266	0,0353	0,0447	4,49***
	< 0,0266	0,0444	0,0513	
Volatility	≥ 0,0913	0,0395	0,0501	−2,87***
	< 0,0913	0,0396	0,0459	

*, **, and *** denote statistical significance at the 10 %, 5 % and 1 % confidence levels, respectively

TABLE 5

Distribution of Explanatory Variables by Auditor Choice

		Big Four			*Certified*		
		1	0	t-statistic	1	0	t-statistic
Law	Mean	0,7532	0,4362	−13,87***	0,6016	0,1027	−28,05***
	Median	1,0000	0,0000		1,0000	0,0000	
LnAssets		6,9844	5,8071	−16,25***	6,3702	4,7677	−28,09***
		7,1578	5,7646		6,4186	4,7774	
Asset Turnover		2,2015	2,5048	4,49***	2,3433	2,8366	4,98***
		2,0278	2,1475		2,0694	2,3238	
LnAge		2,6171	2,5496	−1,87*	2,6213	2,3369	−9,22***
		2,6027	2,6027		2,6027	2,3514	
Leverage		0,5252	0,5403	1,25	0,5393	0,5295	−0,83
		0,5271	0,5479		0,5395	0,5385	
Maturity		0,2387	0,2852	3,45***	0,2705	0,2972	1,80*
		0,1655	0,2418		0,2266	0,2298	
Current Assets		0,2285	0,1795	−4,09***	0,1998	0,1482	−4,46***
		0,1668	0,0877		0,1256	0,0330	
Current Ratio		2,8599	2,5239	−1,20	2,4898	2,9830	1,71*
		1,8000	1,7000		1,7000	1,7000	
Interest Coverage		0,1664	0,1368	−0,40	0,1443	0,1365	−0,12
		0,0412	0,0573		0,0527	0,0558	
Tangible Assets		0,2332	0,2790	3,59***	0,2593	0,3110	3,90***
		0,1353	0,1936		0,1670	0,2620	
ROA		0,1390	0,1582	2,25**	0,1493	0,1743	2,49**
		0,1128	0,1369		0,1250	0,1578	
Loss		0,2468	0,2155	−1,43	0,2111	0,2628	2,34**
		0,0000	0,0000		0,0000	0,0000	
Growth		0,0952	0,1568	2,26**	0,1381	0,1692	0,80
		0,0169	0,0295		0,0260	0,0341	
Volatility		0,1099	0,1249	3,07***	0,1131	0,1562	7,81
		0,0833	0,0946		0,0840	0,1298	

*, **, and *** denote statistical significance at the 10 %, 5 % and 1 % confidence levels, respectively

TABLE 6

Pearson Correlation Matrix

	Interest Rate	*Big Four*	*Certified*	*Law*	*LnAssets*	*Asset Turnover*	*LnAge*	*Leverage*	*Maturity*
Interest Rate	1,0000								
Big Four	−0,1025***	1,0000							
Certified	−0,1269***	0,2455***	1,0000						
Law	−0,1315***	0,2533***	0,4027***	1,0000					
LnAssets	−0,1849***	0,3103***	0,4266***	0,7740***	1,0000				
Asset Turnover	0,1156***	−0,0754***	−0,1239***	−0,0606***	−0,3017***	1,0000			
LnAge	−0,0644***	0,0402**	0,1711***	0,2532***	0,3297***	−0,1191***	1,0000		
Leverage	0,0646***	−0,0257	0,0167	0,0542***	0,0327	0,1530***	−0,0618***	1,0000	
Maturity	−0,0689***	−0,0692***	−0,0401*	−0,0345*	0,0858***	−0,3225***	0,0406**	0,3292***	1,0000
Current Assets	0,0193	0,0875***	0,0930***	0,1923***	0,1961***	0,1282***	0,1584***	0,1509***	−0,0154
Current Ratio	−0,0263	0,0316	−0,0468**	−0,0503**	−0,0015	−0,1130***	−0,0045	−0,3105***	0,0788***
Interest	0,0326	0,0065	0,0017	0,0333	0,0137	−0,0201	0,0105	0,0171	0,0268
Tangible Assets	0,1054***	−0,0724***	−0,0824***	−0,0781***	0,0039	−0,2247***	0,0003	0,1298***	0,3463***
ROA	0,0283	−0,0417**	−0,0549***	−0,0526**	−0,0731***	0,0559***	−0,1065***	−0,3642***	−0,1977***
Loss	0,0553***	0,0302	-0,0503**	-0,0712***	-0,1113***	0,0446**	-0,0093	0,2605***	0,0633***
Growth	−0,0542***	−0,0302	−0,0154	−0,0143	0,0164	−0,0730***	−0,0499**	0,1037***	0,0301
Volatility	0,0864***	−0,0587***	−0,1711***	−0,2422***	−0,3977***	0,2540***	−0,2399***	−0,0628***	−0,231***

	Current Assets	*Current Ratio*	*Interest Coverage*	*Tangible Assets*	*ROA*	*Loss*	*Growth*	*Volatility*
Current Assets	1,0000							
Current Ratio	0,0824***	1,0000						
Interest	0,0030	−0,0122	1,0000					
Tangibility	−0,3573***	−0,1588***	0,0285	1,0000				
ROA	−0,1008***	0,0828***	−0,0222	−0,1555***	1,0000			
Loss	0,0075	-0,0800***	-0,0262	0,0715***	-0,4188***	1,0000		
Growth	−0,0414**	−0,0247	0,0070	−0,0378*	0,0766***	0,0175	1,0000	
Volatility	−0,1709***	−0,0155	−0,0367*	−0,0889***	0,1409***	0,1848***	0,0678***	1,0000

*, **, and *** denote statistical significance at the 10 %, 5 % and 1 % confidence levels, respectively

TABLE 7

Pooled OLS and Fixed Effects (within) Estimation of Regression Models

Dependent variable		*Interest Rate*							
Model specification		Model 1				Model 2			
Estimation method		Pooled OLS		Fixed Effects		Pooled OLS		Fixed Effects	
Variable	Expected sign	Coef.	t-value[a]	Coef.	t-value[a]	Coef.	t-value[a]	Coef.	t-value[a]
Constant		0,08341***	4,66	−0,02266	−0,49	0,08206***	4,57	−0,02911	−0,62
Big Four		**−0,00475****	**−2,04**	**−0,01337*****	**−3,51**	–		–	
Certified		–		–		−0,00421	−1,37	−0,01082	−1,62
Law		−0,00057	−0,18	−0,00387	−0,85	−0,00007	−0,02	−0,00430	−0,94
LnAssets		**−0,01010****	**−2,54**	−0,00148	−0,12	**−0,00900****	**−2,17**	0,00046	0,04
$LnAssets^2$		**0,00050***	**1,74**	−0,00056	−0,57	0,00040	1,35	−0,00069	−0,69
LnAge		−0,00537	−0,80	−0,00998	−0,72	−0,00520	−0,77	−0,01122	−0,81
$LnAge^2$		0,00117	0,92	**0,01849*****	**2,82**	0,00119	0,94	**0,01971*****	**3,01**
Leverage		**0,02080*****	**3,97**	**−0,01658****	**−1,66**	**0,02097*****	**4,00**	**−0,01747****	**−1,74**
Maturity		**−0,01948*****	**−4,47**	**−0,01540****	**−2,51**	**−0,01918*****	**−4,40**	**−0,01477****	**−2,40**
Current Ratio		**0,00040*****	**1,60**	0,00030	1,30	0,00036	1,47	0,00029	1,27
Interest Coverage		**0,00062****	**2,37**	0,00033	1,28	**0,00060****	**2,28**	0,00027	0,98
Tangible Assets		**0,01850*****	**3,82**	**0,01346****	**1,78**	**0,01857*****	**3,84**	**0,01376****	**1,80**
ROA		**0,01353****	**2,43**	0,00385	0,55	**0,01359****	**2,48**	0,00337	0,48
Growth		**−0,00260****	**−1,73**	−0,00145	−1,32	**−0,00257****	**−1,68**	−0,00142	−1,27
Volatility		0,00484	0,39	Dropped		0,00375	0,31	Dropped	
Year controls		Included		Included		Included		Included	
Industry controls		Included		Dropped		Included		Dropped	
Adjusted R^2		0,0807		0,0666		0,0780		0,0632	
F-statistic		F(25, 831) = 6,52***		F(16, 831) = 6,94***		F(25, 831) = 13,41***		F(16, 831) = 6,15***	
Number of observations		2377		2377		2377		2377	
Breusch-Pagan LM test				$\chi^2(1)$ = 343,82***				$\chi^2(1)$ = 345,02***	
Hausman specification test				$\chi^2(16)$ = 71,75***				$\chi^2(16)$ = 70,93***	
F-test for fixed effects				F(831, 1529) = 3,89***				F(831, 1529) = 3,87***	

*, **, and *** denote statistical significance at the 10 %, 5 % and 1 % confidence levels, respectively

[a] Cluster robust standard errors

TABLE 8

Two-Stage Treatment Effects Estimation of Regression Models

Dependent variable	*Interest Rate*							
Model specification	Model 1				Model 2			
Estimation method	1. Stage: Pooled Probit		2. Stage: Pooled OLS		1. Stage: Pooled Probit		2. Stage: Pooled OLS	
Variable	Coef.	z-value[a]	Coef.	t-value[a]	Coef.	z-value[a]	Coef.	t-value[a]
Constant	**−2,43424*** **	**−3,18**	**0,18666*** **	**3,83**	1,13847	1,55	**0,07423** **	**2,59**
Big Four			**−0,00505** **	**−2,17**				
Certified							−0,00408	−1,33
Law	0,11694	0,85			**0,35202** **	**2,13**		
LnAssets	0,25434	1,23	**−0,02032*** **	**−3,37**	−0,39663	−1,61	−0,00745	−1,21
LnAssets^2	0,00575	0,37	**0,00054** *	**1,90**	**0,07598*** **	**2,84**	0,00033	0,87
Asset Turnover	0,00550	0,19			−0,02314	−0,92		
LnAge	−0,26462	−0,90	0,00142	0,19	**−0,65832** *	**−1,85**	−0,00565	−0,82
LnAge^2	0,03300	0,58	0,00031	0,23	**0,15203** **	**2,00**	0,00130	0,99
Leverage	−0,15205	−0,82	**0,02246*** **	**4,21**	0,10830	0,59	**0,02103*** **	**4,02**
Maturity			**−0,01851*** **	**−4,31**			**−0,01919*** **	**−4,46**
Current Assets	0,13253	0,60			−0,28190	−1,30		
Current Ratio	0,00049	0,53	0,00038	1,54	−0,00043	−0,51	0,00036	1,46
Interest Coverage			**0,00062** **	**2,33**			**0,00061** **	**2,28**
Tangible Assets			**0,01987*** **	**4,09**			**0,01857*** **	**3,86**
ROA	−0,15859	−1,05	**0,02234*** **	**3,30**	0,03430	0,27	**0,01351** **	**2,45**
Loss	**0,16578** *	**1,91**			−0,02126	−0,25		
Growth	−0,08169	−1,33	−0,00011	−0,06	−0,01843	−1,43	**−0,00259** *	**−1,71**
Volatility	**1,34010 ** **	**3,22**	**−0,03802 * **	**−1,65**	0,03639	0,09	0,00414	0,34
Inverse Mills Ratio			**−0,03489 ** **	**−2,22**			0,00403	0,36
Year controls			Included				Included	
Industry controls			Included				Included	
Correct classification percentage	82,51				75,81			
Pseudo R^2 or Adjusted R^2	0,1165		0,0840		0,1917		0,0800	
Wald χ^2 or F-statistic	$\chi^2(13) = 118,82$ ***		$F(25, 831) = 7,42$ ***		$\chi^2(13) = 181,88$ ***		$F(25, 831) = 12,17$ ***	
Number of observations	4146		2377		4146		2377	

*, **, and *** denote statistical significance at the 10 %, 5 % and 1 % confidence levels, respectively

[a] Cluster robust standard errors