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The association between share price volatility and audit fees

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Abstract

A number of prior studies have examined the relationship between client business risk and audit fees charged for audit services by using various measures of client risk such as litigation risk, audit opinion, inherent and systematic risk, leverage, and client profitability. However, these measures of client risk are not always readily observable to users of financial information before the release of financial statements, in contrast to share price volatility. While volatility of share price is expected to be positively associated with audit fees, Pratt and Stice (1994) did not support this positive relationship. This study, hence, investigates the association between audit fees and client business risk by using share price volatility as proxy, with the aim of addressing the anomaly found in the paper of Pratt and Stice (1994). Leverage, another common measure of business risk in previous studies, is considered in order to provide a base comparison for risk. A cross-sectional audit fee regression model is used to analyse this relationship in an Australian context for the three year period 2004-2006 with some widely accepted audit fees determinants controlled. This study contributes to the extant literature by considering an additional and readily observable proxy for business risk and improves the explanatory power of existing audit fee models.

Keywords: Audit fees, share price volatility, business risk, leverage.
1. Introduction

This thesis examines the relationship between business risk and audit fees for firms listed on the Australian Stock Exchange (ASX) 2004-2006 by using alternative proxies for risk including volatility in share price and leverage. The factors that affect audit fees charged for external auditing services are the subject of increasing public interest with an increased attention to the justification of the size of the audit fee charged. The audit fee paid by an individual company is publicly available, and auditors need to justify comparatively high fees for particular clients in similar industries. S331 of the Corporations Act and APES 110 state that audit fees should be reasonable fees and expenses based on the work performed. ASA200 also states that auditors can reduce audit risk by changing the nature, timing and extent of audit procedures. Hence, it would be expected that audit fees would be higher for high risk clients.

A substantial body of research has examined the determinants of audit fees over the past 25 years. For example, studies have examined size (Bell et al., 2001, Johnstone and Bedard, 2001, Lyon and Maher, 2005), complexity (Simunic, 1980, Pong and Whittington, 1994), litigation risk (Pratt and Stice, 1994, Houston et al., 2005) as well as audit opinion (Ferguson et al., 2003, Casterella et al., 2004, Goodwin-Stewart and Kent, 2006), leverage (William L. Felix et al., 2001, Bell et al., 2001, Johnstone and Bedard, 2001, Lyon and Maher, 2005, Goodwin-Stewart and Kent, 2006), and inherent risk/systematic risk (Simunic, 1980, Stice, 1991, O'Sullivan, 2000) measures. In all cases risk was found to be positively related to audit fees. Hay et al. (2006) conducted a meta-analysis of audit fee model research, analysing the most common independent variables used in previous audit fee research.

Many of these measures are not readily observable prior to the public release of the financial information. In contrast, share price volatility measure is observable prior to the disclosure of the audit fee. It is expected share prices capture risk as indicated by Baginski and Wahlen (2003). In addition, Firth (1985 pp32) in analysing unsystematic risk in New Zealand public companies found that “The greater the risk specific to the stock of an individual company, the greater the audit fee.”

One prior study by Pratt and Stice (1994) considered the relationship between share price volatility and audit fees. They found that the variability of the client’s stock price was either ignored or viewed as relating negatively to litigation risk. Contrary to their expectations, share price volatility did not significantly influence expected audit fees from auditors. However, in their study Pratt and Stice (1994) used an experimental approach manipulating share price volatility at two levels (high/median) rather than using archival share price volatility data. Moreover, the measure of audit fees was expected audit fees rather than actual audit fees. Manipulation of these measures may not have been sufficiently robust to demonstrate a significant relationship.

This thesis, using share price volatility and leverage as proxies for business risk, attempts to address this anomaly and examines the effect of increased business risk of organisations on actual audit fees charged by audit firms using archival data for all companies listed on the ASX for the three years, 2004-2006.

This research extends prior research using the audit fee model in two ways. First, most of the extant literature that has examined the determinants of audit fees has been undertaken
outside Australia (Hay et al., 2006). Empirical evidence of the applicability of those findings in the Australian market will be provided in this paper. Second, while previous research (Stice, 1991, Pratt and Stice, 1994) noted that stock price variability should be an important variable related to business risk, results in these studies are mixed. This study attempts to address this anomaly by using archival share price volatility results and actual audit fees rather than manipulated variables to investigate the relationship. Also, this thesis will complement existing studies by providing additional empirical evidence examining the relationship between organisation business risk, using share price volatility and leverage as surrogates, and the price of audit service.

We expect that the increased client business risk can be explained by high share price volatility and high leverage of an auditee, and that there will be a positive relationship between client business risk and audit fees. The results will be of particular importance to academics, the accounting profession and stakeholders, as not only the explanatory power of the existing audit fee model can be improved by the consideration of additional proxies for risk, but audit firms will have more supporting evidence for the audit fees they charge for external services, and for audit clients’ understanding of fee differences.

The remainder of the paper is structured as follows. The next section reviews the relevant literature and develops the hypotheses. The third section describes the research method adopted. Sample selection and data collection are reported in section four and limitations of this paper are discussed in the final section.

2. Literature review and hypotheses development

2.0 Audit fees and client risk

According to ASA200, it is required that auditors should link the accessed risks to audit procedures by changing the nature, timing and extent of the auditor’s work through the audit process in order to reduce audit risk to an acceptable level. Additionally, S331 of the Corporations Act and APES 110 state that audit fees charged by audit firms should be reasonable fees and expenses based on the work performed. Therefore, audit firms would charge more for comparatively more audit hours. Consequently, it is reasonable to expect the audit fee is a function of a client’s risk. Numerous studies (Pratt and Stice, 1994, O’Sullivan, 2000, Bell et al., 2001, Johnstone and Bedard, 2001, Lyon and Maher, 2005, Hay et al., 2006) have demonstrated that the costs of audit service increase as the level of risk increases. A variety of dimensions have been adopted to measure risk when examining the relationship between risk and audit fees, while two proxies for audit risk are considered in this thesis. The primary variable of interest in this thesis is share price volatility (2.1). This thesis considers the anomaly found in the paper of Pratt and Stice (1994) which did not support this positive relationship. Also, it provides additional evidence on the relationship between leverage (2.2) and audit fees. Similar to share price volatility, leverage is an observable measure of risk, albeit only on issue of the financial statements. This measure has been used in prior studies and is included in this study to provide a base comparison for risk.

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1 Hay et al. (2006) summarise that there are 17 audit fees studies undertaken in Australian in the past 25 years (147 studies in total all around the world).
2.1 Share price volatility

Using the total volatility in residual income as a surrogate for risk, Baginski and Wahlen (2003) found that risk (total volatility in earnings) is positively associated with price differentials\(^2\) and captures priced risk factors. As a result, we can infer that the volatility in earnings relates to the volatility in share price. Firth (1985) used unsystematic risk of stock market, which represents the risk specific to individual company, to measure audit risk and found it to be a statistically important factor in the model explaining audit fees. Some studies of the exploration of audit fee pricing have included share price volatility as a proxy for the measure of litigation risk, but reveal mixed findings in examining the relationship between stock price volatility and audit fees charged. Houston et al. (2005) indicate that litigation risk is one of three sources of business risk, which also includes audit risk and nonlitigation risk. Stice (1991) obtains evidence that high stock price variability measured by the variance of abnormal returns indicates high litigation risk of a client and results in a higher audit fee. While Pratt and Stice (1994) indicate that the volatility in share price should be an important variable related to audit fees, this factor was either ignored or viewed as relating negatively to litigation risk and did not have significant influence on expected audit fees with the share price volatility manipulated in median or high level\(^3\). Potentially, their measure may not have been sufficiently robust to reveal a significant relationship. In this thesis, share price volatility is measured by using variance of both monthly and daily share price differences, which is different from previous studies, to investigate the relationship between client business risk and audit fees.

Given only one negative result in the literature, the hypothesis for share price volatility is stated in the positive form.

**H1:** *Ceteris paribus,* share price volatility of a client during the financial year is positively associated with audit fees charged for the financial year.

2.1.2 Leverage

Leverage is used to measure the extent of financial distress of an auditee (Gist, 1992), which in turn affects the probability of loss suffered by auditor. Expressed as total liabilities to total assets, it is inferred that the higher the leverage ratio, the greater the risk of bankruptcy. O’Keefe et al. (1994) claim that the tendency that management will attempt to mispresent the financial position of a firm will increase, when there is indication of a high probability of insolvency of a company. Hence, it is necessary for auditors to invest more effort in order to “form a legal defence” (O’Keefe et al., 1994) with a higher likelihood of material misstatement. Gist (1992), Bell et al. (2001), Felix et al. (2001), and Johnstone and Bedard (2001) found that a high leverage ratio indicates higher risk of a company, which contributes to a higher audit fee. This discussion leads to the following hypothesis:

**H2:** *Ceteris paribus,* the leverage ratio of a client is positively associated with the audit fee charged for the financial year.

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2 Baginski and Wahlen (2003) compute the price differential, which is the market’s discount for risk, as the risk-free value estimate minus actual share price. And risk-free value is an estimate of firm value, which omits the effect of risk on share price and uses the risk-free rate of return as the discount rate in calculation. The measure of price differential is based on analysts’ forecasts, whereas share price volatility based on historical data.

3 High level share price volatility means “stock price fluctuations have significantly exceeded the industry norm”, while that “stock price fluctuations have been typical for the industry” is represented as median level (Pratt and Stice, 1994).
3. The research method

To test the hypotheses, a cross-sectional audit fee regression model based on prior audit fee research (Simunic, 1980, Bell et al., 2001, Johnstone and Bedard, 2001, William L. Felix et al., 2001, Lyon and Maher, 2005, Goodwin-Stewart and Kent, 2006) is used by including the variable of share price volatility in the present study. Following prior studies, the dependent variable is the natural log of audit fees. The model is specified as follows:

\[
\log(\text{fee}) = \beta_0 + \beta_1\log(\text{Asset}) + \beta_2\text{ROI} + \beta_3\text{Loss} + \beta_4\text{Fin} + \beta_5\text{Beta} + \beta_6\text{Opin} + \beta_7\text{Big4} + \beta_8\text{SPV} + \beta_9\text{DE} + \epsilon
\]

Where:

\(\log(\text{fee}) = \) natural log of total audit fees paid by the client;

Control variables:

\(\log(\text{Asset}) = \) natural log of total asset;
\(\text{ROI} = \) ratio of net income before interest and taxes to total assets (probability ratio);
\(\text{Loss} = \) indicator variable that equals 1 if there was a reported loss in any of the prior three years, and 0 otherwise;
\(\text{Fin} = \) indicator variable that equals 1 if the industry is financial institution, and 0 otherwise;
\(\text{Min} = \) indicator variable that equals 1 if the industry is mining, and 0 otherwise;
\(\text{Beta} = \) systematic risk;
\(\text{Opin} = \) indicator variable that equals 1 for a qualified or modified opinion, and 0 otherwise;
\(\text{Big4} = \) indicator variable that equals 1 if the audit firm is a Big4 accounting firm, and 0 otherwise;

Experimental variables:

\(\text{SPV} = \) historical share price volatility\(^4\);
\(\text{DE} = \) ratio of total debt to total assets (leverage ratio);

with:

\(\beta_i = \) regression parameters \((i = 1,2,3,4,...,9)\);
\(\epsilon = \) an error term.

3.1 Control variables

This thesis controls for variables previously found to effect audit fees including size (3.1.1), profitability (3.1.2) and industry (3.1.3), systematic risk (3.1.4) , audit opinion (3.1.5) and audit firm (3.1.6).

3.1.1 Size

Client size is found to be the most dominant determinant of audit fee (Hay et al., 2006)

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\(^4\) Historical share price volatility is calculated as the standard deviation of bar-to-bar share price differences which is measured on a settlement-price to settlement-price basis (Natenberg, 1988). Refer to Appendix for further explanation.
and it is measured in terms of total asset in natural logarithms in this paper, consistent with Bell et al. (2001), Johnstone and Bedard (2001), Felix et al. (2001), Casterella et al. (2004), Lyon and Maher (2005) and Goodwin-Stewart and Kent (2006). The coefficient for such variable is expected to be positive.

3.1.2 Profitability

Hay et al. (2006) summarise that audit fees have been demonstrated to be associated with profitability in most of the audit fees research. According to prior studies, a profitability ratio – return on investment (ROI) (Casterella et al., 2004, Goodwin-Stewart and Kent, 2006) and a dummy variable for the existence of a loss (Casterella et al., 2004, Lyon and Maher, 2005, Goodwin-Stewart and Kent, 2006) are typically used to measure client performance. It is expected that the relationship between audit fees and ROI will be negative whereas the relationship with loss will be positive.

3.1.3 Industry

The client’s industry is included as control variable as the business risk of an organisation can vary across industries. Hence, dummy variables are used to represent the industry of financial institution or mining following previous research (Johnstone and Bedard, 2001, Casterella et al., 2004, Lyon and Maher, 2005, Goodwin-Stewart and Kent, 2006).

3.1.4 Systematic risk

Systematic risk with a measure of the stock’s beta is one of the control variables in this thesis, because prior audit fee research has found a significant and positive relationship between inherent risk of an auditee, which is used a proxy as systematic risk, and audit fees (O'Sullivan, 2000, Hay et al., 2006).

3.1.5 Audit opinion

Ferguson et al. (2003) and Hay et al. (2006) report that higher audit fees are associated with audit opinions that are other than unqualified, and they also argue that the reason for such association is probably that auditors need to put more investigative effort to the audit problems in completing the audit. A dummy variable is applied to indicate the issuance of an audit opinion that is qualified or modified in our audit fee model. Consequently, a qualified or modified opinion for the audit is expected to positively relate to the quantity of the audit fee.

3.1.6 Audit firm

Audit fees are expected to be higher when audit services provided by Big 4 audit firms, as it is argued that Big 4 accounting firms provide higher quality audits (Hay et al., 2006). Consistent with prior studies, a dummy variable is adopted to denote the type of audit firm.

3.2 Experimental variables

Included in the regression models are two specific experimental variables relating to the hypotheses developed in Section 2, namely share price volatility and leverage.

To examine the relationship between share price volatility and audit fees we measure
historical share price volatility (hypothesis 1) as the standard deviation of bar-to-bar periodical share price differences (Natenberg, 1988) (See Appendix A). The reason for using historical share price data is that external validity can be improved by the application of archival data.

Leverage (hypothesis 2), consistent with Gist (1992), O’Keefe et al. (1994), Bell et al. (2001), Felix et al. (2001), and Johnstone and Bedard (2001), is measured as total liabilities to total asset with the purpose of investigation of the relationship between leverage and audit fees.

4. Data collection and data analysis

The sample of this thesis is selected from all Australian Companies listed on the ASX in the years, 2004-2006. Data for all companies is obtained from the Aspect Annual Reports On-line database (ASPECT) and the Centre for Research in Finance database (CRIF), supplemented by audit fee data provided by Professor Colin Ferguson. The annual report is the major source of data for this study. The data for total assets, total liabilities, net income and other relevant information were downloaded from ASPECT. To determine share price volatility of an individual firm, the standard deviations of daily and monthly settlement price are computed from monthly trading price obtained from the “Share Price and Price Relatives Data File” database in CRIF and daily from “AXS Daily Data” of SIRCA. Quarterly betas which measure the level of systematic risk over this 36-month period can be found in the “Risk Measurement Service” database of CRIF. The size of sample firms is determined by the availability of matched data from these four databases.

The selection criteria for sample companies was as follows. First, the sample was limited to those firms included in the audit fees database. Care was taken to ensure, data in financial statements and the period of share prices is consistent with the fiscal year of a specific organisation. The betas closest to the date of the financial year end are adopted in this paper. Secondly, those companies where data was not available for one or more variables were excluded from the sample.

The sample in year 2006 consists of 752 listed companies on the ASX after following the sample selection procedures above and Table 1 outlines the result.

<table>
<thead>
<tr>
<th>Table 1 Sample Description for 2006</th>
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<tbody>
<tr>
<td>Original sample from audit fees database</td>
</tr>
<tr>
<td>Minus:</td>
</tr>
<tr>
<td>Audit fees data not available</td>
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<tr>
<td>Financial statement data not available from ASPECT</td>
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<tr>
<td>Share price and risk data not available from CRIF</td>
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<tr>
<td>Final sample</td>
</tr>
</tbody>
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Based on the audit fees database obtained from Professor Colin Ferguson, audit fee data not settled in Australian dollar were converted to AUD using the exchange rate on the
financial statement date obtained from XE.com (2007).

Several difficulties have been encountered in my data collection procedures. For the measure of complexity of companies, as the information of the number of subsidiaries of an organisation was not readily available, this variable has been excluded from the original model. Another problem is the availability of quarterly betas. Only December 2004 betas are available, that is, betas of March, June and September 2004 are not available. Lastly, while daily stock price are available on SIRCA, I have not yet been able to gain access to this database due to password problems.

Multivariate analysis will be used to investigate the results of the regression model to consider the degree of explanatory power. Further sensitivity tests will be employed to address the correlation between our independent variables.

5. The limitations of the proposed study

There are a number of limitations associated with this study. Firstly, the data used to compute share price volatility is based on monthly share price of individual company and daily data. The accuracy of the measure of share price volatility may be lower when using monthly returns. In either case, share price volatility may be a noisy measure of individual client risk and may require decomposition into systematic and non-systematic volatility. Hence, the study may need to use a single index model to take out market related share price volatility. Another limitation is that the need for the availability of audit fee data and other publicly data may limit the randomness of the sample selection and also the implication for this study. Finally, as only a limited number of client characteristics were examined, there may be other possible explanations for different audit fees charged.
BIBLIOGRAPHY


Appendix A: Detailed explanation of Historical Share Price Volatility

In Natenberg (1988 pp343), Historical Volatility is a measure of price fluctuation over time. Historical volatility uses historical (daily, weekly, monthly, quarterly, and yearly) price data to empirically measure the volatility of a market or instrument in the past, and measured as the standard deviation of bar-to-bar share price differences which is measured on a settlement-price to settlement-price basis. The formula is specified as following:

Formula:

\[
\sigma = \sqrt{\frac{1}{n-1} \sum_{i=1}^{n} (m - x_i)^2}
\]

Where:

\(\sigma\) = standard deviation of share price differences, or historical volatility

\(n\) = number of differences (bars)

\(m\) = mean

\(x_i\) = percentage of price changes

With

\(m = \frac{1}{n} \sum_{i=1}^{n} x_i\)

And:

\(x_i = \frac{P_t - P_{t-1}}{P_t}\)