

Contesting the Benefits of Executing a Deed of Cross Guarantee

i. Introduction

In 1985 the then corporate regulator, the National Companies and Securities Commission (NCSC) introduced a regime whereby wholly-owned subsidiaries in corporate groups could be relieved from financial reporting requirements if they entered a regulatory-approved *Deed of Indemnity*. Over time the arrangements under the *Deed of Indemnity* was found to be flawed under judicial scrutiny (see Hill, 1992) and it was replaced by a more rigorous *Deed of Cross Guarantee* (DXG). The regime was advanced and justified on the basis that relieving wholly-owned subsidiaries from financial reporting requirements would reduce audit and administration costs (Bosch, 1990). Parties to a DXG became a *closed group* of companies.

The estimated potential reporting cost savings for companies taking up the DXG were substantial, with some estimates of up to 40% savings (Bradbury *et al.*, 2007). The direct reporting cost savings attributed to the DXG are said to be derived from reduced audit and administrations costs¹ (ASC, 1992), due primarily to the materiality thresholds being set at the *closed group* level if a DXG is in place (Bradbury *et al.*, 2007). The *quid pro quo* for the relief provided by the DXG is that *closed group* companies are subject to cross-claim provisions. Under a DXG wholly-owned subsidiaries effectively ‘pool’ their assets and liabilities with the holding company. There is also a

¹ Expected savings of over \$3.5 million were reported in the 1989/90 NCSC Annual Report for the few companies taking advantage of the relief for the first time during the 1989/90 financial year.

requirement to produce a set of *closed group* consolidated accounts in the notes to the accounts of the holding company. Importantly the covenants of the DXG only crystallise on liquidation (Clarke and Dean, 1995; Hill, 1992).

While any benefits or savings in administration costs due to the DXG would be impossible to isolate and quantify, this is not the case with audit fees. This primary claim of the benefits of the DXG has not previously been tested empirically. It has merely been assumed and confirmed anecdotally each time the issue of the continuation of relief has been revisited by regulators².

In order to test empirically the purported 'audit fee' benefits of the DXG, a general audit fee model is estimated. Interestingly, to date, the DXG has not been included as a variable in the audit fee model literature that employs post-1986 Australian data. If the claims by the corporate regulator over time (first the NCSC, then ASC and ASIC) regarding the benefits of DXG hold, then it could be argued there is a significant deficiency in the extant literature because the effect of the DXG has not been considered. Accordingly the evidence adduced here makes a major contribution to the literature.

ii. Modelling Audit Fees

Audit fees have been the subject of a substantial body of research over the past three or more decades (see Hay *et al.*, 2006).

² In 1991 the regulator at the time, the Australian Securities Commission (ASC), reviewed arrangements under the regime. Also in 2006 it was proposed to provide statutory financial reporting relief under the *Simpler Regulatory System* amendments to the *Corporations Law* (see van der Laan, 2009).

Associations between a significant number of variables and audit fees have been found.

The general audit fee model that is employed in the literature represents audit fees as a function of three groups of variables:

1. *client attributes* such as; size, complexity, inherent risk, profitability, industry and ownership attributes;
2. *auditor attributes* such as; audit firm size, audit firm tier, quality, tenure and location; and
3. *engagement attributes* such as; year end (whether this coincides with the 'busy season'), audit opinion and the provision of non-audit services (Hay *et al.*, 2006; Carson and Fargher, 2007).

Confirming the topicality of the model, Hay *et al.* (2006) conducted a meta-analysis of the audit fee model literature and their findings provide significant insights into the variables that can be most directly linked with the determination of audit fees. Their review of 27 years of research to December 31, 2003 entailed a meta-analysis of the determinants of audit fees. Coupled with the consistent findings in subsequent studies in the Australian context (e.g. Carson and Fargher, 2007; Ferguson *et al.* 2006), Hay *et al.*'s analysis provides the basis for the model used below.

Consistent with prior research, the hypothesis (H1) below is tested against a modified version of the generic model based on a production function first developed by Simunic (1980). There it was hypothesised that variations in the level of audit fees would be associated with certain drivers as these drivers would cause variations in the amount of work the auditor is required to undertake

in the course of the audit. Indeed, subsequent research has demonstrated unequivocally that audit fees are associated with variables relating to client size, client risk and client complexity (Hay *et al.*, 2006). However, while Simunic's (1980) production function view of audit fees has provided valuable insights into the determinants of audit fees, it is not without limitations. Most importantly, as with most empirical models, there is an implicit assumption that omitted variables do not have a systematic effect on the relationship between the dependent and independent variables (Greene, 2008).

Notwithstanding, the limitation outlined above, this production function view of audit fees is generally employed in the literature, and is used in this study. However, here it is suggested that prior research on the determinants of audit fees in the Australian context, using samples post-1986, has overlooked an important, systematic variable. As noted, this variable, whether the client has a DXG in place, has been claimed to have a significant affect on audit fees. A further contribution to knowledge is that, to the extent that Australian studies are used to support or refute similar research work on audit fees in other jurisdictions, there is the potential for misleading signals caused by prior works failing to consider this variable.

H1: The Class Order Deed of Cross-Guarantee is an omitted variable in the audit fee model.

1. Method

As noted, the general audit fee model common to the literature (See Hay *et al.*, 2006) which represents audit fees as a function of client size, client complexity and risk is adopted below. Selected variables

drew on the results of Hay *et al.*'s (2006) meta-analysis of variables used in the audit fee model literature. This model is first developed without the test variable. Then the model is extended to examine the primary hypothesis, that Class Order Deeds of Cross Guarantee (DXG) is an omitted variable in audit fee modelling using Australian data by adding the test variable of 'DXG'. Consistent with the literature an ordinary least-squares (OLS) regression model is estimated with the natural log of external audit fees as the dependent variable; and it includes the 1-0 dummy test variable of a DXG being in place or not .

For firm $i = 1, 2, \dots, 1317$ and year $t = 2007$, the audit fee model is formally specified as:

$$LAF_{it} = b_0 + b_1LTA_{it} + b_2LTS_{it} + b_3LFS_{it} + b_4CTA_{it} + b_5LOS_{it} + b_6ROI_{it} + b_7DE_{it} + b_8CUR_{it} + b_9TOP_{it} + b_{10}YRE_{it} + b_{11}MOD_{it} + b_{12}DXG_{it} + e_{it}$$

Where:

<i>LAF</i>	=	Natural log of audit fees (\$AUD)
<i>LTA</i>	=	Natural log of total assets (\$AUD)
<i>LTS</i>	=	Natural log of the total number of subsidiaries
<i>LFS</i>	=	Natural log of subsidiaries that represent foreign operations
<i>CTA</i>	=	Ratio of current assets to total assets
<i>LOS</i>	=	Indicator variable, 1 for loss in any of the past two years
<i>ROI</i>	=	Ratio of earnings before interest and taxes to total assets
<i>DE</i>	=	Ratio of debt to equity (total assets minus total liabilities)
<i>CUR</i>	=	Ratio of current assets to current liabilities
<i>TOP</i>	=	Indicator variable, 1 for Top Tier audit firm
<i>YRE</i>	=	Indicator variable, 1 for non-June 30 th year end
<i>MOD</i>	=	Indicator variable, 1 for opinion that is modified
<i>DXG</i>	=	Indicator variable, 1 for DXG in place

2. Sample and Definition of Variables

2.1 Sample Selection

The sample comprises audit fee data related to audit engagements in Australia for the year ended June 30th 2007. The sample is drawn from companies listed on the Australian Stock Exchange (ASX) as at June 30th, 2007. The sample size of 1526 companies was achieved by excluding companies that:

- i) were delisted during the year or prior to producing the relevant annual report which meant no relevant information was available;
- ii) were foreign companies, or;
- iii) were listed managed investments or stapled securities.

Companies that had a reporting period other than one year, for example newly incorporated companies or companies changing their reporting period, were excluded reducing the sample by 57 companies. It is also commonplace to restrict the sampling to non-financial companies given the differential financial reporting of banks and other financial services companies. This resulted in reducing the sample by 148 companies (excluding GICS codes 4010, 4020, 4030 and 4040) (see Francis, 1984)³. Only observations with all available data⁴ and comparative financial statement information⁵ were included, which further reduced the sample by four companies. Thirteen companies in the sample report in a foreign currency, all in United States dollars (USD). These companies were not excluded

³ Banks have been traditionally excluded from audit fee modelling as the model has generally found an 'industry effect' (Simunic, 1980). And given the differential financial reporting of banks and other financial services companies it remains appropriate to exclude these companies as the basic audit fee model is not designed for companies in the financial sector (e.g. firms that do not classify assets and liabilities into current and non-current).

⁴ Three companies did not disclose audit fees or had other data points missing.

⁵ One company was exiting a deed of company arrangement and had no comparative information.

but the hand collected data were converted to Australian Dollars using the same methodology as the Aspect Huntley FinAnalysis database⁶. This resulted in a useable sample of 1317 companies.

2.2 Selection and Definition of Variables

As noted earlier, variables (apart from the dummy test variable) were selected primarily on the basis of the results of Hay *et al.*'s (2006) meta-analysis of the audit fee literature which persuasively establishes the most significant determinants of audit fees. That analysis shows that the determinants of audit fees commonly found in the literature are represented by a function of three groups of variables: client attributes, auditor attributes, and engagement attributes. The selection and definition of the variables are considered below.

2.2.1 Audit Fees

Reported audit fees can include items such as audit of regulatory returns or items recorded as 'other audit services'. Audit fee data were hand collected from annual reports by the researcher ensuring only fees attributable to the audit or review of financial statements were included. Items categorised as anything other than audit fees directly attributable to the current year were not included in the calculation of audit fees. In order to linearise the variable, audit fees are transformed by taking the natural logarithm of audit fees (*LAF*).

2.2.2 Client Attributes

Client size is the most dominant determinant of audit fees found in the literature and is typically measured as total assets (Hay *et al.*, 2006). Size is expected to be exponentially related to audit fees

⁶ The FinAnalysis methodology converts foreign currency at the published Reserve Bank of Australia rate on balance date.

(Simunic, 1980). In order to improve the linear relationship of the size measure with audit fees, the size measure is also transformed by taking the natural logarithm of total assets (*LTA*).

Client complexity is also expected to be exponentially related to audit fees, as for each unit of increase in the complexity of the client, it is likely there will be much greater increase in the time and effort expended on the audit by the auditor (Hay *et al.*, 2006; Simunic, 1980). Complexity can be measured in a number of different ways, however the most commonly employed indicator with the strongest results found in the literature is the number of subsidiaries (Hay *et al.*, 2006). As with client size, the complexity measure is transformed by taking the natural logarithm of total subsidiaries (*LTS*)⁷. A number of studies also use the proportion of subsidiaries⁸ that represent foreign operations in conjunction with the number of subsidiaries as a complexity measure (e.g. Ferguson *et al.*, 2003), as this measure has been found to be positive and significant (Hay *et al.*, 2006). Prior research offers no clear explanation why the proportion of foreign subsidiaries is used as a measure of complexity. Nevertheless, this measure assumes a marginal increase in audit fees for each additional foreign subsidiary relative to the number of total subsidiaries. As foreign subsidiaries are audited in their domestic jurisdiction and then subject to additional procedures as part of the consolidation process, it would follow that foreign subsidiaries create complexity in their own right. Therefore a more meaningful measure of complexity is the natural logarithm of foreign subsidiaries given the

⁷ To enable a logarithmic transformation of observations with a zero value, the value of 1 was added to the number of total and foreign subsidiaries, so that the transformed variables *LTS* and *LFS* will also take the value of zero. This approach has two main advantages (*i*) no observations are lost, and (*ii*) the analysis takes into consideration the effect of having zero subsidiaries.

⁸ The model was estimated initially using the proportion of subsidiaries which yielded a larger coefficient, but a smaller t-value.

expected exponential relationship to audit fees. Moreover, this transformation will reduce the impact of outliers. Accordingly, this variable was calculated by taking the natural logarithm of the number foreign subsidiaries (*LFS*) as a measure of complexity.

Client risk is expected to be positively associated with audit fees. Audit risk can be measured by a number of variables, however the common measures employed in the literature are measures that proxy for inherent risk, profitability and leverage. Inherent risk⁹ is argued to be positively associated with audit fees as specialised audit procedures may be required. As inherent risk is generally measured by the proportion of assets that are 'risky', metrics generally used in the literature to proxy for inherent risk are inventory divided by total assets, receivables divided by total assets or inventory and receivables divided by total assets and current assets to total assets (Hay *et al.*, 2006). Here, the ratio of current assets to total assets is used as a measure of inherent risk (*CTA*).

Client profitability is associated with audit fees as it reflects the exposure of the auditor to loss if the client is not profitable (Ferguson *et al.*, 2003; Hay *et al.*, 2006; Simunic, 1980). Profitability measures are expected to be negatively associated with audit fees, as more profitable clients pose less risk to auditors, however, studies using a dummy variable for profitability (*LOS*) expect a positive association consistent with the notion of auditor-client risk sharing (Ferguson *et al.*, 2003; Hay *et al.*, 2006; Simunic, 1980). Therefore a dummy variable (*LOS*) for clients experiencing a loss in either the current year or the previous year is used. Despite the fact that the literature

⁹ Inherent risk in auditing is the susceptibility of an account balance or class of transactions to material misstatement given the inherent characteristics and environment of the business, but without regard to related internal controls (Gay and Simnett, 2006; Leung *et al.*, 2007)

provides mixed results for both using a proxy for profitability and a dummy variable (in Canadian and Australian studies in particular, results tend to be not significant – see Hay *et al.*, 2006), both will be employed in order to ensure robustness of the findings. Consistent with research using Australian data, the profitability measure employed will be ratio of earnings before interest and taxes to total assets (*ROI*) (e.g. Craswell and Francis, 1999; Ferguson *et al.*, 2003; Ferguson *et al.*, 2006).

Leverage is an indirect proxy measure of the risk of the client failing. As such, a positive association between the leverage of a company and its audit fees is expected. A significant number of proxies are found in the literature for leverage, however the most common are the debt to assets ratio and the quick ratio (Hay *et al.*, 2006). Despite a large number of studies reporting insignificant results, both the debt-to-equity ratio¹⁰ (*DE*) and the current ratio¹¹ (*CUR*) are employed. The present results can be compared to about half the prior studies surveyed by Hay *et al.* (2006) where a significant positive relationship between the debt to equity ratio and a negative relationship between the current ratio and audit fees (Hay *et al.*, 2006) are evident.

¹⁰ Many Australian studies employ a leverage ratio of long-term debt to total assets. However, of the sample companies 783 had no long term debt. Given leverage can also be measured by the debt-to-equity ratio and the Hay *et al.* (2006) meta-analysis revealed this measure yields consistent results, the debt-to-equity ratio was preferred.

¹¹ The model was originally estimated using both the quick ratio and the current ratio. However, the variability of the quick ratio is merely a subset of the variability of the current ratio, implying high collinearity between the two variables that may compromise the validity of the entire model. Indeed, the examination of variance inflation factors (*VIF*) confirms that only one of the two should be included in the empirical model. The current ratio (*CUR*) is selected, as it is a more comprehensive measure than the quick ratio, the latter being also more sensitive to uncontrolled factors. The inclusion of *CUR* passes the *VIF* test with values of less than 4 for all covariates (Baum, 2006)

There are a number of other client attributes that have been identified as likely drivers of audit fees, such as governance, industry, type of firm and internal control factors (Hay *et al.*, 2006). However, the studies included in the Hay *et al.* (2006) meta-analysis that test these variables produce results that are generally inconclusive or limited by insufficient research or data availability to draw conclusions. As such the client attribute variables are limited to those described above.

2.2.3 Auditor Attributes

Audit fee premiums are expected when the audit firm is of higher quality. And, prior research supports the proposition that higher audit fees are positively associated with the audit firm being one of the Big 8/6/5/4¹² (Hay *et al.*, 2006). Therefore, a dummy variable for auditor quality (*TOP*) is included in the model. While recent research has drilled further into the relationship between auditor quality and audit fees, particularly in the Australian context, by testing for the effects of industry specialisation (Carson and Fargher, 2007) and market leadership and industry expertise (Ferguson *et al.*, 2006), there remains a lack of consensus among researchers as to how these variables should be measured (Hay *et al.*, 2006) and as such, these variables are excluded in this study.

A number of studies have asserted that auditor tenure is an important variable and should be considered in audit fee models (for example Craswell and Francis, 1999; DeAngelo, 1981; Dye, 1991) as there are assumptions in the literature about discounting at initial engagement ('low-balling'). However, Craswell and Francis (1999)

¹² The top tier audit firms over the period of this study and specified in prior research has reduced from 8 to 4 through a series of mergers and the most recent (2002) failure of Arthur Andersen. As such, studies using a dummy variable for auditor quality may have this variable represent any of the prevailing number of top tier firms from the Big 8 through to the Big 4.

find that in an environment of public disclosure of audit fees (as is the case in Australia) audit fee discounts do not generally occur, and therefore this variable is omitted from this study.

2.2.4 Engagement Attributes

A number of engagement attributes have been found to be drivers of audit fees in the literature. Variables considered, based on prior literature for inclusion in the model, include audit report lag¹³, busy season, audit problems, non-audit services and reporting complexity. Two of these attributes were discounted, namely audit report lag, due to lack of clearly identifiable conclusion drawn from this metric (Hay *et al.*, 2006), and non-audit services as the study is unrelated to non-audit services.

The remaining two variables in this category, busy season (*YRE*) and audit problems (*MOD*) are indicated by the use of a dummy variable. Audit fees are likely to be higher if work is required to be performed during the auditor's busy season (in Australia most companies have a June 30th year end). And while Hay *et al.* (2006) find the individual results of this variable to be inconclusive, the meta-analysis they perform finds this variable to be positive and significant when the results of individual studies are accumulated.

Audit problems, resulting in the issue of a modified opinion, are likely to result in higher audit fees as the quantity of work completed by the auditor is likely to increase in order to reduce the audit risk (Craswell and Francis, 1999; Francis and Stokes, 1986; Hay *et al.*, 2006). This association between the audit opinion and higher audit fees has been

¹³ Report lag is the time between the end of the year of the client (balance date) and the end of audit fieldwork.

found to be positive and significant, particularly in the Australian context (Hay *et al.*, 2006). The variable *MOD* is generally used in the literature to differentiate between a qualified or unqualified opinion. While an 'emphasis of matter' is regarded as an unqualified opinion, as a driver of audit fees there would be an expectation that a greater amount of audit work would be required in auditing assertions that lead to an emphasis of matter. Therefore in this study, the variable *MOD* represents any opinion that is modified in any way, including an emphasis of matter, disclaimer or qualified opinion.

2.2.5 Test Variable

The test variable, *DXG*, is drawn from annual reports and cross-checked with the database of Class Order Deeds of Cross Guarantee (DXG) registered with the Australian corporate regulator (formerly the Australian Securities Commission (ASC), currently the Australian Securities and Investments Commission (ASIC)). The database contains details of all DXGs registered and includes an indication of the holding company and the trustee company, as well as information relating to companies assumed (taken into a DXG), companies revoked from a DXG and companies disposed removing them from a DXG. The variable is set to indicate 1 for a DXG in place for that reporting period and 0 for no DXG. While there are alternate reasons offered in the literature for companies taking advantage of a DXG, such as the opportunity not to disclose proprietary information (Bradbury *et al.*, 2007; Clarke and Dean, 2005), the principal justification for the introduction of the DXG and its persistence is the perceived reduction in accounting and audit fees (with the latter being deemed the only material one). As such if the main hypothesis is supported, the variable is expected to be negative and significant.

iii. Descriptive Statistical Analysis

Table 1 reports the range of variation and nonparametric estimates of location and dispersion for each one of the variables employed in the model, by separating the sample to non-DXG companies (DXG=0) and DXG companies (DXG=1).

[Insert Table 1 here]

Table 1 also highlights corporate groups that have a DXG in place are dominated by 'larger' groups, both by size (Total Assets) and by complexity (Total Subsidiaries). Importantly, as expected, given the covenants of the DXG, proportionally far fewer groups with a DXG have experienced a loss in the last two years (*LOS*). While only 28% DXG companies have experienced a loss in the last two years compared to 77% of non-DXG companies, this figure is still much higher than anticipated. These results however do bear a direct relationship to the percentage of companies in each group receiving modified audit opinion, with a similar proportion of (predominantly loss making) companies receiving modifications.

As the use of DXGs is largely confined to large companies, on average measures of leverage (*DE* and *CUR*) are as expected. The debt-to-equity ratio of DXG companies is on average, better as they have less debt than equity while non-DXG companies have more debt than equity. The current ratio appears, on average, higher in non-DXG companies than DXG companies. However, this finding is consistent with many small Australian listed companies being in the non-DXG group and operating in the materials and energy sectors

and as such have relatively small amounts recorded for current liabilities due to their inability to secure short-term finance.

Other findings of interest are groups with a DXG are much more likely to use a 'Big 4' (*TOP*) audit firm and have a year end other than June 30 (*YRE*).

The maximum observations, both in terms of assets and audit fees, come from the non-DXG group. In terms of total assets (after excluding companies as outlined above) BHP Billiton was the largest company in 2007. In terms of audit fees Rio Tinto recorded the maximum. Both BHP Billiton and Rio Tinto are dual listed companies and companies that list on foreign exchanges appear less likely to avail themselves to the relief available under a DXG. However, it appears companies with large numbers of subsidiaries are likely to take up relief. The maximum observation in terms of subsidiaries is Harvey Norman Holdings Limited with 1355, and several hundred of these being party to the DXG.

Figure 1 plots the firm size (measured by the natural log of total assets) against audit fees (measured by the natural log of audit fees) to indicate the relationship between audit fees and firm size for the total sample of 1317 companies.

[Insert Figure 1 here]

As noted, the firm size variable has been found to be the single most important determinant of audit fees (*Hay et al., 2006*). Figure 1 demonstrates by the flat section of the curve that there is a 'minimum' audit fee that is charged irrespective of firm size (measured by Total

Assets) up to a threshold by observation (at around \$3 million to \$5 million of Total Assets) of around the natural log (ln) of 15. After this threshold there is a linear relationship between audit fees and firm size. There is also clear differentiation in the relationship to audit fees between size and complexity.

Figure 1 also plots audit fees against complexity (as measured by the natural log of total subsidiaries and the natural log of foreign subsidiaries). The graph demonstrates that if the firm has no subsidiaries then the minimum audit fee as defined by total assets (referred to above) is paid, however, there is clearly a premium paid as complexity increases. Each additional subsidiary increases the percentage paid in audit fees and the linear relationship between audit fees and subsidiaries is steeper than the relationship between audit fees and assets. However, again there is a threshold and after a certain number of total subsidiaries (by observation over about 500 subsidiaries) the penalty for each additional subsidiary becomes less severe. There are economies of scale when the total number of subsidiaries becomes very large.

Firms with foreign subsidiaries clearly pay a 'consolidation premium' (the distance between the two broken lines) for consolidating foreign subsidiaries into their financial reports in their audit fees. This premium is relatively stable irrespective of the proportion of foreign subsidiaries relative to total subsidiaries. This aspect has not been noted in previous studies¹⁴.

¹⁴ Employing an alternate measure for foreign subsidiaries has allowed this consolidation premium to be revealed.

Audit fees (as measured by the natural log of audit fees), partitioned by the two groups (non-DXG companies and DXG companies), were also plotted against a number of the indicator variables. The results (shown in Figure 2) demonstrate that audit fees in each case are, on average, higher for companies with a DXG in place. The results presented in Figure 2 are inconsistent with the rationale for the implementation and continuation of the DXG regime, however these findings are only partial and not as sophisticated as the regression model (estimated below) as the graph does not control for the important variables that determine audit fees as outlined above that the OLS regression will capture.

[Insert Figure 2 here]

iv. Results

1. Multivariate Tests

Table 2 reports the results for the model based on the OLS regression specified above for the sample of companies without the test variable (Model (1)) and then with the test variable (Model (2)). The models find, consistent with prior research that audit fees increase with client size, client complexity and risk. These coefficients are consistent with the predicted associations. Also consistent with prior literature (see for example, Carson and Fargher, 2007; Ferguson *et al.*, 2006) the variables *DE* and *YRE* are not significant in the estimates.

[Insert Table 2 here]

The models specified in Table 2 are well specified in terms of standard OLS assumptions. Explanatory power is strong in terms of

adjusted R^2 which improves (albeit marginally) from 0.8112 to 0.8123. The root mean square error (Root MSE) was calculated to compare how well the models explain the observations. Once again this measure improves (reduces) slightly in the model that includes the test variable from 0.5566 to 0.5549. The Akaike Information Criterion (AIC) and Bayesian Information Criterion (BIC) were also calculated as alternative measures of fit¹⁵ to the adjusted R^2 measure and demonstrate the model is improved by the addition of the test variable (Greene, 2008).

2. Test Variable - DXG

The regression confirms the hypothesis (H1) that the DXG is an omitted variable in the audit fee model. However, contrary to expectations, the test variable, *DXG*, has a positive coefficient which is statistically significant at the one percent level (see Table 2). This result is surprising given the original justification for the implementation of a cross guarantee regime and its persistence over time was firmly grounded in the savings in audit (and the not observable administration) fees that companies taking up a DXG were expected to enjoy.

There are a number of possible reasons why a DXG may in fact increase, rather than decrease, audit fees. Principally, the evidence provided by this analysis could lead to an inference that the initial audit fees savings reported by companies upon the take up of a DXG dissipate over time. In our 2007 sample of companies, only a small

¹⁵ The values for these measures, in themselves, have no meaning but are a relative measure of the trade-off between the precision and complexity of the model or the information lost. Competing models can be ranked by these measures and the model with the lowest AIC or BIC is considered the best.

percentage of companies (22 companies or less than 10%) were first time DXG users.

Another possible explanation for the findings is the fact that there is considerable 'movement' in DXGs. Entering a DXG is at the discretion of both the holding company and the subsidiary company. Companies are frequently added to (assumed) and removed from (revoked or disposed) existing DXGs. These movements in the composition of the DXG companies may serve to increase complexity and subsequently increase associated audit fees. For example, if a company were to be revoked from a DXG there would be increased audit work as certain comparative information may not have been audited due to changes in materiality thresholds. Dean and Clarke (2005) report that as at 2000 in their database of DXGs of all companies to that time that around 50% of DXGs had activity (i.e. an assumption and/or revocation deed implemented). They also highlight, for example, the James Hardie Group as having "nearly yearly activity in revocation and assumption Deeds" in the period from their introduction of a DXG in March 1992 to June 2000 (p. 306).

The DXG regime also creates additional disclosures for the holding company. *Closed group* financial statements¹⁶ are presented in the notes to the financial statements and as such are also subject to audit. This too may increase audit work and subsequently audit fees, as these consolidated financial statements of the *closed group* are

¹⁶ The *closed group* accounts reported in the financial statements of the sample companies rarely included comparative information. This again may be explained by DXG activity and audit requirements of information in the financial statements.

different (in most cases¹⁷) to the consolidated financial statements of the group.

3. Sensitivity Analysis and Robustness Checks

A number of sensitivity tests were performed. To assess industry effects the model was re-run with an industry dummy variable for each GICS classification code to ensure particular industries do not drive the results.

Prior audit fee studies (e.g. Craswell *et al.*, 1995; Ferguson and Stokes, 2002; Ferguson *et al.*, 2003) perform sensitivity analysis to control for client size. As with other models client size is controlled for by including total assets (LTA) in the model. This literature also tends to test for sensitivity to client size. However, much of this literature is aimed at the supply side characteristics of audit fee determination. These studies generally speculate if there is an audit fee ‘premium’ paid by clients on the basis of auditor attributes such as industry specialty or location. And while this literature does find that ‘size matters’ the results are generally inconclusive as to why. Ferguson *et al.* (2003) suggest that larger firms may have greater bargaining power and as such pay a lower premium for expertise. On the other hand, Craswell *et al.* (1995) offer that larger companies are more likely to benefit from hiring an industry expert and also have a greater capacity to pay a premium. This study is concerned with whether a demand or client attribute, the existence of a *DXG*, decreases audit complexity and hence audit risk and audit fees. Given that the results show that the test variable is positive and significant and the incidence of *DXGs* is much higher in larger companies, the results

¹⁷ There were very few *closed groups* in the sample companies that reported all companies in the consolidated group were part of the *closed group*.

should be sensitive to size. Partitioning the sample into quartiles revealed that the results were sensitive to size with the top quartile the only sample where the results for the test variable remained significant.

Stepwise procedures were performed on the model, both forwards and backwards selection at the 99% level. In both instances the model was reduced by the variables of *DE* and *YRE* which are reported as insignificant, but there was no loss of information in the model which is a strong indication the model is statistically sound.

Hadi tests (filters) were performed to reduce the effect of outliers (see Hadi 1992; 1994) creating a Hadi OLS estimate (see Appendix 1). Hadi filters were performed in addition to 'winsorizing' the sample as winsorizing results in a greater distortion to the regression as it is performed on a univariate basis and as such disregards the multivariate relationships, such as those described by the regression (Grambovas *et al.*, 2006). Hadi filters are acknowledged as an innovative and important advance in identifying outliers in regression analysis (Bradbury, 2006). In addition, robustness tests were performed on the Hadi estimate. These tests were performed as well as trimming the sample and 'winsorizing' the sample (see Appendix 1). These results demonstrate that trimming the sample or winsorizing the variables to reduce the impact of outliers has little impact on the estimates. All variables (except the test variable, but consistent with Table 2) have a sign consistent with expectations. These tests confirm the model is robust and well specified.

v. Summary and Conclusions

This study tested empirically the purported 'audit fee' benefits of the DXG, as, to date, the DXG has not been included as a variable in the audit fee model literature that employs post-1986 Australian data. The evidence adduced here confirms that there is a deficiency in the extant literature given the statistical significance of the effect of the *DXG* variable, even though the results were not in line with the direction posited by the regulators and expected by the researcher. Accordingly that evidence provides a major contribution to the literature and indicates that any future audit fee model research using Australian data should include the indicator *DXG* variable.

Rather than confirm the audit fee savings for *closed groups*, this study has found that introducing a test variable of *DXG* into a basic audit fee model produces a result that contradicts 'conventional wisdom'¹⁸. The *DXG* variable was found to be positive and significant for the sample of 2007 listed companies. A number of possible reasons for the *DXG* variable increasing the estimated audit fees in the model were outlined. While it is not within the ambit of this work, further research is required to estimate an audit fee model for other periods to confirm the results of this model. Another important area of investigation will be to perform time series or event studies to confirm or refute the speculations as to why the *DXG* variable estimated 'drives' audit fees and whether there is observed an reduction of

¹⁸ In particular the submissions to the 1991 ASC Public Hearing on relief provided through the DXG regime and again in 2006 in the submissions to the Financial Services Regulation Review in 2006 where a statutory class order deed of cross guarantee was considered repealing or removing the availability of the DXG regime was considered a retrograde step in the regulation of companies in Australia by respondents. A number of NCSC annual reports did estimate audit fee savings for companies taking advantage of the predecessor to the current DXG in the millions of dollars.

audit fees on the initial execution of a DXG (or an increase in audit fees upon a complete revocation) and those audit fee benefits reduce and turn around to increase audit fees over time.

Appendix 1

Table A.1 Hadi Estimates

Variable	Expected Sign	Hadi		
		Estimate	Hadi Robust	Hadi Bootstrap
<i>Intercept</i>		4.8551***	4.8551***	4.8551***
<i>LTA</i>	(+)	0.3302***	0.3302***	0.3302***
<i>LTS</i>	(+)	0.1553***	0.1553***	0.1553***
<i>LFS</i>	(+)	0.2138***	0.2138***	0.2138***
<i>CTA</i>	(+)	0.4089***	0.4089***	0.4089***
<i>CUR</i>	(-)	-0.3422***	-0.3422***	-0.3422***
<i>DE</i>	(+)	0.1467***	0.1467***	0.1467***
<i>ROI</i>	(-)	-0.0166***	-0.0166***	-0.0166***
<i>LOS</i>	(-)	-0.3193***	-0.3193***	-0.3193***
<i>TOP</i>	(+)	0.4153***	0.4153***	0.4153***
<i>YRE</i>	(-)	-0.0433	-0.0433	-0.0433
<i>MOD</i>	(+)	0.2034***	0.2034***	0.2034***
<i>DXG</i>	(-)	0.0964**	0.0964*	0.0964*
Sample Size		1142	1142	1142
R²		0.8415	0.8415	0.8415
Adjusted R²		0.8398	0.8398	0.8398
Root MSE		0.5041	0.5041	0.5041
AIC		1689.1696	1689.1696	1689.1696
BIC		1754.6966	1754.6966	1754.6966

*** significant at 1% **significant at 5% *significant at 10%

Table A.2 Trimmed and Winsorized Estimates¹⁹

Variable	Expected Sign	Estimate	Estimate	Estimate	Estimate
		(1) Trimmed 98	(2) Trimmed 90	(3) Winsor 3%	(4) Winsor 5%
<i>Intercept</i>		5.3031***	5.7928***	5.3589***	5.5226***
<i>LTA</i>	(+)	0.3065***	0.2823***	0.3015***	0.2928***
<i>LTS</i>	(+)	0.1693***	0.1184***	0.1722***	0.1618***
<i>LFS</i>	(+)	0.2026***	0.2031***	0.2009***	0.1978***
<i>CTA</i>	(+)	0.4098***	0.3753***	0.3340***	0.3296***
<i>CUR</i>	(-)	-0.2231***	-0.2401***	-0.2679***	-0.3050***
<i>DE</i>	(+)	0.0318*	0.1730***	0.0967***	0.1260***
<i>ROI</i>	(-)	-0.0125***	-0.0166***	-0.0105***	-0.0122***
<i>LOS</i>	(-)	-0.3466***	-0.3148***	-0.3326***	-0.3248***
<i>TOP</i>	(+)	0.4302***	0.3707***	0.4400***	0.4314***
<i>YRE</i>	(-)	-0.0364	0.0299	-0.0182	-0.0087
<i>MOD</i>	(+)	0.2801***	0.1857***	0.2386***	0.2137***
<i>DXG</i>	(-)	0.1490***	0.1456***	0.1532***	0.1572***
Sample Size		1177	801	1317	1317
R²		0.7982	0.7418	0.8235	0.8184
Adjusted R²		0.7961	0.7379	0.8218	0.8167
Root MSE		0.5143	0.4710	0.5041	0.4881
AIC		1783.9427	1078.5452	1946.0045	1861.4673
BIC		1849.8621	1139.4614	2013.385	1928.8478

*** significant at 1% **significant at 5% *significant at 10%

¹⁹ Estimate (1) and (2) estimate the sample with trimmed by 1% and 5% at both ends respectively. Estimate (3) and (4) were winsorized by 3% and 5% respectively.

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Table 1 Descriptive statistics

Non-DXG Companies (N=1,099)							
	Min	5%	Mean	Median	95%	Max	Std.Dev.
Audit Fees:							
\$AUD '000	2.02	13.70	130.51	44.19	304.06	12725.34	616.77
Natural log (<i>LAF</i>)	7.61	9.53	10.92	10.78	12.79	16.36	1.07
Total Assets:							
\$AUD '000,000	0.04	1.67	213.60	15.47	359.76	68537.77	2500.37
Natural log (<i>LTA</i>)	10.66	14.33	16.76	16.55	19.70	24.95	1.68
Total Subsidiaries:							
Units	0.00	0.00	6.18	3.00	20.00	191.00	12.24
Natural log (<i>LTS</i>)	0.00	0.00	1.46	1.39	3.04	5.26	0.94
Foreign Subsidiaries:							
Units	0.00	0.00	2.13	0.00	9.00	91.00	5.92
Natural log (<i>LFS</i>)	0.00	0.00	0.63	0.00	2.30	4.52	0.84
Other Variables:							
<i>CTA</i>	0.01	0.09	0.51	0.47	0.97	1.00	0.28
<i>CUR</i>	0.04	0.53	9.98	3.63	42.55	212.63	17.76
<i>DE</i>	-37.34	0.01	0.51	0.19	2.10	24.27	2.41
<i>ROI</i>	-21.93	-1.26	-0.28	-0.11	0.26	2.35	0.94
<i>LOS</i>	77%						
<i>TOP</i>	38%						
<i>YRE</i>	10%						
<i>MOD</i>	17%						
DXG Companies (N=218)							
	Min	5%	Mean	Median	95%	Max	Std.Dev.
Audit Fees:							
\$AUD '000	11.35	51.00	660.08	287.85	2517.00	8938.00	1094.96
Natural log (<i>LAF</i>)	9.34	10.91	12.72	12.63	14.90	16.01	1.20
Total Assets:							
\$AUD '000,000	1.78	10.10	1643.29	285.02	8000.54	37875.00	3791.72
Natural log (<i>LTA</i>)	14.39	16.13	19.55	19.47	22.80	24.36	1.99
Total Subsidiaries:							
Units	0.00	3.00	39.91	15.00	138.00	1355.00	99.77
Natural log (<i>LTS</i>)	0.00	1.39	2.95	2.77	4.93	7.21	1.15
Foreign Subsidiaries:							
Units	0.00	0.00	9.46	2.00	44.00	129.00	18.74
Natural log (<i>LFS</i>)	0.00	0.00	1.40	1.10	3.81	4.87	1.30
Other Variables:							
<i>CTA</i>	0.04	0.10	0.43	0.42	0.87	0.99	0.22
<i>CUR</i>	0.22	0.55	2.47	1.43	7.82	27.38	3.91
<i>DE</i>	-10.40	0.11	1.55	1.07	4.02	44.74	3.58
<i>ROI</i>	-0.68	-0.32	0.05	0.09	0.24	0.58	0.17
<i>LOS</i>	28%						
<i>TOP</i>	84%						
<i>YRE</i>	22%						
<i>MOD</i>	4%						

Table 2 Audit Fee Regression Model

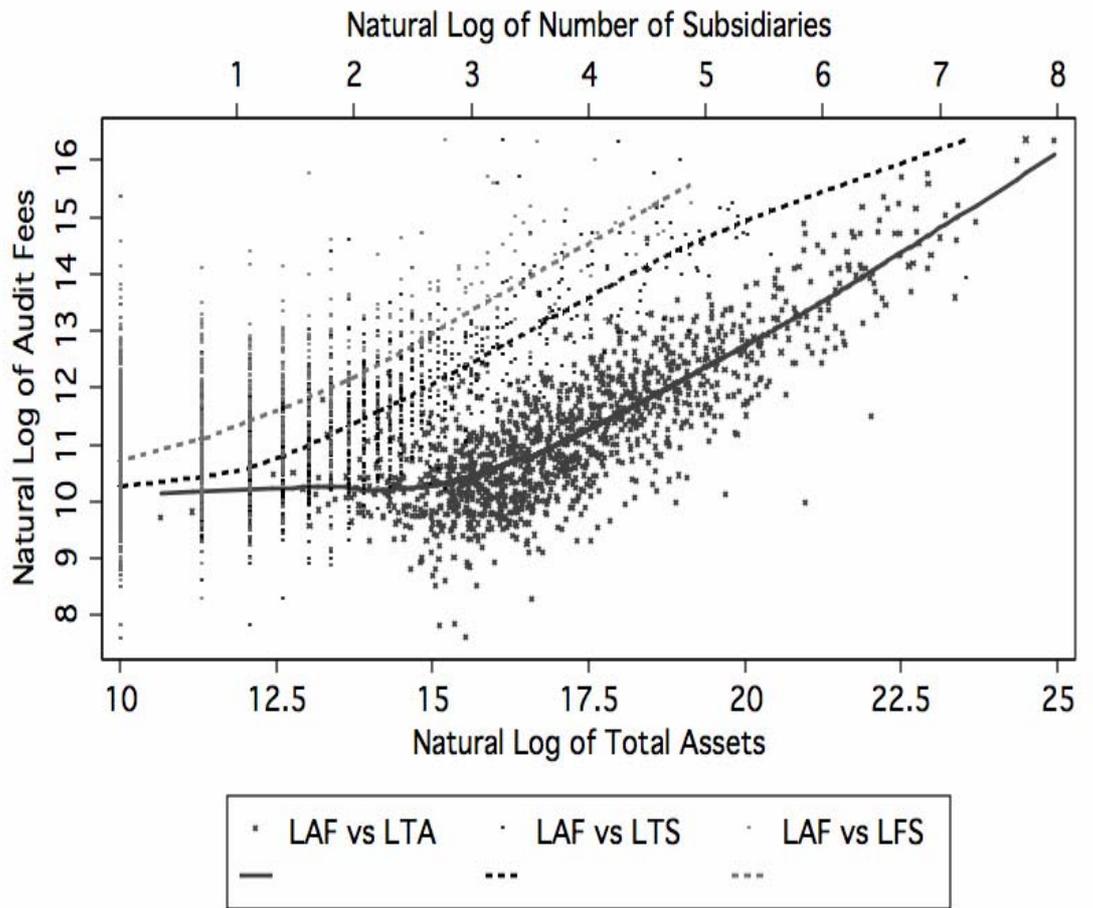
Variable	Expected Sign	(1) Standard Model (No <i>DXG</i>)	(2) Model with Test Variable (<i>DXG</i>)
<i>Intercept</i>		4.8486***	4.9733***
<i>LTA</i>	(+)	0.3287***	0.3216***
<i>LTS</i>	(+)	0.1966***	0.1800***
<i>LFS</i>	(+)	0.2110***	0.2181***
<i>CTA</i>	(+)	0.4622***	0.4511***
<i>CUR</i>	(-)	-0.0094***	-0.0094***
<i>DE</i>	(+)	0.0041	0.0027
<i>ROI</i>	(-)	-0.1033***	-0.0998***
<i>LOS</i>	(-)	-0.3184***	-0.3060***
<i>TOP</i>	(+)	0.4653***	0.4520***
<i>YRE</i>	(-)	-.0300	-.0307
<i>MOD</i>	(+)	0.3541***	0.3601***
<i>DXG</i>	(-)		0.1510***
Sample Size		1317	1317
R²		0.8127	0.8140
Adjusted R²		0.8112	0.8123
Root MSE		0.5566	0.5549
AIC		2206.0749	2199.1472
BIC		2268.2722	2266.5277

*** significant at 1%; **significant at 5%, *significant at 10% in two-tailed tests

Where:

- LAF* = Natural log of audit fees;
- LTA* = Natural log of total assets
- LSUB* = Natural log of subsidiaries
- LFOREIGN* = Proportion of subsidiaries that represent foreign operations
- CATA* = Ratio of current assets to total assets
- LOSS* = Indicator variable, 1 for loss in any of the past two years
- ROI* = Ratio of earnings before interest and taxes to total assets
- DE* = Ratio of debt to equity (total assets minus total liabilities)
- CURRENT* = Ratio of current assets to current liabilities
- TOPTIER* = Indicator variable, 1 for Top Tier audit firm
- YRE* = Indicator variable, 1 for non-June 30th year end
- OPINION* = Indicator variable, 1 for opinion other than unqualified
- DEED* = Indicator variable, 1 for DXG in place

Figure 1 Scatter Graph and Lowess Smoothing²⁰ of Audit Fees and Size/Complexity.



²⁰ Lowess smoothing is a technique for producing a 'smooth' set of values from a scatter plot where the relationship between the two variables is 'noisy'. A local polynomial regression is fit to each data point and the points close to it. The smoothed data provide a clearer picture of the overall shape of the relationship between the x and y variables (Härdle, 1990).

Figure 2 **Audit Fees, Opinion and Audit Firms**

