

## **Resource Allocation and Efficiency in Public Sector Audits**

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**ABSTRACT:** In recent years, the push for reform in the Australian public sector audit has placed the office of the auditor-general (hereafter OAG) in a more contestable or market-like environment, where the OAG is accountable for an efficient and effective provision of public sector audit. The purpose of this study is to compare the efficiency of in-house and contract-out arrangements to deliver financial audits in the public sector. This study examines the audit cost efficiency and audit fees within the context of the current public sector arrangement at the state level in Western Australia (WA). The results for 223 public agencies in WA suggest that contract-out audits are more costly than in-house audits but the result is conditional on agency type. Further analysis reveals that the type of audit arrangement is significantly associated with audit costs for the statutory authority audits only. Specifically, the costs of contract-out audits are, on average, significantly higher than in-house audits. However, the cost differences between in-house and contract-out audits for the statutory authority audits are not reflected in audit fees billed to agencies. There is no significant difference in audit costs between contract-out and in-house arrangement for hospital audits. Sensitivity analyses on the OAG's supervision costs reveal that these costs have a significant impact on the interpretation of the cost efficiency results.

**Key Words:** *Cost Efficiency, Public Sector Audits, In-house, Contract-out*

**Data Availability:** *Contact the first author. Data is confidential.*

# Resource Allocation and Efficiency in Public Sector Audits

## MOTIVATION OF THE STUDY

In recent years, following the reform that has taken place in the public sector for the past two decades, there is a push for reform in the Australian public sector audit (see, for example, Joint Committee of Public Accounts [JCPA] 1989, 1996; Maddock, Dahlsen and Spencer 1997). This reform has placed the office of the auditor-general (hereafter OAG) in a more contestable or market-like environment, where the OAG is accountable for an efficient and effective provision of public sector audit.

This study focuses on the economic issues that surround the current reform in public sector audits. It seeks to compare the main methods of delivering audit services in the public sector and provide evidence on their relative efficiency. Specifically, it attempts to answer the question of whether contracting-out audits is the more cost efficient form of delivery in public sector audits when compared to an in-house arrangement.

The research question is motivated from the recent move to a more contestable environment to deliver public sector audits. While the sole provision of public sector audits by the OAG has been questioned and criticized, particularly in regards to efficiency, no attempt has been made to measure this performance criterion and compare the criterion to various models of public sector audit delivery. An emphasis towards a market-based provision of public services in recent years, as exemplified by the recent development in Victoria<sup>1</sup>, has increased the presence and role of contestable models (with involvement from private sector suppliers), in the public sector audit market. As such, investigations and debate that seek to identify the most efficient and effective form of delivering public sector audits are timely.

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<sup>1</sup> In Victoria, the Maddock Report (1997) proposed that greater competition in the public sector audit market will bring benefits to the Victorian public. The main assumption that underlies this report is the perceived superiority of a competitive model in the public sector audit market to deliver more cost efficient and effective audits. Consequently, a more competitive model has been adopted as the preferred model of supplying audit services in Victoria. The recent changes in Victoria (i.e., Audit Act and the OAG) have raised the possibility that competition plays a key role in delivering public sector audits. The developments in Victoria will, no doubt, influence the operations of the OAGs in other jurisdictions, where contracting-out audits has been emphasized as a mean for benchmarking audit services in the public sector.

An issue that is closely related to discussions of the preferred model of delivering public sector audit is the use of contracting as a means for benchmarking public sector audits. One of the often-cited benefits of contracting is that the system of contracting enables the OAGs to compare the performance of their internal staff (i.e., in-house providers) against the private sector suppliers (i.e., contractors) (Craswell 1997). The rationale for undertaking benchmarking exercise is to bring the OAG's practices closer to those with whom the OAG should be contestable (Barrett 1999).

This study compares the costs of undertaking financial audit work in the public sector between an in-house provider (i.e., the OAG) and contractors (i.e., private audit suppliers). Audit efficiency and production of audit services in the public sector audit market are examined within the context of the current public sector audit arrangement at the state level in Western Australia (WA).

Based on the above, the research question is, "After controlling for factors that affect audit costs, is there a difference in the costs of undertaking financial audits between the in-house providers and contractors in the public sector audit market?"

## **THEORETICAL FRAMEWORK FOR AUDIT EFFICIENCY IN THE PUBLIC SECTOR<sup>2</sup>**

The OAG and contractors operate in different market structures with different capital investments and, hence, face different incentives. Therefore, the issue of production efficiency becomes important because these incentives influence the audit suppliers' allocation of resources and, hence, audit efficiency in the public sector. However, there are also other factors to consider when examining the suppliers' set of incentives in the public sector audit market.

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<sup>2</sup> Refer to Appendix 1 for a discussion on the institutional framework of public sector audits in WA and Appendix 2 for a discussion on audit quality in the public sector.

In Australia, the rights to provide financial audit services to public sector agencies are dictated by the audit legislation that governs the conduct of public sector audits. The OAG does not have to compete for the public sector audits because the legislation provides the OAG a monopoly on the supply of financial audits to public sector agencies. Contractors, on the other hand, are subject to competitive pressures. Unlike the OAG, potential contractors are required to compete for public sector audits through a tender bidding process.<sup>3</sup>

Given that the OAG and contractors operate in different market structures, they face different economic incentives in their conduct of financial audits in the public sector. Differences in market structures suggest that suppliers who operate in a competitive market, i.e., contractors, are more cost efficient than the suppliers who operate in a relatively monopolistic market, i.e., the OAG. The competitive tender process creates a market-like practice, which ensures that the prospective contractors compete against each other and provide incentives for contractors to lower their fees and costs. In addition, Houghton and Jubb (1998, 31) note that, “competition also relates to the issues of ongoing development, refinement and utilisation of new audit technologies and how this is best achieved”. Contractors have the abilities to develop and refine new audit technologies because they have the capital and economies of scale to spend more on research and development activities. The OAG, on the other hand, has limited capacity to develop new audit technology because of its limited budget cycle in the public sector. The greater use of innovative and new audit technologies and the continual emphasis on reducing audit hours for audit engagements (Craswell 1992; McDaniel 1990; Otley and Pierce 1996) should ensure that contractors are more cost efficient than the OAG in undertaking financial audits in the public sector.

Market-based pressure is only one of the factors that constrain resource utilisation. In the public sector, institutional factors provide the non-market based incentives that affect the use of resources by the audit suppliers and, hence, audit cost efficiency. Examples of non-market based incentives for the OAG include the appropriation received from parliament, pressure from potential entrants into the public sector audit

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<sup>3</sup> In WA, the tendering process generally elicits three to four offers from prospective contractors to undertake an audit engagement, thereby ensuring that the tender market for contract audits is competitive.

market by private audit suppliers and the increasing public accountability for financial efficiency. Due to reforms in public sector management and the increasing adoption of competitive structures in the public sector, there is the threat that the OAG may lose its monopoly of public sector audits. The threat of government's intervention to decrease existing barriers to entry in market service areas may prompt the OAG to place greater emphasis on cost efficiency.

The increasing public accountability for efficiency and effectiveness in public services have led to many reviews on the role, functions and operations of the OAGs at state and federal levels (see JCPA 1989, 1996; Price Waterhouse 1995; Maddock et al. 1997).<sup>4</sup> Furthermore, in a bid to improve the efficiency and effectiveness of their operations, the OAGs are adopting private sector's intellectual capital and customising private sector audit technologies for public sector audits.<sup>5</sup>

Another factor that may contribute towards the OAG's audit cost efficiency is its audit specialisation in public sector audits. Due to the audit legislation, the OAG has been the traditional supplier of audits in the public sector market and controls the whole of the public sector audit market. The need to allocate audit resources to the market annually allows the OAG to develop insight into the history and background of the market and the inter-dependence between agencies. At a micro level, an obligatory relationship with agencies enables the OAG to develop and update client-specific knowledge continuously. This is important in achieving cost efficiency because industry specialists may achieve economies of scale as a result of having a large clientele in the public sector and a greater understanding of the agencies' institutional and organisational context (Eichenseher and Danos 1981).

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<sup>4</sup> For example, private sector accounting firms have conducted independent performance reviews of the Victorian OAG's operations since 1991 (refer to Price Waterhouse 1995; Ernst & Young 1998). Thus far, all three reviews conclude that the Victorian OAG has achieved its objectives effectively in an economical and efficient manner. In respect of financial audits, the reviews found that the Victorian OAG compares favourably with the "Big 6" chartered accounting firms in Australia. In addition, the Victorian OAG reported that for 1997-98, "the in-house auditing costs are considerably less expensive than similar costs incurred by contractors" (Victorian Audit Office 1998, 47). The Office compared the average annual audit cost to the Office for in-house and contract-out audits per million dollars of income and expenditure transactions and, total assets of the agencies.

<sup>5</sup> For example, the WA OAG has adopted the Arthur Andersen audit methodology in 1996, while the Victorian OAG had adopted the Coopers & Lybrand audit methodology for its operations (Price Waterhouse 1995).

Specialisation in public sector audits is essential because public sector audits are inherently complex and subjective. Public sector audits require highly specialized knowledge and skills (Simnett, Lockett and Wright 2000) and potential audit suppliers need to invest and develop industry-specific knowledge and technology in this industry (Parker 1993; Raman and Wilson 1994; O’Keefe, King and Gaver 1994a; Houghton and Jubb 1998).<sup>6</sup> The nature of the public sector environment requires strong accountability requirements and, therefore, requires additional testing on internal controls and matters that relate to compliance with regulations and statutes.

While substandard audits by contractors are minimal in Australia, due to the OAG’s supervision (see Appendix 2), there are limited incentives for contractors to invest in developing knowledge and expertise in the public sector industry. Major reasons may include the limited opportunities for private sector suppliers to enter the public sector audit market and the short-term contracting arrangements. The term of the contract usually operates between three to four years. In addition, the OAG’s practice is to contract out the audits in a financial year to several audit firms, instead of favouring one or two audit firms to undertake public sector audits for that year.

The short-term contract arrangement may impact on the efficiency of the contractors. This arrangement does not allow contractors sufficient time to develop substantial client-specific knowledge and, hence, some form of industry/client specialisation in the public sector. This limitation is compounded by the OAG’s tender rotation where the contract for an agency is terminated at the end of the contract term and the conduct of financial audit for that agency is taken up again by the OAG for another three to four years. Therefore, it can be argued that the OAG possesses a greater knowledge and

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<sup>6</sup> The need to develop and invest in public sector audits is evident from the United States General Accounting Office’s (1986) report. Evidence suggest that there are variations in audit quality provided to public sector agencies, with many audits of government agencies in US not complying with Generally Accepted Auditing Standards (GAAS). For example, quality review reports indicate that thirty-one percent of audits violated either fieldwork or reporting standards, or both standards (General Accounting Office 1986). Two major reasons for substandard audits in the public sector are: (1) the private sector suppliers’ low expertise in public sector audits, which, is caused by the low investment in knowledge and technology in this area; and (2) the low litigious environment in the public sector, which can lead to the use of inexperienced staff in public sector audits by private sector suppliers (O’Keefe et al. 1994a; Brown and Raghunandan 1995).

expertise of the public sector industry and, for a given level of audit quality, is more efficient than the contractors.

Another factor that suggests that the OAG may be more cost efficient than the contractors is the contractors' "set-up" costs. The contractors' "set-up" costs are spread over a short time period due to the high turnover of contracted audits. While contractors may have new audit technologies that enable them to be more efficient, they do not operate in a similar structural setting as the OAG (i.e., long-term relationship with agencies) and, as such, the efficiencies are lost in the "set-up" costs. Since it is not viable for contractors to absorb these costs every time, they price these additional hidden costs in their tender fees. The additional hidden costs and a profit margin component in the tender fees may make the contracting arrangement less cost efficient when compared to the in-house arrangement.

In summary, the combination of non-market based incentives and audit specialisation suggests that OAG is more cost efficient than contractors in undertaking financial audits in the public sector. There are clearly two competing arguments on the effect of type of audit arrangement on audit cost efficiency in the public sector. These arguments can be resolved empirically. The conflicting arguments lead to the following null hypothesis:

*Hypothesis 1: There is no difference in the costs of providing public sector financial statement audits between the in-house and contract-out arrangements.*

Client industry has been found to affect audit fees and audit hours (see Stein, Simunic and O'Keefe 1994; Butterworth and Houghton 1995; Hackenbrack and Knechel 1997). Presumably, this is due to differences in audit risk across industry groupings or differences in audit requirements that require different amount of work in the audit (Butterworth and Houghton 1995). Stein et al. found across-industry differences within the private sector market and concluded that the results from one industry do not extend easily to another industry. They argue that the differences between financial services and industrial firms are due to the differences in the nature of assets, complexity of

information systems and the regulatory environment on the strength of control procedures.

In the context of this study, industry-type effects on audit costs can be operationalised using different types of agency in the public sector. Public sector agencies can be classified into three types, namely, department, statutory authority and hospital. In line with the OAG's classification of agency type in its annual report, a hospital is defined as statutory authority but is treated as a separate agency type.

Agency type is expected to interact with the test variable, type of audit arrangement, to affect audit costs. Specifically, the impact of hospital on audit costs is more pronounced for contract-out audits where contract-out audits of hospitals are expected to be associated with lower audit costs and fees. The contractors' experience with hospital audits in the private sector and the similarity in the hospital's organisational structure and operations in both sectors allow contractors to transfer their expertise to public sector hospital audits. This translates to higher cost efficiency, and therefore, lower audit costs and fees. However, there may be no private sector equivalent for statutory authorities. Therefore, the contractors are at a disadvantage, in terms of expertise in auditing statutory authorities, compared to the OAG, and that expertise can translate to cost efficiency. The second null hypothesis is as follows:

*Hypothesis 2: There is no interaction effect between agency type and type of audit arrangement on audit costs.*

The OAG's pricing policy is expected to be based on the audit costs, therefore, the effect of type of audit arrangement and the interaction between agency type and type of audit arrangement on audit fees is expected to be similar to audit costs. Therefore, the following null hypotheses for audit fees are:

*Hypothesis 3: There is no difference in the fees for financial statement audits in the public sector between the in-house and contract-out arrangements.*

*Hypothesis 4: There is no interaction effect between agency type and type of audit arrangement on audit fees.*

## **RESEARCH METHOD**

This study relies on prior audit fee and audit production function studies to develop a production model of audit services in the public sector in order to control for factors that could affect audit efficiency. The audit production model treats audit costs and audit fees as the dependent variables. The model is as follows:

Audit costs/fees = f [size, complexity, risk (audit and business), reliance on internal control, Big 5 audit firm, industry, type of audit arrangement, industry \* type of audit arrangement]

### **Variable Measurement - Dependent Variables**

The dependent variables are audit fees and audit costs. Audit fees refer to the fees billed to the agencies. The OAG determines the fees for all agencies, irrespective of whether the audit is conducted by in-house staff or contractors. Audit costs are defined as the costs of issuing an audit opinion in the public sector. The unit of analysis for cost efficiency in this study is costs at the audit engagement level. An audit engagement is assumed to be more efficient if it incurs less audit costs than another engagement in providing an audit opinion at a specific level of audit quality, for a given level of client-related characteristics. This study uses the dollar amount of costs, rather than labour hours, to define audit efficiency because the labour mix (i.e., partner, manager, senior and junior or OAG's equivalent levels) in an audit engagement can affect the total costs

of the engagement. Resource allocation in audit firms requires knowledge, not only on the amount of time needed to complete an audit engagement, but also the type and mix of audit staff in the engagement (Palmrose 1989; O’Keefe, Simunic and Stein 1994b; Hackenbrack and Knechel 1997). Therefore, a measure of cost efficiency that considers labour hours and the associated costs of those labour hours is more appropriate than a measure that calculates labour hours only.

The cost of issuing an audit opinion in the public sector is measured differently, depending on the type of audit arrangement. For in-house audits, audit costs are comprised of the sum of billable labour hours times the standard billing rate of the OAG staff at each rank level. The standard billing rate is based on the full cost of maintaining an auditor in the field, that is, the auditor’s salary, information technology infrastructure and office overhead, among other things. Audit costs also include out-of-pocket costs associated with the audit (e.g., travel, lodging and meals). Therefore, the costs of in-house audits are based on full cost recovery.

For contract-out audits, audit costs are comprised of the actual audit fees charged by the contractors and the costs of supervision from the OAG staff. Supervision cost is an important feature of contract-out audits. These costs are part of the contracting costs where services are contracted-out (Domberger and Rimmer 1994; Craswell 1997). Supervision costs reflect the additional tasks that are undertaken by the OAG as part of the quality assurance program for contract-out audits. These tasks include managing and evaluating the tenders, reviewing the contractor’s audit plan before contractors can commence with the audit, monitoring for contractors’ deviations from the plan, gathering evidence to confirm contractor’s findings, reviewing contractors’ working papers and reporting findings to parliament.

To compare the work of private and public sector suppliers, supervision costs should be included in the cost of contract-out audits to reflect the fulfillment of accountability requirements. Sensitivity analysis is conducted as part of the data analysis to examine the inclusion and exclusion of the supervision costs.

## **Variable Measurement - Independent Variables**

Public sector agencies are consumers of public funds, through grants and appropriations from government. They exist to serve social and community needs and obligations. Since the capital required to fund these agencies is raised through compulsion, the major task of financial audits in the public sector is to ensure that the agencies' transactions and activities comply with various rules and regulations. As such, tracing the flow of monetary resources is the main focus of financial audits in the public sector. Hence, the larger the monetary transactions, the more effort have to be allocated to audit activities to verify transactions and ensure that the transactions are properly accounted for and compliant with regulations. In the context of the Australian public sector audit at the state level, total expenditure is expected to be a suitable proxy for agency size.

Discussions with the OAG staff indicate that agency complexity can be proxied by an agency's operational complexity in terms of the breadth and scope of functions and activities performed by the agency. This proxy is similar to the proxy for client complexity in Rubin's (1988) and Copley's (1989) studies. They used the index of the number of non-ordinary services provided by the municipalities. However, this study recognizes that complexity can be proxied, not only by the number of services, but also the intricacies of those services. The auditors-in-charge provide an *ex-post* assessment of the agency overall complexity, on a five-point Likert-type scale, where 1 denotes "very simple" and 5 denotes "very complex" (see also O'Keefe et al. 1994b).

This study uses three proxies for audit risk in the public sector. First, this study relies on the OAG's assessment of agency's overall financial statement risk to measure audit risk. The overall risk measure is a categorical variable of high (1) or low (0) and is assessed during the planning stage of the audit. The other measures of audit risk are the audit opinions for the financial statements and the performance indicators. Prior audit fee studies in the private sector found audit qualifications to be positively associated with audit fees (e.g., Simunic, 1980; Palmrose, 1986) while prior audit fee studies in the public sector did not find any significant association (e.g., Rubin, 1988; Copley, 1989; Ward et al., 1994). The audit opinion for performance indicators is used as an audit risk measure because public sector auditors in WA must express an opinion on the agency's

performance indicators, as part of the financial audit. For both opinions, a qualified audit opinion is coded as “1” and an unqualified audit opinion is coded as “0”.

A proxy for business risk in the public sector is the advice provided to agencies by the OAG. This proxy may capture the concept of political sensitivity in the public sector. Discussions with the OAG indicate that the advice usually relates to problems affecting the agency. The desire to protect and maintain the reputation and profile of the OAG drives business risk in the public sector. The advice is provided throughout the year and generally covers issues relating to accountability and performance of agencies, which includes advice on the application of FAAA and Treasury Instructions, accounting standards, performance indicators and EDP audit on major computing issues (OAG WA, 1999). The advice also includes the attendance of the OAG staff on the agency’s audit committee meetings. The advice provided by the OAG to the agencies is measured as the sum of billable labour hours times the standard billing rate of the OAG staff at each staff level. The standard billing rate for advice is similar to the rate for audit costs. However, the labour hours for total advice and, financial statement and PI audits, are billed and recorded separately in different codes, i.e., the total hours for the financial statement and PI audits do not include the total hours from advice provided by the OAG.

The level of reliance on internal control is measured by a three-point scale, that is, limited, moderate or extensive. For the purpose of analysis, the scale is treated as a continuous scale where “limited” reliance is coded as “1”, “moderate” is coded as “2” and “extensive” is coded as “3”. Unlike prior studies, this study considers the level of reliance on internal controls that allows for changes in the *extent* of substantive procedures only. This study recognizes that auditors’ reliance on internal controls may affect the nature and timing of substantive testing only, which may not affect auditors’ total effort (Murphy 1994). Focusing on the *extent* of changes in substantive procedures may increase the sensitivity of the scale. The auditors-in-charge provide an *ex-post* assessment of the level of reliance on internal controls.

Consistent with prior studies, audit firm size or affiliation with top-tier audit group is a dichotomous variable and is proxied by the suppliers’ affiliation with a Big 5 audit firm (1) or otherwise (0). The industry measure consists of two dichotomous variables, that

are, “Department” (department [1], otherwise [0]) and “Hospital” (hospital [1], otherwise [0]). The test variable, type of audit arrangement, is a dichotomous variable, where a contract-out arrangement is coded as “1” and an in-house arrangement is coded as “0”. For the interaction variable, this study considers the interaction between the “Hospital” variable and type of audit arrangement only because departmental audits were not contracted-out for year-end 1998. The contract-out hospital audits are coded as “1” and others as “0”.

## Data Collection

The population of financial statement audits for the WA OAG for the 1998 audit cycle is 314 audits (OAG WA 1999).<sup>7</sup> The sample consists of 223 agencies in WA after eliminating the following agencies:

Total financial statement audits for year-end 1998	314
<i>less:</i>	
Treasurer’s annual statement	1
Financial statement audits conducted under legislation other than FAAA:	
subsidiaries	18
corporatised entities	3
local cemetery boards (conducted under the Cemeteries Act)	11
Request audits	10
Agencies not active	11
Agencies which ceased operations during year-end June 30, 1998 & 1999	23
Information relating to independent variables was not determinable due to non-response to the questionnaires	14
<b>Total sample</b>	<b>223</b>

The data for the empirical models was collected from three sources; the OAG’s internal records, agencies’ year-end 1998 annual reports and questionnaires. For agency complexity, the respondents answered the question, “The level of agency complexity in terms of breadth and scope of agency’s functions and activities”, on a Likert-scale of 1

<sup>7</sup> Using the 1998 year-end audit data has the advantage of ensuring that all agencies are consistent in regards to the type of accounting treatment for financial reporting, i.e., accrual accounting. In addition, two years have lapsed since the OAG adopted the Arthur Andersen methodology and, therefore, would be familiar with the methodology in planning and executing audit programs. No major changes in the structure of the public sector audit market in WA, public sector auditing requirements or the internal structure of the OAG were noted for year-end 1998. These events provide assurance that variations in audit costs or fees are not overly affected by extraneous factors.

(very simple) to 5 (very complex). For reliance on internal control, the respondents answered the question, “The level of reliance on agency’s internal controls to allow for changes in the extent of substantive procedures in performing the audit engagement”, on a three-point scale of limited, moderate and extensive. Respondents recognised that “limited” reliance can also mean “zero” reliance on internal controls.

Table 1 summarises the concept and measurements of the variables and the source of data for the variables. The table also summarizes the predicted direction of the relationship between each independent variable and audit costs/fees.

Insert Table 1 here

### **Estimation Method**

Consistent with prior audit fees and production studies, this study uses a cross-sectional method to test the hypotheses and adopts an ordinary least-square (OLS) estimation technique to compare the cost efficiency and fees between in-house and contract-out arrangements to undertake public sector audits.

Prior studies report that the regression models violate important statistical assumptions if the audit fees or hours and client size are not transformed to logarithmic figures. Therefore, following prior audit fee and production models, the audit cost and audit fee models in this study take on the functional form of log-linear regression models to investigate cross-sectional relations between audit cost/fees and the exogenous engagement characteristics, as follows:

$$\text{Lncost or Lnfees} = a + b_1\text{Lnexp} + b_2\text{Complex} + b_3\text{Risk} + b_4\text{FSOpin} + b_5\text{PIOpin} + b_6\text{Advice} + b_7\text{IControl} + b_8\text{Big5} + b_9\text{Department} + b_{10}\text{Hospital} + b_{10}\text{Type} + b_{11}\text{Hospital*Type} + e$$

where:

- Lncost = natural logarithm of total audit costs
- Lnfees = natural logarithm of audit fees billed to agencies
- Lnexp = natural logarithm of total operating expenditure
- Complex = breadth and scope of agency's functions and activities
- Risk = overall financial statement risk (1 = high, 0 = low)
- FSOpin = audit opinion for financial statement (1 = qualified opinion, otherwise 0)
- PIOpin = audit opinion for performance indicators (1 = qualified opinion, otherwise 0)
- Advice = total costs of advice provided to agencies by the OAG
- IControl = reliance on internal control on a scale from 1 (limited) to 3 (extensive)
- Big 5 = (1 = Big 5 audit firms, otherwise 0)
- Department = (1 = department, 0 = otherwise)
- Hospital = (1 = hospital, 0 = otherwise)
- Type = type of audit arrangement (1 = contract-out, 0 = in-house)
- Hospital\*Type = (1 = contract-out hospital, 0 = otherwise)
- e = error term

## DESCRIPTIVE ANALYSIS

Table 2 shows the distribution of agency type for the total sample and, the in-house and contract-out sub-samples.

Insert Table 2 here

Table 3 presents the descriptive statistics for the independent and dependent variables. To test for univariate differences between the in-house and contract out sub-samples, the Mann-Whitney U and chi-square tests are utilized for continuous and dichotomous variables respectively.<sup>8</sup>

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<sup>8</sup> While independent groups t-test is a more powerful test of differences between two unrelated groups when compare to the Mann-Whitney U test, the scores for the continuous variables in the sub-samples need to be normally distributed in the population before the t-test can be used. A test of normality, using the Kolmogorov-Smirnov statistic with a Lilliefors significance level, indicate that the significance levels for the continuous variables are not significant ( $p \leq 0.05$ ). As such, a non-parametric test (i.e., Mann-

Insert Table 3 here

An examination of the frequency tables and histogram graphs indicate that the distribution for audit cost is highly skewed to the right. While the audit costs range from approximately \$3,000 to \$250,000, the majority of the agencies in the sample have costs less than \$30,000 (i.e., 83 percent).

Since the costs of contract out audits are a combination of tender fees and the OAG's supervision costs, a descriptive analysis for the two components of contract-out costs is provided in Table 4.

Insert Table 4 here

The cost of OAG's supervision of contractors' work range between \$196 to \$89,731. The ratio of supervision costs to total costs of contractors range between 4 percent to 42 percent, with a mean of 20 percent. Table 4 indicates that there is a significance difference in supervision costs between Big 5 and non-Big 5 but is insignificant after adjusting the supervision costs to the total contract out costs.

### **Pearson Correlation**

Table 5 presents a matrix of Pearson correlation coefficient between the independent and dependent variables.

Insert Table 5 here

## **REGRESSION ANALYSES – AUDIT COSTS**

The first null hypothesis states that there is no difference in the costs of public sector financial statement audits between the in-house and contract-out arrangements. The

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Whitney U) is used to test for univariate differences for continuous variables.

second null hypothesis states that there is no interaction effect between agency type and type of audit arrangement. Tables 6 and 7 present the regression results for the main effect of type of audit arrangement and the interaction effect between agency type and type of audit arrangement on audit costs respectively. With respect to the interaction variable, only “Hospital” is included in the interaction term. The OAG did not contract-out departmental audits for year-end 1998.

Insert Tables 6 & 7 here

Table 6 indicates that the coefficients for logarithm total expenditure, complexity and risk are positive and significant in the predicted directions. This finding is consistent with prior audit fee and production studies in the private and public sectors (Simunic, 1980; Rubin, 1988; Copley, 1989, O’Keefe et al., 1994b). In addition, as with previous audit fee and production studies, agency size explains most of the variation in audit costs.

Audit qualification for financial statements and performance indicators are both significant at the 5 percent level in the predicted direction. This finding is in contrast with prior studies in the US public sector (see Rubin, 1988; Copley, 1989; Ward et al., 1994), which show no significant association between audit qualifications for financial statements and audit fees.

The level of reliance on internal control does not significantly affect audit costs. This result is consistent with several prior studies (e.g., O’Keefe et al., 1994b; Hackenbrack & Knechel, 1997). This result is surprising, given that the auditors have to form an audit opinion on agencies’ internal controls. However, it should be noted that this result pertains to changes in the extent of substantive procedures only. The auditors in the sample may adjust the nature and timing rather than the extent of substantive procedures in their reliance on the internal control.

The Big 5 variable is not significantly associated with audit costs. This result suggests that there may be no significant difference in audit quality between Big 5 and non-Big 5 (i.e., the OAG, local, second-tier) audit firms. It provides support to the earlier

discussion (see Appendix 2) that Big 5 audit firms have limited incentives to provide a higher audit quality than required by the OAG and the OAG selects the contractor that meets, rather than exceeds, the OAG's level of quality. Alternatively, it may be that the direct application of audit fee premiums for the Big 5 in the private sector does not automatically translate into this particular market. Big 5 audit firms could not command a premium for their reputation in this market, due to the tendering policies of the OAG.

With respect to the main effects of agency type, the evidence suggests that the coefficient for hospitals is highly significant in a negative direction. Specifically, hospital audits are associated with lower audit costs compared to other agency types.

More importantly, the coefficient for the test variable, type of audit arrangement, is positive and weakly significant with audit costs ( $p < 0.089$ , two-tailed). This suggests that the contract-out audits are more costly than the in-house audits. Therefore, the first null hypothesis of no difference in audit costs between in-house and contract-out arrangement is rejected at the 10 percent significance level.

The main effect of type of audit arrangement on audit costs needs to be interpreted in light of the significant coefficient for the interaction variable in Table 7. This suggests that the effect of type of audit arrangement is contingent on agency types, which in this case, are hospital and statutory authority.<sup>9</sup> The second null hypothesis of no interaction effect between agency type and type of audit arrangement is rejected.

Overall, the model for audit costs explains 82 percent of the variance in public sector audit costs. The high explanatory power of the model and the presence of several significant variables in the predicted direction suggest that the possibility of model misspecification is low. The high explanatory power is also consistent with prior audit fee and audit production models that used the logarithm of audit fee/hours as the dependent variable (e.g., Francis, 1984; Palmrose, 1986; O'Keefe et al., 1994b; Craswell & Francis, 1999).

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<sup>9</sup> Since there are three types of agencies and two dichotomous variables, the coefficient for the "Hospital" variable shows the difference between the intercepts for hospital and statutory authority.

Given the significance of agency type variables in the main and interaction effects, splitting the observations by agency type may provide insights into the results of the total sample and the consistency of the cost model across agency type categories in the public sector. Table 8 presents the regression results for the sub-samples, partitioned by agency type: department, statutory authority and hospital.<sup>10</sup>

Insert Table 8 here

When the model is presented by agency type, the type of audit arrangement is significantly associated with audit costs for the statutory authority sub-sample only. The coefficient is positive, which indicates that, on average, the costs of contract-out audits are significantly higher than in-house audits. The type of audit arrangement is not significantly related to audit costs for the hospital sub-sample. This sub-analysis shows that the statutory authority audits are driving the significance of the interaction term in the hypothesised model for the total sample.

### **REGRESSION ANALYSES – AUDIT COSTS LESS THE OAG’S SUPERVISION COSTS FOR CONTRACTORS**

As discussed earlier, supervision costs are a necessary feature of contract-out audits. To examine the impact of supervision costs on the test variables, type of audit arrangement and the interaction between agency type and type of audit arrangement, the OAG’s supervision costs are excluded from the total costs for contract-out audits. It can be argued that, while supervision costs are an essential part of the contracting-out process to maintain audit quality and meet the accountability requirements in the public sector, these costs are outside the control of the contractors. By excluding supervision costs from contract-out audits, this study can assess the influence of these costs on the test variables. The results for the total sample are reported in Tables 9 and 10.

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<sup>10</sup> The Big 5 variable is excluded from the hospital’s audit cost model because the OAG did not contract-out the 1998 financial audits of hospitals to any of the Big 5 audit firms. In addition, type of audit arrangement and the Big 5 variables are not included in the department’s audit cost model because the OAG did not contract-out departmental audits for year-end 1998.

Insert Tables 9 & 10 here

By excluding supervision costs from contract-out audits,<sup>11</sup> the test variable, type of audit arrangement has no main effect on audit costs ( $p < 0.201$ , two-tailed). This result is in contrast to the previous finding where the coefficient for this variable was positive and weakly significant. Table 10 shows that the coefficient for the interaction term remains negative and significant. The significance and direction for the control variables remain unchanged.

To determine the impact of supervision costs on agency type, the total sample is partitioned into sub-samples by agency type (i.e., statutory authority and hospital). The results appear in Table 11.

Insert Table 11 here

The results for the sub-samples indicate that supervision costs influence the significance of the test variable. For the statutory authority sub-sample, excluding supervision costs changes the result for the test variable from positive significance to non-significance. For the hospital sub-sample, excluding supervision costs changes the non-significance of the coefficient for the test variable to a negative and significant association. These results imply that the size of supervision costs is significant. As such, it raises the issue about the impact of the OAG's efficiency on the contractors' efficiencies and the interpretation of the earlier results.

## **REGRESSION ANALYSES – AUDIT FEES**

The third null hypothesis states that there is no difference in the audit fees of public sector financial audits between the in-house and contract-out arrangements. The fourth null hypothesis states that there is no interaction effect between agency type and type of audit arrangement on audit fees. Tables 12 and 13 present the regression results for the

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<sup>11</sup> Supervision costs for a contract-out audit are defined as the difference between the total audit costs for the contract-out audit (as shown in the OAG's database) and the tender fees paid to the contractor.

main effect of type of audit arrangement and the interaction effect between agency type and type of audit arrangement on audit fees respectively.

Insert Tables 12 & 13 here

The results in Table 12 are consistent with the results for the audit cost model, except for the audit opinion for performance indicators and departmental audits. In the audit cost model, the audit opinion for performance indicators is significantly associated with audit costs but the cost difference is not reflected in audit fees. A possible explanation is that the OAG is required by legislation to audit performance indicators from year-end 1996 and the OAG is allowing an adjustment period for the agencies to prepare and fine-tune their performance indicators.

In contrast to prior fee studies in the public sector, audit qualification on financial statements is positive and significantly associated with audit fees. A low qualification rate of 9 percent in the WA public sector and the significant association may suggest that qualified audit opinions are rare and, if qualified opinions are issued, auditors increase the amount of their evidence to justify their opinions.

The test variable, type of audit arrangement, is not significantly associated with audit fees ( $p < 0.569$ , two-tailed) in Table 12. This result suggests that the third null hypothesis of no difference in audit fees between in-house and contract-out arrangement cannot be rejected. Surprisingly, the coefficient for the interaction term is also not significantly associated with audit fees ( $p < 0.454$ , one-tailed). Therefore, the fourth null hypothesis of no interaction effect between agency type and type of audit arrangement on audit fees cannot be rejected.

Overall, the fee model explains 86 percent of the variance in public sector audit fees. The fee model has greater explanatory power than the audit costs model by 4 percent. In summary, the determinants of audit fees in the public sector are agency size, complexity, risk, audit opinion for financial statement and total advice provided to the agencies. With the exception of audit opinion for financial statements and total advice provided to the agencies, this finding is consistent with prior audit fee studies in the public sector.

The high explanatory power of the model is also consistent with or superior to prior audit fee models in the public and private sectors.

Similar to the audit cost model, the total sample is partitioned by agency type to provide insights into the results of the total sample and the consistency of the audit fee model across agency type categories in the public sector. Table 14 presents the regression results for the sub-samples: department, statutory authority and hospital.

Insert Table 14 here

The test variable, type of audit arrangement, is not significantly associated with audit fees for both statutory authority and hospital sub-samples. This result is surprising for the statutory authority sub-sample because, in the earlier analysis, the result suggests that contract-out audits are more costly than in-house audits for this sub-sample. Overall, the audit fee models provide greater explanatory power compared to the audit cost models for each agency type.

## **DISCUSSIONS & CONCLUSIONS**

Table 15 provides a summary of the results for the relations between the test variables and the three dependent variables.

Insert Table 15 here

Results suggest that contract-out audits are more costly than in-house audits but the significant interaction term suggests that the effect of type of audit arrangement is conditional upon agency type. Further analysis reveals that contract-out audits are more costly than in-house audits for statutory authority audits only. The type of audit arrangement for hospital audits has no effect on audit costs. This suggests that the statutory authority audits are driving the significant association between type of audit arrangement and audit costs. As discussed earlier, this result is attributed to the contractor's expertise in auditing a similar agency type in the private sector and the ability to transfer that expertise to the public sector. However, the non-significant

interaction term in the audit fee model suggests that cost differences between in-house and contract-out audits for hospital and statutory authority are not reflected in audit fees billed to agencies.

Supervision costs have a significant impact on the interpretation of the results for type of audit arrangement. By excluding supervision costs from contract-out audits, there are significant changes in the results for the total sample and the two sub-samples. These changes favor the contract-out audits for all groupings. Specifically, the costs of contract-out audits are not significantly different from the costs of in-house audits in the total sample. When the sample is partitioned by agency type, the audit costs for contract-out audits are now not significantly different from the audit costs for in-house audits in the statutory authority sub-sample. There is a shift in the result from contract-out audits incurring higher audit costs relative to in-house audits, to no difference in costs. In the hospital sub-sample, the results favor the contract-out audits where contract-out audits are significantly less costly than in-house audits.

Overall, supervision costs play a crucial role in the interpretation of the results. To compare the relative cost efficiency between in-house and contract-out audits, researchers need to consider supervision costs as part of the total audit costs for contract-out audits. Supervision costs are a necessary cost of having a system where private sector auditors are contractors in the public sector process. The presence of contractors inevitably raises the issue on whether the nature and amount of monitoring and supervisory activities for contractors are sufficient so as to ensure that a specific quality level has been achieved. The OAG can only fulfil its objective if he has quality oversight on public sector audits. In the context of an efficient and effective provision of audit services, the more significant question is probably, "to what extent can these oversight costs be reduced significantly while maintaining an appropriate level of audit quality?" The OAG, who oversees the supervisory activities, needs to decide on the optimal level of monitoring to ensure that the monitoring devices are sufficient, appropriate and able to enforce penalties to reduce low quality audits in the future.

The results for audit fees raise questions about the OAG's pricing policy. Discussions with the OAG reveal that audit fees billed to an agency are not based solely on audit

costs but several factors, which include the agency's fee history and the ability to pay. All departments and hospitals and, some statutory authorities receive the OAG's audit services free of charge and, therefore, the OAG has incentives to bill higher audit fees to those agencies that are required to pay for the audit services. However, given that audit fees are highly correlated with audit costs (see Table 5), it is surprising that the cost differences in type of arrangement are not reflected in the audit fees. A reasonable explanation is that the OAG does not consider type of audit arrangement in its pricing policy because the OAG may view contracting-out as a short-term arrangement (i.e., three to four years). As such, the OAG may discount any short-term cost differential to focus on the long-term cost effects when pricing their audits. Alternatively, the OAG may adjust the audit fees so that the contract-out audits are not penalised for the higher audit costs (in this case, the statutory authority audits).

Empirical evidence on the relative cost efficiency of in-house and contracted audits will enable the OAGs to compare their performance with private sector contractors and determine the more efficient form of public sector audit delivery. At the firm level, deciding on the mix of in-house and outsourcing forms of audit delivery is important because the tendering process is a costly process and, as noted by Craswell (1997, 17), "the organisation calling tenders incurs not only administrative costs but also risks discouraging tenderers for whom the probability of success is a function of the number of firms bidding". At the market level, such evidence is important because it has the potential to influence government policies in matters relating to the most efficient form of public sector audit delivery. As an example, the evidence from this study can provide a framework for the policy makers in Victoria to evaluate their decisions regarding contestability in the public sector audit market. By identifying the factors that drive efficiency in the public sector audit market, (i.e., type of suppliers and their relationship with the market structure and its incentives, and the institutional environment), the evidence from this study may provide input to policy decisions on matters relating to the structure of the public sector audit market that best fulfils the efficient and effective criteria. In the long-run, the benefits will accrue to the public, through a more efficient and effective use of public funds.

## **Appendix 1: Financial Audits in Western Australia**

In Western Australia (WA), the Financial Administration and Audit Act 1985 (FAAA) and Treasurer's Instructions (TI) govern the conduct, operations and funding of the auditor-general and the audit office. The Governor, with the Premier's recommendation, appoints the auditor-general (FAAA, s.71), with parliament as the principal client. The auditor-general is empowered by the FAAA to audit all agencies, i.e., department, statutory authority, government business enterprise and government-owned corporation. If requested by the Treasurer, the auditor-general is required to audit the accounts of any person or institution in receipt of a specific purpose grant or advance (FAAA, s.78). A feature of the financial audit that is unique to WA is the audit opinion on the relevance and appropriateness of an agency's performance indicators (FAAA, s.93). In summary, the OAG is required to perform these tasks for financial statement audits:

- form opinions, required by Sec 93 of FAAA 1985 in relation to controls and financial statements;
- report audit findings and significant control weaknesses;
- report of any significant legislative non-compliance for the purposes of Sec 79 (2) of FAAA; and
- form an opinion on performance indicators.

In regards to funding, the OAG's budget is presented to Treasury for review prior to being included in the state's budget. Audit fees received from agencies are transferred to the Consolidated Fund Revenue where the total fees become the basis for determining the amount of funding for the OAG in the following year. The Treasury determines the amount to be allocated to the OAG from this reserve.

Similar to other jurisdictions in Australia, the OAG in WA has the authority to contract qualified auditors to carry out functions on the OAG's behalf (FAAA, s.82), with the OAG retaining responsibility for the audit opinions. Audits for departments are not contracted-out (OAG WA 1998). Discussions with the OAG staff reveal that, for statutory authorities and hospitals, the policy for selecting which agencies to contract-

out is fairly randomized and on a rotational basis. However, the OAG does not contract-out a few statutory authority audits but contracts-out indefinitely the audits in which it has no expertise. Public agencies in WA do not have the option of selecting auditors to audit their accounts.

As in other jurisdictions, audit engagements are contracted-out for a set period of time in WA. The term of the contract is usually three years, with the possibility of a “roll-over” in the contract for another one or two years. Potential contractors are required to compete for public sector audits through the tender bidding process. The method of appointment follows a selective tender where the OAG invites prospective contractors to submit quotes or tenders. This method of appointment is also used in NSW and at the commonwealth level. This process generally elicits three to four offers from prospective contractors to undertake an audit engagement, thereby ensuring that the tender market is competitive.

The WA OAG adopts a two-envelope system to evaluate tender bids. The first envelope requires prospective contractors to provide information on the types of expertise, audit methodology and audit plan to be used in the engagement. Specifically, the OAG evaluates prospective contractors based on criteria that include: (1) ability to undertake work (e.g., professional standing, appropriateness of methodology, previous experience, industry knowledge); (2) adequacy of resources to actually perform the audit assignment; and (3) an assessment of quality control within the contractor’s Organisation and depth of personnel to supervise and review the project. The OAG evaluates the information contained in the first envelope before opening the second envelope. The second envelope contains information about the tender fees, total budgeted audit hours and a breakdown of audit hours by rank level (i.e., partners, managers, seniors and juniors). The two-envelope system ensures that both quality and price are taken into account in deciding the best value-for-money audits. Similar to other jurisdictions, the OAG in WA undertakes quality control procedures before, during and after the conduct of contract-out audits and, bears the responsibilities of issuing audit opinions and reporting audit findings.

## **Appendix 2: Audit Quality in the Public Sector.**

Audit quality (defined as the probability of discovering misstatements or omissions in the financial statement) encompasses audit effectiveness, i.e., the achievement of a desired level of assurance that material client errors have been detected (Bedard, Gopi and Vijayalakshmi 1991).

This study assumes that audit quality is homogeneous across audits in the WA public sector audit market. Consistent with the literature, the OAG is assumed to deliver a fixed level of audit assurance (quality) at a moment in time (see O’Keefe et al. 1994b). O’Keefe and Westort (1992) argue that an audit firm’s investments in knowledge are fixed costs and the firm would find it more cost efficient to deliver audit services to clients who demand an audit quality that is consistent with those investments. Given that the provision of audit services in the WA public sector audit market at the state level is supply-driven, it is plausible that the OAG is motivated to deliver one type of audit quality across agencies, in order to be more cost efficient. In addition, the demand from parliament (the OAG’s principal client) can be assumed to be relatively homogeneous.

The WA public sector audit market at the state level is also served by private sector audit firms, as sub-contractors to assist the OAG in the audit. While the presence of private sector audit suppliers suggests that it is possible to have different types of audit quality in the market, this study assumes that the contractors deliver the same level of audit quality as the OAG.<sup>12</sup>

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<sup>12</sup> The presence of non-government audit suppliers, e.g., contractors, has implications for audit quality in the public sector. Commentators and researchers suggest that audit quality in the public sector should be monitored when dealing with private sector audit suppliers and their apparent efficiencies in providing audit services. The Treadway Commission in the US found that both small and large audit firms (including the then Big 8) performed substandard governmental audits. Private audit suppliers may shirk their responsibilities in a low litigious environment. Raman and Wilson (1994) argue that auditor moral hazard is acute in the government environment because the chances of auditees’ financial failure and consequent ex-post revelation of lower-than-implied audit quality are minimal. The allocation of proportionately more junior or inexperienced staff to public sector audit engagements and the absence of capital market incentives in the public sector to discipline audit firms make public sector agencies susceptible to lower quality audits (Raman and Wilson 1994; Brown and Raghunandan 1995). Another reason for the lower-than-implied audit quality is the current short-term contracting arrangement in Australia. This arrangement is costly to the contractors because they incur frequent set-up costs for each new audit engagement. To remain competitive, the contractors may absorb these costs by compromising on the quality of the audits. In addition, the short-term contracting arrangement and the limited role of

Based on the current public sector audit arrangement in WA, this study assumes that the contractors' quality level meets, at least, the minimum level of audit quality as required by the OAG. While the contractors are required to form an audit opinion on agencies' financial statements, it is the OAG that makes the final certification on the agencies' audit reports. Since the OAG is responsible for signing off the agencies' audit reports and, therefore, accountable to parliament for the reports, the OAG has incentives to ensure that the contract-out audits are managed and monitored adequately.

The quality control procedures start with the tender process. The OAG selects a contractor for its ability to meet and deliver the OAG's level of audit quality, in addition to the fees requested for an audit job. It is assumed that successful tenderers are usually repeat suppliers or have experience in auditing public sector agencies. This selection process reduces the OAG's risk of contracting low quality contractors. The OAG also provides the overall direction in matters relating to the conduct of the audit. For instance, contractors need to get their audit plans approved by the OAG before commencing the audit. Contractors also report significant issues during the course of the audit and present their work to the OAG for review. The OAG will ensure that the contractors' work meets, at least, the minimal audit quality as required by the OAG before the audit reports are released to each agency and tabled in parliament. If a contractor's work is not satisfactory, i.e., provides a lower audit quality level than demanded by the OAG, the OAG will undertake further work to ensure that the audit meets the OAG's desired audit quality level. Therefore, it is reasonable to assume that the quality of audit service provided to public sector agencies is acceptable and lower-than-expected level of the OAG's audit quality by contractors is minimal.

One can also assume that contractors have limited incentives to provide a higher audit quality than the OAG. Since the final audit report bears the signature of the OAG, regardless of the suppliers that undertake the audit, the market can only identify the final report to the OAG's "brand name". Since the contract-out audits are not identified with the contractors' "brand name", they would have limited incentive to deliver audit quality

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private sector audit firms in the public sector audit market may discourage the firms from investing in public sector audits.

beyond the level required by the OAG. In addition, it can be argued that, in selecting the best value-for-money tender offer, the OAG will select the contractors that meets its quality criteria and reject the higher-than-required audit quality offered by the contractors.

The two major assumptions in this study have implications for the findings. Studies that examine audit efficiency need to be aware that variations in audit costs can be influenced by efficiency and effectiveness aspects of a production process. If it is reasonable to assume that audit quality is homogeneous across agencies and audit suppliers, the effect of type of audit arrangement on audit efficiency can be examined in the context of a model that explains total audit costs/fees required to achieve a given level of audit quality.

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Table 1

**A Summary of the Audit Production Model**

Construct	Measurement	Predicted sign	Source of data
Dependent variables			
Audit costs	in-house audits = billable hours * standard billing rate (\$) contract-out audits = tender fees (\$) + costs of in-house's supervision (billable hours * standard billing rate [\$])	n/a	Internal records
Audit fees	audit fees billed to the agencies (\$)	n/a	Annual report
Independent variables			
Agency size	total operating expenditure (\$)	+	Annual report
Agency complexity	breadth and scope of agency's functions and activities - scale from 1 (very simple) to 5 (very complex)	+	Questionnaire
Risk	audit risk: overall financial statement risk - high (1); low (0)	+	Internal records
	current year audit opinion for financial statement - qualified (1); otherwise (0)	+	Annual report
	current year audit opinion for performance indicators - qualified (1); otherwise (0)	+	Annual report
	business risk: total costs of advice to agency (billable hours for advice * standard billing rate [\$])	+	Internal records

Table 1

**A Summary of the Audit Production Model (continued)**

Construct	Measurement	Predicted sign	Source of data
Internal control	level of reliance on internal control to allow for changes in the extent of substantive procedures - limited (1), moderate (2) or extensive (3)	-	Questionnaire
Big 5 audit firm	Big 5 (1); otherwise (0)	+	Internal records
Industry	“Department” – department (1); otherwise (0)	+	Annual report
	“Hospital” – hospital (1); otherwise (0)	-	Annual report
Type of arrangement	contract-out (1); in-house (0)	?	Internal records
Industry*Type of arrangement	contract-out hospital (1); otherwise (0)	-	Annual report & internal records

Table 2

**Sample Coverage by Agency Type**

Agency Type	Total Sample	In-house	Contract-out
Department	45 (20%)	45 (29%)	0 (0%)
Statutory authority	120 (54%)	84 (55%)	36 (51%)
Hospital	58 (26%)	24 (16%)	34 (49%)
Total	223 (100%)	153 (100%)	70 (100%)

Table 3

**Descriptive Statistics for Total Sample and Sub-samples**

		Total sample	In-house	Contract-out
Audit costs (\$)	mean	19,820	20,076	19,260
	median	9,945	10,505	9,718
	std. dev.	28,657	26,464	33,151
Log audit costs	mean	9.327	9.346	9.285
	median	9.205	9.260	9.181
	std. dev.	1.007	1.024	0.974
	signif.			0.586
Audit fees (\$)	mean	26,894	28,736	22,869
	median	13,000	13,000	9,250
	std. dev.	44,704	44,072	46,121
Log audit fees	mean	9.452	9.530	9.283
	median	9.473	9.473	9.129
	std. dev.	1.151	1.165	1.109
	signif.			0.148
Total operating expenditure (\$)	mean	48,674,973	46,450,209	53,537,671
	median	5,117,000	6,721,000	3,298,500
	std. dev.	157,527,987	146,887,670	179,652,730
Log total operating expenditure	mean	8.675	8.739	8.535
	median	8.540	8.813	8.101
	std. dev.	2.023	2.019	2.040
	signif.			0.239

Table 3

**Descriptive Statistics for Total Sample and Sub-samples (continued)**

		Total sample	In-house	Contract-out
Level of complexity (1-5)	mean	2.731	2.680	2.843
	median	3.000	3.000	3.000
	std. dev.	0.766	0.834	0.581
	signif.			0.062
Total advice to agency (\$)	mean	2,593	3,320	1,004
	median	500	655	276
	std. dev.	8506	9887	3702
	signif.			0.001
Reliance on internal control (1-3)	mean	1.740	1.732	1.757
	median	2.000	2.000	2.000
	std. dev.	0.557	0.574	0.523
	signif.			0.678
Overall high risk of financial statement	%	28.7	30.7	24.3
	signif.			0.324
Qualified FS audit opinion	%	8.5	11.1	2.9
	signif.			0.04
Qualified PI audit opinion	%	17.9	12.4	30.0
	signif.			0.001
Big 5	%	4.9	-	15.7
Department	%	20.2	29.4	-
Hospital	%	26.0	15.7	48.6
Contract-out audit arrangement	%	31.4	-	-

Table 4

**Descriptive Statistics for the Tender Fees and Supervision Costs for Contract-out Audits and, the OAG's Charge-out Rate**

		Total contract-out audits	Big 5	non-Big 5
Tender fees (\$)	mean	15,501	36,001	11,679
	median	6860	43,800	5,750
	std. dev.	23,652	24,574	21,607
	signif.			0.000
Supervision costs (\$)	mean	3,759	5,422	3,450
	median	1,704	5,928	1,546
	std. dev.	10,813	2,251	11,731
Log supervision costs	mean	7.543	8.480	7.369
	median	7.441	8.687	7.343
	std. dev.	0.965	0.585	0.922
	signif.			0.000
Percentage of supervision costs to tender fees	mean	0.271	0.251	0.275
	median	0.228	0.157	0.231
	std. dev.	0.167	0.191	0.164
	signif.			0.463
Charge-out rate	mean	1.034	1.214	1.000
	median	1.060	1.301	1.050
	std. dev.	0.262	0.383	0.221
	signif.			0.013

Table 5

**Pearson Correlation Matrix for Independent and Dependent Variables**

	Lncost	Lnfees	Lnexp	Complex	Risk	FSOpin	PIOpin	Advice	IControl	Big 5	Department	Hospital	Type
Lnfees	.955*												
Lnexp	.872*	.884*											
Complex	.577*	.550*	.533*										
Risk	.444*	.451*	.366*	.204*									
FSOpin	.242*	.243*	.210*	.160	.161								
PIOpin	-.056	-.113	-.061	.088	-.142	.025							
Advice	.481*	.487*	.388*	.399*	.198*	.091	.107						
IControl	.346*	.347*	.375*	.500*	.190*	.027	.072	.126					
Big 5	.234*	.205*	.223*	.188*	.222*	-.070	-.106	-.021	.144				
Department	.322*	.342*	.336*	.170	.175*	.407*	-.060	.317*	.074	-.115			
Hospital	-.339*	-.413*	-.263*	.128	-.354*	-.108	.522*	-.158	.167	-.135	-.298*		
Type	-.028	-.100	-.047	.099	-.066	-.137	.213*	-.127	.021	.337*	-.340*	.348*	
Hospital X Type	-.279*	-.327*	-.237*	.068	-.269*	-.040	.419*	-.115	.064	-.097	-.213*	.715*	.627*

\* significant at  $p < 0.01$  (2-tailed)

Table 6

**Regression: Audit Costs as Explained by Control Variables and Type of Audit Arrangement**

	Predicted sign	Standardised coefficients	t	Sig.*
(Constant)			37.624	.000
Lnexp	+	.657	16.759	.000
Complex	+	.169	4.212	.000
Risk	+	.083	2.551	.006
FSOpin	+	.053	1.684	.047
PIOpin	+	.054	1.557	.061
Advice	+	.117	3.424	.000
IControl	-	.014	.399	.345
Big 5	+	-.004	-.106	.458
Department	+	-.037	-1.055	.147
Hospital	-	-.197	-4.670	.000
Type	?	.059	1.706	.089
Adjusted R <sup>2</sup>			.82	
F statistic			94.199 (p < 0.001)	
N			223	

\* A one-tail test is used for significance where an *a priori* expectation could be made about the effect of a variable on audit costs.

Table 7

**Regression: Audit Costs as Explained by Control Variables, Type of Audit Arrangement and Interaction Between Hospital and Type of Audit Arrangement**

	Predicted sign	Standardised coefficients	t	Sig.*
(Constant)			37.816	.000
Lnexp	+	.649	16.478	.000
Complex	+	.167	4.176	.000
Risk	+	.082	2.519	.001
FSOpin	+	.058	1.839	.034
PIOpin	+	.055	1.598	.056
Advice	+	.120	3.525	.000
IControl	-	.016	.469	.320
Big 5	+	-.019	-.548	.292
Department	+	-.028	-.773	.220
Hospital	-	-.152	-3.026	.002
Type	?	.108	2.382	.018
Hospital*Type	-	-.090	-1.660	.049
Adjusted R <sup>2</sup>			.82	
F statistic			87.298 (p < 0.001)	
N			223	

\* A one-tail test is used for significance where an *a priori* expectation could be made about the effect of a variable on audit costs.

Table 8

**Regression: Audit Costs as Explained by Expenditure, Complexity, Risk, Audit Opinions for Financial Statement and Performance Indicators, Total Advice, Internal Control, Big 5 and Type of Audit Arrangement by Agency Type**

Variables	Predicted sign	Department			Statutory authority			Hospital		
		Standardised coefficients	t	Sig.*	Standardised coefficients	t	Sig.*	Standardised coefficients	t	Sig.*
(Constant)			14.425	.000		29.861	.000		8.846	.000
Lnexp	+	.482	5.125	.000	.598	9.753	.000	.661	6.284	.000
Complex	+	.299	3.367	.001	.175	2.719	.004	-.019	-.155	.439
Risk	+	.014	.191	.425	.136	3.017	.002	.009	.124	.451
FSOpin	+	.131	2.008	.026	-.028	-.626	.267	.039	.529	.300
PIOpin	+	-.056	-.781	.220	.041	.832	.204	.156	2.147	.019
Advice	+	.260	3.255	.001	.084	1.535	.064	.132	1.465	.075
IControl	-	.089	1.270	.106	.069	1.285	.101	-.153	-1.189	.120
Big 5	+	-	-	-	-.030	-.601	.275	-	-	-
Type	?	-	-	-	.114	2.332	.022	-.082	-1.038	.304
Adjusted R <sup>2</sup>			.83			.81			.74	
F statistic			30.772 (p < 0.001)			55.814 (p < 0.001)			21.610 (p < 0.001)	
N			45			120			58	

\* A one-tail test is used for significance where an *a priori* expectation could be made about the effect of a variable on audit costs.

Table 9

**Regression: Audit Costs (less the OAG's supervision costs for contractors) as Explained by Control Variables and Type of Audit Arrangement**

	Predicted sign	Standardised coefficients	t	Sig.*
(Constant)			35.894	.000
Lnexp	+	.651	16.271	.000
Complex	+	.169	4.130	.000
Risk	+	.079	2.369	.010
FSOpin	+	.048	1.472	.071
PIOpin	+	.046	1.312	.096
Advice	+	.109	3.110	.001
IControl	-	.013	.377	.354
Big 5	+	-.004	-.122	.452
Department	+	-.037	-1.029	.152
Hospital	-	-.200	-4.643	.000
Type	?	-.045	-1.282	.201
Adjusted R <sup>2</sup>			.82	
F statistic			89.803 (p < 0.001)	
N			223	

\* A one-tail test is used for significance where an *a priori* expectation could be made about the effect of a variable on audit costs.

Table 10

**Regression: Audit Costs (less the OAG's supervision costs for contractors) as Explained by Control Variables, Type of Audit Arrangement and Interaction Between Agency Type and Type of Audit Arrangement**

	Predicted sign	Standardised coefficients	t	Sig.*
(Constant)			36.154	.000
Lnexp	+	.641	15.994	.000
Complex	+	.167	4.095	.000
Risk	+	.078	2.335	.010
FSOpin	+	.053	1.651	.050
PIOpin	+	.048	1.359	.088
Advice	+	.112	3.229	.001
IControl	-	.016	.456	.325
Big 5	+	-.022	-.622	.268
Department	+	-.026	-.714	.238
Hospital	-	-.147	-2.892	.002
Type	?	.012	.254	.800
Hospital*Type	-	-.103	-1.877	.031
Adjusted R <sup>2</sup>			.82	
F statistic			83.597 (p < 0.001)	
N			223	

\* A one-tail test is used for significance where an *a priori* expectation could be made about the effect of a variable on audit costs.

Table 11

**Regression: Audit Costs (less the OAG's supervision costs for contractors) as Explained by Control Variables and Type of Audit Arrangement by Agency Type**

	Predicted sign	Statutory authority			Hospital		
		Std. coeff.	t	Sig.*	Std. coeff.	t	Sig.*
(Constant)			28.104	.000		8.362	.000
Lnexp	+	.613	9.364	.000	.614	5.914	.000
Complex	+	.196	2.848	.003	-.016	-.127	.450
Risk	+	.133	2.767	.004	.010	.142	.444
FSOpin	+	-.029	-.612	.271	.009	.132	.448
PIOpin	+	.036	.678	.250	.130	1.821	.038
Advice	+	.060	1.036	.151	.141	1.582	.060
IControl	-	.075	1.310	.097	-.162	-1.279	.104
Big 5	+	-.039	-.748	.228	-	-	-
Type	?	.018	.341	.734	-.260	-3.335	.002
Adjusted R <sup>2</sup>			.78			.75	
F statistic			47.381 (p < 0.001)			22.278 (p < 0.001)	
N			120			58	

\* A one-tail test is used for significance where an *a priori* expectation could be made about the effect of a variable on audit costs.

Table 12

**Regression: Audit Fees as Explained by Control Variables and Type of Audit Arrangement**

	Predicted sign	Standardised coefficients	t	Sig.*
(Constant)			34.548	.000
Lnexp	+	.668	18.975	.000
Complex	+	.147	4.070	.000
Risk	+	.067	2.290	.012
FSOpin	+	.050	1.737	.042
PIOpin	+	.032	1.035	.151
Advice	+	.120	3.894	.000
IControl	-	.043	1.369	.086
Big 5	+	-.030	-1.017	.155
Department	+	-.053	-1.664	.049
Hospital	-	-.258	-6.810	.000
Type	?	.018	.571	.569
Adjusted R <sup>2</sup>			.86	
F statistic			121.420 (p < 0.001)	
N			223	

\* A one-tail test is used for significance where an *a priori* expectation could be made about the effect of a variable on audit fees.

Table 13

**Regression: Audit Fees as Explained by Control Variables, Type of Audit Arrangement and Interaction Between Agency Type and Type of Audit Arrangement**

	Predicted sign	Standardised coefficients	t	Sig.*
(Constant)			34.446	.000
Lnexp	+	.668	18.761	.000
Complex	+	.146	4.055	.000
Risk	+	.067	2.281	.012
FSOpin	+	.050	1.736	.042
PIOpin	+	.032	1.035	.151
Advice	+	.120	3.885	.000
IControl	-	.043	1.370	.086
Big 5	+	-.031	-1.008	.158
Department	+	-.052	-1.619	.054
Hospital	-	-.255	-5.633	.000
Type	?	.021	.506	.614
Hospital*Type	-	-.006	-.115	.454
Adjusted R <sup>2</sup>			.86	
F statistic			110.782 (p < 0.001)	
N			223	

\* A one-tail test is used for significance where an *a priori* expectation could be made about the effect of a variable on audit fees.

Table 14

**Regression: Audit Fees as Explained by Control Variables: Expenditure, Complexity, Risk, Audit Opinions for Financial Statement and Performance Indicators, Total Advice, Internal Control, Big 5 and Type of Audit Arrangement by Agency Type**

Variables	Predicted sign	Department			Statutory authority			Hospital		
		Standardised coefficients	t	Sig.*	Standardised coefficients	t	Sig.*	Standardised coefficients	t	Sig.*
(Constant)			13.764	.000		26.327	.000		9.042	.000
Lnexp	+	.579	7.215	.000	.594	9.811	.000	.763	9.424	.000
Complex	+	.245	3.229	.002	.182	2.856	.003	-.070	-.739	.232
Risk	+	.017	.282	.390	.101	2.269	.013	.037	.700	.244
FSOpin	+	.118	2.123	.020	-.020	-.449	.327	.008	.140	.445
PIOpin	+	-.026	-.429	.335	.031	.634	.264	.048	.852	.199
Advice	+	.228	3.336	.001	.122	2.275	.013	.188	2.706	.005
IControl	-	.086	1.434	.080	.105	1.988	.025	-.029	-.292	.386
Big 5	+	-	-	-	-.041	-.830	.204	-	-	-
Type	?	-	-	-	.036	.736	.464	.008	.132	.895
Adjusted R <sup>2</sup>			.87			.81			.85	
F statistic			44.241 (p < 0.001)			57.497 (p < 0.001)			40.628 (p < 0.001)	
N			45			120			58	

\* A one-tail test is used for significance where an *a priori* expectation could be made about the effect of a variable on audit fees.

Table 15

**Summary of Results for Type of Audit Arrangement and Interaction Between Hospital and Type of Audit Arrangement**

Dependent variables	Type of Audit Arrangement	Hospital*	Type of Audit Arrangement	
		Type of Audit Arrangement	Statutory authority	Hospital
		Total sample		
Audit costs	Significant & positive	Significant & negative	Significant & positive	Not significant
Audit costs (less supervision costs)	Not significant	Significant & negative	Not significant	Significant & negative
Audit fees	Not significant	Not significant	Not significant	Not significant