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## Resource allocation and efficiency in public sector audits

Kar M. Chong  
*Edith Cowan University*

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**RESOURCE ALLOCATION AND EFFICIENCY  
IN PUBLIC SECTOR AUDITS**

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**KAR MING CHONG**

A Thesis Submitted in Partial Fulfillment of the  
Requirements for the Award of

**Doctor of Philosophy (Business) Degree**

at the Faculty of Business and Public Management,  
Edith Cowan University

Date of Submission : 13th October 2000

## USE OF THESIS

The Use of Thesis statement is not included in this version of the thesis.

## 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 cost efficiency of in-house and contract-out arrangements to deliver financial audits in the public sector. It empirically tests whether there are audit cost and audit fee differences between in-house providers (i.e., the OAG) and contractors (i.e., public accounting firms). The secondary aims of this study are to develop audit cost and fee models for the public sector. The unit of analysis is audit cost/fee at the audit engagement level. The data for this study is collected for a sample of financial statement audit engagements for year-end 1998, at the state level in Western Australia. The data is extracted from publicly available and private sources.

The audit cost and fee models are used to test for the cost differences between in-house providers and contractors. Prior audit production and audit fee studies in the private and public sectors provide the basis for the development of the two models. The results indicate that agency size, complexity and risk are positively associated with audit costs and audit fees. In addition, the total advice provided to the agencies by the OAG and agency type are also significantly associated with audit costs and audit fees. Overall, by incorporating these factors into the models, the audit cost model explains 82 percent of the variance in audit costs, while the audit fee model explains 86 percent of the variance in audit fees.

More importantly, the main findings suggest that contract-out audits are more costly than in-house audits. However, this finding 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. There is no significant difference in audit costs between contract-out and in-house arrangement for hospital audits. This analysis shows that the statutory authority audits are driving the significance of the interaction between type of audit arrangement and agency type. Specifically, the costs of contract-out audits are, on average, significantly higher than in-house audits. This result is attributed to the contractor's lack of expertise in auditing statutory authority as there is no equivalent of this agency type in the private sector. As such, the OAG has the greater advantage of delivering a lower audit cost for statutory authority audits compared to the contractors. However, the non-significant interaction term in the audit fee model suggests that cost differences between in-house and contract-out audits for the statutory authority audits are not reflected in audit fees billed to agencies. Further analyses, using audit hours as the dependent variable, generally corroborate the findings from the audit cost and audit fee models.

Sensitivity analyses on the OAG's supervision costs reveal that these costs have a significant effect on the interpretation of the cost efficiency results. By excluding supervision costs from contract-out audits, there are significant changes in the results for the total sample and the two sub-samples (partitioned by agency type). Generally, these changes favour the contract-out audits for all groupings, where contract-out audits are now more cost efficient than in-house audits for hospitals, and not significantly different in costs for statutory authority audits. Additional tests to investigate the determinants of the OAG's supervision costs in contract-out audits

reveal that agency size, risk, reliance on internal control, total advice provided by the OAG and packaged audits (a single contract for two or more audits) are significantly associated with the supervision costs of contract-out audits.

The main contribution of this study is to add to the growing literature on audit market efficiency (see Dopuch, Gupta, Simunic & Stein, 2000; Knechel & Payne, forthcoming). It provides evidence on the production function of different type of suppliers in the public sector and their relative efficiency in providing audit services. This study contributes to the recent discussions on the changing nature of public sector audit market towards a market-based provision of public sector audits. The evidence from this study allows researchers and policy-makers to compare the two types of audit arrangement to undertake public sector audits. In part, this study also contributes to the line of inquiry that examines the difference between government auditors and public accounting firms in US municipalities (Copley, 1989; Dwyer & Wilson, 1989; Rubin, 1992).

The secondary contribution of this study is to develop and test the audit cost and fee models in the public sector and provide validity on the transferability of audit models from the private and public sectors. This study adds to the literature that examines the public sector audit market. More importantly, it is one of the few non-US studies that examine the public sector audit market and the findings from this study suggest that the public sector audit studies from the US are generalisable to Australia. These findings add to our understanding of the range of market conditions under which it is so far known to hold.

## **DECLARATION**

“I certify that this thesis does not incorporate, without acknowledgment, any material previously submitted for a degree or diploma in any institution of higher education and that, to the best of my knowledge and belief, it does not contain any material previously published or written by another person except where due reference is made in the text”.

A black rectangular box redacting the signature of the author.

Signature

Date : 20th February 2001



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# CHAPTER 1

## Introduction

### Motivation for the Study

The public sector is undergoing significant change. Reforms in public sector management over the past two decades have led to a re-examination of public service delivery practices. Government-led managerial reforms have brought on a dramatic shift in the method of delivering government services to the community, with an emphasis on a more efficient, effective and accountable public services (Hood, 1995; Guthrie & Humphrey, 1996). In Australia, the National Competition Policy (NCP) reform and the Industry Commission inquiry provide the basis for a contestable environment in the public sector to deliver public services. The transition to a contestable environment is matched by greater private sector involvement as an active partner, supplier and competitor, to participate in the provision of services to government, with the basic aims of increasing efficiency, improving service quality and reducing costs for businesses and consumers.

This thesis examines the provision of audit services in the public sector, with a focus on contracting-out. The push for reform in the Australian public sector audit in recent years (see, for example, Joint Committee of Public Accounts [JCPA], 1989; 1996; Maddock, Dahlsen & Spencer, 1997) is noted by Funnell (1997, footnote 1) that, “there have been at least 15 enquiries throughout Australia by public sector bodies which have either been convened specifically to investigate reforms for public sector

audit or have made recommendations for the future of audit offices and auditors-general". For example, there have been inquiries into the role and function of the Auditor-General and, specifically, on the resources provided to the Auditor-General's office at the commonwealth level (JCPA, 1989; 1996). The public sector audit market is also undergoing major changes with private sector audit suppliers increasing their presence in the market (Hardman, 1991; Funnell & Cooper, 1998). For example, as a result of an inquiry into the notion of contestability in public sector audit (see Maddock et al., 1997), the Victorian Auditor-General had to open the majority of public sector audits in Victoria to competition for year-end 1999.

The recent push for reform in public sector audit, to a large extent, mirrors the changes that have taken place in the public sector for the past two decades. These changes are predicated on the notions of efficiency and effectiveness in delivering public services. This reform has placed the Office of the Auditor-General (hereafter OAG) in a more contestable or market-like environment. Over the years, the public sector audit activities in Australia have shifted from a monopolistic operation to varying degrees of contestable operations. Funnell and Cooper (1998, p. 270) observed that there is a shift from an administrative to a corporatist model of public sector audit arrangement where there is a "greater operational independence for public sector audit by establishing it as a body separate from executive agencies, and greater reliance upon private sector auditors".<sup>1</sup>

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<sup>1</sup> According to Funnell and Cooper (1998), there are essentially three public sector audit models in Australia: administrative, corporatist and contestable markets. The administrative model is the traditional audit model where the audit office operated as an agency that was located within an executive portfolio and private sector's involvement in public sector audits is limited. The defining feature of a contestable markets model is the open competition between public and private sector auditors for all public sector audits.

Motivations for reform in public sector audit are complex and difficult to establish. Commentaries from academics, previous Auditors-General, policy makers, professional bodies and interested parties suggest that reform in the Australian public sector audit is political or a complex mix of political and economic factors (e.g., Funnell, 1997; Craswell, 1997; ASCPA, 1997; ICA, 1997; Maddock et al., 1997; Taylor, 1998; Houghton & Jubb, 1998; English & Guthrie, 1999; Harris, 1999).

From a political perspective, reform in public sector audit can be understood in the context of a political struggle over parliament's right, as exercised through the OAG, to oversee the accounts and management practices of the executive arm of the government (Funnell, 1997; English & Guthrie, 1999; Taylor, 1998; Harris, 1999). The reform essentially relates to matters of governance between parliament and executive government to determine the appropriate accountability process in the public sector. The rise of managerialism and the increased adoption of private sector models and management practices to deliver public services led parliament to review the adequacy of accountability mechanisms in the public sector. As the Auditor-General provides a vital link in the chain of accountability between the executive and parliament, issues that relate to the audit mandate, independence and funding of the Auditor-General and the audit office have been placed under review (see JCPA, 1989; 1996; Maddock et al., 1997).

The political struggle between parliament and executive to determine a compatible accountability process with the 'new public management' practices resulted in two major discussions of and, subsequently, amendments to the audit legislation. At the commonwealth level, the Australia National Audit Organisation (ANAO) Audit Act

1901 was replaced by the Auditor-General Act 1997. Among the important confirmation in this new Act is the pre-eminence of parliament in monitoring the financial and management activities of the executive and its service providers. The Act formally recognises parliament as the client of the Auditor-General and provides greater power to parliament, through the JCPA, to determine the resource needs of the OAG. At the state level, the issue of contestability in public sector audit was initiated and driven by the executive government (Taylor, 1998; Harris, 1999). The then Victorian premier initiated a review to examine the application of the NCP in Victoria's public sector audit by establishing a committee, known as the Maddock committee, to review the Victorian Audit Act 1994.

From an economic perspective, reform in public sector audit can be understood in the context of a more efficient and effective delivery of public services. This reform is part of a general economic reform in the public sector that aims to enhance the financial accountability of government entities by making the activities of government more transparent. One of the most significant developments in the reform has been the requirement to test the market, with a view to determine the most efficient and effective method of service delivery (Barrett, 1999). The Hilmer Report, the impetus for economic reforms in the public sector, arose because of the problems perceived to be associated with monopolistic markets in the public sector and the incentives to be inefficient. The report calls for the creation of a contestable environment to deliver a more efficient and effective public services.

The move towards a contestable environment in the public sector to deliver services has permeated the activities of the OAGs in Australia. The control and management

of cost in audit activities take on a greater role, with increased emphasis on contracting-out and benchmarking public sector audit activities as means to test the market.<sup>2</sup>

The search for the most efficient and effective method of delivering public sector audit has resulted in various forms of contestability in the Australian public sector audit markets. For example, the application of NCP in the Victorian public sector audit market had shifted the supply of audit services from a monopolistic to a more competitive arrangement (Maddock et al., 1997). Under this arrangement, the Victorian OAG was required to competitively tender out the majority of the financial audits in Victoria. In New South Wales (NSW), a rotational model has been accepted as an alternative to the competitive tendering approach (Audit Office of NSW, 1999). This model involves rotating most audits undertaken by the Auditor-General between the Office and private sector auditors.

## **Financial Audits in the Public Sector**

State audit remains one of the important ways to ensure accountability (Lovell, 1996; Funnell & Cooper, 1998). A traditional component of state audit activity is the supervision of the regularity of accounts and the legality of expenditures.<sup>3</sup> The financial audit, with its access to information and review of government activities,

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<sup>2</sup> A survey of the OAG's Annual Report for the financial year-end 1998 in various jurisdictions indicate that the OAGs tend to devote a section of their reports to measures of operational efficiency and effectiveness.

<sup>3</sup> In recent times, the scope of the OAG has been widened to include the assessment of the efficiency and effectiveness of government operations. This type of auditing is known as "performance auditing".

has an important role in providing legislators with the detailed, reliable information necessary for control (Geist, 1981). Verification of the legality of an action taken by a public official or a person using public funds is a central element of financial audit.

Financial audit in the public sector resembles its counterpart in the private sector in several technical aspects. Auditors are required to plan the audit, evaluate internal control, collect evidence, perform substantive tests and, based on these evidence and tests, provide an opinion as to whether the client's financial statements are fairly presented. The audit opinion allows third parties to place reliance on the financial statements for decision making. While the technical aspect of a financial audit is similar for private and public sector audits, there are differences in the level of audit coverage and emphasis. For instance, the Australian Audit Office's (AAO) Auditing Standard (1987, s. 1.1.6) indicates that:

. . . there are large areas of commonality in standards and practices (between private and public sector audit) . . . but there are important differences of principle and practice. The most important of these stem from public accountability requirements and differences in the scope of the audit mandate.

There is commonality in standards because government auditing standards incorporate, to a large extent, the standards of the private sector. However, financial audits in the public sector place additional emphasis on the review and evaluation of internal controls, and compliance with laws and regulations. The mandate in the public sector imposes additional obligations on public sector auditors to consider issues that relate to probity, equity and public interests that flow from the mandate. These issues are not a characteristic of private sector audits. As such, financial audits

in the public sector require a more comprehensive approach than audits in the private sector (Parker, 1993; Raman & Wilson, 1994; Funnell & Cooper, 1998). Financial audit in the public sector is known as the attest and compliance audit to reflect the greater level of audit scope and emphasis on agencies' financial accounts.

Each state or territory in Australia has its own audit legislation to govern audit activities in the state or territory. However, each state or territory shares similar characteristics in regards to the role and objective of the Auditor-General and the audit office, and, to a large extent, the contracting processes of public sector audits.

The Westminster model of governance requires the Auditor-General to check the accountability of public sector agencies and report directly to parliament.<sup>4</sup> The Auditor-General, through the audit office, ensures that there is a chain of accountability between parliament and executive government by reporting on the executive's use of public funds and compliance with law and regulations. Audit legislation in each state imposes a statutory obligation on the Auditor-General to audit the accounts of public agencies and report on the financial accountability of these agencies to parliament. This legislation enables the Auditor-General to determine the extent and types of audit activities undertaken, to allocate resources to where the Auditor-General sees as necessary, without the influence of executives or bureaucrats of public agencies. Parliament normally appoints the Auditor-General for a fixed term and determines the resource needs of the Auditor-General and the audit office. This arrangement identifies the OAG as the financial audit supplier,

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<sup>4</sup> Auditing is one of the accountability mechanisms to provide checks on the operations of government and the expenditure of public funds. Other accountability mechanisms in the public sector include scrutiny from the media, opposition parties and interest groups (Lovell, 1996).



parliament as the principal client and public sector agencies as the auditees. The OAG's independence is a critical attribute of this arrangement.

### **Contracting procedures and policies for financial audits.**

Audit legislation in each state or territory provides the OAG with exclusive rights and responsibilities to conduct, authorise and report on the financial reports of all government agencies. Private sector suppliers are permitted to provide financial audit services to government agencies only at the discretion of, and under the supervision of, the Auditor-General. This arrangement identifies the role of private sector suppliers as sub-contractors or agents of the OAG. All states and territories have a mixture of both types of suppliers to undertake financial audits in the public sector. With the exception of the Northern Territory, a common practice in other jurisdictions is for the OAGs to contract-out a percentage of public sector audits to private sector suppliers. The OAG in the Northern Territory contracts-out all of the territory's financial audits.<sup>5</sup>

Unlike the private sector and municipal audit markets (e.g., Simunic, 1980; Ward, Elder & Kattelus, 1994; Hackenbrack & Knechel, 1997), government agencies at the state level in Australia do not have the option of choosing their auditors. In addition, legislation generally does not allow private sector contractors to provide audit and non-audit services to an agency concurrently to avoid possible conflict of interest.

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<sup>5</sup> A recent structural change in Victoria's public sector audit market required the Victorian OAG to tender the majority of the state's financial audits. For the financial year-end 1999, Audit Victoria had to compete with private sector suppliers for tenders of public sector audits in Victoria.

A summary of the audit offices in Australia is provided in Table 1. A detailed summary of selected contracting procedures and policies of various states or territories in Australia is provided in Table 2. Selected commonwealth countries are included in Table 2 for comparative purposes.<sup>6</sup>

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<sup>6</sup> The information in Table 2 is adapted from a report, titled, “Centre of Excellence - Contract Auditing (The Final Report)”. This report was prepared by the OAG for the Northern Territory in 1994 as part of the Centres of Excellence’s projects. The aim of this project was to lead public sector auditing in the subject of contract auditing by developing and providing advice on current and emerging issues. The information was collected through surveys sent to Auditors-General in Australia, Canada, UK and New Zealand. The first draft copy of the report was sent to the Auditors-General for additional responses before it was finalised. All the contracting procedures and policies contained in this report reflect the practices of the OAGs in various jurisdictions at year-end 1994.

Table 1

**A Summary of Audit Offices in Australia for Financial Year-end 1998**

State/Territory	Audit mandate	Number of financial statement audits	Percentage of financial audits contracted to private sector firms*	Expenditure on contract audits	Average expenditure per contracted audit
Victoria	Audit Act 1994	538	55%	\$5,365,252	\$18,132
Tasmania	Financial Management & Audit Act 1990	119	5%	\$144,000	\$24,202
Northern Territory	Audit Act 1995	n/a	100%	\$1,493,000	n/a
ACT	Auditor-General Act 1996 Financial Management Act 1996	58	n/a	\$571,551	n/a
New South Wales	Public Finance & Audit Act 1983	430	15%	\$1,932,000	\$29,953
Western Australia	Financial Administration & Audit Act 1985	314	30%	\$1,339,000	\$14,214
South Australia	Public Finance & Audit Act 1987	200	n/a	\$899,000	n/a
Queensland	Financial Administration & Audit Act 1977	645	50%	\$3,286,000	\$10,189

Note: \* responses to a questionnaire sent to the OAGs in various jurisdictions in Australia

n/a = information not available

Table 2

### A Summary of Selected Contracting Procedures and Policies in Australia and Other Commonwealth Countries

Policy/Procedure/Documentation	WA	VIC	TAS	SA	QLD	NT	NSW	AUS	ACT	NZ	UK	CAN
<b>I. POLICY</b>												
• The Financial Administration and Audit Act (or equivalent) provides the OAG with the power to appoint contract auditors.	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
• Notwithstanding no stated Government (Govt.) Policy on use of private sector auditors, there is a perceived expectation by government that this will occur.	no	yes (4)	yes (3)	yes	yes	n/a	yes (2)	no	no	yes (1)	n/a	n/a
• In the absence of Govt. Policy on contracting audit services, the OAG has issued a policy (i.e., to use or not use private sector auditors).	yes (7)	yes (6)	yes	no	yes	n/a (5)	no	yes	no	yes	yes	n/a (5)
• In regard to policy (Govt. or OAG), there is a limitation placed on types of audits to be put out to contract auditors.	no	no (8)	no	n/a	yes (7)	no	n/a	no	n/a	yes (7)	no	no

- (1) History of contracting out. In 1989, 2600 separate accountable bodies were established these were contracted out.
- (2) The electricity distribution industry and District area Health Services contracted out. Plus area Health Services and some miscellaneous audits.
- (3) Audit of Govt. authorities.
- (4) History of contracting out to cover peak workload since mid-eighties.
- (5) Policy statements issued reinforce those of Govt.
- (6) Manual for contract audits in use.
- (7) OAG policy currently excludes Govt. departments from contract audits (and core local authorities in NZ)
- (8) Other than in hospital, water and education sectors, where the majority of these audits are contracted to agents, major audits not generally contracted out.

Table 2

**A Summary of Selected Contracting Procedures and Policies in Australia and Other Commonwealth Countries (continued)**

Policy/Procedure/Documentation	WA	VIC	TAS	SA	QLD	NT	NSW	AUS	ACT	NZ	UK	CAN
<b>2. BASIS OF CONTRACTING</b>												
• Individual audits for a set period of time (e.g., 3 years).	yes	yes	yes	yes	yes	no	yes	yes	yes	yes	yes	no
• Specific audit assignments where the contract auditor manages the audit (per ANAO – Contracted Out).	yes	yes	yes	no	yes	no	yes	yes (1)	yes	yes	yes	no
<b>3. METHOD OF APPOINTMENT</b>												
• Selective tender. No open invitation. However, selective representation to prospective contractors to submit quotes or tenders.	yes	yes	no	no	no	no	yes	yes (2)	yes (2)	yes (3)	yes	no

- (1) Contract may require contract auditor to use AGO staff on assignment. 'Manage' is meant loosely here and does not necessarily equate to control. Control is examined in greater depth in Section 7.
- (2) In a large competitive environment, open tender preferred. This can be reduced to a short list of sufficient representative number of competent potential auditors. Individual appointments can occur but reasoning must bear up to public scrutiny.
- (3) Open to all CA firms.

Table 2

**A Summary of Selected Contracting Procedures and Policies in Australia and Other Commonwealth Countries (continued)**

Policy/Procedure/Documentation	WA	VIC	TAS	SA	QLD	NT	NSW	AUS	ACT	NZ	UK	CAN
<b>4. PROSPECTIVE CONTRACT AUDITORS EVALUATED ACCORDING TO A SPECIFIC CRITERIA</b>												
• An adhoc/non-documented evaluation process exists, e.g., general criteria listed but evaluation procedure not formalised.	yes	no	yes	yes	yes (2)	yes (1)	no	yes (1)	yes	no	yes	yes
• Criteria includes: 1) Ability to undertake work (professional standing, appropriateness of methodology, previous experience, industry knowledge etc) 2) Adequacy of resources to actually perform the audit assignment 3) An assessment of quality control within the contractors organisation and depth of personnel to supervise and review the project.	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes (4)
• Evaluation is divided into two stages, i.e., initial acceptance to register/tender, followed by review for specific assignment tenders/offers.	yes	yes	yes	no	yes	n/a	yes (3)	no	no	yes	yes	no
(1) Review and selection completed in accordance with general procurement policies and guidelines. No print score or other formalised measurement system operates to rank applications. (2) Review required by Executive Director Audit but no criteria listed. (3) n/a where limited tender used. (4) information is not supplied on the last criteria.												

Table 2

**A Summary of Selected Contracting Procedures and Policies in Australia and Other Commonwealth Countries (continued)**

Policy/Procedure/Documentation	WA	VIC	TAS	SA	QLD	NT	NSW	AUS	ACT	NZ	UK	CAN
<b>5. APPOINTMENT CONTRACT ARRANGEMENTS</b>												
• A formal contract under seal for services of contract auditor entered into by OAG and contract auditor.	yes	yes (1)	no (2)	no	yes	no	yes	yes	yes	yes	no (2)	yes
<b>6. BASIS OF FEES</b>												
• Fixed fee per audit.	yes (4)	yes	yes	yes	yes (3) (4)	no	yes	yes	yes	yes	yes	yes (5)

- (1) Proforma contract is a fairly simple form.  
 (2) Formal contract but not under seal.  
 (3) OAG can determine a set fee.  
 (4) Subject to further negotiation if necessary.  
 (5) Both hourly and fixed price used.

Table 2

**A Summary of Selected Contracting Procedures and Policies in Australia and Other Commonwealth Countries (continued)**

Policy/Procedure/Documentation	WA	VIC	TAS	SA	QLD	NT	NSW	AUS	ACT	NZ	UK	CAN
<b>7. QUALITY CONTROL</b>												
• Audit reviews and approves audit plans before work commences.	yes	yes	yes	yes	yes	no (1)	yes	yes	yes	no (2)	yes	yes
• Audit reviews interim and final workpaper files before any reports are issued (excluding Management Reports).	yes	yes	yes	yes	yes	yes	yes	yes	yes	no	yes	yes
• Audit reviews financial statements of auditees.	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
• Audit prescribes the audit methodology to be used in the assignment.	no (4)	yes	no	yes	no	no	no	no (3)	no	no	no	n/s
• Audit evaluates contract auditors at completion of assignment.	yes (5)	yes	yes	yes	yes	yes	no	yes	yes	yes (6)	yes	no
• Audit undertakes a quality assurance review program.	yes (5)	yes	yes	yes	yes	yes	yes	yes	yes	yes (7)	yes	yes
• External reviews of contract auditors arranged by Audit.	no	no	no	no	no	yes (8)	no	no	no	no	no	no

- (1) Where auditee or contract auditor is new, Audit reviews audit plan.  
 (2) Audit plan received at end of audit.  
 (3) Brief description of the methodology to be employed by the firm to be included in tender submission.  
 (4) Except for small hospitals where Audit office methodology is used.  
 (5) May be subjected to normal quality review procedures adopted by the OAG.  
 (6) Audit returns for each assignment.  
 (7) Contract allows for AG with 7 days notice to examine all relevant files of contract auditor for purpose of quality review.  
 (8) The Basic Financial Audit (BFA) is controlled by a contract auditor known as a group leader. The group leader reviews the work of other contract auditors in their completion of the BFA program.



Table 2

**A Summary of Selected Contracting Procedures and Policies in Australia and Other Commonwealth Countries (continued)**

Policy/Procedure/Documentation	WA	VIC	TAS	SA	QLD	NT	NSW	AUS	ACT	NZ	UK	CAN
<b>8. REPORTING RESPONSIBILITIES</b>												
• The OAG issues all management reports and statutory reports.	yes	yes (2)	yes	no	no	no	no	yes (1)	yes (1)	no	yes	yes
• The OAG issues all statutory reports but delegates to contract auditor to issue management reports.	no	no	no	yes	yes	yes	yes	no	no	no	no	no
<b>9. CONTRACTORS INVOLVEMENT IN PLANNING</b>												
• Contractor develops planning strategy for individual assignments but requires Audit approval before implementation.	yes	yes (5)	yes	yes	yes	no (4)	yes	yes (3)	yes	no	yes	yes
<b>10. INDEPENDENCE AND OBJECTIVITY</b>												
• Contract auditor to advise Audit immediately of any potential conflicts of interest.	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
• Contract auditor to seek Audit approval before any direct work can be completed for auditee.	yes	no (7)	yes	yes	yes (8)	yes (6)	yes	yes	yes	no (9)	yes	yes

- (1) Procedural letters can be issued by contract auditor. Other correspondence can be issued by contractor once approved by ANAO officer.
- (2) In the case of management reports, the contract auditor reports to the AG who sends the report under the cover of his own report to the auditee.
- (3) Senior ANAO staff involved in development of planning strategy.
- (4) For new auditees and contract auditors Audit is involved in the review and approval of the strategic audit plan before implementation.
- (5) Office reviews such plans and provides feedback where required.
- (6) Contract auditor and associates cannot offer to perform, perform for, or provide any other work to any auditee of the AG without the prior written approval of the AG.
- (7) New contracts do not allow the conduct of any internal audit work by contract auditor. Other services can only be undertaken with the prior approval of the AG.
- (8) Contract auditor barred from doing other work for the auditee.
- (9) Provided they stay within guidelines.

Adapted from: Centre of Excellence - Contract auditing: Final Report, 7 October 1994, Prepared by the Office of the Auditor-General for the Northern Territory.

Yes = substantially complies; no = usually does not comply; n/a = procedure not applicable; n/s = information not supplied to make assessment

## Objective of the Study

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 for 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. This move has increased the focus on outsourcing as a means to deliver public sector audits. 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 to deliver more cost efficient and effective audits in the public sector audit market. 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 may play a key role in delivering public sector audits. The developments in Victoria will, no doubt, influence the operations of the OAGs in other jurisdictions. While, to date, there is no compulsion in other jurisdictions to adopt a more competitive model to deliver public sector audits, outsourcing has been emphasised as a means to benchmark audit services in the public sector.

The Victorian government justified the application of the NCP to public sector audits on the basis of conserving public sector resources and engendering a more competitive public service to improve efficiency and effectiveness (Maddock et al., 1997; Craswell, 1997; Houghton & Jubb, 1998; Taylor, 1998; Harris, 1999). Predictably, the economic issues revolve around the monopoly power conferred on Auditors-General to supply audits to public sector agencies and questions of efficiency and effectiveness in performing these duties are inevitably raised (Maddock et al., 1997). The efficiency and effectiveness of the OAG in carrying out these duties are often discussed in the context of the various models of contestability, with the competitive model being perceived as being more efficient and effective (e.g., Houghton & Jubb, 1998). On the other hand, several commentators have questioned the economic benefits of introducing competition and increasing the role of alternative audit suppliers in the public sector audit market (see Craswell, 1997; Houghton & Jubb, 1998; Taylor, 1998; Harris, 1999). For example, Harris (p. 34) noted that:

The review [Maddock Report (1997)] did contemplate that overall the cost of audits might rise. This, perhaps understandably, was never quoted by the premier when announcing the government's decision or when introducing the associated legislation. Many people might not comprehend that a decision to increase competition might lead to increase prices.

While the sole provision of public sector audits by the OAG has been questioned and criticised, 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. In countries such as the United Kingdom, Canada, Australia, New Zealand and United States, the OAGs (or its equivalent) are the primary suppliers of audits at the state and federal levels and, as such, play an important role in the financial reporting process of public sector agencies. An emphasis towards a market-based provision of public services in recent years, as exemplified by the recent developments in Victoria, has increased the 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.

While public funds are channelled into the public sector audit, there is limited evidence on the allocation of audit resources in the market. For year-end 1999, the funding allocated to attest and compliance function amounts to \$6 million and comprised 60 percent of the funding received by the OAG in WA (OAG WA, 1999). In NSW, 90 percent of the resources received by the OAG flow to the attest and compliance function. Given that one of the main motivations for reform in the public sector audit is to provide a more effective and efficient audits, it is important to examine the economic activities of audit suppliers in this market.

An issue that is closely related to discussions of the preferred model of delivering public sector audit is the use of outsourcing as a means of benchmarking public sector audits. Benchmarking audit activities usually involves comparisons of efficiency and effectiveness measures (1) with previous years, (2) against other

jurisdictions and overseas audit offices and (3) against private sector auditors (see Victorian Auditor-General's Office, 1998; Auditor-General's Department of South Australia, 1998; OAG WA, 1998; Queensland Audit Office, 1998). As noted by the Audit Office of NSW (1999, p. 11):

The Office recognises the value and importance of comparing Office performance against our counterparts in other jurisdictions and the private sector. We have compared/benchmarked a number of our processes and outcomes, for example, the university and health sector audits and the operation of computer services. . . . During the coming year the Office will be developing measures to compare ourselves against appropriate external benchmarks.

One of the often-cited benefits of outsourcing is that the system of outsourcing 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 benchmark can include the audit methodology adopted and audit costs for a comparable engagement. The rationale for undertaking a benchmarking exercise is to bring the OAG's practices closer to those with whom the OAG should be contestable (Barrett, 1999). A major reason why private sector practices are used as a benchmark is that they have the economies of scale to spend more on research and development of audit technologies.

In summary, the arguments for introducing competition in public sector audit are based on the assumption that a competitive model, through greater use of outsourcing and the involvement of private sector suppliers, is the more efficient form of delivery compare to a relatively monopolistic arrangement (i.e., the OAG as in-house

providers). This assumption implies that the public sector audit market should be open to competition because a monopoly on the market by the OAG may cause inefficiencies in the provision of those audits. This also implies that outsourced audits should be the benchmark for public sector audits. Thus far, there is no evidence on whether outsourcing results in more cost efficient audits.

This study compares the costs of undertaking financial audit work in the public sector between an in-house (i.e., the OAG as supplier) and contract-out (i.e., private audit firms as suppliers) arrangement. This study focuses on financial audits and uses contractors as a proxy for suppliers that must exist in a competitive market, i.e., a benchmark. Audit efficiency in the public sector audit market is examined within the context of the current public sector audit arrangement at the state level in WA.

Testing audit efficiency allows this study to simultaneously consider the issue of benchmarking of public sector audits. The activities of contractors in the public sector are often viewed as benchmarks for public sector audits. By examining the audit work of private sector suppliers in the public sector, this study controls for potential market-related differences that can affect audit production costs when comparing the work of public and private sector suppliers. As noted by Craswell (1997) and, Guthrie and English (1997), benchmarking is a complex process and a benchmarking exercise that adopts a straightforward comparative analysis of private and public sector audit costs is problematic because of differences in audit mandate, market structure and the demand for audit services.

Empirical evidence on the relative cost efficiency of in-house and contract-out audits will enable the OAGs to compare their performance with private sector contractors and determine the more efficient form of public sector audit delivery. A potential issue that may arise out of this benchmarking exercise is the need to partition public sector audit costs into the costs for the actual audit work and the costs for oversight or supervisory work for contract-out audits. As a result, a further issue is to decide on whether the OAG's supervision activities, and, hence, costs, should be factor into the contract-out audits when evaluating contractors' performance.

At the firm level, deciding on the mix of in-house and contract-out arrangement for audit delivery is important because tendering is a costly process. As noted by Craswell (1997, p. 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 (e.g., type of suppliers, market structure, incentives, 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.



To examine audit efficiency in the public sector, production function and fee models of audit services in the public sector are developed. Prior literature in the private sector market has identified client-related characteristics as potential determinants of audit fees and hours (see Simunic, 1980; O’Keefe, Simunic & Stein, 1994b; Hackenbrack & Knechel, 1997). However, knowledge of the public sector audit market and its production of audit services and, audit fees, is still limited and, hence, the available evidence is tentative. Consequently, the secondary motivation for this study is to develop appropriate audit production and fee models for public sector audits.

Based on the above, the three research questions are (1) What are the factors that influence the costs and fees of financial audits in the public sector? (2) After controlling for major factors identified in (1), is there a difference in the costs of financial audits between the in-house and contract-out arrangement? and (3) After controlling for major factors identified in (1), is there a difference in the fees of financial audits between the in-house and contract-out arrangement?

## **Notions of Audit Efficiency and Audit Effectiveness**

This section discusses the notions of audit efficiency and audit effectiveness. The latter is also discussed and examined in this section and subsequent chapters because audit efficiency is inextricably linked with audit effectiveness. The first part of this

section describes the criteria for audit efficiency that will provide a benchmark for theory development while the second part provides the notion for audit effectiveness.

### **Notion of audit efficiency.**

The first step in defining efficiency is to identify the input and output components of a production process. A general definition of efficiency is “the relative amount of inputs used to achieve a given level of output” or, stated alternatively, the relative amount of output produced for a given level of input (Horngren, Foster & Datar, 1997, p. 992).

In an auditing context, the audit effort and audit opinion issued would be the input and output of an audit production process respectively. The economics of auditing literature has adopted the views that: (1) the output of an audit firm is not directly observable to the market; and (2) the firm is assumed to supply a fixed level of audit assurance, i.e., one type of audit quality, across audit engagements at a given point in time. Therefore, any cross-sectional differences in the audit firm’s production function on different audit engagements are due to client characteristics. Prior studies have operationalised audit fees or hours as the dependent variable and client-related characteristics as the independent variables, thereby implying that, audit hours or fees vary, depending on the client’s characteristics.

An alternative way of conceptualising efficiency, using the input-output model, is to view the quantity of audit services provided to a client, i.e., the amount and costs of

audit effort, as the output and the client's characteristics as the input of the production process. In audit production studies, the amount of audit effort is proxied by audit labour hours (e.g., O'Keefe et al., 1994b; Stein et al., 1994; Hackenbrack & Knechel, 1997). Human capital is the main resource in most service firms and since the product supplied by an audit firm is a service that is labour intensive, audit labour hours often serve as a proxy for effort. Therefore, in a production model of audit services, client-related characteristics constitute the inputs that influence the amount of output, i.e., labour hours, at a given level of audit quality.

This study uses the costs of providing an audit opinion on financial statement at a specific (implicit or explicit) level of audit quality for a given level of client-related characteristics as the measure of audit efficiency.

#### **Notion of audit effectiveness.**

A general definition of effectiveness is “the degree to which a predetermined objective or target is met” (Horngren et al., 1997, p. 992). In an auditing context, audit quality (defined as the probability of discovering misstatements or omissions in the financial statement and reporting those misstatements or omissions) encompasses audit effectiveness, i.e., the achievement of a desired level of assurance that material client errors have been detected and reported (Bedard, Gopi & Vijayalakshmi, 1991).

## **Conclusions**

This chapter has documented the recent reform in the Australian public sector audit market to provide the motivation for this study. As exemplified in the discussions of the public sector audit market in Victoria, there was a shift towards a contestable model in the public sector audit market. This study aims to provide empirical evidence on the relative cost efficiency of in-house and contract-out audits. A brief overview on the role of financial audits in the public sector and the current audit arrangements in various jurisdictions in Australia provide the background to the study. This study relies on prior audit fee and production function studies to examine the issue of audit efficiency in the public sector. The next chapter provides a review of the relevant literature on audit fees and production function, and a set of conclusions from this literature.

## **Chapter Outline and Organisation**

This thesis is organised as follows. Chapter 2 provides a review of the relevant literature on audit fees and audit production function. Summary tables and conclusions from the literature review are also provided. Chapter 3 discusses the theory underpinning concepts such as audit effectiveness and audit efficiency that lead to hypotheses formulation. Chapter 4 proposes empirical models for audit costs and audit fees in the public sector. The research method is also presented in this chapter where the sample selection and measurement instruments are explained and

justified. Chapter 5 presents the descriptive statistics and correlation matrix for dependent and independent variables. Chapter 6 presents the results of regression models while chapter 7 presents further tests on the models. Chapter 8 concludes with a summary of the major findings and the implications of the results. Limitations of the research and further research avenues are also discussed.

## **CHAPTER 2**

### **Literature Review**

#### **Introduction**

This chapter is divided into two main sections: (1) audit fee studies; and (2) audit production function (hereafter audit production) studies. The first section reviews prior audit fee studies and examines the differences between fee models in the private and public sector audit markets. The next section examines the audit production studies and the assumptions regarding the input and output of an audit firm.

To examine issues in audit efficiency and audit effectiveness, this study relies on a branch of literature in auditing known as the economics of auditing. This literature has focused primarily on the role of audit firms in the private sector market and, to a lesser extent, the public sector market. The major issues examined in prior studies include the level of competition in the private sector audit market (e.g., Simunic, 1980; Maher, Tiessen, Colson & Broman, 1992), product differentiation through industry specialisation (e.g., Craswell, Francis & Taylor, 1995), initial audit engagements (e.g., Ettredge & Greenburg, 1990; Craswell & Francis, 1999), audit contract type (e.g., Palmrose, 1989), auditor choice (e.g., Simon & Francis, 1988), audit quality (e.g., Deis & Giroux, 1992) and provision of non-audit services (e.g., Davis, Ricchiute & Trompeter, 1993). These studies constitute a body of research that examines the factors that influence audit fees or audit effort in a competitive audit market. A common characteristic of these studies is the use of an audit fee or

audit production model to provide a framework for the research questions. An audit fee or audit production model enables the researchers to identify factors that impact on audit pricing and audit cost functions in the private and public sector markets.

To date, there has been no significant prior work on production efficiency in auditing. There is no research that directly examines the efficiency of public or private sector auditors or, the comparative efficiency between public and private sector auditors in their undertaking of public sector audits. Discussions of audit efficiency in the literature are usually not undertaken because audit efficiency is often implied in the ways an audit firm allocates its resources in a competitive audit market.<sup>7</sup> Notwithstanding the differentiated audit market, the assumption is that market mechanisms provide incentives for firms to operate at minimal costs and maximise resource utilisation for an agreed level of audit quality. In a competitive audit market, firms that are inefficient will lose their market share, which will affect their profit margin and possibly their survival in the long run. Recent studies are beginning to focus on the efficiency of audit firms in the private sector (see Dopuch, Gupta, Simunic & Stein, 2000; Knechel & Payne, forthcoming).

To answer the research questions, audit fee and audit production models need to be developed for the public sector audit market in Australia. Therefore, the relevant literature for this study are prior studies that focused on the development of audit fee and audit production models and, issues relating to audit quality in the public sector. Greater emphasis is placed on the review of audit production studies because these

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<sup>7</sup> Evidence of a competitive audit market in the private sector is suggested by Simunic (1980) and Maher et al. (1992).

studies provide a direct examination of audit costs, with the use of labour hours to proxy for auditor effort, and specification of an input-output model for the production of audit services.

Audit fee studies are included in the literature review because the pricing of audit services in a competitive market is assumed to approximate the cost structures and production processes of audit firms (e.g., Simunic, 1980). Audit fee studies that focused on the development of audit fee models are selected for the literature review. These studies highlight the conceptual and measurement issues associated with the development of audit fee models. Emphasis is on the audit fee models developed in different countries to illustrate the extent of generalisability and transferability of the models. Simunic's (1980) study is the starting point in the literature review because it is one of the earliest and influential studies to provide a basic conceptual framework for an audit fee model. Other studies in the review are Francis (1984), Firth (1985), Chung and Lindsay (1988) and Chan, Ezzamel and Gwilliam (1993); selected to illustrate the early development of audit fee models in countries other than the United States (US), specifically, in Australia, New Zealand, Canada and the United Kingdom (UK) respectively.

Thus far, the selected audit fee studies are based on the private sector market. Several audit fee studies in the public sector are also reviewed to provide greater relevance to the focus of this study, that is, an examination of audit efficiency in the Australian public sector market. Potential differences between the private and public sector markets, for example, the political environment, may give rise to differences in the pricing of audits. Therefore, studies that developed audit fee models in the public



sector to test the unique aspects of the environment are included in the literature review. These studies are Baber, Brooks and Ricks (1987), Rubin (1988), Copley (1989) and Ward et al. (1994). Baber et al. and Rubin are two of the earliest studies that examined audit fees in the public sector audit market, with Copley and Ward et al. extending their audit fee models subsequently. Since audit efficiency is inextricably linked with audit effectiveness, prior studies that examined audit quality in the public sector audit market are also reviewed. These studies are Copley and Doucet (1993), Raman and Wilson (1994), O'Keefe, King and Gaver (1994a) and Brown and Raghunandan (1995). Major audit fee studies in the public sector have, to date, been based exclusively in the US.

With regard to audit production studies, all major studies in this area are reviewed. These studies are O'Keefe et al. (1994b), Stein, Simunic and O'Keefe (1994) and Hackenbrack and Knechel (1997).

## **Audit Fee Studies**

This section reviews the initial development of an audit fee model and the assumptions applicable to the model. Next, it reviews the generalisability of the model in various countries such as Australia, New Zealand, Canada and the UK. More importantly, this section reviews the public sector audit fee models and the differences between public sector and private sector audit fee models. Selected studies for this section include Simunic (1980), Francis (1984), Firth (1985), Chung and Lindsay (1988), Baber et al. (1987), Rubin (1988), Copley (1989), Chan et al.

(1993) and Ward et al. (1994).

### **Private sector audit fee studies.**

Numerous studies in the economics of auditing literature have proposed various approaches and models to explain the variation in audit fees paid by firms in the private sector market. Simunic (1980) is an influential study in this research area because it provides the basic conceptual framework for an audit fee model. The study's main objective is to provide evidence on the existence of competition among audit firms in the private sector audit market. To test the competitiveness of the audit market, Simunic developed a model of the process by which audit fees are determined. This model represents the product of unit price and the quantity of audit services demanded by the client, hence, factors that cause variations in these components need to be controlled before any inference about competition can be made from observed fee data.

The fee model is based on an important assumption that auditors and clients are jointly liable to financial statement users and, therefore, both parties have incentives to avoid liability. The external financial reporting system, of which auditing is a part of, is designed to reduce expected liability losses of auditors and clients. Given that liability loss exposure and assessed loss-sharing ratios vary across audit engagements, sources of liability losses need to be identified and controlled before any inference about competition can be made from observed fee data. The control variables selected for Simunic's (1980) study are client's total assets, number of consolidated subsidiaries, client industry, the ratios of foreign assets to total assets,

accounts receivable to total assets, inventories to total assets, net income to total assets, losses in any of the last three financial years, audit qualification and tenure of auditors.

Simunic's (1980) results suggest that, with the exception of two variables, all variables are significant in explaining audit fees. The insignificant variables are the ratio of net income to total assets and tenure of auditors. For the total observation of 397 publicly-listed companies in the US, the research model explains approximately 46 percent of the variability in audit fees. In the context of the research question, the results failed to reject the hypothesis that price competition prevails throughout the markets for audits of publicly-held companies. The coefficients for auditor type (measured as Big 8 versus non-Big 8) are not significantly different from zero for the total observation and two sub-samples of "large" and "small" clients. Therefore, the allegation that the Big 8 firms are monopolising the market for audit services cannot be supported.

The ability of various client-related factors to explain the variability in audit fees is also investigated in other countries such as Australia, Canada, United Kingdom (UK) and New Zealand. Prior studies such as Francis (1984), Firth (1985), Chung and Lindsay (1988) and Chan et al. (1993) have adopted Simunic's (1980) audit fee model to test the generalisability of the model in countries other than the US.

Francis (1984) found that control variables such as client's total assets, number of consolidated subsidiaries, percentage of current assets and Big 8 accounting firms are significantly associated with audit fees for the total sample of Australian companies.

Using the logarithm of the external audit fee as the dependent variable, the model explains 71 percent of the variance in audit fees. In a study using a New Zealand sample, Firth (1985) found client's total assets, account receivable to total assets, the variance of rates of return for stock and on the market portfolio and, systematic risk of stock to be significant explanatory variables for differences in audit fees across 96 manufacturing firms. Chung and Lindsay (1988) investigated audit firm pricing in the Canadian market. They replicated Simunic's study by using data for 228 Canadian audits of publicly-held companies in 1980. Results suggest that significant variables include client's total assets, number of subsidiaries and level of inventory. The extent of foreign assets and amount of receivable are significant determinants of audit fees for large and small companies respectively. Chan et al. (1993) provided evidence from the UK on the determinants of audit fees. Client-related factors such as turnover (measured as inventory/total assets), return on shareholders' equity, audit delay (measured as lag in weeks between the accounting year-end and the audit report date), diversification, ownership (measured as directors' beneficial and non-beneficial shareholdings and, all disclosed shareholdings in excess of 5 percent) and number of subsidiaries and, auditor-related factors such as auditor size (measured as Big 6 versus non-Big 6) and location (measured as London versus non-London office), are significant and explains 87 percent of the variability in audit fees.

Prior studies have conventionally classified audit fee determinants into three broad groups of client-related characteristics: size, complexity and risk. Size and complexity have shown strong relationships with audit fees and accounted for the largest percentage of the variance in audit fees. However, measures in the risk category typically exhibit a weak relationship with audit fees (Simunic & Stein,

1996). In the auditing literature, it is generally accepted that the audit risk concept is composed of two distinct but related concepts; “audit risk” and “business risk” (Jubb, Houghton & Butterworth, 1996). The audit fee literature has treated “audit” and “business” risks as a single construct to encompass the concept and measurement of audit risk.<sup>8</sup> In reviewing prior audit fee studies, Simunic and Stein (p. 126) conclude that, “on balance, the US evidence is consistent with audit firms increasing their audit fees in the face of higher than usual litigation risk. However, the relationship between litigation-risk measures and audit fees is generally not very strong”. Examples of litigation risk measures are whether the client reported a net loss in the current or two previous financial years, audit qualification and client ownership (measured as public versus non-public). The mixed results in non-US studies led them to suggest that, overall, it is not possible to generalise the results on the relationship between risk and audit fees. They noted that a possible reason for the weak relationship is the difference in auditor behaviour in different national legal environments and, hence, studies have to be carefully designed to enable meaningful comparisons between studies.

Prior audit fee studies have used total assets, sales and/or turnover as proxies for client size and, number of subsidiaries, foreign assets, receivable proportions and/or diversification as proxies for client complexity. Audit risk is usually proxied by items

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<sup>8</sup> “Audit risk” is the probability that an auditor will issue an inappropriate opinion on an auditee’s financial statements that are materially misstated, while “business risk” is the probability that an auditor will suffer a loss or injury to his/her professional practice (Brumfield, Elliott & Jacobson, 1983). “Audit risk” is often represented by an audit risk model which consists of three components; inherent risk, control risk and detection risk. The second element of audit risk is “business risk” and it is the probability that an audit firm will incur litigation costs, sanctions imposed by private or public regulatory bodies (e.g., Securities and Exchange Commission [SEC], Australian Securities Commission [ASC], professional bodies) and impaired professional reputation (Brumfield et al., 1983). Both concepts of risk are inter-related and have the potential to influence the amount of evidential matter needed to support an audit opinion (i.e., audit effort) and the fee premium charged to clients.

in the client's balance sheet such as debt-to-equity ratio, operating losses and audit qualification. This approach captures the financial risk of the firm only and does not wholly reflect the nature of the business of the firm and the control environment instituted by the firm (Chan et al., 1993).

Overall, the results from audit fee studies suggest that the fee models have high explanatory power and are robust across different countries, markets and time periods. A summary of selected audit fee studies in the private sector market is presented in Table 3.

Table 3

**A Summary of Selected Audit Fee Studies in the Private Sector Market**

	Simunic (1980)	Francis (1984)	Firth (1985)	Chung & Lindsay (1988)	Chan et al. (1993)
Sample size	397	136	96	228	280
Sample origin	US	Australia	New Zealand	Canada	UK
Explanatory variables					
Client size	total assets*#	total assets*	total assets**	-	-
	-	-	-	-	turnover*
Risk	operating losses**	operating losses	operating losses	operating losses	-
	audit qualification**	audit qualification	-	-	-
	-	-	unsystematic risk**	-	unsystematic risk
	-	equity/debt	-	-	-
	-	-	-	-	gearing & liquidity ratios
	-	-	-	-	return/sh. equity*
	-	-	-	-	ownership*

Table 3

**A Summary of Selected Audit Fee Studies in the Private Sector Market (continued)**

	Simunic (1980)	Francis (1984)	Firth (1985)	Chung & Lindsay (1988)	Chan et al. (1993)
Client complexity	no. of subsidiaries**	no. of subsidiaries*	no. of subsidiaries	no. of subsidiaries**	no. of subsidiaries*
	receivable & inventory**	-	receivable & inventory**	receivable & inventory**	-
	foreign assets**	-	-	foreign assets**	-
	-	-	-	-	diversification*
Other variables	Big 8 audit firms	Big 8 audit firms*	Six major audit firms	Big 8 audit firms	Big 6 audit firms*
	auditor tenure	-	-	auditor tenure	-
	-	-	-	-	audit delay*
	-	-	-	-	busy season
	-	-	-	-	location*
Adj. R <sup>2</sup> of audit fee model	46%	71%	70-72%	61%	87%

Note: \* significant at 0.01 level  
 \*\* significant at 0.05 level  
 \*\*\* significant at 0.10 level  
 # in Simunic's (1980) fee model, this variable is used to deflate audit fees. A regression of audit fees on total assets indicate that the variable is significant and positively related to audit fees and, explains 57 percent of the variance in audit fees.



### **Public sector audit fee studies.**

There are several studies that examine the pricing of audit services in the public sector audit market. Among the relevant studies are Baber et al. (1987), Rubin (1988), Copley (1989) and Ward et al. (1994).

Baber et al. (1987) is one of the earliest studies that examined audit fees in the public sector audit market. One of the main objectives of the study is to relate the differences in audit fees to differences in the financial and political characteristics of the county governments. Cross-sectional analysis of the audit fees paid by 100 North Carolina county governments indicates significant associations between audit fees and client size (measured as county population), audit firm size (measured as Big 8 versus non-Big 8), audit scope (measured as single audit versus other)<sup>9</sup>, political factors (measured as party membership)<sup>10</sup> and outstanding debt. Audit qualification is not significantly associated with county audit fees.

Rubin (1988) develops an audit fee model for municipalities by extending prior research in the private sector audit market. His study adopts many of the determinants of private sector audit fee models to develop a municipal audit fee model. Rubin argues that it is important to extend research in audit pricing practices to the public sector because the public sector may differ from the private sector in both the environment and procedures surrounding the audit contracting process. The

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<sup>9</sup> Baber et al. (1987) note that a single audit is more comprehensive than audits required prior to 1979 and 31 of the 100 North Carolina counties adopted the single audit prior to fiscal year-end 1985.

<sup>10</sup> A dichotomous variable where "1" signifies one or more Republicans are elected to the Board of County Commissioners during the period 1978-84.

main differences are the accounting systems and types of financial reports associated with governmental units, users of financial statements and contracting procedures for audits in the public sector, which may be regulated by statute. As such, new variables need to be developed to capture the unique aspects of the municipal government environment.

Rubin (1988) classifies the determinants of the fee model into client size, loss exposure, client complexity, report complexity, auditor retention and auditor size. Results based on a sample of 189 cities suggest that significant variables include client size (measured as population of the city), loss exposure (measured as debt per capita and bond rating of city), complexity (measured as service index of the city<sup>11</sup>, number of separate reports, Comprehensive Annual Financial Report [CAFR] versus non-CAFR), auditor tenure and audit production factors (whether the audit is performed during the auditor's busy season and, the length of auditee's Chief Financial Officer [CFO] tenure). He found that auditor tenure has a positive and significant association with audit fees in non-bid cities. He argues that this result supports DeAngelo's (1981) expectation that audit fees may rise over time due to "low balling". Contrary to prior audit fee studies in the private sector (e.g., Simunic, 1980; Palmrose, 1986; Houghton & Jubb, 1999), audit qualification is not associated with municipal audit fees. The audit fee model explains approximately 58 percent of the variance in audit fees of municipalities in his sample.

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<sup>11</sup> The service index reflects the number of non-ordinary services a city offered to its constituents. As such, the index excludes public safety and general administration activities because it is assumed that these activities are provided by all cities. The index is a count of activities that are not uniformly provided by all municipal governments.

Copley (1989) undertook a similar study in the public sector audit market. He extended Rubin's (1988) study by examining a larger sample of local governments, which include both city and county governments. His study incorporates variables not examined in Rubin's study such as type of auditor (measured as CPA versus state agency), form of municipal administration (measured as manager versus mayor-operated), size of client's accounting staff, number of client CPAs, inter-governmental revenue and the existence of state-mandated Generally Accepted Accounting Principles (GAAP) and non-GAAP (e.g., cash basis revenue recognition). Results based on a sample of 330 municipals indicate consistency with Rubin's results for variables that relate to client size (measured as revenues), busy season, outstanding debt, low bond ratings and audit qualification. With the exception of audit qualification, both studies found significant and positive associations between these variables and municipal audit fees. Both studies did not find a significant association between audit qualification and audit fees. However, in contrast to Rubin's study, auditor size (measured as Big 8 versus non-Big 8) is significantly associated with audit fees, but the number of non-ordinary services provided by the governmental unit is not a significant variable.

In regards to the additional variables in Copley's (1989) audit fee model, the only significant variable is the existence of state-mandated GAAP. An interesting variable in this study is the fees charged by state agencies versus private sector audit firms. While the result is not significant for the total sample (city and county governments), the relationship is marginally significant for the city government sub-sample, with state agencies charging higher audit fees compared to private sector audit firms. He did not, *a priori*, predict the direction of the relationship between audit fees and type

of auditors due to the lack of information regarding the pricing of state agency audits. He attributed the possible differences in the audit cost functions for these two type of auditors to differences in exposure to liability losses and opportunity costs of audit resources, given that local government audits are only a subset of the services provided by the CPA. The audit fee model explains approximately 50 percent of the variance in audit fees of municipalities in Copley's sample.

Additional evidence on the differences between the audit services provided by government audit organisations and private sector audit suppliers in the municipal audit market is provided by Dwyer and Wilson (1989) and Rubin (1992). Results in Rubin's study suggest that, for a sample of municipals in Ohio, private sector auditors charge higher audit fees and are associated with more timely audits. He attributed the fee difference to the profit incentive of the private sector auditors. Government auditors are expected to charge fee levels that will enable a recovery of the full costs of the audits. In regards to timely audits, Rubin's result is consistent with Dwyer and Wilson's result. Private sector auditors are more timely in providing audit reports because they have a greater pool and flexibility of resources compared to government auditors. Rubin also examined the municipal's preference for the types of audit supplier in the municipal audit market. He found that cities with modified audit opinions and new debt issues are more likely to request and use private sector auditors.

Ward et al. (1994) provide further evidence on the determinants of municipal audit fees. They extend prior studies in municipal audit fee models (e.g., Rubin, 1988; Copley, 1989) by incorporating additional variables that reflect the unique aspects of

the municipal accounting and auditing environment. Specifically, they replicate Rubin's audit fee model and incorporate five additional variables that relate to auditor expertise, audit adjustments, audit qualifications, political costs and agency costs, into the model. Agency costs are defined and measured as costs that relate to the extent of taxpayer funding of services (measured as the percentage of locally-raised revenues and property tax rate) and form of government (measured as city-manager versus mayor) while political cost is defined as political competition (measured as turnover of elected officials and percentage of seats held by minority party). The agency costs reflect a set of incentives for monitoring in the public sector by taxpayers/voters on elected officials.

Ward et al.'s (1994) audit fee model explains a greater portion of the variation in audit fees than previous studies. The high explanatory power of the fee model (i.e., 83 percent) can be attributed to the inclusion of five additional variables and the use of a relatively homogeneous sample. The sample is based on 171 municipalities located in Michigan<sup>12</sup>, thereby ensuring that the municipals comply with similar state legislation and, accounting and auditing policies. Results suggest that control variables from previous research, which include client size (measured as revenues), loss exposure (measured as bond rating of city), complexity (measured as number of significant funds and CAFR reports), audit bidding, auditor size (measured as Big 6 versus non-Big 6) and auditor tenure, are significant and generally consistent with previous research. However, in contrast to Rubin's (1988) and/or Copley's (1989) studies, they did not find significant results for CFO's tenure, busy season audits and

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<sup>12</sup> The municipalities consist of 92 cities and villages with a population greater than 2,500 and 79 townships with a population greater than 5,000.

debt per capita.

In regards to the additional explanatory variables in Ward et al.'s (1994) fee model, auditor experience (measured as a dichotomous variable for the regional CPA firm that audited a significant portion of audits in the sample) and number of audit adjustment entries are significant explanatory variables. They note that audit adjustment entries may proxy for the level of inherent risk and control risk for the client. They further note that these adjustments appear to be an important element of the auditors' cost function in the governmental sector.<sup>13</sup> Consistent with Rubin's (1988) and Copley's (1989) results, their study did not find a significant association between audit qualification (measured as general fixed asset qualifications and other audit qualifications) and audit fees. Results for agency costs and political cost indicate that only one measure of agency costs, i.e., the extent of taxpayer funding of services, is related to audit fees while the political cost (measured as political competition) did not significantly affect audit fees.

A summary of selected audit fee studies in the public sector market is presented in Table 4. Following Rubin (1988) and Copley (1989), explanatory variables are broadly classified as client size, client inputs, auditor cost function, loss exposure, client complexity, report complexity and accounting regulation.

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<sup>13</sup> Ward et al. (1994) found that audit adjustments are common in the government sector with the mean of 34 adjustments in their sample, which is "considerably greater than found in studies of audit adjustments in the commercial studies. Studies by Kreutzfeldt and Wallace (1986) and Hylas and Ashton (1982) report average audit adjustments of 5.75 and 1.85 respectively" (p. 401, footnote 5).

Table 4

**A Summary of Selected Audit Fee Studies in the Public Sector Market**

	Baber et al. (1987)	Rubin (1988)	Copley (1989)	Ward et al. (1994)
Sample size	100	189	330	171
Population	Counties in North Carolina	Cities with population > 50,000	Cities & counties with population > 25,000	Cities, villages & townships in Michigan with population > 5,000
Explanatory variables				
Client size	population*	population*	revenue and population*	revenue*
Client inputs	-	CFO tenure*	-	CFO tenure
	-	-	mayor vs. manager	mayor vs. manager
	-	-	size of client accounting staff	-
	-	-	no. of client CPAs	-
Auditor cost function	Big 8 audit firms*	Big 8 audit firms	Big 8 audit firms*	Big 6 audit firms*
	-	busy season*	busy season*	busy season
	-	-	-	auditor tenure*
	-	auditor tenure in bid cities*	-	competitive bidding*
	-	-	state auditor	-

Table 4

**A Summary of Selected Audit Fee Studies in the Public Sector Market (continued)**

	Baber et al. (1987)	Rubin (1988)	Copley (1989)	Ward et al. (1994)
Loss exposure	-	bond rating*	bond rating*	bond rating*
	debt per capita*	debt per capita*	non-guaranteed debt*	debt per capita
	income per capita	-	-	-
	-	-	-	no. of audit adjustments*
Client complexity	-	no. of services*	no. of services	no. of significant funds*
	-	-	inter-governmental revenue	-
Report complexity	qualified opinion	modified opinion	qualified opinion	qualified opinion
	-	CAFR*	-	CAFR*
	-	no. of audit reports*	-	-
	single audits*	-	-	-
Accounting regulation	-	-	state-mandated GAAP*	-
	-	-	state-mandated non-GAAP	-
	-	-	-	-



Table 3

**A Summary of Selected Audit Fee Studies in the Public Sector Market (continued)**

	Baber et al. (1987)	Rubin (1988)	Copley (1989)	Ward et al. (1994)
Political costs	party membership*	-	-	turnover of elected officials
	commissioner turnover	-	-	% of seats held by minority party
Agency costs	-	-	-	taxpayer funding of services*
Adj. R <sup>2</sup> of audit fee model	76%	58%	50%	83%

Note: \* significant at 0.10 level or lower

### **Characteristics of public sector audit studies.**

Prior audit fee studies in the public sector have four characteristics. First, these studies have focused on the public sector audits at the local government level, i.e., municipalities, which include cities, counties, townships and villages. Second, evidence of public sector audit pricing is based solely on the samples from the US. Third, there is evidence to suggest that public sector audit fee models are different from private sector fee models. Fourth, while there is evidence to suggest unique aspects of the municipal accounting and auditing environment and their effects on audit fees, the focus of prior audit fee studies in the public sector is on private sector auditors and their implied production costs of undertaking audits in the public sector. These characteristics of prior public sector audit fees studies have implications for future research in this area.

The focus on US-based samples at the local government level raises the issue of generalisability of the public sector audit models to other countries and at other levels of the public sector, i.e., state and federal levels. There is a need to test the public sector fee model in other countries because, as noted by Simunic and Stein (1996), auditors could behave differently in different national legal environments (and, by implication, different institutional public sector audit market arrangements) and, hence, will require carefully designed studies to enable comparisons between studies. In addition, the public sector audit market and audit pricing at the state and federal levels have not been empirically tested. Stein et al. (1994) provide evidence that results from one industry do not extend easily to another industry. They found across-industry differences within the private sector audit market, due to the differences

between financial service and industrial firms in the nature of the assets, complexity of information systems and the regulatory environment on the strength of control procedures. Baber et al. (1987, p. 294) noted that “differences both between and among public and private enterprises can lead to differences with respect to factors that determine the supply and demand, and thus the fees for audit services”.

As there are institutional differences between public and private sector markets and, within the private sector market, this study assumes that there are institutional differences within the public sector that may affect audit fees. Municipals at the local government level in the US differ from agencies at the state or federal level in the nature of ownership and primary objective of agencies and, regulatory environment. These aspects may impact on, among other things, the specification and measurement of risk, due to the absence of a capital market at the state level, and the measurement of client size. The importance of testing for across-industry differences is stressed by Stein et al. (1994, p. 130) who state that:

For empirical research, the existence of across-industry differences will affect the proper specification of models. Researchers who pool industries in studies of audit fees or audit competition (which rely upon assumptions about audit production) need to know which variables to include and which variables have differential effects across industries. Such knowledge can prevent specification errors which can lead to the acceptance of false hypotheses.

Similar to private sector audit fee studies, client size has consistently accounted for the largest percentage of the variance in municipal audit fees. However, proxies for client size in the municipal audit fee studies are municipal population or revenues

rather than total assets. Measures of loss exposure in the public sector, i.e., audit risk, such as bond rating and debt per capita, are significant variables in several audit fee models (e.g., Rubin, 1988; Copley, 1989; Ward et al., 1994). Bond rating reflects the level of clients' securities risk. Significant explanatory variables unique to the municipal environment include the number of audit adjustments and complexity of audit reports, which relate mainly to comprehensiveness (e.g., CAFR, single audits, number of separate reports) (Rubin, 1988; Copley, 1989; Ward et al., 1994). Measures that relate to agency costs and political competition have been suggested in prior studies as being potential determinants of audit fees in the public sector (see Baber, 1983; Baber et al., 1987; Ward et al., 1994). Thus far, results for these variables have been mixed (see Ward et al., 1994). Ward et al. attribute the lack of association between audit fees and, political and agency variables to crude measurements and the inability of audit fees to adjust for short-term effects (e.g., presence of an election).

In contrast to the private sector studies, audit qualification appears to have no effect on audit fees in the public sector (e.g., Rubin, 1988; Copley, 1989; Ward et al., 1994). In the private sector, audit qualifications may impact on the audit production process and audit fees in three stages. In the initial stage, where auditors are faced with the possibility of issuing a qualified audit report to the client, they collect more evidence before presenting their case to the client. In the next stage, the client negotiates with the auditors for an unqualified audit opinion. This process incurs additional time spent on the audit and usually involves higher audit skill levels (i.e., partners or managers) (O'Keefe et al., 1994b). In the final stage, the auditors collect more evidence before and after issuing the qualified audit report to protect

themselves from potential legal actions taken by the client, its stakeholders or third parties that rely on the audit report. Therefore, a qualified audit report is likely to increase audit costs and audit fees in the private sector.

The lack of a significant association between audit qualification and audit fees in the public sector may reflect the weak demand for audit reports in the sector. The existence of a relatively risk-free debt or equity capital market (i.e., debt is guaranteed by government) in the public sector suggests that the demand for an unqualified audit report is weaker in the public sector when compared to the private sector. Therefore, agencies and auditors do not invest a significant amount of time to investigate and deal with audit qualifications in the public sector. Ward et al. (1994) suggest that the high incidence of audit qualifications in the public sector may not significantly contribute to adjustments in auditors' effort, hence, audit fees.<sup>14</sup> In addition, the fixed tender contracts for contractors ensure that extra costs wouldn't find their way into the audit fees. Therefore, the impact of audit qualification on the audit production process and fees are modest in the public sector. Another possible explanation is the timing differential in the relationship between audit fees and qualifications (Houghton & Jubb, 1999). They found that audit costs from audit qualifications are not incorporated into the current year's audit fees but are taken into account in the following year's audit fees (i.e., recognition lag). A survey of public sector audit fee studies indicate that audit opinions are measured contemporaneously

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<sup>14</sup> Ward et al. (1994, p. 401, footnote 6 & 7) note that approximately 29 percent of municipalities in their sample and Rubin's (1988) sample received audit qualifications. In contrast, only 8 percent of the companies in Palmrose (1986) received qualified opinions. Furthermore, studies by Robert and Glezen (1990) and Deis and Giroux (1992) on Texas school districts found a positive relation between audit fees and audit qualifications. Both studies report that less than 5 percent of school districts received audit qualifications.

in the audit fee models.

The audit fee literature has focused mainly on the role of private sector audit suppliers in the public sector market. This emphasis has the advantage of controlling for type of audit supplier while investigating differences in the determinants of audit fee models in both markets. However, the role of government auditors in the financial reporting process in the public sector should not be neglected. Government auditors have different roles, responsibilities and incentives from the private sector suppliers and these differences may affect the audit cost functions and pricing of government auditors. In comparing the audit services provided by government auditors and private sector suppliers in the public sector, prior studies have inferred the government auditors' production costs from the audit fees that they charged (e.g., Copley, 1989; Rubin, 1992). Unlike the private sector market, where audit fees are assumed to reflect the audit costs due to competitive pressures, audit fees of the government auditors may not reflect their production costs. The main reason is that public sector agencies may be charged nominal fees only, rather than the fees that reflect the full costs of the audits. Therefore, an audit production model may be a more accurate reflection of the government auditors' use of resources in the public sector. Knowledge of the production function is necessary because it may contribute to discussions of government auditors' operations *vis a vis* alternative audit suppliers in matters relating to audit efficiency and effectiveness.

The role of private sector suppliers and their impact on audit quality in government audits is another important issue in public sector audit studies (e.g., Raman & Wilson, 1994; Copley & Doucet, 1993; O'Keefe et al., 1994a; Brown &

Raghunandan, 1995). These studies are motivated from the reports and findings of Treadway Commission (1987) and US General Accounting Office (GAO) (1985; 1986). As summarised by Raman and Wilson (p. 520):

The results of federal monitoring revealed the widespread problem of substandard audits and, in Congressional hearings, the profession was publicly chastised for “sloppy, unprofessional, substandard CPA audits” (Meinhardt et al., 1987; 86). The GAO (1985, 1986) indicated that substandard audits were being performed by both small and large audit firms (including the Big Eight), although the proportion of substandard audits was lower for the larger firms”.

Raman and Wilson (1994) highlight the important role of contracting processes as a mechanism for enhancing the credibility of public sector audits. They argue that auditor moral hazard is particularly acute in the government environment because governmental bankruptcy is a relatively rare event and, hence, the potential for auditor legal liability (in the form of large financial settlements) is correspondingly reduced.<sup>15</sup> They further argue that the contracting practices of municipal entities play an important role in ensuring the credibility of public sector audits, in addition to being less expensive relative to other forms of monitoring in the public sector such as federal monitoring of audit reports, quality control reviews and disciplinary actions. The four critical attributes of the audit procurement process, as identified by the

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<sup>15</sup> Auditor moral hazard, in the context of government audits, refer to the existence of information asymmetry between the auditor and (1) outsiders (including bondholders) and (2) government client, with respect to the quality of the audit that is actually delivered (Raman & Wilson, 1994). The problem of auditor moral hazard in the private sector is less likely due to the existence of capital markets. The probability of financial failure and the threat of litigation, with the potential loss of quasi-rents on fixed investments from the failure to deliver the implied audit quality and the subsequent revelation of such failure, are mechanisms in the private sector to discipline the auditors (Simunic & Stein, 1987).

GAO (1987), are: (1) competition, i.e., the invitation of bids from at least two firms; (2) solicitation, i.e., a written Request for Proposal, intended to communicate needs and requirements to audit firms; includes costs and technical information; (3) technical evaluation, i.e., auditor selection guidelines, includes auditor's qualifications, past experience and peer review; and (4) written agreement that permits the client to monitor auditor compliance with terms of contract and, if necessary, to take recourse against the audit firm in the event the auditor's performance falls short of expectations. Results from a sample of 539 cities suggest that audit contracting practices, as an aggregate, are significantly related to yield premium on seasoned general municipal bonds. This result suggests that, in addition to the Big 8/non-Big 8 audit firm dichotomy, the use of audit contracting practices can signal information about audit quality to bond investors in the public sector.

Copley and Doucet (1993) investigate the impact of one the procurement processes, competition, on the quality of governmental audits. This study is motivated from the policy makers' concerns that increased competition may have an adverse effect on audit quality in the public sector, through pressure to minimise audit fees. This study used a direct measure of audit quality and, as such, has the advantage of analysing the relation between audit quality and competition. Audit quality is defined as compliance with professional standards for reporting and fieldwork.<sup>16</sup> Results based on a sample of 140 audits of federal assistance programs indicate that the likelihood of receiving an audit of acceptable quality is positively and significantly related to competition (measured as number of bids received for an audit engagement). In

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<sup>16</sup> The government officials, who were responsible for reviewing the work of independent CPAs engaged in audits of federal assistance programs, made the assessments of audit quality.



addition, they found that higher competition is related to lower audit fees.

O'Keefe et al. (1994a) seek to address the question of non-compliance in governmental audit. Regulators have asserted that the reasons for non-compliance are due to: (1) the procurement practices of governmental entities that focus on low audit fee rather than compliance with GAAS (Generally Accepted Auditing Standards); and (2) that some audit firms lack knowledge of the unique aspects of governmental auditing, i.e., they lack industry-specific knowledge. O'Keefe et al. develop a production function for audit quality in the public sector to test the two assertions. The proxy for audit quality is the level of compliance with GAAS reporting standards and is measured by the number and importance of violations of GAAS reporting standards. The production function model for compliance with GAAS is comprised of labour hours, client characteristics (size [measured as the school's revenue], internal control) and audit firm characteristics (size, industry-specific knowledge, general knowledge, client-specific knowledge). Audit fee is used as a proxy for labour hours and industry-specific knowledge is measured as the number of school district audits performed by the local office of the audit firm in 1986. Results based on 935 school district audits indicate that the number and importance of violations of GAAS reporting standards decrease, i.e., higher audit quality, with increases in audit fees and audit firm's industry specialisation. In addition, higher audit quality is associated with Big 8 firms, bigger client size, participation in the state CPA society and audit firms that provided a substandard audit in the previous year. The quality of client's internal control has no effect on the level of compliance with GAAS reporting standards.

Brown and Raghunandan (1995) provide further evidence on audit quality in the public sector by comparing the audit quality of independent public accountants in non-federal audits with public company audits and state/local auditors. They argue that the absence of litigation threats, coupled with the pressure to reduce audit fees significantly in the bidding process, can lead to the use of inexperienced staff in non-federal audits. As non-federal audits require compliance with Governmental Auditing Standards (GAS), which are broader in scope than the GAAP, the use of inexperienced staff can result in lower quality audits when compared to public company audits and state/local auditors. The measures of audit quality for non-federal audits are based on the results of desk reviews and quality control reviews conducted by the Inspectors General of various federal agencies. The measurement of audit quality for public company audits is based on the peer review program of the SEC Practice Section of the AICPA's Division for Firms. The results support both of their arguments. Audit quality in non-federal audits is lower than audit quality in public company audits and the quality of audits performed by state and local auditors is superior to the quality of audits performed by independent public accountants.

Prior studies that examine audit quality in the public sector suggest that audit quality is an important issue to consider if alternative suppliers are allowed to conduct audits in the public sector. Studies by Raman and Wilson (1994) and Copley and Doucet (1993) suggest that procurement (or contracting) practices play an important role in the public sector to ensure that the desired audit quality is provided by non-government suppliers. Raman and Wilson (p. 536) state that "by emphasizing procurement practices, the GAO and the AICPA are relying on client monitoring as a mechanism for controlling auditor moral hazard in governmental audits". In addition,

they argue that these practices are less costly compared to *ex-post* approaches for assessing auditor compliance with professional standards (e.g., federal monitoring of audit reports, quality control reviews and disciplinary actions) and provide another proxy or indicator for audit quality in the public sector. Brown and Raghunandan (1995) provide a direct link between the litigation environment and audit quality. Their results suggest that the absence of litigation threats and a more complex audit requirement for public sector audits have implications for audit quality in the public sector. Their results also suggest that state/local auditors have greater industry-experience because, as a result of their work experience, they are generally more knowledgeable about governmental rules, regulations and specific public sector auditing standards. This result is supported by O’Keefe et al. (1994a) who found that violations of GAAS are more likely to result from the audit firm’s lack of industry-specific knowledge.

## **Audit Production Studies**

Research on audit production function is a recent feature in the economics of auditing literature. It is a continuation in a line of research that explored the characteristics of audit markets with audit fee models. The general purpose of audit fee studies is to examine factors that determine audit fees and, as noted by Firth (1997, p. 511), “analyzing audit fees is of interest in examining cost structures of accounting firms, predicting future fees, measuring audit efficiency, and investigating pricing policies”. However, audit fees may not accurately reflect the production process of audit firms

because fee level may be affected by pricing policies and competition in the audit market. Studies by O'Keefe et al. (1994b), Stein et al. (1994) and Hackenbrack and Knechel (1997) develop and refine the production function of audit firms in the competitive audit market.

O'Keefe et al. (1994b) is perhaps the most significant work in the development of the production function of audit firms. Their main objective is to examine the empirical relation between client characteristics and, the nature and mix of labour resources in the private sector. Their study measures audit effort using audit hours charged to an engagement and utilises disaggregated labour hours by rank within the firm. O'Keefe et al. argue that a simple sum of hours to measure auditor effort can lead to a loss of information and loss of statistical efficiency in estimating the effect of changes in client characteristics, given that resources are used in different proportions as client characteristics vary. Results based on 249 audits in the US indicate that client size (measured as total assets), complexity (measured as partner's assessment on a 5-point ordinal scale from "very simple" to "very complex", the number of separate audit reports issued) and risk (measured as liabilities/total assets, overall inherent risk, private versus public holdings of client's shares or debt securities) are all significant determinants of at least some class of labour hours. The models are based on hours in the four labour categories, i.e., partner, manager, senior and staff hours. The models' explanatory power ranges from 70 to 81 percent. There is no systematic effect on auditor's internal control reliance or the joint production of non-audit services on either the level or mix of audit labour inputs. The number of years an audit has been performed (i.e., auditor learning over time) has no significant impact on the level and mix of labour hours. This result may indicate the absence of auditor learning,

systematic under-reporting of audit hours in the early years of an audit or the failure of firm to produce the target level of assurance in those early years.

O'Keefe et al. (1994b) found that size and risk measures are associated with significant changes in the mix of labour inputs. As clients increase in size, the proportion of junior staff hours increases, while the proportion of manager and senior hours decreases. This result suggests that the audit firm substitutes relatively cheaper labour as client size increases. On the other hand, a higher risk of bankruptcy (measured as leverage) results in the use of relatively more "high level" labour (i.e., partners and managers) in an engagement while having no significant effect on the level of senior and junior staff hours. O'Keefe et al. note that high levels of audit expertise are needed to address concerns such as the appropriateness of the going-concern assumption and the possibility of deliberate manipulation of accounting numbers for firms on the brink of bankruptcy. The greater use of high levels of audit expertise also applies to public firms. However, the results for another risk measure, inherent risk, suggest that increased inherent risk leads to greater use of "low level" labour in the audit while having no significant impact on partner and manager hours. While measures of client complexity are positively and significantly associated with audit hours in all labour categories, they do not affect the labour mix.

The use of disaggregated labour hours by rank within the firm in O'Keefe et al. (1994b) is innovative because it reveals changes in labour mix and, therefore, provides a more powerful test to examine the influence of client characteristics on audit production. The insignificant results for several variables, including auditor's reliance on internal control, in their sample provide opportunities for further research.

O'Keefe et al.'s (1994b) study investigates the demand for factors of production and extent of factor substitution in an industrial sample (i.e., manufacturing and wholesale/retail trade firms). Stein et al. (1994) extend O'Keefe et al.'s study by testing for industry-specific differences in the production of audit services. The motivations for Stein et al.'s study are to determine the generalisability of O'Keefe et al.'s results and to investigate whether certain anomalous results in O'Keefe et al. are due to industry effects. The sample was divided into an industrial sample and a financial service sample (banks and, savings and loans firms). Across-sample comparisons are performed using the empirical model developed in O'Keefe et al. Results suggest that the financial service model has a lower explanatory power and, as such, may be misspecified. The effect of size on labour hours in each category is consistent with O'Keefe et al.'s results. However, in contrast to O'Keefe et al.'s results, two risk measures, leverage and ownership of firm, have no effect on auditor effort for financial service clients. In addition, inherent risk affects the high-level labour hours (i.e., partners and managers) only in the financial service sample. This result is in contrast to industrial clients, where only seniors and staff hours are significant. Similar to O'Keefe et al.'s results, the degree of reliance on internal controls, auditor tenure and joint production of non-audit services have no effect on audit hours.

Due to concerns of model mis-specification for the financial service sample, Stein et al. (1994) re-specified the model by including three new variables to reflect the operating environment in the financial service sample. The additional variables are the existence of a negative net income in the current year, the extent of internal audit

assistance and the extent of client assistance. Results based on 108 financial audits indicate that client size (measured as total assets), complexity (measured as partner's assessment on a 5-point ordinal scale from "very simple" to "very complex", the number of separate audit reports issued), risk (measured as the existence of a negative net income in the current year), quality of internal control and internal audit assistance are all significant determinants of some classes of labour hours.

The effects of client size and complexity on the mix of labour hours are consistent with O'Keefe et al.'s (1994b) results. A new risk measure that relates to the existence of a negative net income in the current year is found to be positively associated with all classes of labour hours, except senior hours. In regards to labour mix, both "high" and "low" levels of labour are significant when the incidence for negative net income in the current year increases. Measures that relate to internal control and their impact on audit effort in Stein et al.'s study provide interesting results. Contrary to expectations, the level of assistance provided by a client's internal auditors is positively and significantly associated with external audit staff's effort (for partner, manager and senior hours). Stein et al. attribute the result to the increased need for supervision and review time. The level of client assistance is generally not significant, except for staff hours. The quality of clients' internal controls is negatively and significantly associated with two classes of labour hours (manager and senior hours). This result led Stein et al. to conclude that a measure of internal control quality is a more significant determinant of auditor effort than the measures of auditor reliance on internal controls for the financial service sample. Since O'Keefe et al. did not find significant effects of internal control quality variations, Stein et al. note that the role of internal control quality is an important industry effect.

Stein et al. (1994) provide evidence that factor demands in response to client characteristics, are not the same for industrial and financial service clients. For example, the financial service production model includes a new risk variable, the existence of a negative net income in the current year, and deletes two risk variables that are found to be important in O'Keefe et al.'s (1994b) model. This analysis suggests that each industry has a unique set of risks that place varying demands on the factors of production of audit services. Stein et al. also attributed the role of internal control quality as an important industry effect. In addition, auditor effort in financial service audits displays greater unexplained cross-sectional variation than for industrial audits. The differences could be due to the nature of assets, regulations and regulatory complexity. Stein et al.'s study highlights the need to take into account across-industry differences when undertaking a study on the production of audit services in a different audit environment. This has implication for future audit production studies because the measurement of risk and internal controls and their impact on audit production may vary across industries. An accurate specification of audit production models is essential if researchers are to understand the provision of audit services in different markets.

Disaggregated labour hours are useful in revealing changes in labour mix and provide a more powerful test for research on the production of audit services. However, further work on labour hours could relate to how an audit firm allocates its audit hours to different audit activities and how that allocation is influenced by client characteristics. These questions form the basis for Hackenbrack and Knechel's (1997) study. They extend prior audit production research by refining the use of audit



hours to examine task assignment patterns (hours by activity and rank), instead of the level (total hours) or mix (hours by rank) of labour inputs. Their measures of resources by audit hours are considered in terms of activity and rank-specific allocations. Types of audit activities examined are: (1) audit planning; (2) evaluation of internal control; (3) critical substantive testing; (4) non-critical substantive testing; (5) critical review of substantive tests; (6) non-critical review of substantive tests; (7) preparing financial statements; and (8) interactions with clients.

Results in Hackenbrack and Knechel's (1997) study suggest that client characteristics such as size, industry affiliation, complexity, nature of ownership and level of consulting services provided to the client are associated with changes in the allocation of labour among audit activities. Specifically, increases in client size and complexity are associated with increases for seven out of eight audit activities. Proportionately more demand is placed on substantive testing and review of critical, audit objectives for increases in client size, while more demand is placed on substantive-non-critical activity for increases in client complexity. In regards to industry effects, financial service clients consume significantly fewer labour resources in substantive-non-critical, review, financial statements and client interaction activities. In regards to ownership effects, public entities demand significantly higher labour resources in planning, substantive-critical, review and client interaction activities. Proportionately more demand is placed on the review-critical or client interaction activities. These activities are the primary sources of demand for high grades of labour and, as such, this result is consistent with O'Keefe et al.'s (1994b) labour mix results for public clients. The level of reliance on internal controls has no significant effect on any audit activities. This result is consistent with

O'Keefe et al. and Stein et al. (1994), in that there is no association between internal control reliance and audit effort (in total or by rank). As a result, they suggest that, "the lack of association between control reliance and audit effort (in total or by rank) in prior audit production studies is not caused by the substitution of labour from substantive testing to internal control review and testing" (p. 495).

Further analysis in Hackenbrack and Knechel's (1997) study examines the allocation of labour hours among ranks within each activity. Results suggest that client characteristics such as size, complexity, risk and level of consulting services influence the use of a different mix of staff level on planning, substantive testing (both critical and non-critical), critical review of substantive tests and client interaction activities.

In summary, studies by O'Keefe et al. (1994b), Stein et al. (1994) and, Hackenbrack and Knechel (1997) have investigated the cross-sectional relation between different grades of professional labour and various client characteristics (i.e., demand for factors of production). These studies also investigate the changes in labour mix as client characteristics vary (i.e., extent of factor substitution).

In developing a theory of production of audit services, prior studies have considered the main factors or resources used to provide those services and the resultant output. An understanding of a firm's production function allows inferences to be made in regards to allocation and control of scarce resources and, hence, efficiency in conducting audits. A difficulty in the studies of the production function of service organisations, such as audit firms, is the measurement of a firm's output. Unlike

manufacturing firms, the output of service-oriented firms is often not directly observable or measurable. The literature in economics of auditing has adopted the view that, while the output of an audit firm is not directly observable to the market, the output is observable to the purchasers of audit services, i.e., clients (e.g., Simunic, 1980; Simunic & Stein, 1987; O'Keefe et. al., 1994b). Clients purchase audit services to obtain a level of assurance for its financial reports. The level of assurance varies across clients, depending on the level of quality demanded by the clients.

In O'Keefe et al. (1994b), an audit firm is assumed to supply a fixed level of audit assurance, i.e., one type of audit quality, across all audit engagements at a moment in time. Investments in knowledge are costly for an audit firm. Given that the investments are fixed costs, an audit firm that supplies its services to more clients with similar demand for a given audit quality level will decrease its audit costs to each client. Holding audit quality constant for all audits, cross-sectional differences in the firm's audit production function on different audit engagements are due to client characteristics. As such, the output of an audit firm can be viewed as the quantity of audit services demanded by the client, i.e., the amount of audit effort and the costs of labour. In audit production studies, the amount of audit effort is proxied by audit labour hours (e.g., O'Keefe et al., 1994b; Stein et al., 1994; Hackenbrack & Knechel, 1997). Human capital is the main resource in most service firms and since the product supplied by an audit firm is a service that is labour intensive, audit labour hours often serve as a proxy in an audit production model. Client characteristics such as size, complexity, risk and internal audit constitute the input for an audit firm because these characteristics affect the quantity of audit services demanded by the client. Therefore, in a production model of audit services, client-related

characteristics constitute the input that influences the amount of output, i.e., labour hours, at a given level of audit quality.

Thus far, the development and analyses of a production model are based on observations from a single audit firm. As discussed above, examining a single audit firm has the advantages of controlling for pricing policies, audit product, in terms of assurance level, and production technologies. Results from audit production studies suggest that cross-sectional variation in labour hours can largely be explained by the same client size, complexity and risk measures found to be important in previous audit fee studies (O’Keefe et al., 1994b; Hackenbrack & Knechel, 1997). However, Stein et al. (p. 142) conclude by noting that, “this line of research needs to be expanded in many directions before a complete picture of audit production emerges. Extensions across auditors, additional industries, different auditing environments, and time periods appear to be fruitful areas for future research”.

Prior audit production and fee studies have stressed the importance of client’s internal control and internal auditors’ work in influencing the external auditors’ work. The degree of reliance on internal control and internal audit can affect audit hours and, hence, audit fees. Auditing guidelines recommend that external auditors may place reliance on internal controls and internal audit in performing their tasks, where the work of the internal audit is satisfactory (refer to AICPA SAS no. 9, “The effect of an internal audit function on the scope of the independent auditor examination” or SAP AUs No. 2, “Using the work of an internal auditor”). Thus far, empirical evidence on the links between the two factors and, audit hours and fees have not uncovered any significant association. For example, Simunic (1980),

O'Keefe et al. (1994a; 1994b) and, Hackenbrack and Knechel (1997) did not find any significant association between the quality of internal controls and the degree of reliance on internal controls and, audit hours and fees. Stein et al. (1994) suggest that the effects of internal controls might vary from one industry/audit environment to another. They provide evidence that the measure of internal control quality is a more suitable measure of auditor effort for the financial service sample than measures of the degree of auditor reliance on controls (as measured in O'Keefe et al.'s [1994b] study). The industry effect on internal control quality and audit effort shows that managing cash with good internal control is critical in financial institutions. Stein et al. highlight the importance of investigating different audit environment/industries when examining the relationship between internal controls and auditor effort. This finding has implication for studies investigating the public sector environment.

Simunic (1980) argues that total audit activity is comprised of external audit and internal audit activities. As such, both activities are substitutes and can serve as alternative monitoring mechanisms. External auditors and their clients have an interest in the mix of internal and external audit activities because it has economic implications for the audit firm and clients. Thus far, results for reliance on internal audit and, audit hours and fees have been mixed. Stein et al. (1994), contrary to expectations, found that audit hours are positively associated with internal audit assistance for some classes of labour but no association with audit fees. A recent study by Felix et al. (1999) found that internal audit contribution to a financial statement audit is a significant and negative determinant of external audit fees. Further analysis reveals that the contribution of internal audit to a financial statement audit is explained by the interaction between internal audit quality and the contingent

effects of inherent risk and (1) internal audit availability, and (2) co-ordination between external and internal audit groups.

Limited evidence from the audit production literature regarding (1) reliance on internal audit and, (2) reliance on internal controls, on external audit effort seem to suggest that there is a tendency for private sector firms to “overaudit”. The rationale for this tendency could be due to higher litigation risk in the private sector. An interesting question is whether the tendency to “overaudit” is prevalent in audits conducted by government auditors. Government auditors have often been criticised on their approach to auditing financial statements in the public sector because they tend to “nitpick” and audit every transaction by the clients. However, Murphy (1994) argues that auditor’s reliance on internal control may not affect audit effort because auditors, in most cases, may adjust the nature and timing of substantive testing only, rather than the extent of the testing. Therefore, studies that investigate the link between internal control and audit effort should differentiate between the types of substantive testing.

On the issue of audit risk, there is general consensus in the audit fee/production literature on characteristics that constitute audit risks in private sector audits. Audit production studies show that the conduct of an audit is influenced by audit risk and business risk (see O’Keefe et al., 1994b). Examples of audit and business risks, as identified in the literature, are the client’s leverage level (liabilities/total assets), ownership (public versus private), inherent risk and the existence of a negative net income in the current year (e.g., O’Keefe et al., 1994b; Stein et al., 1994; Hackenbrack & Knechel, 1997). In contrast to a few audit fee studies in the private

sector, prior audit production studies did not find an association between audit qualification and auditor effort (e.g., O’Keefe et al., 1994b; Stein et al., 1994).

A summary of audit production studies is provided in Table 5.

Table 5

**A Summary of Audit Production Studies**

	O'Keefe et al. (1994b)	Stein et al. (1994)	Hackenbrack & Knechel (1997)
Sample size	249	108	241
Sample sector	Private	Private	Private
Dependent variables	Audit hours by rank (i.e., partners, managers, seniors, staff)	Audit hours by rank (i.e., partners, managers, seniors, staff)	Audit hours by activities (i.e., 8 audit activities)
Explanatory variables			
Client size	total assets*	total assets*	-
	-	-	total revenue*
Risk	leverage*	leverage	-
	ownership*	ownership	ownership*
	inherent risk*	inherent risk	-
	-	audit qualification	-
	-	operating loss*	-
	-	-	industry*



Table 5

**A Summary of Audit Production Studies (continued)**

	O'Keefe et al. (1994b)	Stein et al. (1994)	Hackenbrack & Knechel (1997)
Client complexity	foreign assets*	-	-
	scale of complexity*	scale of complexity*	-
	number of separate audit reports*	number of separate audit reports*	-
	-	-	presence of subsidiaries*
Other variables	reliance on internal control	reliance on internal control	reliance on internal control
	internal control quality	internal control quality*	-
	auditor tenure	auditor tenure	-
	-	internal audit assistance*	-
	-	client assistance	-
	consulting services	consulting services	consulting services*
Adj. R <sup>2</sup> of audit production model/s	78-81%	28-55%	14-53%

Note: \* significant at 0.05 level or lower

## Conclusions

This study relies on a branch of literature in auditing, known as the economics of auditing, to provide the framework to investigate issues that relate to audit efficiency in the public sector audit market. Specifically, it reviews several audit fee studies and audit production studies. This section provides a set of conclusions from this literature in regards to the nature of the research questions and the underpinning theory, major findings, data collection method and analysis employed.

The focus of audit fee studies is to examine the demand for audits in the private and public sectors through audit fees. The fee model is based on an important assumption that auditors and clients are jointly liable to financial statement users and, therefore, both parties have incentives to avoid liability (Simunic, 1980). Audit fees are assumed to reflect the use of resources in an audit firm because the audit markets are competitive. The audit firm is assumed to operate at maximum efficiency by minimising its costs and charging fees that reflects the use of those resources and the firm's profit component. Three major client characteristics, conceptually measured as size, complexity and risk, have been noted as factors that can influence the demand for audits, which will, in turn, affect the audit firm's resource allocation decisions and audit fees. Prior audit fee studies have consistently found that client size, complexity and risk are significant determinants of audit fees in the private and public sector, although these determinants are measured differently in both sectors (e.g., Simunic, 1980; Chung & Lindsay, 1988; Rubin, 1988; Chan et al., 1993; Ward et al., 1994). Results of private sector studies are generalisable across national

boundaries and are robust across different samples and time periods. The explanatory power of audit fee models ranges from 46 to 87 percent. These findings suggest that client size, complexity and risk are important control variables in audit fee models.

The operations of private sector suppliers in public sector audits have received scrutiny from academics and regulators in the past decade (e.g., Rubin, 1988; Copley & Doucet, 1993; Raman & Wilson, 1994; Brown & Raghunandan, 1995). A strand of research has focused on the development of audit fee models in the public sector while another strand of research has investigated the impact of audit quality in the public sector. Specifically, prior studies have examined audit pricing and production costs in the public sector (e.g., Rubin, 1988; Deis & Giroux, 1992; Ward et al., 1994; O'Keefe et al., 1994a) and the effect of procurement practices and litigation threats in the public sector on audit quality (Copley & Doucet, 1993; Raman & Wilson, 1994; Brown & Raghunandan, 1995).

Prior audit fee studies in the public sector are motivated from the need to develop fee models that capture the unique characteristics of the public sector environment (e.g., Rubin, 1988; Copley, 1989; Ward et al., 1994). Comparisons between private and public sector audit studies reveal that client characteristics such as size, complexity and risk account for a large percentage of variance in audit fees in both sectors. The differences lie mainly in measuring client size, complexity and risk for the fee models. In addition, audit qualifications appear to have no effect on audit fees in the public sector (Rubin, 1988; Copley, 1989; Ward et al., 1994). While unique public sector variables that relate to agency costs and political competition that may affect audit fees in the public sector have been proposed, the empirical evidence suggest

that these variables have an insignificant or marginal impact on audit fees in the fee models (see Ward et al., 1994). Overall, the evidence from public sector audit studies suggests that private sector audit fee models are generally transferable to the public sector environment.

A review of audit fee studies in the public sector also raises the issue of audit quality in the public sector (e.g., Rubin, 1988; Copley & Doucet, 1993; O'Keefe et al., 1994a; Raman & Wilson, 1994; Brown & Raghunandan, 1995). These studies examine the role of private sector suppliers and their impact on audit quality in government audits. Evidence suggests that Big 8/6 audit firms have a positive and significant association with audit fees, indicating that there are demands for high quality audits at the local government level in the US (Baber et al., 1987; Copley, 1989; Ward et al., 1994). On the supply-side, the Treadway Commission (1987) and GAO (1985; 1986) indicate that private sector suppliers are providing substandard audits in the public sector. Raman and Wilson (1994) and, Brown and Raghunandan (1995) argue that the substandard audits in the public sector are due to the absence of litigation threats and a more complex audit requirement for public sector audits. Studies by Raman and Wilson and, Copley and Doucet (1993) suggest that procurement practices play an important role in the public sector to ensure that the desired audit quality is provided by non-government suppliers. Studies that examine audit quality in the public sector suggest that audit quality is an important issue to consider if alternative suppliers are allowed to conduct audits in the public sector. This has implications for studies that examine the Australian public sector audit market because the move towards a more efficient and effective delivery of public services has increased the participation of private sector suppliers in this market.

Audit production studies extend the line of research that explored the characteristics of audit markets and products with audit fee models. Since the products supplied by audit firms are services that are labour intensive, the use of audit hours by audit engagements and grades of labour enable researchers to directly examine the production function of audit firms. An audit firm is assumed to supply a fixed level of audit quality across all engagements at a moment in time (O'Keefe et al., 1994b; Stein et al., 1994; Hackenbrack & Knechel, 1997). Furthermore, audit quality is only observable *ex-post* in some circumstances by some observers. As such, the production function of an audit firm consists of audit hours as its output and client characteristics as the input.

Evidence from audit production studies provides support to audit fee studies for the use of client characteristics such as size, complexity and risk to explain the audit firms' use of resources in their conduct of private sector audits. Additional issues in audit production studies include the need to conceptualise and measure the roles of internal control and internal audit in the production model. In addition, Stein et al. (1994) provide evidence that audit production models need to incorporate the unique characteristics of an industry. They found that audits in the financial service sample place more emphasis on internal control quality and the existence of a negative net income in the current year, as compared to the industrial sample.

Audit production studies also refine the use of audit hours to examine the changes in the mix of labour inputs (O'Keefe et al., 1994b; Stein et al., 1994) and task assignment patterns (Hackenbrack & Knechel, 1997). The findings indicate that

resources are used in different proportions as client characteristics vary. As clients increase in size, the audit firm substitutes relatively cheaper labour to conduct the engagements while increase in complexity does not affect the labour mix (O’Keefe et al., 1994b; Stein et al., 1994). An increased risk of bankruptcy is positively associated with the use of more expensive labour (O’Keefe et al., 1994b). Hackenbrack and Knechel found that client size, industry affiliation, complexity, nature of firm ownership and level of consulting services are associated with changes in the allocation of labour among audit activities.

The method employed in audit fee and production studies to test the effects of control and experimental variables on audit fees and hours has been cross-sectional in nature. The data is usually based on audit engagements over a one-year period. The cross-sectional method has the advantage of controlling for potential changes in audit technology over time. The technique used in audit fee and production studies to analyse the data is the ordinary least-square (OLS) regression. Client size, complexity and risk are assumed to have linear relationships with audit fees and hours. The transformation of measures that relate to audit fees or audit hours and, client size and complexity, to logarithm figures, suggests that audit fees and audit hours increase with client size and complexity at a decreasing rate. As the range of client increases in size and complexity, the audit firm is able to capitalise on its economies of scale.

This study relies on the audit fee and production literature to provide the basic framework and assumptions of audit fee and production models. The set of conclusions from this literature enables this study to develop a public sector audit model by identifying appropriate measures and variables to include in the model and

the underlying assumptions of the model. Thus far, there is limited evidence on how the public sector audit suppliers allocate their resources to audits. In addition, while there is increasing interest in the literature to examine production efficiency in auditing (see Dopuch et al., 2000; Knechel & Payne, forthcoming), there are limited studies that examine the comparative efficiency between private sector and government auditors in their undertaking of public sector audits. The next chapter provides a theoretical framework on the relative cost efficiency of private sector suppliers (as contractors) and government auditors in their undertaking of public sector audits.

## **CHAPTER 3**

### **Theoretical Framework and Hypotheses Development**

#### **Introduction**

This chapter begins with a discussion on the institutional framework of the public sector audit market in Western Australia (WA). Specifically, it examines the role and appointment of the Auditor-General in WA, the characteristics of financial audits, and the contracting model adopted by the OAG in WA. This discussion provides a framework to develop the theories on audit effectiveness and audit efficiency in the public sector. The majority of the chapter is devoted to the development of the hypotheses, which relate to the comparative cost efficiency of in-house and contract-out audit arrangements in undertaking public sector audits.

#### **Financial Audits in WA**

In 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 FAAA was amended in 1989 and 1991 to enhance the powers and responsibilities of the Auditor-General. 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., departments, statutory authorities, government business



enterprises and government-owned corporations. 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). As part of the attest and compliance audit, which includes providing an annual audit opinion on the financial statements and internal controls, the OAG in WA must provide an opinion on the relevance and appropriateness of an agency's performance indicators (FAAA, s.93). This feature of the financial audit is unique to WA. In summary, the OAG is required to perform the following 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 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.

### **Contracting procedures and policies for financial audits in WA.**

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. For the financial year-

end 1998, the OAG contracted-out 30 percent of financial audits to public accounting firms. Audits for departments are not contracted-out (OAG WA, 1998). Discussions with the OAG staff reveal that, for statutory authorities and hospitals, the OAG rotates these agencies to be contracted-out. The OAG does not contract-out a few statutory authority audits and contracts-out indefinitely the audits in which it has no expertise, for example, the audits of Western Power and State Government Insurance Commission (SGIO). 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, and on rare occasions, there is a “roll-over” in the contract for a further one or two years. Potential contractors compete for public sector audits through a tender bidding process. The appointment starts with 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 when deciding the best value-for-money audits.

## **Audit Effectiveness in the WA Public Sector Audit Market**

There are two major assumptions in this study on audit effectiveness in the WA public sector audit market. The first assumption focuses on the audit quality of in-house audits, and the second assumption focuses on the audit quality of in-house and contract-out audits.

This study assumes that audit quality for in-house audits 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 any given point 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 level of audit quality across agencies to be more cost efficient. In addition, the demand from parliament (the OAG's principal client) is 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 carry out audit functions on behalf of the OAG. 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.<sup>17</sup> The Treadway Commission in the US found that both small and large audit firms performed substandard governmental audits (including the then Big 8, although to a lesser extent). An explanation is that the private audit firms may shirk their responsibilities in a low litigious environment. Raman and Wilson (1994) argue that auditor moral hazard (see footnote 15) is acute in the government environment because the likelihood 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 & Wilson, 1994; Brown & Raghunandan, 1995). In Australia, the current short-term contracting arrangement (i.e., three to five years) may be another reason for the lower-than-implied audit quality in the public sector. This arrangement is costly to the

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<sup>17</sup> Refer to Raman and Wilson (1994), Copley and Doucet (1993), O'Keefe et al. (1994a) and, Brown and Raghunandan (1995) for studies that examined audit quality in the US public sector audit market. Refer to Taylor (1998) and Houghton and Jubb (1998) for commentaries on audit quality in the Australian public sector audit market.

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 limited role of private sector audit firms in the public sector audit market, due to the short-term contracting arrangement and small audit market, may discourage or prevent firms from investing in public sector audits.

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 audit quality of contract-out audits meet, at least, the minimum level of audit quality required by the OAG; given the current public sector audit arrangement in WA. This implies that audit quality of contract-out audits can be similar to or higher than in-house audits.

The OAG has incentives to ensure that contract-out audits meet the minimum level of audit quality required by the OAG. Although the contractors are required to form audit opinions 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 needs to ensure that the contract-out audits meet a minimum level of audit quality. The OAG achieves this objective by implementing quality control procedures before, during and after the conduct of contract-out audits.

The OAG's quality control procedures start with the tender process, where the OAG selects and invites several potential contractors to put in their bids for the tender. In

addition to fees requested for an audit job, the OAG selects a contractor for its ability to meet and deliver the OAG's level of audit quality for any given agency or class of agency. Successful tenderers are usually repeat suppliers or have experience in auditing public sector agencies.<sup>18</sup> 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. These activities 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 undertakes further work, or requests the contractors to 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 delivery of audits with a quality level lower than expected by the OAG is minimal.

The issue on whether contractors provide a higher audit quality level than required by the OAG is ambiguous. Discussions with the OAG staff indicate that they view all audits as having a similar quality, and try to impose the same quality level for all audits. One can also assume that contractors have limited incentives to provide a higher audit quality than requested by the OAG. Since the final audit report bears the

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<sup>18</sup> The OAG's willingness to accept the quality of particular audit suppliers can be assessed by the extent to which audit suppliers are re-hired. The presumption is that if they are not re-hired for any job then they, among other things, do not necessarily match the quality designed by the OAG. Price and efficiency are the other factors that may affect re-hiring.

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 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 selects contractors that meet its quality criteria and reject the higher-than-required audit quality offered by the contractors. On the other hand, some contractors, who view the OAG as their client, might vary audit quality upward to impress the OAG, in the hope of securing future audit engagements.

In summary, contractors are assumed to deliver, the very least, a minimal audit quality, as determined by the OAG, as a result of the OAG's quality control procedures on contract-out audits. This implies that audit quality for contract-out audits can be similar to or higher than in-house audits. The contractors may deliver a higher audit quality than required by the OAG to impress the OAG.

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 both the 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 or fees required to achieve a given level of audit quality.

## **Audit Efficiency in the WA Public Sector Audit Market**

The issue of production efficiency in auditing arises at the firm level because client specificity gives rise to differentiated production process and auditors need to exercise judgment in the production process. In the public sector audit market in Australia, the presence of alternative audit arrangements and the involvement of private sector audit firms raise additional issues in production efficiency as to the most efficient form of audit arrangement to undertake public sector audits. As discussed in Chapter 1, the arguments for increasing competition in the public sector audit market are generally based on the assumption that a competitive model, through a greater use of outsourcing and the involvement of private sector suppliers (hereafter contractors), is able to improve the efficiency of public sector audits.

To compare the cost efficiency between the in-house and contract-out arrangements to undertake public sector audits, this study considers the differences in market structures and capital investments and, hence, differences in incentives between the OAG and contractors. Since the OAG and contractors face different incentives in the public sector market, the issue of production efficiency becomes important because these incentives influence their allocation of resources and, therefore, audit efficiency in the public sector. As discussed in the later section of this chapter, there are also other factors to consider when examining the suppliers' set of incentives in the public sector audit market.



### **Level of competition.**

Audit legislation affects the level of competition faced by each type of supplier in the public sector audit market and, therefore, places the OAG and contractors in different market structures. Legislation provides the OAG with exclusive rights and responsibilities to conduct, authorise and report on external audits of all public sector agencies. In addition, the OAG has the power to determine the amount of financial audit work and types of agency to be contracted-out to private sector suppliers. Since the OAG does not have to compete for the audits, the legislation, in effect, provides the OAG with 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. The tendering process in WA generally elicits three to four offers from prospective contractors to undertake an audit engagement, thereby ensuring that the market for contract audits is reasonably competitive. This contributes towards price equilibrium in contract-out audits.

While evidence from the US suggests that tender bids are often selected on the basis of lowest price and tend to be fee-driven (Beck & Barefield, 1986; O'Keefe et al., 1994a), the contracting procedures in WA suggest that the OAG evaluates prospective contractors based on both quality and cost criteria. As such, the OAG selects the prospective contractor that offers the lowest price for a given level of audit quality deemed appropriate by the OAG. Therefore, the tender process has the potential to drive competition between prospective contractors and force them to

lower their engagement fees and, subsequently, to lower the costs of production. The tender process also ensures a minimum level of audit quality.

Firms that operate in a competitive environment need to minimise their costs and maximise resource utilisation within the constraints of a specified level of quality to be able to charge competitive prices for audit services. In addition, they need to generate and maintain a profit margin. Since the product supplied by the audit firm is a service that is labour intensive, increasing audit hours will increase service cost unless there are compensating improvements in efficiency (McNair, 1991). Audit firms in the private sector reduce costs by investing in new audit technologies to improve efficiency (Craswell, 1992; Maher et al., 1992) or by continually reducing audit hours for an audit engagement (McDaniel, 1990; Otley & Pierce, 1996).

Given that the OAG and contractors operate in relatively 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 tender process creates a competitive market, which ensures that the prospective contractors compete against each other and provide incentives for contractors to lower their fees and costs (Copley & Doucet, 1993). In addition, Houghton and Jubb (1998, p. 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 ability 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 may ensure that contractors are more cost efficient than the OAG in undertaking financial audits in the public sector.

**Nature and proximity of the relationship between audit suppliers and agencies.**

Another factor that could impact on audit suppliers' cost efficiency is the nature and proximity of the relationship between audit suppliers and agencies. The OAG maintains an obligatory relationship with the agencies as their external auditor. The length of audit engagements runs indefinitely or until the accounts are contracted-out to private sector suppliers. Public sector agencies at the state level do not have the option of selecting, retaining or switching auditors. Parliament is the principal client of the OAG, while public sector agencies are the auditees of the OAG. A typical relationship between the OAG and the agencies is succinctly noted by the Victorian Auditor-General (Price Waterhouse, 1995):

While there is a growing trend to view client services as the objective of all audit activities, this trend runs the risk of failing to recognise the unique responsibilities to the wider community that attach to the audit function in the public sector. . . . To be able to report publicly in such circumstances, without being unduly concerned about any possible adverse impact on relationships with client agency management, reinforces the independence of an Auditor-General and provides an important safeguard to the primary audit clientele, namely the Parliament and taxpayers of Victoria.

The power invested in the Auditor-General by parliament allows the Auditor-General to determine the extent and types of audit activity undertaken. It also allows the OAG to allocate resources to where he/she sees as necessary, without the influence of executives or bureaucrats of public agencies (Taylor, 1998; Harris, 1999). As such, the resourcing strategy of the OAG is supply-driven and, consequently, there are minimal pressures for the OAG to justify and account for their audit hours to the agencies.

There is a higher level of proximity in the relationship between the OAG and contractors compared to the relationship between the OAG and parliament in accounting for audit resource utilisation. Due to the rotation practice in the contracting process, the OAG, as the client, has the option of switching contractors and may not contract with them for future audit engagements. A non-obligatory relationship and the rotational tender arrangement suggest that the contractors are more likely than the OAG to account for and justify their billable audit costs. Therefore, contractors have greater incentives to manage their hours (amount and mix) and, therefore, audit costs compared to the OAG. These incentives may result in contractors being more cost efficient than the OAG in undertaking financial audits in the public sector.

Thus far, arguments based on the market structures and capital investments of audit suppliers, and the level of proximity between audit suppliers and clients suggest that contractors are more cost efficient than the OAG. However, market-based pressure is only one of the factors that affects resource utilisation. Institutional factors in the

public sector provide 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 market by private audit suppliers and the increasing demand for public accountability with respect to financial efficiency.

### **Reforms in the public sector.**

The total costs available to the OAG to undertake public sector audits are determined by the size of the budget approved by parliament. Consistent with other areas in the public sector, the size of budget for audit is decreasing as a result of the cost cutting reforms in the public sector. Recent inquiries in Australia indicate that the OAG at the commonwealth level has not been receiving adequate resources for its audit services in prior years (JCPA, 1989; 1996). This implies that the OAG is pressured to maximise its use of resources.

Due to the 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 on public sector audits. The threat of government's intervention to decrease existing barriers to entry in market service areas may provide incentives to the OAG to place a greater emphasis on managing costs.

The decreasing budget for public sector audits and calls for a contestable public sector audit market can be linked to increasing public accountability for efficiency

and effectiveness in public services. In the last decade, there have been many reviews on the role, functions and operations of the OAGs at the state and federal levels (see JCPA, 1989; 1996, Price Waterhouse, 1995; Maddock et al., 1997). For example, public accounting firms have conducted independent performance reviews of the Victorian OAG's operations since 1991 (refer to Price Waterhouse, 1995; Ernst & Young, 1998).<sup>19</sup> 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. Furthermore, the Victorian OAG reported that for year-end 1998, "the in-house auditing costs are considerably less expensive than similar costs incurred by contractors" (Victorian Auditor-General's Office, p. 47, 1998). It 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.

In a bid to improve their efficiency and effectiveness, the OAGs are adopting and customising private sector audit technologies to undertake public sector audits (Price Waterhouse, 1995; OAG WA, 1998; Simnett, Luckett & Wright, 2000). For example, the OAG in WA adopted the Arthur Andersen audit methodology in 1996, while the Victorian OAG had used the Coopers and Lybrand audit methodology for its operations.

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<sup>19</sup> Price Waterhouse conducted the examination of the performance of the Victorian OAG for the three years ended 30 June 1995. Similar reviews are planned for the NSW OAG where a Public Accounts Committee (PAC) sponsored peer reviews are to be conducted at least once every three years to examine the auditing practices and standards of the Auditor-General (Audit Office of New South Wales, 1999).

### **Audit specialisation.**

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 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 agency-specific knowledge continuously. This relationship allows the OAG to be familiar with the operations and internal controls of agencies, and, as a result, enables the OAG to develop expertise in the audit of public sector agencies. Familiarity and subsequent expertise should contribute to greater cost efficiency. In addition, the OAG, as an industry specialist, 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 & Danos, 1981). O'Keefe et al. (1994a) found that the number of school districts performed by the local office of the audit firm is negatively associated with violations in GAAS compliance. This suggests that industry-specialisation is important in providing high quality audits.

Specialisation in public sector audits is essential because public sector audits are inherently complex and subjective (Brown & Raghunandan, 1995; Funnell & Cooper, 1998). As discussed earlier, public sector audits require more than a substantive audit approach because the nature of the public sector environment requires strong accountability requirements and, therefore, requires additional testing

of internal controls and matters that relate to compliance with regulations and statutes. Another factor that could account for the complex and subjective nature of public sector audits is the inherent instability in the public sector. Instability in the public sector is due to, among other things, the frequent restructuring of organisations and changes in legislation and regulations. As such, auditing in the public sector requires highly specialised knowledge and skills (Simnett et al., 2000) and potential audit suppliers need to invest and develop industry-specific knowledge and technology (Parker, 1993; Raman & Wilson, 1994; O’Keefe et al., 1994a; Brown & Raghunandan, 1995; Houghton & Jubb, 1998). A response to an inquiry from the Maddock Report (1997) indicates that government audits require specialist skills and that the OAG possesses these skills. Even within the public sector, the OAG divides its resources by types of industry-related knowledge in public sector audits (Simnett et al., 2000).

The need to develop and invest in public sector audits is evident from the US General Accounting Office’s (GAO) (1986) report. Evidence suggest that there is variation in audit quality provided to public sector agencies, with many audits of government agencies in US not complying with GAAS. For example, quality review reports indicate that 31 percent of audits violated either fieldwork or reporting standards, or both standards (US GAO, 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 & Raghunandan, 1995).



In the context of WA, substandard audits by contractors are minimal because they are managed and monitored by the OAG. However, there are limited incentives for contractors to invest in knowledge and expertise in the public sector industry. Major reasons include the limited opportunities for private sector suppliers to enter the public sector audit market and the short-term contracting arrangement. The term of the contract usually operates between three to five years. In addition, the OAG has a policy of contracting-out the audits to several audit firms instead of favouring one or two audit firms to undertake the audits.

The short-term contracting arrangement may impact on the efficiency of the contractors. This arrangement may not allow contractors sufficient time to develop substantial client-specific knowledge and, hence, some form of industry or 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 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 greater knowledge and expertise of the public sector industry and, for a given level of audit quality, is more cost efficient than the contractors.

### **"Set-up" costs.**

Another factor that may contribute to the OAG's greater cost efficiency lies in the contractors' "set-up" costs. These costs are spread over a short time period due to the high turnover of contracted-out audits. While contractors may adopt the latest audit

technology to manage more efficiently, they do not operate in a similar structural setting as the OAG (i.e., long-term relationship with agencies) and, therefore, the resulting efficiencies may be lost in the “set-up” costs. Since it is not viable for contractors to absorb these costs every time, they price these costs in their tender fees. Combined with a profit margin component in the tender fees and other factors, the “set-up” costs make the contract-out arrangement less cost efficient when compared to the in-house arrangement.<sup>20</sup>

### **Additional costs of contract-out audits: Supervision costs**

The inclusion of supervision costs as part the costs of contract-out audits is another factor that adds weight to the argument that the in-house arrangement are more cost efficient than the contract-out arrangement.

Supervision costs are an important feature of contract-out audits. These costs are part of the contracting costs where services are contracted-out (Domberger & 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.

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<sup>20</sup> However, it needs to be noted with respect to “set-up” costs, that some contractors may have a comparative advantage in the audit technology that deals with set-up issues, that is, they have a standard structure or form documents that help them get familiar with public sector clients.

Supervision costs should be included as part of the total costs for contract-out audits.

As noted by Talbot in his review of the Victorian OAG's performance (Price Waterhouse, 1995, p. 48):

I am aware of some criticism of this process [review of the work of all agents] but I did not find the time taken to fulfil this auditing standards requirement to be excessive. The Office incurs a cost for this review and signing process and this is correctly passed on to the auditee.

In addition, Mulgan (1997) argues that one of the reasons for the perceived greater efficiency of the private sector, when undertaking projects in the public sector, is the reduction in accountability requirements. He argues that private sector providers generally should be subjected to the same accountability requirements as public officials. The inclusion of supervision costs in contract-out audits reflects the fulfilment of accountability requirements for contract-out audits.

The overall combination of non-market based incentives, due to the reforms in the public sector, audit specialisation, "set-up" costs and supervision costs suggests that the contract-out arrangement is less cost efficient when compared to the in-house arrangement in undertaking public sector audits.

Overall, 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.*

The effect of type of audit arrangement on audit cost efficiency is expected to be conditional on client industry. Client industry has been found to affect audit fees and audit hours (see O’Keefe et al., 1994b; Stein et al., 1994; Butterworth & Houghton, 1995; Hackenbrack & 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 & 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 agencies in the public sector. Public sector agencies can be classified into three types, namely, department, statutory authority and hospital.

Agency type may interact with type of audit arrangement to affect audit costs. This is due to the contractors’ expertise in auditing different types of agencies in the public sector. Discussions of agency type is limited to statutory authority and hospital only. As noted earlier, the OAG did not contract-out departmental audits for year-end 1998.

Hospital audits that are contracted-out may be associated with lower audit costs. 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 utilise and transfer their experience of hospital audits from the private to the public sector. Therefore, the contractors may possess similar auditing expertise as the OAG for hospital audits. However, since contractors compete for audits and adopt greater use of innovative and new audit technologies, these factors may translate into higher cost efficiency, and therefore, lower audit costs for the contractors compared to the OAG.

Alternatively, the interaction between agency type and type of audit arrangement may be driven by statutory authority audits. There may be no equivalent of statutory authorities in the private sector. Therefore, the contractors do not have an advantage over the OAG, in terms of expertise in auditing statutory authorities which may translate into lower cost efficiency, and therefore, lower audit costs for the contractors compared to the OAG. Therefore, the statutory authority audits that are contracted-out may be more expensive than the in-house audits.

Therefore, in addition to the main effect of type of audit arrangement on audit costs, type of audit arrangement is expected to interact with agency type to affect audit costs. 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 are 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 public sector financial statement audits 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.*

## **Conclusions**

This chapter has presented arguments on which type of audit arrangement is more cost efficient and concluded that the contract-out arrangement may be more cost efficient or less cost efficient than the in-house arrangement. In addition, the interaction effect between agency type and type of audit arrangement has been proposed to affect audit costs and audit fees. These arguments can be resolved empirically. The next chapter discusses the development of a public sector cost/fee model to test the hypotheses. It identifies the variables that affect the production of audit services in the public sector and the measurements of those variables. The chapter also discusses the sample selection, data collection and estimation technique.

# **CHAPTER 4**

## **Research Method**

### **Introduction**

This chapter is divided into three main sections: (1) production of audit services in the public sector, (2) data collection and (3) estimation technique. The first section identifies the factors that affect the production of audit services in the public sector. It discusses the conceptual and measurement issues associated with those factors, including the factor of interest, and develops an audit cost and audit fee model in the public sector. The next section discusses sample selection and data collection. The final section presents the estimation techniques and empirical models to test the hypotheses.

### **Production of Audit Services in the Public Sector**

To compare the audit costs and audit fees between in-house and contract-out arrangements, this study needs to identify factors that affect variability in audit costs and audit fees. Prior literature has developed audit fee and production function models to explain the variability in audit costs. Specifically, client-related characteristics such as client size, complexity and risk have been suggested as the main factors that contribute to the variability in audit costs (e.g., Simunic, 1980; Firth, 1985; Chan et al., 1993; O'Keefe et al., 1994b; Hackenbrack & Knechel,

1997). Other factors include the level of audit quality demanded by clients (e.g., audit firm size or membership in the top-tier audit group to proxy for audit quality) and the characteristics of audit suppliers (e.g., the supplier's client portfolio).

Most audit fee and production function models have been developed for private sector audits. To adapt private sector audit models to a public sector environment, these models need to consider the nature of the clients and stakeholders in the public sector, and the institutional arrangements that govern the activities and objectives of agencies in the public sector. Based on municipal samples in the US, Rubin (1988) and Copley (1989) conclude that private sector audit models are transferable to the public sector environment. However, their studies suggest that the private sector audit models need to be modified (in terms of measurement and variable issues) to take into account the unique characteristics of the public sector. Overall, both studies suggest that client-related factors such as size, complexity and risk are applicable in the public sector to explain variability in audit costs and fees.

### **Audit production factors.**

Prior audit fee and production studies have found that client size explains the largest component of the cross-sectional variability in audit fees and audit hours, explaining more than 50 percent of these variations. As client size increases, the amount of audit effort required to undertake audits is also expected to increase. Auditors have to perform more work to ensure adequate compliance and substantive testing (Butterworth & Houghton, 1995). However, prior studies suggest that the relationship between client size and audit costs (i.e., hours or fees) is not strictly



linear (e.g., O’Keefe et al., 1994b; Firth, 1997). Audit costs increase at a decreasing rate as client size increases. The larger the client, the easier it is for the auditors to achieve economies of scale, which result in a more efficient use of resources within the audit firm. Simunic (1980) suggests that the audit sample size, required to give a certain degree of control, will increase at a decreasing rate as the client increases in size. Therefore, auditors perform proportionately less work for each increase in unit size of the client. Due to pressures in a competitive market (for contractors) or the need to operate efficiently in the public sector (for the OAG), the savings from economies of scale should be reflected in the tender fees or billable hours charged to agencies. Overall, audit costs and audit fees are expected to increase as client size increases, but at a decreasing rate.

Client complexity is another factor that consistently explains the variability in audit fees and hours. As client complexity increases, the amount of audit effort required to undertake these audits is also expected to increase. This is due to the greater amount of resources needed to understand the diverse operations of the client (e.g., different markets, various regulations and laws) and to co-ordinate and integrate the audit functions that relate to these operations (Butterworth & Houghton, 1995). Similar to client size, audit costs and audit fees are expected to increase as client complexity increases, but at a decreasing rate.

Client risk plays a major role in explaining the variability in audit hours and fees in the private sector. Business and economic operations of a client affect client risk, which, in turn, influences the auditor’s business and audit risk (Johnstone, 2000).<sup>21</sup>

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<sup>21</sup> See footnote 8 for the distinction between the concept of “audit risk” and “business risk”.

Audit risk arises in the private sector because the risk of a firm going bankrupt or suffering consecutive losses is shared between management and auditors where they are “jointly and severally liable to financial statement users for losses attributable to defects in the audited financial statements” (Simunic, 1980, p. 164). The increasingly litigious environment in the private sector has motivated auditors to increase their audit effort and/or fee premium when undertaking audits of risky clients (Simunic & Stein, 1996). Auditors increase their effort to collect sufficient amount of evidential matter to support an audit opinion.

While the concept and measurement of risk in the private sector audit models are fairly consistent, the extent of audit risk in public sector at the state level is, at present, not clearly defined. At the local government level in the US, the existence of a bond market affects client risk, although the litigation environment is relatively weak when compared to the private sector market (Raman & Wilson, 1994). Audit risk derived from shared risk of business losses and litigation activities may not apply in the public sector environment at the state level. Organisations in the public sector are funded by taxpayers and their primary objective is not to maximise profit but to serve community needs, that is, to provide social, economic and infrastructure services. While maximising profit is not the primary objective of these organisations, the bureaucrats and politicians are accountable to the public for the appropriate use of funds. In addition, litigation cases in the public sector at the state level are rare.

However, risk is still expected to drive the auditor’s effort in the public sector environment. The risk that an auditor will issue an inappropriate opinion on an auditee’s financial statement is still relevant while business risk of public sector

auditors is more likely to relate to professional reputation rather than litigation costs. Examples of client risk that would impact on the auditor's audit and business risk in the public sector are sparse and mostly anecdotal (e.g., Parker, 1993; Craswell, 1997; Guthrie & English, 1997). Assessment of client risk in the public sector may be better served with the concept of political sensitivity (see Zimmerman, 1977; Baber et al., 1987, Ward et al., 1994). Politically-sensitive agencies could be associated with a high scrutiny by parliament, interest groups, politicians, the media and general public, due to the nature and sensitivity of services provided, handling of sensitive issues and previous discoveries of financial mismanagement. These agencies influence the OAG's business risk because findings of mismanagement in these entities will inevitably elicit extreme political reactions, with consequences for the ministers, government-of-the-day and auditors. The desire to protect and maintain the reputation and profile of the OAG drives business risks in the public sector. Overall, audit costs and audit fees are expected to increase as client risk increases.

Another important factor is the role of internal control in public sector audits. Internal control systems play an important role in the public sector to ensure compliance with laws and regulations and to minimise waste and fraud (Raman & Wilson, 1994). A high reliance on a client's internal control should decrease the amount of external audit effort due to a decrease in the amount of substantive testing. Evidence from prior studies indicates that reliance on internal controls have no effect on the external auditors' effort (O'Keefe et al., 1994a; 1994b; Hackenbrack & Knechel, 1997). However, Stein et al.'s (1994) found that the effect of internal controls on the production of audit services is industry specific. A tight regulatory environment in the financial sector could induce auditors to rely on clients' internal

controls. In the public sector, there is an emphasis on government agencies to have good internal controls to protect public funds. Furthermore, public sector auditors must provide an opinion on the agencies' internal control system as part of the financial statement audit. A higher reliance on client's internal control is expected to be associated with lower (external) audit costs and audit fees.

Prior studies have also found that Big 5 audit firms are associated with higher audit hours and fees (e.g., Palmrose, 1986; Deis & Giroux, 1992; 1996; Raman & Wilson, 1994). These studies used audit firm size or top-tier affiliation to proxy for audit quality. In the context of this study, if contractors deliver a higher audit quality level than required by the OAG, it is more likely to be a Big 5 audit supplier. DeAngelo (1981) argues that big audit firms are more likely to deliver a higher audit quality because they have greater resources, competence and independence. To control for possible variations in audit costs and audit fees as a result of the higher audit quality, the Big 5 and non-Big 5 audit suppliers dichotomy is included as a control factor in the models. Generally, audit costs and audit fees are expected to increase if a Big 5 audit supplier conducts the audit.

As discussed earlier, client industry has been found to affect audit fees and audit hours (see O'Keefe et al., 1994b; Stein et al., 1994; Butterworth & Houghton, 1995; Hackenbrack & 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 & 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, the effects of industry on audit costs and audit fees are analogous to the effects of agency type on audit costs and audit fees in the public sector.

Public sector agencies can be classified into three types, namely, department, statutory authority and hospital. A department is a body established or deemed to have been established under the Public Sector Management Act 1994 (OAG WA, 1999). A statutory authority is a person or body specified in Schedule 1 of the Financial Administration and Audit Act 1985. These agencies are established by parliament under legislation for specified purposes (OAG WA, 1999). 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.

Statutory authorities differ from government departments in the nature of their creation (by statute) and by extent of their activities (Funnell & Cooper, 1998).

According to Funnell & Cooper (1998, p. 58):

Statutory authorities have considerably more operating freedom than departments and many, for practical purposes, are free to operate as they think fit within the mandate given to them by their Enabling Act. Statutory bodies. . . have greater administrative flexibility when compared with departments. They also have an ability to accommodate a wide spectrum of expert contributions and concerned interests.

Hospitals are expected to incur lower audit costs compared to departments and statutory authorities. A less diverse and complex nature in terms of asset base, basic services, management structure, regulatory environment and control procedures leads to the expectation that, on average, hospital audits require less effort and time that translate to audit costs and audit fees relative to departments and statutory authorities. Departmental audits are expected to incur higher audit costs relative to statutory authority audits because departments have more variation in terms of the services, conformance to different set of legislation and control procedures.

Drawing from the audit fee and audit production function literature, the factors expected to drive audit costs and fees in the public sector are agency size, complexity, risk (audit and business), reliance on internal control, Big 5 audit firms and agency type. The audit production model treats audit costs and audit fees as the dependent variables. The model is as follows:

$$\text{Audit costs/fees} = f \left[ \text{size, complexity, risk (audit and business), reliance on internal control, Big 5 audit firm, agency type, test variables} \right]$$

### **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. For example, the total costs of an engagement increase where there is a greater use of auditors' effort at the partner level.<sup>22</sup> 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 et al., 1994b; Hackenbrack & 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 staff 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. While

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<sup>22</sup> The normal hierarchy for an audit firm consists of four levels; juniors, seniors, managers and partners, with partners at the highest level. The labour rates increase with each step in the audit firm's level of hierarchy, with partners at the highest level.

overhead allocation is a problem in most costing exercises, discussions with the OAG reveal that the rates gave a fairly accurate account of the total audit costs at the end of the year (i.e., less than 3 percent difference) between costs incurred and costs charged to jobs.

For contract-out audits, audit costs are comprised of the actual audit fees charged by the contractors and the costs of supervision by the OAG staff. As noted earlier, supervision costs are an important feature of contract-out audits. The costs reflect the additional tasks that are undertaken by the OAG as part of the quality assurance program for contract-out audits. Therefore, supervision costs should be included as part of the total costs for contract-out audits. In addition, Mulgan (1997) argues private sector providers should be subjected to the same accountability requirements as public officials. Therefore, 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 fulfilment 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.**

Examples of proxies used in prior studies to measure client size are client's total assets, total revenue or total population. Examples of proxies used in prior studies to measure client complexity are client's total subsidiaries, the ratio of accounts receivable to total assets, number of separate audit reports and percentage of foreign assets (Simunic, 1980, Ward et al., 1994).



There are potential differences between private sector and public sector audit models in measuring and proxying for agency size and complexity. These measures need to consider the unique characteristics of the public sector environment. Proxies from the private sector and municipal studies may not apply to public sector agencies at the state level because, unlike private sector organisations, public sector agencies do not have a profit maximisation goal. As such, total revenue and total assets may not be suitable proxies for agency size in the public sector.

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 by 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. This is to ensure that taxpayers' funds are properly accounted for and used in the community's best interest. Therefore, issues that figure prominently in public sector audits relate to, among other things, compliance, probity, equity and protection of public funds with possible political overtones. As such, tracing the flow of monetary resources is the main focus of financial audits in the public sector. Hence, larger monetary transactions require more audit effort 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.<sup>23</sup>

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<sup>23</sup> Measuring agency size using financial measures can be affected by differences in measurement and recognition criteria between public sector agencies, e.g., accrual versus cash/fund basis (Copley, 1989). In this study, the measurement of expenditure is expected to be consistent across public sector agencies in WA because, as of year-end 1996, all agencies in WA are required to adopt the accrual

Similarly, proxies for client complexity such as the client's total number of subsidiaries, the ratio of accounts receivable to total assets, number of separate audit reports and percentage of foreign assets are not suitable proxies for agency complexity in the public sector. 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 recognises that complexity can be proxied not only by the number of services, but also the intricacies of those services. To measure complexity, the auditors-in-charge provided 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 *ex-ante* 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 recognises 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 provided 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 agency type 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". 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.

# **Data Collection**

The population of financial statement audits for the WA OAG for the 1998 audit cycle is 314 audits (OAG WA, 1999). Subsidiaries, corporatised entities and local cemetery boards were excluded from the analysis because their financial audits are conducted under legislation other than FAAA (the legislation for majority of the audits in WA), or under FAAA and other legislation specific to these entities. Thirty-four agencies were also excluded from the analysis because they are inactive or have ceased operations during year-end 1998. The application of legislation other than FAAA, and the application of additional or unique audit procedures to agencies that were in the process of winding up, may give rise to different cost and pricing structures for these agencies. Finally, due to missing data in one or more fields as a result of non-response to questionnaires, fourteen agencies were eliminated from the analysis, leaving a sample of 223 agencies for tests of hypotheses. In summary, the sample of 223 agencies is derived from eliminating the following agencies from the population:

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 or have ceased operations during year-end 1998	(34)
Information relating to independent variables was not determinable due to non-response to the questionnaires	(14)
Total sample	223

A list of agencies in the sample (categorised by agency type) is provided in Appendix 1. Data was collected for the financial year-end 1998 audit cycle. 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.<sup>24</sup> 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.

The data for the empirical models was collected from three sources; the OAG's internal records, agencies' year-end 1998 annual reports and questionnaires. A questionnaire, attached with a covering letter, was distributed to an in-house auditor or contractor in charge of each audit engagement by an OAG senior staff. A total of two hundred and thirty seven questionnaires were distributed to auditors, and, within a month, two hundred and twenty three questionnaires were returned, providing a 94 percent response rate. Due to the high response rate, no test was conducted for non-response bias.

The total audit costs for each audit engagement (and supervision costs for contract-out audits), the OAG's assessments of agencies' overall risk, total costs of advice provided by the OAG and Big 5 classification were collected from the OAG's

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<sup>24</sup> As of year-end 1996, all public sector agencies are required to adhere to accrual accounting for their financial reporting purposes.

internal records. Audit fees, total operating expenditure, audit opinions for financial statement and performance indicators, and agency type were obtained from the agency’s year-end 1998 annual report. Measures for agency complexity and the level of reliance on the agency’s internal control were obtained from 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 (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. Information on the test variable, type of audit arrangement, was obtained from the OAG’s internal records.

Table 6 summarises the concept and measurements of the variables and the source of data for the variables. The table also summarises the predicted direction of the relationship between each independent variable and audit costs/fees.

Table 6

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 6

**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
Agency type	“Department” – department (1); otherwise (0) “Hospital” – hospital (1); otherwise (0)	+	Annual report
		-	Annual report
Type of arrangement	contract-out (1); in-house (0)	?	Internal records
Agency*Type of arrangement	contract-out hospital (1); otherwise (0)	-	Annual report & internal records

## **Estimation Method**

This study uses a cross-sectional method to test the hypotheses. The data is based on the 1998 year-end audit engagements. The cross-sectional method has the advantage of controlling for potential changes in the audit technology and level of audit quality over time. Consistent with prior audit fees and production studies, this study 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.

The audit cost model and the audit fee model share similar independent variables to test the research questions. Audit cost is assumed to be highly correlated with audit fees in the public sector because of the move towards a contestable audit market and pressures on the OAG to provide “value-for-money” audits to agencies. Previous studies have used audit fees as a proxy to examine cost structures of accounting firms (e.g., Simunic, 1980; Rubin, 1988; Firth, 1997). Furthermore, production function studies by O’Keefe et al. (1994b), Stein et al. (1994) and Hackenbrack and Knechel (1997) suggest that cross-sectional variation in labour hours can largely be explained by the same client size, complexity and risk measures found to be important in previous audit fee studies.

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 adopt the functional form of log-linear regression models to investigate cross-sectional relations between audit cost/fees and the exogenous engagement characteristics. Two models are used to test the hypotheses, as follows:

$$\text{Lncost or Lnfees}^{25} = a + b_1\text{Lnexp} + b_2\text{Complex} + b_3\text{Risk} + b_4\text{FSOpin} + b_5\text{PIOpin} + b_6\text{Advice} + b_7\text{IControl} + b_8\text{Big5} + b_9\text{Department} + b_{10}\text{Hospital} + b_{11}\text{Type} + e$$

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 (1 = very simple, 5 = very complex)
- 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)
- e = error term

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<sup>25</sup> To test the research questions, supervision costs are included in the definition of total audit costs for contract-out audits. As part of the sensitivity analysis, supervision costs are excluded from the definition of total audit costs for contract-out audits to examine the effect of supervision costs on the test variables. Discussions with the OAG indicate that audit fees billed to agencies take into account the supervision costs for contract-out audits. However, the information for the audit fee equivalent of supervision costs is not recorded in the OAG's database and, therefore, sensitivity analysis is not being performed on the audit fee model.

$$\begin{aligned} \text{Lncost or Lnfees} = & a + b_1 \text{Lnexp} + b_2 \text{Complex} + b_3 \text{Risk} + b_4 \text{FSOpin} + b_5 \text{PIOpin} + \\ & b_6 \text{Advice} + b_7 \text{IControl} + b_8 \text{Big5} + b_9 \text{Department} + \\ & b_{10} \text{Hospital} + b_{11} \text{Type} + b_{12} \text{Hospital*Type} + e \end{aligned}$$

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 (1 = very simple, 5 = very complex)
- 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

## Conclusions

Based on the set of conclusions from the audit fee and audit production function literature, two empirical models have been developed to test the research questions. The next chapter provides an initial investigation of the variables in the models by presenting the descriptive statistics for the independent and dependent variables. The statistics are displayed for the total sample and the two sub-samples, that is, in-house and contract-out arrangements. Univariate tests are also conducted to allow a more detailed examination of the characteristics of the variable of interest.

# CHAPTER 5

## Descriptive Statistics

### Introduction

This chapter presents the descriptive statistics for the total sample, and the in-house and contract-out sub-samples. Results of the univariate tests are also presented.

Table 7 shows the distribution of the total sample, and the in-house and contract-out sub-samples by agency type. Table 7 shows that no department is contracted-out, and statutory authorities comprise half of the total contract-out audits. Approximately half of the total audits in WA are comprised of statutory authority audits. A list of agencies for the in-house and contract-out sub-samples (categorised by agency type) is provided in Appendix 2.

Table 7

#### 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 8 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 utilised for the continuous and dichotomous variables respectively.<sup>26</sup>

Table 8

**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

<sup>26</sup> While the independent group’s t-test is a more powerful test of differences between two unrelated groups compared 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, indicates that the significance levels for the continuous variables are not significant ( $p \leq 0.05$ ). As such, a non-parametric test (Mann-Whitney U) is used to test for univariate differences for continuous variables.

Table 8

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

		Total sample	In-house	Contract-out
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	
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	-	-

An examination of the frequency tables and histogram graphs indicate that the distributions for audit costs and fees are 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). Audit fees range between \$1,000 to \$350,000, with 47.5 percent of the fees range between \$1,000 to \$10,000 and a further 33 percent of the fees range between \$10,000 and \$31,000.

Approximately 30 percent of the agencies are classified as having high overall audit risk for financial statement audits. Only 8.5 percent of the agencies in the sample received a qualified audit opinion for the financial statements but a higher percentage (18%) for the performance indicators. The low rate of audit qualifications for financial statements in the WA public sector is in contrast to the qualifications reported in the US public sector fee studies and in other states in Australia. For example, Ward et al. (1994, p. 401, footnote 6 & 7) note that approximately 29 percent of municipalities in their sample and Rubin's (1988) sample received audit qualifications. Copley's (1989) municipal sample contains 25 percent audit qualifications.

For the descriptive analysis, the responses for reliance on internal control can be presented in discrete terms, i.e., limited, moderate and extensive. The majority of the auditors in the sample relied moderately on the agencies' internal controls (62 percent). Only 6 percent of the auditors relied extensively on the agencies' internal controls while 32 percent of the auditors relied in a limited manner.



The in-house sub-sample is significantly different from the contract-out sub-sample on three variables: audit opinions for financial statements and performance indicators, and total advice provided by the OAG. Specifically, in-house audits have a significantly higher rate of qualified audit opinions for the financial statements (11%) compared to contract-out audits (3%) but possessed significantly fewer qualified audit opinions for performance indicators (12.4%) compared to contractors (30%).

The cause of these variances may be due to the characteristics of the auditees or the auditors. With regard to the auditees, the in-house sub-sample may contain entities that are prone to receiving qualified audit opinions. The presence of departments in the in-house sub-sample only may influence the qualification rate because departments may have a higher qualification rate when compared to other agency type. Alternatively, this observation could indicate that contractors are less likely to issue qualified audit opinions. This argument can also be used to explain why the OAG provided significantly higher total advice to in-house audits compared to contract-out audits. The OAG may give proportionately greater advice to departments compared to other agency types.

To determine whether the significant univariate difference between the two sub-samples is due to the presence of departments in the in-house sub-sample, a matched-pair sample is constructed for the three variables. The in-house and contract-out sub-samples are matched by hospitals and statutory authorities only and agencies classified as “department” are excluded from the in-house sub-sample. The results appear in Table 9.

The test shows that the significant univariate difference between in-house and contract-out sub-samples for total advice and qualified audit opinion for financial statement is due to the presence of departments in the in-house sub-sample. As for performance indicators, the difference between the two sub-samples remains significant. This observation could indicate that contractors are more likely to issue qualified audit opinions for performance indicators compared to in-house auditors.

Table 9

**Descriptive Statistics for the Matched-Pair Samples**

		In-house	Contract-out
Total advice to agency (\$)	mean	1,397	1,004
	median	490	276
	std. dev.	2,708	3,702
	signif.	0.109	
Qualified FS audit opinion	%	2.8	2.9
	signif.	0.975	
Qualified PI audit opinion	%	12.0	30.0
	signif.	0.003	

Discussions with the OAG staff reveal that, for statutory authorities and hospitals, the OAG rotates the agencies to be contracted-out and selects which ones to contract-out in a fairly haphazard manner. However, the OAG does not contract-out departmental audits and a few statutory authority audits. The OAG also contracts-out indefinitely the audits in which it has no expertise, for example, the audits of Western Power and State Government Insurance Commission (SGIO).

For financial year-end 1998, the OAG contracted-out approximately 30 percent of public sector audits in WA to contractors but retained all the audits of departments for in-house operations (see Table 7). In addition, the OAG contracted-out about 16 percent of the audits to Big 5 audit firms. The audit coverage by Big 5 and non-Big 5 audit firms and, the mean and median of total costs of audits for each firm are provided in Appendix 3.

As discussed in Chapter 4, audit costs are measured differently for the in-house and contract-out audits. 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 10.

The results indicate that there are univariate differences between Big 5 and non-Big 5 audit firms for tender fees and supervision costs. However, there is no significant difference where supervision costs are expressed as a percentage of tender fees. Big 5 audit firms have higher tender fees when compared with non-Big 5 firms.

The OAG's supervision costs range between 4 to 73 percent of tender fees, with a mean of 27 percent. Discussions with the OAG staff reveal that approximately 20 percent of the value of tender fees are allocated to supervisory activities.

Table 10

**Descriptive Statistics for the Tender Fees and Supervision Costs for Contract-out Audits**

		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		

**Spearman (rank-order) Correlation**

Table 11 presents a matrix of Spearman (rank-order) correlation coefficients between the independent (including test variables) and dependent variables.

The Spearman correlation coefficients show that the dependent variables (natural logarithm of audit costs and natural logarithm of audit fees) are significantly

correlated with all of the independent variables, except audit opinion for performance indicators and type of audit arrangement. In addition, audit fees is highly correlated with audit costs at 0.955 ( $p < 0.01$ ), which implies that the OAG's fee-setting policy is based, largely, on the audit costs incurred.

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## Conclusions

This chapter has provided the descriptive statistics for the total sample, and the in-house and contract-out sub-samples and the results of the univariate tests for the two sub-samples. A Spearman correlation matrix is presented to provide an initial analysis on the relations between dependent and independent variables and between independent variables. The next chapter presents the ordinary least-square (OLS) regression results to test the hypotheses. The results are presented for the base model and hypothesised model for both audit costs and audit fees. A sensitivity analysis is conducted for the hypothesised audit cost model to account for the supervision costs.

Table 11

**Spearman 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)

## CHAPTER 6

### Results

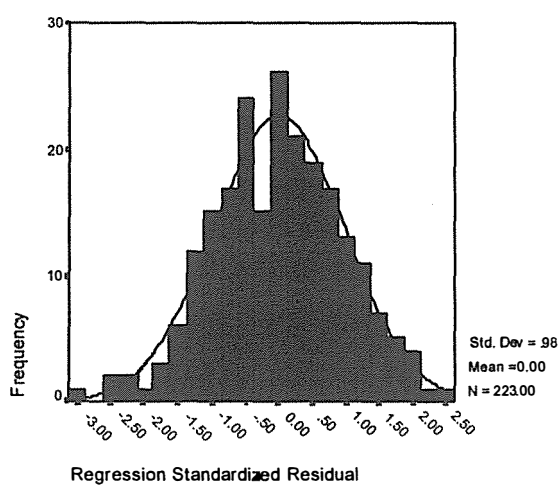
#### Introduction

This chapter presents the ordinary least-square (OLS) regression results for three sets of analyses. The analyses are based on the development of: (1) a base model and a hypothesised model for audit costs; (2) supervision cost models; and (3) a base model and a hypothesised model for audit fees. The supervision cost models refer to audit cost less the supervision costs as the dependent variable, and supervision costs as the dependent variable.

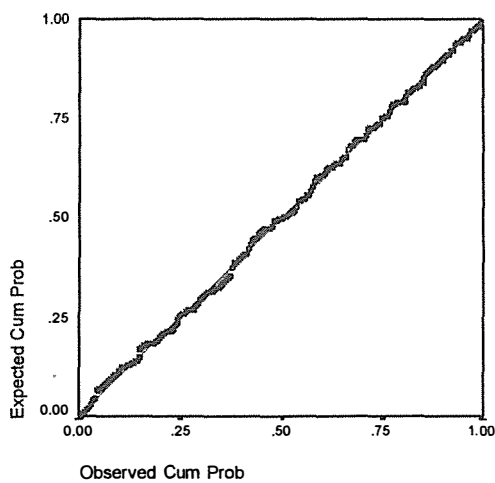
#### Regression Analyses: Audit Costs as the Dependent Variable

To test the first and second hypotheses, audit cost is regressed on explanatory variables for the total sample. The regression model must fulfil several assumptions to ensure that the results from the model can be interpreted with authority. According to Gujarati (1995), the main assumptions are that: (1) the stochastic (disturbance) term  $u_i$  is normally distributed; (2) there is no exact linear relationship (i.e., multicollinearity) in the independent variables; and (3) the variance of  $u_i$  is constant or homoscedastic.

To test for normality, the histogram and normal probability plot diagrams for the regression residuals from the base and hypothesised models are constructed and presented in Figures 1, 2, 3 and 4. These diagrams indicate that the residuals are approximately normally distributed, i.e., the residuals fit the normal distribution line in normal probability plot and approximate a normal bell curve in the histogram.

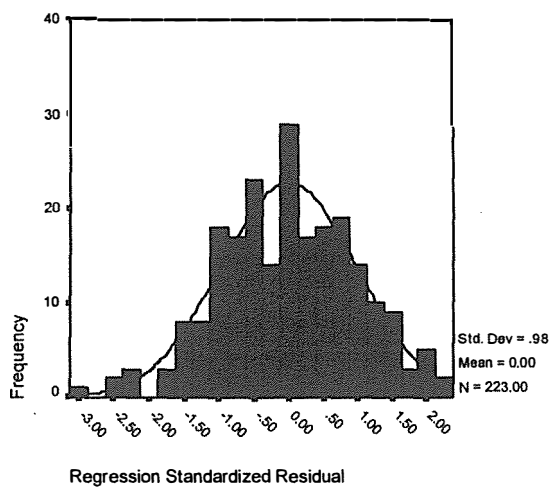


**Figure 1.** Histogram for the base model

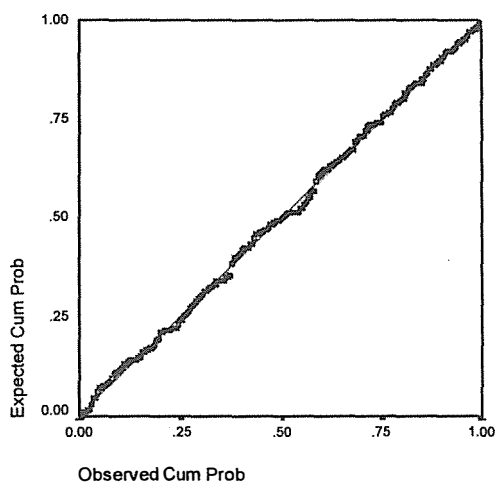


**Figure 2.** Normal P-P plot for the base model





**Figure 3.** Histogram for the hypothesised model



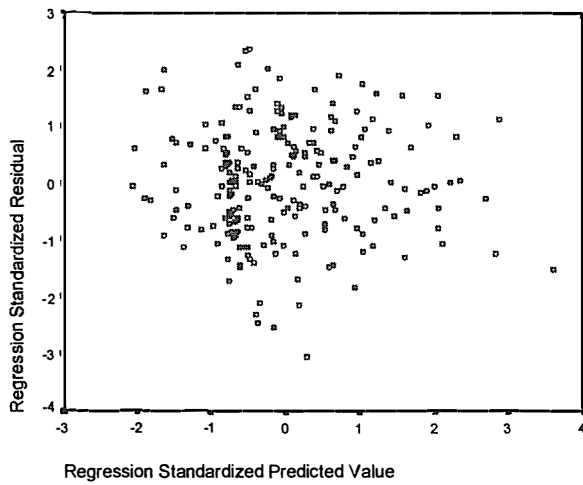
**Figure 4.** Normal P-P plot for the hypothesised model

A test of normality, using the Kolmogorov-Smirnov statistic with a Lilliefors significance level, was performed on the standardised residuals to support the graphical diagnosis of normality. The test indicates that the residuals for the

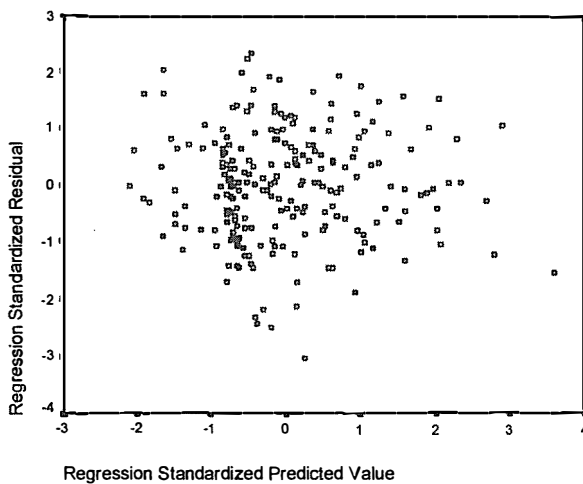
regression model are approximately normally distributed, i.e., the test could not reject the null hypothesis of normally distributed residuals at a significant level.

A useful formal diagnostic for multicollinearity is the variance inflation factor (VIF). This factor measures “the increase in the variance of the regression coefficient over that which would occur if multicollinearity were not present” (Webster, 1995, p. 719). The VIF values for the independent variables in the base and hypothesised regression models range between 1.188 to 2.075 and 1.269 to 3.657 respectively. Myers suggests that “though no rule of thumb on numerical values is foolproof, it is generally believed that if any VIF exceeds 10, there is reason for at least some concern; then one should combat the problem” (1990, p. 369). Based on the VIF values for the base and hypothesised models, multicollinearity is not a significant concern.

To test the assumption that the variance of  $u_i$  is constant, graphs are plotted for the error terms against predicted  $y$  values for the base and hypothesised models. The dots on the graphs do not show any discernible relationship, therefore, suggesting that the variance of  $u_i$  is constant or homoscedastic. The graphs are presented in Figures 5 and 6.



**Figure 5.** Scatterplot for the base model



**Figure 6.** Scatterplot for the hypothesised model

All these tests provide support for the use of the multiple linear regression models in the analyses. For example, residuals that are normally distributed suggest that the OLS estimators of the regression coefficients follow the normal distribution and, hence, the  $t$  and  $F$  tests can be applied to test various statistical hypotheses (Gujarati,

1995). The absence of high multicollinearity suggests that the regression coefficients are determinate and their standard errors are not large, which means the coefficients can be estimated with great precision or accuracy (Gujarati, 1995).

The casewise diagnostic is used to detect outliers. Residuals that are outside three standard deviations can indicate the presence of significant outliers. The output identified an observation with a studentized residual greater than the value of 3.00 for the hypothesised model. To ensure that this observation does not unduly influence the results, it is deleted from the total sample and the regression model is re-run. There is no significant change in the model fit (i.e., a marginal increase in the adjusted  $R^2$  from .823 to .832) and the coefficients for the independent variables remain unchanged in significance and direction. Therefore, this observation is retained in the sample.

#### **Base model for audit costs.**

Before testing the first and second hypotheses, a base model is constructed to determine if the major factors identified in prior audit fee and production studies can explain the variance in public sector audit costs. These factors are size, complexity, risk, internal control, Big 5 audit firms and industry. The results appear in Table 12.

Table 12

**Regression: Audit Costs as Explained by Control Variables: Expenditure, Complexity, Risk, Audit Opinions for Financial Statement and Performance Indicators, Total Advice, Internal Control, Big 5, Department and Hospital**

	Predicted sign	Standardised coefficients	t	Sig.*
(Constant)			37.732	.000
Lnexp	+	.660	16.788	.000
Complex	+	.173	4.308	.000
Risk	+	.084	2.567	.001
FSOpin	+	.052	1.645	.051
PIOpin	+	.059	1.710	.045
Advice	+	.114	3.323	.001
IControl	-	.006	.186	.426
Big 5	+	.017	.552	.291
Department	+	-.049	-1.416	.079
Hospital	-	-.179	-4.361	.000
Adjusted R <sup>2</sup>			.82	
F statistic			102.405 (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 12 indicates that the coefficients for logarithm total expenditure, complexity and risk are positive and significant in the predicted directions. Specifically, as agency size, complexity and overall risk increase, audit costs increase. 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. Higher costs are incurred

for audits that received qualifications for that year. 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. Total cost of advice provided to the agencies is positively and significantly related to audit costs, thus suggesting that, as the OAG provides more advice to the agencies, the auditors incur higher costs to audit the agencies.

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. This is a distinguishing feature of financial statement audit between the public and private sectors. As such, it is expected that the evaluation of internal control would feature strongly in the auditors' work in the public sector, where the level of reliance would influence the amount of external audit effort and, hence, audit costs. 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 two interpretations. First, there is no difference in audit quality between Big 5 and non-Big 5 (i.e., the OAG, local, second-tier) audit suppliers in the public sector audit market. Second, the differences in audit quality between Big 5 and non-Big 5 audit suppliers, if any, are not reflected in audit costs. There are three possible

explanations. First, as discussed in Chapter 3, Big 5 audit firms have limited incentives to provide a higher audit quality than required by the OAG. Second, the OAG selects the contractor that meets, rather than exceeds, the OAG's level of quality. Third, 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. The evidence also suggests that the coefficient for departments is not significant at a 5 percent level ( $p < 0.079$ , one-tailed).

Overall, the base 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 mis-specification is low. The high explanatory power is also consistent with or superior to 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).

### Hypothesised models for audit costs.

The test variable, type of audit arrangement, is added to the base model to test the first hypothesis. Another test variable, the interaction between agency type and type of audit arrangement, is subsequently added to the model to test the second hypothesis. 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 second null hypothesis states that there is no interaction effect between agency type and type of audit arrangement. Tables 13 and 14 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.

Table 13

#### 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 14

**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.

As observed in Tables 13 and 14, the inclusion of test variables did not affect the significance and direction of the control variables in the audit cost model. More importantly, the coefficient for the test variable, type of audit arrangement, is not significantly associated with audit costs at a 5 percent level ( $p < 0.089$ , two-tailed); indicating no significance difference in costs between contract-out and in-house audits. Therefore, the first null hypothesis of no difference in audit costs between in-house and contract-out arrangement cannot be rejected at the 5 percent significance level.

Table 14 shows that 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. This suggests that the effect of type of audit arrangement is contingent on agency types, which in this case, are hospital and statutory authority. The second null hypothesis of no interaction effect between agency type and type of audit arrangement is rejected at the 5 percent significance level.

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 15 presents the regression results for the sub-samples, partitioned by agency type: department, statutory authority and hospital. 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.

Table 15 shows that the audit cost model differs across sub-samples partitioned by agency type. As expected, agency size is the major determinant of public sector audit costs for all agency type. Consistent with the result for the total sample, reliance on internal control is not significant for any agency type. The coefficient for total advice provided to agency is positive and significantly associated with audit costs for all agency type at the 10 percent significance level. However, the significance of variables such as agency complexity and risk variables varies between agency type.

No evidence was found to suggest that higher complexity and overall risk is significantly associated with higher audit costs for the hospital sub-sample. The evidence suggests that the statutory authority sub-sample is driving the significant association between overall risk and audit costs in the total sample. One explanation for these results is that the hospitals may be homogeneous in terms of complexity and overall risk. A descriptive analysis indicates that hospital sub-sample has the smallest standard deviation (0.3072) for the complexity measure compared to the department and statutory authority sub-samples (1.0362 and 0.7637 respectively). Another possible reason is that the way the two variables are measured may not be sensitive enough to capture the hospital's variability in complexity and overall risk.

The audit opinion on the financial statements is significantly associated with audit costs for the department sub-sample only. This result suggests that the department sub-sample is driving the results for this variable in the total sample.

More importantly, 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.

Table 15

**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.

# Supervision Costs

This section presents additional analyses on supervision costs. 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 16 and 17.

Table 16  
**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
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)	

\* 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 17

**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.

By excluding supervision costs from contract-out audits,<sup>27</sup> the test variable, type of audit arrangement has no main effect on audit costs (p < 0.201, two-tailed). This result is similar to the previous finding where the coefficient for this variable is not

<sup>27</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.

significant at the 5 percent level. Table 17 shows that, with the inclusion of the interaction variable in the model, the coefficient for the type of audit arrangement is not significant; a contrast to the previous finding in Table 14. 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 18.

Table 18

**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.

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.

Given the significance of supervision costs and their importance in contract-out audits, a preliminary test is conducted to examine the determinants of supervision costs. The determinants can be broadly classified into two categories. The first category is the characteristics of the contractor's audits and the second category is the characteristics of the contractor.

The characteristics of the contractor's audits that may affect the OAG's supervision costs are size, complexity, risk, reliance on internal control and packaged audits. As contractors undertake larger, more complex or riskier audits, the OAG increases their supervision effort to ensure that the contractors account for these agency characteristics. This ensures that the required level of audit quality is achieved. Higher reliance on the internal control by the contractor is expected to result in lower supervision costs. Greater reliance on an agency's internal control by the contractor means that the internal control is strong and that material misstatements or omissions are less likely to occur. The probability that contractors will not discover those misstatements or omissions is reduced and, as a result, the OAG does not monitor the



contractors extensively. In addition, a higher reliance on internal control by contractors means that there are less substantive tests for the OAG to review.

The OAG contracts-out some audits as a package, presumably to reduce transaction costs when calling for tenders. The contract-out audits that are part of a package are expected to have less supervision costs compared to individual contract-out audits. The OAG reviews the audits that are part of a package more efficiently because the OAG is familiar with the contractor's quality of work and is able to generalise across other audits in the same package. The OAG is able to generalise because the audits that are in the same package offer the similar type of products or services, or belong to a particular region. An example is the grouping of hospitals in the "Eastern Wheatbelt" region in WA where one contractor undertakes all audits of the hospitals in that region. Audit package is measured as a dichotomous variable where audits that belong in a package (a package is defined as a single contract for two or more audits) are classified as "1" and others "0". The measures for size, complexity, risk and reliance on internal control are similar to the measures for the audit cost model.

The characteristics of the contractor that may affect the OAG's supervision costs are industry specialisation, tenure and affiliation with Big 5 tier group. Contractors that are classified as industry specialists are expected to receive less supervision from the OAG. Prior studies in the public sector found that audit quality is positively related to the industry experience of the audit firm (Deis & Giroux, 1992; O'Keefe et al., 1994a). The OAG would have more confidence in the quality of the work provided by contractors classified as an industry specialist because the contractors are less likely to deliver substandard audits. Therefore, the OAG allocates less supervision

effort. A firm is classified as an industry specialist if it audits a significant percentage of total contract-out audits in the sample (see also Ward et al., 1994). Appendix 3 indicates that Bird Cameron, Hall Chadwick and Stanton Partners audited a total of 14 (20%), 13 (19%) and 10 (14%) agencies respectively, which comprise 53 percent of the total contract-out audits for year-end 1998. Industry specialisation is measured as a dichotomous variable where Bird Cameron, Hall Chadwick and Stanton Partners are classified as “1” and others “0”.

Contractor’s tenure is expected to be negatively associated with supervision costs. As the contractor’s tenure increases, its learning curve is expected to increase (O’Keefe et al., 1994b). Therefore, the OAG should decrease its supervisory activities in terms of providing debriefings to the contractor about the agency and reviewing the contractor’s audit planning program and working papers since the OAG is familiar with the standard of the contractor’s work. In addition, supervision costs from the evaluation of tenders are not applicable from the second year onwards. Tenure is measured as the number of years the engagement has been performed by a contractor.

Supervision costs are expected to decrease for Big 5 contractors. Given that the Big 5 firms are viewed as having greater resources, competence and independence (DeAngelo, 1981; Palmrose, 1986), they are less likely to violate the minimum audit quality required by the OAG. Therefore, the Big 5 firms will require less supervision, hence supervision costs, compared to the non-Big 5 firms.

Supervision costs are expected to be lower for hospital audits compared to statutory authority audits because hospitals are less diverse and complex in terms of asset base,

basic services, management structure, regulatory environment and control procedures. Therefore, the hospital audits are easier to monitor.

Table 19 presents the regression results for the supervision cost model. Following the audit cost model, the supervision cost model adopts the functional form of log-linear regression models to investigate cross-sectional relations between supervision costs and the exogenous characteristics.

Table 19

**Regression: OAG’s Audit Supervision Costs for Contractors as Explained by Expenditure, Complexity, Risk, Audit Opinions for Financial Statement and Performance Indicators, Total Advice, Internal Control, Audit Package, Industry Specialisation, Tenure, Big 5 and Hospital**

	Predicted sign	Standardised coefficients	t	Sig.*
(Constant)			11.766	.000
Lnexp	+	.425	4.503	.000
Complex	+	.083	.881	.191
Risk	+	.055	.619	.270
FSOpin	+	.092	1.428	.080
PIOpin	+	.060	.753	.227
Advice	+	.334	4.462	.000
IControl	-	-.236	-2.862	.003
Package	-	-.293	-3.542	.000
Specialisation	-	.074	1.011	.158
Tenure	-	-.058	-.806	.212
Big 5	-	.116	1.421	.081
Hospital	-	-.069	-.729	.235
Adjusted R <sup>2</sup>			.77	
F statistic			20.146 (p < 0.001)	
N			70	

\* 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.

The supervision cost model is significant and has high predictive power. The high predictive power of the model (adjusted  $R^2$  of .77) suggests that the model is a reasonably good fit. In addition, four out of the twelve independent variables are highly significant and in the predicted direction. This implies that these variables should provide the basis for the development of a supervision cost model. Nevertheless, the supervision cost model in this study remains tentative and should be a subject of future research. Other potential variables that may impact on supervision costs include the tender procurement procedures, the contractor's management structure and the level of audit experience in public sector audits and the OAG's previous work experience with the contractors.

Evidence suggests that agency size and risk, reliance on internal control and audit package are significantly associated with supervision costs in the predicted direction. Specifically, the OAG increases its supervision effort for contractors that undertake larger and riskier audits. For example, the OAG increases its supervision efforts where more advice is provided to the agencies.

Two surprising findings are the insignificant relation between tenure and supervision costs, and specialisation and supervision costs. With tenure, the possible explanation is that the OAG apportion the costs of evaluating and managing tenders equally across the engagement period. Alternatively, the OAG may be inefficient in its allocation of supervisory activities by not accounting for the contractor's learning curve or the OAG considers the contract term to be too short to have any significant impact on the contractor's learning ability. Specialisation, as defined in this study,

does not seem to play a role in reducing supervision costs.<sup>28</sup> As indicated earlier, the OAG has the policy of “spreading-out” the contract-out audits to as many audit firms as possible and, therefore, the concept of specialisation may not apply to the contract-out audits in the Australian public sector audit market and needs to be further examined.

Another interesting result is the relation between type of contractors (i.e., Big 5 or non-Big 5) and supervision costs. The evidence suggests that the coefficient for the Big 5 variable is not significantly associated with supervision costs at the 5 percent level. This raises the question as to what extent do the Big 5 firms differ from the non-Big 5 firms in their supply of services in the public sector audit market or, alternatively, the OAG’s treatment of all contractors. Discussions with the OAG staff indicate that they do not differentiate between Big 5 and non-Big 5 firms when allocating resources for supervisory activities. They perceive that both type of firms possess similar functional and industry expertise in the public sector audit market. Furthermore, they believe that their supervisory activities are a function of the partners-in-charge of the engagement and the composition of the audit team, rather than firm type. The result indicates that the OAG is providing more supervision to Big 5 audit teams compared to non-Big 5 teams, possibly due to the greater likelihood of Big 5 audit firms to utilise more junior level staff.

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<sup>28</sup> Sensitivity analysis is performed on the definition of industry specialist. The regression is re-run separately for each of the three contractors that qualified as an industry specialist. Supervision costs are not significantly associated with two firms but are positive and significantly associated with the third firm ( $t = 1.784$ ,  $p < 0.004$ , one-tailed).

No evidence was found for a significant relation between agency type and supervision costs. The OAG does not appear to differentiate between hospital and statutory audits in allocating supervision costs.

An exploratory investigation is undertaken on the supervision cost model to determine whether any particular audit firm or types of firms are driving the supervision costs. This information is useful to test the sensitivity of the cost model where audit firms that significantly affect supervision costs are included in the audit cost model as control variables.

Appendix 3 indicates that there are 17 different audit firms undertaking contract-out audits. For the analysis, 16 dummy variables are included in the supervision cost model, each with “1” representing the audit firm and “0” for others. The results indicate that two audit firms are significantly associated with supervision costs (at the 5 percent significance level, two-tailed). The audit firm, “Firm X”, has a positive relationship with supervision costs and another audit firm, “Firm Y” has a negative relationship with supervision costs.<sup>29</sup>

To ensure that these two firms are not driving the relationship between the test variables and audit costs, these firms are included in the audit cost model as control variables. Results for the total sample suggest that “Firm X” has a positive and significant relationship with audit costs while “Firm Y” is not significant. Previously, type of audit arrangement is not significantly associated with audit costs ( $p < 0.089$ , two-tailed) at the 5 percent significance level. The inclusion of the two audit firms as

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<sup>29</sup> Due to confidentiality, the two audit firms are simply known as “Firm X” and “Firm Y”.

control variables shows that type of audit arrangement is still not significant ( $p < 0.141$ , two-tailed). This result indicates that the two firms do not influence the previous result.

With respect to the test variables, type of audit arrangement and the interaction term, the results remain unchanged. The results for the test variables also remain unchanged with audit costs less the OAG's supervision costs for contractors as the dependent variable.

The two audit firms are also used as control variables in the audit cost model, partitioned by agency type (see Table 15) to investigate whether these variables affect the results for the type of audit arrangement. "Firm Y" is not significant for the statutory authority sub-sample and the result for type of audit arrangement remains unchanged. "Firm X" did not undertake any contract-out audits of statutory authorities. Results for the hospital sub-sample indicate that "Firm X" has a significant positive relationship ( $p < 0.005$ , two-tailed) with audit costs while "Firm Y" is not significant. The result for the type of audit arrangement remains unchanged. The adjusted  $R^2$  for the hospital sub-sample increases from 0.74 to 0.78, an explanatory power that approximates the cost models for statutory authority and the total sample. The "Firm X" variable partly accounts for the difference in the adjusted  $R^2$  between the cost model for the statutory authority and hospital sub-samples (see Table 15). Discussions with the OAG reveal that "Firm X" had delivered substandard audit work for year-end 1998 and, therefore, required a high level of supervision effort from the OAG.

The results for the test variable, type of audit arrangement, when partitioned by agency type, also remain unchanged with audit costs less the OAG's supervision costs for contractors as the dependent variable.

Overall, the results for the total sample and the sub-samples indicate that no private audit firm is significantly driving the relationship between the test variables and audit costs.

### **Regression Analyses: Audit Fees as the Dependent Variable**

To test the third and fourth hypotheses, audit fees are regressed on explanatory variables for the total sample. Similar to the audit cost regression models, diagnostic tests are conducted on the audit fee models so that the results from the models can be interpreted with authority. The tests suggest that the audit fee models do not violate the assumptions of the regression models. Casewise diagnostic did not detect any data point outside three standard deviations. This result suggests that the presence of a significant outlier is minimal and, therefore, the full sample size of 223 is used in the fee analyses. Discussions of the audit fee models focus on the development of the base model and hypothesised models.

#### **Base model for audit fees.**

Before testing the third and fourth hypotheses, a base model is constructed to determine if the major factors identified in prior audit fee and production studies can



explain the variance in public sector audit fees. Since prior audit fee models are based on an auditor’s cost function, the determinants for the audit fee model are expected to be similar to the determinants for the audit cost model. As such, the determinants include size, complexity, risk, internal control, Big 5 audit firms and industry. Table 20 presents the regression results for the base model.

Table 20

**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, Department and Hospital**

	Predicted sign	Standardised coefficients	t	Sig.*
(Constant)			34.774	.000
Lnexp	+	.669	19.057	.000
Complex	+	.148	4.120	.000
Risk	+	.068	2.303	.011
FSOpin	+	.049	1.729	.043
PIOpin	+	.034	1.093	.138
Advice	+	.119	3.875	.000
IControl	-	.040	1.310	.096
Big 5	+	-.024	-.870	.193
Department	+	-.056	-1.817	.036
Hospital	-	-.252	-6.900	.000
Adjusted R <sup>2</sup>			.86	
F statistic			133.955 (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.

The results in Table 20 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.

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.

### **Hypothesised models for audit fees.**

To test the third hypothesis, the test variable, type of audit arrangement is added to the base model. Another test variable, the interaction between agency type and type of audit arrangement, is subsequently added to the model to test the fourth hypothesis. 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 21 and 22 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 fees respectively.

Table 21.

**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 22

**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.

The test variable, type of audit arrangement, is not significantly associated with audit fees ( $p < 0.569$ , two-tailed) in Table 21. 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.

The significance and direction of the control variables remain unchanged, with departmental audits remaining significant and negatively associated with audit fees. On average, departments are billed lower audit fees compared to statutory authorities. However, Table 14 indicates that the costs of departmental audits are not significantly different from the costs of statutory audits. An examination of the OAG's Annual Report (OAG WA, 1998) reveals that audit services are provided free of charge to all departments and hospitals and some statutory authorities. Therefore, a possible explanation for this result is that the OAG tends to bill higher audit fees to agencies that have to pay for the audit services, i.e., statutory authorities.

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 23 presents the regression results for the sub-samples: department, statutory authority and hospital. The Big 5 variable is excluded from the hospital's audit fee model because the OAG did not contract-out the 1998 financial audits of hospitals to any of the Big 5 audit firms. In addition, the test variable, type of audit arrangement, and the Big 5 variable are not included in the department's audit fee model because the OAG did not contract-out departmental audits for year-end 1998.

The results in Table 23 are similar to the results for audit cost models for agency size, complexity, risk and audit opinion for financial statement for all agency type. As expected, agency size is the major determinant of public sector audit fees for all agency type.

Table 23

**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.

The results in Table 23 suggest that the audit cost and audit fee models by agency type may differ in one explanatory variable, namely, audit opinion for performance indicators. This variable is significantly associated with audit costs for the hospital sub-sample but is not reflected in the audit fees. As noted earlier, 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.

The coefficient for reliance on internal control is positive and highly significant with audit fees for the department and statutory authority sub-samples although they are weakly significant with audit costs ( $p < 0.106$  and  $p < 0.101$  respectively, one-tailed). These results suggest that higher reliance on internal control incurs higher audit costs and audit fees. This could be because the auditors perform more tests of controls to justify higher reliance, whereas if there is no reliance, they adopt a substantive approach.

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 and Conclusions

This section provides discussions on the relations between the test variables, type of audit arrangement and the interaction between agency type and type of audit arrangement, and three dependent variables: (1) audit costs, (2) audit costs less the OAG’s supervision costs for the contract-out audits and (3) audit fees. Table 24 provides a summary of the results for the relations between the test variables and the three dependent variables.

Table 24

**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
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

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 favour 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 favour 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. This is to enable the OAG to discharge its accountability once the OAG is satisfied with the quality of audits provided to public sector agencies. However, 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 pricing audits is a complex process. 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. As noted earlier, 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 11), 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 five 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).

The next chapter presents additional analyses to test the robustness and sensitivity of the results in the audit cost and audit fee models by using audit hours as the dependent variable. The sample size and measure for audit hours are discussed before the results of the regression analyses are presented.

# **CHAPTER 7**

## **Further Analyses**

### **Introduction**

This chapter extends the previous analyses on the effects of control and test variables on audit costs and audit fees. This chapter uses audit hours as the dependent variable to provide an alternative measure for audit effort, which was measured as audit costs or audit fees in the preceding chapter. This provides a test on the robustness and sensitivity of the results in the audit cost and audit fee models.

### **Regression Analyses: Audit Hours as the Dependent Variable**

Similar to the audit cost measure, audit hours are measured differently, depending on the type of audit arrangement. For an in-house audit, audit hours comprise total billable (reported) audit hours for the engagement. For a contract-out audit, audit hours comprise total billable (reported) supervision hours from the OAG and the contractor's total budgeted audit hours for the engagement. The information for the total billable audit hours for in-house audits is collected from the OAG's database while the contractors' total budgeted audit hours for contract-out audits is collected from tenders. The contractors' total actual audit hours for contract-out audits are not available for the majority of the audits because the contractors are not required to disclose this information to the OAG.

A sample, which consists of 115 statutory authority audits, is selected to test the robustness of the earlier findings for control and test variables. The information for total budgeted audit hours is not available for individual contract-out hospital audits because the OAG had contracted-out the hospital audits as packages to contractors. Therefore, only statutory authority audits are retained in the sample to test and compare the test variable, type of audit arrangement, across audit cost and audit fee models. In addition, the information is also not available for five contract-out audits for statutory authority.

Similar to the audit cost and audit fee models, the audit hour models adopt the functional form of log-linear regression models, where audit hours and agency total expenditure are transformed into natural logarithm. This is to ensure that the residuals from the models are normally distributed. Tests are conducted on the audit hour models to ensure that the results from the models can be interpreted with authority. The tests suggest that the audit hour models do not violate the assumptions of the regression models. The casewise diagnostic detected two observations with a studentized residual value greater than 3.00, indicating two potential outliers in the audit hour models. To ensure that these two observations do not unduly influence the results, they are deleted from the total sample and the regression models are re-run. While there is a marginal increase of two percent in the explanatory power of the models, the coefficients for the independent variables remain unchanged in significance and direction. Therefore, the two observations are retained in the sample.

Discussions of the audit hour models are based on the development of the base model and hypothesised model. To be consistent with the sensitivity analysis undertaken for the hypothesised audit cost model, the audit hours less the OAG's supervision hours for contractors model is also examined. Since the results in audit hour models are based on a reduced sample of 115 audits, the results are not comparable to results in the audit cost and audit fee models in the previous chapter. To compare models, audit costs and audit fees are regressed against control and test variables using the same sample as the audit hour models. The interaction variable is not included in the models because contract-out hospital audits have been excluded from the original sample size of 223 audits.

Tables 25, 26 and 27 present the regression results for the base model, hypothesised model and audit hours/costs less the OAG's supervision hours/costs for contractors model respectively, for each dependent variable, using the reduced sample size of 115 audits.

Table 25

**Regression: Audit Hours/Costs/Fees as Explained by Control Variables: Expenditure, Complexity, Risk, Audit Opinions for Financial Statement and Performance Indicators, Total Advice, Internal Control and Big 5**

Variables	Predicted sign	Audit Hours			Audit Costs			Audit Fees		
		Standardised coefficients	t	Sig.*	Standardised coefficients	t	Sig.*	Standardised coefficients	t	Sig.*
(Constant)			8.748	.000		29.437	.000		26.117	.000
Lnexp	+	.579	8.237	.000	.611	9.919	.000	.586	9.692	.000
Complex	+	.206	2.656	.005	.173	2.542	.006	.185	2.769	.004
Risk	+	.155	2.949	.002	.161	3.504	.001	.118	2.602	.006
FSOpin	+	-.033	-.635	.264	-.047	-1.044	.150	-.027	-.622	.268
PIOpin	+	.046	.809	.211	.068	1.371	.087	.043	.872	.193
Advice	+	.055	.876	.192	.064	1.149	.127	.114	2.088	.020
IControl	-	.075	1.216	.114	.054	.996	.161	.103	1.930	.028
Big 5	+	-.052	-.989	.163	.052	1.117	.134	-.011	-.250	.402
Adjusted R <sup>2</sup>			.74			.80			.81	
F statistic			41.966 (p < 0.001)			58.535 (p < 0.001)			61.333 (p < 0.001)	
N			115			115			115	

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

Table 26

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

Variables	Predicted sign	Audit Hours			Audit Costs			Audit Fees		
		Standardised coefficients	t	Sig.*	Standardised coefficients	t	Sig.*	Standardised coefficients	t	Sig.*
(Constant)			8.739	.000		30.107	.000		26.056	.000
Lnexp	+	.572	7.985	.000	.587	9.565	.000	.579	9.401	.000
Complex	+	.203	2.608	.005	.164	2.451	.008	.182	2.715	.004
Risk	+	.152	2.878	.003	.152	3.360	.001	.115	2.526	.007
FSOpin	+	-.027	-.519	.303	-.029	-.641	.262	-.022	-.489	.313
PIOpin	+	.039	.677	.250	.046	.928	.178	.036	.720	.237
Advice	+	.062	.960	.170	.085	1.548	.063	.120	2.171	.016
IControl	-	.081	1.286	.101	.073	1.348	.091	.109	2.007	.024
Big 5	+	-.064	-1.130	.131	.012	.255	.400	-.023	-.477	.317
Type	?	.033	.589	.557	.110	2.306	.023	.033	.692	.490
Adjusted R <sup>2</sup>			.74			.81			.81	
F statistic			37.111 (p < 0.001)			54.741 (p < 0.001)			54.304 (p < 0.001)	
N			115			115			115	

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



Table 25 indicates that the significance and direction for the agency size, complexity, risk measures and the Big 5 variable are consistent across the models. Overall, the audit hour model is similar to the audit cost model in terms of significance and direction for all control variables. However, audit hour and audit cost models differ from audit fee model in terms of total advice provided to the agencies and reliance on internal control. To ensure that these differences are not due to omitted variables, discussions for these two variables are postponed until the test variable, type of audit arrangement, is included in the model (see Table 26). All models are significant, with the audit fee and audit cost models providing the greatest explanatory power, followed by the audit hour model.

In Table 26, the results for the control variables remain unchanged with the inclusion of the test variable, type of audit arrangement, in the hypothesised model. The reliance on internal control variable remains positive and significant in the audit fee model, and weakly significant in the audit hour and cost models ( $p < 0.101$  and  $p < 0.091$  respectively, one-tailed). As noted earlier, the positive and significant coefficient suggests that the auditors may be performing more tests of controls to justify higher reliance, whereas if there is no reliance, they are adopting a substantive approach. With regard to total advice provided to agencies from the OAG, this variable is not significant in the audit hour model only. This suggests that the OAG used a greater proportion of senior staff to provide advice to the agencies.

Consistent with the result for the statutory authority sub-sample in Table 15, the test variable, type of audit arrangement, is significant and positively associated with audit costs, that is, contract-out audits are more costly than in-house audits. However, the

cost differences between contract-out and in-house audits are not reflected in audit hours and audit fees. Comparing audit hours and audit costs, this result suggests that contract-out audits utilise a greater proportion of senior staff compared to in-house audits (i.e., different labour mix). Alternatively, it could be that the costs of labour are more expensive for contractors compared to in-house staff (i.e., billing versus cost rates). Type of audit arrangement is not significant in the audit fee model because the OAG may view contracting-out for an agency as a short-term arrangement and discount any short-term cost differential to focus on the long-term cost effects in pricing their audits.

Table 27

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

	Predicted sign	Audit Hours			Audit Costs		
		Std. coeff.	t	Sig.*	Std. coeff.	t	Sig.*
(Constant)			8.012	.000		28.962	.000
Lnexp	+	.581	7.717	.000	.600	9.362	.000
Complex	+	.234	2.861	.003	.177	2.534	.007
Risk	+	.152	2.726	.004	.155	3.277	.001
FSOpin	+	-.027	-.497	.310	-.030	-.634	.264
PIOpin	+	.026	.426	.336	.042	.814	.209
Advice	+	.006	.093	.463	.063	1.091	.139
IControl	-	.091	1.371	.087	.080	1.425	.079
Big 5	+	-.078	-1.315	.096	.021	.419	.338
Type	?	-.062	-1.069	.288	.016	.320	.750
Adjusted R <sup>2</sup>			.71			.79	
F statistic			32.465 (p < 0.001)			49.118 (p < 0.001)	
N			115			115	

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

Table 27 shows the effect of supervisory activities on the test variable, type of audit arrangement, for the audit hour and audit cost models. The audit fee model is not presented because information for the supervision fees equivalent is not available.

Results for the control variables remain unchanged after excluding supervision hours/costs from the definition of audit hours/costs for contractors. The coefficient for type of audit arrangement remains insignificant in the audit hour model. Consistent with the result for the statutory authority sub-sample in Table 18, type of audit arrangement is not significantly associated with audit costs after excluding supervision costs from contract-out audits.

Additional tests are performed to determine if the difference in the result for type of audit arrangement in the audit hour and audit cost models in Table 26 is due to a higher proportion of senior staff hours in contract-out audits relative to in-house audits. To examine the difference in labour mix between contract-out and in-house audits, total hours are classified categorically as junior or senior hours, and the proportion of senior hours to total audit hours is calculated.<sup>30</sup> For in-house audits, senior hours comprise Levels 8, 9, Special 7, Class 1 and Class 3 hours. For contract-out audits, senior hours comprise partner and manager hours, in addition to the OAG's Levels 8, 9, Special 7, Class 1 and Class 3 hours, to account for supervision hours. Appendix 4 provides the staff levels in the OAG (in the ascending order of billable rate per hour) and the possible private sector equivalent.

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<sup>30</sup> To reduce concern that the staff levels are not comparable between contractors and the OAG, a broad classification of junior and senior hours is used.

The regression models, with the ratio of senior hours to total audit hours as the dependent variable, adopt the functional form of log-linear regression models, where the dependent variable and agency total expenditure are transformed into natural logarithm. This is to ensure that the residuals from the models are normally distributed. The dependent variable is regressed against the control variables and test variable used in the audit hour/cost/fee models. The sample size is reduced from 115 to 112 agencies because the labour mix information for three in-house audits is not available.

Results suggest that the coefficient for type of audit arrangement is positive and significantly associated with the proportion of senior hours to total audit hours ( $t = 12.698$ ,  $p < 0.000$ , two-tailed). Contract-out audits used a higher proportion of senior hours relative to in-house audits. Additional test without the supervision hours for contractors suggest similar result ( $t = 10.850$ ,  $p < 0.000$ , two-tailed). A sensitivity analysis is performed where the classification of senior hours for the OAG is expanded to include Level 7 hours. Results remain unchanged. Overall, these results indicate that contractors used a higher proportion of senior staff to undertake public sector audits compared to in-house staff. The higher cost of the contract-out audits is due to a higher proportion of senior staff in contract-out audits as the senior staff has higher rates than the junior staff.

## Conclusions

The purpose of this chapter is to provide tests of robustness and sensitivity to the results found in the audit cost and audit fee models, using audit hours as the dependent variable. Overall, the results in the audit hour models are consistent with the audit cost models except for the test variable, type of audit arrangement. The results suggest that the higher cost for contract-out audits of statutory authority is not due to higher audit hours. Further tests show that the difference is due to the use of a higher proportion of senior hours in contract-out audits relative to in-house audits.

The results in the audit hour models are also consistent with the audit fee models except for total advice provided to agencies. This is attributed to the use of a higher proportion of the OAG's senior staff to provide advice to the agencies. Overall, using audit hour as the dependent variable, the results for the control variables (except total advice provided to the agencies) are robust against alternative specifications for audit effort, costs and fees.

The exclusion of the interaction term from the audit hour models and the focus on statutory authority audits only suggest that caution is needed when comparing the results that used the full sample size in the previous chapter. Caution is also needed in interpreting the test variable, type of audit arrangement, given that the audit hours for in-house audits are based on actual (billable) hours while contract-out audits are based on budgeted hours from tenders. This can be a concern where the OAG's labour mix is compared with the contractors' labour mix. The contractors may

ultimately decide to change the labour mix and use more junior hours for the engagements while still maintaining the cost level.

The next chapter concludes with a summary of the major findings and the implications of the results for literature and regulators. Limitations of the research and further research avenues are also discussed.

# **CHAPTER 8**

## **Discussion and Conclusions**

### **Introduction**

This chapter is structured as follows. The aims and findings of this study are summarised in the next section. The following section discusses the contributions of this study to the economics of auditing literature and the implications of the findings to audit practice and regulation. The final section discusses the potential limitations of this study and future research opportunities.

### **Aims and Findings of This Study**

The general purpose of this study is to provide a better understanding of the public sector audit market in Australia. The main impediments to understanding the audit service at the state level in Australia are the limited knowledge of the production function for government auditors (i.e., the OAG and contractors) and the differences in their audit production functions, the effects of institutional factors on the provision of audit services and the OAG's fee-setting policy. Empirical evidence in this area is needed so that future discussions on the changing nature of public sector audit market are not confined to conjectures, assumptions and anecdotal evidence.

The main aim of this study is to investigate the cost efficiency between in-house and contract-out arrangements to undertake financial statement audits in the public sector. It empirically tests whether there are cost and fee differences between in-house providers (i.e., the OAG) and contractors (i.e., public accounting firms) by examining audit costs and fees. The secondary aims of this study are to develop audit cost and fee models for the public sector. The unit of analysis is audit cost/fee at the audit engagement level. The data for this study is collected for a sample of financial statement audit engagements for year-end 1998, at the state level in WA. The data is extracted from publicly available and private sources.

The audit cost and fee models are used to test for the cost differences between in-house providers and contractors. The models are developed for the WA public sector at the state level. These models identify variables that have an impact on the distribution of audit resources in the public sector. Prior audit production and audit fee studies in the private and public sectors provide the basis for the development of the two models. The results indicate that agency size, complexity and risk are positively associated with audit costs and fees. This finding is consistent with prior studies. In addition, the total advice provided to the agencies by the OAG, and agency type are also significantly associated with audit costs and audit fees. Overall, by incorporating these factors into the models, the audit cost model explains 82 percent of the variance in audit costs, while the audit fee model explains 86 percent of the variance in audit fees. Both models possess high explanatory power to explain the variances in audit costs and audit fees.



More importantly, the main findings suggest that contract-out audits are more costly than in-house audits. However, this finding 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. There is no significant difference in audit costs between contract-out and in-house arrangement for hospital audits. This analysis shows that the statutory authority audits are driving the significance of the interaction between type of audit arrangement and agency type. Specifically, the costs of contract-out audits are, on average, significantly higher than in-house audits. This result is attributed to the contractor's lack of expertise in auditing statutory authority as there is no equivalent of this agency type in the private sector. As such, the OAG has the greater advantage of delivering a lower audit cost for statutory authority audits compared to the contractors. However, the non-significant interaction term in the audit fee model suggests that cost differences between in-house and contract-out audits for the statutory authority audits are not reflected in audit fees billed to agencies. Further analyses, using audit hours as the dependent variable, generally corroborate the findings from the audit cost and audit fee models.

Sensitivity analyses on the OAG's supervision costs reveal that these costs have a significant effect on the interpretation of the cost efficiency results. By excluding supervision costs from contract-out audits, there are significant changes in the results for the total sample and the two sub-samples (partitioned by agency type). Generally, these changes favour the contract-out audits for all groupings, where contract-out audits are now more cost efficient than in-house audits for hospitals, and not significantly different in costs for statutory authority audits. Additional tests to investigate the determinants of the OAG's supervision costs in contract-out audits

reveal that agency size, risk, reliance on internal control, total advice provided by the OAG and packaged audits are significantly associated with the supervision costs of contract-out audits.

## **Contributions of This Study to the Literature**

The main contribution of this study is to add to the growing literature on audit market efficiency (see Dopuch et al., 2000; Knechel & Payne, forthcoming). This study examines audit efficiency in the public sector market by comparing the cost efficiency between in-house and contract-out arrangements. It provides evidence on the production function of different type of suppliers in the public sector and their relative efficiency in providing audit services. In part, this evidence contributes to the line of inquiry that examines the difference between government auditors and public accounting firms in US municipalities (see Copley, 1989; Dwyer & Wilson, 1989; Rubin, 1992).

The second contribution of this study is to develop and test the audit cost and fee models in the public sector and provide validity on the transferability of audit models from the private and public sectors. This study adds to the literature that examines the public sector audit market. More importantly, it is one of the few non-US studies that examine the public sector audit market and the findings from this study suggest that the public sector audit studies from the US are generalisable to Australia. These findings add to our understanding of the range of market conditions under which it is so far known to hold and this is an important contribution to knowledge in its own

right. However, this study suggests that the measurements for agency characteristics need to be modified to account for the differences in state and local government levels. This study also found that the pricing policy of the OAG reflects the audit costs incurred and, therefore, for research purposes, it provides validity on the use of the audit fee model to proxy for the auditors' cost function.

### **Implications of This Study for Audit Practice and Regulation**

This study contributes to the recent discussions on the changing nature of public sector audit market. With a movement towards a market-based provision of public sector audits, the evidence from this study allows researchers and policy-makers to compare the two types of audit arrangement to undertake public sector audits.

Initial findings in the US public sector audit market suggest that greater competition (defined as number of bids received by the client) is associated with higher audit quality and lower fees (see Copley & Doucet, 1993; Raman & Wilson, 1994). The findings in this study suggest that industry specialisation may play an important role where the benefits of competition are emphasised. As exemplified in the debate and restructuring of the Victoria's public sector audit market, greater competition is frequently associated with greater outsourcing of public sector audits. However, the concept of competition in the Australian's public sector audit market needs to be evaluated in the context of its current audit arrangements. These arrangements may offset any benefits derived from outsourcing of audits. For example, the short-term

contracts may limit the contractors' incentives to invest and develop public sector audit skills and, as a result, offset the efficiency gained from competitive tendering.

Changes in the public sector audit market have economic and social implications (see Parker, 1993; Lovell, 1996; Guthrie & English, 1997; Houghton & Jubb, 1998, Taylor, 1998). The main findings in this study suggest that economic benefits from competition (defined as contract-out audits) and the opening of the audit market to outside audit suppliers are conditional on the development of industry expertise in the public sector. The regulators should also give greater weight to the social issues of the reform (e.g., independence of public sector auditors) when discussing and deciding on the appropriate model for the public sector audit market. However, this study also points to the importance of evaluating the current audit arrangement and its possible impact on competition. For competition to have an effect on audit costs and quality, regulators need to examine the current incentive structure so that suppliers are motivated to deliver low cost and/or high quality audits. Examples of the incentive structures include the procurement practices of the OAGs, the length of the contract terms and institutional factors that affect the suppliers' incentives in the public sector audit market.

This study also raises the issue of oversight activities (defined as supervision costs for contractors) in public sector audits. The finding in this study suggests that supervision cost is a significant component of the contractor's total audit costs. Investigation of this issue is important because it has implications for audit quality in the public sector. However, in the context of an efficient and effective provision of audit services, the significant question is, "to what extent can these oversight costs be

reduced significantly while maintaining an appropriate level of audit quality?". The presence of contractors in public sector audit inevitably raises the question on whether the nature and amount of monitoring and supervisory activities for contractors are sufficient. On the other hand, the Talbot report has addressed the issue on whether too much resources have been applied to supervisory activities, with Talbot (Price Waterhouse, 1995, p. 48) stating that, "I am aware of some criticism of this process [review of the work of all agents] but I did not find the time taken to fulfil this auditing standards requirement to be excessive". 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.

One of the contentious issues between the OAG and auditees is the audit fees billed to the auditees. There is the perception that the OAG prices their audit services in an arbitrary manner and, as a result, some auditees feel that they're being "overcharged". The high explanatory power of the audit cost and audit fee models in this study, that is, 82 and 86 percent respectively, and the presence of a few significant independent variables, indicate that the OAG's costing and pricing policies are consistent with agency-related characteristics. As such, the assumption that the OAG costs and prices public sector audits in an arbitrary manner, due to the lack of competition, cannot be supported. While the results do not provide evidence on whether the OAG "overcharges" its auditees (the OAG could consistently "overcharged" in line with auditee characteristics), preliminary evidence on the costs of in-house relative to contract-out audits suggests that the OAG may be costing and pricing their audits competitively.

## **Limitations of This Study**

There are several limitations in this study. A major concern relates to the issue of audit quality in the public sector. The interpretation of the cost efficiency results hinges upon the audit quality provided by the OAG and the contractors. Audit quality is difficult to measure and, to date, the OAG does not keep a formal record of contractors' compliance with professional standards for reporting and fieldwork that allow for systematic investigation of audit quality. However, the monitoring process employed by the OAG provides considerable assurance that, at least, minimal acceptable levels of quality are delivered. In addition, discussions with the OAG indicate that the OAG believes that the audits are of similar quality. If it is reasonable to assume that audit quality is homogeneous across audit suppliers because of the certification process, then audit cost and fee differences are more likely to reflect the efficiency differences in the production of audit services. Further tests on the effects of Big 5 audit firms on audit costs and fees suggest no statistically significant association. As higher quality can also be linked to higher audit hours (and, by implication, costs) (Deis & Giroux, 1992), an insignificant association suggest that there is no difference in audit quality provided by the OAG and Big 5 audit firms.

Another possible limitation of this study is the generalisability of the results to other jurisdictions. Since this sample was drawn from one jurisdiction in Australia (i.e., WA), caution should be exercised when generalising the results to other jurisdictions in Australia and in other countries because of differences in audit legislation, contract management, audit technology and audit market structure, among other things. In so far as the tendering system, e.g., competitive tenders, and the institutional factors that

govern the incentives to provide audit services in the public sector are not similar to WA, the results may not be generalisable to other jurisdictions. Nevertheless, examining one jurisdiction has the advantage of controlling for confounding results that may arise as a result of different regulations in each jurisdiction and assurance level provided by the OAGs. A focus on one jurisdiction partly accounts for the high explanatory power (84 percent) of the audit fee model in Ward et al.'s (1994) study. Other public sector audit studies such as Copley (1989) and Rubin (1992) have stressed the importance of obtaining a relatively homogeneous sample to test the audit fee models.

Another possible limitation is the measurement of the variables. Some variables are subject to hindsight bias (e.g., agency complexity) or are not sensitive enough to capture the variable of interest (e.g., reliance on internal control). Auditors-in-charge provided an *ex-post* assessment of agency complexity, on a Likert-type scale from 1 (simple) to 5 (complex). An *ex-post* assessment suggests that auditors may be biased in their evaluation, in that the responses may reflect the auditor's current experience with an engagement. However, it can also be argued that agency complexity is a fairly stable construct and, therefore, unlikely to change over a short-term period. As such, auditors are more likely to evaluate an agency's complexity on a long-term basis rather than on the current engagement. The measure for the level of reliance on internal control may be limited by the scope of responses that may limit the sensitivity of the scale. Rather than relying on a three-point scale (i.e., limited, moderate, extensive), future studies should, for example, incorporate a 7-point Likert-type scale from 1 (limited) to 7 (extensive) or a 100-point scale to increase the

sensitivity of the measurement. The lack of variance in the responses may account for the lack of significance between reliance on internal control and audit costs and fees.

## **Future Research**

Given the importance of the research issue, that is, contestability in the public sector audit market, future studies should address one of the limitations in this study by replicating this study in other jurisdictions in Australia and other countries. Replications are important because they assess initial findings and allow researchers to determine their confidence in the findings (Lindsay & Ehrenberg, 1993; Lindsay, 1995; Bamber, Christensen & Gaver, 2000). Lindsay argues that replication (under different conditions, different instruments, different methods and/or different researchers) provides a more crucial test of the reliability and validity of facts, hypotheses and theories. Therefore, facts are established when there is a “significant sameness” in related studies rather than interpreting the test of significance. However, in replicating studies, researchers should carefully note the main institutional factors in the public sector audit market in various jurisdictions and how those factors can impact on the findings.

In addition, there are several ways to test the effects of competition on audit costs. For example, one can test the effects of the Victorian’s public sector audit market restructuring in year-end 1999 on audit costs. The costs of audits that were not contracted-out before the restructuring are compared with the costs of the same audits that were obliged to be contracted-out in year-end 1999. However, the possible effect



of low-balling needs to be taken into account when interpreting the results. Another method would be to examine the level of competitiveness in each jurisdiction and its effect on audit fees and costs. Competition can be defined as the percentage of audits that are contracted-out or the number of tenders received.

Future research may focus on refining the use of cost data to investigate the relative efficiency between in-house providers and contractors. Data on charge-out rates, staff level of employee and audit hours per engagement may provide a more powerful test to investigate the issue of efficiency. For example, future studies can investigate the impact of labour or activity mix on the use of resources. In addition, future studies can focus on the OAG's charge-out rates for in-house and contract-out audits, with a focus on the Big 5 and non-Big 5 audits. This allows researchers to determine whether the OAG's pricing policy follows, on average, a cost-reimbursement policy.

Reform in public sector audit is based on the idea that a competitive audit market can deliver cheaper and/or higher quality audits. At present, the issues of audit demand and audit quality in the Australian public sector audit market are highly ambiguous. The absence of a capital market in the public sector suggests that the demand for audit in the public sector is probably not as strong as the demand in the private sector. The audit in the public sector may have a sole function of monitoring, rather than monitoring and signalling as found in the private sector. Future studies should address issues relating to audit quality, expertise and industry specialisation in the public sector. For example, what is the level of demand for audits in the public sector at the state level? Given that public agencies do not have the option of choosing their external auditors, how can the level of demand be determined? Alternatively, do all

agencies demand the same level of audit quality? A greater understanding of audit quality in the public sector audit market is important because it allows policy-makers and researchers to assess the relation between cost efficiency and effectiveness and the potential trade-off between the two concepts. As such, investigating the nature and, the cost and benefit of supervision costs would be a worthwhile research endeavour. Future research can examine the components of supervisory activities as “necessary” and “not necessary” or “important” and “not important” to assist discussions on whether supervision costs should be included in the costs of contract-out audits.

The measurements of agency risk and complexity in this study are based on the auditor’s assessments. Future studies can seek to identify and provide different measures of agency risk and complexity. This will allow the researchers, who do not have access to private sources, to develop an appropriate fee model and, thus, avoid mis-specifying the model. In addition, future studies should also measure assessments of control risk rather than reliance on internal control. Various components of control risk can be examined such as internal audit or management philosophy and attitudes.

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## Appendix 1

### *Department:*

Aboriginal Affairs Department  
 Agriculture WA  
 Chemistry Centre  
 Commerce & Trade  
 Conservation & Land Management (CALM)  
 Contract & Management Services (CAMS)  
 Culture & the Arts Ministry  
 Department of Land Administration (DOLA)  
 Department of Minerals & Energy (DOME)  
 Department of Public Prosecutions Office (DPP)  
 Education Department  
 Education Services  
 Electoral Commission  
 Energy Office  
 Environmental Protection  
 Equal Opportunity Commission  
 Fair Trading Ministry  
 Family & Children's Services  
 Fisheries Department  
 Governor's Establishment  
 Health Department  
 Industrial Relations Commission  
 Information Commissioner  
 Local Government  
 Main Roads  
 Ministry of Justice (MOJ)  
 Multicultural Interests Office  
 Office of Seniors Interests  
 Ombudsman's Office - Parliamentary Commissioner  
 Planning Ministry  
 Police Service  
 Premier & Cabinet Ministry  
 Productivity & Labour Relations (DOPLAR)  
 Public Sector Standards Office  
 Racing, Gaming & Liquor Office  
 Resources Development  
 Sport and Recreation Ministry

State Revenue Department  
 Training Department  
 Transport Department  
 Treasury Department  
 Valuer General's Office (VGO)  
 Water Regulation Office  
 Women's Policy Development Office  
 Worksafe WA

### *Statutory Authority:*

Aboriginal Affairs Planning Authority  
 Agricultural Practices Board  
 Agriculture Protection Board (APB)  
 Albany Port Authority  
 Alcohol & Drug Authority  
 Animal Resources Authority  
 Anti Corruption Commission  
 Art Gallery  
 Betting Control Board  
 Building & Construction (BCITB)  
 Building Management Authority (BMA)  
 Bunbury Port Authority  
 Bunbury Water Board  
 Burswood Park Board  
 Busselton Water Board  
 Carnarvon Banana Industry  
 Compensation Committee  
 Central Metropolitan College TAFE  
 Central West College  
 Centre for Application of Solar Energy (CASE)  
 Coastal Shipping Commission (Stateships)  
 Construction Industry Long Service Leave  
 Country High Schools  
 Curriculum Council of WA  
 Curtin University  
 Dairy Industry Authority  
 Dampier Port Authority  
 Disability Services Commission  
 East Perth Redevelopment  
 Eastern Goldfields Transport

## Appendix 1 (continued)

Edith Cowan University	Museum
Egg Marketing Board	National Trust
Esperance Port Authority	Parliamentary Super Board
Financial Institutions Authority	Pathology & Medical Research Centre
Fremantle Cemetery Board	Peel Dev Commission
Fremantle Port Authority	Perth Market Authority
Gaming Commission	Perth Theatre Trust
Gascoyne Development	Pilbara Dev Commission
Geraldton Port Authority	Planning Commission
Gold Corporation	Port Hedland Port Authority
Goldfields Esperance Development	Potato Growing Industry Trust Fund
Govt Employees Superannuation	Potato Marketing Corporation
Govt Employees' Housing	Poultry Industry Trust Fund
Grain Pool	Public Education Endowment
Great Southern Development	Public Trustee
Commission	Queen Elizabeth II Medical Centre
Great Southern Regional College	(QEII)
Greyhound Racing Association	Racecourse Dev Trust
Health Promotion Foundation	Racing Penalties Appeal Tribunal
Health Review Office	Real Estate & Bus Agents Board
Hedland College	Recreation Camps & Reserves Board
Herd Improvement Service	Rottneest Island Authority
Heritage Council	Rural Adjustment & Finance Corporation
Homeswest	Rural Housing Authority
Horticultural Produce Commission	Screen West (WA Film)
Keep Australia Beautiful	Settlement Agents Supervisory Board
Kimberley Development Commission	Small Business Dev Corp
Kings Park Board	South East Metropolitan TAFE
Landcare Trust	South Metropolitan College
Law Reform Commission (WALRC)	South West Development Commission
Legal Aid Commission	South West Regional TAFE
Legal Contribution Trust	Sports Centre Trust (Superdrome)
Legal Costs Committee	State Supply
Library Board (LISWA)	Subiaco Redevelopment
Local Health Authorities Analytical	Swan River Trust
Commission	Totalisator Agency Board (TAB)
Lotteries Commission	Tourism Commission
Meat Industry Authority	Treasury Corporation
Meat Marketing Corporation	University of Western Australia
Metro Bus	Waters & Rivers Commission
Metro Cemeteries Board	West Coast College
Metro Health Service Board	Western Australia Institute of Sport
Mid West Development	(WAIS)
Midland TAFE	Western Australia Land Authority
Minerals & Energy (MERIWA)	(WALA)
Murdoch University	Westrail
	Wheatbelt Development Commission

## Appendix 1 (continued)

Workcover WA  
Workplace Agreements  
Zoo

### *Hospital:*

Albany Health Service  
Ashburton Health Service  
Avon Health Service  
Beverley Hospital  
Boddington Hospital  
Boyup Brook Health Service  
Bridgetown Hospital  
Brookton Health Service  
Bruce Rock Hospital  
Bunbury Health Service  
Collie Health Service  
Corrigin District Hospital  
Cunderdin Hospital  
Denmark Hospital  
Dongara Health Service  
Donnybrook Health Service  
Dundas Health Service  
East Pilbara Health Service  
Esperance Health Service  
Gascoyne Health Service  
Geraldton Health Service  
Gnowangerup Hospital  
Harvey Health Service  
Hawthorn Hospital  
Jerramungup Hospital  
Kalgoorlie Health Service  
Katanning Health Service  
Kellerberrin Hospital  
Kimberley Health Service  
Kojonup Hospital  
Kununoppin Hospital  
Laverton & Leonora Health Service  
Merredin Health Service  
Morawa Health Service  
Mount Henry Hospital  
Mukinbudin Health Services  
Mullewa Health Service  
Murchinson Health Service  
Nannup Health Service

Narembeen Health Service  
Nickol Bay Hospital  
North Midlands Health Services  
Northampton Kalbarri Health  
Northcliffe Nursing Post  
Peel Health Services  
Pemberton Hospital  
Plantagenet Hospital  
Quadriplegic Centre  
Quairading Hospital  
Ravensthorpe Health Service  
Roebourne Hospital  
Tambellup Hospital  
Warren District Hospital  
Western Health Service  
Wickham Hospital  
Wyalkatchem-Kooda  
Yalgoo Health Services  
Yarloop Health Service

## Appendix 2

### In-house Audits

#### *Department:*

Aboriginal Affairs Department  
 Agriculture WA  
 Chemistry Centre  
 Commerce & Trade  
 Conservation & Land Management (CALM)  
 Contract & Management Services (CAMS)  
 Culture & the Arts Ministry  
 Department of Land Administration (DOLA)  
 Department of Public Prosecutions Office (DPP)  
 Education Department  
 Education Services  
 Electoral Commission  
 Energy Office  
 Environmental Protection  
 Equal Opportunity Commission  
 Fair Trading Ministry  
 Family & Children's Services  
 Fisheries Department  
 Governor's Establishment  
 Health Department  
 Industrial Relations Commission  
 Information Commissioner  
 Local Government  
 Main Roads  
 Minerals & Energy (DOME)  
 Ministry of Justice (MOJ)  
 Multicultural Interests Office  
 Office of Seniors Interests  
 Ombudsman's Office - Parliamentary Commission  
 Planning Ministry  
 Police Service  
 Premier & Cabinet Ministry  
 Productivity & Labour Relations (DOPLAR)  
 Public Sector Standards Office  
 Racing, Gaming & Liquor Office  
 Resources Development

Sport and Recreation Ministry  
 State Revenue Department  
 Training Department  
 Transport Department  
 Treasury Department  
 Valuer General's Office (VGO)  
 Water Regulation Office  
 Women's Policy Development Office  
 Worksafe WA

#### *Statutory Authority:*

Aboriginal Affairs Planning Authority  
 Agricultural Practices Board  
 Agriculture Protection Board (APB)  
 Albany Port Authority  
 Alcohol & Drug Authority  
 Animal Resources Authority  
 Anti Corruption Commission  
 Art Gallery  
 Betting Control Board  
 Building & Construction (BCITB)  
 Building Management Authority (BMA)  
 Bunbury Port Authority  
 Bunbury Water Board  
 Burswood Park Board  
 Carnarvon Banana Industry  
 Compensation Committee  
 CASE - Centre for Application of Solar Energy  
 Central Metropolitan College TAFE  
 Coastal Shipping Commission (Stateships)  
 Country High Schools  
 Curriculum Council of WA (98)  
 Curtin University  
 Dampier Port Authority  
 Financial Institutions Authority  
 Fremantle Cemetery Board  
 Fremantle Port Authority  
 Gaming Commission  
 Grain Pool  
 Great Southern Development Commission

## Appendix 2 (continued)

Great Southern Regional College	South West Regional TAFE
Health Review Office	Sports Centre Trust (Superdrome)
Hedland College	State Supply
Herd Improvement Service	Swan River Trust
Heritage Council	Tourism Commission
Homeswest	University of Western Australia
Horticultural Produce Commission	Waters & Rivers Commission
Keep Australia Beautiful	Western Australia Institute of Sport (WAIS)
Kimberley Development Commission	Wheatbelt Development Commission
Kings Park Board	Workcover WA
Landcare Trust	Workplace Agreements
Law Reform Commission (WALRC)	Zoo
Legal Aid Commission	
Legal Costs Committee	<i>Hospital:</i>
Local Health Authorities Analytical Commission	Albany Health Service
Lotteries Commission	Ashburton Health Service
Meat Industry Authority	Avon Health Service
Metro Bus	Beverley Hospital
Metro Cemeteries Board	Bruce Rock Hospital
Minerals & Energy (MERIWA)	Collie Health Service
Murdoch University	Corrigin District Hospital
National Trust	Cunderdin Hospital
Parliamentary Super Board	Denmark Hospital
Peel Dev Commission	Donnybrook Health Service
Perth Theatre Trust	East Pilbara Health Service
Pilbara Dev Commission	Harvey Health Service
Planning Commission	Hawthorn Hospital
Port Hedland Port Authority	Jerramungup Hospital
Potato Growing Industry Trust Fund	Kimberley Health Service
Poultry Industry Trust Fund	Mount Henry Hospital
Public Education Endowment	Nickol Bay Hospital
Public Trustee	Peel Health Services
Queen Elizabeth II Medical Centre (QEII)	Plantagenet Hospital
Racecourse Dev Trust	Quadriplegic Centre
Racing Penalties Appeal Tribunal	Quairading Hospital
Real Estate & Bus Agents Board	Roebourne Hospital
Recreation Camps & Reserves Board	Wickham Hospital
Rottnest Island Authority	Yarloop Health Service
Rural Adjustment & Finance Corporation	
Rural Housing Authority	
Settlement Agents Supervisory Board	
Small Business Dev Corp	
South Metropolitan College	
South West Development Commission	

## Appendix 2 (continued)

### Contract-out Audits

#### *Statutory Authority:*

Busselton Water Board  
Central West College  
Construction Industry LS  
Dairy Industry Authority  
Disability Services Commission  
East Perth Redevelopment  
Eastern Goldfields Transport  
Edith Cowan University  
Egg Marketing Board  
Esperance Port Authority  
Gascoyne Development  
Geraldton Port Authority  
Gold Corporation  
Goldfields Esperance Development  
Govt Employees Superannuation  
Govt Employees' Housing  
Greyhound Racing Association  
Health Promotion Foundation  
Legal Contribution Trust  
Library Board (LISWA)  
Meat Marketing Corporation  
Metro Health Service Board  
Mid West Development  
Midland TAFE  
Museum  
Pathology & Medical Research Centre  
Perth Market Authority  
Potato Marketing Corporation  
Screen West (WA Film)  
South East Metropolitan TAFE  
Subiaco Redevelopment  
Totalisator Agency Board (TAB)  
Treasury Corporation  
West Coast College  
Western Australia Land Authority  
(WALA)  
Westrail

#### *Hospital:*

Boddington Hospital  
Boyup Brook Health Service  
Bridgetown Hospital  
Brookton Health Service  
Bunbury Health Service  
Dongara Health Service  
Dundas Health Service  
Esperance Health Service  
Gascoyne Health Service  
Geraldton Health Service  
Gnowangerup Hospital  
Kalgoorlie Health Service  
Katanning Health Service  
Kellerberrin Hospital  
Kojonup Hospital  
Kununoppin Hospital  
Laverton & Leonora Health Service  
Merredin Health Service  
Morawa Health Service  
Mukinbudin Health Services  
Mullewa Health Service  
Murchinson Health Service  
Nannup Health Service  
Narembeen Health Service  
North Midlands Health Services  
Northampton Kalbarri Health  
Northcliffe Nursing Post  
Pemberton Hospital  
Ravensthorpe Health Service  
Tambellup Hospital  
Warren District Hospital  
Western Health Service  
Wyalkatchem-Kooda  
Yalgoo Health Services

### Appendix 3

<i>Big 5 Audit Firms:</i>	Total agencies	Total costs of contractors (\$)	
		Median	Mean
Arthur Andersen	2	52,843	52,843
Deloitte Touche Tomatsu	3	11,416	11,853
Ernst & Young	2	26,804	26,804
KPMG	3	59,565	58,703
PWC	1	-	83,605
Total	11	47,078	41,324

<i>Non-Big 5 Audit Firms:</i>	Total agencies	Total costs of contractors (\$)	
		Median	Mean
Anderson Mountford	1	-	6,474
Barret Partners	5	4,097	4,013
BDO Nelson	2	10,649	10,649
Bentleys	1	-	19,128
Bird Cameron	14	8,010	9,9993
Bulter Settineri	1	-	10,729
Grant Thornton	6	5,685	20,426
Hall Chadwick	13	8,795	27,811
Horwath	4	7,633	9,317
Pannell Kerr Forster	1	-	20,068
Shakespeare	1	-	20,864
Stanton Partners	10	8,577	11,020
Total	59	7,689	15,086



## Appendix 4

Level	Note	Private sector equivalent
Level 1		Junior
Level 2		Junior
Level 4		Junior
Level 5	A person at this level is described as a team leader in the OAG	Senior
Level 6	A person at this level is described as a senior team leader in the OAG	Senior
Level 7		Senior
Level 8		Manager
Level 9		Manager
Class 1		Partner
Class 3		Partner
Special 7		Partner