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THE EFFECT OF AUDIT FIRM SIZE ON AUDIT PRICES
A Study of the Australian Market

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The effect of audit firm size on audit prices is a complex function of competition in the market for audit services, product differentiation, and scale economies to large firms. In this study, a competitive market is supported in Australia with product differentiation to Big Eight accounting firms. Specifically, Big Eight accounting firms have significantly higher audit prices than non-Big Eight firms. This result holds for both 'large' and 'small' auditees. A test is also made of price cutting in the Australian market. Price cutting is defined as lower initial audit fees than continuing engagement fees for a comparable audit. Test results do not evidence price-cutting behavior by accounting firms. There is in fact weak evidence that initial audit fees are higher than continuing engagement fee levels. Higher initial fees suggest that accounting firms may recover at least some of the audit start-up costs immediately.

1. Introduction

The empirical question addressed in this study is how audit prices are affected by accounting firm size. A second issue is the effect of auditor changes on companies' audit fees. The relationship between audit prices and accounting firm size depends on (1) competition in the market, (2) the extent to which audit services are differentiated (product differentiation) and (3) potential scale economies to large accounting firms.

Competition is difficult to objectively measure. One approach uses market concentration by suppliers to proxy for competitiveness [Demsetz (1973)]. Concentration studies in accounting [see Buckley and O'Sullivan (1980) for a survey] indicate that Big Eight accounting firms[1] dominate the supply of audits to companies listed on the New York and American stock exchanges.[2] Big Eight concentration led to allegations that the auditing services market for

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[1]The Big Eight are: Arthur Andersen, Arthur Young, Coopers and Lybrand, Deloitte Haskins and Sells, Ernst & Whinney, Peat Marwick Mitchell, Price Waterhouse, and Touche Ross.

[2]U.S. Senate (1976) indicated the Big Eight audits 92% of the listings on the New York and 76% of the listings on the American stock exchanges.

publicly traded companies is an oligopoly with insufficient competition [U.S. House of Representatives (1976) and U.S. Senate (1976)], and investigation by the Federal Trade Commission for possible restraint-of-trade activity. An oligopolistic (or concentrated) market structure does not necessarily imply the occurrence of monopolistic pricing. Rather, pricing will be a function of the level of collusion among the dominant firms [Bain (1964)]. Simunic's (1980) evidence is consistent with a competitive U.S. auditing market. Informal evidence from the Cohen Commission Report [AICPA (1978)] and other sources [Bernstein (1978)] also suggests that price competition occurs rather than collusion.

Closely allied with the competition question is the nature of auditing services themselves. One view of audit services is that they are a homogeneous economic good. That is, an audit supplied by one accounting firm is a perfect substitute for an audit from another firm. Legally, of course, any licensed CPA can supply an audit. Criticism of large-firm dominance [see U.S. House (1976), U.S. Senate (1976) and AICPA (1980)] is predicated on the belief that smaller accounting firms are capable of supplying audits that are comparable to large-firm audits. Displacement, or the tendency to switch to Big Eight auditors when going public, is also criticized on the same grounds.[3] *Ceteris paribus*, accounting firm size would have no effect on either audits or audit prices if audits are homogeneous goods supplied in a competitive market, and assuming no scale economies exist.

There are reasons to believe that audits are not homogeneous and that product differentiation occurs with respect to audit quality. De Angelo (1981b, p. 186) defines audit quality as:

> the market-assessed joint probability that a given auditor will *both* (a) discover a breach in the client's accounting system, and (b) report the breach.

Reputation for audit quality, is based on perceptions of audit firm competence [part (a) of the definition] and independence from the client [part (b) of the definition]. Audits are, in effect, a market for reputations [Watts and Zimmerman (1981)].

Agency theory provides an explanation of why differing quality audits are demanded. There are economic incentives for some companies to demand higher quality audits to monitor contracts. Agency costs might be minimized in some high conflict owner–management situations by employing higher reputation auditors to review managements' financial statements, even though these audits cost more than lower quality audits. Where the agency setting has low conflict among contracting parties (for example, a manager-owned firm), lower

[3]See Bedingfield and Loeb (1974) for evidence on auditor switches.

quality and less costly minimum compliance audits might be demanded from accounting firms with lower reputations for independence and competence.

Evidence supports that investors perceive reputational differences between large and small accounting firms. Libby (1979) reports evidence that bank loan officers perceive differences in reputations of accounting firms, particularly outside the Big Eight group. Shockley (1981) indicates that perceptions of auditor independence are significantly different between large and small accounting firms when non-audit services are performed. Shockley and Holt (1983) report a study in which perceptions of auditor reputation are differentiated even within the Big Eight group.

The tendency to switch auditors when companies go public is also consistent with the differentiated demand argument. Large accounting firms are preferred by underwriters (and probably companies themselves), because it is perceived that the securities will be more marketable if an auditor is used who has a higher reputation.

DeAngelo (1981b) argues that audit quality is directly related to the size of accounting firms but for a different reason. It is posited that accounting firms earn client-specific quasi-economic rents due to technological advantages of incumbency. Larger firms stand to lose more client-specific quasi-economic rents if a loss in reputation occurs because they have more clients. For this reason large firms have a greater incentive to supply higher quality audits in order to avoid a loss in reputation, and thus accounting firm size serves as a proxy for audit quality.

If audit quality is not homogeneous across accounting firms, two implications follow. First, market concentration may occur but it is incorrect to suggest that small accounting firms are 'unfairly' squeezed out of the market for audits of publicly-traded companies. An alternative explanation is that small firms have chosen not to invest in the brand name capital that is necessary to build up and maintain their reputations to compete in a certain segment of the market. Second, if large firms supply higher quality audits as has been argued in the literature, then large-firm audit prices will be higher than small-firm prices – given a competitive market structure, the absence of scale economies, and the existence of differentiated demand.

Large accounting firms may experience scale economies in the audits of large companies [Simunic (1980)]. Technological considerations require an appropriate matchup of auditee size and auditor ability to conduct the audit. Large accounting firms would be able to spread the cost of the necessary infrastructure (e.g., human capital and multiple-office location) over more audits, giving them a cost advantage. Scale economies would result in lower prices by large accounting firms for large auditees.

This paper extends Simunic's (1980) tests of the effect of accounting firm size on audit prices. The remainder of the paper is organized as follows. Hypothe-

ses and research design are presented in the next section. The multiple regression model used to test the hypotheses is developed in section 3. Test results of Hypotheses 1 and 2 are reported in sections 4 and 5. The tests are discussed in section 6. A summary of the study is made in section 7.

2. Hypotheses and research design

The first question to be examined in this study is the relationship between accounting firm size and audit prices. Big Eight accounting firms are used as a proxy for large auditors and non-Big Eight firms as a proxy for small auditors.[4] The market studied is the Australian auditing services market over the period 1974–1978. The null hypothesis is stated formally as:

Hypothesis 1. Audit firm size has no significant effect on audit prices in Australia.

If competition prevails in the audit services market, one of the following three scenarios would hold regarding audit prices [Simunic (1980)]:[5]

Scenario 1: No price differences between Big and non-Big Eight firms would indicate no product differentiation or scale economies.
Scenario 2: Higher Big Eight prices would indicate product differentiation to Big Eight auditors.
Scenario 3: Lower Big Eight prices would indicate economies of scale to Big Eight auditors.

Hypothesis 1 is tested by use of a multiple-regression equation of the audit fee function. Multiple regression has been used in other similar studies [Elliott and Korpi (1978), Simunic (1980), and Taffler and Ramalinggam (1982)]. Simunic (1980) states that observed audit fees are a function of both quantity and price. Therefore, in order to make inferences about audit prices, it is necessary to control for the quantity of auditing supplied. A set of variables is used to control for audit quantity and a dummy variable (the experimental variable) is then used to represent audit firm size. Non-Big Eight firms are given a value of zero and Big Eight firms a value of one. The null hypothesis is that the regression coefficient of the audit firm size variable is not significantly different from zero. In previous audit fee research using regression analysis, Hypothesis 1 has been rejected using United Kingdom data [Taffler and

[4] Grouping into the Big Eight and non-Big Eight categories follows the conventional treatment in accounting literature. It should also be noted that the U.S. Big Eight are also the largest firms in Australia.

[5] Other scenarios are possible if competition does not exist.

Ramalinggam (1982)], but was inconclusive in the United States [Simunic (1980)].[6]

In order to test the joint effects of product differentiation and scale economies, separate regressions are made on 'large' and 'small' auditee partitions of the sample [see Simunic (1980)]. It is assumed that competition prevails in the 'small' auditee market segment. Technological feasibility exists for small accounting firms to audit small auditees, and this reduces market concentration. Francis (1978) reports that large numbers of Australian accounting firms audit one or two publicly traded clients. Also, the overall level of concentration is lower in Australia than in the U.S. Big Eight firms audit about half the companies listed on the Sydney Stock Exchange [Francis and Pollard (1979)]. In summary, the small market segment is used as a competitive benchmark to test the effects of accounting firm size on audit prices. If price tests are consistent between the large and small partitions, then one of the three scenarios outlined above is supported.

Thirty companies were selected from each of the years 1974 to 1978, for a total sample of 150 companies.[7] Companies were selected at random from the industrials listing of the Sydney stock exchange. Data were obtained from the companies' annual reports and the Investment Service of the Sydney Stock Exchange. Using five years of data in a pooled cross-sectional regression, and testing for consistency across the five periods, establishes a more generalisable result than a cross-sectional regression based on one year of data. No companies in the sample represented initial audit engagements. Auditor remuneration is statutory disclosure in Australia and must be separated into audit and non-audit portions.[8] A total of 71 companies in the sample employed Big Eight accounting firms, and 79 employed non-Big Eight firms. This sample is consistent with the fact that Big Eight firms audit about half of Australian publicly traded companies.

The second pricing question to be examined in this study concerns the impact of a change in auditor on audit prices. There have been allegations and anecdotal evidence in the U.S. that accounting firms engage in 'low balling' to gain new clients.[9] DeAngelo (1981a, p. 11) defines low balling as 'setting audit fees below total current costs on initial audit engagements'. The public interest concern about low balling is the adverse effect it could have on audit quality.

[6]The Simunic (1980) study is discussed in sections 2 and 3.

[7]The sample was selected from the June 30, 1979 Sydney Stock Exchange listing of industrial companies. Companies having joint auditors were eliminated from the population as were companies not on file at the Sydney Stock Exchange library of annual company reports. The period 1974–1978 was selected because 1978 was the most recent year available when the research commenced, and a five-year period was considered suitable for a pooled regression.

[8]New South Wales Companies Act of 1971 (as amended), section 166.

[9]For anecdotal evidence, see AICPA (1978, p. 110).

The Cohen Commission Report [AICPA (1978, p. 110)] suggested that low balling leads to time and budget pressures, which in turn results in substandard auditing. DeAngelo (1981a) argues that low balling is a competitive response to expected future client-specific quasi-economic rents. Initial audit returns are foregone (the low balling) in expectation of higher future returns. Therefore low balling does not necessarily impair auditor independence or audit quality.

Low balling cannot be directly observed because audit costs are proprietary information. What has been observed is better called audit fee price cutting. Therefore, a test is made of price cutting rather than low balling, and provides only an indirect test of low balling. Price-cutting behavior is tested by comparing the initial audit fee to: (1) the precedessor auditor's fees, (2) the second-year fee, or (3) a continuing audit fee for a comparable audit.[10]

The second null hypothesis to be tested is:

Hypothesis 2. There is no significant price cutting of initial audit fees in Australia.

Hypothesis 2 is tested in the following manner. A sample of companies changing auditors is selected. Predicted initial audit fees are calculated using the regression equation developed for the testing of Hypothesis 1. Because the original sample of 150 companies excluded first-year audits, the regression equation represents a model of audit fees for continuing audit engagements. Differences between actual initial fees and predicted initial fees can be attributed to the initial engagement. If price cutting is a widespread practice, actual first year audit fees would be consistently lower than predicted fees derived from the regression model. A ranked sign test is used to determine the probability that differences between actual and predicted audit fees are due to chance. Price cutting is evidenced (rejection of Hypothesis 2) if differences between actual and predicted fees are negative and the probability is low that the differences are due to random chance. Price cutting could also be observed either as a lower initial fee compared to the prior-year fee, or as a lower initial fee compared to the second-year fee, and is tested in the same manner described above.

[10]Low balling describes a relationship between audit fees and audit costs in which initial audit fees are lower than total audit costs. Low balling theory makes no explicit statement about the relationship between initial and subsequent audit fees. However, the following two-period model was suggested by Professor DeAngelo. Audit costs are \$100 in t_0 and \$0 in t_1, with t_0 the year of initial audit. A zero interest rate is assumed. If audit fees are \$50 in t_0 and \$50 in t_1, low balling occurs but fee levels are constant. Unrecovered costs of \$50 in t_0 are recovered in t_1. If audit fees are \$60 in t_0 and \$40 in t_1, low balling again occurs but a higher initial audit fee is observed. Finally, if audit fees are \$40 in t_0 and \$60 in t_1, low balling occurs but a lower initial fee is observed. So, the existence of audit fee price cutting does not confirm the existence of low balling, but it would describe a scenario consistent with low balling in which future fee-raising potential is present. This fee-raising potential would drive initial fees below future fee levels, all other factors held constant.

The sample of initial audit engagements to test Hypothesis 2 was restricted to the period 1974 to 1978. This was done because the regression model used to predict fees is based on data from 1974 to 1978. Twenty-six initial audit engagements were sampled and tested.[11] Eighteen companies in the sample chose a Big Eight accounting firm, and eight companies chose a non-Big Eight auditor. The changes were distributed throughout the five periods. Three changes occurred in 1974, ten in 1975, eleven in 1976, and one each in 1977 and 1978.

3. Regression model

Previous studies have used various regression equations to depict the audit fee function [Elliott and Korpi (1978), Simunic (1980), Taffler and Ramaling-gam (1982), and Taylor and Baker (1981)]. The most completely specified model is Simunic (1980) and it is adapted for use in this study.

Simunic used ten variables to control for the quantity of auditing supplied. The audit fee control variables were classified in three categories: (1) accounting firm production function, (2) loss exposure attributable to the audit, and (3) how the loss risk is shared between the accounting firm and the auditee. The auditor production function control variable was the number of years on the audit (a learning curve effect). Loss exposure was evaluated in terms of asset composition (types of assets being audited) and organizational complexity. Asset composition consisted of percentage of assets in inventories, receivables and foreign assets, respectively. Organizational complexity was denoted by the number of subsidiaries (a square root transformation) and the number of different industries in which the firm operates. Allocation of the loss risk between auditor and auditee was represented by the type of opinion issued by the accounting firm, auditee profitability (ROI), and the existence of a net loss in any of the three most recent reporting years. A dummy variable for accounting firm size was the experimental variable.

In order to test the effect of accounting firm size on audit fees (after controlling for quantity), Simunic partitioned the sample into 'large' and 'small' auditees. His findings did not statistically evidence either product differentiation or scale economies for seven of the Big Eight firms. The sign of the accounting firm dummy variable was negative, a finding which implied scale economies for the Big Eight. But it was not statistically significant in the partitioned samples. Price Waterhouse (PW) was given a separate dummy variable because its average fees were higher than the other Big Eight firms. The sign of the PW dummy variable implied product differentiation (higher fees), but was significant only for the large partition.

[11] The sample was selected from a review of approximately 500 companies whose annual report was available from the Australian Graduate School of Management subscription service of annual reports on microfiche.

The original intent was to replicate Simunic's study on Australian data. However, since the replication is based on publicly available data in Australia, this was not possible. Three control variables were not available: percentages of assets in foreign assets, number of operating industries, and years on the audit by the auditor. In addition, percentage of assets in current assets is used rather than percentages of assets in receivables and inventories.[12] Simunic's (1980) remaining five control variables are used here and defined in the same manner.

Three additional control variables are used. Two of these pertain to liquidity and financial structure: the quick ratio and equity to debt ratio. It is hypothesized that these two ratios are associated with the auditor's loss exposure or audit risk. The argument assumes that auditee financial risk relating to debt also affects audit risk. Specifically, a small quick ratio and equity–debt ratio should be associated with higher financial and audit risk than a large quick ratio and equity–debt ratio. Schultz and Gustavson (1978) found that auditee financial characteristics affect perceptions of audit risk. The third new variable, month of year-end, is introduced to control for off-peak pricing. A non-June 30 year-end is predicted to reduce audit fees, all other factors held constant because June 30 is the predominant Australian year-end. A dummy variable is used with 0 representing non-June 30 year-ends and 1 representing June 30 year-ends. This control variable is related to the auditor production function.

The dependent variable used in this study is $\log_{10}$ external audit fees. Simunic deflated audit fees by the square root of assets to control for size effects. The approach taken here is to control for size by using $\log_{10}$ assets as an independent variable.[13] When assets are incorporated into the dependent variable as a deflator, it is implied that all of the independent variables are related to assets. Such a relationship is not borne out in the regression results. Assets are not highly correlated with other variables except number of subsidiaries (see table 2 later in the paper).

Simunic used two separate regression equations: one using external audit fees as the dependent variable, and one using external audit fees plus internal audit staff salaries as the dependent variable. External fees plus internal audit salaries was used to proxy for total audit cost. In this study it is necessary to use 'external audit fees' as the dependent variable since information on internal audit staff salaries is not public information. However, internal audit departments were only beginning to develop in Australia during the 1970s. Therefore, external audit fees are considered to be a better estimate of total audit costs in Australia than they would be in the U.S. It should also be noted

[12]This study was commenced prior to the publishing of Simunic's results. I chose a similar set of control variables, but used percentage of current assets rather than more detailed percentages.

[13]A regression model using deflated audit fees as the dependent variable was evaluated and produced similar results. However, the model violated regression assumptions of constant variance and normally distributed residuals.

that Simunic's results for the two dependent variables were consistent in the partitioned samples for the seven Big Eight firms. Only the PW result was not consistent for both definitions of the dependent variables.

Australian companies are required to report total fees and the components – audit and non-audit fees. Companies or auditors may have incentives to skew cost allocations between 'audit' and 'non-audit' categories.[14] If such skewing exists and occurs in a systematically different way between Big Eight and non-Big Eight auditors, then the tests reported here based on audit fees would be distorted. Francis and Pollard (1979) analyzed non-audit fees for companies listed on the Sydney stock exchange at June 30, 1976, which is in the middle of the 1974–1978 period tested here. They found that the ratio of non-audit fees to total auditor remuneration (both audit and non-audit) was not significantly different between Big Eight and non-Big Eight firms. However, since the test was based on reported numbers that may be the product of skewing, the results do not unambiguously reject skewing. Therefore, the possibility exists that skewing occurs in which case the regression results reported here could be distorted.[15]

The audit fee model is formally defined as

$$\begin{aligned}&\log_{10}\text{External audit fee}\\&= a + b_1\log_{10}\text{Assets(\$000)} + b_2\text{Subsidiaries}^{0.5} + b_3\text{Current asset\%}\\&\quad + b_4\text{Quick ratio} + b_5\text{Equity–debt ratio} + b_6\text{ROI}\\&\quad + b_7\text{Loss in last 3 years} + b_8\text{Audit opinion}\\&\quad + b_9\text{Month year-end} + b_{10}\text{Accounting firm} + \varepsilon.\end{aligned}$$

The first six independent variables are continuous variables. The last four are 0–1 dummy variables. 'Loss in last 3 years' has a value of 1 if a loss occurred.

[14]This point was raised by Professor Watts.

[15]Francis and Pollard (1979) performed a distribution test of the ratio of non-audit fees to total auditor remuneration. Such a test was considered more appropriate than a central tendency test because 25% of the companies had no non-audit fees (a ratio of zero). A Kolmogorov–Smirnov test was used and the hypothesis of no differences in the two distributions could not be rejected at $\alpha = 0.10$. However, because the test is based on numbers which may be skewed, the results are somewhat ambiguous. A further test is made here by considering the number of auditees having 'no' and 'some' non-audit fees. The following 2×2 contingency table results [source: Francis and Pollard (1979)]:

	No non-audit fees	Some non-audit fees
Companies with Big Eight auditors	102	366
Companies with non-Big Eight auditors	135	326

The assumption underlying this test is that skewing opportunities only exist in the presence of non-audit fees. A chi-square value of 6.85 results from this 2×2 contingency table, rejecting a hypothesis of variable independence at $\alpha = 0.01$. Clients of Big Eight firms thus have more opportunity to skew, though whether they actually do remains an open question.

'Audit opinion' is a dummy variable with a value of 1 if a qualified audit report is issued. Month of year-end has a value of 1 for June 30 year-ends. Finally, accounting firm is also a dummy variable with a value of 1 if the auditor is a Big Eight firm.

Simunic's sample was sensitive to industry effects. Specifically, dummy variables representing banks and utilities were significant. Banks were dropped from his sample because they produced residual outliers and were all audited by Big Eight firms. The sample reported here contained no utilities but included 14 financial institutions. Other dummy variables were tried for different industries, but only financial institutions was significant at $\alpha = 0.10$ or lower. Consequently, these fourteen observations were dropped from the original sample of 150 to produce a more homogeneous final sample of 136 companies. The final sample had 64 Big Eight auditors and 72 non-Big Eight auditors.

4. Test of Hypothesis 1

Regression results are summarized in table 1. A correlation matrix is reported in table 2. For the overall sample, Hypothesis 1 is rejected $\alpha = 0.01$. Accounting firm size is significant. The sign of the regression coefficient is positive which means that large firms (the Big Eight) are associated with higher external audit fees.[16] In order to determine that one or two firms did not drive the results, a regression was also made using eight dummy variables, one for each Big Eight accounting firm. Four firms were significant at the 0.10 level.[17] A partial ANOVA, also called a Chow test, indicated the regression model was consistent over the five time periods.[18] A hypothesis of equal slopes and intercepts could not be rejected (the right-tail probability of the F-ratio was 0.228). This supports pooling the five years of data in one cross-sectional regression.

Analysis of residuals for the total sample indicated no violation of regression assumptions. A hypothesis that the residuals were normally distributed could not be rejected at $\alpha = 0.082$ (using a Kolmogorov D-statistic). Finally, a Goldfeld–Quandt test was performed to determine if the constant variance assumption was violated.[19] The hypothesis of homoscedasticity could not be rejected at $\alpha = 0.10$. A good linear fit was achieved by the regression model.

[16]Significance levels are likely to be overstated because of cross-sectional and time-series dependence in the observations.

[17]Signs were positive for seven of the eight dummy variables. The one firm with a negative sign had only one audit in the sample.

[18]The hypothesis tested is that regression slopes and intercepts are consistent across subsamples partitioned from a total sample. See Chow (1960) for a description of the test.

[19]See Goldfeld and Quandt (1965) for a description of the test. The procedure is to run the regression model separately on the highest 40% of the predicted value of the dependent variable and the lowest 40%. The null hypothesis is that the sum of squared errors for the two subsamples will be equal (homoscedasticity). The calculated F-ratio is 1.09 with 54,54 degrees of freedom.

Table 1

Regression equations: Dependent variable is external audit fee ('small' and 'large' subsamples are partitioned at the median auditee asset value of the pooled sample, 1974–1978).

	Predicted sign	Total sample ($n = 136$)			'Small' subsample ($n = 68$)			'Large' subsample ($n = 68$)		
		Coefficient	Std.error	T-statistic	Coefficient	Std.error	T-statistic	Coefficient	Std.error	T-statistic
Intercept		1.977	0.240	8.251[a]	1.780	0.531	3.355[a]	1.625	0.589	2.759[a]
Coefficients of independent variables										
$\log_{10}$assets ($000)	+	0.461	0.059	7.865[a]	0.479	0.137	3.494[a]	0.545	0.123	4.430[a]
Subsidiaries$^{0.5}$	+	0.108	0.016	6.931[a]	0.159	0.029	5.502[a]	0.093	0.020	4.689[a]
Current asset %	+	0.404	0.151	2.670[a]	0.026	0.250	0.102	0.641	0.217	2.961[a]
Quick ratio	−	0.004	0.025	0.180	0.011	0.032	0.332	−0.004	0.042	−0.090
Equity–debt ratio	−	0.004	0.019	0.213	0.012	0.020	0.611	−0.060	0.058	−1.046
ROI	−	−0.257	0.367	−0.703	−0.205	0.374	−0.547	0.243	1.421	0.171
Loss in last 3 years	+	−0.027	0.061	−0.452	−0.041	0.085	−0.479	0.022	0.094	0.234
Audit opinion	+	0.046	0.078	0.598	−0.014	0.115	−0.121	0.212	0.129	1.643
Month year-end	−	0.033	0.056	0.572	0.073	0.083	0.874	−0.033	0.085	−0.384
Accounting firm (Big Eight = 1)	+ or −	0.153	0.051	2.982[a]	0.175	0.076	2.300[b]	0.174	0.083	2.097[b]
Overall F-test		34.652[a]			7.376[a]			8.99[a]		
R^2		0.735			0.564			0.612		
Adjusted R^2		0.714			0.489			0.544		
Standard error of estimate		0.289			0.270			0.306		
Partial ANOVA, time period subpopulations $F = 1.209$ ($p = 0.228$)										
Partial ANOVA, auditee size subpopulations $F = 1.142$ ($p = 0.336$)										

[a]Significant at $\alpha = 0.01$.
[b]Significant at $\alpha = 0.05$.

Table 2

Correlation matrix ($n = 136$).

	$\log_{10}$ audit fee	$\log_{10}$ assets	Subsidiaries$^{0.5}$	Current asset %	Quick ratio	Equity–debt ratio	ROI	Loss in last 3 years	Audit opinion	Month year-end	Accounting firm
$\log_{10}$ audit fee	1.000										
$\log_{10}$ assets	0.770	1.000									
Subsidiaries$^{0.5}$	0.746	0.653	1.000								
Current assets %	0.169	0.065	0.055	1.000							
Quick ratio	0.076	0.048	0.002	0.259	1.000						
Equity–debt ratio	−0.124	−0.196	−0.123	0.034	0.102	1.000					
ROI	−0.004	0.035	0.049	0.081	−0.010	−0.038	1.000				
Loss in last 3 years	−0.099	−0.072	−0.122	0.044	−0.157	−0.030	−0.276	1.000			
Audit opinion	0.055	0.011	0.017	0.034	−0.077	0.018	−0.001	−0.012	1.000		
Month year-end	−0.007	−0.096	0.035	0.025	−0.015	−0.108	−0.018	−0.099	0.030	1.000	
Accounting firm	0.070	−0.054	−0.089	−0.118	0.048	0.132	−0.168	0.002	0.067	−0.054	1.000

Table 3

Means and standard deviations (in parentheses) of the dependent and independent variables used in the regression tests: Data are from 1974–1978.[a]

Variable	Total sample ($n = 136$)	Big Eight ($n = 64$)	Non-Big Eight ($n = 72$)
$\log_{10}$assets ($000)	4.308 (0.577)	4.275 (0.613)	4.338 (0.547)
Subsidiaries$^{0.5}$	3.575 (2.132)	3.374 (1.900)	3.754 (2.318)
Current asset %	0.141 (0.174)	0.119 (0.172)	0.160 (0.174)
Quick ratio	1.123 (1.079)	1.178 (1.021)	1.074 (1.133)
Equity–debt ratio	0.801 (1.402)	0.997 (1.927)	0.628 (0.614)
ROI	0.056 (0.072)	0.043 (0.098)	0.067 (0.035)
Loss in last 3 years (yes)	26.5%	26.6%	26.4%
Audit opinion (clean)	88.2%	85.9%	90.3%
Month year-end (June 30)	71.3%	68.8%	73.6%
$\log_{10}$external audit fee	4.494 (0.539)	4.534 (0.495)	4.459 (0.577)

[a]Equality of means between Big Eight and non-Big Eight partitions could not be rejected at $\alpha = 0.05$ using a two-sample t-test for each variable.

Simunic (1980) partitioned his sample into 'small' and 'large' auditees and did separate regressions on the partitions. The same approach is used for this study. The sample of 136 companies was partitioned into 'small' and 'large' halves based on the median value of auditee assets.[20] Mean auditee assets of the partitioned samples were $8.3 million and $90.2 million, respectively. Based on these partitions, a partial ANOVA (Chow test) was performed on the total sample. A hypothesis of regression equality across the two size partitions could not be rejected. The right-tail probability of the F-ratio was $p = 0.336$. This test supports that the overall regression results are consistent for the small and large halves of the sample.

In addition, separate regressions are reported in table 1 for the partitioned sample. Using a two-tail test, the accounting firm variable is significant at $\alpha = 0.05$ for both the small and large partitions. The sign of the coefficient is positive which indicates that large firms are associated with higher audit prices. Given the assumption of competition in the small segment of the audit services market, higher prices by large firms in *both* partitions evidence product differentiation [Simunic (1980, table 3, p. 171)].

Univariate statistics on regression variables are reported in table 3. Sample means are reported first, then subsample means for companies with Big Eight auditors and non-Big Eight auditors, respectively. T-tests are also reported on the equality of subsample means. None of the variables was significantly different between the two subsamples. The broad similarity of the two subsam-

[20]The median of auditee assets was determined from the pooled sample taken as a whole.

ples contrasts with Simunic's U.S. study where both audit fees and assets were sensitive to auditor size (*t*-tests were not reported). Given the similar characteristics of Australian companies audited by Big Eight and non-Big Eight auditors, it is not surprising that the regression model is consistent for the entire range of auditee size in the sample.

5. Test of Hypothesis 2

Univariate statistics for the sample of 26 companies changing auditors are reported in table 4. *T*-tests were made on mean values of variables for the auditor change sample compared with the original sample (table 3). None of the *t*-tests were significant at $\alpha = 0.05$ except a 'loss in the last 3 years' and the type of audit opinion issued. These two factors could be related to the decision to change auditors. For a discussion of auditor–client disagreements see Chow and Rice (1982) and DeAngelo (1982). However, basic size and fee levels were not significantly different between the two samples. Overall, then, the sample of companies changing auditors is similar to the original sample on which the regression model is derived. It is appropriate to use the regression model (table 1) to calculate expected audit fees for the sample of companies changing auditors.

Differences between actual and predicted initial audit fees were ranked by sign and tested using the Wilcoxon ranked sign test. A positive sign denotes

Table 4

Descriptive statistics of variables for the sample of auditor changes[a] (standard deviations in parentheses).

Variable	Sample of auditor changes ($n = 26$)
$\log_{10}$assets ($000)	4.388 (0.641)
Subsidiaries$^{0.5}$	3.675 (1.731)
Current asset %	0.164 (0.171)
Quick ratio	1.241 (2.422)
Equity–debt ratio	0.696 (0.544)
ROI	0.058 (0.059)
Loss in last 3 years (yes)	53.8%
Audit opinion (clean)	69.2%
Month year-end (June 30)	69.2%
$\log_{10}$external audit fee	4.620 (0.529)

[a]Equality of means for continuous variables between the sample of auditor changes and the original sample (table 3) could not be rejected at $\alpha = 0.05$ using a two-sample *t*-test. However, the portion of companies having a loss in the last three years was much larger in the auditor change sample (53.8% versus 26.5%), and the number of clean audit opinions was somewhat smaller (69.2% versus 88.2%).

actual fees exceed predicted, and a negative sign indicates that actual fees are lower than predicted (price cutting). Two groupings were made to test Hypothesis 2. First, all 26 changes were analyzed as one group. Twenty-one companies had higher than predicted fees and five had lower than predicted. Positive ranks were 232, and negative ranks were 119. A second grouping was made by partitioning the sample into the eighteen Big Eight auditors and eight non-Big Eight auditors. The Big Eight group had positive ranks of 99 and negative ranks of 72. Non-Big Eight auditors had positive ranks of 29 and negative ranks of 7. For both groupings, Hypothesis 2 cannot be rejected at $\alpha = 0.10$. There is no systematic evidence of price cutting because negative ranks occur significantly less than half the time.

An alternative test was also undertaken due to noise in the regression predictive model (adjusted $R^2 = 0.714$). Price cutting could be observed as either (1) a lower initial audit fee compared to the previous auditor's fee, or (2) a lower initial audit fee compared to the second-year fee. Both tests were performed. In order to compare audit fees between consecutive years a price-level adjustment is made.[21] The price deflator is based on average yearly changes in audit fees for a random sample of thirty companies not changing auditors. The mean yearly changes in fees were: 1974 12.8%, 1975 33.03%, 1976 20.30%, 1977 13.8%, 1978 16.45%, and 1979 8.8%.

Results for initial fee versus previous auditor's fee do not support the existence of price cutting. Initial fees were lower for 11 companies and higher for 15 companies. Positive ranks were 217 and negative ranks (price cutting) were 134. The price cutting hypothesis could not be rejected at $\alpha = 0.10$. Same results occurred when the sample was partitioned into Big Eight and non-Big Eight accounting firms.

Results of the initial fee versus second year fee test also fail to evidence price cutting. Initial fees were lower for 11 companies and higher for 15 companies. Positive ranks were 148 and negative ranks (price cutting) were 203. Hypothesis 2 cannot be rejected at $\alpha = 0.10$. Same results occurred again when the sample was partitioned into Big Eight and non-Big Eight accounting firms.

6. Discussion of the tests

Simunic (1980, p. 170) suggests that the audit services market is hedonic in which 'differentiated products are not observed directly but rather are revealed by differences in prices which are associated with differences in observed product characteristics'. The test of Hypothesis 1 supports the existence of product differentiation in the Australian audit services market. Big Eight firms are associated with higher audit fees, for both large and small auditees. This is consistent with a differentiated demand for audit quality or reputation. It appears that companies voluntarily contract for higher priced audits from large

[21] Tests were also made on the unadjusted fees, and the results of the tests were the same.

accounting firms because it is perceived that higher quality audits will be purchased. These findings are, of course, limited to the Australian audit services market.

A similar test of the British market [Taffler and Ramalinggam (1982)] is consistent with the current test of Australian market. Large accounting firms are associated with higher prices in Australia and Great Britain. However, only one firm (Price Waterhouse) had higher prices in the U.S. study [Simunic (1980)]. The other seven Big Eight firms had lower prices than non-Big Eight firms. That is, the accounting firm regression coefficient was negative, though not significant when the sample was partitioned into small and large auditees. The U.S. study offers weak evidence on the existence economies of scale in the U.S. market. One possible interpretation of these three studies is that there are scale economies in the U.S. market which offset higher prices related to product differentiation. If such scale economies do not exist in the British or Australian markets, pricing there would only reflect product differentiation; whereas, the effect of product differentiation on U.S. audit prices may be offset by scale economies.

In Australia and Britain, Big Eight firms audit about 50% of publicly listed companies [Francis and Pollard (1979)]. This compares with 92% of NYSE and 76% of AMEX listings in the U.S. [U.S. Senate (1976)]. The Big Eight also audit about 50% of OTC listed companies [McConnell (1984)]. One possible reason for higher concentration in the U.S. is auditee size. The mean assets in Simunic's (1980) sample was $551 million compared to $49 million for the Australian sample. Large and small partition means were $892 million and $176 million in the U.S. sample, and $90 million and $8 million in the Australian sample. Clearly, the U.S. sample was larger by an average factor of around 10.

These size differences may give rise to scale economies in the U.S. market. Large companies are more likely to have complex accounting systems and geographically dispersed operations. Large accounting firms are more likely to have specialized audit skills and also numerous offices which can perform the necessary participating engagements for companies with dispersed operations. If scale economies dominate the U.S. pricing structure, it may not be possible to identify product differentiation by observing audit fees. As a result, perception type studies [such as Shockley (1981) and Shockley and Holt (1983)] may offer the only direct evidence in support of product differentiation.

The second audit pricing hypothesis concerning price cutting could not be rejected. The often-alleged price-cutting behavior to gain new clients is not supported in the Australian market. There is actually weak evidence that initial audit fees are higher than fees on continuing engagements. Higher initial audit fees are consistent with conventional arguments relating to audit start-up costs and suggest that accounting firms recover some of these costs immediately.

The test results in price cutting are not necessarily inconsistent with low balling [as defined by DeAngelo (1981a)]. It would still be possible for initial

audit costs to exceed initial audit fees, even if initial audit fees are higher than subsequent fees. [See footnote 10.] The results here suggest that future fee-raising does not occur and hence does not affect the amount of low balling. It is not possible to make a more precise statement about low balling due to the absence of proprietory information on audit costs.

7. Summary

A regression model of the audit fee function was utilized to determine the effects of accounting firm size on audit fees in the Australian market. A set of control variables was used to control for other factors affecting fees. Accounting firm size was then included in the model as the experimental variable. A 0–1 dummy variable was used with a value of 1 for companies having a Big Eight auditor. A good linear fit was achieved with the model and the accounting firm size variable was significant. The sign of the coefficient was positive indicating higher audit prices for Big Eight firms. Separate regressions were made for the sample partitioned into small and large halves. This was done to test a joint hypothesis of product differentiation and economies of scale. Results were consistent for both small and large auditees, supporting that product differentiation was present in a competitive market structure.

The observation of systematic price differences between large and small accounting firms evidences product differentiation to large firms in the Australian audit services market. Higher prices are consistent with higher quality audits. Differentiated demand for audit quality appears to exist, as well as differential supply between large and small accounting firms. This conclusion follows because companies can legally satisfy statutory audit requirements by use of small (and less expensive) accounting firms.

Price cutting of initial audit fees was evaluated in the second part of the study. If price cutting were present, initial fees could be observed as being lower than the predicted fees based on a regression model of continuing engagements, or lower than either prior-year or subsequent-year fees. Three separate tests were made. The regression model of the audit fee function (from part one of this study) was used to predict initial audit fees. Actual fees were then compared to predicted fees. Initial audit fees were also compared with prior and subsequent year's fees. A Wilcoxon ranked sign test was used to evaluate the differences between actual and predicted fees.

The evidence is inconsistent with price cutting of initial audit fees by either Big Eight or non-Big Eight accounting firms in Australia. In fact there is weak evidence that initial audit fees are higher than continuing engagement fee levels. It appears that accounting firms may recover initial audit start-up costs in the first year.

Finally, the possibility that the amount of low balling [DeAngelo (1981a)] is affected by future fee-raising potential is not supported. However, the absence of fee-raising is not necessarily inconsistent with low balling. Initial audit costs

could still exceed initial audit fees, even when initial audit fees are higher than continuing engagement fee levels.

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