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Audit Effort, Audit Fees, and the Provision of Nonaudit Services to Audit Clients

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SYNOPSIS AND INTRODUCTION: In this article, we use audit-hour and billing-rate data supplied by a large public accounting firm to address the question, "Does providing audit clients with nonaudit services result in knowledge spillovers and audit production efficiencies that could produce economic rents for the auditor?" In prior analytical work, both Simunic (1984) and Beck et al. (1988) have argued that knowledge acquired while providing nonaudit services may "spill over" to the production of the audit, and thus generate production efficiencies. If audit production efficiencies lead to cost savings that are retained in whole or in part by the auditor (rather than passed on to the client), then economic rents accrue to the auditor, creating incentives for the auditor to resolve disputes in the client's favor.

Although several past studies suggest that the joint provision of audit and nonaudit services may give rise to knowledge spillovers that could lead to economic rents (Palmrose 1986; Simon 1985; Simunic 1984; Turpen 1990), they do not provide direct evidence that spillovers or rents exist, and the empirical results are mixed. For example, Abdel-khalik (1990, 320) reports that he was unable to detect interdependencies between audit and nonaudit fees, a direct contrast to the findings of Simunic and Palmrose. Further, Palmrose reports a positive relation between audit fees and the nonaudit fees paid to *non*incumbent firms, a finding that weakens the argu-

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ment for knowledge spillovers. Thus, as Solomon (1990, 328) points out, ". . . the impact of MAS (management advisory services) on audit pricing as well as who (i.e., the client or the auditor) benefits from knowledge spillovers (if they exist) remains an open and interesting question."

Our empirical analysis consists of three steps. First, we demonstrate the comparability of our sample to those in prior studies by fitting prior researchers' models to our data and replicating a finding Simunic (1984) interpreted as evidence of knowledge spillovers: a positive relation between audit and nonaudit fees. Second, we use a unique data set compiled from the participating firm's internal billing records, working papers, and audit planning memos to test for a positive relation between nonaudit services and audit effort. This test is motivated by Palmrose's (1986, 410) speculation that the higher audit fees paid by clients who also purchase nonaudit services may be driven by additional audit effort. We regress audit effort on nonaudit service fees (and Palmrose's control variables), partitioning nonaudit fees into three types: tax, accounting, and other. We use three measures of audit effort: unweighted audit hours, audit hours weighted by billing rate ratios, and audit hours weighted by billing rates. We find a weakly significant, positive relation between tax services and all three audit effort measures and between accounting-related consulting services and audit hours weighted by billing-rate ratios, which suggests that additonal effort is required for audits of clients who also purchase nonaudit services. With the assumption that the demand for auditing is inelastic (Beck et al. 1988, 52-54), these results do not support the existence of audit production efficiencies from knowledge spillovers.

Third, we test whether there is a positive relation between audit fees for a given level of audit effort and each of our three types of nonaudit service fees. This test is motivated by the possibility that, if the demand for auditing is elastic (Simunic 1984, 698), the observed increase in audit fees and effort could be driven by demand for more auditing by purchasers of nonaudit services (e.g., in substitution for internal control) as the result of auditors passing on cost savings from knowledge spillovers. If auditors are able to retain some of the cost savings, and thereby earn economic rents in the form of higher fees for a given level of audit effort, then our results should reveal a significant, positive relation between nonaudit and audit fees. However, we do not find a significant relation when we control for direct measures of audit effort that were not available to prior researchers.

These results suggest that, although purchasers of nonaudit services pay higher audit fees than nonpurchasers, the higher fees are associated with a proportional increase in audit effort, measured in this study as unweighted and weighted audit hours. These findings are inconsistent with one interpretation of prior research: that performing nonaudit services for audit clients may provide the auditor with incentives to compromise objectivity.

Key Words: *Auditing, Knowledge spillovers, Nonaudit services.*

Data Availability: *Requests for data used in this study may be made to the participating firm through the authors.*

THE remainder of this article is organized as follows: section I reviews prior research, section II describes the sample and data, section III reports the analysis and results, section IV discusses additional tests and limitations, and section V provides a summary and conclusion.

I. Prior Research

Over the past three decades, the effect of nonaudit services on auditor independence and objectivity has been addressed by Congressional committees (e.g., U.S. Senate 1977), special commissions (e.g., AICPA 1978), and more recently by the profession itself (e.g., AICPA 1991a; Arthur Andersen et al. 1991). A central concern to these groups and to academic researchers as well is whether auditors earn economic rents by providing nonaudit services to audit clients.

In audit fee research focusing on the joint provision of audit and nonaudit services, the general approach has been to regress audit fees on nonaudit fees, after controlling for differences across clients with financial statement measures and selected audit characteristics (Palmrose 1986; Simon 1985; Simunic 1984; Turpen 1990). These studies have reported a positive association between audit and nonaudit fees, and suggest that the audit fees paid by clients who also purchase nonaudit services are significantly higher than those paid by nonpurchasers.

Simunic (1984, 698), pointing to the interdependencies between audit and nonaudit services, interpreted the finding as evidence "... consistent with the hypothesis that the cost functions for MAS and auditing are significantly interdependent. Specifically ... the observed relationship would arise if the production of auditing generates knowledge useful in MAS production and/or the production of MAS reduces the marginal cost of auditing and audit demand is relatively elastic." This interpretation suggests that public accounting firms can provide audit (nonaudit) services more efficiently (i.e., with less effort) for nonaudit (audit) service purchasers and, thereby, earn economic rents.

However, Abdel-khalik (1990, 318) characterized the positive relation between audit and nonaudit fees as counterintuitive, noting that "... it is difficult to think of economic incentives that could exist *a priori* for clients to pay more for the joint acquisition of two products than for the sum of acquiring them separately." Several alternative explanations for the positive relation have been offered in the literature (see Abdel-khalik 1990; Palmrose 1986; Simunic 1984; Solomon 1990). For example, Palmrose found a positive relation between audit fees and nonaudit fees paid both to incumbent and to *non*incumbent audit firms (i.e., a firm other than the one performing the audit). Her finding for nonincumbent firms weakens the argument for spillovers, since it is unlikely that knowledge obtained by a nonincumbent audit firm from nonaudit services would spill over to the incumbent audit firm's production of the audit. She speculated that the positive relation for incumbent and nonincumbent firms could be the result of more effort being required to audit nonaudit service purchasers since, for example, nonaudit services may have audit implications (Palmrose 1986, 410). Thus, past research leaves unresolved the relationship among nonaudit services, audit effort, and audit fees. The objective of this study is to provide more direct evidence with respect to this issue by using proprietary data not reported previously in research on audit pricing (i.e., audit hours and staff billing rates).

II. Sample and Data

Sample data from a large public accounting firm were collected by members of the firm according to the authors' written instructions. Ten U.S. offices were asked to provide data on all publicly held audit clients and on an equal or greater number of privately held audit clients for the three most recent audits performed by the participating firm. From one to three years of usable data were returned for 98 clients. To avoid potential statistical problems related to the independence of observations, we included only one randomly chosen observation per client in the analyses.[1] Thus, the final sample consists of one observation for each of 98 clients.[2]

Data obtained from the firm's internal billing records consists of the actual fees charged for audit and nonaudit services, individual staff members' billing rates (see fn. 15), total audit hours by staff level, and out-of-pocket costs.[3] To test the robustness of our results using actual audit hours, we included two weighted measures of audit hours, both of which are based on the participating firm's hourly billing rates for individual staff members. The first weighted measure, total audit hours for an engagement normalized by the ratios between staff members' billing rates and the average billing rate in the sample (*RATIOHRS*), follows:

$$RATIOHRS = \frac{(\Sigma_i Hours_{ij} * Rate_i)}{\Sigma_i \Sigma_j (Rate_i * Hours_{ij}) / \Sigma_i \Sigma_j Hours_{ij}},$$

where,

Hours = the hours charged by a staff member to an engagement,
Rate = the firm's billing rate for one hour of a staff member's time,
i = an individual staff member, and
j = an individual audit engagement.

The next weighted measure, total audit hours for an engagement weighted by the staff members' billing rates plus out-of-pocket costs (*RATEHRS*), the participating firm's measure of audit costs for an engagement, is expressed as follows:

$$RATEHRS_j = (\Sigma_i Hours_{ij} * Rate_i) + Out\text{-}of\text{-}Pocket\ Costs_j,$$

where variables and subscripts are defined as above and out-of-pocket costs include travel, lodging, and meals.

Based on our discussions with firm personnel about the cycle of annual audit work, the firm provided audit-hour and fee data for services performed during the 12 months

[1] Tests for differences across audit years are reported in footnote 12.

[2] In total, we requested that the firm provide data for 225 clients; since data collection was labor intensive for the firm, we were reluctant to request a larger sample size. We received information on 176 clients. For inclusion in the final sample, we required that responses for each of the variables used in our models be provided. Thus, 44 clients were deleted because they were not billed separately for each type of service performed (i.e., the client received a single, non-itemized bill for all services). Twenty clients were deleted from the sample because of other missing billing or financial statement data. Finally, as we note in section IV, our test for a relationship between audit fees and the provision of nonaudit services may be sensitive to the time period over which we measure nonaudit services. This is of particular concern with new clients, and we therefore eliminated all observations for first-year engagements, further reducing our sample by 14 clients. The final sample of 98 clients consists of 38 public companies and 60 private companies.

[3] Throughout this article, the term "staff" refers to all auditors assigned to an engagement (e.g., engagement partner, manager, etc.), rather than to a particular rank (e.g., entry-level "staff" accountant).

beginning eight months prior to the client's fiscal year-end. Fees for nonaudit services were collected for services performed during the same period.[4] In consideration of Palmrose's (1986) finding that the likelihood of knowledge spillovers may be a function of the type of nonaudit service provided, the firm partitioned nonaudit fees into tax (i.e., all tax consulting other than return preparation, such as consultation about the tax implications of financing alternatives), accounting (e.g., merger and acquisition advice, the design and installation of a new accounting system), and other services (i.e., nontax, nonaccounting services such as executive recruiting or business site selection) according to the firm's classification of services in its internal records.

To control for the potential effect of risk on audit fees, the firm collected the auditors' assessments of the risk associated with each engagement from audit planning memos (i.e., low, medium, or high risk). This risk measure is based primarily on the firm's assessment of the loss that will be incurred if an unqualified audit opinion is issued inappropriately. Although risk measures assessed during the planning stage of an engagement are arguably subjective, we believe they more closely reflect auditors' actual perceptions of risk, and therefore the effect of risk on audit fees, than the surrogates used in prior research. Descriptive statistics for these variables and for assets (a size measure) are in table 1.[5]

To permit us to fit prior researchers' models to our data, the firm collected financial statement measures and selected characteristics of the audit from copies of clients' annual reports retained by the firm and from audit working papers. These variables included net receivables, inventory, total assets, opinion type, number of locations visited by the auditor, number of reports issued by the auditor, primary SIC code,[6] ownership (public or private), number of subsidiaries, and number of industries in which business is conducted.

III. Analysis and Results

Replication of Past Findings

Table 2 presents the results of regression analyses to fit the models used in previous research to our data. Although several variables are nonsignificant[7] and our adjusted

[4] In section IV, we test the sensitivity of our results to the period over which nonaudit services are measured.

[5] Observe in table 1 that the mean total asset size of our sample of 64 nonaudit purchasers is larger than that of our sample of 34 nonpurchasers ($56.8 vs. $12.3 million). To address the structural stability of our models (using, in turn, each of our three measures of audit effort), we performed Chow tests for our sample of nonaudit purchasers and nonpurchasers (Kennedy 1985, 87–89). The overall *F*-test indicates that the regression coefficients are stable across subsamples. We also performed a dummy variable version of the Chow test that allows tests for a specific coefficient or a subset of coefficients (Kennedy 1985, 186). In this test, we focused on the input measure, since it is most directly correlated with size. This test requires a new variable, *DUMMY*INPUT*, in the regression equation that takes on a value equal to the input measure if the observation represents a client who purchased nonaudit services, and a value of zero for nonpurchasers. Results of the tests indicate that the regression coefficients in tables 2, 3, and 4 are robust across our samples.

[6] Using two-digit SIC codes, we classified companies in the following industries: construction, financial institutions, manufacturing, mining, natural resources, retail, service, transportation, and wholesale.

[7] For example, in comparison with Simunic's (1984) and Palmrose's (1986) small-companies subsamples (their subsamples that are most comparable to ours), the following variables are significant in their analyses but not in ours. Simunic: audit opinion type, number of subsidiaries; Palmrose: number of audit locations, publicly/privately held. None of the significant variables in our table 2 replications of Simunic and Palmrose were nonsignificant for the smaller-companies analyses reported in their papers.

Table 1
Descriptive Statistics

	Purchasers of Nonaudit Services	*Nonpurchasers*
Total assets (000)	$56,836.6 (132,448.3)	$12,349.7 (15,311.7)
Audit hours	727 (591)	438 (349)
Hours weighted by billing rate ratios	730 (575)	431 (341)
Hours weighted by billing rates (000)	$63.8 (50.8)	$38.5 (30.8)
Audit fees (000)	$55.0 (46.5)	$28.9 (24.4)
Noncompliance tax fees (000)	$8.5 (14.7)	—
Accounting-related nonaudit fees (000)	$14.7 (19.7)	—
Other nonaudit fees (000)	$1.2 (6.7)	—
High risk (percentage)	14.1	2.9
Medium risk (percentage)	51.6	41.1
Low risk (percentage)	34.3	56.0
Number of observations	64	34

R^2s (0.22, 0.24, 0.53, and 0.52) are lower than those reported in the previous four studies listed in table 2 (0.36, 0.54, 0.89, and 0.81, respectively), our results are generally consistent. Assets, a proxy for client size, are highly correlated with fees, as are other variables used in the models to proxy for financial or audit complexity and risk (e.g., number of subsidiaries and opinion type). Of greatest interest is the finding that nonaudit fees are positively associated with audit fees. The only exception is the nonsignificant coefficient for other nonaudit fees (i.e., nontax, nonaccounting services) in Palmrose's (1986) model; however, this is consistent with Palmrose's findings for smaller companies, the subsample in her study that is most comparable to ours. These findings indicate that our sample is comparable to samples used in prior research, since the positive relation between audit and nonaudit fees, interpreted in prior research as evidence of knowledge spillovers, is also present in our sample. In the next section we describe our analyses designed to test for a positive relation between nonaudit services and audit effort.

Tests for a Relation Between Nonaudit Services and Audit Effort

The positive relation between audit and nonaudit fees reported in table 2 and in previous research (Palmrose 1986; Simon 1985; Simunic 1984; Turpen 1990) indicates that clients who spend more for nonaudit services may pay higher audit fees. In view of

Table 2
Replication of Positive Relation Between Audit and Nonaudit Fees by Regressing Audit Fees on Prior Researchers' Variables
($n=98$)

	Simunic[a] (*1984*)	*Simon*[b] (*1985*)	*Palmrose*[b] (*1986*)	*Turpen*[b] (*1990*)
Control variables:				
Intercept	9.09 (3.36)***	4.82 (1.68)**	4.97 (6.04)***	5.57 (7.62)***
Assets	—	—	0.29 (6.07)***	0.26 (5.61)***
Number of audit locations	—	—	0.09 (0.83)	—
Audit opinion type	0.78 (0.88)	0.70 (0.81)	0.14 (2.29)**	0.11 (1.97)**
Industry indicators	—	—	[c]	[c]
Publicly/privately held	—	—	0.03 (0.61)	—
Number of reports issued by auditor	—	—	0.47 (2.96)***	—
Accounts receivable	−0.86 (−0.19)	−1.29 (−0.30)	—	—
Inventory	−1.92 (−0.43)	−1.49 (−0.34)	—	—
Number of subsidiaries	−0.33 (−0.45)	−0.14 (−1.37)*	—	0.15 (2.97)***
Number of segments	4.00 (2.99)***	4.38 (3.33)***	—	—
Financial institution	0.10 (0.03)	—	—	—
Current assets	—	—	—	0.18 (0.81)
Experimental variables:				
Total nonaudit fees	0.65 (4.39)**	0.66 (4.54)***	—	0.04 (2.89)***
Noncompliance tax-related nonaudit fees	—	—	0.03 (1.65)*	—
Accounting-related nonaudit fees	—	—	0.02 (1.49)*	—
Other nonaudit fees	—	—	0.02 (0.95)	—
Adjusted R^2	0.22	0.24	0.53	0.52

Note: The *t*-values for each parameter estimate appear in parentheses below the estimate.

[a] Audit fees and nonaudit fees are deflated by the square root of total assets. Inventory and accounts receivable are deflated by total assets.
[b] Audit fees, assets, and nonaudit fees are set equal to their natural logs.
[c] Coefficients of industry indicator variables based on two-digit SIC codes are not significant.

* Significant at $p \leq 0.10$ (one-tailed test).
** Significant at $p < 0.05$ (one-tailed test).
*** Significant at $p < 0.01$ (one-tailed test).

Palmrose's (1986, 410) speculation, we test whether the positive relation is driven by auditors expending more effort to audit the financial statements of clients who spend more for nonaudit services. To do this, we regress audit effort on the three nonaudit service variables—tax, accounting, and other—and the control variables Palmrose (1986) used to predict audit fees. We use Palmrose's (1986) control variables because she justifies her model primarily on the basis of the relationship between audit effort and her independent variables, and she also partitioned nonaudit services into tax, accounting, and other. Each of the three alternative measures of audit effort introduced in section II (audit hours, audit hours weighted by billing rate ratios, and audit hours weighted by billing rates) is used in a separate regression to test the robustness of our findings. In our regressions, a positive relation between the purchase of nonaudit services and audit effort would be evidence of auditors' expending more audit effort.

As was true for the prediction of audit fees (table 2), the results reported in table 3 indicate that measures of client size (assets) and audit complexity (e.g., number of locations visited) are positively associated with audit effort. Most important, the coefficients on all nonaudit services are positive, the coefficient on tax services is positive and weakly significant for all three audit effort measures, and the accounting-related services measure is positive and weakly significant for the *RATIOHRS* measure of audit effort.[8] These results suggest that those nonaudit services most closely related to a client's financial activities (i.e., tax and accounting-related nonaudit services) are positively related to audit effort. That is, contrary to the intuitive expectation that knowledge spillovers would allow the auditor to perform the audit with less effort, we find evidence that clients who spend more for nonaudit services typically require more audit effort.

One possible explanation for this finding is that nonaudit services may have audit implications (Palmrose 1986, 410). For example, consider a client who purchases tax advice that leads to the use of leases rather than loans to finance asset acquisitions, or who purchases accounting services that lead to a new accounting information system. In both cases, the provision of nonaudit services would likely require the auditor to gather a larger quantity of audit evidence because leases may increase financial complexity, and a new accounting system creates the need to document the new internal control structure (AICPA 1991b, AU sec. 319).

The results in table 3 contradict the existence of audit production efficiencies from knowledge spillovers, with the assumption that the demand for auditing is inelastic (Beck et al. 1988, 52–54). However, if the demand for auditing is elastic (Simunic 1984, 698), then the results in table 3 are not necessarily inconsistent with knowlege spillovers. That is, if auditors pass on cost savings from spillovers, then the increase in audit effort could be driven by nonaudit purchasers' acquiring more auditing (Simunic 1984). For example, some clients may be compelled by audit cost savings to expend less for internal control, electing instead to substitute the purchase of auditing services from accounting firms. As a consequence, factors such as a weaker internal control structure would necessitate more audit hours. In this scenario, auditors would earn economic rents from nonaudit service purchasers in the form of higher fees for a given level of effort if audit cost savings from spillovers are retained in part by the auditor. We address this next.

[8] In addition to the regression results reported in table 3, we also pooled the three nonaudit service variables (*TAX*, *ACC*, *OTHER*) and found that total combined nonaudit service fees is significant for all three measures of effort at p levels of less than 0.02 (one-tailed test).

Table 3
Tests for Relation Between Nonaudit Services and Quantity of Effort Used in the Production of an Audit
($n=98$)

	ℓn(audit hours)	*ℓn(audit hours weighted by billing rate ratios)*	*ℓn(audit hours weighted by billing rates)*
Control variables:			
Intercept	1.63 (2.24)**	1.54 (2.01)**	5.71 (7.62)***
Assets	0.24 (5.77)***	0.25 (5.86)***	0.27 (6.21)***
Number of audit locations	0.17 (1.80)**	0.16 (1.63)*	0.13 (1.41)*
Audit opinion type	0.07 (1.39)*	0.09 (1.73)**	0.11 (2.08)**
Industry indicators	[a]	[a]	[a]
Publicly/privately held	−0.02 (−0.41)	−0.004 (−0.09)	−0.001 (−0.03)
Number of reports issued by auditor	0.46 (3.26)***	0.41 (2.88)***	0.41 (2.85)***
Experimental variables:			
Noncompliance tax-related nonaudit fees	0.02 (1.47)*	0.02 (1.35)*	0.03 (1.53)*
Accounting-related nonaudit fees	0.02 (1.26)	0.02 (1.62)*	0.02 (1.22)
Other nonaudit fees	0.01 (0.78)	0.01 (0.72)	0.01 (0.54)
Adjusted R^2	0.54	0.54	0.54

Note: The *t*-values for each parameter estimate appear in parentheses below the estimate.

[a] Coefficients of industry indicator variables based on two-digit SIC codes are not significant.

* Significant at $p<0.10$ (one-tailed test).
** Significant at $p<0.05$ (one-tailed test).
*** Significant at $p<0.01$ (one-tailed test).

Tests for a Relation Between Nonaudit Services and Audit Fees

In this section, we test for a positive relation between the provision of nonaudit services and audit fees for a given level of audit effort.[9] We regress total audit fees on audit effort, risk, and the primary experimental variables of interest: nonaudit fees for tax, accounting, and other consulting services.

[9] Although a positive relation between nonaudit services and audit fees would suggest that the accounting firm realized economic rents, no relation would not rule out economic rents. For example, the auditor could earn rents through increased tenure or through nonaudit service fees. Thus, the tests reported are a sufficient but not a necessary condition for economic rents.

To control for heteroscedasticity,[10] we use weighted least squares (WLS) regression (Judge et al. 1985).[11] WLS produces unbiased estimates of the regression coefficients that can be interpreted in the same manner as OLS estimates. However, because WLS weightings could lead to inflated R^2s, we also report ordinary least squares (OLS) results for the models below as a benchmark for comparison (see table 4). The use of WLS involves the following three-step procedure for each model: (1) with OLS, audit fees are regressed on the effort measure; (2) the absolute values of the residuals from step 1 are regressed on the effort measure; and (3) for each observation, the variables are weighted by the reciprocal of the predicted residual from step 2. Formal statements of the models are as follows:

$$FEES_w = B_0 + B_1 HRS_w + B_2 HRISK_w + B_3 MRISK_w + B_4 TAX_w + B_5 ACC_w + B_5 OTHER_w \quad (1)$$

$$FEES_w = B_0 + B_1 RATIOHRS_w + B_2 HRISK_w + B_3 MRISK_w + B_4 TAX_w + B_5 ACC_w + B_6 OTHER_w \quad (2)$$

$$FEES_w = B_0 + B_1 RATEHRS_w + B_2 HRISK_w + B_3 MRISK_w + B_4 TAX_w + B_5 ACC_w + B_6 OTHER_w \quad (3)$$

with the "w" subscript denoting a weighted variable as described above. Variables are defined as follows:

$FEES$ = the total audit fee paid to the auditor,
HRS = the direct labor hours used in the production of the audit,
$RATIOHRS$ = HRS weighted by the ratio of the billing rates of the individuals providing the labor to the average billing rate for all audit hours in our sample,
RATEHRS = HRS weighted by the billing rates for the individuals providing the labor, plus any out-of-pocket costs associated with the audit,
$HRISK$ = an indicator variable coded 1 if the auditor's assessment of risk was high, 0 otherwise,
$MRISK$ = an indicator variable coded 1 if the auditor's assessment of risk was moderate, 0 otherwise,
TAX = total fees paid to the audit firm for tax consulting services,
ACC = total fees paid to the audit firm for accounting related consulting services, and
$OTHER$ = total fees paid to the audit firm for non-tax, non-accounting related consulting services.

[10] Scatter plots of the data (not reported) indicate that the relation between each of the three effort measures and audit fees is linear but that the absolute values of the regression residuals are positively correlated with the size of the dependent variable's predicted values. A Goldfeld-Quandt test for heteroscedasticity was significant at $p < 0.001$ for each of our three effort measures.

[11] Prior audit-fee research predicts audit fees as a function of asset size and accordingly uses either log or square root transformations to correct for heteroscedasticity. As depicted in data plots (not reported), the audit fees in this study increase with asset size at a decreasing rate, thus making such transformations appropriate when modeling audit fees as a function of asset size. However, our models predict audit fees as a function of audit effort, and, as one would expect, scatter plots (not reported) indicate a strong linear relation between fees and effort (i.e., as a function of audit effort, the actual fee increases at an approximately constant rate). For this reason, weighted least squares (WLS) is more appropriate here for controlling heteroscedasticity than are transformation techniques such as log or square root transformations.

Table 4
Weighted Least Squares and Ordinary Least Squares Regressions of Audit Fees on Audit Effort, Nonaudit Fees, and Risk
($n=98$)

	Model 1		*Model 2*		*Model 3*	
	WLS[a]	*OLS*[b]	*WLS*[c]	*OLS*[d]	*WLS*[e]	*OLS*[f]
Control variables:						
INTERCEPT	371.14 (0.19)	4.36 (13.71)***	175.81 (0.10)	4.32 (14.24)***	−1,834.44 (−2.05)**	−0.58 (−1.93)*
HRS	68.82 (14.67)***	0.96 (17.15)***	—	—	—	—
RATIOHRS	—	—	71.45 (15.24)***	0.97 (18.16)***	—	—
RATEHRS	—	—	—	—	0.86 (34.01)***	1.03 (34.56)***
HRISK	5,848.80 (1.00)	0.18 (1.27)*	7,399.64 (1.30)*	0.20 (1.52)*	4,311.90 (1.57)*	0.08 (1.05)
MRISK	34.94 (0.01)	0.04 (0.46)	−1,040.00 (−0.42)	0.01 (0.10)	172.04 (0.14)	0.02 (0.44)

Continued

Table 4—*Continued*

Weighted Least Squares and Ordinary Least Squares Regressions of Audit Fees on Audit Effort, Nonaudit Fees and Risk

(n=98)

	Model 1		*Model 2*		*Model 3*	
	WLS[a]	*OLS*[b]	*WLS*[c]	*OLS*[d]	*WLS*[e]	*OLS*[f]
Experimental variables:						
TAX	0.15	0.01	0.11	0.01	−0.02	<0.01
	(0.93)	(0.71)	(0.69)	(1.21)	(−0.20)	(0.62)
ACC	0.09	0.01	0.01	−0.01	−0.03	<0.01
	(0.71)	(0.89)	(0.10)	(−0.02)	(−0.52)	(0.94)
OTHER	0.11	<0.01	<0.01	<0.01	0.10	0.01
	(0.46)	(0.10)	(0.01)	(0.04)	(0.90)	(0.83)
Adjusted R^2	0.79	0.83	0.81	0.85	0.95	0.95

Note: The *t*-values for each parameter estimate appear in parentheses below the estimate.

[a] $FEES_w = B_0 + B_1 HRS_w + B_2 HRISK_w + B_3 MRISK_w + B_4 TAX_w + B_5 ACC_w + B_6 OTHER_w$

[b] $LFEE = B_0 + B_1 \ell n(HRS) + B_2 HRISK + B_3 MRISK + B_4 \ell n(TAX) + B_5 \ell n(ACC) + B_6 \ell n(OTHER)$

[c] $FEES_w = B_0 + B_1 RATIOHRS_w + B_2 HRISK_w + B_3 MRISK_w + B_4 TAX_w + B_5 ACC_w + B_6 OTHER_w$

[d] $LFEE = B_0 + B_1 \ell n(RATIOHRS) + B_2 HRISK + B_3 MRISK + B_4 \ell n(TAX) + B_5 \ell n(ACC) + B_6 \ell n(OTHER)$

[e] $FEES_w = B_0 + B_1 RATEHRS_w + B_2 HRISK_w + B_3 MRISK_w + B_4 TAX_w + B_5 ACC_w + B_6 OTHER_w$

[f] $LFEE = B_0 + B_1 \ell n(RATEHRS) + B_2 HRISK + B_3 MRISK + B_4 \ell n(TAX) + B_3 \ell n(ACC) + B_6 \ell n(OTHER)$

* Significant at $p<0.10$ (one-tailed test).
** Significant at $p<0.05$ (one-tailed test).
*** Significant at $p<0.01$ (one-tailed test).

The regression results are presented in table 4. The WLS (OLS) R^2s for all three models—0.79 (0.83), 0.81 (0.85), and 0.95 (0.95), respectively—indicate a good linear fit and that the regression models explain a large proportion of the cross-sectional variation in audit fees.[12] As expected, the coefficients for audit effort are positive and statistically significant in each model. The WLS results for models 1 and 2 indicate that, on average, $69 of revenue is realized per unweighted audit hour and that $71 of revenue is realized per weighted audit hour. The results for model 3 indicate that, on average, the firm realized as revenue 86 percent of audit hours weighted by billing rates.

The most important finding is the nonsignificant coefficients on the nonaudit services variables (*TAX*, *ACC*, *OTHER*) in all three models.[13] This indicates that, controlling for audit effort and risk, these nonaudit service variables are not related to audit fees.[14] That is, relative to the effort auditors expend on an audit, the level of nonaudit fees received from audit clients is not associated with a significantly higher (or lower) audit fee. Thus, our results do not support the existence of economic rents accruing to auditors as the result of knowledge obtained from performing nonaudit services. This suggests either that knowledge spillovers from nonaudit services do not lead to audit production efficiencies or, alternatively, that the benefits of efficiencies are passed on to clients.

To test the sensitivity of our results, we fit expanded models to our sample, adding indicator vaiables for office location (city), industry, and ownership structure (public vs. private companies). Adding office location to the analysis is motivated by Abdelkhalik's (1990, 297) argument that a firm's monopoly power within a city may reduce its incentives to pass on to clients the cost savings attributable to knowledge spillovers. Adding industry and ownership structure is motivated by research that indicates that audit fees may vary across industries and as a function of ownership structure (see, e.g., Palmrose 1986; Simunic 1984). Results for the expanded models 1, 2, and 3 reveal that all three nonaudit services (*TAX*, *ACC*, *OTHER*) are nonsignificant, indicating that the addition of office location, industry, and ownership structure does not significantly affect the results reported in table 4.

We also performed tests using *FEES* divided by *RATEHRS* as the dependent variable to represent an engagement profitability measure referred to by the firm as the "realization rate."[15] If the joint provision of audit and nonaudit services results in

[12] Tests indicated that our primary results are not affected by the fiscal year that was audited or the time of year (i.e., month) when work was performed. Tests for fiscal-year effects were performed by incorporating categorical variables into the regression models. Tests for time-of-year effects were performed by including in the models a variable defined as the total audit hours charged by an office for all engagements during the month when the audit report was signed, divided by the total audit hours charged to all audit engagements by the office for the fiscal year as a surrogate for how "busy" a month is relative to all other months in the year. The results of these tests indicate that the audit fees received for a given level of effort do not vary by time of year or fiscal year, and do not affect our primary tests of the relation between audit and nonaudit fees. For the sake of expositional clarity, we report only the reduced models.

[13] Diagnostic procedures (Belsley et. al. 1980) indicate that the lack of significant coefficients on nonaudit service fees reported in table 4 is not the result of collinearity among the variables in our models.

[14] In addition to the tests reported in table 4, we also pooled the three nonaudit service variables (*TAX*, *ACC*, and *OTHER*) and found that total combined nonaudit services is not significant in any of the three models.

[15] For the participating firm, a staff member's billing rate represents the maximum amount the firm would expect to charge for one hour of that employee's labor. However, actual audit fees are generally less than *RATEHRS* (actual hours × billing rates) because of such factors as competition from other firms and slack time or periods of relatively low audit activity (e.g., the summer months in a practice office dominated by December 31 year-end clients). Thus, realization rates commonly have a value less than 1. For example, in our sample, WLS realization rates ranged from 0.51 to 1 (mean = 0.86, quartile values of 0.7, 0.86, 0. 92 and 1).

knowledge spillovers and production efficiencies beneficial to the auditor, then we would expect a positive relation between nonaudit service fees and realization rates. To test for a relation between the purchase of nonaudit services and audit fees for a given level of effort, we regressed realization rates on nonaudit service fees and risk. In conformance with the results reported in table 4, we fail to find a significant relation, additional evidence that the joint provision of services does not lead to economic rents in the form of higher fees for a given level of audit effort.

IV. Additional Tests and Limitations

In our analyses, nonaudit fees are reported for services rendered during the same time period in which the audit is normally conducted. While Simunic (1984) suggests that spillovers may result from providing both audit and nonaudit services in the same year, Beck et al. (1988) recognize that spillovers may result from services performed in previous years. We performed three additional analyses to test the sensitivity of our findings to the period over which nonaudit services are measured.

First, for the 52 clients for which we have two consecutive years of data, we computed the correlations between the nonaudit services purchased by clients from one year to the next. According to Palmrose (1986) and our replication of her findings (see table 2) for smaller companies like those in our sample, tax and accounting-related nonaudit services are the two types of nonaudit services most likely to be associated with relatively higher audit fees. The year-to-year correlations for these two types of services were 0.78 and 0.68, respectively. This suggests that clients who purchase these services tend to do so consistently over time and that fees for these nonaudit services in one 12-month period are a good surrogate for fees in subsequent 12-month periods.[16]

Second, for the same 52 clients, we modified the analysis reported in table 4, by including in the regression models the nonaudit fees for the 12 months preceding the period when the audit is performed. These fees were included in the models as new variables and, alternatively, as increases in the nonaudit fees used in our primary analysis. In conformance with the results reported, we do not find a significant relation between nonaudit and audit fees charged for a given level of effort.

Third, we modified the analysis in table 4 by using only the most recent of the years for which data were collected (rather than randomly choosing one year) and classifying as nonpurchasers only those clients who did not purchase nonaudit services during any of the years for which data were collected. We include in the regression models the nonaudit fees for the two 12-month periods preceding the audit period. Again, in conformance with the results reported, we find no significant relation between nonaudit fees and the audit fees charged for a given level of effort. In combination, these three tests suggest that our results are not affected significantly by the manner in which we measured nonaudit fees.

As Solomon (1990, 325) points out, audit partners' compensation schemes and their influence relative to consulting partners may provide incentives for them to categorize fees arbitrarily as audit or nonaudit. For example, in a period when total fees have fallen from a prior period, an audit partner who acquired a client originally may arbi-

[16] For nontax, nonaccounting services, the year-to-year correlation for fees is 0.23. In conformance with Palmrose's (1986) findings for smaller companies, the results reported in table 2 suggest that, for the clients in our sample, this type of service is unrelated to factors that lead to relatively higher audit fees.

trarily categorize more of the fee as deriving from audit services. Although we have neither empirical nor anecdotal evidence of such practice, our results are subject to the limitation that nonaudit fees may be misclassified.

As indicated previously, the mean total asset size of our sample of 64 nonaudit service purchasers ($56.8 million) is larger than that of our 34 nonpurchasers ($12.3 million). Although various tests (see fn. 5) indicate that the regression coefficients in tables 2, 3, and 4 are robust across samples, our results are subject to the limitation that size may be partially driving the weakly significant coefficients for tax and accounting-related nonaudit services in table 3. Our results are also subject to the limitations that we obtained data from only one public accounting firm and that our sample consists of small companies, most of which are private (see fn. 2). Differences between the audit technologies of competing firms and firms' pricing structures for large versus small companies and for public versus private companies may affect the extent to which the joint provision of services produces knowledge spillovers and production efficiencies for the auditor. Thus, the generalizability of our findings to other firms and larger companies is an open question.

The failure to find a relation between audit fees for a given level of audit effort and nonaudit fees raises the question of the adequacy of our statistical power. However, the high explanatory power of our models, the small magnitude of the *t*-statistics for nonaudit fees in our models, and our ability to replicate past findings indicate that any production efficiencies that do arise from knowledge spillovers are—for our sample—likely quite small.

V. Summary and Conclusion

Simunic (1984) reported a positive association between audit and nonaudit fees, and suggested that this result could be explained either by knowledge spillovers or by systematic differences between nonaudit purchasers and nonpurchasers. Palmrose's (1986) findings of a positive relation between audit fees and the nonaudit fees paid to nonincumbent firms weaken the argument for knowledge spillovers but, lacking data on audit effort, she was unable to provide direct evidence that spillovers, production efficiencies, or economic rents do not exist. She speculated that nonaudit service purchasers may require more audit effort, and the results reported in this article are consistent with that reasoning.

We replicate past findings of a positive relation between audit and nonaudit fees by fitting prior researchers' models to our data (table 2), and we find that nonaudit purchasers require more audit effort (table 3). With the assumption that the demand for auditing is inelastic, the results in table 3 are inconsistent with audit production efficiencies arising from knowledge spillovers, a condition that could lead to economic rents for the auditor. Conversely, with the assumption that the demand for auditing is elastic, the results in table 3 do not rule out spillovers. However, the results in table 4 provide no evidence that spillovers, if they exist, allow auditors to receive higher fees for a given level of audit effort from purchasers of nonaudit services than they receive from nonpurchasers. The results reported in this article provide no empirical evidence for the argument that providing nonaudit services for audit clients creates circumstances that may lead auditors to compromise their objectivity. Further research is needed to investigate other ways in which auditors may benefit from the joint provision of services, such as the effects of auditor tenure on client-firm bonding and economic rents earned through nonaudit services.

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