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An Analysis of Cross-Sectional Differences in Big and Non-Big Public Accounting Firms' Audit Programs

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SUMMARY: A significant body of prior research has shown that audits by the Big 5 (now Big 4) public accounting firms are quality differentiated relative to non-Big 5 audits. This result can be derived analytically by assuming that Big 5 and non-Big 5 firms face different loss functions for "audit failures" and is consistent with a variety of empirical evidence from studies of audit fees, auditor changes, and the stock price reaction to audited earnings. However, there is *no* existing evidence (of which we are aware) concerning the underlying production differences between Big 5 and non-Big 5 audits. As a result, existing empirical evidence cannot distinguish between the possibility that Big 5 audits are simply *perceived* to be different (e.g., by investors) or *actually* differ in how they are produced.

Our research objective is to identify the production characteristics of audit engagements that may explain the differences in expected audit quality between Big 5 and non-Big 5 firms. In this archival study, we examine the total audit effort and the allocation of effort to four audit phases—planning, (control) risk assessment, substantive testing, and completion—for a cross-section sample of 113 audits of Dutch companies in 1998/99 by 14 public accounting firms. We find that, after controlling for client characteristics: (1) both types of auditors exert about the same amount of total audit effort; (2) Big 5 auditors allocate relatively more effort to planning and (control) risk assessment, and relatively less to substantive testing and completion; and (3) client size, use of the business-risk-based audit approach, and reliance on client internal controls affect audit hours differently for the two auditor types. We conclude that the Big 5 firms *actually* produce a higher audit quality level, and that this quality difference

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is related to how audit hours are deployed in a more contextual and less procedural audit approach.

Keywords: audit procedures; audit hours; mix; audit quality; quality differentiation.

Data Availability: Data are derived from a survey of public accounting firms and are confidential. The survey instrument is available from the authors.

INTRODUCTION

Since Simunic (1980), audit fee research has frequently documented a price premium associated with audits performed by "large" audit firms. In their meta-analysis of 88 audit fee studies published over 25 years using data from more than 20 countries, Hay et al. (2006) find that use of a Big 8(6)(5) auditor is associated with a significantly higher audit fee in 67 percent of these studies. One explanation for this price premium is that clients in a given audit market have heterogeneous demand for audit quality (given the expected costs and benefits) and large audit firms serve those clients that demand greater quality. As a result, audits by large audit firms are of higher expected quality than audits by small firms. This view is bolstered by many additional studies. For example, DeAngelo (1981) provides a theoretical argument suggesting that audit quality increases with audit firm size because of differences in the loss functions faced by big versus small audit firms; Palmrose (1988) finds that large auditors have lower litigation rates than small auditors; Teoh and Wong (1993) find that the stock price reaction to the announcement of positive unexpected earnings is larger when the auditor is a Big 6 rather than a non-Big 6 firm; and Becker et al. (1998), Francis et al. (1999), and Lee et al. (2003), among others, find that Big 6 firms restrict their clients' income-increasing discretionary accruals, when compared to the accruals of the clients of non-Big 6 firms.

Because of this significant body of evidence that audit quality differs systematically between Big and non-Big audit firms, accounting researchers often use a Big auditor/non-Big auditor indicator variable either to control or test for differences in audit quality (i.e., the level of assurance that the client's financial statements are free of material misstatement) in cross-sectional studies. Note, however, that *all* of the existing archival evidence concerning audit quality differences focuses on outcome measures such as audit fees, litigation rates, earnings response coefficients, etc. There is *no* existing archival evidence (of which we are aware) of systematic differences in inputs (audit production) by large versus small audit firms. Our research seeks to fill this important gap in the literature. We investigate the auditor quality differentiation hypothesis from a production point of view by addressing the question: Given the maintained assumption that Big firm audits provide greater assurance than non-Big firm audits, how do the audit programs implemented by large auditors differ from those of small auditors?

In order to measure the differences in audit programs we conjecture that the production of audit quality is determined by three general factors: input quality, input intensity, and auditor technology. Input quality represents the skill, knowledge, and judgment of those that actually perform the audit, i.e., human capital (O'Keefe, King, and Gaver 1994). However, because our data do not contain suitable proxy measures of input quality, this factor is not considered in our research. We measure input intensity as the total number of labor hours used in the audit. We expect that, *ceteris paribus*, higher audit quality is associated with greater total effort. To capture audit technology, we measure the relative number of hours devoted to performing the various audit procedures commonly used in audits (see the Appendix for a listing of audit procedures). These relative hours are labeled the audit mix. We have no strong *a priori* beliefs about the specific mapping from audit quality to audit mix, but expect high quality audit technologies to be better at identifying and directing effort toward the problem areas of individual clients. In the parlance of the audit risk model used in practice, this implies more accurate assessments of the inherent and control risks that characterize a client.[1] The audit mix measures should capture systematic differences in the choice of audit activities. Related to both input intensity and audit technology are the set of client and auditor characteristics that explain effort and mix. Differences in the set of significant explanatory variables that drive audit programs across auditor types potentially provide further insight into why audit quality varies. In summary, this research measures differences in audit programs along several dimensions: total audit hours, audit mix, and the variables (and associated coefficient magnitudes) that determine audit effort and mix.

Related prior research includes work by O'Keefe, Simunic, and Stein (1994) (hereafter, OSS) and Hackenbrack and Knechel (1997) (hereafter, HK). OSS examined the determinants of audit hours and the mix of grades of labor (partner, manager, senior, and staff hours) utilized in a sample of U.S. audit engagements performed by one of the then Big 6 firms in 1989. OSS found that the statistically significant "drivers" of audit hours were the size, complexity, and riskiness of the client. In addition, they found that higher financial leverage (a measure of client business risk) and whether the client was publicly held (a measure of auditor business risk) increased partner and manager hours relative to senior and staff hours. Conversely, a higher assessed inherent risk of material misstatements increased senior and staff hours, relative to partner and manager hours. Finally, the proportion of work performed by junior staff members was an increasing function of client size, and ranged from about 7 percent of total hours for very small audits to about 50 percent of total hours for the largest engagements.

HK also examined the determinants of labor hours and the allocation of effort to eight general audit activities (e.g., planning, internal control, substantive testing, etc.). Their sample consisted of U.S. audits done in 1991 by the same Big 6 firm studied by OSS. They documented that the primary determinants of mix variation across audits in their sample were: client size, client complexity, whether the client is publicly held, and if the client is a financial services firm.

Our data are derived from a survey of 113 audits of Dutch companies with fiscal years ending in 1998 or 1999. These client firms operate in manufacturing, merchandising, or (nonfinancial, nongovernmental) services. Sixty-seven of the audits were performed by the then Big 5 firms while 46 audits were performed by non-Big 5 firms. Audit hours for these engagements were collected for each audit procedure included in the audit program. We then assigned the audit procedures and the time used for each procedure to one of four audit phases: planning, risk assessment, substantive testing, and completion.[2] These phases (discussed in detail later in the paper) provide structure to audit production.

Briefly, our tests show that, after controlling for client characteristics, Big 5 and non-Big 5 auditors expend equal amounts of total audit effort. This somewhat surprising result implies that quality differentiation across auditor types is not associated with greater input

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[1] The audit risk model partitions the risk that financial statements are materially misstated (audit risk) into the risk that material misstatements can arise while ignoring any controls in place (inherent risk), the risk that the client's control systems fail to prevent or detect misstatements (control risk), and the risk that the auditor's substantive tests fail to detect material misstatements (detection risk). Thus, audit risk is a joint probability or audit risk = inherent risk × control risk × detection risk.

[2] The number of detailed procedures identified within each phase are: planning phase, 10 procedures; risk-assessment phase, 8 procedures; substantive testing phase, 14 procedures; and completion phase, 2 procedures. See the Appendix.

intensity. With respect to audit mix, we find that Big 5 firms spend relatively more time planning the audit and assessing internal controls, and relatively less time doing test of details and completion than non-Big 5 auditors. Turning to the underlying determinants of effort and mix, we find that Big 5 and non-Big 5 auditors differ in their response to client size, their implementation of the business risk approach to audits, and reliance on internal controls. All in all, we conclude that the documented quality difference between Big and non-Big auditors is due to *how* they audit, i.e., their audit technologies, rather than *how much* they audit. One caveat, of course, is that we were unable to control for variation in input quality and so the influence of this factor on audit quality remains unknown.

The remainder of the paper is organized as follows. We discuss the underlying conceptual bases for our tests, the methods we use, and the data in the second section. The third section presents the results of tests of total audit hours, the mix of hours in the four basic audit phases, and the determinants of effort and mix. A summary and conclusions are provided in the last section.

CONCEPTS, MODELS, AND DATA

Concepts

Our research question starts from the presumption that Big and non-Big firm audits are quality differentiated, that is Big 5 auditors provide a higher level of assurance than non-Big 5 auditors. In addition, we assume that the expected level of assurance provided by each auditor is known by audit clients and that, conditional upon price, each client chooses to purchase an appropriate amount of audit assurance. Given these assumptions, by looking at production data, we ask: Can we explain the quality differential in terms of what Big firm auditors do in their audit programs that systematically differs from what non-Big firm auditors do in their audit programs? This approach is unlike prior archival research on audit quality differentiation, since it focuses on the production side of the audit rather than the observable implications of hypothesized differences in audit quality.

As indicated above, we characterize audit quality as a function of input quality, input intensity, and audit technology. We take these concepts from production theory, and the motivation for using these concepts is straightforward. The quality of output depends upon the quality of input(s), the amount of input(s), and the technology available for transforming input(s) into output. In our tests, we assume that these factors are, at least to some extent, substitutable. Our study of the source(s) of audit quality differences depends upon the availability of proxies for these constructs. Due to data limitations, input (i.e., labor hour) quality is not controlled in our research design and is assumed to be constant across auditor types. The lack of a viable input quality measure implies that we cannot test if and to what extent the observed audit quality difference across auditor types is attributable to input quality (see O'Keefe, King, and Gaver 1994).

Audit intensity is measured by the total quantity of labor hours used in each audit. We assume that, *ceteris paribus*, greater effort results in higher expected audit quality. Some prior research, including OSS and HK, had access to hours by category of labor provider. Our data are organized differently as audit hours are classified only by the procedure performed and not by who (partner, manager, etc.) performed the task. While it might be ideal to consider both the task performed and who performed the task, when the survey was designed this additional information was not collected as it was considered too burdensome for respondents to classify time spent on both dimensions. Thus, a limitation of our study is that we treat all labor hours equally and do not consider the varying skill levels of, say, audit partners versus audit juniors. Despite this drawback, we believe totals hours provide a good first-order approximation of input intensity.

We measure audit technology by the proportion of audit hours devoted to the various audit procedures. We call these proportions the audit mix. Since we measure effort on 37 separate procedures (listed in the Appendix), we aggregated the procedures into four audit phases (also shown in the Appendix) in order to make the analysis both more manageable and more useful. Note that the phases correspond with the timeline of how audits are performed in the real world, although the classification of procedures into phases is based on the nature of the audit activity rather than its timing, per se. When hours are aggregated into phases, a phase mix can be calculated, and the phase mix is our proxy for audit technology. We justify this construct by noting that the phases represent qualitatively different types of audit activities. Importantly, auditors have discretion to substitute activity in one phase of the audit for activity in another, thereby changing the phase mix. To the extent that heterogeneity in audit technology results in this type of systematic substitution across audit phases, it is detectable by the phase mix.

As can be seen by examining the Appendix, the Planning phase encompasses procedures involved in setting up the audit, understanding the client's business and its industry(ies), determining planning materiality, and assessing inherent risks. The Risk Assessment phase involves assessing the quality of the client's control environment and procedures, and performing (any) tests of control. The Substantive Testing phase includes procedures associated with substantive tests of transactions and account details through such means as third-party confirmations, examination of documents, inquiry, etc. The Completion phase captures effort related to such things as review of work performed, tests for contingencies and subsequent events, and reporting on the engagement.

In our tests, we compare the average phase mix of Big firm audits with that of non-Big firm audits. Two related problems need to be resolved in order to make these comparisons. One problem is that the client characteristics for these two types of auditors may systematically differ. This could result in client characteristics rather than technology determining any observed differences in total hours and phase mix across auditor types. The second, related, problem is that since each client selects the type of auditor it engages (based, in part, on its observed characteristics and, in part, on unobserved characteristics) there can be a selection bias in the estimation of the coefficients used to determine expected audit hours.

To clarify these points, note that phase mix is the proportionate share of total audit hours allocated to each phase. For example, the phase mix of planning for a given client equals Planning Hours/Total Hours, for that client. Since the allocation of hours to phases likely varies with client characteristics, it is important to control for characteristics. To do this we calculate predicted hours for each phase based on a given set of characteristics and then use these predicted hours to calculate the phase mix. Therefore, the first stage in our process requires the calculation of expected hours models. Consider a regression model of, say, planning hours on control variables (in vector form):

$$PH = b_0 + b_1 x_1 + ... + b_k x_k + u = b'x + u.$$

Then the expected planning hours conditional on the observed data matrix x for our two subsamples are:

$$E[PH \mid b_{B5}, x_{B5}] \text{ and } E[PH \mid b_{\sim B5}, x_{\sim B5}]$$

where x_{B5} and $x_{\sim B5}$ are the data for the Big 5 and non-Big 5 subsets and b_{B5} and $b_{\sim B5}$ are the estimated coefficients for the Big 5 and non-Big 5 subsets, respectively.

To control for characteristics we compare the mixes based on the calculation of hours (once again using planning as an example):

$$E[PH \mid b_{B5}, x_{B5}] \text{ and } E[PH \mid b\sim_{B5}, x_{B5}], \text{ and}$$

$$E[PH \mid b_{B5}, x\sim_{B5}] \text{ and } E[PH \mid b\sim_{B5}, x\sim_{B5}].$$

As can be seen, the expected hour calculations are based on common sets of client characteristics and the technology of each auditor type as characterized by the vectors b_{B5} and $b\sim_{B5}$. The calculation of the phase mix is accomplished by using the expected hours for each of the four phases.

To further clarify our notation, we use $E[PH \mid b\sim_{B5}, x_{B5}]$, for example, to represent the set of expected planning hours that non-Big 5 auditors would generate if they audited the set of Big 5 clients. Essentially, we are applying the estimated parameters, $b\sim_{B5}$, from the regression of non-Big 5 planning hours on non-Big 5 clients to the set of Big 5 client characteristics, x_{B5}.

As noted above, self-selection bias can occur when clients choose the auditor type. Potentially, this selection process results in a correlation between the elements of the data matrix, x, and the error term, u. This correlation can lead to inconsistent estimates of b even when the subsets are estimated separately (Greene 2003). In terms of our above example, selection bias implies that the vectors b_{B5} and $b\sim_{B5}$ used to predict hours are potentially biased and consequently the predicted hours would be biased as well. A test for selection bias is to pool the data and apply Heckman's two-stage approach in which a selection model is estimated in the first stage and the inverse Mill's ratio derived from the first-stage model is then inserted into the second-stage structural model. After adjusting the standard errors as required by the Heckman model, the t-statistic for the coefficient of the inverse Mill's ratio serves as a test of selection bias. In results (not tabulated) selection bias does not appear to be a problem in our dataset and we use OLS to derive the predicted hours in the remainder of the paper.

Models

An important step in the analysis is to identify a set of independent variables that explain the level of audit hours dedicated to each audit phase. We consider explanatory variables that either have support from prior research or relate to current auditing issues. The latter include the adoption of new business-risk-based audit methodologies; the extent of management advisory services performed for a client; and the risk of fraud assessed by the auditor—whose real-world impact on detailed audit program design (choice among and time devoted to various procedures) is largely unknown. Our variable selection criteria were primarily related to theoretical concerns (size, risk, complexity) and prior literature. However, given our limited sample size we also used common statistics such as Adjusted R^2, PRESS, and Mallows' C_p to identify a parsimonious set of independent variables that would not over-fit the data. To facilitate comparison across models we used a common set of regressors even though that entails a slight loss of efficiency in those models where some of the regressors are not statistically significant.

Once a set of explanatory variables is determined, we estimate an hours equation for total hours (model 0) and for each of the four phases (denoted by subscript j) with regression functions of the following form by auditor type:

$$\ln(h_j) = b_{0j} + b_{1j}\ln(\text{assets}) + \Sigma\, b_{kj}\,\text{characteristic}_k + u_j \qquad j = 0,\ldots,4 \qquad (1)$$

where:

$\ln$ = natural logarithm;
h_j = time devoted to an audit phase or procedure by all levels of staff;
assets = total assets of the client at year end (basic measure of client size);
characteristic_k = other explanatory variables (the same in all regression functions); and
u_j = error term in model j.

OSS discuss the properties of this functional form, which is standard in many prior empirical studies of audit fees and audit hours.

The models described by Equation (1) are run for each subset of data and vectors of parameter estimates b_j are obtained. These parameter estimates are then used to determine predicted audit hours for each phase: planning (PH), risk assessment (RH), substantive testing (SH), and completion (CH). Total predicted hours and audit phase mix is then calculated. The vector of total predicted hours used by Big 5 auditors on their own clients is:

$$TH_{B5,\,B5} = E[PH \mid b_{B5\ PH}, x_{B5}] + E[RH \mid b_{B5\ RH}, x_{B5}] + E[SH \mid b_{B5\ SH}, x_{B5}] + E[CH \mid b_{B5\ CH}, x_{B5}]. \qquad (2)$$

And the corresponding mix vector for, say, planning hours is:

$$PM_{B5,\,B5} = E[PH \mid b_{B5\ PH}, x_{B5}]/TH_{B5,\,B5}. \qquad (3)$$

Similar calculations are performed to determine total predicted hours by non-Big 5 firms on their own clients ($TH_{\sim B5,\,\sim B5}$) and the out of sample predictions ($TH_{B5,\,\sim B5}$, $TH_{\sim B5,\,B5}$). Phase mix calculations follow the pattern given in Equation (3). Finally, we chose to calculate the total hours as the sum of the phase hours rather than estimating predicted total hours directly. While the correlation between the predicted total hours using these two methods is high ($\rho > .999$), the magnitudes of the total hours are different because of the nonlinear nature of Equation (1). Using the method described by Equation (2) assures that the sum of the phase mixes calculated using Equation (3) equals 100 percent.

Data

We obtained the data via questionnaires sent to contact persons within the public accounting firms that agreed to participate in the research. The survey was conducted by the Limperg Instituut in Amsterdam. The questionnaire (available from the authors upon request) instructed the person who was responsible for the decisions about the audit approach used for the specific audit clients included in the survey to complete the document. The questionnaire listed a wide variety of "generally accepted" audit procedures within audit phases, but also allowed the respondent to separately report (any) additional procedures used. Respondents were requested to supply actual hours devoted to various procedures, when possible, and to supply estimated hours when necessary (7 of 113 respondents indicated the hours were estimates). The clients were selected at random by the respondents, from the participating firms' client portfolios, subject to the restrictions that:

- the engagement is a full audit of a separate Dutch legal entity for the year 1998 or 1999;
- the client is a medium or large company operating in trading, manufacturing, or a service industry that is "for profit" and excludes financial institutions, and governmental organizations.

We received 113 usable responses.[3] The identities of the clients included in the database are unknown to us. Two Big 5 audit firms contributed 32 and 24 of our 67 Big 5 audits, respectively. Following data entry, we performed extensive screening using logical consistency checks, etc., to eliminate errors. Several cases required follow-up with the responding auditor to ensure that reported data were correct.

While our data are from The Netherlands, we believe that Dutch audits are representative of modern audits performed in North America, Europe, and other developed economies. As noted earlier, 60 percent of the sample audits were performed by the then Big 5 firms, whose auditing methods are standardized worldwide. In addition, Dutch audits are performed in accordance with the *International Standards on Auditing*, which, while not as detailed or as prescriptive, are similar in substance to U.S. auditing standards. Finally, The Netherlands has a highly developed economy and legal institutions, where auditors face significant litigation risk. La Porta et al. (1998) assign a "law and order" score of 10 (the highest attainable) to both the U.S. and The Netherlands, and a "law enforcement score" of 49.33 (from a maximum of 50) to The Netherlands, compared to a 47.61 score to the U.S. With respect to the severity of the litigation environment facing Dutch auditors, Wingate (1997) assigns an index value of 10 (from a maximum of 15) to The Netherlands, the highest of any country rated outside the U.S. (which earns a score of 15 and is the only country with a score greater than 10). Note also that 10 is the same litigation risk score assigned to Australia, New Zealand, Hong Kong, and the United Kingdom—all countries that are well represented in the published literature in the economics of auditing.

RESULTS

Model Selection

In our initial analysis we selected a set of independent variables to explain audit hours by type of auditor. To do this we estimated Equation (1) for total hours and for each audit phase. The variables used in the initial analysis are defined below.

Dependent Variables

PH = hours used in the planning phase of the audit; *LPH* is the natural logarithm of these hours;

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[3] In conducting the survey, potential respondents were first approached personally to inquire about their willingness to participate in the research. Those who agreed to do so were then provided with several copies of the questionnaire and asked to select randomly from their clients that fit our parameters, and to complete the questionnaire(s). Three participants agreed to provide information for two of their clients. Thus, the sample of 113 audits comes from 110 different participants. Personal follow-up was used as needed to elicit responses. Given this procedure, calculation of a survey response rate and performance of standard tests for nonresponse bias (such as comparing early and late responses) is not feasible. However, we have no reason to believe that the audits in our sample are not representative of Dutch audits of the type we chose to study. Note that, in The Netherlands, audits of financial statements are compulsory only for large- or medium-sized companies, of which there are some 9,000, and for governmental agencies. In addition, a number of small companies, as well as not-for-profit foundations and the like, have their financial statements audited on a voluntary basis.

RH = hours used in the risk-assessment phase of the audit; *LRH* is the natural logarithm of these hours;

SH = hours used in the substantive testing phase of the audit; *LSH* is the natural logarithm of these hours; and

CH = hours used in the completion phase of the audit; *LCH* is the natural logarithm of these hours.

Independent Variables

Assets = total assets of the client at fiscal year-end, in 1,000's nlg (Netherlands Guilders);[4]

Ln *Assets* = natural logarithm of total assets;

Complexity = complexity of the client as assessed by the respondent on a seven-point scale (1 = simple to 7 = very complex);

Services = dummy variable where 1 = client is in a service industry;

Tenure = tenure of the auditor as measured by the number of years the firm has performed the engagement;

Reliance = overall degree of reliance on the client's internal controls in performing the audit, where 1 = very low to 7 = very high;

BR Approach = dummy variable where 1 = audit firm used the business risk approach (strategic systems audit) rather than the conventional audit-risk-model-based approach;

X Time Pressure = measures client pressure on audit time and audit fees as perceived by the respondent. The original measure was based on a seven-point scale from 1 (no pressure) to 7 (severe pressure); *XTP* is a transformation of the time pressure variable, where 0 = pressure assessed at less than 4 and 1 = pressure assessed at 4 or greater;

Management Fraud = risk of management fraud as assessed by the respondent on a seven-point scale (1 = very low to 7 = very high);

MAS = management advisory services performed for the client in the current year, as a percent of the total fees charged the client for all services rendered; *MAS0* is defined to *exclude* information technology services, tax services, and due diligence engagements;

ROI = return on investment;

Current Ratio = current ratio;

Controls = overall quality of client's internal controls as assessed by the respondent on a seven-point scale (1 = very low to 7 = very high); and

Listed = 1 if the client is listed on a stock exchange, and 0 otherwise.

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4 At the time of the conversion from Netherlands Guilders (nlg) to euros on December 31, 1998, the exchange rate was set at 2.20nlg = 1 euro. In subsequent trading, 1 euro has roughly been equal to 1 U.S. dollar, plus or minus about a 20 percent variation.

Descriptive statistics for these variables, partitioned by class of audit firm (Big 5 and non-Big 5) are shown in Table 1.[5] As expected, the average Big 5 client is larger than the average non-Big 5 client (Ln (*Assets*)). In addition, a larger proportion of Big 5 audits in the sample are for service industry (*Service*) clients (25 percent versus 11 percent), Big 5 auditors are more likely to use the business-risk-based audit approach (*BR Approach*) (31 percent versus 17 percent), and Big 5 auditors face strong time pressure (*X Time Pressure*) on a higher proportion of their engagements (40 percent versus 24 percent). Other differences include auditor tenure (*Tenure*), the auditor's assessment of the client's control quality (*Controls*), the auditor's reliance on controls (*Reliance*), and whether the client's shares are listed on a stock exchange (*Listed*). Table 2 displays a simple correlation matrix of the variables.

Results of the regression of total engagement hours on the explanatory variables are reported in Table 3. These results are reported as a benchmark. Note that the statistical model has good overall explanatory power. The R^2s are not as high as, for example, in OSS—who examined audit hours from a single Big 6 firm—but are consistent with research using audit fee data from a cross-section of firms (e.g., Ferguson and Stokes [2002] who use Australian audit fee data). The independent variables reported in the analysis are a subset of the measures we examined to investigate associations with total audit hours and with various subsets of hours such as: hours by type of audit firm, by audit phase, and by audit procedure. The explanatory variables we retained and which appear in Table 3 are those that attained statistical significance in some part of these analyses. The reduced model for each auditor type subset is:

$$\ln(h_j) = b_{0j} + b_{1j}\,\mathrm{Ln}(\mathit{Assets}) + b_{2j}\mathit{Complexity} + b_{3j}\mathit{BR\ Approach} + b_{4j}\mathit{Reliance} + b_{5j}\mathit{Tenure} + b_{6j}\mathit{X\ Time\ Pressure} + u_j. \quad (4)$$

As discussed earlier, the hypothesis that Big 5 audits are of higher quality, on average, than non-Big 5 audits has been extensively tested (and supported) using a variety of data and research methods. It is therefore interesting to look at the similarities and differences in the Big 5 and non-Big 5 equations. In both equations, total hours increase in client *Assets* and *Complexity*. Differences in the equations occur with respect to *Reliance* and *BR Approach*. Reliance on a client's internal controls (*Reliance*) decreases audit hours for the subsample of Big 5 audits. While consistent with auditing theory and common sense, this negative relationship has typically not been observed in prior archival studies, though Felix et al. (2001) did find a negative relationship between internal audit effort and external audit fees in a small sample study.[6] Interestingly, the use of the business risk approach (*BR Approach*) appears to decrease audit hours, but only for non-Big 5 audits.

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[5] For the record, we investigated a number of additional possible explanatory variables that never attained statistical significance in any of our tests. These were:
- client's financial leverage
- nature of the auditor's opinion
- years experience of the respondent (i.e., the audit supervisor, manager, or partner who is responsible for the whole or greater part of the technical decisions about the audit approach) with the client.
- assessed risk of employee fraud (i.e., theft of assets)
- assessed risk of client illegal acts
- assessed level of overall inherent risk for the engagement
- extent of information technology services, tax services, and due diligence engagements performed for the client.

[6] We thank an anonymous referee for bringing this finding to our attention.

TABLE 1
Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Panel A: Non-Big 5 Clients					
Total Hours	46	372.30	254.45	108	1300
Planning %	46	7.51	3.62	1	16
Risk Assessment %	46	21.18	11.77	1	55.8
Substantive Testing %	46	51.61	14.40	13	75
Completion %	46	19.70	10.76	3.33	65
Assets[a] (000s)	46	46,661	105,368	2,695	570,000
Complexity	46	3.54	1.17	1.00	6.00
Services[a]	46	0.11	0.31	0.00	1.00
Tenure[a]	46	9.78	8.92	1.00	52.00
Reliance[a]	46	4.70	1.15	2.00	6.00
BR Approach[a]	46	0.17	0.38	0.00	1.00
X Time Pressure[a]	46	0.24	0.43	0.00	1.00
Management Fraud	46	2.33	1.08	1.00	5.00
MAS	46	7.41	12.36	0.00	57.00
ROI	46	0.06	0.13	(0.24)	0.46
Controls[a]	46	4.48	1.26	2.00	7.00
Listed[a]	46	0.07	0.25	0.00	1.00
Current Ratio	45	1.666	.23	.16	10.14
Panel B: Big 5 Clients					
Total Hours	67	714.12	837.63	79	5500
Planning %	67	10.57	5.50	2	25
Risk Assessment %	67	25.39	11.91	5	56
Substantive Testing %	67	47.96	13.05	20	75
Completion %	67	16.09	7.50	4	40
Assets (000s)	67	249,799	476,933	6,380	2,100,000
Complexity	67	3.48	1.06	1.00	6.00
Services	67	0.25	0.44	0.00	1.00
Tenure	67	13.31	10.06	1.00	50.00
Reliance	67	5.13	1.14	2.00	7.00
BR Approach	67	0.31	0.47	0.00	1.00
X Time Pressure	67	0.40	0.49	0.00	1.00
Management Fraud	67	2.06	0.94	1.00	5.00
MAS	67	7.43	18.53	0.00	80.00
ROI	67	0.09	0.10	(0.13)	0.56
Controls	67	5.10	0.91	3.00	7.00
Listed	67	0.42	0.50	0.00	1.00
Current Ratio	67	1.78	.33	.10	21.70

[a] Indicates that the sample mean for the non-Big 5 clients is significantly different from the Big 5 sample with a p-value of .10 or less. Only independent variables are tested.

TABLE 2
Correlation Matrix

	Assets	*Complexity*	*Services*	*Tenure*	*Reliance*	*BR Approach*	*X Time Pressure*	*Management Fraud*	*MAS*	*ROI*	*Current Ratio*	*Controls*	*Listed*
Panel A: Non-Big 5 Clients													
Assets	1.0000												
Complexity		1.0000											
Services			1.0000										
Tenure				1.0000									
Reliance	0.2916			−0.2553	1.0000								
BR Approach						1.0000							
X Time Pressure							1.0000						
Management Fraud					−0.2587			1.0000					
MAS					−0.3593				1.0000				
ROI										1.0000			
Current Ratio										0.5781	1.0000		
Controls	0.2791			−0.3267	0.6534	−0.2681	0.3573	−0.5600	−0.2541			1.0000	
Listed	0.4951	0.2568			0.3023		0.2647					0.3224	1.0000
Panel B: Big 5 Clients													
Assets	1.0000												
Complexity	0.2976	1.0000											
Services			1.0000										
Tenure				1.0000									
Reliance				0.2222	1.0000								
BR Approach						1.0000							
X Time Pressure			−0.3392			0.2320	1.0000						
Management Fraud					−0.2065			1.0000					
MAS									1.0000				
ROI							0.2425		−0.2402	1.0000			
Current Ratio											1.0000		
Controls				0.2754	0.6164	0.2076						1.0000	
Listed		0.2472											1.0000

Only correlations with p-values of .10 or less are shown.

TABLE 3
Regression of Ln (Total Hours) on Explanatory Variables by Auditor Type

	Big 5 Clients Total Hours	Non-Big 5 Clients Total Hours	Chow Test of Across-Equation Differences in Coefficients
Ln (*Assets*)	.38 0.000***	.2835 0.000***	ns
Complexity	.1672 0.017**	.1261 0.014**	ns
BR Approach	.1073 0.452	−.36 0.021**	**
Reliance	−.1637 0.009***	.06584 0.235	***
Tenure	.01366 0.043**	.008757 0.203	ns
X Time Pressure	−.1143 0.400	−.2504 0.072*	ns
Constant	−.629 0.448	.2676 0.759	Not Tested
n	67	46	
Adj. R^2	.6066	.5942	

Coefficient/p-value:
*, **, *** Indicates significant at the 10 percent, 5 percent, and 1 percent levels, respectively.
ns = not significant.

Finally, two other results related to the total hours regressions are worth noting. First, and consistent with prior research, the performance of MAS (*MAS*) by the auditor for a client has no discernible impact on total audit hours (regression result not reported). Second, the length of the auditor's tenure (*Tenure*) with a client *increases* audit hours, particularly for Big 5 audits. This finding is contrary to the conjectured auditor learning curve that (partially) underlies DeAngelo's (1981) argument that aggregate quasi-rents can result from multi-period pricing in the presence of auditor learning and/or transactions costs of auditor change.

The differences on *Reliance* and *BR Approach*, taken alone, do not suggest to us any obvious conclusions with respect to the quality differentiation hypothesis.

Tests of Total Hours

As the next step in our analysis, Table 4 reports the results of our estimation for the phase hours by auditor type. Using the regression coefficients reported in Table 4, we apply Equation (2) to calculate predicted audit hours by summing across the predicted phase hours for each client. We do this for the clients of Big 5 firms using a Big 5 auditor ($TH_{B5, B5}$), and again as if they had used a non-Big 5 auditor ($TH{\sim}_{B5, B5}$). Similarly, we calculate the predicted hours for the clients of non-Big 5 firms using a non-Big 5 auditor ($TH{\sim}_{B5, {\sim}B5}$), and again as if they had used a Big 5 auditor ($TH_{B5, {\sim}B5}$). The results are reported in Table 5.

In Panel A of Table 5 the cells indicate the means and differences in total predicted hours across the Big 5 and non-Big 5 samples. A t-test shows that the differences are not

TABLE 4
Regression of Ln (Phase Hours) on Explanatory Variables

Variable	B5 Planning Hours	~B5 Planning Hours	B5 Risk Assessment Hours	~B5 Risk Assessment Hours	B5 Substantive Hours	~B5 Substantive Hours	B5 Completion Hours	~B5 Completion Hours
Ln (*Assets*)	.3776 0.000***	.1015 0.302	.4194 0.000***	.1802 0.169	.35 0.000***	.3145 0.000***	.3333 0.000***	.2731 0.002***
Complexity	.1524 0.073*	.2704 0.003***	.12 0.239	.2573 0.028**	.216 0.007***	.07376 0.293	.1189 0.163	.1168 0.109
BR Approach	.2191 0.214	.003067 0.991	.369 0.085*	−.4665 0.183	.005648 0.972	−.709 0.002***	.1561 0.378	.01729 0.937
Reliance	.02851 0.704	.1995 0.041**	−.03848 0.671	.1939 0.130	−.2433 0.001***	.07548 0.333	−.1468 0.056*	−.06048 0.450
Tenure	.01569 0.059*	−.002355 0.842	.01774 0.076*	.004285 0.784	.009805 0.200	.01219 0.209	.0145 0.082*	.009224 0.353
X Time Pressure	−.2983 0.078*	−.3387 0.157	−.2538 0.211	−.8478 0.010***	−.09327 0.548	−.02128 0.912	−.073 0.665	−.4521 0.027**
Constant	−3.906 0.000***	−.4714 0.755	−3.403 0.007***	−.6142 0.759	−.5446 0.565	−.8497 0.490	−1.679 0.106	−.7123 0.574
n	67	46	67	46	67	46	67	46
Adj. R^2	.5495	.2651	.4631	.2924	.5264	.483	.4072	.3526

Coefficients/p-values are reported:
*, **, *** Indicates significant at the 10 percent, 5 percent, and 1 percent levels, respectively.

TABLE 5
Predicted Total Audit Hours by Auditor Type

Panel A: Predicted Auditor Hours by Auditor and Client Types

	Mean Hours Predicted for Big 5 Auditors	Mean Hours Predicted for Non-Big 5 Auditors	Difference	p-value of Two-Sided t-test
Non-Big 5 Clients	330	325	5	.91
Big 5 Clients	571	482	89	.19

Panel B: Number of Engagements where Predicted Audit Hours by One Auditor Type Exceed the Other Auditor Type

	Predicted Big 5 Hours Exceed Predicted Non-Big 5 Hours	Predicted Non-Big 5 Hours Exceed Predicted Big 5 Hours	Total Cases	p-value of Two-Sided Nonparametric Sign Test
Non-Big 5 Clients	19	27	46	.302
Big 5 Clients	36	31	67	.625

Predictions are based on the total hours aggregated over individual phase models.

significant in a two-tailed test. However, in a one-tailed test of Big 5 clients, Big 5 auditors are predicted to use marginally more audit hours than non-Big 5 auditors. In Panel B the cells represent the number of times one type of auditor is predicted to use more total hours than the other type of auditor. For example, in the upper left-hand cell, the 19 indicates that of the 46 non-Big 5 clients, a Big 5 auditor is predicted to use more total hours 19 times (and fewer total hours 27 times). Interestingly, while the results in Table 5, Panel A suggest that Big 5 auditors may use more hours than non-Big 5 auditors for Big 5 clients, this is not seen in Panel B where in 54 percent of cases (36/67) Big 5 auditors are predicted to use more hours, but in 46 percent of cases (31/67) non-Big 5 auditors are predicted to use more hours. Thus, the nonparametric sign tests indicate that there is no statistically significant evidence that one type of auditor applies more audit effort than the other, and that the relatively large mean difference in Panel A for Big 5 clients is due to outliers.

We performed two sensitivity tests of this result. In one test, we re-estimated the models shown in Table 4 for a subset of the Big 5 clients that overlaps the non-Big 5 clients in total assets (results not reported). This requirement reduced the Big 5 sample to 61 clients. Using this reduced sample we replicated the analysis shown in Table 5. While the particulars of the results reported in Table 5 did change somewhat, the overall conclusion did not change. In the second sensitivity test, we based our predicted total effort on the models shown in Table 3. The parametric tests showed no differences across the auditor types for either Big 5 or non-Big 5 clients. The nonparametric sign test indicated that non-Big 5 auditors were predicted to use more effort than Big 5 auditors for non-Big 5 clients. This test was significant at the 10 percent level in a two-tailed test and contrasts with the results reported in Table 5, Panel B. Based on these various tests, we conclude that the product differentiation hypothesis—that average Big 5 audit quality is greater than average non-Big 5 audit quality—is not supported in our sample by Big 5 auditors auditing more intensively (i.e., expending greater total audit effort) than non-Big 5 auditors.

Audit Phase Mix

As noted above, in examining total audit hours across auditor types we estimated the predicted audit hours for each phase of the audit by auditor type using the coefficients reported in Table 4, and then applied Equations (2) and (3) to calculate a phase mix for each observation by auditor type. Of course, the coefficients estimated in Table 4 determine the resulting phase mix, and we now examine these coefficients more closely.

One interesting result is the relative inability of the models to explain planning and risk-assessment hours for non-Big 5 auditors, where the adjusted R^2s are .26 and .29, respectively. These low R^2s are most likely due to the lack of association between auditor effort and client size in the planning and risk-assessment phases for non-Big 5 auditors. It appears that non-Big 5 audit firms do not spend significantly more time on the "softer," more judgmental, aspects of auditing for their larger clients than for smaller clients, relying instead on increasing substantive testing as client size increases.

Increasing reliance on a client's internal controls significantly changes audit mix (Table 3), but the effects are quite different for Big 5 and non-Big 5 audits. For Big 5 firms, there is a strong decrease in substantive testing hours (−.243 in Table 4), and to a lesser extent completion hours (−.146 in Table 4), resulting in a shift away from substantive testing and completion to planning and risk assessment. To our knowledge, this is the first time that an archival study of audit hours has detected this very reasonable pattern of changing effort consistent with textbook auditing theory and auditing standards. For non-Big 5 auditors, reliance on controls has the anomalous effect of increasing planning hours without decreasing substantive testing. However, the increase in total hours is consistent with the (unexpected) finding regarding internal control reliance (i.e., greater reliance results in more total audit hours) reported in OSS, and may suggest that non-Big 5 auditors sometimes have difficulties in linking audit judgments concerning the quality of internal controls to judgments concerning appropriate levels of substantive testing. Behavioral researchers (e.g., Mock and Turner 1979) have previously documented this type of problem in audit decision-making.

Use of the "business risk" audit approach—that emphasizes a "top down, holistic" view of a financial statement audit rather than the more "bottom up" transactions-based audit risk model approach—decreases substantive testing for non-Big 5 auditors. In principle, the business risk approach is expected to change the deployment of audit resources toward the soft, judgmental activities covered in the planning and risk-assessment phases of the audit (see Bell et al. 2002). This shift in hours should be accompanied by a decrease in traditional substantive testing of the details of transactions and account balances, as sophisticated analytical tests are substituted for the more traditional transactions based substantive audit tests. To our knowledge, no one has articulated the expected impact of the business risk approach on total hours. Moreover, the impact of these approaches on audit quality is unknown, but our results raise concerns about the potential effectiveness (quality) of non-Big 5 audits using the business risk approach, since there is no attendant increase in planning or risk-assessment effort, and a decrease in total effort by these firms in our sample.

The phase mix results are reported in Table 6. Panels A and B confirm the differences in audit program structures suggested by the regressions in Table 4. Panel A shows the predicted phase mix for the clients of non-Big 5 auditors. From this panel we see that the audit programs of non-Big 5 auditors spend relatively less time on planning and relatively more time on completion than do Big 5 auditors (p-values for differences in phase percentages are less than .001 for these categories). Both auditor types dedicate about the same

TABLE 6
Predicted Mix of Hours in Audit Phases by Auditor Type

Audit Phase	Predicted % of Audit Hours by Big 5 Firms	Predicted % of Audit Hours by Non-Big 5 Firms	Big 5 Minus Non-Big 5	p-value of Two-Tailed t-test of Equal Means
Panel A: Non-Big 5 Clients (n = 46)				
Planning	.0911	.0746	.016	0.0002
Risk Assessment	.2082	.1941	.014	0.1038
Substantive Testing	.5422	.5376	.004	0.7730
Completion	.1583	.1935	−.035	0.0003
Panel B: Big 5 Clients (n = 67)				
Planning	.1002	.0629	.037	0.0000
Risk Assessment	.2452	.1624	.082	0.0000
Substantive Testing	.4990	.5838	−.084	0.0000
Completion	.1553	.1906	−.035	0.0000

amount of effort to (control) risk assessment and substantive testing. Panel B shows the predicted phase mix for the clients of Big 5 auditors. Here the phase percentages differ across the board. For these clients, Big 5 auditors spend relatively more time on planning and (control) risk assessment and less time on substantive testing and completion.

It should be remembered that the comparisons of phase mixes using our within-sample and out-of-sample design controls for differences in client characteristics, while incorporating each auditor's technology. Importantly, the technology is conditioned upon the planned level of assurance that we assume varies across the auditor types. Therefore, we attribute differences in phase mix across auditor types explicitly to differences in planned assurance levels and not to differences in client characteristics.

To further understand these differences in audit programs, we next look at the mix of specific audit procedures within the planning and risk-assessment phases for the two auditor types.

Within Phase Mix

From Tables 5 and 6 we conclude that Big 5 and non-Big 5 auditors expend about equal amounts of total effort on audits, but allocate their effort differently. To gain further insight into how the audit programs of the two firm types differ, we now examine the time spent by each audit firm type on specific audit procedures performed during the planning and risk-assessment phases. We concentrate on these two phases since, under the hypothesis that Big 5 auditors provide a higher level of assurance, it is useful to look at those activities that Big 5 auditors emphasize (relative to non-Big 5 auditors) to try to understand the sources of higher audit quality.

To obtain a more intuitive description of audit activities, we subjected the audit hours devoted to the underlying audit procedures (see the Appendix for a listing) within each phase to a factor analysis (results not reported). The factor loadings suggested that we could combine a number of the procedures into a reduced number of factors, all of which have a reasonable auditing interpretation. This procedure yielded six factors in the planning phase and four factors in the risk-assessment phase. We label the planning factors as follows:

- Knowledge (of the client's business)
- (use of the business risk approach) B Risk
- (implementing the audit) Risk Model
- (use of analytical procedures) Analytical
- Audit Planning, and
- Other Activities.

The risk-assessment factors are labeled as follows:

- (assessing and testing of controls) Internal Cntrls
- (use of Business Risk Approach) B Risk
- (relating controls to substantive tests) Relate Cntrls, and
- Other Activities.

Combining the audit hours for the various procedures according to these factor definitions (see details in the Appendix), we then calculate a factor mix for the planning and risk-assessment phases for each audit, using the same procedures we used to obtain the phase mix as described in the "Tests of Total Hours" and "Audit Phase Mix" sections. The results are reported in Table 7. Note that the mixes calculated in this table represent the estimated proportion of *total* audit hours devoted to each activity. Because of the level of detail of these activities, we did not calculate statistical significance tests of the differences between Big 5 and non-Big 5 audits, but rather use the results to obtain an overall sense of the apparent sources of audit quality differences.

Table 6 suggests that Big 5 auditors allocate significantly more audit time to planning and risk assessment, and Table 7 indicates that this is true of most activities within these phases. Of these activities, the least interesting are those associated with B Risk since we know (from Table 1) that a larger proportion of Big 5 (versus non-Big 5) audits in the sample (31 percent versus 17 percent) are performed using this new audit methodology. For the other activities in the planning phase, Big 5 auditors spend relatively more time in obtaining knowledge of the client's business and its industry(ies), and relatively more time in implementing the audit risk model, including the assessment of inherent risk—both directly and through the performance of "attention-directing" analytical procedures. The proportion of time devoted by both auditor types to developing the audit plan and program, as well as miscellaneous other activities, is essentially the same.

With respect to the (control) risk-assessment phase, Big 5 auditors spend relatively *more* time assessing and testing internal controls (Internal Cntrls) for the subsample of Big 5 clients, but non-Big 5 auditors spend relatively *more* time in this area for the subsample of non-Big 5 clients. While these differences seems odd at first, recall from Table 3 that the greater the degree of reliance on a client's internal controls (Reliance, self-reported) by non-Big 5 audit firms, the greater the total hours these firms spend on engagements. This is contrary to textbook auditing theory and auditing standards, since an audit firm should *choose* to rely on a client's internal controls only when it is *efficient* to do so. Note also from Panel B of Table 7 that Big 5 auditors consistently spend relatively more time in relating controls to substantive tests (Relate Cntrls). Since the major purpose of understanding and testing internal controls is to be able to restrict the level of substantive testing, it appears that the additional time non-Big 5 firms spend on internal controls (Internal Cntrl) may result, on average, in the performance of inefficient audits by these firms.

Taken together our analysis of the details of activities within the planning and (control) risk-assessment phases is consistent with the argument that Big 5 audits are less procedural and more contextual than non-Big 5 audits. That is, they focus more on those aspects of

TABLE 7
Analysis of Planning and Risk Assessment Effort

Panel A: Predicted Percentage of Total Audit Hours in Planning by Activity and Auditor Type

Non-Big 5 Clients (n = 46)	Big 5	Non-Big 5
Knowledge	0.013	0.012
B Risk	0.018	0.012
Risk Model	0.023	0.019
Analytical	0.010	0.008
Audit Planning	0.020	0.024
Other Activities	0.004	0.004
Big 5 Clients (n = 67)	**Big 5**	**Non-Big 5**
Knowledge	0.016	0.011
B Risk	0.018	0.011
Risk Model	0.025	0.015
Analytical	0.011	0.007
Audit Planning	0.024	0.020
Other Activities	0.004	0.003

Panel B: Predicted Percentage of Total Audit Hours in Risk Assessment by Activity and Auditor Type

Non-Big 5 Clients (n = 46)	Big 5	Non-Big 5
Internal Cntrls	0.139	0.163
B Risk	0.030	0.016
Relate Cntrls	0.025	0.014
Other Activities	0.006	0.004
Big 5 Clients (n = 67)	**Big 5**	**Non-Big 5**
Internal Cntrls	0.185	0.139
B Risk	0.031	0.015
Relate Cntrls	0.025	0.016
Other Activities	0.004	0.003

the audit related to understanding various aspects of the client and its operations, and then translating that understanding into audit assurance.

SUMMARY AND CONCLUSIONS

In this paper, we examine how audits performed by Big 5 and non-Big 5 auditors differ. We pose this research question in response to a substantial body of evidence that Big 5 auditors provide a distinctly higher average level of assurance than non-Big 5 firms. This is the first research (of which we are aware) to examine the details of audit performance for a broad cross-section of public accounting firms. Previous archival research has typically examined data from a single Big 5 auditor.

We measure differences across audit programs in terms of total audit hours, the allocation of audit effort to four audit phases (planning, risk assessment, substantive testing, and completion), and the drivers of audit effort. Our main findings are that, after controlling for client characteristics:

(1) Both types of auditors employ about the same amount of total effort;
(2) Big 5 auditors allocate relatively more effort to planning and risk assessment (and relatively less to substantive testing and completion), and
(3) Client size, use of the business risk approach, and reliance on client internal controls effect audit hours differently for the two auditor types.

We conclude that the difference in audit quality, across auditor types, is not a function of the quantity of audit effort (audit intensity), but rather how that effort is applied (audit technology). In particular, our evidence suggests that higher audit quality is associated with a less procedural and more contextual approach to the audit. The Big 5 auditors in our sample consistently spend relatively more hours in the planning and risk-assessment (the thinking) phases of audits, while non-Big 5 audit firms spend relatively more time in the substantive audit testing (the doing) phase. Big 5 audit firms respond to high-quality client internal controls in a reasonable way—they spend more time assessing and evaluating the controls, and then less time in substantive testing. In contrast, non-Big 5 audit firms *increase* total audit time when relying on clients' strong internal controls.

One caveat to our study is that while we hypothesize that audit quality is a function of input quantity, audit technology, and input quality, we are unable to control for the last factor. As a result, we are not able to assess the extent to which our results and conclusions would change if this factor were incorporated into our tests. Another limitation of our study is that our data are restricted to the audits of 113 clients by 14 public accounting firms in The Netherlands during the late 1990s. In the light of recent corporate and related auditing failures, research directed toward how audit assurance is efficiently and effectively produced is of ongoing interest to regulators and the profession. Despite the cost and difficulty in accessing the data required to study auditor assurance within a production framework, we feel that further studies with larger samples, from varying jurisdictions, and over time would definitely be worthwhile.

APPENDIX
Detailed Procedures by Audit Phases

Planning Phase

Label	Description
Knowledge	Obtaining background information and knowledge of the client's business
Knowledge	Obtaining a general understanding of the legal and regulatory framework
Analytical	Performing "attention directing" analytical procedures
B Risk	Identify critical business processes beyond financial processes
B Risk	Identify management use of critical success factors and performance indicators
Risk Model	Consider and set planning materiality
Risk Model	Assess initial acceptable level of audit risk
Risk Model	Assess overall inherent risk at financial statement and account balance level
Audit Planning	Develop overall audit plan and audit program
Other	All other activities in planning phase

Risk Assessment Phase

Label	Description
Internal Cntrls	Obtain understanding of design of accounting and internal control system
Internal Cntrls	Obtain understanding of client's control environment

Internal Cntrls	Obtain understanding of client's control procedures
B Risk	Assess critical business processes beyond financial processes
B Risk	Assess the value of critical success factors and performance indicators
Internal Cntrls	Perform tests of internal control
Relate Cntrls	Preliminary assessment of control risk at assertion level and evaluation of its influence on the nature, extent, and timing of substantive procedures
Other	All other activities in the risk-assessment phase
Substantive Testing Phase	
1	Test relation between flow of goods and flow of money (Dutch practice)
2	Perform other tests of financial statement relationships
3	Perform analytical and other tests of critical success factors and performance indicators
4	Perform other analytical procedures
5	Verify key items with supporting documents, etc.
6	Perform statistical sampling as a substantive procedure
7	Inspect accounting records, documents, and tangible assets
8	Observe processes and procedures performed by client, including inventories
9	Inquire of knowledgeable persons inside the entity
10	Inquire of knowledgeable persons outside the entity
11	Obtain confirmations (e.g., accounts receivable) from third-parties
12	Examine subsequent payments by debtors
13	Perform procedures to verify completeness of payables
14	Miscellaneous substantive testing procedures
Completion Phase	
1	All final audit procedures (e.g., review for contingencies, subsequent events, workpaper review, final analytical procedures)
2	All final reporting activities (e.g., discussions with management and audit committee, drafting audit report and management letter)

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