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Audit Labor Usage and Fees under Business Risk Auditing

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ABSTRACT

The adoption of business risk audit (BRA) approaches during the 1990s by several leading audit firms has been the subject of considerable scrutiny and commentary. Under BRA, the auditor responds to the increasing complexity of auditee financial reports by acquiring a deep and comprehensive understanding of the auditee's industry, strategy, business models, and processes—tasks best accomplished by higher-ranked labor—and by employing this understanding to make audit labor allocations. Using proprietary data for 165 audits conducted in 2002, we investigate three propositions about audit labor use under BRA. First, relative to pre-BRA benchmarks for the same auditor, we expect BRA audits to use a greater *proportion* of higher-ranked labor. Second, we expect engagements with high assessed auditor business risk (ABR), a summary risk assessment that reflects the BRA auditor's rich understanding of the auditee, to be allocated more labor *and* more higher-ranked labor than pre-BRA benchmarks. Third, at all ranks of labor, we expect a positive association between assessed ABR and levels of labor use. We find empirical evidence consistent with these propositions. We also find that total labor use in our sample is only modestly lower than pre-BRA norms. Analysis of fee data from these engagements suggests that audit fees in 2002 are substantially less than would be expected under pre-BRA benchmarks. After controlling for

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audit labor use, both total fees and fees per hour increase with assessed ABR for first-year auditees but not for continuing auditees. Overall, our results provide evidence on the impact of the BRA audit regime and speak to the likely impact of BRA on audit effectiveness and efficiency.

1. Introduction

The proliferation of forward-looking and other judgment-laden financial reporting requirements in the 1990s, coupled with more dynamic client business environments and significant audit fee pressure, prompted the largest public accounting firms to develop new audit approaches to improve both audit effectiveness and efficiency (Cushing et al. [1995], Bell et al. [1997], Arthur Andersen [1998], KPMG [1999], Lemon, Tatum, and Turley [2000], Winograd, Gerson, and Berlin [2000], Eilifsen, Knechel, and Wallage [2001]). A key aspect of such approaches is developing a deep and comprehensive understanding of auditees' industries, business models, strategies, and processes. While the details of each firm's practices differ, the development of such an understanding and the attendant risk assessments is often referred to as business risk auditing (hereafter, BRA; Lemon, Tatum, and Turley, [2000]).[1] In the firm from which we obtain our data, the BRA process involves the assessment of auditor business risk (ABR), a composite risk metric incorporating client business risk (hereafter, CBR), material misstatement risk, and auditor litigation risk factors.[2] These ABR assessments, in turn, influence the assignment of audit labor within and across engagements (see Bell et al. [1997], Bell, Peecher, and Solomon [2005]).

The adoption of BRA has not been without controversy. In one view, BRA is a natural step in the evolution of audit approaches. BRA calls for the use of expanded evidentiary bases, more comprehensive risk assessments, deployment of professionals who possess the requisite knowledge and competencies to perform these more complex risk assessments, and the redirection of audit resources in accord with such assessed risks. Others, however, see BRA as an unsound departure from traditional audit practices that can lead to underauditing, most notably in the form of substantial reductions in audit effort (Berkowitz and Rampell [2002], Weil [2004]). While resolution of this debate is beyond the scope of any single study, our analysis provides empirical evidence that speaks to the underlying issues.

We address three key questions about the impact of BRA on audit labor use. First, *How has BRA changed audit labor usage relative to pre-BRA*

[1] By the late 1990s, BRA approaches were being used by Arthur Andersen LLP (*Business Audit*), Ernst and Young LLP (*Audit Innovation*), KPMG LLP (*BMP*, alternatively, *SSA*—see Bell et al. [1997]), and PricewaterhouseCoopers LLP (PwC Audit Approach—*PwCAA*). We obtain our data from a firm that employed such an approach during the sample period.

[2] CBR is more formally defined later. Broadly speaking, CBR is a measure of the threats to financial statement validity stemming from auditee failure to achieve business objectives.

benchmarks?[3] Second, *Are these changes systematically associated with assessed ABR?* Third, *Does the cross-sectional variation in BRA audit labor usage reflect variation in assessed ABR?* These three questions address different aspects of BRA. The first question addresses changes in BRA labor usage relative to pre-BRA benchmarks by comparing the cross-sectional variation in hours and fees across time. The second question links the changes to ABR assessments. The third question links the level of labor usage within a sample of BRA audits to assessed ABR. With respect to audit fees, we investigate how 2002 audit fees compare to pre-BRA benchmarks and whether, after adjusting for labor usage and controlling for other determinants studied in prior research, audit fees show evidence of a risk premium (higher fees associated with ABR). This aspect of our investigation updates prior studies of audit labor usage, audit fees, and fee per hour.

Our data consist of labor hours, fees, and key client and engagement characteristics for 165 U.S. audits conducted by a Big 4 firm during 2002–2003.[4] Notably our sample includes 79 new engagements (including 71 former Arthur Andersen engagements). We use the coefficients reported in table 3 of O'Keefe, Simunic, and Stein [1994] (hereafter, OSS) to compute, for each engagement, expected pre-BRA audit labor hours by rank and audit fees. These expected hours and fees constitute the pre-BRA benchmarks against which we evaluate actual 2002 audit labor usage and audit fees. Our data are obtained from the same auditor and our sample audit clients are from the same industry sectors as studied in OSS. We are, thus, able to control for auditor identity, auditee industry sector, *and* country when comparing current labor usage and fees to pre-BRA outcomes.[5]

Our principal findings are as follows. *First*, comparing 2002 actual labor mix and levels to 1989 benchmarks reveals that the mean share of partner and manager labor in the labor mix is about 40% higher (the labor mix is 40% *richer*) while mean levels of total labor use are about 10% lower than pre-BRA benchmarks. The overall pattern in our data, therefore, is one of BRA audits using a much richer labor mix *without* substantially reducing total labor hours relative to pre-BRA benchmarks.

Second, we find that in 2002, compared to an auditee with low assessed ABR, an auditee with moderate or higher assessed ABR is about four times more likely to be assigned *both* a richer labor mix and more total labor than expected under pre-BRA benchmarks. *Third*, after accounting for other

[3] Hereafter, we employ *use* or *usage* interchangeably to refer to *both* labor mix and levels of labor use, or when referring to labor use in general. We refer to *labor mix* or *labor levels* when the assertion of interest concerns only one of the two aspects of labor usage.

[4] The engagements that we analyze all were completed before the effective date of the Sarbanes Oxley Act of 2002 and were selected for review as part of the firm's internal quality control and peer review procedures. Since the auditee fiscal years correspond to Compustat fiscal year 2002, we henceforth refer to our labor usage and fees as 2002 labor usage and fees.

[5] That said, there are significant differences between the composition of our sample and that of OSS. We discuss the sensitivity of our findings to sample differences in a later section of the paper.

determinants of audit labor hours examined in prior research, including factors such as new auditee and public auditee status, we find that auditee financial leverage and a composite measure of audit risk, assessed ABR, are positively associated with higher levels of labor usage at every rank of labor in 2002. While auditee size remains the most significant determinant of labor hours, some variables that explain pre-BRA labor use are no longer significant in our data. Collectively these findings are consistent with the proposition that under BRA, auditors use a richer labor mix and assign audit labor in line with their ABR assessments while only modestly reducing total hours.

With respect to fees we find that, at the mean, BRA audit fees (in constant 1989 dollars) are about 75% of pre-BRA benchmarks. While audit fees are, for the most part, explained by actual labor usage, we find that first year auditees, auditees with highly reliable internal controls, and auditees that also obtain non-audit services from the auditor pay somewhat lower total and per-hour fees. Interestingly, we also find that within the subsample of first year auditees, higher assessed ABR is associated with higher total fees and fees per hour even after one accounts for labor use on higher-ABR engagements.

The rest of the paper unfolds as follows. In section 2 we review prior related research and spell out our research expectations. In section 3 we describe the sample and the research method while in section 4 we present our results and provide concluding comments in section 5.

2. *Prior Related Research and Research Expectations*

The principal objective of our study is to provide evidence on the impact of BRA on audit labor usage and audit fees (Kinney [2005], Simunic [2005]). Consequently, the most relevant literature is prior studies of audit labor usage.[6] Key studies include Davis, Ricchiute, and Trompeter [1993], OSS [1994], Stein, Simunic, and O'Keefe [1994], Davidson and Gist [1996],

[6] There also is a rich literature on audit pricing that relates audit fees to publicly observable engagement attributes, audit market competition, auditor industry specialization, and auditee going-public decisions. Notable studies along these lines include Simunic [1980, 1984], Francis [1984], Palmrose [1986a, b, 1989], Francis and Stokes [1986], Francis and Simon [1987], Simon and Francis [1988], Ettredge and Greenberg [1990], Beatty [1993], Copley, Doucet, and Gaver [1994], Pearson and Trompeter [1994], Craswell, Francis, and Taylor [1995], Gul and Tsui [1997], Craswell and Francis [1999], Willenborg [1999], Hackenbrack, Jensen, and Payne [2000], Felix, Gramling, and Maletta [2001], Copley and Douthett [2002], Ferguson and Stokes [2002], Seetharaman, Gul, and Lynn [2002], Ferguson, Francis, and Stokes [2003], Gul, Chen, and Tsui [2003], Whisenant, Sankaraguruswamy, and Raghunandan [2003], Chaney, Jeter, and Shivakumar [2004], Francis, Reichelt, and Wang [2005], Lyon and Maher [2005], and Carson and Fargher [2005] to cite only a few of the over 100 studies reviewed by Hay, Knechel, and Wong [2006]. This literature suggests that audit fees increase in auditee size and risk, that audit market competition reduces fees over time, and that large audit firms are perceived by capital markets as signaling either higher audit quality or offering greater (deep-pockets) insurance to investors. In addition, auditor reputation as an industry or local-market

Hackenbrack and Knechel [1997], Bell, Landsman, and Shackelford [2001], Dopuch et al. [2003], and Hackenbrack and Hogan [2005], all of which employ data from U.S. audits conducted in the late 1980s and the early 1990s, i.e., during the pre-BRA era. Using more recent data, Blokdijk et al. [2006] investigate 1998–1999 labor usage on 113 engagements of 14 Big 5 and non–Big 5 auditors in the Netherlands. Our study sheds light on the evolution of audit approaches by comparing pre-BRA and BRA outcomes while holding both country and auditor identity constant. In addition, our results provide contemporary empirical evidence on the levels and determinants of audit fees (both total and per hour).

In one sense, BRA can be seen as an evolutionary extension of prior audit approaches that rely more heavily on the auditor's[7] understanding of transaction cycles to flag risky financial statement assertions (hereafter, the transactions cycle approach or TCA). BRA does not, a priori, eschew activities that an auditor might have conducted under TCA (Bell, Peecher, and Solomon [2005]). As business arrangements (and requisite accounting treatments) become more complex and dynamic, however, viewing the auditee through transaction cycles may not provide the auditor with a sufficient understanding to support identification and assessment of *at risk* financial statement assertions. BRA enables the auditor to address such complexity by more extensively focusing on CBR, i.e., "the risk that an entity's business objectives will not be attained" (Bell et al. [1997]). While BRA allows for a wide variety of approaches to the assessment and aggregation of risk, auditors in the firm from which we obtained data holistically incorporate factors associated with CBR, traditional audit risk, and auditor litigation risk into a composite risk metric, ABR, and assign audit labor in line with assessed ABR.[8]

Assessing CBR is central to maintaining or increasing audit effectiveness and efficiency. The deep knowledge of auditee industry and business processes required to perform these assessments, however, is more likely to

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specialist also appears to affects audit fees. Our inability to identify the client organizations in our sample and the fact that our data pertain to audits conducted by a single audit firm limit our efforts to more directly address some of the factors that this literature documents as significant determinants of audit fees. Another line of investigation, e.g., Elder and Allen [2003], Houston, Peters, and Pratt [1999], Mock and Wright [1993, 1999], and Waller [1993], uses data from audit firm internal records to examine how sample sizes or auditor reliance on controls varies with auditor risk perceptions. Our analysis, by contrast, focuses on engagement level labor usage by rank.

[7] For expositional convenience we use the term *auditor* to refer to the entire audit team deployed on an engagement. Our data analysis focuses on hours of audit labor use by rank and the audit labor mix.

[8] These ABR assessments are inherently *holistic* in that they incorporate complex interdependencies among factors associated with CBR, material misstatement risk, and auditor litigation risk factors (as opposed, say, to a risk assessment process in which *component risks* are assessed separately and then combined into a composite assessment). More generally, such attention to interdependencies is one way to differentiate BRA risk assessments from more traditional audit risk assessments (Bell et al. [1997, p. 18–20]).

reside in higher-ranked personnel than in lower-ranked personnel (Bell et al. [1997], Arthur Andersen [1998], KPMG [1999], Winograd, Gerson, and Berlin [2000]). Operationally, therefore, under BRA, one should expect the *proportion* of partner and manager time (as a fraction of total labor hours used) to increase relative to TCA due both to the need to perform requisite risk assessments and to ensure audit effectiveness in the presence of assessed risks.

The effect of BRA on *levels* of audit labor use is more complex. By better focusing auditor attention on key risks, BRA can improve audit efficiency by helping auditors identify and eliminate uninformative or nondiagnostic audit procedures. In other cases, the focus on key risks under BRA can lead to increased labor allocations relative to a pre-BRA audit. Audit labor hours (at any rank of labor or in total) under BRA, therefore, either can be greater than or less than those under TCA. We employ the extent to which the actual level of total audit labor used under BRA differs from pre-BRA benchmarks to assess whether BRA leads to *substantially* lower audit effort (as alleged in the business press).

These observations lead to three predictions concerning BRA labor usage. First, due to the increased emphasis on more complex risk assessments and audit judgments, under BRA, one would expect the *proportion* of partner and manager time relative to the total labor usage to increase compared to pre-BRA benchmarks.[9] Second, if BRA reallocates labor in line with ABR, one would expect to find that *differences* between pre-BRA and BRA labor usage are systematically associated with ABR assessments. Third, under BRA, levels of labor use at each rank would be expected to increase with assessed ABR. Our analysis presents empirical evidence on each of these three predictions.

In a competitive audit market, audit fees are set to recover the auditor's costs plus a normal profit. In prior research, OSS find that, for this auditor, before accounting for audit labor, audit fees increase with the risk of material misstatement. Bell, Landsman, and Shackelford [2001], however, show that (again, for this auditor), after one accounts for audit labor usage, engagement characteristics affect pre-BRA audit fees *only through their impact on audit hours*.[10] While BRA directs the auditor to obtain a deep and rich understanding of the auditee's business, the extent to which such knowledge

[9] To the extent that auditors at *all* ranks possess greater industry specialization in 2002 than they did in 1989, such effects would be *less* likely to occur. Consequently an *observed* increase in the proportion of higher-rank (partner and manager) labor in our data is a conservative test of the proposition that BRA increases the demand for more knowledgeable auditors.

[10] More specifically, Bell, Landsman, and Shackelford [2001] find that 1989 audit fees per hour for our audit firm do *not* increase with increases in auditee riskiness and conclude that this audit firm responds to risk by increasing hours worked, but does not increase the rate per hour charged to the client. Johnstone and Bedard [2001] and Bedard and Johnstone [2004]), in contrast, find, using 2001 and 2003 data on *planned* audit fees, that planned audit fees per planned audit hour are higher for perceived riskier engagements. They, therefore, conclude that their audit firm responds to higher engagement risk by both increasing planned hours and planning to charge a higher fee per hour.

effectively translates into pricing power depends in large part on competitive conditions in the audit market. Consequently, we make no directional predictions with respect to the effect of assessed ABR on either audit fees or fees per hour.[11]

3. Data and Research Method

3.1 DATA SOURCES

Audit firm personnel collected our data as part of their annual internal quality control reviews during the period of late spring through early fall of 2003. The data pertain to the most recent annual audits completed prior to data collection. Consequently, these audits all are for auditee fiscal years ending before the effective date of the audit provisions of the Sarbanes-Oxley Act of 2002. Firm policy mandates compliance with quality control review questionnaires so the response rate was 100%. The firm's quality control review teams performed several reasonableness assessments on the sample data to assure consistency of reported hours, fees, entity and engagement characteristics, and risk assessments with the firm's internal accounting systems, audit work papers, and inquiries made of audit personnel.

The firm initially selected 307 audit engagements for internal quality control reviews using a stratified sampling approach that resulted in oversampling of engagements with higher perceived ABR (the exact selection criteria remain private to the firm). For example, approximately one-third of the original sample (113 out of 307 engagements) consists of first-year audits where Arthur Andersen LLP had been the predecessor auditor. We delete 4 engagements for which the audits subject to review were not yet completed, 15 engagements because of missing data, 71 financial-services industry engagements, and 44 engagements in the health care and government sectors, and thus, are left with 173 usable engagements. These engagements are from the high-technology, manufacturing, and merchandising sectors studied in OSS.[12] Of these 173 engagements, 5 have total assets in excess of $6 billion, and thus, are considerably larger than the engagements studied by OSS (their largest auditee has assets of about $5.5 billion) while 3 engagements report zero usage of staff and other specialist hours.[13] Since we base large parts of our analysis on benchmarks derived from the OSS study, and since labor mix comparisons are an important part of our analysis, we

[11] In essence, the effect of assessed ABR (or any auditee characteristic), after controlling for the level and mix of labor used on an engagement, on total fees or fees per hour for that engagement depends on competitive conditions prevalent at the time in the market for audit services. Thus, tests of the effects of assessed ABR on audit fees or fees per hour address the joint impact of BRA and the effects of market competition.

[12] Of the 71 financial services engagements, only 8 were banks and thrifts, preventing a direct comparison with the 108 bank and thrift sector engagements studied by Stein, Simunic, and O'Keefe [1994].

[13] We express all monetary amounts, unless otherwise noted, in constant 1989 dollars.

exclude these eight auditees from the reported analyses.[14] Of the remaining 165 engagements, 79 are new engagements (71 of which are former Arthur Andersen engagements) and the remaining 86 are continuing engagements.

3.2 DATA ITEMS

Our data, with three exceptions, include all of the variables reported by OSS and include audit hours broken down by several ranks of labor, information about engagement characteristics, and key auditor-generated risk assessments. The first of these three exceptions is that, while OSS report models of labor demand for four ranks—partner, manager, senior, and other staff—our data consist of hours by partner (*PHrs*), manager (*MHrs*), in-charge (the firm's new nomenclature for OSS's senior category, *IHrs*), and staff and other specialist (*SHrs*) hours. Discussions with firm personnel suggest that while the last category (*SHrs*) is, for most engagements, comprised entirely of staff hours, in some small number (less than 10%) of engagements, this category also may include hours spent by specialists. Second, in lieu of OSS's INHRSK measure, we obtain a closely related measure, the assessed risk of material misstatement (*ROMM*) at the overall financial statement level. Third, we cannot obtain data on the exact length of the auditor–client affiliation, and thus, only can distinguish between first-year and all other engagements.

We also have access to data for two variables not reported in OSS. These variables are *Covenant*, which takes the value 1 if the auditee is subject to restrictive debt covenants, 0 otherwise, and assessed ABR (*ABR*), which takes values between 1 and 5 depending upon the assessed ABR for that engagement. Discussions with firm personnel indicate that our *ABR* data are assessments made early in the engagement when some strategic analysis and analysis of critical business processes had been performed, but prior to the audit teams' additional evidence-gathering activities in response to these risk assessments. These data, therefore, predate (and thus, can be treated as exogenous to) the final realized labor usage patterns captured in our data.

3.3 METHOD

We use the coefficients from the labor hours and audit fee models reported in table 3 of OSS to compute expected audit labor use (in natural logs of labor hours by rank) and audit fees (in natural logs) for each of the 165 engagements most likely to resemble the engagements studied by OSS.[15] More specifically, we compute expected (log) hours and fees under

[14] Our principal conclusions are robust to the inclusion of these eight observations and in what follows, we indicate, where relevant, how our results would be affected by such inclusion.

[15] Blokdijk et al. [2003, p. 304] apply a similar approach to benchmarking planning materiality.

pre-BRA (1989) benchmarks as explained in detail in the appendix.[16] Taking antilogarithms of the expected (log) values yields the expected labor hours by rank ($PHrs_{89}$, $MHrs_{89}$, $IHrs_{89}$, and $SHrs_{89}$) and the expected audit fee, Fee_{89}. Expected total hours, $THrs_{89}$, is the sum of the expected labor hours by rank. We denote by *Pratio*, *Mratio*, *Iratio*, *Sratio, Tratio*, and *Fratio*, respectively, the ratio of actual to expected *PHrs*, *MHrs, IHrs*, *SHrs*, *THrs*, and *Fee*. We, thus, compute *Pratio* as $PHrs/PHrs_{89}$, where $PHrs_{89}$ is the antilogarithm of $\ln(PHrs_{89})$ computed using the OSS model. We compute the other ratios in an analogous fashion. Each ratio scales actual BRA labor hours (fee) by the expected labor hours (fee) for that engagement so that values of the ratio can be meaningfully compared across engagements of varying characteristics. *Pdiff*, *Mdiff*, *Idiff*, *Sdiff*, *Tdiff*, and *Fdiff* denote, respectively, the difference between the actual and expected labor hours for each rank of labor and expected and actual fees. We compute *Pdiff*, for instance, as *PHrs* minus $PHrs_{89}$, where $PHrs_{89}$ is the antilogarithm of $\ln(PHrs_{89})$ computed using the OSS coefficients. We investigate whether the pattern of these ratios and differences is consistent with greater use of higher-ranked labor (a richer labor mix) and with a substantial decline in labor hours under BRA.

To investigate the effects of ABR on audit labor hours and audit fees after controlling for other determinants of labor use and fees we estimate models of the form[17]

$$\begin{aligned}
\ln(PHrs) = {} & b_{0P} + b_{1P} * \ln(Assets) + b_{2P} * Forasst + b_{3P} * Cmplx \\
& + b_{4P} * Treports + b_{5P} * Leverage + b_{6P} * Public \\
& + b_{7P} * FirstYear + b_{8P} * ABRDUM + b_{9P} * ROMM \\
& + b_{10P} * MRely + b_{11P} * HRely + b_{12P} * MC \\
& + b_{13P} * TAX + b_{14P} * Covenants \\
\ln(MHrs) = {} & b_{0M} + b_{1M} * \ln(Assets) + b_{2M} * Forasst + b_{3M} * Cmplx \\
& + b_{4M} * Treports + b_{5M} * Leverage + b_{6M} * Public \\
& + b_{7M} * FirstYear + b_{8M} * ABRDUM + b_{9M} * ROMM \\
& + b_{10M} * MRely + b_{11M} * HRely + b_{12M} * MC \\
& + b_{13M} * TAX + b_{14M} * Covenants
\end{aligned}$$

[16] We obtain the constant in the $\ln(Fee_{89})$ equation from Dopuch et al.'s [2003] reanalysis of the OSS data.

[17] Two functional forms commonly used in the literature are $X = \{1, \ln(Assets), Other\ Characteristics\}$ and $X = [1, \ln(Assets) \cdot \{1, Other\ Characteristics\}]$. The latter functional form permits the elasticity of substitution between grades of labor to vary with auditee size (OSS). While we report only the results of the latter specification, our key findings are invariant to functional form specification.

$$\begin{aligned}\ln(IHrs) = {} & b_{0I} + b_{1I} * \ln(Assets) + b_{2I} * Forasst + b_{3I} * Cmplx \\ & + b_{4I} * Treports + b_{5I} * Leverage + b_{6I} * Public \\ & + b_{7I} * FirstYear + b_{8I} * ABRDUM + b_{9I} * ROMM \\ & + b_{10I} * MRely + b_{11I} * HRely + b_{12I} * MC \\ & + b_{13I} * TAX + b_{14I} * Covenants\end{aligned}$$

$$\begin{aligned}\ln(SHrs) = {} & b_{0S} + b_{1S} * \ln(Assets) + b_{2S} * Forasst + b_{3S} * Cmplx \\ & + b_{4S} * Treports + b_{5S} * Leverage + b_{6S} * Public \\ & + b_{7S} * FirstYear + b_{8S} * ABRDUM + b_{9S} * ROMM \\ & + b_{10S} * MRely + b_{11S} * HRely + b_{12S} * MC \\ & + b_{13S} * TAX + b_{14S} * Covenants\end{aligned}$$

and

$$\begin{aligned}\ln(Fee) = {} & b_{0F} + b_{1F} * \ln(Assets) + b_{2F} * Forasst + b_{3F} * Cmplx \\ & + b_{4F} * Treports + b_{5F} * Leverage + b_{6F} * Public + b_{7F} * FirstYear \\ & + b_{8F} * ABRDUM + b_{9F} * ROMM + b_{10F} * MRely \\ & + b_{11F} * HRely + b_{12F} * MC + b_{13F} * TAX + b_{14F} * Covenants\end{aligned}$$

where $\ln(Assets)$ is the natural logarithm of auditee total assets in 1989 dollars while the following variables all enter the model interacted with $\ln(Assets)$:

Forasst = Percent of auditee total assets located outside the United States.
Cmplx = Auditee operational complexity assessed on a five-point scale by audit personnel (1 = simple, 5 = highly complex).
Treports = Total number of audit reports rendered for the engagement.
Leverage = Auditee's financial leverage (debt/assets).
Public = 1 if the auditee has issued any publicly traded securities, 0 otherwise.
FirstYear = 1 if the engagement is a new engagement, 0 otherwise.
ABRDUM = 1 if auditor business risk is assessed as moderate, high, or very high, 0 otherwise.
ROMM = 1 if risk of material misstatement is assessed as moderate or high, 0 otherwise.
MRely = 1 if the auditor placed moderate reliance on the auditee's internal control system, 0 otherwise.
HRely = 1 if the auditor placed high reliance on the auditee's internal control system, 0 otherwise.
MC = Proportion of management consulting services fee to audit fee.

TAX = Proportion of tax services fee to audit fee.
Covenants = 1 if auditee is bound by restrictive covenants, 0 otherwise.

This specification augments the models estimated by OSS by adding *ABRDUM* and *Covenants* as potential explanatory variables. To reduce the effects of outliers on estimated effects, we employ bounded influence ordinary least squares (OLS) (unreported results using seemingly unrelated regressions yield qualitatively similar conclusions).[18] We test whether (1) the coefficients estimated from our data differ from the pre-BRA benchmarks (based on OSS) and (2) whether, after controlling for the determinants examined by OSS, *ABRDUM* is systematically associated with audit labor hours used and audit fees.

In addition, to examine whether, after controlling for labor usage at all ranks, other auditee characteristics affect audit fees, we estimate a model of the form

$$\begin{aligned}\ln(Fee) = {} & b_{0F} + b_{1F} * \ln(Assets) + b_{2F} * Forasst + b_{3F} * Cmplx + b_{4F} * Treports \\ & + b_{5F} * Leverage + b_{6F} * Public + b_{7F} * FirstYear + b_{8F} * ABRDUM \\ & + b_{9F} * ROMM + b_{10F} * MRely + b_{11F} * HRely + b_{12F} * MC \\ & + b_{13F} * TAX + b_{14F} * Covenants + c_{1F} * \ln(PHrs) \\ & + c_{2F} * \ln(MHrs) + c_{3F} * \ln(IHrs) + c_{4F} * \ln(SHrs)\end{aligned}$$

Finally, we examine the effects of ABR on fee per hour using a specification of the form[19]

$$\begin{aligned}Fee\ per\ hour = {} & b_{0HF} + b_{1HF} * \ln(Assets) + b_{2HF} * Forasst + b_{3HF} * Cmplx \\ & + b_{4HF} * Treports + b_{5HF} * Leverage + b_{6HF} * Public \\ & + b_{7HF} * FirstYear + b_{8HF} * ABRDUM + b_{9HF} * ROMM \\ & + b_{10HF} * MRely + b_{11HF} * HRely + b_{12HF} * MC \\ & + b_{13HF} * TAX + b_{14HF} * Covenants + c_{1HF} * PShr \\ & + c_{2HF} * MShr + c_{3HF} * IShr\end{aligned}$$

where *PShr*, *MShr*, and *IShr* are shares of the partner, manager, and in-charge hours to total labor hours (*THrs*).

3.4 DESCRIPTIVE STATISTICS

Table 1 presents comparisons to select prior studies to provide some historical context for the sample descriptive statistics reported in table 2. Table 1,

[18] We obtain the results reported in tables 5, 7, and 8 after excluding all observations for which the studentized residual for the corresponding model exceeds two. Consequently the number of observations used to estimate each model varies by rank of labor. Estimating each model using robust regressions (excluding observations with leverage greater than one and smoothly downweighting outliers) does not materially alter the results.

[19] Since the sum of labor shares by rank must add up to one, we omit *SShr* from the model.

TABLE 1
Comparisons to Prior Studies

Panel A: Mean fees and auditee sizes

			As reported			In 1989 dollars	
Data Year	Study (Publication Year)	*N*	Fee (10^3)	Total Assets (10^6)	Consumer Price Index	Fee (10^3)	Total Assets (10^6)
Studies based on public data or surveys of audit engagements							
1977	Simunic [1980]	397	207	555	2.043	422	1,134
1981	Palmrose [1986a]	361	180	1,260	1.361	244	1,714
1984	Francis and Simon [1987]	208	57	30	1.191	68	36
1984	Simon and Francis [1988]	440	83.5	69.7	1.191	99	83
Studies based on surveys of firm internal records							
1989	O'Keefe, Simunic, and Stein [1994]	249	107	152	1.000	107	152
1989	Stein, Simunic, and O'Keefe [1994][a]	108	62	489	1.000	62	489
1989	Bell, Landsman, and Shackelford [2001]	422	52	150	1.000	52	150
1990	Davis, Ricchiute, and Trompeter [1993]	98	46	41	0.949	44	39
1991	Hackenbrack and Knechel [1997][b]	241	132	–	0.910	120	–
2002	This study	173	372	1,681	0.689	256	1,158

Panel B: Mean audit labor hours

			Hours					
Data Year	Study (Publication Year)	*N*	Total	Partners	Managers	Senior	Staff	Staff and Specialists
1989	O'Keefe, Simunic, and Stein [1994]	249	1,636	88	199	486	863	–
1989	Stein, Simunic, and O'Keefe [1994][a]	108	1,073	73	135	377	488	–
1989	Bell, Landsman, and Shackelford [2001]	422	839	–	–	–	–	–
1990	Davis, Ricchiute, and Trompeter [1993]	98	627	–	–	–	–	–
1991	Hackenbrack and Hogan [2005][b]	222	1,620	90	230	556	744	–
2002	This study	173	2,055	190	357	607	–	901

Panel C: Mean engagement characteristics

Data Year	Study (Publication Year)	*N*	Leverage	% Foreign Assets	No. Reports	% Public
1989	O'Keefe, Simunic, and Stein [1994]	249	0.68	3%	2.63	20%
1989	Stein, Simunic, and O'Keefe [1994][†]	108	0.9	0%	3.5	28%
1989	Bell, Landsman, and Shackelford [2001]	422	0.72	1%	2.4	17%
1990	Davis, Ricchiute, and Trompeter [1993]	98	–	–	–	39%
1991	Hackenbrack and Hogan[‡] [2005]	222	–	–	–	29%
2002	This study	173	0.61	9%	4.9	73%

[a]The Stein, Simunic, and O'Keefe [1994] data set was a superset of the O'Keefe, Simunic, and Stein [1994] data set, so we report separately only the incremental subset used in Stein, Simunic, and O'Keefe [1994].

[b]The data set used by Hackenbrack and Hogan [2005] appears to be a subset of that used in Hackenbrack and Knechel [1997] (compare Hackenbrack and Hogan [2005, p. 29, fn. 6] to Hackenbrack and Knechel [1997, p.486]). Hackenbrack and Knechel [1997] do not report audit hours by rank so we report the corresponding numbers from Hackenbrack and Hogan [2005]. Blokdijk et al. [2006, p. 29] note that the Hackenbrack-Knechel-Hogan and OSS data sets pertain to audits performed by the same Big 6 firm (which also provided our data).

TABLE 2

Descriptive Statistics for the Sample

The sample consists of 165 audit engagements of a Big 4 auditor in 2002–2003 (financial data in 2002 dollars) for which auditee total assets are less than $6 billion (in 1989 dollars). *PHrs*, *MHrs*, *IHrs*, and *SHrs* are actual labor usage at the partner, manager, in-charge, and staff-and-specialist ranks, respectively. *THrs* is total labor usage at all ranks (*PHrs* + *MHrs* + *IHrs* + *SHrs*). *Fee* ($) is total audit fee billed in 2002 dollars. *Assets* ($000) is auditee total assets in thousands of 2002 dollars. *Forasst* is the proportion of auditee assets located outside the United States. *Cmplx* is auditee operational complexity on a five-point scale (1 = simple, 5 = highly complex). *Treports* is the total number of audit reports rendered for the engagement. *Leverage* is auditee financial leverage measured as debt/assets. *Public* equals 1 if the auditee has issued any publicly traded securities, 0 otherwise. *FirstYear* equals 1 if the auditee is a new engagement, 0 otherwise. *AAClt* equals 1 if the auditee is a new and former Andersen engagement, 0 otherwise. *LRely* equals 1 if the auditor placed low reliance on the auditee's internal control system, 0 otherwise. *MRely* equals 1 if the auditor placed moderate reliance on the auditee's internal control system, 0 otherwise. *HRely* equals 1 if the auditor placed high reliance on the auditee's internal control system, 0 otherwise. *ABR* is assessed auditor business risk (1 = very low to 5 = very high). *ROMM* is assessed risk of material misstatement (0 = low, 1 = moderate or high). *NAS* equals 1 if any non-audit services were provided to the auditee, 0 otherwise. *MC* is fees for management consulting services scaled by fees for audit services. *TAX* is fees for tax services scaled by audit fees. *Covenants* equals 1 if the auditee is bound by restrictive debt covenants, 0 otherwise.

	Mean	Standard Deviation	Median	Minimum	Maximum	*N*
PHrs	162	210	106	3	1,681	165
MHrs	314	384	218	19	3,135	165
IHrs	560	561	417	17	4,918	165
SHrs	852	1471	492	1	14,812	165
THrs	1,887.996	2,425.42	1,258	152	22,102	165
Fees ($)	313,297	424,447	209,000	25,000	3,700,000	165
Assets ($000)	681,322	1,322,832	185,669	1,581	7,770,408	165
Forasst	0.09	0.18	0	0	0.96	165
Cmplx	2.61	0.87	3	1	5	165
Treports	4.78	10.01	2	0	72	165
Leverage	0.61	0.33	0.60	0.04	1.75	165
Public	0.72	0.45	1	0	1	165
FirstYear	0.48	0.50	0	0	1	165
AAClt	0.45	0.50	0	0	1	165
LRely	0.18	0.39	0	0	1	165
MRely	0.72	0.45	1	0	1	165
HRely	0.10	0.30	0	0	1	165
ABR	1.99	0.78	2	1	5	165
ROMM	0.53	0.50	1	0	1	165
NAS	0.61	0.49	1	0	1	165
MC	0.01	0.07	0	0	0.66	165
TAX	0.04	0.17	0.00	0	1.37	165
Covenants	0.60	0.49	1	0	1	165

panel A shows that our sample engagements are, after adjusting for inflation, comparable in size to those studied by Simunic [1980] and Palmrose [1986a], who surveyed the then largest U.S. corporations. However, relative to prior studies of audit labor that employed data from firm internal records, the mean audit fee and mean auditee total assets for our sample

are much larger.[20] Table 1, panel B shows that mean total labor use as well as that by rank of labor is larger for our sample than in prior samples. Table 1, panel C shows that relative to samples used in prior studies of audit fees and labor usage, our sample engagements have comparable leverage, have more foreign assets, demand a larger number of reports, and are more likely to have publicly traded securities.

The first and perhaps most notable feature of the data reported in table 2 is that labor hours, fees, and auditee size are left-skewed with a small number of very large observations pulling the means above the median: In each case, the range exceeds three times the (untabulated) interquartile range. For partner hours, for instance, the range is 1,678 hours while the (untabulated) interquartile range is only 142 hours. Audit fees range from a minimum of $25,000 to a maximum of $3.7 million with a mean of approximately $313,000, median of $209,000, and (untabulated) interquartile range of $255,000.

The mean of auditee assets is about $681 million, the median is about $186 million, and the range and interquartile range are about $7.7 billion and $552 million, respectively. The distributions of the other variables are within the range of values commonly reported in prior research (see also table 1). The median auditee in our sample has almost no foreign assets, and on average foreign assets are about 9.2% of auditee total assets. The maximum proportion of foreign assets, however, is quite high: One auditee has 96% of its total assets in foreign locations. The median of auditee complexity is higher than the mean, suggesting that the majority of auditees have either moderately complex or complex operations. However, less than 10% of the auditees have highly complex ($Cmplx = 5$) operations and about 40% of them have either very simple ($Cmplx = 1$) or simple ($Cmplx = 2$) operations. The median number of reports rendered is two, but one engagement calls for 72 reports and the mean number of reports rendered is about 4.8. Leverage is one of the rare variables for which the mean and the median in the sample coincide at about 60% of total assets, though in some cases equity is negative and leverage exceeds 100%.

Note that 72% of our sample consists of public companies and about half the sample (79 observations) is comprised of first-year engagements. Of these 79 first-year engagements, the vast majority, 71, are also former Arthur Andersen auditees. We, therefore, have a significant number of observations available for testing hypotheses that involve dichotomies between public/private and new/continuing engagements (subject to the, hereafter maintained, caveat that new engagements consist largely of former Arthur Andersen engagements). In 18% of the cases, the auditor placed low reliance on auditee internal controls, in 72% of the cases the auditor

[20] By way of comparison, some recent samples of *planned* engagement hours and billing rates consist of entities much smaller than ours (e.g., Johnstone and Bedard [2001]) while others consist of auditees comparable in size and in other characteristics to our sample (e.g., Bedard and Johnstone [2004]).

TABLE 3

Comparison of Actual and Expected Labor Usage

The sample consists of 165 audit engagements of a Big 4 auditor in 2002–2003 for which auditee total assets are less than $6 billion (in 1989 dollars). Actual labor usage by rank (*PHrs*, *MHrs*, *IHrs*, *SHrs*, and *THrs*) is labor usage at the partner, manager, in-charge, and staff ranks or in total, respectively. Expected labor usage ($PHrs_{89}$, $MHrs_{89}$, $IHrs_{89}$, $SHrs_{89}$, and $THrs_{89}$) is labor usage under pre-BRA benchmarks, at the partner, manager, in-charge, and staff ranks or in total. *Pdiff*, *Mdiff*, *Idiff*, *Sdiff*, and *Tdiff* are, respectively, the difference between the actual and expected labor hours by rank or, in the case of *Tdiff*, total labor hours, while *Pratio, Mratio, Iratio, Sratio*, and *Tratio* are, respectively, the ratio of actual labor hours by rank or in total to expected labor hours at that rank or in total (see appendix for details). *Z*-statistics are for the Wilcoxon sign-rank test that the proportion of cases in which *Pdiff*, *Mdiff*, *Idiff, Sdiff*, or *Tdiff* is positive differs from one-half. *p(05)*, median, mean, and *p(95)* are, respectively, the 5th percentile, median, mean, and 95th percentile of the distribution of *Pratio*, *Mratio*, *Iratio*, *Sratio*, or *Tratio*. *t*-statistics are for tests of the hypothesis that the mean of *Pratio*, *Mratio*, *Iratio*, *Sratio*, or *Tratio* is equal to one.

	1	2	3	4	5	6	7
Hours by Rank	*N*	*Z*	*p(05)*	Median	Mean	*p(95)*	*t*
Partner	165	0.51	0.28	0.96	1.25	3.13	3.24***
Manager	165	0.08	0.31	0.88	1.23	2.91	3.04***
In-charge	165	−4.95***	0.29	0.77	0.87	1.83	−3.77***
Staff and specialist	165	−6.15***	0.01	0.63	0.80	1.91	−3.44***
Total hours	165	−5.27***	0.28	0.76	0.89	1.81	−2.35***

*** denotes significance at the 1% level.

placed moderate reliance, and in 10% of the cases the auditor placed high reliance. About 61% of all auditees obtain non-audit services from the auditor.

4. Results

4.1 LABOR USAGE IN THE BRA ERA

4.1.1. *Comparisons to TCA Labor Usage.* Table 3 reports BRA labor use by rank of labor compared to pre-BRA benchmarks. Table 3 is organized as follows. Column 1 of table 3 reports the number of observations used in each test. Column 2 reports the *Z*-statistic for a nonparametric (Wilcoxon sign-rank) test that the fraction of instances in which the *difference* between actual labor and expected labor use (*Pdiff*, *Mdiff*, *Idiff*, and *Sdiff*) is positive (or, equivalently, negative) differs from one-half.[21] Columns 3 through 6 report, respectively, the 5th percentile, the median, the mean and the 95th percentile of the *ratio* of actual labor hours by rank to expected hours under the pre-BRA benchmark (*Pratio*, *Mratio*, *Iratio*, or *Sratio*). Values of the ratio in excess of one (less than one) indicate that actual hours at that rank exceed (are less than) expected hours under the pre-BRA benchmarks. Column 7

[21] The Wilcoxon test ignores the *magnitudes* of the differences and tests whether the differences are systematically negative or positive. Parametric tests of *Pdiff*, *Mdiff*, *Idiff*, and *Sdiff* confirm these results in every case and are discussed in more detail later. We report in tables 3 and 4 only the results of the nonparametric test since it accounts for the entire distribution of differences and, thus, is more stringent.

reports the associated *t*-statistic and level of significance for a test that the mean value of the ratio is equal to one.

Collectively, the location measures reported in table 3 address whether the level of labor usage at a given rank of labor is systematically higher (lower) than the corresponding pre-BRA benchmark. The *Z*-statistic addresses the *frequency* with which the level of labor exceeds benchmark levels, but ignores magnitudes. The 5th percentile, median, and 95th percentile of the ratio take scaled magnitudes into account, but address changes in labor usage only at that percentile of the sample. The mean ratio incorporates both direction and magnitude of the entire distribution of changes. These measures, therefore, in tandem, shed light on the relative locations of the actual and benchmark labor usage as well as the magnitudes of the differences. We report the percentiles and medians in addition to the mean values of the ratios since the mean is susceptible to the influence of outliers.

Column 2 of table 3 shows that, at the two higher ranks of labor (partners and managers), actual labor use at that rank is as likely as not to exceed the corresponding pre-BRA benchmark. By contrast, for the two lower ranks of labor, and in total, labor use falls short of the benchmark in a substantial fraction of instances. Collectively, the five entries in column 2, therefore, suggest that the actual labor mix in our sample is richer than the pre-BRA benchmark. The four median ratios reported in column 4 also lead to the same conclusion: The median partner and manager labor hours are 96% and 88% of the pre-BRA benchmark while at the two lower ranks, the median hours are only 77% and 63% of the pre-BRA benchmark. Overall, the pattern in column 4 reinforces the conclusion from column 2 that the BRA labor mix is substantially richer than the benchmark.

While the two tests reported so far permit an assessment of either the direction *or* the magnitude of the change in BRA labor usage relative to the pre-BRA benchmark, the mean ratio reported in column 5 incorporates both the direction *and* magnitude of the changes. The results reported in column 5 show that, at the mean, BRA audits use 125% (123%) of benchmark levels of partner (manager) hours and 87% (80%) of benchmark levels of in-charge (staff) hours. The *t*-statistics reported in column 7 show that the mean ratio, in each case, is significantly different from one. Overall, the results reported in columns 5 and 7 provide further and stronger evidence that accounting for both the direction and magnitude of the changes, the BRA labor mix is much richer than its pre-BRA benchmark.

Applying the mean values of the ratios reported in column 5 to the mean pre-BRA labor mix documented by OSS (partner 5%, manager 12%, senior 33%, staff 50%) suggests that, under BRA, the audit labor mix is about 35% richer and total labor use is about 10% lower than expected under pre-BRA benchmarks.[22] The last row of table 3 corroborates this computation:

[22] For an engagement requiring 100 pre-BRA labor hours, a BRA engagement would use about 6.25 hours of partner time ($5\% * 1.25 * 100$), 14.75 hours of manager time ($12\% * 1.23 * 100$), 28.7 hours of in-charge time ($33\% * 0.87 * 100$), and 40 hours of staff

It shows that the mean total labor usage at all ranks under BRA is about 89% of pre-BRA levels. Additional (untabulated) analyses of the actual labor mix reveal that the summary labor mix computations also are reasonable: At the mean, the share of partner and manager hours is about 26% of total labor hours while the expected pre-BRA share only is 19%.[23] The mean partner and manager share of total labor is about 140% of the benchmark share, and in 78% of the instances, the BRA share is higher than the pre-BRA benchmark. Overall, table 3, in conjunction with these untabulated analyses, provides strong evidence that the labor mix under BRA is substantially richer than the pre-BRA benchmark while total labor hours have decreased by about 10% at the mean.[24]

As noted earlier, our sample consists of many more public companies and first-year auditees than the OSS sample. To shed light on the extent to which differences in sample composition may be driving the results reported in table 3, we report in table 4 similar results separately for new, continuing, private, and public auditees. In every case, the pattern of labor usage reveals that the share of partner and manager time in the labor mix has increased. For instance, new auditees are allocated more partner and manager labor than expected, somewhat less in-charge labor, and about as much staff labor as expected, leading to a richer than expected mix. For continuing auditees the labor mix is richer because the partner and manager hours remain about the same as expected while the use of in-charge and staff time is significantly lower. The subsample analyses further reveal that the shift in labor mix is most pronounced for new auditees and for public auditees. In sum, the detailed subsample analyses reported in table 4 show that the basic finding in table 3—relative to our pre-BRA benchmark, BRA labor use is much more heavily titled toward higher-ranked labor—obtains for each subsample of interest.

Overall, the pattern of results in tables 3 and 4 is consistent with the substitution of higher-ranked (and higher-paid) labor for lower-ranked (and lower-paid) labor in the labor mix. In particular, the substantial increases

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time ($50\% * 0.8 * 100$) for a total 2002 labor use of about 89.7 hours. BRA mean labor shares, therefore, would be: partner about 7%, manager about 16%, in-charge about 32% and staff about 45%. The share of partner and manager hours in the BRA labor mix would be about 23% compared to a share of 17% under OSS benchmarks, an increase of about 35%.

[23] The differences between the mean actual partner and manager shares (26%) and the summary computation (23%) and between the OSS mean partner and manager share (17%) and mean expected partner and manager share in our sample (19%) reflect variations in individual auditee characteristics around the sample means of those characteristics.

[24] Untabulated analyses also show that if labor hours are adjusted for productivity increases of 1% per annum (see Banker, Chang, and Cunningham [2003]), the mean 2002 level of labor use at lower ranks would be about the same as under pre-BRA benchmarks, and at higher ranks the mean labor use level would be about 140% of pre-BRA benchmarks. At a 1% annual improvement level, the mean ratio of actual total hours across all ranks to expected total hours is 1.01 and is not significantly different from one (2-sided p-value = 0.77). Overall, therefore, it appears that both the mean and median productivity-adjusted total labor hours used under BRA are *not substantially lower* than expected under pre-BRA benchmarks.

TABLE 4

Comparison of Actual and Expected Labor Usage

The sample consists of 165 audit engagements of a Big 4 auditor in 2002–2003 for which auditee total assets are less than $6 billion (in 1989 dollars). Actual labor usage by rank (*PHrs*, *MHrs*, *IHrs*, *SHrs*, and *THrs*) is labor usage at the partner, manager, in-charge, and staff ranks or in total, respectively. Expected labor usage ($PHrs_{89}$, $MHrs_{89}$, $IHrs_{89}$, $SHrs_{89}$, and $THrs_{89}$) is labor usage under pre-BRA benchmarks, at the partner, manager, in-charge, and staff ranks or in total. *Pdiff*, *Mdiff*, *Idiff*, *Sdiff*, and *Tdiff* are, respectively, the difference between the actual and expected labor hours by rank or, in the case of *Tdiff*, total labor hours, while *Pratio, Mratio, Iratio, Sratio*, and *Tratio* are, respectively, the ratio of actual labor hours by rank or in total to expected labor hours at that rank or in total (see appendix for details). *Z*-statistics are for the Wilcoxon sign-rank test that the proportion of cases in which *Pdiff*, *Mdiff*, *Idiff, Sdiff*, or *Tdiff* is positive differs from one-half. *p(05)*, median, mean, and *p(95)* are, respectively, the 5th percentile, median, mean, and 95th percentile of the distribution of *Pratio*, *Mratio*, *Iratio*, *Sratio*, or *Tratio*. *t*-statistics are for tests of the hypothesis that the mean of *Pratio*, *Mratio*, *Iratio*, *Sratio*, or *Tratio* is equal to one.

	1	2	3	4	5	6	7
	N	*Z*	*p(05)*	Median	Mean	*p(95)*	*t*
Panel A: Partner hours							
New	79	−1.77**	0.35	1.08	1.46	3.86	3.64***
Continuing	86	2.31**	0.27	0.82	1.05	2.4	0.6
Private	46	−0.22	0.29	0.78	1.26	4.36	1.42*
Public	119	0.57	0.27	0.99	1.24	3.02	3.06***
Panel B: Manager hours							
New	79	−1.76**	0.36	1.15	1.42	3.81	3.43***
Continuing	86	1.8**	0.27	0.78	1.06	2.42	0.65
Private	46	0.56	0.27	0.87	1.42	4.04	2.28**
Public	119	−0.37	0.33	0.94	1.16	2.63	2.04**
Panel C: In-charge hours							
New	79	−3.85***	0.29	0.77	0.89	1.97	−2.06**
Continuing	86	−3.17***	0.32	0.75	0.85	1.7	−3.34***
Private	46	−1.8**	0.29	0.75	0.92	1.97	−1.05
Public	119	−4.68***	0.29	0.77	0.85	1.67	−3.93***
Panel D: Staff and specialist hours							
New	79	−6.2***	0.01	0.85	0.97	2.28	−0.34
Continuing	86	−2.24**	0.01	0.5	0.64	1.56	−5.49***
Private	46	−2.76***	0.01	0.62	0.83	2.35	−1.5*
Public	119	−5.44***	0.01	0.63	0.78	1.78	−3.11***
Panel E: Total hours							
New	79	−5.78***	0.28	0.92	1.03	1.96	0.35
Continuing	86	−1.43*	0.23	0.67	0.77	1.63	−4.57***
Private	46	−1.79**	0.28	0.74	0.94	2.55	−0.69
Public	119	−5***	0.29	0.76	0.87	1.66	−2.37***

*, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

in the use of higher-ranked labor without large concomitant total labor reductions is *not* consistent with usage patterns that might be expected if BRA is simply a rationalization for systematic underauditing.[25] Further analyses

[25] Including the eight observations with auditee total assets in excess of $6 billion (five observations) or missing staff hours (three observations) does not change the means or medians

(untabulated) show a moderate or higher ABR assessment increases by a factor of 3.3 the odds of the engagement being assigned *both* a richer labor mix and more total labor than pre-BRA benchmarks. A first-year engagement is about 4.2 times more likely, and a first-year auditee with moderate or higher assessed ABR is about 13.9 times more likely, to be assigned *both* more higher-ranked labor and more total labor than suggested by the 1989 benchmarks.

4.1.2. *Levels of Labor Usage under BRA.* Table 5 reports the effect of ABR assessments on levels of audit labor use under BRA estimated by an OSS-style labor demand model with ABR assessments added as an explanatory variable.[26] Table 5 is laid out as follows. Panel A of table 5 reports the results for partner and manager hours and panel B reports the results for in-charge and staff and other specialist hours. In columns 1 and 5 of each of these two panels we report the estimated coefficient and its significance level, and in columns 2 and 6 we report the associated *t*-statistic. Columns 3 and 7 report, for ease of reference, the coefficient estimate reported in table 3 of OSS together with the significance level reported in that table. Finally, in columns 4 and 8 we report the *F*-statistic for a test that the coefficient reported in column 1 (column 5) equals that reported in column 3 (column 7). Panel C of table 5 reports a similar model for total hours. Since this model has no cognate in the OSS study, there are no comparisons to the OSS coefficients in panel C.

The significant coefficient for *ABRDUM* in columns 1 and 5 of panels A and B shows that, after controlling for other determinants studied by OSS, in our sample of 165 BRA engagements, assessed ABR significantly affects the allocation of audit labor at all ranks. *ROMM,* our analog to the OSS *INHRSK* measure, is never significant in any of the labor demand models.[27] Four other features of the results reported in table 5 seem worthy of note. First, the estimated intercepts in each of the four labor demand models are positive and in three of the four models (partner, manager, and staff) are significantly greater than the intercepts reported by OSS. Second, for partner, manager, and staff hours, the slope of hours in auditee size (ln(*Assets*)) is lower than reported by OSS. Thus, the minimum number of hours spent by partners, managers, and staff appear to increase relative to the OSS benchmark but, the effect of auditee size on audit labor use is less pronounced in

(or the tests of significance) reported in tables 3 and 4 by more than one unit in the second decimal place at any rank of labor. Including these observations leaves (for the full sample and for every subsample) the means and medians for *Pratio* and *Mratio* unchanged or higher and those for *Iratio* and *Sratio* unchanged or lower.

[26] Absolute values of pairwise correlations between the explanatory variables are, for the most part, less than 0.25. Variance inflation factors in the models reported in table 5 never exceed 2.6. Multicollinearity among explanatory variables is, therefore, unlikely to seriously affect our inferences.

[27] This result holds even when *ABRDUM* is excluded from the models.

BRA audits. Third, neither auditee foreign assets (*Forasst*) nor the number of reports issued (*Treports*) systematically affects labor hour usage in our sample (OSS find both to be significant in the pre-BRA sample). Fourth, auditee public company status (*Public*) increases labor demand at the three higher ranks of labor (partner, manager, and in-charge; for staff labor the coefficient is significant only at $p = 0.13$) while auditee first-year status (*FirstYear*)

TABLE 5

OSS Style Regression for Labor Hours

The sample consists of 165 audit engagements of a Big 4 auditor in 2002–2003 for which auditee total assets are less than $6 billion (in 1989 dollars). *PHrs*, *MHrs*, *IHrs*, and *SHrs* are actual labor usage at the partner, manager, in-charge, and staff-and-specialist ranks, respectively. *THrs* is total labor usage at all ranks (*PHrs* + *MHrs* + *IHrs* + *SHrs*). ln(*Assets*) is the natural log of auditee total assets in 1989 dollars. The following variables are all interacted with ln(*Assets*) in the regressions reported in the table. *Forasst* is the proportion of auditee assets located outside the United States. *Cmplx* is auditee operational complexity on a five-point scale (1 = simple, 5 = highly complex). *Treports* is the total number of audit reports rendered for the engagement. *Leverage* is auditee financial leverage measured as debt/assets. *Public* equals 1 if the auditee has issued any publicly traded securities, 0 otherwise. *FirstYear* equals 1 if the auditee is a new engagement, 0 otherwise. *ABRDUM* equals 1 if assessed auditor business risk is moderate or higher, 0 otherwise. *ROMM* is assessed risk of material misstatement (0 = low, 1 = moderate or high). *MRely* equals 1 if the auditor placed moderate reliance on the auditee's internal control system, 0 otherwise. *HRely* equals 1 if the auditor placed high reliance on the auditee's internal control system, 0 otherwise. *MC* is fees for management consulting services scaled by fees for audit services. *TAX* is fees for tax services scaled by audit fees. *Covenants* equals 1 if the auditee is bound by restrictive debt covenants, 0 otherwise. In panels A and B, columns 1 and 5 report parameter estimates, columns 2 and 6 the associated *t*-values, columns 3 and 7 the corresponding coefficients from table 3 of OSS, and columns 4 and 8 *F*-statistics for tests for differences between the BRA coefficients in columns 1 and 5 and the OSS reported coefficients in columns 3 and 7. In panel C, column 1 reports parameter estimates and column 2 the associated *t*-values.

Panel A: Partner and manager hours regressions

	ln(*PHrs*)				ln(*MHrs*)			
	1	2	3	4	5	6	7	8
	Coefficient	*t*-value	OSS	*F*	Coefficient	*t*-value	OSS	*F*
ln(*Assets*)	0.1385***	3.06	0.301**	12.9028***	0.1758***	4.04	0.26**	3.746*
Forasst	0.0085	0.58	0.001**	0.2639	−0.0194	−1.36	0.001**	2.0445
Cmplx	0.0087**	2.58	0.006**	0.6405	0.0089***	2.7	0.007**	0.3352
Treports	0.0002	0.82	0.001**	11.3251***	0.0003	1.22	0.001**	7.3061***
Leverage	−0.0142*	−1.69	0.01**	8.3642***	0.008	0.95	0.012**	0.229
Public	0.0494***	8.25	0.043**	1.1316	0.0285***	4.85	0.033**	0.5731
FirstYear	0.0192***	3.81	0.002	11.6268***	0.0229***	4.63	0.003	14.5785***
ABRDUM	0.0226***	3.58			0.016***	2.6		
ROMM	0.0009	0.16	0.005	0.5099	−0.0034	−0.62	0.002	0.9788
MRely	0.015**	2.13	−0.006	0.5985	0.0066	0.99	0.001	6.3067**
HRely	−0.0055	−0.5	0.003	8.8478***	0.0004	0.03	0.027	0.7047
MC	0.034	0.88	0	0.7725	0.0848**	2.1	0	4.4197**
TAX	−0.01	−0.67	0	0.4548	−0.0102	−0.7	0.001	0.5887
Covenants	0.0097*	1.81			0.0008	0.15		
Constant	0.3905	0.57	−2.161**	13.8165***	0.7694	1.15	−0.697	4.841**
Model R^2	0.6832				0.5983			
N	157				154			

(*Continued*)

TABLE 5 — *Continued*

Panel B: In-charge and staff hours regressions

	ln(*IHrs*)				ln(*SHrs*)			
	1 Coefficient	2 *t*-value	3 OSS	4 *F*	5 Coefficient	6 *t*-value	7 OSS	8 *F*
ln(*Assets*)	0.2043***	5.76	0.241**	1.0708	0.1986***	3.27	0.36**	7.0451***
Forasst	−0.0363***	−3.21	0.001**	10.8957***	−0.0262	−1.34	0.001**	1.9256
Cmplx	0.009***	3.42	0.008**	0.15	0.0134***	2.88	0.011**	0.2742
Treports	0.0003	1.5	0.001**	13.37***	0.0003	0.88	0.001**	4.0451**
Leverage	−0.0026	−0.4	0.002	0.4936	0.0097	0.84	0.005	0.1646
Public	0.0171***	3.63	0.018**	0.0368	0.0125	1.52	0.017**	0.3033
FirstYear	0.0105***	2.69	0.009	0.1544	0.0263***	3.75	−0.006	21.233***
ABRDUM	0.0104**	2.09			0.0191**	2.19		
ROMM	0.0005	0.11	0.008**	3.0299*	−0.0001	−0.02	0.015**	3.9581**
MRely	0.0029	0.54	−0.002	0.6772	0.0135	1.4	0.006	0.4531
HRely	0.0021	0.24	−0.005	0.8375	0.0182	1.2	0.008	0.6021
MC	0.0491	1.62	0	2.6089	−0.009	−0.17	0	0.0289
TAX	−0.0071	−0.61	−0.001	0.2767	−0.022	−1.08	0	1.1721
Covenants	0.0083**	1.98			0.0047	0.62		
Constant	1.323**	2.46	0.878**	0.6834	1.0189	1.1	−1.206**	5.8165**
Model R^2	0.6315				0.4864			
N	159				152			

Panel C: Total hours

	ln(*THrs*)	
	1 Coefficient	2 *t*-value
ln(*Assets*)	0.165***	4.95
Forasst	−0.0017	−0.15
Cmplx	0.0125***	5.02
Treports	0.0003*	1.67
Leverage	0.0042	0.67
Public	0.0273***	6.08
FirstYear	0.0166***	4.48
ABRDUM	0.0187***	4
ROMM	−0.0001	−0.02
MRely	0.0065	1.22
HRely	0.0175**	2.09
MC	0.0146	0.51
TAX	−0.0106	−0.98
Covenants	0.0046	1.17
Constant	2.5844***	5.14
Model R^2	0.7425	
N	153	

*, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

systematically increases labor demand at *every* rank of labor in our sample (OSS find only *Public* to be significant in the pre-BRA sample).[28]

To provide a better sense of the impact of the coefficient differences documented in panels A and B on hours by rank and on the labor mix,

[28] Including the three observations with reported staff hours of zero or the five observations for auditees with total assets greater than $6 billion does not materially affect any of these conclusions.

we compare predicted hours by rank across two otherwise *average* auditees for which all but three engagement characteristics are held constant at the sample mean.[29] The two engagements differ only in that one is a private, continuing engagement with low assessed ABR and *ROMM* (hereafter, engagement A) while the other is a public, new engagement with high assessed ABR and *ROMM* (hereafter, engagement B). For engagement A, the values of the expected labor use variables by rank under the OSS model (updated 2002 model predictions shown in parentheses) are: *PHrs* 84 (53), *MHrs* 191 (154), *IHrs* 586 (428), and *SHrs* 1268 (484). By contrast, for engagement B, the values of the expected labor use variables under the OSS (updated 2002) model are: *PHrs* 221 (339), *MHrs* 406 (586), *IHrs* 1096 (931), and *SHrs* 1832 (1568). These comparisons highlight two aspects of the results already discussed in the context of tables 3 and 4. First, BRA audits use a greater proportion of higher-ranked labor: 18% on engagement A and 27% on engagement B (compared to 13% and 18%, respectively, under pre-BRA benchmarks).[30] Second, for the less risky engagement A, the ratio of total labor use under BRA to that under TCA is about 53% while for the more risky engagement B, the ratio of BRA total labor use to that under TCA is about 96%. Thus, holding other factors constant at the sample mean, for a riskier engagement, BRA audits are expected to use about as much labor as and a 50% greater proportion of higher-ranked labor than TCA audits. These estimates indicate that expected labor allocations under BRA are considerably more sensitive to engagement risk characteristics than are the corresponding TCA labor allocations.

Panel C of table 5 corroborates the results reported in panels A and B. The only differences from the by-rank labor hour regressions in panels A and B are that the number of reports (*Treports*) and high reliance on auditee internal controls (*HRely*) are significantly associated with greater labor usage. The key finding in panels A and B, i.e., that labor usage is strongly increasing with new auditee and auditee public company status and with assessed ABR, is very salient from panel C.

Overall, the results reported in table 5 are consistent with the view that BRA represents an evolution in audit approaches: Many of the significant determinants of labor usage documented by OSS are still significant in the BRA epoch. Table 5 also provides support for the proposition that within our sample of BRA engagements, the cross-sectional variation in labor hours is quite strongly related to auditors' ABR assessments. It further is noteworthy that this increase in labor allocation in response to assessed ABR occurs

[29] For both engagements, we fix reliance on auditee internal controls at the moderate level, i.e., $MRely = 1$, $LRely = Hrely = 0$.

[30] For BRA the use of higher rank labor is 207 hours ($PHrs = 53 + MHrs = 154$) or about 18% of total labor usage of 1,119 hours ($PHrs = 53 + MHrs = 154 + IHrs = 428 + SHrs = 484$); under pre-BRA benchmarks the comparable figure is 275 hours out of a total labor use of 2,129 hours or about 13%. The ratio of total labor usage predicted under BRA to that predicted under the pre-BRA benchmark is 1,118/2,129 or about 53%.

after controlling for the effects of auditee public company status (*Public*) and new auditee status (*FirstYear*), two other important determinants of auditors' risk exposure. Taken together, the results reported in tables 3 through 5 are consistent with the expected profile of labor usage under BRA: a substitution of higher-ranked labor for lower-ranked labor and a systematic assignment of audit labor in line with auditors' assessments of ABR.

4.2 AUDIT FEES IN THE BRA ERA

Table 6 shows that overall, and by subsample of auditees, audit fees in 2002 are lower than suggested by pre-BRA benchmarks. In every case, the mean and median are well below one and the formal tests show that, for the full sample and for every subsample, 2002 fees (in constant 1989 dollars) are substantially lower than suggested by 1989 benchmarks. Overall, the results in table 6 are consistent with the existence of substantial (downward) fee pressure in the period just prior to clients' and audit firms' mandated compliance with the Sarbanes-Oxley Act of 2002.

Table 7 reports the results of estimating an OSS-style fee model both excluding and including actual labor hours by rank. We organize the first four columns of table 7 along the same lines as table 5. (The model reported in columns 5 and 6 includes labor hours by rank and has no analog in OSS.) Columns 1 through 4 of table 7 show that auditee size, complexity of operations, number of audit reports, public company status, and moderate or higher assessed *ABR* (*ABRDUM* = 1) significantly affect audit fees. Columns 5 and 6 show that, after controlling for actual labor usage, fees are lower for new auditees and for auditees that also obtain non-audit services from the auditor. Interestingly, the statistically significant effect of *ABRDUM* on total audit fees persists *even after adjusting for labor use*, although its magnitude

TABLE 6

Comparison of Actual and Expected Fees

The sample consists of 165 audit engagements of a Big 4 auditor in 2002–2003 with total assets not exceeding $6 billion (in 1989 dollars). Actual fee (*Fee*) is the fee as reported by respondents. Expected fee (Fee_{89}) is the fee under pre-BRA benchmarks, *Fdiff* is the difference between the actual and expected fee, while *Fratio* is the ratio of the actual to expected fee under pre-BRA benchmarks (see appendix for details). *Z*-statistics are for the Wilcoxon sign-rank test that the proportion of cases in which *Fdiff* is positive differs significantly from one-half. *p(05)*, median, mean and *p(95)* are, respectively, the 5th percentile, median, mean, and 95th percentile of the distribution of *Fratio*. *t*-statistics are for tests of the hypothesis that the mean of *Fratio* is equal to one.

	1	2	3	4	5	6	7
Sample	*N*	*Z*	*p(05)*	Median	Mean	*p(95)*	*t*
All	165	−7.94***	0.23	0.60	0.74	1.57	−6.44***
New	79	−6.58***	0.2	0.64	0.81	1.38	−2.85***
Continuing	86	−4.66***	0.25	0.55	0.68	1.9	−7.02***
Private	46	−3.46***	0.23	0.56	0.74	1.92	−3.24***
Public	119	−7.11***	0.2	0.60	0.74	1.46	−5.56***

*** denotes significance at the 1% level.

TABLE 7

Determinants of Audit Fees (with Comparisons to OSS)

The sample consists of 165 audit engagements of a Big 4 auditor in 2002–2003 for which auditee total assets are less than $6 billion (in 1989 dollars). ln(*Fee*) is the natural logarithm of audit fees (in 1989 dollars). *PHrs*, *MHrs*, *IHrs*, and *SHrs* are, respectively, labor usage at the partner, manager, in-charge, and staff-and-specialist ranks. ln(*Assets*) is the natural log of auditee total assets in 1989 dollars. The following variables are all interacted with ln(*Assets*) in the regressions reported in the table. *Forasst* is the proportion of auditee assets located outside the United States. *Cmplx* is auditee operational complexity on a five-point scale (1 = simple, 5 = highly complex). *Treports* is the total number of audit reports rendered for the engagement. *Leverage* is auditee financial leverage measured as debt/assets. *Public* equals 1 if the auditee has issued any publicly traded securities, 0 otherwise. *FirstYear* equals 1 if the auditee is a new engagement, 0 otherwise. *ABRDUM* equals 1 if assessed auditor business risk is moderate or higher, 0 otherwise. *ROMM* is assessed risk of material misstatement (0 = low, 1 = moderate or high). *MRely* equals 1 if the auditor placed moderate reliance on the auditee's internal control system, 0 otherwise. *HRely* equals 1 if the auditor placed high reliance on the auditee's internal control system, 0 otherwise. *MC* is fees for management consulting services scaled by fees for audit services. *TAX* is fee for tax services scaled by audit fees. *Covenants* equals 1 if the auditee is bound by restrictive debt covenants, 0 otherwise. Columns 1 and 5 report parameter estimates, columns 2 and 6 the associated *t*-values, column 3 the corresponding coefficients from table 3 of OSS, and column 4 *F*-statistics for tests for differences between the BRA coefficients in column 1 and the OSS reported coefficients in column 3.

	ln(*Fee*)					
	1	2	3	4	5	6
	Coefficient	*t*-value	OSS	*F*	Coefficient	*t*-value
ln(*PHrs*)					0.1617**	2.53
ln(*MHrs*)					0.242***	3.64
ln(*IHrs*)					0.3617***	5.66
ln(*SHrs*)					0.0409**	2.16
ln(*Assets*)	0.25***	6.65	0.3403**	5.7255**	0.0956***	3.39
Forasst	−0.0086	−0.7	0.001**	0.6056	0.0077	0.9
Cmplx	0.0086***	2.98	0.007**	0.2996	0.0008	0.38
Treports	0.0005**	2.25	0.001**	6.8361***	0.0003**	2.2
Leverage	−0.003	−0.43	0.007*	2.0584	−0.0001	−0.02
Public	0.0247***	4.89	0.022**	0.2775	0.0023	0.58
FirstYear	0.0065	1.54	−0.003	5.0478**	−0.0062**	−2.06
ABRDUM	0.0196***	3.61			0.0079**	2.1
ROMM	0.0013	0.27	0.011**	4.2597**	0.0013	0.42
MRely	0.0002	0.04	−0.001	5.3493**	−0.0034	−0.87
HRely	−0.0104	−1.13	0.011	0.0437	−0.0086	−1.37
MC	0.0017	0.05	0	0.0025	−0.0386*	−1.73
TAX	−0.0152	−1.21	0	1.4625	−0.0094	−1.11
Covenants	0.0027	0.6			−0.0023	−0.76
Constant	6.2465***	10.9	5***	4.7332**	5.6134***	14.27
Model R^2	0.687				0.8595	
N	158				158	

*, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

is considerably smaller than that documented in column 1. Additional analyses (untabulated) show that this finding of a *risk premium* (higher fees associated with ABR after controlling for labor use) is attributable to new engagements: Restricting the estimation to the sample of continuing

engagements shows no evidence of a systematic relationship between *ABRDUM* and audit fees once one accounts for labor usage. This finding of a significant risk premium is inconsistent with the research expectation that auditors "obtain compensation through billing additional hours, not by raising the hourly charge" (Bell, Landsman, and Shackelford [2001, p. 35]). It is, however, consistent with competitive conditions in the audit market permitting the auditor a limited degree of pricing power: Our results suggest this power manifests itself in the form of riskier first-year auditees paying higher fees than less-risky first-year auditees. Overall, the models reported in table 7 suggest that the BRA (TCA) auditor would charge $136,163 ($298,948) for engagement A and $387,454 ($474,337) for engagement B (both engagements as defined in the discussion of table 5). As with labor hours, BRA audit fees are considerably more sensitive to auditee risk characteristics than are TCA fees.

We further investigate the nature of the apparent risk premium in columns 5 and 6 of table 7 by examining three fee-per-hour models in table 8. Since billing rates vary with rank of labor, fees per hour are likely to vary with the labor mix used on an engagement. To examine the strength of this relationship, columns 1 and 2 of table 8 report a model in which fee per hour is presumed to depend on labor shares alone. Columns 3 and 4 of table 8 present an expanded version of the model used by Bell, Landsman, and Shackelford [2001].[31] The last two columns of table 8 report a fee-per-hour model that includes both labor mix and the expanded model variables as determinants of fee per hour (combined model).

We find that the first model (labor mix only) has significant explanatory power (the adjusted R^2 value of the corresponding OLS model is about 19%) and the intercept is positive and significant.[32] In the second model (expanded BLS) where we omit labor shares from the analysis, we find that after controlling for other determinants of audit labor usage, fees per hour are significantly lower for auditees with higher operational complexity, for new auditees, and for engagements with moderately or highly reliable internal controls. Unlike the results from the total fee model reported in table 7, *ABRDUM* has no significant effect on audit fees per hour. Finally, the intercept in this model is positive but not significant. The results from the third (combined) model are virtually identical to those of the first two models: Variables significant in either model 1 or model 2 are significant

[31] For comparability with the results reported to this point, particularly in table 7, we expand the original Bell, Landsman, and Shackelford [2001] specification to include the entire vector of explanatory variables used by OSS.

[32] The share of manager time (*MShr*), however, is not significant due to high collinearity with partner shares (*PShr*). When *MShr* is omitted from the model, the coefficient on *PShr* is about 378.79 with a *p*-value of 0.000 and a model adjusted R^2 value of 19% while, when *PShr* is omitted from the model, the coefficient on *MShr* is about 110.76, with a *p*-value of 0.02 and the model adjusted R^2 value is 7%. We also investigate (and reject) possible multicollinearity between *MShr* and *IShr* as an explanation for the lack of significance of *MShr* in the models reported in table 8.

TABLE 8

Determinants of Audit Fees per Hour

The sample consists of 165 audit engagements of a Big 4 auditor in 2002–2003 with total assets not exceeding $6 billion (in 1989 dollars). *PShr, MShr*, and *IShr* are, respectively, the share of partner hours, manager hours, and in-charge hours in the labor mix. ln(*Assets*) is the natural log of auditee total assets in 1989 dollars. The following variables are all interacted with ln(*Assets*) in the regressions reported in the table. *Forasst* is the proportion of auditee assets located outside the United States. *Cmplx* is auditee operational complexity on a five-point scale (1 = simple, 5 = highly complex). *Treports* is the total number of audit reports rendered for the engagement. *Leverage* is auditee financial leverage measured as debt/assets. *Public* equals 1 if the auditee has issued any publicly traded securities, 0 otherwise. *FirstYear* equals 1 if the auditee is a new engagement, 0 otherwise. *ROMM* is assessed risk of material misstatement (0 = low, 1 = moderate or high). *MRely* equals 1 if the auditor placed moderate reliance on the auditee's internal control system, 0 otherwise. *HRely* equals 1 if the auditor placed high reliance on the auditee's internal control system, 0 otherwise. *MC* is fees for management consulting services scaled by fees for audit services. *TAX* is the fee for tax services scaled by audit fees. *Covenants* equals 1 if the auditee is bound by restrictive debt covenants, 0 otherwise. Columns 1, 3, and 5 report parameter estimates; columns 2, 4, and 6 report the associated *t*-values.

	Labor Shares Only		Expanded BLS		Combined	
	1 Coefficient	2 *t*-value	3 Coefficient	4 *t*-value	5 Coefficient	6 *t*-value
PShr	375.9056***	4.72			273.7982***	3.41
MShr	3.7244	0.08			52.8295	1.21
IShr	64.4823***	3.24			62.112***	3.33
ln(*Assets*)			8.4416***	3.23	8.4575***	3.57
Forasst			2.9909***	3.38	2.5541***	3.11
Cmplx			−0.725***	−3.5	−0.5285***	−2.77
Treports			0.0328**	2.32	0.0314**	2.45
Leverage			−0.1108	−0.22	0.0315	0.07
Public			0.2572	0.74	−0.1929	−0.56
FirstYear			−1.265***	−4.24	−1.211***	−4.44
ABRDUM			0.3339	0.87	0.4649	1.31
ROMM			0.1494	0.45	0.1335	0.44
MRely			−0.904**	−2.23	−0.7334**	−1.99
HRely			−2.7069***	−4.18	−2.1149***	−3.55
MC			−3.6235	−1.57	−4.5062**	−2.15
TAX			0.3229	0.37	0.1451	0.18
Covenants			−0.0944	−0.29	−0.0789	−0.27
Constant	59.5327***	5.45	9.1509	0.23	−53.3996	−1.41
Model R^2	0.1853		0.252		0.3875	
N	156		156		156	

** and *** denote significance at the 5% and 1% levels, respectively.

in model 3 as well and the coefficients are not dramatically different. The only new insight from the third model is the existence of an apparent fee-per-hour discount for auditees that also obtain consulting services. Further disaggregating engagements into new and continuing subgroups shows that *ABRDUM* is significant only in the combined fee-per-hour model for new engagements reported in columns 5 and 6 (the coefficient is 0.813, *p*-value = 0.09).

Unlike the total fee model reported in table 7, therefore, *ABRDUM* does not figure significantly in either of the two fee-per-hour models that include

it as an explanatory variable. However additional analyses show that for first-year/Arthur Andersen auditees with moderate or higher assessed ABR, there is a significant increase in total fees and in fees per hour. Overall, for our sample of continuing auditees the evidence is consistent with auditors responding to heightened ABR by adjusting hours worked and not by charging higher fees or a higher rate per hour. However, we also find that, even after accounting for the higher audit labor use on such engagements, first-year auditees with moderate or higher levels of assessed ABR pay both higher total fees *and* higher fees per hour than do first-year auditees with lower levels of assessed ABR.

5. *Concluding Remarks*

As with all studies that use proprietary data from a single source and time period, our findings must be interpreted with due regard to their limitations. First, the extent to which our findings are influenced by sample selection is unknown. Second, our conclusions are based only on engagements most directly comparable to the high-technology, manufacturing, and merchandising sectors, for which we were able to obtain pre-BRA benchmarks and thus, the extent to which they reflect trends in other segments of the firm's practice is unknown. Third, since we are not privy to auditee identities, we could not supplement the data items available to us with additional data items from public sources. Lastly, the period we study was a time of great scrutiny of auditor conduct in general and of Arthur Andersen auditees in particular. Thus, the extent to which findings for other time periods and for engagements of other auditors would differ remains a question for future research.

Overall, our results suggest that relative to 1989 benchmarks, in 2002, at the mean, total audit labor hours are about 10% lower but total partner and manager hours are about 25% higher. As a consequence, the proportion of partner and manager labor increases by about 40%. In addition, we also find that new/former Arthur Andersen auditees and auditees with moderate or higher assessed ABR elicit both larger labor allocations *and* a higher-ranked labor mix. The major determinants of audit labor hours in 2002 are auditee size, public and new/former Arthur Andersen auditee status, and, most critically for our purposes, assessed ABR. Several determinants of labor demand in the pre-BRA era are no longer statistically significant in the BRA era.

We also find that, at the mean, 2002 audit fees are about 25% lower than would be expected under the pre-BRA benchmark. After controlling for labor hours used by rank, new auditees, auditees with highly reliable internal control systems, and auditees that also obtain non-audit services from the auditor pay lower fees and lower fees per hour. Finally, after accounting for the extra labor usage associated with higher assessed ABR, we find no association (a positive association) between ABR and total fees as well as fees per hour paid by continuing (new) auditees.

Collectively, our findings are consistent with the expected profile of BRA and with the existence of downward pressure on audit fees relative to 1989 benchmarks. Perhaps the most salient pattern in the 2002 labor usage data is that the audit labor mix is much richer than would be predicted by pre-BRA benchmarks. We also find that audit labor allocations are strongly and systematically associated with ABR assessments and with surrogates for auditor litigation risk (*Public* and *FirstYear*) but not with the traditional audit risk measure (*ROMM*). Interestingly, we find little support for allegations in the financial press that audits during this time period had become substantially less labor intensive.

More fundamentally, the effectiveness of the ABR assessments, and thus of BRA audits relative to pre-BRA audits, remains an open question. A logical next step is to further investigate the attributes of auditors' risk assessments under BRA: Future research on this critical aspect of auditor performance would go a long way towards providing a more complete understanding of the impact of BRA on audit quality.

APPENDIX
Computing Expected Hours and Fees

We use the following models (originally reported in table 3 of OSS [1994]) to compute (natural logarithms of) expected labor usage:

$$\begin{aligned}
\ln(PHrs_{89}) &= 0.301 * \ln(Assets) + 0.001 * Forasst + 0.006 * Cmplx \\
&\quad + 0.001 * Treports + 0.01 * Leverage + 0.043 * Public \\
&\quad + 0.005 * ROMM + 0.003 * HRely - 0.006 * MRely \\
&\quad + 0.009 * LRely + 0.002 * FirstYear - 2.161 \\
\ln(MHrs_{89}) &= 0.26 * \ln(Assets) + 0.001 * Forasst + 0.007 * Cmplx \\
&\quad + 0.001 * Treports + 0.012 * Leverage + 0.033 * Public \\
&\quad + 0.002 * ROMM + 0.027 * HRely + 0.001 * MRely \\
&\quad + 0.007 * LRely + 0.004 * FirstYear + 0.001 * TAX - 0.697 \\
\ln(IHrs_{89}) &= 0.241 * \ln(Assets) + 0.001 * Forasst + 0.008 * Cmplx \\
&\quad + 0.001 * Treports + 0.002 * Leverage + 0.018 * Public \\
&\quad + 0.008 * ROMM - 0.005 * HRely - 0.002 * MRely \\
&\quad + 0.001 * LRely + 0.009 * FirstYear - 0.001 * TAX + 0.878 \\
\ln(SHrs_{89}) &= 0.360 * \ln(Assets) + 0.001 * Forasst + 0.011 * Cmplx \\
&\quad + 0.001 * Treports + 0.005 * Leverage + 0.017 * Public \\
&\quad + 0.015 * ROMM + 0.008 * HRely + 0.006 * MRely \\
&\quad + 0.006 * LRely - 0.006 * FirstYear - 1.206
\end{aligned}$$

We use the following model (originally reported in table 3 of OSS [1994]) to compute (natural logarithms of) expected fees:

$$\begin{aligned}\ln(Fee_{89}) = {} & 0.34 * \ln(Assets) + 0.001 * Forasst + 0.007 * Cmplx \\ & + 0.001 * Treports + 0.007 * Leverage + 0.022 * Public \\ & + 0.011 * ROMM + 0.011 * HRely - 0.001 * MRely \\ & + 0.008 * LRely - 0.003 * FirstYear + 5\end{aligned}$$

In all of these models, $\ln(Assets)$ is natural log of auditee total assets in 1989 dollars. The following variables are all interacted with $\ln(Assets)$ in the models reported above: *Forasst* is the proportion of auditee assets located outside the United States. *Cmplx* is auditee operational complexity on a five-point scale (1 = simple, 5 = highly complex). *Treports* is the total number of audit reports rendered for the engagement. *Leverage* is auditee financial leverage measured as debt/assets. *Public* equals 1 if the auditee has issued any publicly traded securities, 0 otherwise. *FirstYear* equals 1 if the auditee is a new engagement, 0 otherwise. *ROMM* is assessed risk of material misstatement (0 = low, 1 = moderate or high). *HRely* equals 1 if the auditor placed high reliance on the auditee's internal control system, 0 otherwise. *MRely* equals 1 if the auditor placed moderate reliance on the auditee's internal control system, 0 otherwise. *LRely* equals 1 if the auditor placed low reliance on the auditee's internal control system, 0 otherwise. *MC* is fees for management consulting services scaled by fees for audit services. *TAX* is fees for tax services scaled by audit fees.

We compute expected labor hours by rank for the pre-BRA era ($PHrs_{89}$, $MHrs_{89}$, $IHrs_{89}$, $SHrs_{89}$) as the antilogarithm of $\ln(PHrs_{89})$, $\ln(MHrs_{89})$, $\ln(IHrs_{89})$, and $\ln(SHrs_{89})$, respectively.[33] We compute total expected labor hours for the pre-BRA era ($THrs_{89}$) as the sum of the expected hours at all ranks ($PHrs_{89} + MHrs_{89} + IHrs_{89} + SHrs_{89}$) and the expected audit fees (Fee_{89}) as the antilogarithm of $\ln(Fee_{89})$. Differences between the actual and expected labor use or fees *Pdiff*, *Mdiff*, *Idiff*, *Sdiff*, *Tdiff*, and *Fdiff* are, respectively, the differences between the actual and expected labor hours by rank, or in the case of *THrs*, by total labor hours and, in the case of *Fdiff*, actual and expected fees. More specifically, *Pdiff* is computed as *PHrs* minus $PHrs_{89}$ (the antilogarithm of $\ln(PHrs_{89})$) and the other differences are analogously computed. *Pratio, Mratio, Iratio, Sratio*, *Tratio*, and *Fratio* are the ratios of actual labor hours (by rank, in total) or fees, scaled by expected labor hours at that rank (in total) or by expected fees. More specifically, *Pratio* is computed as $PHrs/PHrs_{89}$ and the other ratios are analogously computed. Expected labor hours by rank, expected total hours, and expected fees

[33] Following OSS (p. 256, paragraph 4), we do not adjust predicted values using a smearing factor. Replacing actual hours or fees in Tables 3, 4, and 7 by expected hours or fees under BRA computed as described later or, alternatively, using a smearing factor up to 1.15 does not qualitatively change our findings.

under BRA ($PHrs_{02}$, $MHrs_{02}$, $IHrs_{02}$, $SHrs_{02}$, $THrs_{02}$, and Fee_{02}) are computed analogously using the coefficients reported in columns 1 and 5 of panels A and B of table 5 for labor hours by rank and by summing the hours thus computed for $THrs_{02}$ and, in the case of Fee_{02}, using the coefficients reported in column 1 of table 7.

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