Meta-regression analysis and the Big firm premium

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Abstract :

Can the small number of very large audit firms can charge a fee premium to their clients? This issue has been examined in many research papers over thirty years. The results have been mixed and controversial, and the issue remains topical. There are many significant results reported in this literature, but there are also many that are not significant, and it may be that any apparent premium is overstated because of publication bias. The literature on audit pricing includes arguments that higher prices are an indication of market power, or alternatively that they represent higher quality shown by product differentiation. This paper takes stock of the results so far using meta-regression analysis. The meta-regression analysis supports the view that the Big firm premium exists, but its effect may be overstated in research generally due to the publication bias that is inherent in the system of research publication. While this raises doubt about the existence of any premium at all, further testing shows that a smaller underlying effect remains after taking account of this bias. The underlying premium is about 10%. The premium applies in private sector auditing but not in the public sector, consistent with the product differentiation explanation for it. Meta-regression analysis has potential to make published audit research in many areas more useful.

Key words: *Auditing; Audit fee research; Meta-analysis; Big 4; Audit quality*
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1. Introduction

This paper applies meta-regression analysis to examine the evidence about whether the Big audit firms are able to charge a premium for their services. The results of previous studies have been very mixed, and indeed this area of research commenced with a study reporting results that show no overall premium (Simunic, 1980). Since then, published studies show almost as many results where the premium is not significant as results where it is highly significant. Accounting and auditing research is known to be subject to publication bias, so there is also some concern that the body of published research may give a misleading impression that could overstate whether any premium exists and (if it does) its extent. Meta-regression analysis contains techniques for assessing whether publication bias is present, and for estimating the extent of any remaining effect of taking account of it. Meta-regression analysis allows multivariate testing of other factors that could influence the results, such as the setting of the research, the period and factors relating to the research and the researchers themselves. This study tests whether the Big firm premium exists, examines its size, what settings it is found in and the reasons for it.

The Big firm premium is related to continuing concerns about domination of the market for audit services. These concerns have led to investigations by government and regulatory bodies since the 1970s (e.g., US Senate, 1977) and continuing up to the present (US Senate 1977; GAO 2003; Oxera 2006; GAO 2008; European Commission 2010; House of Lords 2011). There is also an extensive body of published research over almost as long a period, commencing with Simunic (1980) and including more than 121 published papers.

As well as the existence of the premium itself, the study examines alternative explanations for it. Two explanations for the premium are well-established in the literature, namely monopolistic pricing and product differentiation. Examining the settings in which the previous research has been conducted can help to explain whether either or both of these apply. If the monopolistic pricing explanation applies, it is likely that the premium will exist in all sectors of the market, including listed companies, other entities and public sector entities. If the premium applies only in some settings, then it is more likely that auditees are voluntarily paying a premium for a higher-quality product that meets their needs.

The study also investigates the extent of publication bias. Publication bias is a concern because it may lead scholars to a distorted view of the field they are examining. It occurs because authors, reviewers and editors all regard significant results as more interesting, and are all more likely to persevere with studies that find significant results. It is very likely that pressure to obtain more interesting results is higher when submitting papers to higher-quality publications, or at better universities, or among higher-ranked faculty. Auditing faculty also have many close links with the Big audit firms (such as named chairs) and it is worth investigating whether these links systematically influence their results.

The results show that there is extensive publication bias, raising the specter that despite all these years of research, the Big firm premium might be merely an illusion. Further tests show that it is more than an illusion, and that there is a small (10%) underlying premium after removing the effects of publication bias. Also consistent with publication bias, the results show that the Big firm effect and publication bias occur in studies that set out to look at the Big firm premium, but not in studies that do not (and use Big firm as a control variable. The Big firm premium applies to the private sector but not the public sector, consistent with the product

differentiation explanation and not the monopolistic pricing explanation. There are some indications of country differences and a higher Big firm premium appears to be associated with better corporate governance in a country. Publication bias is worse in research that would be regarded as higher-quality – based on journal quality, university status and whether the authors include a full professor.

The paper now proceeds to discuss previous research in this area, followed by the need for meta-regression analysis and an explanation of the technique used, and the results of the study. These are followed by discussion of the findings, limitations and a conclusion.

2. Previous research on the Big firm premium

In studies of audit fees it has often been the case that the issue under examination is whether a small group of large audit firms can charge higher fees than other firms, *ceteris paribus*, an issue known as the Big firm[1] premium. The Big firm premium has been examined in studies starting with Simunic (1980), and there are more than 121 published research papers on this topic, including 189 separate studies. Francis (2004 352) states that, "on average, the Big firm premium has been around 20%"[2] (but there is a very wide range of reported results and this estimate could be overstated due to publication bias). Domination of the market for audit services by the Big firms is also a continuing concern of regulatory bodies (US Senate 1977; GAO 2003; Oxera 2006; GAO 2008; European Commission 2010; House of Lords 2011). Sometimes the Big firm premium is the issue being examined in a research study; sometimes it is a control variable in an investigation of another issue, and this point helps in investigating publication bias. The results include a large number of studies reporting a significant premium, but also many studies finding no significant result. The premium is variously seen as a threat,

[1] The Big firm premium currently applies to the Big 4 audit firms; in earlier periods they were the Big 8, Big 6 or Big 5.
[2] Simunic (2004) suggests 30%.

implying monopolistic pricing, or as a positive feature indicating that clients appreciate a higher-quality audit and will pay more for it. [3]

In the model presented by Simunic (1980, 167), where there is monopoly pricing, then audit fees will be higher. Simunic notes that differentiation of product may also take place, and that the differentiating factor would be the visibility and brand name recognition of the Big firm firms. He does not find evidence of higher fees for the Big firms as a group, but does find it for one firm only (Price Waterhouse) and recognizes that this may indicate product differentiation (Simunic 1980, 188). Francis (1984, 133) also recognizes that both effects can apply, while developing arguments that the Big firm firms have invested in developing brand name capital, and that they receive higher fees because their audits are recognized as being of higher quality (Francis, 1984, 135).

The issue of monopolistic pricing is examined by considering segments of the audit fee market, namely large clients versus small. Simunic (1980) argued that small clients have a wide choice of auditor but large clients do not, so that if there was monopoly pricing by the Big 8 then there would be an audit fee premium paid by large but not small clients. In his study, there was no overall premium for either group, consistent with a competitive market and product differentiation. Causholli et al. (2011) report that a large number of other studies have reported a wide variety of results, including no premium in either group (e.g., Chung and Lindsay 1988; Firth 1985; Rubin 1988; Firth 1997), premiums in both large and small segments (e.g., Francis 1984; Gul 1999; Su 2000), and premiums for small clients only (e.g., Francis and Stokes 1986; Palmrose 1986; Lee 1996). Very few show evidence consistent with monopoly pricing.

[3] The product differentiation argument is frequently identified with Francis (1984) but is also discussed in Simunic (1980). The product differentiation argument was first developed in a conference paper by Dopuch and Simunic presented in 1980, according to Simunic (2004).

The alternative explanation for the Big firm premium is that higher fees indicate higher quality. Craswell et al. (1995, 297-8) argue that: "Based on economic theories of product differentiation (Klein and Leffler, 1981; Shapiro, 1983), higher Big 8 audit fees in competitive markets are consistent with positive returns to Big 8 investments in brand name reputation for higher quality audits". They extend this argument to auditor industry specialization, where there is reported evidence of an industry-specialist auditor fee premium (e.g., Craswell et al. 1995; Francis et al. 2005) although the evidence is mixed (Causholli et al. 2011).

There are also issues regarding model specification, for example whether clients slef-slect a Big firm auditor based on similar factors to those that influence audit fees. Chaney et al. (2004, 51) assert that, in their UK setting, "the premium vanishes once we control for self-selection bias," (because certain clients are more suited to Big firm firms, and it is economically more efficient for them to use those firms). However, Lennox and Francis (2008) suggest that there are pitfalls in using self-selection models.[4]

Recent calls for more research include Simunic (2004, 5) who states, "given the recent problems and changes in the profession, and the many unanswered questions, revisiting this issue seems worthwhile;" Watkins et al. (2004, 168), who call for more research into the issue of monopoly pricing versus product differentiation; Choi et al. (2008, 56) who note the mixed evidence and ask, "are there any country-level, institutional factors that can explain the observed differences" in the results, and Clatworthy et al. (2009, 163) who state that "further research is warranted" using innovative methods. Simunic (2004, 5) revisits the Big firm issue, and notes that it is in need of further investigation. He suggests that, "the underlying 'theory' is sketchy"; most practitioners do not accept the quality ranking of Big firms higher than small firms; and that

[4] Clatworthy et al. (2009, 139) also note that self-selection models are highly sensitive to changes in model specification, and that "conclusions of the premium vanishing when selection bias is controlled for appear premature." It is an unresolved question as to whether self-selection effects make a difference.

"there is good reason for concern that audit quality of Big firms may become (be) no higher than some minimum (e.g., GAAS audit)." He also raises the issue that the audit market now might be quite different from that in the past due to such changes as firm mergers, and notes that recent audit failures have frequently involved the Big firms. If the premiums found in previous research are not well based in theory and not supported in practice, the issue may be worth further investigating.

The issue of the Big firm premium is worthy of further investigation applying current techniques of meta-analysis. The study reported here synthesizes audit fee research on audit quality as represented by a Big firm premium and reviews the accumulated weight of evidence, using meta-regression analysis to take account of issues about the research settings and the researchers themselves. The questions under examination are whether the Big firm premium exists; if it does, how large it is; and the extent to which the results of these studies vary according to factors about the research setting and the researchers.

The results show evidence of publication bias in this area of research. This raises the question of whether the premium exists at all. I carry out further testing of that issue and despite the publication bias, there remains evidence of higher audit fees being associated with the Big firms. Publication bias is evident in studies of the Big firm premium, but not in studies using it as a control; and publication bias is worse in higher-quality publications. I further investigate the issue by examining whether the Big firm premium applies consistently across all audit markets, or occurs only in certain settings. If it applies universally, then this is consistent with monopoly pricing; if it is restricted to certain settings, such as list companies or the private sector, then this may suggest product differentiation. The results show that the Big firm premium is a private sector phenomenon and does not consistently occur in the public sector, consistent with product

differentiation. The Big firm premium also appears to be associated with countries where governance is better, and where Big firm market share is less.

3. The need for meta-analysis

A number of recent narrative literature reviews of research note that research in auditing comes to conflicting conclusions and that it lacks influence over public policy and practice (e.g., Francis 2004, DeFond and Francis 2005, Carcello 2005, Kinney 2005, Simunic 2005 and Humphrey 2008). Meta-analysis has a place in reconciling the inconsistent results of research to date and assisting research to make a contribution to policy making.

Recent papers discussing auditing research include Francis (2004, 360) who argues that, "there are some fundamental and important things we do not know about audit quality." DeFond and Francis (2005, 26) suggest that now that there is a government oversight body (the PCAOB) "there is at least the possibility that academic research can have a greater impact on policy-making and auditing practice than has been the case in the past". Carcello (2005, 37) states that a reason why auditing research does not have more effect on public policy is that "as is the case with most social science work, findings across different studies are often inconsistent. These inconsistent results reflect the realities of using different samples, different models and different variable definitions". Carcello (2005) calls for research to synthesize the conflicting findings of research. Singleton-Green (2010, 133) observes (from a professional body perspective) that one deterrent to communication from researchers to policy-makers is the existence of disagreements among researchers. This issue of inconsistent results is well-known in meta-analysis as the "ambiguity problem", whereby policy makers are unable to make use of literature that includes conflicting results. Meta-regression analysis is an appropriate means of synthesizing the existing conflicting results.

The "ambiguity problem" was referred to (in another setting) by Senator Walter Mondale in a speech to the American Psychological Association in 1970. When Mondale sought guidance from educational research, he noted:

> "What I have not learned is what we should do about these problems. . . . For every study, statistical or theoretical, that contains a proposed solution or recommendation, there is always another equally well–documented study, challenging the assumptions or conclusions of the first. No one seems to agree with anyone else's approach. But more distressing: no one seems to know what works."
>
> (cited in Bangert-Drowns and Rudner, 1991, 1).

Subsequently, meta-analysis became widely used to advance research in psychology and other fields by synthesizing the existing literature and allowing an overall conclusion to be developed. The term meta-analysis was first used by Glass (1976)[5]. Meta-analysis is a quantitative literature review, which can contribute in making sense of previous research, especially when integrating previous results becomes a task that is "too taxing for the human mind" (Hunter and Schmidt, 1990, 468). One difficult problem is the unavoidable bias that occurs in narrative literature reviews because there are so many results to take account of.[6]

Examples of papers based on meta-analysis techniques in auditing and accounting include Christie (1990), Trotman and Wood (1991), Kinney and Martin (1994) and Ahmed and Courtis (1999). Recent examples in auditing-related areas include Hay et al. (2006) on audit fee research in general; Sánchez-Ballesta and García-Meca (2007) examining corporate governance; Pomeroy and Thornton (2008) examining audit committee effectiveness; and Lin and Huang (2010) on the effects of corporate governance and audit quality attributes on earnings

[5] There were earlier criticisms of the fragmentary outcomes of hypothesis-testing approaches to research. Meehl (1967) describes an "eager-beaver researcher who has a long list of publications based on statistical hypothesis testing" thus: "In terms of his contribution to the enduring body of psychological knowledge, he has done hardly anything. His true position is that of a potent but sterile intellectual rake who leaves in his merry path a long train of ravished maidens but no viable scientific offspring" (Meehl 1967, 114).

[6] "Informal methods of narrative review permit biases to remain easily undetected. Reviewers' biases can influence decisions about study inclusion, relative weights given to different findings, and analysis of relations between study features and outcomes. These biases can have clandestine effects when reviewers do not systematically seek to reduce them or provide sufficient information for readers to evaluate their extent." (Rudner et al., 2000)

management. In Hay et al. (2006), some factors that could influence reported results were examined by a simple approach of separate analysis of certain groups of studies.[7] The present study uses alternative techniques using meta-regression analysis because meta-regression has the advantage that it can examine more than one factor at a time in order to consider issues related to the research setting and the researchers.

Taking account of variables related to the research studies allows me to examine whether the Big firm premium is related to the setting of the research. It may be that the premium applies only in certain countries (the US, the UK and Australia) are the most frequently researched. It may also be that the extent of premium is related to the extent of development of the country (Cobbin 2002) or to institutional factors such as common law or code law, litigation risk, transparency, or to the Big firm market share.

Examining issues related to the research and researchers allows several issues about the research environment to be examined. I examine the following issues: First, is research in higher quality journals different from that in lower quality journals? Several auditing papers have already asked whether affiliation to an auditing firm through an endowed chair or being a former employee of the firm affects research results (Francis 2004; DeFond and Francis 2005; Carcello 2005; Bazerman et al. 2006).[8] Second, therefore, I consider Big firm affiliations by the

[7] They included analysis according to the status of the journal, the country the study was set in, and the period of the study. Some variation was found, e.g., profitability was not significantly associated with audit fees before 1990, but was negative and significant after; leverage was significant in the US and UK but not Hong Kong; the "busy season" effect mainly arose in US municipal audits.

[8] Francis (2004, 360) states: "academic accountants are often viewed as apologists for the accounting profession and in particular for the Big 4 firms. This view is reinforced by numerous Big 4 professorships and donations to accounting departments of US universities, and the general lack of critical reflection in accounting scholarship published in leading US research journals." DeFond and Francis (2005, 10) point out that: "the auditing industry hires our students, makes donations to our departments and schools, funds professorships and chairs, gives us subjects for experiments and hires us as expert witnesses. All of these factors create a cosy relationship and a temptation for auditing researchers, referees and journal editors to adopt a sympathetic view to the profession". Carcello (2005, 37) notes: "there is an inherent risk that researchers, referees and journal editors might cater to research that is favourable to the profession". Bazerman et al. (2006, 43) say: "This careful incremental approach [to changing the system of regulation in auditing] is endorsed by accounting firms themselves, and bears a striking

researchers. Another issue is that of a side effect compared to a main effect – many studies examine the Big firm premium as an issue in itself, while many others include it as a control variable in studies of other issues. Perhaps researchers find differing results when the variable is important to their research question, compared to when it is being used as a control variable. This difference in the studies, where some are studying whether a Big firm premium exists, while others are examining other issues and including it as a control, makes this setting particularly well-suited for examining publication bias. Does publication bias, and the Big firm premium itself, occur only in studies examining the Big firm premium?

An issue of particular concern is potential publication bias – does the literature publish only those studies that find significant results in the expected direction? It is widely believed (e.g., Stanley et al. 2008, 279) that studies with statistically significant results are much more likely to be published than those with "no results".[9] This is because authors, reviewers and editors all regard significant results as more interesting. Thus, it is more likely that a researcher will lose the motivation to persevere with a study that does not find significant results (or will keep on trying variations in the tests reported). Editors and reviewers are also more likely to reject a study without significant results. Similarly, studies with effects opposite to those generally expected are also likely to be discarded by authors or rejected by other authorities. The outcome of this effect is that the overall results in published research will frequently overstate the underlying effects simply because of the publication bias that is inherent in the system.

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resemblance to the approaches advocated by the leaders of other industries attempting to stave off regulation in the face of strong evidence that they have been misleading the public. For example, tobacco industry executives have argued that we need more research on the causal effects of smoking . . .". It is therefore appropriate to conduct tests for publication bias concerning issues like the Big firm premium, where there are mixed results and the issue is controversial, and the influence of the accounting profession could be important.

[9] Publication bias is also commented upon by Ashenfelter and Greenstone (2004), Sutton et al. (2000) and Egger et al. (2007).

The existence of publication bias in accounting research has been identified in earlier papers. Pomeroy and Thornton (2008, 319) argue that "prior research suggests that publication bias is particularly acute in accounting." This is consistent with Bamber et al.'s (2000, 123) argument that "the placement of the first research bricks affected the whole wall" – initial studies of an issue in accounting are very influential and there are barriers to publishing work that challenges (or even replicates) previous published accounting research. Earlier still, Lindsay (1994, 33) argued that publication bias was impeding the progress of accounting research. Publication bias is also evident in the development of some research areas, e.g. Francis (2004, 357) comments as follows on non-audit services research: "The accounting establishment was upset by the Frankel et al. study, and I believe there was some sympathy within the academic community to publish papers refuting their findings. Top-level accounting research journals do not generally publish replications or 'no results' studies, yet that is what has occurred in the non-audit services area." Hay et al. (2006, 163) note that publication bias might be affected by journal quality – top journals may be less likely to publish studies with insignificant results than lower level journals, and thus the system under which research is published may inflict top journals with even greater publication bias.

Publication bias will be apparent when the research reports systematically different results for more precise studies than for less precise studies.[10] Publication bias and other issues can be examined by meta-regression analysis.[11] Other effects can also be taken into account, for

[10] Goldacre (2008, 215) points out that "not only has publication bias been found in many fields of medicine, but a paper has even found evidence of publication bias in studies of publication bias. . . This is what passes for humour in the field of evidence-based medicine." The paper is Dubben and Beck-Bornhold (2005).

[11] Meta-regression analysis was proposed and discussed by Stanley and Jarrell (1989, 161). They described meta-regression analysis as "the regression analysis of regression analyses . . . it studies the processes that produce empirical economic results as though they were any other social scientific phenomenon". "Meta-regression analysis can see through the murk of random sampling error and selected misspecification bias to identify the underlying statistical structures" (Stanley 2005, 309).

example, the prestige of the researcher's institution, or the funding source or location might be relevant.

The Big firm premium is a particularly appropriate issue to examine in this meta-regression analysis because it was the starting point for audit fee research (Simunic 1980); there is widespread research either examining the issue or using it as a control variable; the results of previous studies are mixed; and it is a topic on which certain issues (such as the affiliations of academic researchers) are particularly relevant. The product differentiation explanation is appealing to auditors and auditing professors, because it is consistent with the view that auditing is of value and that the market will pay more for a higher-quality audit. The idea that Big firm audits are valued for their high quality might appeal particularly to researchers who are associated with the Big firms in some way, and it is worth investigating whether these affiliations could be associated with greater publication bias. The Big firms are influential, and academics have previously been described as "apologists" for them (Francis, 2004).

4. Meta-regression analysis

Meta-regression analysis allows for tests for publication bias (the funnel asymmetry test) and the precision of the estimated effect (the precision effect test) while taking account of other variables (e.g., Stanley et al., 2008). The previously-published meta-analysis of audit fee research, by Hay et al. (2006), included univariate tests for country effects, period effects and journal effects. I argue here that it is more useful to examine multivariate tests that examine each of these effects together, and that meta-regression analysis including the funnel asymmetry test and the precision effect test provides a means to do that.

Stanley et al. (2008) explain how meta-regression analysis is applied to research using econometric models. In economics research (and audit fee research) there is usually a regression model of this form:

$$Y = X\beta + \varepsilon \quad (1)$$

Where Y is the dependent variable vector (audit fees in this case), $X\beta$ is the vector of explanatory variables and ε is the error vector. Often the significance of one particular regression coefficient (in this case, the significance of the coefficient on the Big firm variable) is the key issue. Differences in findings may be due to differences in the private sector or public sector setting, the country setting, the time period or other effects. I examine these effects as possible explanations for variations in the results. Stanley et al. (2008) suggest that these can be examined using a meta-regression model like this:

$$b_j = \beta + \sum_{k=1}^{K} \alpha_k Z_{jk} + e_j \quad (2)$$

Where b_j is the reported estimate of β in the jth study, β is the underlying value of the parameter of interest, Z_{jk} is the matrix of meta-independent variables which explain the relevant characteristics of the study and its systematic variation from other studies, α_k are the meta-regression coefficients and e_j is the meta-regression disturbance term (Stanley and Jarrell, 1989 164; Stanley et al. 2008, 279). The moderator (or meta-independent) variables Z_{jk} should include the precision of the estimate (measured using its standard error), model specification characteristics of Equation (1), quality measures of the study, characteristics of the authors (such as institutional affiliations[12]) and characteristics of the data (Stanley and Jarrell 1989, 165).

[12] Stanley et al. (2008, 278) suggest "gender, experience, income, ideology, funding source, etc." Not all of these are relevant to auditing research.

To examine the effect of publication bias, meta-analysis studies often include a plot of reported results and the precision of those results in a funnel plot (Egger et al. 1997; Sutton el. 2000; Stanley et al. 2008). Effect size is plotted against precision (defined as 1 divided by standard error). In the absence of publication bias, the result should resemble an inverted funnel. More precise studies (those with lower standard errors) form the top of the funnel, and tend to cluster together. Less precise studies form the lower part of the funnel chart and are more widely dispersed – but if publication selection bias exists, those with unexpected results will be truncated, and one half of the funnel will not be present, leaving an asymmetrical funnel. Publication bias results in the precise studies and imprecise studies being significantly different from each other. Such a funnel plot of studies of the elasticity of demand for water appears in Dalhuisen et al. (2003), and the authors observe that the mean elasticity in reported studies is overstated by a factor of three to four times. The overstatement of the mean result occurs because of the inclusion of less precise studies in the expected direction, but not those whose results are in the opposite direction.

Figure 1 shows a funnel plot of the Big firm audit firm premium, and it shows a pattern very similar to those in previous studies of areas in which publication bias was evident. The funnel is asymmetrical, with extreme observations in the expected positive direction associated with low precision, and a comparative absence of low-precision results in the opposite direction. The most precise studies (usually those with very large sample sizes) form the top of the funnel. The less precise studies are widely dispersed, but mainly on the right hand side of the funnel. The mean Big firm effect estimated using this published data might well overstate the underlying premium.

Insert Figure 1 here

A meta-regression analysis test for publication bias, and the existence of an underlying effect, can be conducted using the following model (Stanley et al 2008 280).

$$b_j = \beta + \sum_{k=1}^{K} \alpha_j Z_{jk} + \beta_0 Se_j + e_j \quad (3)$$

This equation is as equation (2) with the addition of the standard error *Se* to measure precision. If there is no publication bias, the reported effect b_j will vary randomly around the underlying effect, β, with other factors that affect the results taken account of by the Z_{jk} variables. If there is publication bias, the standard error of the study will affect the direction of the results, and β_0 will be significant. This occurs because studies with smaller standard errors obtain significant results with smaller coefficients, and are likely to be published even with relatively small reported effects. Less precise studies are likely to have a wider range of results, and those with significant effects in the expected direction are more likely to be published. The funnel asymmetry test (FAT) examines this issue. The same equation also allows a test of whether there is a significant underlying effect, which is indicated by $\beta \neq 0$ (the precision effect test, PET) (Stanley et al 2008 280).

Since equation (3) suffers from heteroscedasticity with regard to *Se*, in practice the following version of the equation is usually estimated, with both sides of the equation divided by Se_j (so that the dependent variable now becomes b_j/Se_j, the *t*-statistic):

$$t_j = \frac{b_j}{Se_j} = \beta_0 + \beta\left(\frac{1}{Se_j}\right) + \sum_{k=1}^{K} \frac{\alpha_k Z_{jk}}{Se_j} + v_j \quad (4)$$

As a result of dividing through, the intercept β_0 now becomes the funnel asymmetry test variable, and a significant result indicates publication bias. β is the test for an underlying effect, free of publication selection bias (Stanley et al. 2008, 281). Explanatory variables (Z_k) that relate

to factors about the setting of the study are also divided by *Se*. Finally, explanatory variables (K_i) that might affect the study itself, such as affiliation of the authors, are added:

$$t_j = \frac{b_j}{Se_j} = \beta_0 + \beta\left(\frac{1}{Se_j}\right) + \sum_{k=1}^{K} \frac{\alpha_k Z_{jk}}{Se_j} + \sum_{i=1}^{I} \gamma_i K_{ji} + v_j \quad (5)$$

This test allows examination of whether publication bias is more closely associated with higher or lower quality journals, higher or lower quality universities, higher or lower grades of faculty and whether or not the Big firm premium is the issue under examination.

5. Data and results

A list of published audit fee studies was identified from the papers in Hay et al. (2006), supplemented with papers in *Thirty Years of Audit Research* (Brazel, 2006), and then extended to the end of 2007 by electronic searches using ABI/Inform and EBSCO Host with the key words 'audit' or 'auditing', and followed by a detailed review of the tables of contents of journals which publish research on auditing.[13] The search examined publications up to December 31, 2007.

I examined observations from 121 papers that included a Big firm variable, published from 1980 to 2007, in 41 journals. The papers are listed in Appendix 1. In many cases, papers include more than one set of observations (for example different countries, or different years reported separately for comparison with each other) so that there are 184 analyses of separate sets of data available. There also many cases of papers that report several analyses of the same data, giving a total of 498 regression analyses. I carried out two sets of analyses, the first on the main observation that features in each paper (or where this was not identifiable, the observation from the most comprehensive analysis) and a second set of analysis using all observations (and

[13] I did not include conference papers or unpublished papers listed in SSRN since these papers may not have been subject to a review and editorial process, and are usually published with some variation at a later date.

taking account of the repeated observations of the same data). Papers were excluded if they did not use log of audit fee as the dependent variable, and if they did not report sufficient data about the coefficient, standard error and t-statistic.

The analysis of the main results includes 171 observations; the analysis of all observations includes 485 observations. Table 1 shows the number of papers and analyses included, and Table 2 shows a summary of the results. The summary shows that there are a large number of highly significant results. The most extreme observation suggests Big firm premium of over 100%; the most precise study indicates a 5% premium.[14]

Insert Tables 1 and 2

Table 3 shows the descriptive statistics for continuous variables, which examined the effect size from each study, and its precision. The mean coefficient on the Big firm variable is .188 for the main observations, and the mean t-statistic is 2.53, suggesting that published studies on average find a significant coefficient. The mean coefficient is .181 (and mean t-statistic 2.872) when all of the observations are examined, a very similar result. These unadjusted mean coefficients are equivalent to premiums of 20.7% and 19.8%[15] respectively, consistent with the 20% premium discussed in Francis (2004).

Insert Table 3 here

Other variables of interest include variables for countries where there are large numbers of observations (the US, the UK and Australia), and categories of entity (listed companies versus other entities, and public sector versus private sector). Examining whether these issues influence

[14] Applying the method in Hay et al. (2006) to this data shows that there is a premium, which is significant at $p < .000$, and that a file-drawer test shows that there would need to be approx 73,000 unpublished studies to change this result. However, the file-drawer test has substantial limitations. (Stanley 2005, 337) notes that the file-drawer test can be "quite misleading" because it does not take account of publication bias, and this calculation probably overstates the extent of the premium.

[15] Computed as $e^{x}-1$ (Gujarati 2003, 333).

the result will help to explain the Big firm premium. Table 4 shows the descriptive statistics for these binary variables. The variables are used in Table 4 to break down the reported coefficient on the Big firm premium and conduct a univariate test for differences in the coefficient on the Big firm variable. The univariate tests found some evidence that the Big firm premium is higher in the US than in other countries, and lower in the UK and Australia. Non-English-speaking countries have a significantly higher premium than English-speaking countries, and developing countries have higher premium than developed countries. Premiums were higher before 1990 than in the other periods, and lower in the 1990s than before or after. Non-standard entities (such as municipalities, schools, insurance companies and pension funds) were not significantly different from companies. However, public sector entities have significantly lower Big firm premiums than the other entities. Variables related to the research process (Big firm affiliation of the authors, publication in a top journal and whether the Big firm premium was the topic of interest in the paper) did not show significant differences. I also examined whether studies by certain authors who have many results included in the data have results that are different from the rest, but there were no significant differences.

Insert Table 4 here

Meta-regression models using Equation (5) are reported in Table 5. Panel A shows models with only precision and the intercept from the main observations and from all observations, using cluster regression. The two models show very similar results. Both variables are significant in both models. The significant coefficient on the intercept shows that publication bias exists, although the significant coefficient on *1/Se* (the measure of precision) shows that there is an underlying effect even after taking account of this. The significant coefficient on the

intercept shows that publication bias exists, although the significant coefficient on *1/Se* shows that there is an underlying effect even after taking account of this.

In Panel B, explanatory variables for country (US, UK or Australia), journal quality (Top 5 journals or other), stated author affiliation to a Big firm and public sector are added. As shown in equations (4) and (5), these are divided by standard error. The only other variable that is significant is PUBLICSECTOR/Se, which is significant and negative, indicating that there is a significantly lower Big firm premium in the public sector. [16] After taking account of these effects, the intercept (Funnel Asymmetry Test variable) and the coefficient on precision (Precision Effect Test) are still significant at $p < .000$, indicating that, while there is publication bias, an underlying effect still applies. Despite the univariate test results suggesting that US premiums are higher, and those in the UK and Australia are lower, these results do not hold when other variables are controlled for.[17]

In order to explain the factors behind the existence of the premium, I examined more issues related to the country in which each study is set, including the legal system, corporate governance and the standard of accounting. It could be expected that if the Big firm premium is driven by demand, then it will be higher in countries with greater need for assurance; and if it is driven by dominant market positions, it will be higher in countries where the Big firms have higher market share. Measures for these issues were the Wingate index of litigation (Wingate 1997), rule of law (La Porta et al., 1997), antidirector rights (La Porta et al., 1998), overall earnings opacity (Bhattacharya et al. 2003), the CIFAR measure of disclosure intensity (Bushman et al. 2004, 248), Transparency International's Corruption Perceptions Index

[16] I also examine whether non-standard entities (i.e., all except listed companies) were different from the remaining observations of listed companies and found no significant difference.
[17] In multivariate tests, English-speaking countries are also not significantly different from all others, and developing countries overall are not significantly different from all others.

(Transparency International, 2010) and Big firm market share (Bushman et al. 2004, 249). Three of these measures have a significant effect but do not change the overall fit of the model substantially. Rule of law and antidirector rights have a small significant positive relationship with the Big firm premium, implying higher audit fee premiums are associated with better governance, consistent with previous findings that suggest governance and auditing are complementary, such as Hay et al. (2006), Hay et al. (2008) and Knechel and Willekens (2008). Big firm market share is negatively associated with the Big firm premium, providing further evidence contrary to the monopolistic pricing view of the Big firm premium.

I also examined the results broken down by periods, before 1990, the 1990s, and after 2000. There are significant coefficients on the intercept and on precision only in the 1990s, suggesting that publication bias and the Big firm premium are concentrated in this period (not reported in the paper). However, the numbers of observations in the other two periods are small. I carried out further tests using a dummy for each year. None were significant. I carried out further tests of issues about the researchers that might affect the results, namely seniority of researchers (whether or not any author is a full professor), journal quality measured by Social Sciences Citation Index journal impact factor, whether the journal is US-based or not, whether the journal is published by an association or is private, and the ranking of the authors' universities.

Insert Table 5 here

Table 6 reports regression models for the data broken down according to issues about the research itself, including the quality of the journal it was published in, and whether the researchers were examining the Big firm premium or using it as a control. Panel A reports results for Top 5 journals and other journals. The intercept and the coefficient on precision are

significant in both models, consistent with publication bias existing in both sets of journals, and with a remaining Big firm effect still present after allowing for publication bias. There are significant coefficients, but only for the Top 5 journals, on US data and UK data (both negative). This is consistent with lower Big firm premiums in these countries, but only in research appearing in higher-quality journals. The analysis of results reported in the top journals also shows a higher R^2, consistent with the extent of variation in results being more amenable to explanation.

Insert Table 6 here

Panel B reports results broken down according to whether the authors were studying the Big firm issue, or simply including Big firm as a control variable. Publication bias regarding the Big firm premium is not applicable where the Big firm premium is not the issue under examination, but applies where the study is examining the existence of a Big firm premium. The intercept is significant for studies examining the Big firm issue, but not for the other studies. This is consistent with publication bias being found in studies where this is the issue that is relevant to reporting the results. In those studies, precision is also weakly significant (.052) suggesting that there is some evidence of a remaining effect after removing the publication bias.[18]

There was a consistent pattern of results suggesting that in general, higher-quality publications are associated with greater publication bias. Publication bias is evident in papers where at least one author was a full professor,[19] but not in papers where this was not the case. Publication bias also applies to US journals but not to those outside the US. Standards for

[18] I also examined interactions of TOP5JOURNAL and ISBIG with the other variables. I used Chow tests to examine whether studies with each of these characteristics (TOP5JOURNAL and ISBIG) are different from others. The Chow tests showed that the models with the interactions for these variables do not have significantly more explanatory power than those without, indicating that the models are not significantly different. There was a significant and negative coefficient on the interaction between US data and Top5 journals (US/Se * TOP5JOURNAL), which suggests a lower premium in the US but only in research in top five journals, consistent with the findings shown in Table 6 Panel A.

[19] At the time of publication as shown in the paper's author details.

publication are very high in the US, but there is also very strong pressure to publish or perish, and the circle of reviewers of papers will tend to be smaller than that for the whole world. The results for association journals are not different from those of private journals, consistent with a view that both categories include both higher and lower quality journals. I also examined whether authors who were affiliated with a top 100 university (using any of four classifications, the *US News and World Report* listing of top 100 US universities[20]; and the listings of top 100 world universities published by the *Times Higher Education Supplement*,[21] Quacquarelli Symonds[22] and Shanghai Jiao Tong University (also known as *Academic Ranking of World Universities*[23]*).* Publication bias was evident in papers with an author from a top 100 university, but not in those with no author from a top 100 university.[24] I also examined publication quality by including a variable for the Social Sciences Citation Index (SSCI) Impact Factor of the journal, but this is not significant. I also partitioned the studies by whether journals had an SSCI Impact Factor rating or not, and found similar results for both groups.

It is intriguing to consider, in the light of comments above that audit researchers are sometimes seen as apologists for the accounting profession (Francis 2004) whether papers by authors with a Big firm affiliation are more likely to report a Big firm premium. If a Big firm premium is explained as indicating higher quality, then researchers affiliated with Big firms may find their results more plausible and be more inclined to pursue publishing them when they show a Big firm premium. There are 14 papers, including 26 studies, where the author can be

[20] Obtained 15 November 2010 from http://colleges.usnews.rankingsandreviews.com/best-colleges/national-universities-rankings/
[21] Obtained 18 November 2010 from: http://www.timeshighereducation.co.uk/world-university-rankings/2010-2011/top-200.html
[22] Obtained 18 November 2010 from: http://www.topuniversities.com/university-rankings/world-university-rankings/2010/results
[23] Obtained 18 November 2010 from: http://www.arwu.org/ARWU2010.jsp
[24] University rankings have limitations (Enserink 2007), and unintended consequences (Diver 2005), but using a broad range of top 100 measures gives a reasonable opportunity for any highly regarded university to be recognized.

identified as a Big firm professor at the time of the study, a surprisingly small number, implying that Big firm professors do not delve into this issue. The results of testing papers with a Big firm-affiliated author separately from those with no affiliation do not provide signs that there is such an association, but there are considerable limitations to the use of this variable, because it provides a very incomplete measure of Big firm associations.[25] Almost all auditing academics have close links with professional firms through former colleagues or former students.

I conducted a variety of diagnostic tests. These included a Ramsey RESET test, which found no significant result, consistent with the hypothesis that there are no omitted variables. The Breusch-Pagan test for heteroscedasticity showed some indication of heteroscedasticity, and as a result I carried out tests using White's heteroscedasticity-consistent t-statistics. The results are very similar and significance levels did not change. I also repeated testing excluding some extreme observations and again obtained very similar results. I also computed variance inflation factors. The largest value was 5.49. This suggests that multi-collinearity is not a concern as the value is less than 10 (Gujarati 2003, 362).

The size of the underlying empirical effect in the absence of publication bias can be computed in several ways. Computing the mean of the reported results suggests a premium of 19.8% (as reported above), but this estimate is affected by publication bias. Methods that take account of publication bias include computing the mean of the most precise 10% of estimates (Stanley 2005, 316); or using the PEESE (precision-effect estimate with standard error) method set out by Stanley (2009).[26] The mean coefficient using the mist precise 10% of observations is

[25] Alternatively, it might be that professors with an affiliation to an audit firm outside the Big firms would be less subject to any association with the Big firms. I identified three Grant Thornton Professors – Ziegler, (UIUC), Harvey (London Guildhall) and White (UNM) – and one BDO Professor – Bukh (Aarhus). None of them are authors of papers about audit fees that can be included in the meta-analysis, so I was unable to examine this issue empirically.

[26] Estimating the equation $t_i = \beta_0 Se_i + \alpha(1/Se_i) + v_i$, where the estimate of α is the empirical effect corrected for publication selection.

.093, a premium of 9.7%. The PEESE method provides a similar result (.094 and 9.9%). Both of these methods suggest that the underlying Big firm premium is approximately 10%.

6. Concluding remarks

In this paper, meta-regression analysis is applied to the Big firm premium. The results show that the publication bias that is inherent in published research appears to exist in this area of research, and the apparent premium is overstated. This suggests some uncertainty about whether there is reliable evidence that the Big firm premium exists. Further tests suggest that there is a significant remaining underlying premium after adjusting for publication bias. The results also show that there is no overall Big firm premium in the public sector. This finding contributes to resolving the issue of whether the Big firm premium represents monopolistic pricing or product differentiation – as there is more demand from private sector firms for a differentiated higher quality audit, and the premium is much more significant in this setting. (If monopoly pricing occurred, any premium would apply across both settings). There is a remaining Big firm premium evident overall in the subset of studies that set out to examine Big firm effects, but not in the studies that are examining other issues and using the Big firm measure as a control. This result is also consistent with publication bias.

In common with similar studies, the limitations of the study include the relatively small number of published research papers available (121). While studies such as Chaney et al. (2004) have argued that it is necessary to control for self-selection, and therefore the literature using simple OLS models is mis-specified, there are not sufficient studies (2 papers in my data containing 12 sets of results) for the meta-analysis to study this issue and assess whether the premium is different when self-selection is controlled for. A further limitation is the difficulty of taking account of changes over time, such as changes in regulations or business practices such as

corporate governance as the small number of papers means there are not usually sufficient to test results before and after a change. In addition, some of the measures of interest, especially Big firm affiliation by researchers, are not as readily available as necessary to provide more conclusive results with regard to this issue.

Future research could extend to other areas where audit fees provide useful information, such as corporate governance or audit specialization. Meta-regression analysis may also help to provide clearer conclusions, and mitigate the effects of publication bias, in other controversial areas of auditing (such as the effect of consulting services on auditor independence) and thus be capable of providing guidance for policy makers. Meta analysis has potential as a way that will allow the diverse results of research in auditing to be synthesized, and for them to have more influence on policy. The policy implications could include the need for regulation of competition in the audit market; and the level of quality of audit services. However, even disciplines based on extensive scientific research often have difficulty in achieving much impact on policy.

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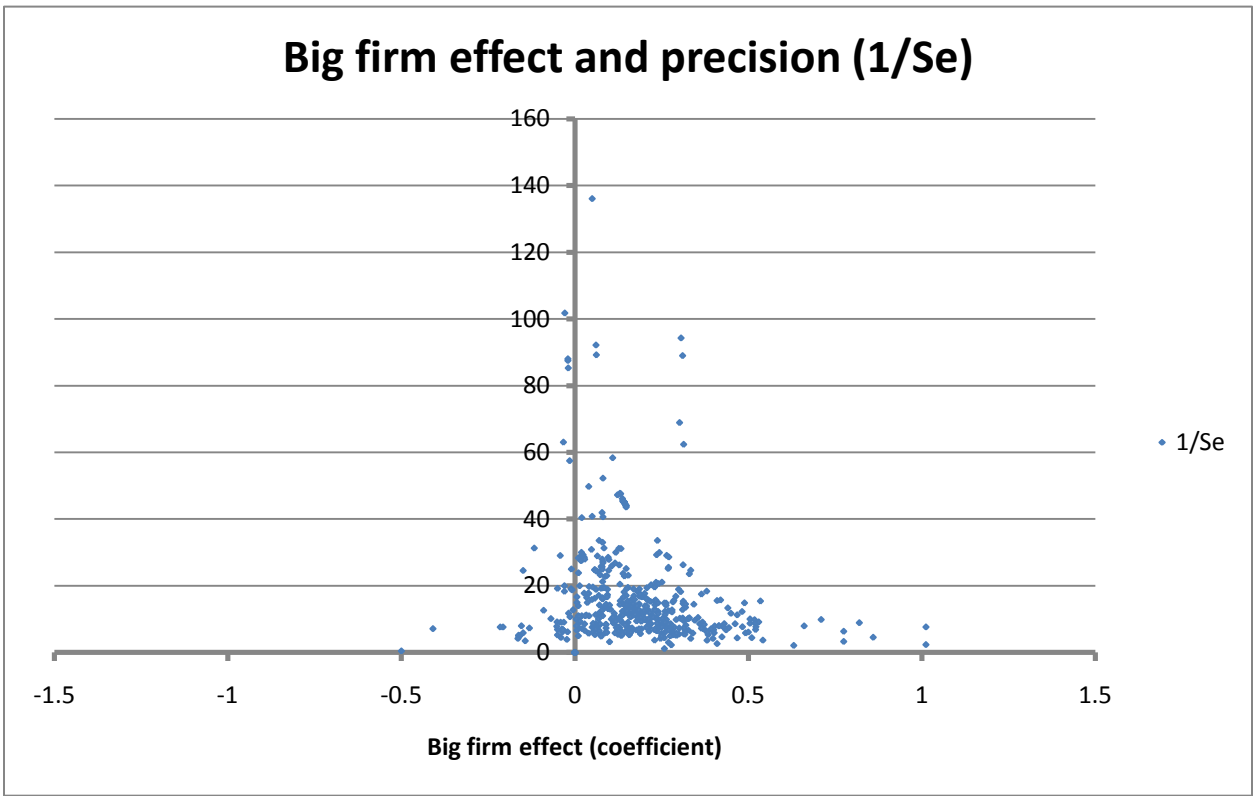

Figure 1: Big firm effect and precision (1/Se)

Table 1: Number of papers included in the meta-regression analysis

	Main observations	All observations
Number of papers	121	121
Plus additional years reported	39	39
Plus additional countries reported	13	13
Plus separate analyses of size	2	2
Plus separate analyses of categories	7	9
Plus additional sensitivity tests	-	314
Total number of studies	182	501
Minus studies not using ln(fee) as dependent variable	5	5
Minus studies not reporting sufficient data	6	11
Studies reporting sufficient data	171	485

Table 2: Summary of significance of results

	Results – main obs.	**Results – all obs.**
Positive and highly significant (1% or less)	78	187
Positive and somewhat significant (from 1% to 5%)	30	105
Not significant	61	186
Negative and somewhat significant (from 1% to 5%)	1	5
Negative and highly significant at 1% or less	1	2
Total	171	485

Table 3: Descriptive statistics of continuous variables

Panel A: main observation (173)

Variable	*Mean*	*Std. Dev.*	*Min*	*Max*	*Median*	*Mode*
COEFFICIENT	.188	. 182	-.50	1.01	.162	.080
TSTATISTIC	2.526	2.903	-3.66	28.86	2.095	2.640
STDERROR	.107	.179	.01	2.17	.077	.052
PRECISION	16.590	16.304	.46	136.00	13.103	19.200

Panel B all observations (485)

Variable	*Mean*	*Std. Dev.*	*Min*	*Max*	*Median*	*Mode*
COEFFICIENT	.181	.179	-.50	1.51	.157	.080
TSTATISTIC	2.366	2.872	-3.66	28.86	1.990	3.721
STDERROR	.108	.139	.01	2.17	.087	.022
PRECISION	16.302	15.591	.46	136.00	11.437	45.141

COEFFICIENT = reported coefficient on Big firm variable
TSTATISTIC = t-statistic of coefficient Big firm variable
STDERROR = standard error of coefficient of Big firm variable
PRECISION = 1 divided by STDERROR

Table 4: Descriptive statistics and univariate testing: number of observations and mean coefficient for study characteristics

Frequency and mean coefficient on Big firm in studies with and without selected characteristics (171 observations)

Characteristic	Frequency - with characteristic	Mean coefficient – observations with characteristic	Frequency – without characteristic	Mean coefficient – observations without characteristic	t-stat	Mann-Whitney U test (Z-statistic)
ISBIG	106	.196	65	.174	-.790	.006
TOP5JOURNAL	44	.177	127	.191	.522	-.433
BIG4AFFIL	13	.183	158	.188	.094	-.586
US	43	.220	128	.177	-1.298	-2.135*
UK	48	.131	123	.210	2.553*	2.661**
AUSTRALIA	24	.125	147	.198	1.841	2.052*
NEW ZEALAND	5	.077	166	.191	1.384	2.187*
ENGLISH-SPEAKING	129	.164	42	.261	3.059**	2.588**
EUROPE	7	.108	164	.191	1.169	-1.410
DEVELOPING COUNTRIES	18	.310	153	.173	-3.058**	-2.099*
PRE90	43	.235	128	.172	-1.963*	-1.973*
NINETIES	100	.161	71	.226	2.304*	2.155*
POST2000	28	.211	143	.183	-.746	- .557
NONSTANDARD	27	.128	144	.199	1.877	1.989*
PUBLICSECTOR	17	.092	154	.198	-2.312*	-1.939*

Significance: * 5%, ** 1%

ISBIG = 1 if the Big firm premium was an issue being investigated by the research, 0 otherwise
TOP5JOURNAL = 1 if published in *Accounting Review, Journal of Accounting Research, Accounting, Organisations and Society, Contemporary Accounting Research* or *Auditing: A Journal of Theory and Practice*, 0 otherwise;
BIG4AFFIL = 1 if Big firm chair or funding identified, 0 otherwise;
US = 1 for US data, 0 otherwise;
UK = 1 for UK data, 0 otherwise;
AUSTRALIA = 1 for Australian data, 0 otherwise;
NEW ZEALAND = 1 for New Zealand data, 0 otherwise;
ENGLISH-SPEAKING = 1 for data from English-speaking countries, 0 otherwise;
EUROPE = 1 for European data (excluding the UK), 0 otherwise;
DEVELOPING COUNTRIES = 1 for developing countries, 0 otherwise;
PRE90 = 1 for data before 1990, 0 otherwise;
NINETIES = 1 for date from 1990-2000, 0 otherwise
POST2000 = 1 for data after 2000, 0 otherwise
NONSTANDARD = 1 for non-standard entities including pension funds, municipalities, schools, and pension funds) etc, 0 for listed companies
PUBLICSECTOR = 1 for public sector entities, 0 otherwise

Table 5: regression models of study effect on precision and study characteristics

Panel A: Models including intercept and precision only

	Main model from each study				*All observations using cluster regression*			
Variable	***Coef.***	***Std. Err.***	***t***	***Sig.***	***Coef.***	***Robust Std. Err.***	***t***	***Sig.***
1/Se	0.064	0.013	5.00	.000	0.080	0.025	3.16	0.002
INTERCEPT	1.471	0.295	4.98	.000	1.096	0.335	3.27	0.001
Observations	173				485			
F-statistic	25			0.000	10			0.000
R-squared	0.128				0.188			
Adj R-squared	0.123				n/a			
Root MSE	2.719							

Panel B: Models including study characteristics

	Main model from each study				*All observations using cluster regression*			
	Coef.	***Std. Err.***	***t***	***Sig.***	***Coef.***	***Robust Std. Err.***	***t***	***Sig.***
1/Se	0.091	0.031	2.91	0.003	0.099	0.018	5.37	0.000
ISBIG	-0.293	0.486	-0.60	0.593	0.150	0.585	0.26	0.798
TOP5JOURNAL	0.018	0.517	0.03	0.967	0.478	0.319	1.50	0.135
BIG4AFFIL	-.079	.859	-0.09	0.927	0.686	0.648	1.06	0.291
US/Se	-0.001	0.036	-0.04	0.995	-0.002	0.030	-0.08	0.938
UK/Se	-0.027	0.029	-0.93	0.314	-0.016	0.038	-0.45	0.656
AUST/Se	-0.036	0.042	-0.85	0.391	-0.001	0.036	-0.01	0.989
PUBLICSECTOR /Se	-0.084	0.039	-2.14	0.034	-0.091	0.032	-2.90	0.004
INTERCEPT	1.616	0.561	2.88	0.005	0.832	0.416	2.00	0.047
Observations	171				485			
F-statistic	4.15			0.000	5.37			0.000
R-squared	0.170				0.222			
Adj R-squared	0.129				n/a			
Root MSE	2.720				2.548			

1/Se = Precision (computed as 1/Standard error); ISBIG = 1 if the Big firm premium is an issue investigated in the paper, 0 otherwise; TOP5JOURNAL = 1 if published in *Accounting Review*, *Journal of Accounting Research*, *Accounting, Organisations and Society*, *Contemporary Accounting Research* or *Auditing: A Journal of Theory and Practice*, 0 otherwise; BIG4AFFIL = author identified as Big 4 affiliated; US/Se = Indicator variable for US settings; UK/Se = Indicator variable for UK settings; AUST/Se = Indicator variable for Australian settings; PUBLICSECTOR/Se = Indicator variable for public sector settings.

Table 6: regression models of study effect on precision and study characteristics broken down by publication variables

Panel A: Top 5 journals compared to others

	TOP5JOURNAL = 0				TOP5JOURNAL = 1			
	Coef.	***Std. Err.***	***t***	***Sig.***	***Coef.***	***Std. Err.***	***t***	***Sig.***
1/Se	0.082	0.036	2.27	0.025	0.182	0.055	3.29	0.002
ISBIG	-0.187	0.635	-0.29	0.769	-1.112	0.559	-1.99	0.054
BIG4AFFIL	-0.217	1.018	-0.21	0.832	-1.846	1.657	-1.11	0.272
US/Se	0.055	0.049	1.10	0.272	-0.144	0.050	-2.86	0.007
UK/Se	-0.015	0.033	-0.45	0.652	-0.130	0.056	-2.32	0.026
AUST/Se	-0.074	0.057	-1.28	0.202	-0.044	0.056	-0.80	0.431
PUBLICSECTOR/Se	-0.091	0.048	-1.89	0.061	-0.045	0.058	-0.78	0.443
INTERCEPT	1.521	0.716	2.12	0.036	1.938	0.594	3.26	0.002
Observations	126				45			
F-statistic	3.97			0.000	3.78			0.003
R-squared	0.191				0.417			
Adj R-squared	0.143				0.307			
Root MSE	2.977				1.546			

Panel B: Studies examining the big firm premium compared to studies using Big firm as a control variable

	ISBIG = 0				ISBIG =1			
	Coef.	***Std. Err.***	***t***	***Sig.***	***Coef.***	***Std. Err.***	***t***	***Sig.***
1/Se	0.109	0.059	1.85	0.069	0.067	0.032	2.08	0.040
TOP5JOURNAL	0.178	1.163	0.15	0.878	0.221	0.487	0.45	0.651
BIG4AFFIL	-0.048	1.326	-0.04	0.971	2.571	1.898	1.35	0.179
US/Se	0.005	0.063	0.08	0.934	-0.046	0.052	-0.89	0.377
UK/Se	-0.014	0.056	-0.25	0.803	-0.029	0.030	-1.00	0.321
AUST/Se	-0.016	0.108	-0.15	0.878	-0.040	0.039	-1.06	0.294
PUBLICSECTOR/Se	-0.106	0.127	-0.84	0.407	-0.065	0.032	-2.04	0.044
INTERCEPT	1.067	1.022	1.04	0.301	1.666	0.341	4.88	0.000
Observations	65				106			
F-statistic	2.11			0.057	2.39			0.027
R-squared	0.205				0.146			
Adj R-squared	0.108				0.084			
Root MSE	3.768				1.876			

1/Se = Precision (computed as 1/Standard error); ISBIG = 1 if the Big firm premium is an issue investigated in the paper, 0 otherwise; TOP5JOURNAL = 1 if published in *Accounting Review, Journal of Accounting Research, Accounting, Organisations and Society, Contemporary Accounting Research* or *Auditing: A Journal of Theory and Practice*, 0 otherwise; BIG4AFFIL = author identified as Big 4 affiliated; US/Se = Indicator variable for US settings; UK/Se = Indicator variable for UK settings; AUST/Se = Indicator variable for Australian settings; PUBLICSECTOR/Se = Indicator variable for public sector settings.

Appendix 1: List of papers included

Authors	Journal	Year published	Main obs.	All obs.
Ahmed & Goyal	IJAu	2005	3	6
Anderson & Zéghal	ABR	1994	2	2
Antle, Gordon, Narayanamoorthy & Zhou	RQFA	2006	2	6
Ashbaugh, LaFond & Mayhew	AR	2003	1	1
Baber, Brooks & Ricks	JAR	1987	1	4
Bandyopadhyay & Kao	CAR	2004	1	2
Basioudis & Ellwood	FAM	2005	1	4
Basioudis	JBFA	2007	1	3
Basioudis & Ellwood	JAPP	2005	1	3
Basioudis & Fifi	IJAu	2004	1	1
Beattie, Goodacre, Pratt & Stevenson	ABR	2002	1	7
Beatty	JAR	1993	1	2
Boon, Crowe, McKinnon & Ross	IJAu	2005	2	3
Brinn, Peel & Roberts	BAR	1994	1	3
Butterworth & Houghton	JBFA	1995	1	2
Cameran	IJAu	2005	2	4
Carson, Fargher, Simon & Taylor	IJAu	2004	5	20
Chan, Ezzamel & Gwilliam	JBFA	1993	1	1
Chaney Jeter & Shivakumar	AR	2004	1	2
Chase	RIGNA	1999	1	1
Che-Ahmad & Houghton	JIAAT	1996	1	1
Chen & Wu	TaiAR	2004	1	12
Chen, Su & Wu	IJAu	2007	2	4
Chi	ICFAI	2006	1	4
Chung & Lindsay	CAR	1988	1	1
Chung & Narasimhan	MAJ	2002	1	5
Clatworthy & Peel	JBFA	2007	1	6
Clatworthy, Mellett & Peel	JBFA	2002	1	3
Collier & Gregory	EAR	1996	1	2
Colson, Maher, Broman and Tiessen	RAR	1988	3	3
Copley, Gaver & Gaver	JAR	1995	1	1
Craswell & Francis	AR	1999	1	6
Craswell, Francis & Taylor	JAE	1995	1	3
Crittenden, Davis, Simon & Trompeter	JSM	2003	1	15
Cullinan	ABR	1997	1	1
Cullinan	AJPT	1998	1	1
Davis & Simon	AJPT	1992	1	1
DeFond, Francis & Wong	AJPT	2000	1	1
Dugar, Ramanan & Simon	AIA	1995	1	1
Dunmore & Shao	PAR	2006	1	1
Ezzamel, Gwilliam & Holland	ABR	1996	1	4
Ezzamel, Gwilliam & Holland	IJAu	2002	1	12
Fargher, Fields & Wilkins	AJPT	2000	1	1
Ferguson & Stokes	CAR	2002	8	8
Fargher, Taylor & Simon	IJA	2001	1	2
Fields, Fraser & Wilkins	JAPP	2004	1	7
Firth	AJPT	1985	1	1

Authors	Journal	Year published	Main obs.	All obs.
Firth	IJRM	1993	1	1
Firth	JBFA	1997	1	1
Firth	JBFA	2002	1	4
Fischer, Johnson & Elder	RIGNA	2004	1	1
Francis	JAE	1984	1	2
Francis & Simon	AR	1987	1	3
Francis & Stokes	JAR	1986	2	2
Ghosh & Lustgarten	CAR	2006	1	1
Giroux & Jones	ABR	2007	1	2
Gist	ABR	1992	1	1
Gist	JAAF	1994	1	2
Goddard & Masters	MAJ	2000	2	6
Goodwin-Stewart & Kent	AF	2006	1	3
Gregory & Collier	JBFA	1996	1	2
Gul	AJPT	1999	2	2
Gul	JAR	2006	1	6
Gul	CAR	2006	1	1
Gul, Chen & Tsui	CAR	2003	1	7
Hackenbrack, Jensen & Payne	JAR	2000	1	1
Hay & Davis	AJPT	2003	1	1
Hay, Knechel & Li	JBFA	2006	3	3
Higgs & Skantz	AJPT	2005	1	2
Hill, Ramsay & Simon	JAPP	1994	6	6
Ho & Ng	ARA	1996	2	2
Hoitash, Markelevich & Barragato	MAJ	2007	4	4
Houghton & Jubb	JIAAT	1999	1	1
Ireland & Lennox	JAAF	2002	1	1
Jensen & Payne	AJPT	2005	1	3
Jeong, Jung & Lee	IJA	2005	1	10
Johnson, Walker & Westergaard	AJPT	1995	1	6
Jubb, Houghton & Butterworth	MAJ	1996	1	6
Langendijk	EAR	1997	1	1
Karim & Moizer	IJA	1996	1	2
Lee	ABR	1996	1	3
Lee	MAJ	2005	1	1
Lowensohn et al	JAPP	2007	1	3
Mathews and Peel	ABR	2003	1	4
McMeeking et al	ABR	2006	18	112
Mellett, Peel & Kharbari	FAM	2007	1	5
Naser & Nuseibeh	IJCM	2007	1	1
Nikkinen & Sahlstrom	IJAu	2004	7	8
O'Sullivan	BAR	2000	1	2
O'Sullivan	EAR	1999	1	1
O'Sullivan & Diacon	IJAu	2002	1	6
Palmrose	JAR	1986	1	3
Peel & Roberts	ABR	2003	1	7
Pong	EAR	2004	1	1
Pong & Burnett	MAJ	2006	1	3

Authors	Journal	Year published	Main obs.	All obs.
Pong & Whittington	JBFA	1994	1	1
Raghunandan & Rama	AJPT	2006	2	2
Raman & Wilson	JAPP	1992	1	6
Roberts & Glezen	RIGNA	1990	1	1
Rose	AIA	1999	2	6
Rubin	AR	1988	1	3
Sanders, Allen & Korte	AJPT	1995	2	2
Seetharaman, Gul & Lynn	JAE	2002	1	5
Simon	IJA	1995	1	1
Simon & Francis	AR	1988	1	1
Simon & Taylor	AIA	1997	1	1
Simon and Taylor	IJAu	2002	1	1
Simon, Ramanan & Dugar	IJA	1986	1	1
Simon, Teo & Trompeter	IJA	1992	3	3
Simunic	JAR	1980	1	1
Taylor	PAR	1997	1	1
Taylor & Simon	IJA	1999	1	1
Taylor & Simon	RAEE	2003	1	1
Taylor, Simon & Burton	RAR	1999	1	1
Tsui, Jaggi and Gul	JAAF	2001	1	2
Van der Zahn & Tower	ICFAI	2006	1	3
Ward, Elder & Kattelus	AR	1994	1	2
Whisenant et al.	JAR	2003	1	2
Willenborg	JAR	1999	2	4
Yatim, Kent & Clarkson	MAJ	2006	1	4
Zhang & Myrteza	ARA	1996	1	2
121 articles			184	498

Key: Journals publishing articles included in the meta-analysis

Abbreviation	Journal	Articles
AF	Accounting & Finance	1
ABR	Accounting and Business Research	10
AIA	Advances in International Accounting	3
AJPT	Auditing: A Journal of Practice & Theory	12
AR	The Accounting Review	7
ARA	Asian Review of Accounting	2
BAR	British Accounting Review	2
CAR	Contemporary Accounting Research	5
EAR	European Accounting Review	4
FAM	Financial Accountability & Management	2
ICFAI	ICFAI Journal of Audit Practice	2
IJA	International Journal of Accounting	7
IJAu	International Journal of Auditing	10
IJCM	International Journal of Commerce and Management	1
IJRM	International Journal of Research in Marketing	1
JAAF	Journal of Accounting, Auditing and Finance	3
JAE	Journal of Accounting & Economics	3
JAPP	Journal of Accounting and Public Policy	5
JAR	Journal of Accounting Research	10
JBFA	Journal of Business Finance & Accounting	11
JIAAT	Journal of International Accounting Auditing and Taxation	2
JSM	Journal of Strategic Marketing	1
MAJ	Managerial Auditing Journal	7
PAR	Pacific Accounting Review	2
RAEE	Research in Accounting in Emerging Economies	1
RAR	Research in Accounting Regulation	2
RIGNA	Research in Governmental and Nonprofit Accounting	3
RQFA	Review of Quantitative Finance and Accounting	1
TaiAR	Taiwan Accounting Review	1
		121