

**THE IMPACT OF AUDIT QUALITY
ON EARNINGS ROUNDING-UP BEHAVIOUR**

1. INTRODUCTION

Inspired by psychological studies that have shown that humans use multiples of ten in their perception and judgement of numbers [see for example Rosch (1975)], several studies [see for example Carslaw (1988), Thomas (1989), Niskanen and Kelojarju (2000) and Van Caneghem (2002)] have investigated whether companies tend to round up the first digits of reported earnings in an attempt to influence perceptions of financial statement users. In general, results obtained in these studies suggest that managers of public companies round up reported *profits*, in a way that increases the first digit by one, when they are faced with a large digit (i.e. in general a nine) in the second-from-the-left position. The purpose of the current study is to examine the impact of differences in audit quality on this type of earnings enhancement. In contrast to prior studies on the relationship between differences in audit quality and earnings management [see for example Davidson and Neu (1993) and Becker et al. (1998)], we predict that differences in audit quality do not affect earnings rounding-up (i.e. earnings management) practices. As expected, our results are inconsistent with high-quality audits acting as an earnings management constraint. The main contribution of the current paper is that we use a very direct indicator of earnings management in establishing the relationship between differences in audit quality and earnings management, whereas prior studies typically employ discretionary accruals as an earnings management proxy. Results obtained in studies that have empirically tested the power and specification of the various discretionary accrual models

that are typically used in the literature [see for example Dechow et al. (1995), and Guay et al. (1996)] do suggest that these models measure earnings management with considerable imprecision. The methodology used in the current study might therefore result in more powerful tests on the impact of audit quality on earnings management.

The remainder of the paper is organised as follows. In Section 2, we give a brief overview of the previous literature on both audit quality and earnings rounding-up behaviour. The hypothesis development and the sample selection procedures are discussed in Section 3. In Section 4, the empirical results are provided. The obtained results are further discussed in Section 5. In Section 6, conclusions are presented.

2. PREVIOUS LITERATURE

2.1. Audit Quality

In general, financial statements of listed companies are required to be monitored by an independent third party (i.e. an auditor). Financial statement audits are conducted to determine whether the financial statements are drawn up in accordance with specified criteria (i.e. in general GAAP) (Arens and Loebbecke, 1997). An unqualified audit report can therefore be considered as a signal to financial statement users that financial statements are prepared in accordance with GAAP and consequently present a true and fair view of the company's financial position and its reported results. It is obvious that such an audit report is only valuable to financial statement users if they estimate the probability of the auditor reporting a breach to be non-zero (Watts and Zimmerman, 1986). The latter probability depends on the quality of the auditor that monitors the financial statements. Audit quality is conditional upon [1] the

auditor's competence (i.e. the probability that an auditor discovers a given breach); and [2] the auditor's independence (i.e. the probability that an auditor reports a discovered breach) (Watts and Zimmerman, 1986).

In general, it is argued that large audit firms provide audits of a higher quality as compared to small audit firms [see for example DeAngelo (1981) and Watts and Zimmerman (1986)]. The latter stems from the fact that large audit firms are assumed to be less dependent on their clients because of the fact that [1] they have a greater number of clients; and [2] they have more to lose (i.e. termination of other clients, reduced fees for remaining clients, loss of reputation, ...) when they give in to clients' pressures to not report a discovered breach.

Audit Quality Proxy

Typically, empirical studies on audit quality employ a dichotomous variable (i.e. Big5ⁱ versus non-Big5) to proxy for differences in audit quality between large and small audit firms. Several studies have made an attempt to evaluate the appropriateness of the aforementioned proxy by focusing on very particular characteristics that might differentiate between high- and low-quality audit firms. These characteristics include [1] the occurrence of accounting errors [see for example DeFond and Jiambalvo (1991)]; [2] the size of audit fees [see for example Craswell et al. (1995)]; and [3] litigation rates [see for example Palmrose (1988)]. Results obtained in these studies are consistent with Big5 audit firms providing audits of a higher quality as compared to non-Big5 audit firms. More specifically, the aforementioned studies reveal [1] that accounting errors are less likely to be observed for Big5 clients; [2] that Big5 audit firms receive higher audit fees; and [3] that Big5 audit firms are confronted with lower litigation rates. Another line of research [see for example Francis and Wilson (1988), DeFond (1992) and Francis et al. (1999)]

has focused on the relationship between agency costs (conflicts) and the aforementioned audit quality proxy. It seems quite logic to assume [1] that as agency costs (conflicts) increase, a company is more likely to hire a high-quality audit firm; and/or [2] that the higher the agency costs (conflicts), the more likely the company is to hire a high-quality audit firm. Results obtained in the aforementioned studies are consistent with the latter hypotheses. A third line of research has investigated the impact of differences in audit quality on stock prices. Nichols and Smith (1983) investigated the stock market response to auditor changes (i.e. changes from a Big8 audit firm to a non-Big8 audit firm and vice versa). Results obtained by Nichols and Smith do reveal positive (negative) abnormal returns for companies that switch to a Big8 (non-Big8) audit firm. However, it has to be noted that the latter results do not attain statistical significance. Teoh and Wong (1993), on the other hand, investigated the impact of the aforementioned dichotomous audit quality variable on the earnings response coefficient (henceforth ERC). The obtained results reveal that ERCs for Big8 clients are significantly larger than for non-Big8 clients, which is consistent with Big8 audit firms generating more precise (i.e. reliable) earnings figures. Altogether, the results obtained in all aforementioned studies do suggest that the traditional audit quality proxy does actually capture differences in audit quality.

One might immediately think of other audit quality proxies that can be used in empirical research. Examples of other proxies that were used in the literature include [1] the aggregate amount of sales for all clients audited by a particular firm (i.e. in an attempt to differentiate between large and small audit firms); and [2] the portion of a client's audit fee in the total amount of audit fees received by a particular audit firm (i.e. to proxy for the auditor independence with regard to that particular client). Studies in which the aforementioned proxies

were employed [see for example Francis and Wilson (1988) and DeFond (1992)] do suggest that the brand name proxy (i.e. Big5 versus non-Big5) is more powerful in capturing audit quality differences as compared to the other proxies. Moreover, results obtained by DeFond (1992) do suggest that the traditional brand name proxy is as powerful in capturing audit quality differences as a more complex measure, which is in fact a combination of all aforementioned proxies.

Audit Quality and Earnings Management

Davidson and Neu (1993) tried to determine the impact of differences in audit quality on earnings management by investigating the difference between management earnings forecasts and subsequent reported earnings for a sample of Canadian companies. They argue that such earnings forecasts reflect management's best estimate of future earnings (i.e. they assume that managers do not have incentives to over- or understate earnings forecasts) and that differences in audit quality do not affect the accuracy of these forecasts (i.e. earnings forecasts of Canadian companies are only subject to a limited audit review). It is obvious that companies do have an incentive to minimize the difference between the aforementioned forecasts and reported earnings in order to avoid negative stock price effects (i.e. the stock market will penalize companies that do not meet their forecasts). One way to minimize this difference is by means of earnings management. Therefore, Davidson and Neu hypothesize that the aforementioned difference will be smaller for clients of non-Big8 audit firms than for clients of Big8 audit firms. The underlying assumptions are [1] that companies manage their earnings in an attempt to minimize the aforementioned difference; and [2] that high-quality audits act as a constraint on earnings management. Results obtained by Davidson and Neu support the hypothesis tested (i.e. the difference between earnings forecasts and reported earnings is smaller for non-Big8 clients) and do therefore suggest that high-quality audits function as a restriction on earnings management.

Becker et al. (1998) investigated the relationship between differences in audit quality and discretionary accruals (i.e. as measured by a cross-sectional version of the Jones model) as an earnings management proxy. They expected relatively higher discretionary accruals for clients of non-Big6 audit firms as compared to clients of Big6 audit firms. The underlying assumptions for this expectation are [1] that managers are more likely to over- rather than understate reported earnings; and [2] that high-quality audits act as a restriction on earnings (i.e. accruals) management. After controlling for potential confounding effects, results reveal that discretionary accruals of clients of non-Big6 audit firms are significantly larger (i.e. between 1.5 and 2.1 percent of total assets) as compared to those of clients of Big6 audit firms, which is entirely consistent with the aforementioned hypothesis. The aforementioned results are supported by the results obtained by Francis et al. (1999). Francis et al. find that for a sample of companies listed on NASDAQ, Big6 clients have (i.e. on average) lower levels of discretionary accruals (i.e. as measured by a cross-sectional version of the Jones model), whereas they have higher levels of total accruals.

In short, results obtained in all aforementioned studies do suggest that high-quality audits really place restrictions on earnings management. More specifically, it seems that Big5 (i.e. large) audit firms leave less room for earnings management as compared to non-Big5 (i.e. small) audit firms.

2.2. Earnings Rounding-Up Behaviour

Carslaw (1988) was the first to investigate whether managers tend to round up the first digits of their reported earnings. The expectations of Carslaw for this type of behaviour were based on: [1] psychological studies that have shown that humans use numbers that are multiples of ten in order to evaluate and compare figures (see introduction); and [2] the existence of the “\$ 1.99” phenomenon [i.e.

“A price of \$ 1.99 is perceived to be abnormally lower to a customer than one of \$ 2.00.” (Carslaw, 1988: 321)]. Both phenomena are induced by the fact that humans only store the most important bits of information (i.e. the first digits of a large number). This led Carslaw to believe that managers might benefit from rounding up the first digits of reported earnings, given the expectation that users of financial statements will place most emphasis on the first digits of reported earnings figures. Therefore, Carslaw predicted an abnormal distribution for the second-from-the-left digit (henceforth second digit) of reported earnings. More specifically, Carslaw predicted “(...) an abnormally low occurrence of high digits in the second place of numbers and a compensating abnormally high frequency of lower digits in order that the number just exceeds the major reference point.” (Carslaw, 1988: 322). Based on a sample of New-Zealand companies, Carslaw found results consistent with his expectations [i.e. significantly more (fewer) zeros (nines) as second digit in reported earnings than would normally be expected]. Company years for which a loss was reported were eliminated because Carslaw did not expect the same pattern to be observed for loss observations.

Thomas (1989) extended the paper of Carslaw (1988) in several ways: [1] he used a sample of U.S. data (i.e. in order to check whether the results obtained by Carslaw could be generalized); [2] he did not eliminate loss observations; and [3] he also performed the analysis on quarterly earnings. In general, results for positive annual earnings were in line with the results obtained by Carslaw [i.e. Thomas also found a significantly higher (lower) than expected incidence of zeros (nines) in the second position]. Results based on negative annual earnings showed an inverse pattern [i.e. a statistically significant higher (lower) than expected occurrence of nines (zeros) in the second position]. Both aforementioned patterns were also found to exist for

quarterly earnings, albeit with smaller deviations from expected frequencies.

Niskanen and Keloharju (2000) performed a third study on this empirical matter by examining this type of behaviour for a sample of Finnish companies. This study is in fact an additional check on the validity of the results obtained in the aforementioned studies. The results obtained in this study are again supportive of rounding-up behaviour. Particularly strange about the results obtained by Niskanen and Keloharju is that they differ from the results obtained in the two aforementioned studies in at least two ways: [1] Niskanen and Keloharju found significantly fewer sixes and sevens as second digit than would be expected in a random sample, whereas no statistically significant anomalies in frequencies were noted for eights and nines; and [2] they reported a statistically significant higher incidence of both zeros and ones as second digit than would normally be expected. In other words, the results of Niskanen and Keloharju suggest that Finnish companies go even further when it comes to the enhancement of earnings figures and that they do not limit themselves to rounding up nines into zeros.

All previous studies did obtain results consistent with earnings rounding-up behaviour based on an analysis of digital frequencies. Van Caneghem (2002) tried to ensure that anomalies noted in the aforementioned analyses of digital frequencies (which are considered as evidence of earnings rounding-up behaviour) are not driven by the mere existence of (non-discretionary) accounting rules. That is, expected frequencies for second digits in all aforementioned studies are estimated using Benford's Law (see 3.3. Estimating Expected Frequencies for Second Digits). However, Benford's Law does only apply to lists of numbers that are not influenced by human thought (Nigrini and Mittermaier, 1997). One might argue that the existence

of accounting rules can be considered as an influence of human thought in the process of generating reported earnings. Therefore, Van Caneghem performed an analysis of digital frequencies (i.e. also based on Benford's Law) for both reported earnings and pre-managed earnings (i.e. reported earnings before discretionary accruals) for a sample of U.K. listed profit companies. Results obtained for reported earnings were consistent with earnings rounding-up behaviour [i.e. a significantly higher (lower) than expected incidence of zeros (nines) in the second position], whereas no similar pattern was observed for pre-managed earnings (i.e. the analysis of digital frequencies for pre-managed earnings did not result in statistically significant discrepancies between observed and expected frequencies with respect to the second digit). These results clearly suggest that anomalies in digital frequencies of reported earnings are induced by earnings management (i.e. no anomalies were noted for pre-managed earnings). Moreover, results suggest that managers use discretionary accruals for earnings rounding-up purposes.

3. RESEARCH DESIGN

3.1. Hypothesis Development

Results obtained in previous studies [see for example DeFond and Jiambalvo (1991) and Kinney and Martin (1994)] clearly suggest that managers tend to over- rather than understate reported earnings. The latter seems quite logic given the fact that most earnings management incentivesⁱⁱ have an income-increasing effect. Previous research [see for example Hirst (1994) and Braun (2001)] does also reveal that auditors are more likely to object to income-increasing misstatements as compared to income-decreasing misstatements. The latter might be explained by [1] a higher litigation risk for

earnings overstatements (i.e. financial statement users are more likely to suffer from earnings overstatements); and [2] the fact that most misstatements have an income-increasing effect. Based on these considerations, one should clearly focus on income-increasing earnings management when testing the impact of differences in audit quality on earnings management. Earnings rounding-up behaviour perfectly satisfies the latter criterion. As compared to for example discretionary accruals, earnings rounding-up behaviour offers the advantage of being a very clear and direct indication of income-increasing earnings management. Empirical studies that have tested the various discretionary accrual models that are typically used in the literature [see for example Dechow et al. (1995) and Guay et al. (1996)] have demonstrated that these models measure earnings management with considerable imprecision. The use of earnings rounding-up behaviour in establishing the relationship between differences in audit quality and earnings management might therefore result in more powerful tests (i.e. as compared to previous studies that typically employ discretionary accruals). Analogous to prior studies on earnings rounding-up behaviour, the occurrence of this phenomenon will be evaluated based on an analysis of frequencies for the second digit using Benford's Law (see 3.3. Estimating Expected Frequencies for Second Digits). As for audit quality, we decided to employ the brand name proxy (i.e. Big5 versus non-Big5) to differentiate between high- and low-quality audit firms. The use of this proxy is induced by the results obtained in previous studies on differences in audit quality (see Section 2.1. Audit Quality) that suggest that the latter dichotomous variable is very powerful in capturing differences in audit quality between large and small audit firms. Despite results obtained in prior studies that focused on the relationship under study [see for example Davidson and Neu (1993) and Becker et al. (1998)], we predict that high-quality audits do not act as an earnings management constraint. Consequently, we do

expect that earnings of both Big5 and non-Big5 clients show patterns consistent with earnings rounding-up behaviour. Several reasons underlie this expectation. Firstly, several empirical studies [see for example Hackenbrack and Nelson (1996), Libby and Kinney (2000) and Braun (2001)] have shown that auditors are willing to waive (both immaterial and material) proposed adjusting journal entries (henceforth PAJEs) under certain conditions. One of the factors that has been found to affect the latter decision, and that might be of interest to the current study, is the nature of the proposed adjustment. More specifically, some PAJEs are related to subjective matters (e.g. accounting estimates), whereas other PAJEs are based on factual data (e.g. the posting of an invoice) (Wright and Wright, 1997). Prior studies [see for example Hackenbrack and Nelson (1996), Wright and Wright (1997), Libby and Kinney (2000) and Braun (2001)] have shown that auditors are more likely (i.e. willing) to waive proposed adjustments of the subjective kind. Given the nature of the phenomenon, earnings management will typically involve the use of highly subjective (i.e. discretionary) accounting matters with the intent of 'steering' reported earnings. Therefore, it will be difficult for both high- and low-quality audit firms to object to earnings management given the fact that disagreements on subjective matters can be considered as justifiable. Secondly, it is probable that earnings management is realised through several immaterial discretionary items that are spread out over various balance sheet and/or income statement items (i.e. as to lower the probability of earnings management being detected). Even if the latter discretionary items aggregate to a material level, it has been shown that there is a greater propensity of auditors to waive several immaterial PAJEs that aggregate to a material level as compared to one single material PAJE [see for example Braun (2001)]. Our expectation is strengthened by the fact that the aforementioned

studies typically focus on Big5 audit firms solely. Therefore, we test the following hypothesis:

H₀: Earnings of both Big5 and non-Big5 clients show patterns consistent with earnings rounding-up behaviour.

3.2. Sample Selection

All accounting data used in the present study were obtained from Bureau van Dijk's Amadeus CD-ROM, which contains (limited) financial statement data for both private and public companies across Europe. From this database, we selected all listed U.K. companies. We limited our sample to earnings figures for the accounting year 1998 and eliminated all companies: [1] that reported a loss for this particular accounting year [as mentioned before, Thomas (1989) evidenced that these companies avoid reporting round earnings numbers]ⁱⁱⁱ; and [2] for which earnings were composed of only one digit. The latter procedure resulted in a total sample of 1,256 companies.

3.3. Estimating Expected Frequencies for Second Digits

Analogous to Carslaw (1988), Thomas (1989), Niskanen and Keloharju (2000) and Van Caneghem (2002), expected frequencies for the second digit in reported earnings were estimated using Benford's Law^{iv} and the normalised Z-statistic was used to evaluate the significance of differences noted between actual and expected frequencies (see Table 1 and Table 2). Contradictory to what one might logically expect, the occurrence of each digit, as second digit in a particular number, is not equally likely. Zeros (nines) are most

(least) likely to be observed as second digit by chance (see Table 1 and Table 2). The latter is referred to as Benford's Law. An extensive study on the frequencies of digits in both the first and second position in large lists of numbers led to Benford's Law. Based on several datasets (total number of observations = 23,197) and the use of integral calculus, Benford developed formulas to estimate expected frequencies of first digits, second digits and digit combinations in lists of numbers. The law applies to lists of numbers that describe the relative sizes of similar phenomena (i.e. if these numbers are not influenced by human thought). (Nigrini and Mittermaier, 1997)

A rather straightforward example might clarify the intuition behind Benford's Law. Consider a company with reported earnings of 10,000 GBP. In this case, an increase of at least 10% of reported earnings is required to alter the second digit. Once reported earnings equal 11,000 GBP, an increase of only 9,1% of reported earnings is needed to change the second digit. The required increase, as a percentage of reported earnings, in order to alter the second digit decreases as the value of the second digit increases up to the moment where the second digit equals nine. In the latter case, an increase of only 5,3% of reported earnings is needed to alter the second digit. In other words, the percentage increases required to change second digits become progressively smaller for higher digits. Therefore, companies will have zeros (nines) much longer (shorter) as a second digit than any of the other potential digits.

4. RESULTS

From the growing body of earnings management literature it is not immediately clear which earnings measure managers tend to enhance. Given the fact that the current study largely corresponds to

that performed by Van Caneghem (2002)^v on both the type of earnings enhancement investigated (i.e. earnings rounding-up behaviour) and the sample of companies employed, we decided to focus our analyses on the earnings measure for which evidence consistent with earnings rounding-up was found by Van Caneghem (2002). Thus, in what follows companies' reported pre-tax incomes will be used in order to investigate the prevalence of earnings rounding-up behaviour.

Before we go any further on the relationship between earnings management and differences in audit quality, it might be useful to first ensure that earnings rounding-up does really occur for the full sample of companies (i.e. without differentiating between Big5 and non-Big5 clients) employed in the current study. The results of the latter analysis are presented in Table 1, which presents both the observed and expected frequencies of the second digits for our (full) sample companies' reported pre-tax incomes.

Table 1 clearly indicates a statistically significant (i.e. at the 1% level) higher (lower) than expected incidence of zeros (nines) as second digit in our sample companies' reported pre-tax incomes. The table illustrates that zeros (nines) occur 3.6 (2.4) percentage points more (less) often than would be expected based on Benford's Law. Moreover, no other statistically significant discrepancies between observed and expected frequencies are noted. These findings are entirely consistent with previous results obtained by Carslaw (1988), Thomas (1989) and Van Caneghem (2002). Two important conclusions can be drawn from the results presented in Table 1. Firstly, the frequencies of the second digits of our sample companies' reported pre-tax incomes are not consistent with Benford's Law. The latter can be considered as direct evidence of earnings management. Secondly, the obtained results are consistent with earnings rounding-up behaviour. More specifically, the obtained results do suggest that sample companies tend to round up their reported pre-tax incomes, in a way that increases the

first digit by one, when they are faced with a nine in the second from the left position.

TABLE 1: The frequency of the second digits of U.K. listed companies' pre-tax incomes.

<i>Digit</i>	<i>Observed Frequency</i>	<i>Percentage of All Observations</i>	<i>Expected Percentage of All Observations</i>	<i>Percentage Deviation from Expected Frequency</i>	<i>Z-Value</i>
0	196	15.6	12.0	3.6	3.89 **
1	146	11.6	11.4	0.2	0.21
2	142	11.3	10.9	0.4	0.42
3	139	11.1	10.4	0.7	0.73
4	120	9.6	10.0	-0.4	-0.57
5	123	9.8	9.7	0.1	0.06
6	111	8.8	9.3	-0.5	-0.61
7	98	7.8	9.0	-1.2	-1.53
8	105	8.4	8.8	-0.4	-0.60
9	76	6.0	8.5	-2.5	-3.16 **

N = 1,256^{vi}

* = statistically significant at the 5% level

** = statistically significant at the 1% level

Whereas the aforementioned analysis did generate results consistent with earnings rounding-up behaviour, it did not control for the potential effect of differences in audit quality. Based on the hypothesis developed in Section 3 (see 3.1. Hypothesis Development), we do expect that earnings of clients of both Big5 and non-Big5 audit firms show patterns consistent with earnings rounding-up behaviour. In order to test the latter hypothesis, we broke up our full sample into a sub-sample of Big5 clients and a sub-sample of non-Big5 clients. Next, we repeated the aforementioned analysis on both sub-samples. Results of these analyses are presented in Table 2.

TABLE 2: The frequency of the second digits of both Big5 and non-Big5 clients' pre-tax incomes.

Panel A: Big5 clients.

<i>Digit</i>	<i>Observed Frequency</i>	<i>Percentage of All Observations</i>	<i>Expected Percentage of All Observations</i>	<i>Percentage Deviation from Expected Frequency</i>	<i>Z-Value</i>
0	138	15.1	12.0	3.1	2.84 **
1	114	12.5	11.4	1.1	0.98
2	104	11.4	10.9	0.5	0.42
3	96	10.5	10.4	0.1	0.06
4	86	9.4	10.0	-0.6	-0.64
5	87	9.5	9.7	-0.2	-0.23
6	83	9.1	9.3	-0.2	-0.27
7	71	7.8	9.0	-1.2	-1.35
8	73	8.0	8.8	-0.8	-0.92
9	61	6.7	8.5	-1.8	-2.03 *

N = 913

Panel B: Non-Big5 clients.

<i>Digit</i>	<i>Observed Frequency</i>	<i>Percentage of All Observations</i>	<i>Expected Percentage of All Observations</i>	<i>Percentage Deviation from Expected Frequency</i>	<i>Z-Value</i>
0	58	16.9	12.0	4.9	2.72 **
1	32	9.3	11.4	-2.1	-1.29
2	38	11.1	10.9	0.2	0.02
3	43	12.5	10.4	2.1	1.21
4	34	9.9	10.0	-0.1	-0.14
5	36	10.5	9.7	0.8	0.41
6	28	8.2	9.3	-1.1	-0.82
7	27	7.9	9.0	-1.1	-0.82
8	32	9.3	8.8	0.5	0.25
9	15	4.4	8.5	-4.1	-2.84 **

N = 343

* = statistically significant at the 5% level

** = statistically significant at the 1% level

Based on the results presented in Table 2 one can immediately conclude that both Big5 and non-Big5 clients engage in earnings rounding-up behaviour. The table clearly illustrates that zeros (nines) occur statistically significant more (less) often for both sub-samples than would be expected based on Benford's Law. Thus, results obtained for both sub-samples are similar to the ones obtained for the full sample of companies (i.e. without differentiating between Big5 and non-Big5 clients). It has to be noted that the deviations between observed and expected frequencies for both zeros and nines are smaller for Big5 clients as compared to non-Big5 clients. However, it is important to acknowledge that the latter difference between the two different samples does not attain statistical significance at the conventional levels (i.e. based on the normalised Z-statistic). Based on the finding [1] that both sub-samples generate results consistent with earnings rounding-up behaviour; and [2] that differences in digital frequencies (i.e. for both zeros and nines) do not significantly differ between both sub-samples, one might conclude that the obtained results do support the hypothesis tested. Consequently, our results are inconsistent with high-quality audits acting as a restriction on earnings management.

Prior studies [see for example Hackenbrack and Nelson (1996)] have shown that engagement risk affects the auditor's decision on whether or not to waive a proposed adjusting journal entry. The latter finding might have an impact on the results obtained in the current study. More specifically, it might be that the obtained results are biased due to statistically significant differences in engagement risks between both sub-samples. Factors that have been found to determine engagement risk are, among others, [1] client size [see for example St. Pierre and Anderson (1984) and Heninger (2001)]; and [2] client industry [see for example St. Pierre and Anderson (1984)]. Therefore,

we decided to carry out the aforementioned analyses on a sample of Big5 clients and a sample of non-Big5 clients that were matched on both industry (i.e. two-digit national industry code) and size (i.e. as measured by total sales^{vii}). The latter procedure resulted in a total of 140 matched pairs. Again, results obtained for both samples of companies were consistent with earnings rounding-up behaviour [i.e. zeros (nines) occur statistically significant more (less) often for both samples than would be expected based on Benford's Law]. As before, no statistically significant discrepancies were noted between both samples as with regard to differences between observed and expected frequencies (i.e. for both zeros and nines in the second position).

5. DISCUSSION OF THE RESULTS

Although results obtained in the current study are consistent with our expectations, they do conflict with results obtained in prior studies on the relationship between earnings management and differences in audit quality [see for example Davidson and Neu (1993), Becker et al. (1998) and Francis et al. (1999)]. The latter certainly deserves some further attention. One might immediately think of several plausible explanations for the fact that results obtained in the current study do not comply with earlier empirical results. Firstly, it might be that results obtained in prior studies are affected by errors in measuring discretionary accruals, which they typically use as an earnings management proxy in establishing the relationship between earnings management and differences in audit quality. As mentioned before, results obtained in studies [see for example Dechow et al. (1995) and Guay et al. (1996)] that have tested the power and specification of the various discretionary accrual models that are typically used in the literature do suggest that these models measure earnings management with considerable imprecision. Secondly, differences in international institutional factors might explain results obtained in the current study. Typically, prior studies focused on samples of U.S. and Canadian companies, whereas we

do employ a set of U.K. companies. Although all three countries belong to the so-called common-law countries, the U.K. can be considered as the one with [1] the least regulated accounting market; and [2] the lowest expected litigation cost (Ball et al., 2001). Prior studies [see for example Hackenbrack and Nelson (1996)] have shown that auditors are more likely to waive PAJEs when engagement risk (i.e. the expected litigation cost) is low. Therefore, it might be that the obtained results (i.e. the absence of a statistically significant relationship between earnings management and differences in audit quality) are affected by U.K. institutional factors.

6. CONCLUSION

The purpose of the current study was to provide additional insights into the relationship between differences in audit quality and earnings management by employing a very direct indicator of earnings management (i.e. earnings rounding-up behaviour). Whereas prior studies on this relationship have typically employed discretionary accruals as an earnings management proxy, we decided to opt for a different methodology inspired by recent studies that have shown that the traditional discretionary accrual models measure earnings management with considerable imprecision. By using the latter earnings management indicator, we overcome the very difficult exercise of estimating discretionary accruals. Therefore, it seems quite logic that our approach results in more powerful tests on the relationship under study. As opposed to results obtained in prior studies, our results are inconsistent with high-quality audits serving as a restriction on earnings management practices. More specifically, our results suggest that earnings (i.e. earnings with a large digit in the second position) of U.K. listed companies are rounded up regardless of the quality of the audit firm that monitors the financial statements. Several plausible explanations for the obtained results were provided.

ENDNOTES

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- i The current Big5 are [1] Arthur Andersen; [2] Deloitte & Touche; [3] Ernst & Young; [4] KPMG; and [5] PricewaterhouseCoopers.
- ii See Fields et al. (2001) for a comprehensive review of the various earnings management incentives.
- iii No analyses were performed on loss observations due to the small number of listed U.K. companies that reported a loss for the accounting year 1998 (i.e. small samples of data do not allow meaningful analyses of digital frequencies).
- iv Benford's Law states that the probability of y being the second digit of a particular number can be estimated as follows:
$$\sum_{x=1}^9 \left(\text{Log}_{10} \left(x + \frac{y+1}{10} \right) - \text{Log}_{10} \left(x + \frac{y}{10} \right) \right)$$
with x being the first digit of that particular number.
- v Van Caneghem (2002) searched for evidence consistent with earnings rounding-up behaviour for a sample of listed U.K. companies. Given the fact that he did not have a priori expectations about the earnings measure that managers try to enhance, he did include several different earnings measures in his study [i.e. (1) operating income; (2) net income before extraordinary items; (3) earnings before interest and taxes; (4) pre-tax income; and (5) net income after tax]. Results obtained by Van Caneghem do suggest that managers of public U.K. companies tend to round up reported pre-tax income, whereas no evidence consistent with earnings rounding-up behaviour was found for all other earnings measures included in the study.
- vi The number of companies included in the current study slightly differs from the number of companies included in the Van Caneghem (2002) study. The latter is due to the fact that financial institutions are retained in the current study, whereas they were eliminated in the Van Caneghem (2002) study (i.e. due to the problems related to the estimation of discretionary accruals for financial institutions).
- vii For two companies to be considered of equal size, their total sales were not allowed to deviate more than 5% (i.e. in both directions).

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