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Misstatements in Financial Statements: The Relationship between Inherent and Control Risk Factors and Audit Adjustments

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SUMMARY: This paper analyzes whether audit adjustments vary systematically with inherent and control risk factors. The analysis is based on proprietary data from a large recent sample of audit adjustments detected in the financial statement audits conducted by a Big 4 audit firm in Germany. We extend the scope of prior studies by incorporating client-specific planning materiality in our design, enabling us to analyze the relative magnitude of adjustments. Our findings show that audit adjustments vary systematically, as proposed by the audit risk model. Specifically, the integrity and competence of the client's management, economic position, entity-level control strength, and internal control system are associated with the number and relative magnitude of audit adjustments. The results also suggest that inherent and control risk factors are particularly strongly associated with income-affecting adjustments.

Keywords: audit adjustments; audit risk model; business risk audit approach; International Standards on Auditing (ISA); materiality.

JEL Classifications: M40; M41; M42.

INTRODUCTION

This paper analyzes whether audit adjustments[1] vary systematically with inherent and control risk factors. Because the audit risk model (ARM) also proposes this relationship, our analysis has a bearing on the empirical validity of the ARM. The analyses are based on

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Supplemental material can be accessed by clicking the link in Appendix A.

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[1] The (inversely directed) journal entry that an auditor proposes to correct a misstatement detected in the course of the audit (audit difference) is termed an audit adjustment.

proprietary firm data from a large recent sample of audit adjustments (n = 1,148) detected in the 2007 financial statements audits of a German Big 4 audit firm's sample of 255 clients. The sample includes data on individual audit adjustments such as size and effect on client income, as well as various attributes of the audit engagements to which the adjustments relate, such as inherent and control risk factors, client size, audit input, and the materiality threshold determined by the auditor for a specific engagement. The audits were conducted in accordance with International Standards on Auditing (ISA) by a Big 4 audit firm. Our results should also be generalizable to non-European jurisdictions including the U.S., because a Big 4 audit firm can be expected to apply the audit approach in a uniform manner globally and because the ISA relevant to our analysis are similar to the American Institute of Certified Public Accountants (AICPA) standards.[2]

Prior archival data-based literature is primarily explorative, or univariately analyzes the effect of individual risk factors on audit adjustments. Only three studies (Johnson 1987; Wallace and Kreutzfeldt 1991, 1995), all based on data gathered in the 1980s, report the results from a multivariate research design. Our paper contributes to the existing literature in two respects. First, our research complements and extends earlier multivariate analyses using recent data that are not publicly accessible. Second, our research design differs from that used in earlier studies in two important respects. We incorporate client-specific planning materiality into our research design, which enables us to compute the relative magnitude of the audit adjustments. The two previous studies that analyze the magnitude of adjustments (Johnson 1987; Wallace and Kreutzfeldt 1991) use either revenue or total assets as a proxy for materiality rather than materiality itself. Furthermore, we analyze different subsets of audit adjustments, distinguishing between adjustments that *affect* profit or loss, *increase* profit or loss, and those that *decrease* profit or loss, in addition to the *number* of adjustments.

Our findings demonstrate that the number and magnitude of audit adjustments vary systematically with inherent and control risk factors as proposed by the ARM. In particular, the quality (i.e., integrity and competence) of a client's management and economic position (inherent risk factors), entity-level controls, internal audit function, and the overall strength of the internal control system (control risk factors) are significantly associated with the magnitude of audit adjustments. Our results are informative to audit standard setters in providing support for reliance on the ARM and assist audit firms in designing and structuring their audit approaches.

The remainder of the paper is organized as follows. The second section describes our research questions and the relationship among the ARM, materiality, and audit differences. After an overview of the previous literature, the third section describes our sample and research design. The fourth section discusses our findings and the limitations of the study. The fifth section summarizes our results and provides suggestions for further research.

RESEARCH QUESTION AND BACKGROUND

This paper addresses the following research question:

RQ: Do audit adjustments vary systematically with inherent and control risk factors?

This research question has implications for the empirical validity of parts of the ARM.

[2] Because the audit adjustments in our sample were detected in the audits of financial statements for the 2007/2008 season (see the "Sample and Research Design" section), the ISA valid in 2007 were formally applicable. In the following analysis, we indicate whether we refer to a specific version of the ISA 2007 or to the current ISA. We add references to the current ISA and the current clarified U.S. AICPA audit standards to assist the reader in reconciling the various requirements. We note that there are no differences between the 2007 and 2013 ISA, U.S. AICPA, and PCAOB standards that affect our findings. For a general comparison of ISA and U.S. audit standards, see, e.g., MARC (2009), Lindberg and Seifert (2011), and AICPA (2013).

The ARM is commonly defined as follows: *audit risk* (*AR*) = *the risk of material misstatements* (*RMM*) × *detection risk* (*DR*). The RMM is the risk that financial statements are misstated prior to audit. The RMM can be decomposed[3] into inherent risk × control risk. Inherent and control risk can be driven by various factors. The ARM suggests a positive relationship between misstatements[4] and various inherent and control risk factors.[5] The misstatement and the audit adjustment that the auditor proposes to correct the misstatement may be associated with an amount (measurement), classification, and/or note disclosure (Kinney 2000, 216).[6]

To provide reasonable assurance that financial statements are not materially misstated, auditors must document *every* misstatement,[7] provided that the deviation is "not clearly trivial" or "relatively small,"[8] because an immaterial misstatement can, together with other immaterial misstatements,[9] result in a *material* misstatement of financial statements.[10] Therefore, the auditor must consider the *total* audit adjustments (i.e., their aggregated magnitude) in relation to materiality.

The concept of materiality is inherent to the ARM and in all ARM components (RMM, DR, and AR). Auditors apply the concept of materiality when planning and performing an audit as well as at the end of the audit when they evaluate the effect of uncorrected adjustments.[11] When determining materiality, auditors must consider both qualitative[12] and quantitative[13] factors.

Only three prior studies conduct multivariate regression to analyze the relationship between different inherent and control risk factors and audit adjustments. These analyses are based on fairly old data.[14] A study by Johnson (1987) using data from the audits of 55 clients in the U.K. manufacturing industry finds that personnel problems, including competence, are associated with the relative magnitude of individual audit adjustments (calculated by dividing the absolute magnitude by revenue). Management incentives, such as bonus and budget issues, are associated with the magnitude and income direction of audit adjustments. Control risk factors are generally not associated with adjustments. Johnson (1987) obtains adjusted R^2 values of 0.18–0.34, depending on the type of misstatement.

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[3] Generally, an auditor is allowed to assess inherent and control risk on an aggregated (combined) basis (i.e., RMM). See ISA 200.A40 (2013); ISA 315.100 (2007); AICPA AU 200.A43 (2013); and PCAOB AS 8.6 (2013) in connection with PCAOB AS 12 (2013). However, in the case of significant risks, the auditor is *de facto* required to evaluate both risks individually. See ISA 315.27 (2013); ISA 315.113 (2007); AICPA AU 315.28 (2013); and PCAOB AS 8.7 (2013) in connection with PCAOB AS 12 (2013).

[4] A misstatement is defined as any deviation from the applicable financial reporting standards.

[5] See ISA 315.Appendix 1–2 (2013); ISA 315 (2007); AICPA AU 315.Appendix A, B (2013); and PCAOB AS 8.7 f. (2013) in connection with PCAOB AS 12 (2013) and PCAOB AS 13 (2013).

[6] Consistent with prior studies, we define an audit adjustment in a narrow sense, as relating to the balance sheet and/or income statement. This definition allows us to compare our results with previous findings.

[7] See ISA 450.8 (2013); AICPA AU 450.7 (2013); and PCAOB AS 14.15 (2013).

[8] ISA 320.6 (2007) refers to the "misstatement of relatively small amounts," whereas ISA 450.5, 450.A2 (2013), AICPA AU 450.5, 450.A2 (2013), and PCAOB AS 14.10 (2013) use the term "other than clearly trivial." Both terms have the same meaning.

[9] See ISA 320.6 (2007); ISA 450.4 f. (2013); AICPA AU-C 450.5 (2013); and PCAOB AS 14.10 ff. (2013).

[10] Therefore, the "not clearly trivial" threshold is substantially lower than the audit materiality threshold.

[11] See ISA 320 (2007); ISA 320 (2013); AICPA AU 320.2 (2013); and PCAOB AS 14.17 ff. (2013). For an overview of the materiality literature, see Messier, Martinov-Bennie, and Eilifsen (2005).

[12] See, e.g., ISA 450.A16 (2013); ISA Framework.47 (2007); ISA 320.5 (2007); AICPA AU 450.A23 (2013); and PCAOB AS 14.17 in connection with Appendix B2 (2013). Qualitative factors may cause the adjustments of quantitatively small amounts to be material (Libby and Kinney 2000; Ng and Tan 2007).

[13] According to the audit firm's audit approach and internal audit guidance, the *quantitative threshold* for materiality may not exceed 5 percent of the profit or loss from continuing activities. If this reference point is not suitable, then audit materiality may not exceed 0.5 percent of total assets or 0.5 percent of sales revenue.

[14] The two studies by Wallace and Kreutzfeldt use the same data gathered in 1983/1984 (see, Kreutzfeldt and Wallace 1986). The years in which the data were gathered are not identified in the work of Johnson (1987).

Wallace and Kreutzfeldt (1991, 504) analyze the association between various risk factors and the *absolute magnitude* of the audit adjustments. The only significant risk factors in their analysis are the *independence* of an existing internal audit department[15] and *total assets*. These researchers obtain an R^2 value of 0.46. In their follow-up study, Wallace and Kreutzfeldt (1995) analyze the relationship between different inherent and control risk factors and the *number* of audit adjustments. Their study draws on 260 clients/audits, obtaining (unadjusted) R^2 values of 0.34 and 0.40. Overall, the study confirms the relationship between risk factors and audit adjustments as proposed by the ARM.

SAMPLE AND RESEARCH DESIGN

Sample

Our sample was compiled by a Big 4 firm in Germany. To form a sample that was representative of the audit firm's client portfolio, the population of all clients under audit in 2007 was divided into a 3×3 matrix; one dimension accounted for client size (measured as the workload in hours required to conduct the audit: $<$ 200 hours; 200–1,000 hours; and $>$ 1,000 hours), and the other dimension considered the firm's industry sector (industrial markets, consumer markets, and information/communication/entertainment).[16] The audit client population (n = approximately 7,500 audits) in all sectors was assigned to the $3 \times 3 = 9$ clusters, and a random sample of 45 client firms from each cluster was drawn, resulting in a total sample of 405 (9 clusters $\times$ 45 client firms). The responses gathered in the second half of 2008 included 255 client-firms (a response rate of 63.0 percent), with a total of 1,148 adjustments. These adjustments comprise both corrected and uncorrected ("waived") adjustments. For 78 engagements, there are no adjustments, as no misstatements were detected. There is no evidence of nonresponse bias because there are valid reasons for nearly all cases of missing responses.[17]

The data were gathered using a questionnaire complemented by a summary-of-differences template for each audit engagement completed by the engagement team under the supervision of the engagement partner. We obtained anonymized data on each of the client firms drawn for the sample (questionnaire) and data on the adjustments, including the magnitude and effect of each adjustment on client income. In designing the questionnaire and the template, we worked closely with the audit firm to ensure that the questions were understandable, relevant, and suitable for the current study. In addition, we conducted a pretest.

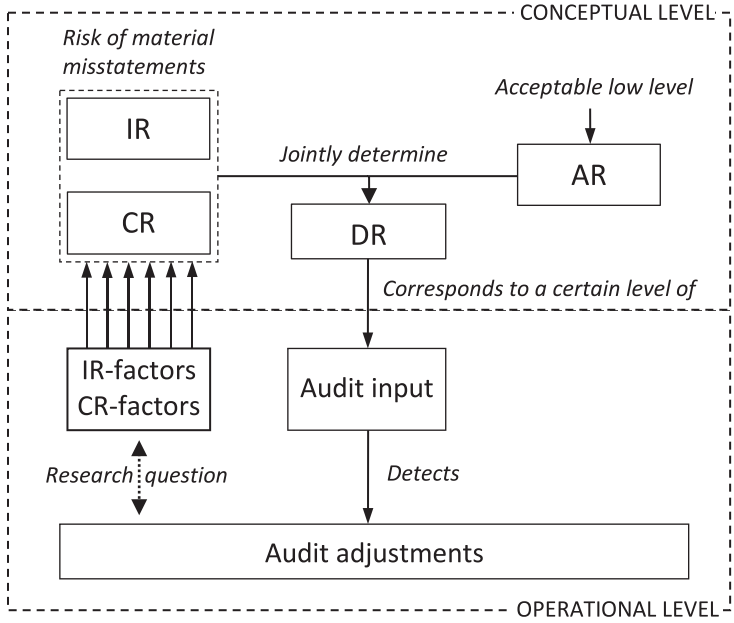
The sample comprises financial statement audits conducted in Germany. The financial statements were prepared in accordance with either German GAAP or International Financial

[15] Wallace and Kreutzfeldt (1991, 501) consider an internal audit department to be independent if it reports to an appropriate level of management (see, Wallace and Kreutzfeldt 1991, 497). The existence of an internal audit department that reports to top management may thus be a proxy for a good control environment, which may in turn be a proxy for control risk in general. However, Wallace and Kreutzfeldt do not find the effectiveness of an internal audit department to be associated with the average number of adjustments per engagement (see, Wallace and Kreutzfeldt 1991, 501, Table 4).

[16] The audit firm's overall audit client portfolio primarily consisted of clients in these three sectors. We omitted financial (banking) institutions and insurance institutions because these types of institutions constituted only a small fraction of the audit firm's client portfolio.

[17] The client no longer exists or is no longer subject to an audit (e.g., because of a change in size; see footnote 19); a noncalendar reporting period is used; the client is not an audit client (i.e., a review engagement); the engagement is not an audit of financial statements in accordance with German GAAP or IFRS (e.g., reconciliation from German GAAP to IFRS); or the template was not completed. However, the number of clients with a template that is not completed represents less than 5 percent of the client population drawn for the sample. Therefore, a nonresponse bias is unlikely.

FIGURE 1
Relationship between Inherent and Control Risk Factors and Audit Adjustments
Conceptual and Operational Level of Analysis



Reporting Standards (IFRS).[18] The majority of the client firms in our sample are required by German law to submit to an audit.[19] The participating audit firm's audit approach requires that the audits fully comply with ISA requirements. In addition to compliance with ISA, the audits are also conducted in accordance with German audit standards. We note that German audit standards do not differ from ISA in terms of how to audit financial statements.[20]

Research Design

We seek to analyze the relationship between inherent and control risk factors and audit adjustments. The ARM *proposes* positive associations between audit adjustments and these risk factors. The number and magnitude of adjustments should be higher in the presence of inherent and control risk factors, as shown in Figure 1.

[18] If the client is a listed company and is required to publish consolidated financial statements under the national law of the European Union member state, then consolidated financial statements must be prepared under IFRS according to EU law. The application of IFRS is voluntary for other companies. Few companies exercise this option. In our sample, the results include two nearly disjunct groups of financial statements: IFRS consolidated financial statements and separate German GAAP financial statements.

[19] For private companies, this requirement depends on size. A combination of thresholds must be met, including revenue, total assets, and the mean number of employees. An audit is mandatory for listed companies regardless of size.

[20] Both sets of standards are similarly detailed, and there are only minor differences. See Köhler, Marten, Quick, and Ruhnke (2007, 121).

Dependent Variables

Audit adjustments can be analyzed by number or by magnitude. Model 1 uses the number of audit adjustments as the dependent variable, consistent with prior research (Wallace and Kreutzfeldt 1991). Models 2–5 use the magnitude of adjustments, as well as different subsets, as the dependent variable (the total of income-affecting, income-increasing, and income-decreasing adjustments). However, the magnitude of an audit adjustment is not meaningful unless considered in relation to materiality. Therefore, we use the *relative magnitude* of the audit adjustment, which we compute by scaling the absolute magnitude by the client-specific planning materiality as determined by the auditor. Additionally, we aggregate adjustments per engagement to use the *total* adjustments rather than individual adjustments.

This research design differs substantially from previous studies. A study by Johnson (1987) scales the absolute magnitude of individual adjustments by client revenue. Wallace and Kreutzfeldt (1995) use the absolute magnitude of the individual adjustment as their dependent variable and include client size measured by total assets as an independent variable in their model to control for materiality. However, neither revenue nor total assets is a good proxy for materiality by itself. First, when used individually, both factors omit other important common points of reference for calculating quantitative materiality. Second, neither factor captures the qualitative aspects of materiality. In using the relative magnitude of the total of adjustments per engagements based on the engagement-specific materiality as the dependent variable, our model specification reflects the auditor's decision model. When evaluating detected misstatements (audit adjustments), auditors focus on client-specific materiality thresholds and, thus, on the magnitude *relative to the materiality* of the *total* adjustments. Additionally, this research design ensures that independent variables and their estimated parameters are meaningful on their own and can be interpreted without regard to client size.

Independent Variables

Based on the sample data, prior literature, and guidance in the audit standards, we select four inherent and four control risk factors at the engagement level. Table 1 explains the definition and measurement of all variables.

Inherent and control risk factors. The *QUALITY* (i.e., competence and integrity) of a client's management substantially influences inherent risk. According to auditing standards, deficiencies such as a client's lack of management competence may have a pervasive effect on financial statements,[21] a view shared by auditors (see the results of the study by Quick [1996, 319]). Researchers have consistently found the accounting competence of client management or personnel to be associated with audit adjustments (e.g., Hylas and Ashton 1982; Johnson 1987; Wright and Ashton 1989; Houghton and Fogarty 1991; Maletta and Wright 1996).

Another set of inherent risk factors is associated with the client's economic position. A weak economic position may exert pressure on the client's management, leading to aggressive or even fraudulent reporting.[22] To capture a client's economic position, we compute a modified *ALTMANZ* score[23] and include an indicator variable for *LOSS*.

[21] See ISA 315.103 (2007); ISA 315.A106 (2013); AICPA AU 315.A109 (2013); and PCAOB AS 14.22 (2013).

[22] See ISA 240.Appendix 1 (2007, 2013); ISA 315.35 (2007); AICPA AU 240.Appendix A (2013); and PCAOB AS 12.17 (2013).

[23] See Altman (1968). The score is computed as $Z = 0.033 \times \text{EBITD}/\textit{total assets} + 0.999 \times \textit{revenue}/\textit{total assets}$. We use two of the five ratios that are used in the original score and weight these as in the original. The three other ratios used in the original score are based on working capital, retained earnings, and market capitalization. We do not include these ratios because of a lack of data. Our sample includes listed and unlisted companies, and there is no market capitalization for the latter. Data on retained earnings and working capital were not gathered by the questionnaire.

TABLE 1

The Definition and Computation of the Independent Variables Used in the Multivariate Regression Analyses

Variables	Definition
Inherent Risk Factors	
QUALITY	The *QUALITY* of client management (integrity and competence): An ordinal variable with values 1–4 assigned based on the auditor's rating on a four-level scale ranging from "Very low" to "Very high."
ALTMANZ	A metric score computed as Z = 0.033 × EBITD/total assets + 0.999 × revenue/total assets (see also footnote No. 23).
LOSS	A binary indicator variable that is assigned a value of 1 if the client's net income is negative, and 0 otherwise.
REMUNERATION	A binary variable that is assigned a value of 1 if the client has established an accounting-based remuneration scheme, and 0 if the client has no such scheme.
Control Risk Factors	
ELC (Entity-Level Controls)	An ordinal variable with values of 1–4 assigned based on the auditor's rating on a four-level scale ranging from "Very weak" to "Very strong."
INTAUDIT (Internal Audit)	A binary variable that is assigned a value of 1 if the client has established an effective internal audit function, and 0 otherwise.
AUDCOMM (Audit Committee)	A binary variable that is assigned a value of 1 if the client has established an audit committee, and 0 otherwise.
ICS (Internal Control System)	An ordinal variable with values of 1–4 assigned based on the auditor's rating on a four-level scale ranging from "Very weak" to "Very strong."
Control Variables	
AUDIT INPUT	A categorical variable measuring audit effort in hours, classified into three levels (< 200 hours; 200–1,000 hours; and > 1,000 hours).
GAAP	A binary variable that is assigned a value of 0 if the client's financial statements under audit were prepared in accordance with German GAAP, and 1 if the financial statements under audit were prepared in accordance with IFRS.
INDUSTRY Sector	A categorical, client-specific variable that is assigned a value of 1 if the client's industry covers industrial markets (IM); 2 if it covers information, communication, and entertainment (ICE); and 3 if it covers consumer and retail markets (CM).
Client TENURE	A categorical, client-specific variable that is assigned a value 1 if the client has been audited by the participating audit firm for 1–2 years; 2 if the client has been audited for 3–5 years; and 3 if the client has been audited for 6 or more years.
LISTED	A categorical variable that is assigned a value of 1 if the client's equity instruments are publicly traded, and 0 otherwise.

A *REMUNERATION* scheme based on financial statement figures represents another inherent risk factor (Healy 1985; Degeorge, Patel, and Zeckhauser 1999).[24] Johnson (1987) finds that management motivations, such as management bonuses, are associated with both the magnitude and income direction of audit adjustments.

Empirical studies show that control risk factors appear to be related to the incidence of misstatements (Wallace and Kreutzfeldt 1995; Wright and Wright 1996; Eilifsen and Messier 2000, 19), whereas control risk factors appear to be related to audit procedures (applied by auditors) and to the detection of adjustments (Wright and Ashton 1989, 719). Control risk factors are associated with a client's internal control system, including both control activities *integrated* into the client's business processes (e.g., embedded audit software modules) and control activities *not integrated* into the client's business processes (i.e., operating alongside the client's business processes).

Because we focus on control risk with respect to the engagement level, the relevant control procedures are primarily those that are either conducted by the client's management (*ELC*, entity-level controls) or conducted on management's behalf (such as an internal audit), as far as the control activities integrated into the client's business processes are concerned. Suitable and effective control activities, such as entity-level controls, enable the client to prevent misstatements and thus decrease control risk. Particularly when implementing audit approaches, business risk is increasingly emphasized (a concept generally termed "business risk audit" [BRA]; see, e.g., Bell, Marrs, Solomon, and Thomas 1997; Bell, Peecher, and Solomon 2005). The logic of this approach supports the operation and evaluation of entity-level controls (e.g., Curtis and Turley 2007, 454).

INTAUDIT (internal audit) departments will both detect misstatements (Wallace and Kreutzfeldt 1991; Hansen 1997) and deter clients from engaging in fraud (Schneider and Wilner 1991; literature review by Gramling, Maletta, Schneider, and Church 2004).

In addition, we incorporate an overall assessment of the *ICS* (internal control system) by the auditor for two reasons. First, in addition to the factors mentioned above, this assessment also includes a multitude of other factors, such as control procedures. Second, not all components of an internal control system contribute equally to the overall strength of the internal control system. Rather, some of the components can be substitutes, whereas others are complements (see, Knechel and Willekens 2006). An effective control environment is an important component of an effective internal control system[25] and an audit committee (*AUDCOMM*) is an important part of the control environment (Bédard, Chtourou, and Courteau 2004).

Control variables. *AUDIT INPUT* controls for detection risk (DR). There are two determinants of detected misstatements (leading to audit adjustments). First, if inherent and/or control risk is high, then financial statements will *contain* more misstatements. Assuming constant audit input, the auditor will detect more misstatements. Second, in responding to a higher inherent and/or control risk, the auditor will increase audit input (decrease DR) to reduce AR to an acceptably low level. The auditor is likely to detect more misstatements (more adjustments) as a result of this increased audit input (Bell, Knechel, Payne, and Willingham 1998, 31; Eilifsen and Messier 2000, 34). However, *AUDIT INPUT* is also a function of client size. Two clients with identical DR, but of different sizes, will require different levels of audit effort. It is therefore necessary to control for any size-induced effects on audit effort. However, using the relative

[24] See ISA 240.Appendix 1 (2007, 2013); ISA 240.4 (2013); ISA 315.A40, .A72 (2013); AICPA AU 240.Appendix A (2013); AU 240.4 (2013); AICPA AU 315.A40, .A74 (2013); PCAOB AS 12.17 (2013).

[25] See ISA 315.43(a), .67 (2007); ISA 315.14(b) (2013); AICPA AU 315.15(b) (2013); and PCAOB AS 5.25 (2013).

magnitude of adjustments effectively also acts as a control for client size because relative magnitude is calculated based on client-specific materiality at the engagement level, and materiality will correspond to the client's size.

The two reporting regimes (IFRS and German GAAP) differ in a number of ways, such as the level of detail or measurement concepts. Thus, the different properties of accounting standards (*GAAP*) could influence the number and magnitude of audit adjustments. Prior literature suggests that the susceptibility of financial statements to (material) misstatements (see, e.g., Eilifsen and Messier 2000, 32) and the magnitude of adjustments may vary across *INDUSTRY Sector*s (Bell and Knechel 1994; Maletta and Wright 1996).

Another factor that may influence the detection of misstatements is *Client TENURE*. Evidence of a potential association between client tenure and audit quality is mixed (see the overviews by Pott, Mock, and Watrin [2009] and Lin and Hwang [2010]). Assuming that longer client tenure increases an auditor's ability to assess a client's inherent and control risk, one could conjecture that longer client tenure is associated with the detection of more misstatements (more adjustments), based on the assumption of constant overall audit effort. A fourth potential factor is whether a client is a *LISTED* company.

Multivariate Regression Analysis

We conduct a multivariate regression to analyze the relationship between inherent and control risk factors and detected audit adjustments. The regression specification error test (RESET) according to Ramsey (1969) suggests that the assumption of a linear relationship between the independent and dependent variables is not valid. To compensate for the lack of linearity, we use a generalized linear model (GLM) and specify a quasi-Poisson distribution for the dependent variable with a log-link function. This distribution also ensures that the predicted values can only be positive because the dependent variables in our various models can take only positive values. Because the residuals in such a generalized linear model are not homoscedastic, we compute Huber-White-adjusted Wald Chi-square standard errors that compensate for the lack of homoscedasticity (a common method to address this type of issue within generalized linear models). Using a log-link function within a GLM is similar to the exponential transformation that prior studies have used (see Kreutzfeldt and Wallace [1990, 6] for possible transformations).

To detect potential multicollinearity between the independent variables, we also compute variance inflation factors (VIFs; see Table 4, Panel B). These factors for the control risk variables do not exceed three and are thus well below the thresholds commonly perceived as associated with serious multicollinearity (Neter, Wasserman, and Kutner 1990, 409; Menard 1995, 66; Hocking 1996, 274 f.).[26]

[26] We also compute Pearson correlation coefficients. Three coefficients exceed 0.50. As expected, the correlation between entity-level controls (*ELC*) as an important component of the internal control system and the overall rating of the internal control system (*ICS*) is high (0.79). The correlation between *QUALITY* and *ICS* is medium-high (0.50). In addition, there is a medium-high correlation between *AUDCOMM* and the client being a *LISTED* company (0.57). This result reflects that the legal requirement in Germany to establish an audit committee applies only to listed companies. None of the other correlation coefficients exceeds 0.50. The correlation table is available as a downloadable file, please see Appendix A.

TABLE 2

Engagement Characteristics
(values in €'000)

	Minimum	25 Percent Quantile	Mean	Median	75 Percent Quantile	Maximum	Standard Deviation
Total assets	977	21,128	1,094,299	76,269	469,563	38,074,000	3,725,463
Current debt[a]	−97	6,951	362,099	26,926	139,687	15,886,000	1,327,589
Revenue[b]	0	19,130	924,926	93,652	485,166	51,723,000	3,800,845
EBITD[c]	−131,168	1,322	152,056	6,992	55,136	6,186,978	563,228
Profit or loss	−468,000	70	73,191	2,935	23,645	2,953,094	298,071

[a] Debt with a remaining maturity of one year or less.
[b] German GAAP define revenue as the gross inflow of economic benefits during the period arising from providing goods or services in the ordinary course of business. A financial holding company will thus not report any revenue under German GAAP because the company does not provide any goods or services on its own. Rather, the company will report proceeds from its subsidiaries as financial income. In our sample, this definition affects only the German GAAP clients and only 14 among those clients. If those 14 clients are eliminated, then the minimum revenue in the sample is €117,000.
[c] Earnings before interest, taxes, and the depreciation of noncurrent assets.

We estimate the following models:

$$
\begin{aligned}
Y = {} & \\
& \left.\begin{aligned} & \beta_1 \cdot QUALITY + \beta_2 \cdot ALTMANZ + \\ & \beta_3 \cdot LOSS + \beta_4 \cdot REMUNERATION + \end{aligned}\right\} \text{Inherent risk factors} \\
& \left.\begin{aligned} & \beta_5 \cdot ELC + \beta_6 \cdot + INTAUDIT \\ & \beta_7 \cdot AUDCOMM + \beta_8 \cdot ICS \end{aligned}\right\} \text{Control risk factors} \\
& \left.\begin{aligned} & \beta_9 \cdot AUDIT\ INPUT + \\ & \beta_{10} \cdot GAAP + \beta_{11} \cdot INDUSTRY\ Sector \\ & \beta_{12} \cdot Client\ TENURE + \beta_{13} \cdot LISTED \end{aligned}\right\} \text{Control variables} \\
& \left.\begin{aligned} & \varepsilon \end{aligned}\right\} \text{error term}
\end{aligned}
$$

where the dependent variable (Y) varies between the models:

- the number of adjustments (Model 1);
- the relative magnitude of the total of all adjustments (Model 2);
- the relative magnitude of the total of all income-affecting adjustments (Model 3);
- the relative magnitude of the total of all income-increasing adjustments (Model 4); and
- the relative magnitude of the total of all income-decreasing adjustments (Model 5).

Note that our sample includes engagements with zero audit adjustments. We also include these engagements in our analysis. Engagements with low inherent and control risks may be associated with no adjustments (Model 1), which would correspond to a zero magnitude in Models 2–5.

FINDINGS

Descriptive Statistics

Table 2 contains general information on the client firms included in our sample. Our sample is skewed toward medium-sized and smaller companies. This skewness reflects the distribution of companies in Germany, which has few very large companies within a large population of

companies. The average short-term debt leverage ratio is approximately 35 percent, which is consistent with the strong reliance that German companies have on bank loans for their financing. Table 3 presents information on the audit adjustments (number and relative magnitude), subclassified by inherent and control risk factors (Panel A) and control variables (Panel B).

In general, both the number and magnitude of total audit adjustments per engagement vary systematically as proposed by the ARM. The mean number and mean magnitude of the audit adjustments are higher in the presence of inherent and control risk factors. Notably, in our sample, the auditor has determined audit materiality at a lower threshold than the common (quantitative) materiality thresholds mentioned previously (i.e., the minimum of 5 percent of profit or loss, 0.5 percent of total assets, and 0.5 percent of sales revenue; untabulated) for 42 companies. This approach appears to be plausible, considering that both qualitative and quantitative factors may lead to a lower materiality threshold. The audit adjustments are an average of 2.4 times greater than materiality (untabulated). These proportions are consistent with the findings of similar studies.[27]

Multivariate Analysis

Table 4 depicts the results of the multivariate analysis in all five models. The parameter estimates for the independent variables explain the change in the dependent variable if the inherent or control risk factor is present (for binary independent variables) or if the inherent or control risk factors decrease by one level (for independent variables measured on a four-level scale). Therefore, the ARM would suggest a decrease in the number and magnitude of adjustments (negative parameter estimate) if the *QUALITY* of the client's management is higher or if the *ICS* (inherent control system) and its components (*ELC, INTAUDIT, AUDCOMM*) are stronger. Conversely, an increase in the number and magnitude of adjustments (positive parameter estimate) is expected in the presence of a *REMUNERATION* system based on financial statements figures or a *LOSS*. A higher audit input should also be associated with an increase in the number and magnitude of adjustments (positive parameter estimate).

The fit for Model 1 (the number of adjustments) and Model 2 (the relative magnitude of all adjustments) is $R^2 = 0.23/0.23$ (adj. $R^2 = 0.18/0.19$). Models 3–5, which focus on income-affecting adjustments, yield model fits ranging from 0.38 to 0.52 (R^2) (adj. $R^2 = 0.34$ to 0.49). These results are comparable with previous U.S.-based studies that use selection routines to eliminate insignificant variables from regression models and with the model fits obtained in the U.K.-based study by Johnson (1987).

Inherent and Control Risk Factors

We find only some inherent risk factors to have an impact on audit adjustments. If the integrity and competence of the client's management (*QUALITY*) is higher and if the client's economic position is stronger (higher *ALTMANZ* scores), then the magnitude of adjustments is lower. The respective parameter estimates have negative signs across all five models. *QUALITY* is significant in Models 2, 3, and 5. *ALTMANZ* is significant in Models 1, 3, and 5. These findings are consistent with prior literature (see, e.g., Kreutzfeldt and Wallace 1986, 38; Wallace and Kreutzfeldt 1995). Model 5 shows that the magnitude of income-decreasing adjustments is lower for clients in a stronger economic position (as evidenced by a higher *ALTMANZ* score). A possible explanation for this finding is that management is less likely to engage in aggressive profit-increasing earnings management, which would result in income-decreasing adjustments of lower magnitude. However,

[27] For example, based on their analysis of nine empirical studies, Kinney and Martin (1994) conclude that audit adjustments are two to eight times greater than the materiality threshold.

TABLE 3

Sample Characteristics and Descriptive Statistics

Panel A: Audit Adjustments, Subclassified by Inherent and Control Risk Factors (Independent Variables)

Variable		Number of Audits (n)	Number of Adjustments (Mean)	Relative Magnitude of Total of Adjustments per Engagement, Mean			
				All Adjustments[a]	Income-Affecting Adjustments Only[b]		
					Sum	Income-Increasing	Income-Decreasing
All clients/audits		255	4.50	8.47	5.02	1.92	3.10
Inherent Risk Factors							
QUALITY	Very low	0	—	—	—	—	—
	Low	8	10.63	45.43	44.46	11.69	32.77
	High	100	5.73	12.63	6.23	2.21	4.02
	Very high	147	3.33	3.62	2.05	1.19	0.86
ALTMANZ	< 1	94	3.98	6.98	4.51	2.47	2.04
	1–2	80	5.54	7.50	4.45	1.58	2.86
	2–3	50	4.34	15.08	7.33	1.37	5.95
	≥ 3	31	3.68	4.77	4.33	1.99	2.34
LOSS	Yes	55	5.87	11.36	6.98	2.07	4.91
	No	200	4.13	7.67	4.48	1.87	2.62
REMUNERATION SCHEME	Yes	96	4.96	6.81	5.44	1.18	4.15
	No	159	4.23	9.46	4.83	2.36	2.47
Control Risk Factors							
ELC	Very weak	0	—	—	—	—	—
	Weak	33	10.58	33.76	23.09	8.86	14.23
	Strong	144	3.90	6.24	2.99	1.07	1.92
	Very strong	78	3.04	1.87	1.12	0.54	0.58
INTAUDIT	Yes	126	3.63	2.64	2.39	0.80	1.58
	No	129	5.35	14.16	7.59	3.00	4.59
AUDCOMM	Yes	46	3.52	1.89	1.53	0.66	0.87
	No	209	4.72	9.91	5.79	2.19	3.59
ICS	Very weak	1	22.00	18.37	18.39	11.17	7.22
	Weak	31	10.29	24.46	16.80	5.53	11.27
	Strong	134	4.33	9.15	4.81	1.94	2.88
	Very strong	89	2.55	1.76	1.08	0.52	0.55

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we have no way to infer whether the income-increasing misstatements underlying these adjustments are intentional. The multivariate analysis does not support an effect of a *REMUNERATION* scheme or a *LOSS* on audit adjustments.

We find stronger associations between the audit adjustments and control risk factors. The parameter estimates for entity-level controls (*ELC*) and an internal audit department (*INTAUDIT*) have a negative sign across all models, suggesting that both internal control system components are

TABLE 3 (continued)

Panel B: Sample Characteristics and Descriptive Statistics: Audit Adjustments, Subclassified by Control Variables

				Relative magnitude of Total of Adjustments per Engagement, Mean			
					Income-Affecting Adjustments Only[b]		
Control Variable		Number of Audits (n)	Number of Adjustments Mean	All Adjustments[a]	Sum	Income-Increasing	Income-Decreasing
AUDIT INPUT	< 200 hours	67	2.04	3.46	1.74	0.79	0.95
	200–1000 hours	119	5.46	11.24	7.09	2.91	4.17
	> 1,000 hours	69	5.23	8.54	4.63	1.29	3.35
GAAP	IFRS	30	3.47	5.16	5.12	0.75	4.38
	German GAAP	225	4.64	8.91	5.01	2.07	2.93
INDUSTRY	Industrial markets	120	4.93	7.08	3.43	1.70	1.73
Sector	Information, communication, entertainment	64	4.56	10.70	7.62	2.58	5.04
	Consumer markets	71	3.73	8.80	5.35	1.69	3.66
Client	1–2 years	17	4.12	6.62	6.46	3.06	3.41
TENURE	3–5 years	86	4.59	5.05	2.76	1.22	1.54
	≥ 6 years	152	4.49	10.61	6.14	2.19	3.95
LISTED	Yes	36	5.22	8.88	7.87	1.56	6.31
	No	219	4.38	8.40	4.55	1.98	2.57

[a] For each client, we sum the absolute magnitude of all detected adjustments and divide the sum by the client-specific planning materiality. The results for the individual clients are then summed and divided by the number of clients.

[b] The "Sum" column is calculated as follows: for each client, the absolute magnitude of income-affecting adjustments is summed, and the resulting amount is divided by the client-specific planning materiality. The results for the individual clients are then summed and divided by the number of clients. The "Income-Increasing" (only the income-increasing adjustments are summed) and "Income-Decreasing" (only the income-decreasing adjustments are summed) Columns are calculated in the same manner.

Table 1 provides variable definitions.

associated with fewer adjustments and adjustments of a lower magnitude. *ELC* is highly significant in all models that analyze the magnitude of adjustments (Models 2–5), while *INTAUDIT* is significant in Models 2 and 4. Our findings related to entity-level controls (*ELC*) suggest that an assessment of the entity-level controls may also serve as a suitable proxy for assessing the overall internal control system. In addition, the findings can be interpreted as supporting the BRA approach, which places greater emphasis on controls at levels in the management hierarchy that are above operational level.[28] However, empirical evidence suggests that it may be difficult to obtain appropriate audit evidence on the effectiveness of entity-level controls (see, Curtis and Turley 2007, 454). References to such controls in current audit standards are only rudimentary,[29] and auditors are

[28] In the context of a BRA approach, see, e.g., Winograd, Gerson, and Berlin (2000, 178), and Curtis and Turley (2007, 454). For empirical findings suggesting a negative correlation between effective entity-level controls and audit adjustments, see, e.g., Kreutzfeldt and Wallace (1986, 39).

[29] See, e.g., ISA 315.A98 (2013), Appendix 1.10 (2013); AICPA AU 315.A102, Appendix B, the *Monitoring of Controls* (2013).

TABLE 4

Multivariate Analysis
(n = 255)

Panel A: Multivariate Analysis Models 1–3

		Dependent Variable								
		Number of Adjustments			Relative Magnitude of Total of Adjustments per Engagement					
					All Adjustments			Income-Affecting Adjustments		
		Model 1			Model 2			Model 3		
Independent Variable	Expected Sign	Parameter Estimate	Wald (Huber-White) χ^2	p-value	Parameter Estimate	Wald (Huber-White) χ^2	p-value	Parameter Estimate	Wald (Huber-White) χ^2	p-value
R^2 (Adj. R^2)		0.23	(0.18)		0.23	(0.19)		0.43	(0.40)	
Intercept		2.33	2.94	0.003	5.83	5.96	0.000	6.98	9.11	0.000
Inherent Risk Factors										
QUALITY	−	−0.03	−0.17	0.868	−0.87**	−2.18	0.029	−0.96***	−2.79	0.005
ALTMANZ		−0.01*	−1.68	0.093	−0.02	−1.29	0.197	−0.03**	−2.35	0.019
LOSS	+	0.08	0.44	0.661	−0.27	−0.77	0.440	−0.42	−1.31	0.189
REMUNERATION		0.21	1.21	0.225	−0.06	−0.16	0.873	0.21	0.69	0.490
Control Risk Factors										
ELC	−	−0.20	−1.10	0.272	−1.36***	−2.56	0.010	−1.62***	−3.65	0.000
INTAUDIT		−0.21	−1.25	0.212	−1.31***	−3.02	0.003	−0.53	−1.23	0.219
AUDCOMM		−0.45*	−1.82	0.068	−0.65	−1.09	0.277	−0.75	−1.08	0.280
ICS		−0.52***	−3.14	0.002	0.46	1.17	0.243	0.39	1.04	0.298
Control Variables										
AUDIT INPUT	+	0.61***	5.83	0.000	0.77**	1.96	0.050	0.73**	2.35	0.019
GAAP		−0.66*	−1.69	0.091	−0.74	−1.24	0.217	−0.28	−0.55	0.585
INDUSTRY Sector	CM vs. IM	0.38	1.61	0.109	0.01	0.01	0.993	−0.28	−0.54	0.591
	CM vs. ICE	0.08	0.31	0.754	0.24	0.40	0.688	0.28	0.53	0.596
	ICE vs. IM	0.31	1.60	0.110	−0.23	−0.60	0.550	−0.56	−1.54	0.123

(continued on next page)

TABLE 4 (continued)

		Dependent Variable								
					Relative Magnitude of Total of Adjustments per Engagement					
		Number of Adjustments			All Adjustments			Income-Affecting Adjustments		
		Model 1			Model 2			Model 3		
Independent Variable	Expected Sign	Parameter Estimate	Wald (Huber-White) χ^2	Wald (Huber-White) p-value	Parameter Estimate	Wald (Huber-White) χ^2	Wald (Huber-White) p-value	Parameter Estimate	Wald (Huber-White) χ^2	Wald (Huber-White) p-value
Client TENURE	1–2 vs. ≥ 6 yrs	0.14	0.41	0.678	1.06	1.56	0.119	0.36	0.71	0.481
	1–2 vs. 3–5 yrs.	0.18	0.58	0.560	0.14	0.28	0.778	−0.38	−0.88	0.379
	3–5 vs. ≥ 6 yrs.	−0.05	−0.24	0.808	0.48*	1.91	0.056	0.74**	2.00	0.045
LISTED		0.22	0.69	0.491	−0.55	−1.43	0.152	−0.34	−1.00	0.319

Panel B: Multivariate Analysis Models 4–5

		Dependent Variable						
		Relative Magnitude of Total of Adjustments per Engagement						
		Income-Increasing			Income-Decreasing			
		Model 4			Model 5			
Independent Variable	Expected Sign	Parameter Estimate	Wald (Huber-White) χ^2	Wald (Huber-White) p-value	Parameter Estimate	Wald (Huber-White) χ^2	Wald (Huber-White) p-value	VIF
R^2 (Adj. R^2)		0.38	(0.34)		0.52	(0.49)		
Intercept		6.27	5.05	0.000	6.29	9.50	0.000	
Inherent Risk Factors								
QUALITY	–	−0.55	−1.48	0.140	−1.32***	−4.32	0.000	1.522
ALTMANZ		−0.04	−0.70	0.486	−0.03**	−2.38	0.017	1.118

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TABLE 4 (continued)

		Dependent Variable						
		Relative Magnitude of Total of Adjustments per Engagement						
		Income-Increasing			Income-Decreasing			
		Model 4			Model 5			
Independent Variable	Expected Sign	Parameter Estimate	Wald (Huber-White) χ^2	Wald (Huber-White) p-value	Parameter Estimate	Wald (Huber-White) χ^2	Wald (Huber-White) p-value	VIF
LOSS	+	−0.61	−1.29	0.197	−0.34	−1.08	0.282	1.153
REMUNERATION		−0.41	−1.43	0.152	0.55	1.59	0.111	1.231
Control Risk Factors								
ELC	−	−1.86***	−3.72	0.000	−1.49***	−3.45	0.001	2.828
INTAUDIT		−0.73**	−1.90	0.057	−0.41	−0.81	0.417	1.270
AUDCOMM		0.14	0.25	0.780	−1.22	−1.53	0.127	2.070
ICS		0.34	0.88	0.382	0.45	1.17	0.240	2.954
Control Variables								
AUDIT INPUT	+	0.42	1.40	0.161	0.97***	2.78	0.006	1.371
GAAP		−1.06**	−2.10	0.036	−0.04	−0.08	0.935	1.300
INDUSTRY Sector	CM vs. IM	0.40	0.79	0.432	−0.76	−1.34	0.180	1.076
	CM vs. ICE	0.78	1.38	0.170	−0.04	−0.07	0.941	
	ICE vs. IM	−0.38	−0.77	0.443	−0.73**	−2.03	0.043	
Client TENURE	1–2 vs. ≥ 6 yrs	0.11	0.21	0.832	0.65	1.10	0.271	1.062
	1–2 vs. 3–5 yrs.	−0.53	−0.96	0.340	−0.10	−0.21	0.830	
	3–5 vs. ≥ 6 yrs.	0.64	1.43	0.154	0.75**	2.10	0.036	
LISTED		−0.69	−1.55	0.122	−0.25	−0.74	0.461	1.750

*, **, *** Significant at the 10 percent, 5 percent, and 1 percent levels, respectively.
Table 1 provides variable definitions.

not explicitly required to consider these controls.[30] Because of the importance of these controls, it may be useful for audit standards to explicitly require auditors to identify, assess, and consider entity-level controls. It may therefore be helpful if the International Auditing and Assurance Standards Board (IAASB) resumes the related discussion.[31]

The other factors are significant only in certain models (*AUDCOMM* and overall *ICS* strength in Model 1). Consistent with the relationship proposed by the ARM, the parameter estimate for *AUDCOMM* is negative in Models 1–3, and 5. Similar evidence on an audit committee is provided by Ng and Tan (2003). The German context may explain why we find no stronger association between an audit committee and audit adjustments. Within the two-tier board system commonly found in Germany and other European countries, the supervisory board is distinct from the management board. The supervisory board is legally charged with the task of supervising management, including management's financial reporting. The supervisory board may delegate preliminary work to an audit committee that is formally only a supervisory board subcommittee. Therefore, in this setting, an audit committee may have no incremental effect on the control environment.

ICS is only significant and has a negative parameter estimate in Model 1. This finding is consistent with the ARM. However, *ICS* is insignificant in Models 2–5. One explanation would be that the internal control system is designed primarily to detect and prevent misstatements in the processing of large quantities of routine transactions and events. Therefore, a strong internal control system reduces the number of misstatements, but does not necessarily reduce their total magnitude. On the other hand, entity-level controls focus on nonroutine (singular) transactions and events, which generally are of a higher magnitude. For this reason, strong entity-level controls should be effective in reducing the magnitude of misstatements, but not necessarily their number. Indeed, we find *ELC* to be highly significant in Models 2–5 (which use the relative magnitude of adjustments as the dependent variable), but not in Model 1.

Control Variables

As expected, we find audit adjustments to be positively associated with audit input. The parameter estimates for *AUDIT INPUT* are significant in all models except Model 4. Another significant control variable is *Client TENURE* (Models 3 and 5). One potential explanation for the positive parameter estimate is that the auditor's ability to detect adjustments is greater for companies that have been audit clients for a longer period of time (in our analysis, $\geq$ 6 years). This explanation would be consistent with evidence from the audit quality literature suggesting that an auditor's ability to detect adjustments (and, thus, any material misstatements of the financial statements) is lower in the *initial years* of an engagement but then *increases* for a certain period of time.[32] The audit quality literature attributes this association primarily to the auditor's specific knowledge of the client that is gained over time and that increases audit quality. However, because

[30] Conversely, PCAOB AS 5 (2013) emphasizes entity-level controls. See, in particular, 8 f., A1-12. However, this audit standard concerns integrated audits (required by the Sarbanes-Oxley Act of 2002), in which the auditor provides an opinion on the financial statements and on the effectiveness of the internal control of financial reporting.

[31] When revising the ISA toward BRA, entity-level controls were the subject of controversy. "Some members of the task force [the Joint Working Group task force] believed that it was highly possible and feasible to identify these high-level and supervisory controls and be able to rely on them, while others felt that, while they were useful in so far as the internal control environment was concerned, that depending on what you wanted to audit, what assertion, that some of these controls would not be sensitive enough to pick errors, should errors occur and that they had limited use" (Curtis and Turley 2005, 15). The debate eventually led to the result "that the new standards make no reference to high-level controls at all" (Curtis and Turley 2005, 15).

[32] Prior evidence suggests that audit quality is lower in the initial years of an auditor-client relationship. See, e.g., Vanstraelen (2000), George (2004), and Davis, Soo, and Trompeter (2009).

our design is not suited to measuring auditors' ability to *detect* misstatements, we cannot eliminate the possibility that the financial statements of clients with long auditor tenure actually *contain* more misstatements.

Additional Analyses

We examine significant differences between income-increasing and income-decreasing adjustments by conducting paired t-tests (untabulated). For clients with a *REMUNERATION* scheme, the mean relative magnitude of income-decreasing adjustments (4.15, see Table 3, Panel A) is significantly ($p = 0.06$) higher than that of income-increasing adjustments (1.18, see Table 3, Panel A). A possible explanation would be that clients with a *REMUNERATION* scheme engage more in income-increasing earnings management and manipulation (for a similar finding, see Johnson 1987, 58). However, we have no basis to infer whether these misstatements are intentional.

Our sample of 255 audit engagements contains 78 engagements in which the auditor did not detect any misstatements. We conduct a MANOVA to examine whether the group of 78 engagements without any adjustments differs from the group of 177 engagements with at least one adjustment. Table 5 presents the results.

These groups of engagements are significantly different from one another in the global test. In addition, the means of the inherent and control risk factors vary consistently with the relationship proposed by the ARM in that engagements without adjustments have lower inherent and control risk factors. Particularly, engagements without adjustments are associated with significantly higher management *QUALITY*. The *ELC* and the *ICS* are significantly stronger, whereas *AUDIT INPUT* is significantly lower. These findings are consistent with our main analysis.

CONCLUSION

This study analyzes the relationship between inherent and control risk factors and detected audit adjustments. Our analysis is based on a recent large sample of 1,148 audit adjustments detected in the financial statement audits of 255 firms conducted in 2007 by a Big 4 audit firm in Germany.

We perform a series of multivariate regression analyses using the following dependent variables: the number of adjustments, the relative magnitude of all adjustments, income-affecting (offset) adjustments, income-increasing adjustments, and income-decreasing adjustments. In contrast to other studies, we scale the absolute magnitude of the audit adjustments by client-specific planning materiality to test the effect on the magnitude of the adjustments. Income-affecting adjustments can be explained particularly well, and we obtain coefficients of determination up to 0.52/0.49 (R^2/adj. R^2). Specifically, we find that the quality (integrity and competence) of a client's management and client financial position (inherent risk factors), in addition to entity-level controls and the overall strength of the internal control system (control risk factors), have a significant effect on the magnitude of the adjustments.

Our findings contribute to the literature by providing new evidence regarding the relationship between inherent and control risk factors and audit adjustments using data that are not publicly available. Because this relationship also underlies the ARM, our findings provide support for certain aspects of the ARM. Our results suggest that auditing standard setters should consider developing additional guidance on the effectiveness of an internal audit department (see, e.g., Krishnamoorthy 2002) and on whether using the opinions reached in a client's internal audit (beyond the guidance included in current ISA 610 and AICPA AU 610) is appropriate. Additionally, our findings suggest that standard setters should consider establishing an explicit requirement for auditors to identify, assess, and evaluate entity-level controls.

TABLE 5

MANOVA Comparing the Means of IR and CR Factors and Audit Input of: (1) Engagements with No Adjustments (n = 78); and (2) Engagements with One or More Adjustments (n = 177)

Hypothesis/ Variable	Engagements with No Adjustments (n = 78) Mean	Expected Sign	Engagements with One or More Adjustments (n = 177) Mean	F-value	p-value
Inherent Risk Factors					
QUALITY	3.76***	>	3.45***	17.11	0.000
ALTMANZ	1.84	>	1.64	0.69	0.408
LOSS	0.17	<	0.23	1.37	0.244
REMUNERATION	0.32	<	0.40	1.50	0.222
Control Risk Factors					
ELC	3.40***	>	3.08***	14.23	0.000
INTAUDIT	0.47	>	0.50	0.17	0.677
AUDCOMM	0.21	>	0.17	0.46	0.497
ICS	3.49***	>	3.10***	19.64	0.000
Control Variables					
AUDIT INPUT	1.77***		2.11***	12.49	0.001
GAAP	0.15		0.10	1.42	0.235
INDUSTRY Sector	1.73		1.84	0.93	0.335
Client TENURE	1.46		1.48	0.02	0.877
LISTED	0.14		0.14	0.00	0.996
	Global test				
	Wilks' Lambda test statistic's value			0.81	
	F-Value			4.31	
	p-level			0.000	

*, **, *** Significant at the 10 percent, 5 percent, and 1 percent levels, respectively.
Table 1 provides variable definitions.

The results should be interpreted in the light of their *limitations*. There may be additional factors associated with audit adjustments. Misstatements may remain undetected, in particular, if those factors are unknown or are not well interpreted. We cannot measure the auditor's ability to detect audit adjustments, and the adjustments detected may not be representative of the overall adjustments contained in the financial statements (Caster, Massey, and Wright 2000, 64; Messier, Eilifsen, and Austen 2004, 226). We do not measure audit risk, but rather assume that the auditor responds to identified risk factors to reduce AR to an acceptable low level. We do not explicitly include fraud risk factors in our analysis as independent variables, although all of our inherent risk factors are closely related to fraud.

Other limitations apply to the measurement of certain variables. Auditors rate certain factors themselves, thus giving rise to potential measurement errors. For some factors (such as audit input) with a continuous nature, using categorical variables may oversimplify. Three of the independent variables are measured on a four-level ordinal scale that we treat as metric in the multivariate

analysis, implying that the ordinal scale is equidistant. Finally, we examine data from only one Big 4 audit firm in Germany. However, we believe that our results are generalizable to other Big 4 audits in other jurisdictions (Ballou, Earley, and Rich 2004, 83; Knechel 2007, 393). However, corroborating research involving non-Big 4 audit firms is needed, as the audit approaches of smaller audit firms are somewhat different (see, Blokdijk, Drieenhuizen, Simunic, and Stein 2006).

Our study reveals a number of opportunities for *future research,* specifically time-series evidence, an analysis of adjustments at account or transaction-cycle levels, or the effect of changes in the audit environment (such as changes associated with materiality considerations, ISA 320; AICPA AU 320). Additionally, cultural factors (see, e.g., Chan, Lin, and Mo 2003), the composition of the engagement team, and the audit team's experience with a client's sector (see, e.g., Bédard and Wright 1994; Owhoso, Messier, and Lynch 2002; Hammersley 2006) may affect an auditor's ability to detect misstatements and, therefore, to audit adjustments.

The finding of an association between audit adjustments and inherent and control risk factors as proposed by the ARM suggests that the auditor did apply the ARM and conducted its audits accordingly. However, existing empirical evidence is not fully conclusive regarding whether auditors respond to inherent and control risk factors by adjusting audit plans (Mock and Wright 1999; Fukukawa, Mock, and Wright 2006, 2011). It may thus be worthwhile to produce corroborating evidence on the extent to which auditors respond to risk factors by adjusting audit plans and to examine whether these adjustments are effective in detecting misstatements.

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APPENDIX A

Pearson Correlation Coefficients (n = 255)

Appendix A_Correlation Table: http://dx.doi.org/10.2308/ajpt-50784.s1