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Finding determinants of audit delay by pooled OLS regression analysis

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Abstract. The aim of this paper is to investigate determinants of audit delay. Audit delay is measured as the length of time (i.e. the number of calendar days) from the fiscal year-end to the audit report date. It is important to understand factors that influence audit delay since it directly affects the timeliness of financial reporting. The research is conducted on a sample of Croatian listed companies, covering the period of four years (from 2008 to 2011). We use pooled OLS regression analysis, modelling audit delay as a function of the following explanatory variables: audit firm type, audit opinion, profitability, leverage, inventory and receivables to total assets, absolute value of total accruals, company size and audit committee existence. Our results indicate that audit committee existence, profitability and leverage are statistically significant determinants of audit delay in Croatia.

Key words: audit delay, timeliness of corporate reporting, listed companies

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1. Introduction

Timeliness is an important characteristic of accounting information, since timely reporting provides more decision-useful information. Timeliness enhances both relevant and faithfully represented information, and is therefore an enhancing qualitative characteristic [13]. Audit delay can affect the timeliness of accounting information releases [1]. Moreover, it is considered to be the single most important determinant of the timeliness of the earnings announcement [12]. The audit report date is the date on which the auditor has obtained sufficient appropriate audit evidence to support the opinion, including evidence that all financial statements have been prepared and that the management have asserted that they have taken responsibility for those financial statements.

The timeliness of financial reporting is especially important for well functioning of capital markets as it reduces information asymmetry and enhances decision-usefulness of information. Croatian Capital Market Act, Article 403 [25] requires

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listed companies to make their annual financial report public (including audited financial statements and audit report) four months at the latest after the end of the financial year. Even though regulatory bodies impose certain requirements regarding the financial reporting timeliness, considerable discretion still remains within the regulatory framework. Timely reporting in emerging markets is of particular importance since in these markets information is relatively limited and has a longer time lag [21]. Also, according to the McGee and Yuan [19], there is evidence that companies in transition economies issue their financial statements much later than companies in more developed market economies. In these countries, different factors might be important in explaining the audit lag with respect to annual financial statements. Therefore, this study extends the previous literature on the timeliness of financial reporting by analysing potential determinants of audit delay in Croatia.

The reminder of the paper is structured as follows. The next section provides a brief literature review. The third section describes research design and variables used in the model. Research results are presented and discussed in Section four. Finally, the last section summarizes the main findings of research.

2. Literature review

Although the issue of timeliness is of great importance to standard setters, the theory in this area is not particularly developed [8, 9]. Still, there are numerous studies that have examined a variety of factors regarding audit delay. The majority of related studies were conducted in the USA and other Anglo-Saxon institutional settings [1, 5, 6, 8, 9, 15, 16]. However, in the recent years the issue has also become popular in other countries with different institutional and regulatory settings, like Malaysia [7], China [19], Greece [21], Spain [4], Turkey [23], etc. A great interest in researching this issue on international level additionally emphasizes its relevance.

Empirical results show that there exists a great variability among different countries with respect to the timelines of financial reporting and audit reporting lag. For example, the study of DeCeuster and Trappers [10] found that it takes Belgian companies longer to report their financial results than companies in Anglo-Saxon countries. Furthermore, prior research has established the importance of a number of variables in explaining audit reporting lag. These factors include, among others, industry and size of the company, profitability, gearing, extraordinary items, auditor business risk, audit complexity, audit firm characteristics and audit opinion.

While studies on audit delay share many similarities, they also present peculiarities that differentiate them [4]. This can be attributed to differences in observation periods, sample sizes and their compositions, measures of audit reporting lag and related variables, methodological approaches, institutional and regulatory settings. This also suggests that empirical research broadening the scope of the analysis and integrating many of these considerations may give us a more comprehensive picture of the effects of different factors on the timeliness of financial reporting and audit delay.

Author	Year	Sample	Main methodology	Main findings
Anglo-Saxon institutional setting				
Davies & Whittred [9]	1980	Australia; 100 public companies; 1972-77	Rank correlation Mann Whitney U test	Size of company appears to be a determinant of the total reporting lag.

Author	Year	Sample	Main methodology	Main findings
Ashton et al. [1]	1987	USA; 488 companies; 1982	OLS regression	Audit delay is positively related to total revenues and operational complexity. Audit delay is negatively related to public/non-public classification, overall quality of internal control and relative mix of audit work.
Carslaw & Kaplan [6]	1991	New Zealand; public companies; 1978 and 1988	OLS regression	The results indicate that company size and sign of income significantly affect audit delay across the two years examined.
Kinney & McDaniel [15]	1993	USA; 85 listed companies; 1986-1988	OLS regression	The results indicate that firms with declining earnings reporting corrections of interim earnings that were initially overstated also tend to have significantly increased audit delay.
Kirshnan & Yang [16]	2009	USA; listed companies (1,393 for audit lag analysis and 1,077 for earnings announcement analysis), 2001-2006	OLS regression	Both lags increased significantly in the two-year period 2001–2002 prior to the introduction of the accelerated filing requirements and in the period 2003–2006 when the new filing requirements were in effect. The likelihood that companies announced earnings prior to the audit report date increased considerably over the period 2001–2006, but particularly during 2004–2006 when Section 404 of the SOX was in effect.
Clatworthy & Peel [8]	2010	UK; 1,032,615 private companies; 2008	OLS regression with White standard errors and negative binomial regression	The presence of a professionally qualified accountant on the board, the proportion of women on the board, the size of the board and the presence and quality of an auditor enhance the timeliness of financial reporting.

Author	Year	Sample	Main methodology	Main findings
Bronson et al. [5]	2011	USA; 16.973 firm-year observations; 2000-2005	Pooled probit regression with heteroskedasticity-robust standard errors	Results indicate revisions to preliminary announcement when filing the 10-K report would have been 35% lower during 2005 if historical frequency of issuing earnings releases after the audit report date had not changed.
Other institutional settings				
Owusu-Ansah & Leventis [21]	2006	Greece; 95 listed companies; 1999	OLS regression	Multivariate regression analysis suggests that large companies, service companies and companies audited by the former Big-5 audit firms have shorter final reporting lead-time. Companies in the construction sector, companies whose audit reports were qualified and companies that had a greater proportion of their equity shares directly and indirectly held by insiders do not promptly release their audited financial statements.
McGee & Yuan [19]	2008	China; 18 Chinese companies and 21 non-Chinese companies; 2002-2006	Comparative analysis T-test	The audit opinion for the average Chinese company was dated 92.1 days after year-end. The average date for non-Chinese companies was 65.5 days. The means for the two groups was significantly different at the 1 percent level.
Che-Ahmad & Abidin [7]	2008	Malaysia; 343 listed companies; 1993	OLS regression	The findings indicated that the mean audit delay of Malaysian companies is much longer than the delay in Western countries. The multivariate analysis showed that director shareholdings, total assets, number of subsidiaries, type of audit firms, audit opinion and return on equity are important determinants of audit delay.

Author	Year	Sample	Main methodology	Main findings
Bonsón-Ponte et al. [4]	2008	Spain; 105 companies (403 company-year observations); 2002-2005	Pooled OLS regression	The regulatory pressures and the company size relative to its sector are influencing factors when the audit report is signed. The companies of larger relative size sign the audit report in fewer days (negative sign).
Türel [23]	2010	Turkey; 211 listed companies; 2007	OLS regression	The multivariate regression analysis indicates that both sign of income, audit opinion, auditor firm and industry affect timeliness. The findings indicate that the companies, which report net income, have standard audit opinion, and operate in manufacturing industry release their financial statements earlier while the companies that are audited by the big four audit firms report their financial statements later.

Table 1: *Analysis of previous studies*

3. Research design

Consistent with prior literature [3, 17], audit delay or audit reporting lag is measured as a function of the number of days that elapse from the closure of the accounting period until the date of the audit report. In order to investigate the association between audit reporting lag and selected independent variables, the following model is developed:

$$AD_{it} = \alpha_0 + \beta_1 Big4_i t + \beta_2 ModOp_{it} + \beta_3 ROA_{it} + \beta_4 Lev_{it} + \beta_5 InvRec_{it} + \beta_6 TA_{it} + \beta_7 \ln Size_{it} + \beta_8 AC_{it} + u_{it} \quad (1)$$

Independent variables included in the model are described in Table 2.

The first two variables are auditor related variables. *Audit firm type* ($Big4$) is a dichotomous variable introduced to explain potential differences in audit firm size on audit delay. Namely, the Big Four auditors are larger and therefore may be able to perform audit faster due to greater personnel capacity, superior audit technology, experience in auditing public companies and economies of scale [2, 4, 21]. *Audit opinion* ($ModOp$) is also a dichotomous variable with the value of one if the audit opinion is a modified, and zero otherwise. Companies with modified opinions are expected to encounter audit delays since a modified audit report conveys negative

Variable	Symbol	Description / Measurement
Audit firm type	$Big4$	1 if a Big 4 audits firm; and 0 otherwise
Audit opinion	$ModOp$	1 if audit opinion is modified; and 0 otherwise
Profitability	ROA	Net income / Total assets
Leverage	Lev	Total liabilities / Total assets
Audit effort	$InvRec$	(Inventories + Receivables) / Total assets
Absolute level of total accruals	TA	|(Net income – Operating Cash Flow) / Total assets|
Company size	$\ln Size$	Natural logarithm of the total asset of the company
Audit committee	AC	1 if audit committee exists in a company; and 0 otherwise

Table 2: *Independent variables description*

information and auditors may spend additional time on audit procedures in order to reduce any uncertainties or disagreements [2, 4, 21].

Davies and Whittred [9] offer several arguments for this kind of reasoning: i) professional auditing standards require that auditors undertake all possible and reasonable steps to issue an unqualified opinion before they can issue a qualified opinion; ii) auditors do not like to issue qualified opinions to their clients, so it is expected that they will broaden their procedures to resolve any uncertainties; iii) management of a company does not want to receive a qualified audit report, so they are likely to start negotiations with their auditors. All these actions will lead to an increase in the reporting lag.

Variables *Profitability* (ROA), *Leverage* (Lev), *Audit effort* ($InvRec$) and *Absolute level of total accruals* (TA) are included in the model to proxy for client complexity and/or engagement risk. Bamber et al. [3] argue that the amount of audit work to be done is an increasing function of the auditor's business risk associated with the client. Business risk will increase if client's financial position deteriorates. Both profitability and leverage can be used as indicators of client's financial condition. Less profitable companies and companies with a greater amount of debt tend to be associated with financial distress and hence a greater risk of bankruptcy [6]. On the other hand, profitable companies may require auditors to complete audit of their accounts earlier in order to convey the 'good news' [1, 6]. Variable $InvRec$ measures audit effort/risk or hand-to-audit asset involving audit time and effort beyond that of other assets. Variable TA is also used as an indicator of audit inherent risk as accruals have a higher risk of error and require more audit effort. Namely, Francis and Krishnan [11] argue audits of high-accrual companies pose more uncertainty than audits of low-accrual companies because of the potential of estimation error and a greater chance that high-accrual companies have undetected asset realization and/or going concern problems related to a higher level of accruals. Since higher levels of accounting accruals increase the risk of information reliability (because they are inherently subjective, linked to future realizations and prone to opportunistic earnings management), a positive relationship between audit delay and the absolute

level of total accruals is expected.

Company Size (*Size*) is a variable commonly used to explain variability in audit delay. Although larger companies have more extensive and complex accounts and may therefore require more time for auditing, empirical research generally supports a negative relationship between audit delay and company size [1, 3, 6, 14, 15]. These findings can be explained with several arguments. Firstly, large companies face greater external pressure to release the financial statement promptly [3] and they can also exert more pressure and demand more timely completion of their audits [3, 6, 14]. Moreover, they are likely to have better internal controls, allowing auditors to perform more interim compliance and substantive tests, thereby reducing year-end audit work [20].

Finally, variable *Audit Committee* (*AC*) is used to capture the effect of the corporate governance mechanism on audit reporting lag. The committee oversees financial reporting procedures, the internal control system, risk management practice and the internal and external audit process. Since 2005 when the Audit Act became effective, all entities of public interest in Croatia are obliged to set up an audit committee. Although setting up an audit committee is a legal obligation, many companies of public interest in Croatia still haven not established it. Therefore, *AC* is a dichotomous variable with the value one if a company has established an audit committee, and zero otherwise. We expect a negative relation between companies having audit committees established and audit delay.

4. Empirical findings

4.1. Sample description

Panel A: Continuous variables ($n = 281$)						
Variable	AD	ROA	Lev	$InvRec$	TA	ln$Size$
Mean	105.90	0.0016	0.4789	0.2221	0.0625	20.1423
Median	110	0.0044	0.4409	0.1913	0.0352	19.9926
Std. dev.	29.95	0.1011	0.2802	0.1963	0.1237	1.2019
Panel B: Categorical variables ($n = 281$)						
Variable				$Big4$	$ModOp$	AC
Frequency of 1				76	38	133
Percentage of 1				27%	14%	47%

Table 3: *Descriptive statistics of variables*

The research is conducted on a sample of non-financial companies listed on the Zagreb Stock Exchange (ZSE), covering the period from 2008 to 2011. This period is chosen since the year 2008 was the first year of organized collection of audit reports in a publicly available database – Register of Financial Statements created by the Financial Agency (FINA). The Register is also used to collect data from financial statements, while data regarding existence or non-existence of an audit committee are collected from the ZSE Annual *Questionnaire - Code* of *Corporate* Governance.

Finally, depending on data availability[‡], the final sample included 281 company-year observations. Descriptive statistics of analyzed variables is presented in Table 3.

As can be noticed from Table 3, mean audit delay is 106 days. Namely, audited information becomes available after a period that ranges from 4 days for the company with the shortest audit delay, up to 208 days for the company with the longest audit delay. Prior studies indicate that the release of annual financial statements is delayed by the audit function by an average of over 50 days across different countries [18].

4.2. Multivariate analysis

Our model is estimated by pooled OLS regression analysis. With panel data, usual OLS standard errors are incorrect unless there is no cluster effect and so robust standard errors that allow "cluster correlation" (and heteroskedasticity) should be used [24]. Standard errors clustered by a company are unbiased and produce correctly sized confidence intervals regardless of the firm effect being permanent or temporary [22]. Consequently, we use White standard errors which are robust to within cluster correlation (i.e. Rogers or clustered standard errors). Also, since many panel data sets have more firms than years, a common approach is to include dummy variables for each time period (to absorb the time effect). If the time effect is fixed the time dummies completely remove the correlation between observations in the same time period [22]. Therefore, we use year dummies to account for time-fixed effects (F-test for joint significance is 2.79 with p-value 0.0437). Also, calculated multicollinearity tests suggest that collinearity is not a serious issue (i.e. variance inflation factors are lower than 5).

As Table 4 shows, the F-statistic of the model is significantly different from zero, indicating that a subset of the explanatory variables does explain the variation in audit delay. The value of R^2 indicates that only about 17% of the variation in audit delay is explained by the model. The low R^2 value can be compared with similar studies. For example, Ashton et al. [1] adjusted R^2 for the overall sample and it was 26.5%; values of Clatworthy and Peel [8] R^2 were 13.29% and 15.03%; Owusu-Ansah and Leventis' [21] R^2 values were 36.8% and 44.2%; Bonsón-Ponte et al. [4] R^2 value is 20.03% and Türel [23] R^2 was 13.3%. The low R^2 is common in social sciences, especially for cross-sectional analysis [24]. In such studies, the signs, magnitudes, and significance of the estimated parameters are of primary interest. Regression analysis results are presented in Table 4.[§]

The results show that only three variables are statistically significant in explaining audit delay in Croatia. Namely, audit delay is inversely related to profitability ($p < 0.05$) and directly related to financial leverage ($p < 0.01$), which is consistent with the findings described previously [3, 6]. Moreover, our results provide evidence that the existence of an audit committee is negatively related to audit delay ($p < 0.01$). This finding emphasizes the importance of a corporate governance mechanism in promoting the timeliness of financial reporting.

In order to test robustness of our results we estimated the model separately for each year. The results of a separate estimation demonstrate the following: 1) the

[‡]The greatest loss of observations was due to non-existence of data regarding an audit committee.
[§]Year dummies are included but not reported for sake of brevity.

financial leverage has expected sign and is statistically significant on conventional levels in all years except the year 2009; 2) a variable audit committee is not statistically significant only in the last year, while the expected sign remains as expected in all years; and 3) profitability is inversely related to audit delay in all years; however, it is only statistically significant in 2009 and 2010. Moreover, when estimating the model separately for each year, two more variables are found to be statistically significant: modified audit opinion in the year 2009 and size in 2010 and 2011. We also estimated the model using logarithmic transformation of audit delay [1, 14, 16]. However, the results remain similar, but the model has lower explanatory power.

Independent variable	Expected sign	Coeff.	t-statistics	p-value	VIF
INTERCEPT	?	171.4131^a	4.29	0.000	
$Big4$	-	6.6771	1.08	0.283	1.30
$ModOp$	+	−9.2831	−1.26	0.212	1.04
ROA	-	-50.2117^b	−2.17	0.032	1.88
Lev	+	24.9872^a	3.24	0.002	1.25
$InvRec$	+	−11.7944	−1.03	0.304	1.12
TA	+	7.3810	0.44	0.658	1.67
$\ln Size$	-	−3.1450	−1.54	0.126	1.48
AC	-	-12.3950^a	−2.78	0.006	1.09
Observations		281	*a, b means significant at 1% and 5% level (two-sided tests), respectively*		
R - square		0.1746			
F-test		5.94			
Prob > F		0.0000			

Table 4: *Estimated results by pooled OLS regression*

5. Conclusion

Timeliness is an important and useful characteristic of accounting information. Thereby, it is of great interest to different regulatory bodies and standard setters. However the timeliness of financial reporting is directly affected by the length of auditing. Our data indicate that the average audit delay in Croatia is 106 days which is below legal requirements set by the Capital Market Act; however, it is much longer than average audit delay in developed countries. The aim of this study was to analyse the effect of several company and audit related variables on audit delay in Croatia. Our findings indicate that lower profitability and higher indebtedness increase audit reporting lag, while the existence of an audit committee contributes to timely financial reporting by shortening audit delay. The results of this paper could be of interest not only to academics but also to standard setters and regulators in the process of improvement of the quality of financial reporting. However, potential limitations of our study are related to a small sample size, sample selection bias and the problem of omitted variables (namely variables that explain different corporate governance aspects, institutional setting, audit firm and audit technology characteristics). These limitations can also be used as suggestions for future research.

References

[1] Ashton, R. H., Willingham, J. J. and Elliott, R. K. (1987). An empirical analysis of audit delay. Journal of Accounting Research, Vol. 25, No. 2, 275-292.

[2] Ashton, R. H., Graul, P. R. and Newton, J. D. (1989). Audit delay and the timeliness of corporate reporting. Contemporary Accounting Research, Vol. 5, No. 2, 657-673.

[3] Bamber, E. M., Bamber, L. S. and Schoderbek, M. P. (1993). Audit structure and other determinants of audit report lag: An empirical analysis. Auditing: A Journal of Practice & Theory, Vol. 12, No. 1, 1-23.

[4] Bonsón-Ponte, E., Escobar-Rodríguez, T. and Borrero-Domínguez, C. (2008). Empirical Analysis of Delays in the Signing of Audit Reports in Spain. International Journal of Auditing, Vol. 12, 129-140.

[5] Bronson, S. N., Hogan, C. E., Johnson, M. F. and Ramesh, K. (2011). The unintended consequences of PCAOB auditing Standard Nos. 2 and 3 on the reliability of preliminary earnings releases. Journal of Accounting and Economics, Vol. 51, No. 1, 95-114.

[6] Carslaw, C. and Kaplan, S. E. (1991). An examination of audit delay: Further evidence from New Zealand. Accounting and Business Research, Vol. 22, No. 85, 21-32.

[7] Che-Ahmad, A. and Abidin, S. (2008). Audit delay of listed companies: A case of Malaysia. International Business Research, Vol. 1, No. 4, 32-42.

[8] Clatworthy, M. A. and Peel, M. J. (2010). Does Corporate Governance Influence the Timeliness of Financial Reporting? Evidence from UK Private Companies. `http://www.hec.edu/Faculty-Research/Research-Seminars/(offset)/30/(dept)/133` [Accessed on 8 July 2013].

[9] Davies, B. and Whittred, G. P. (1980). The Association Between Selected Corporate: Attributes and Timeliness in Corporate: Reporting: Further Analysis. Abacus, Vol. 16, No. 1, 48-60.

[10] DeCeuster, M. and Trappers, D. (1993). Determinants of the Timeliness of Belgian Financial Statements. Working Paper, University of Antwerp.

[11] Francis, J. R. and Krishnan, J. (1999). Accounting accruals and auditor reporting conservatism. Contemporary Accounting Research, Vol. 16, No. 1, 135-165.

[12] Givoly, D. and Palmon, D. (1982). Timeliness of annual earnings announcements: Some empirical evidence. Accounting Review, 486-508.

[13] IASB (2008), Exposure Draft of An Improved Conceptual Framework for Financial Reporting: Chapter 1: The Objectives of Financial Reporting, Chapter 2: Qualitative Characteristics and Constraints of Decision-useful Financial Reporting Information. `http://www.ifrs.org/Current-Projects/IASB-Projects/ConceptualFramework/EDMay08/Documents/conceptual_framework_exposure_draft.pdf` [Accessed 05/07/2013].

[14] James, D. N. and Ashton, R. H. (1989). The association between audit report technology and audit delay. Auditing: A Journal of Practice & Theory, Vol. 8, No. 1, 22-37.

[15] Kinney, W. R. and McDaniel, L. S. (1993). Audit delay for firms correcting quarterly earnings. Auditing: A Journal of Practice and Theory, Vol. 12, No. 2, 135-142.

[16] Kirshnan, J. and Yang, J. S. (2009). Recent trends in audit report and earnings announcement lags. Accounting Horizons, Vol. 23, No. 3, 265-288.

[17] Knechel, W. R. and Payne, L. F. (2001). Additional evidence on audit report lag. Auditing: A Journal of Practice & Theory, Vol. 20, No.1, 137-146.

[18] Lai, K. W., Hom, H. and Cheuk, L. M. (2005). Audit Reporting Lag, Audit Partner Rotation and Audit Firm Rotation: Evidence from Australia.

http://ssrn.com/abstract=783684 [Accessed on 8 July 2013].

[19] McGee, R. W. and Yuan, X. (2008). Corporate Governance and the Timeliness of Financial Reporting: An Empirical Study of the People's Republic of China. http://ssrn.com/abstract=1131338 [Accessed 8 July 2013].

[20] Ng, P. P and Tai, B. Y. (1994). An empirical examination of the determinants of audit delay in Hong Kong. The British Accounting Review, Vol. 26, No. 1, 43-59.

[21] Owusu-Ansah, S. and Leventis, S. (2006). Timeliness of Corporate Annual Financial Reporting in Greece: A Research Note. European Accounting Review, Vol. 15, No. 2, 273-287.

[22] Petersen, M. A. (2009). Estimating Standard Errors in Finance Panel Data Sets: Comparing Approaches. Review of Financial Studies, Vol. 22, No. 1, 435-480.

[23] Türel, A. (2010). Timeliness of financial reporting in emerging capital markets: Evidence from Turkey. Istanbul University Journal of the School of Business Administration, Vol. 39, No. 2, 227-240.

[24] Wooldridge, J. (2012). Introductory Econometrics: A Modern Approach, Cengage Learning.

[25] Zakon o tržištu kapitala, Narodne novine 88/08, 146/08, 74/09, 54/13, 159/13 [Croatian Capital Market Act, Official Gazette, 88/08, 146/08, 74/09, 54/13, 159/13]. http://www.hanfa.hr/getfile/40373/ZTK_nesluzbeni_procisceni_tekst_2014.pdf [Accessed on 8 July 2013].