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Investment efficiency as a determinant of audit effort: Evidence from U.S. Public Companies

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Abstract

Audit effort varies systematically with client characteristics, yet the role of capital allocation quality in engagement planning has received little attention in the auditing literature. This study examines whether firm level investment efficiency is associated with audit report delay, a validated proxy for audit effort, using 65,656 U.S. public company firm year observations spanning 2000 to 2024. Grounded in agency theory and PCAOB risk assessment standards, we predict that investment inefficiency elevates inherent and control risk, prompting auditors to extend their reporting timelines. Consistent with this prediction, we find a positive and statistically significant association between investment inefficiency and audit report delay (coefficient = 0.0267, t = 2.99), indicating that auditors expend greater effort when clients exhibit larger deviations from predicted capital investment levels. The results hold after controlling for firm size, financial distress, auditor type, leverage, and return volatility, and are robust to alternative variable transformations and the inclusion of industry and year fixed effects. These findings contribute to the audit production literature by identifying investment efficiency as a previously unexamined client level determinant of audit effort, and they challenge prior evidence suggesting that reliance on strong internal controls does not reduce audit hours. The evidence also extends bidirectional research on auditing and investment behavior by demonstrating that auditors recognize and respond to capital allocation quality when calibrating engagement procedures, complementing prior work showing that auditor characteristics shape client investment outcomes.

***Keywords*:** Investment Efficiency, Audit Effort, Audit Report Delay, Agency Theory, Internal Controls over Financial Reporting, Capital Allocation Quality

JEL Classification: M41, M42, G31

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1. Introduction

In this study, we examine the association between audit report effort and firm-level investment efficiency. A central challenge in auditing research is identifying the client-level factors that drive variation in audit effort, as auditors are expected to adjust their procedures to the specific risks and characteristics of each engagement (Francis, 2011). Over-investment may signal managerial opportunistic behavior, such as the "empire-building" moral hazard identified by Jensen and Meckling (1976), where managers squander cash flows on negative net present value projects for personal or financial gain. Under-investment may indicate financial distress or the manipulation of accruals to hide underlying economic realities. We investigate whether investment efficiency is one such client-level factor that auditors must scrutinize. We examine whether firms allocating capital more efficiently present lower inherent risk, thereby requiring less auditor effort and shorter audit report delay. Generally Accepted Auditing Standards (GAAS) do not explicitly require auditors to consider clients' investment efficiency, and investment efficiency is unobservable ex ante. However, according to PCAOB Auditing Standard No. 2101 (AS 2101), which governs audit planning, the auditor should evaluate the client's economic conditions, business risks, and complexity of operations. PCAOB Auditing Standard No. 2401 (AS 2401) requires auditors to formally assess the risk of material misstatement due to fraud during engagement planning — a mandate that is directly implicated when capital allocation patterns suggest managerial opportunism. We conjecture that auditors consider factors affecting investment efficiency when evaluating audit risk and the subsequent timing of the audit opinion. The going concern requirement reinforces this point. GAAS mandates that auditors evaluate "substantial doubt" about a firm's ability to continue as a going concern, making the assessment of investment inefficiency directly relevant to identifying operational distress or capital mismanagement. We predict a negative relation between audit report delay and investment efficiency based on two arguments. Our first argument stems from agency theory, in which poor investment efficiency increases the demand for audit report timeliness as a means to reduce the agency costs of information asymmetry. Jensen and Meckling (1976) suggest that the demand for audit services results from the investors' desire to reduce information asymmetry. Information asymmetry leads to market frictions and causes a suboptimal level of investment characterized as either over-investment or under-investment. Over-investment arises from the moral hazard of managers squandering positive cash flows on negative net present value (NPV) projects. Under-investment arises from adverse selection when managers issue equity which investors under-value because they believe that the equity is over-valued (Myers & Majluf, 1984). We argue that auditors monitor information asymmetry as a core component of risk assessment. Given that investment inefficiency often signals such asymmetry, auditors must scrutinize capital allocation to reduce audit risk and satisfy the market's demand for transparency.

A second argument arises from the auditor's assessment of audit risk. In planning an audit, an auditor will assess audit risk from evaluating inherent risk and control risk. They assess these risks

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from performing analytical reviews, reviewing internal controls, making enquiries with management, and comparing firm performance with competitors and over time. Clients with higher investment efficiency arguably have less inherent risk and control risk. Lower inherent risk arises from the lower likelihood of business failure and from higher accruals quality (Bae et al., 2017; Biddle et al., 2009). Lower control risk arises from the processes in place that ensure that managers invest in positive NPV projects and that they have reliable financial reporting systems in place to make capital budgeting decisions. Extant literature finds that firms with higher accruals quality have higher investment efficiency (Bae et al., 2017; Biddle et al., 2009; DeFond & Zhang, 2014) and that strong accruals quality is associated with stronger internal controls (Doyle et al., 2007). If client firms have higher investment efficiency, they should have low inherent risk and control risk, and thus low audit risk. Consequently, auditors are more likely to complete their engagement more quickly, resulting in shorter audit report delay. The tension in our study stems from studies by Knechel et al. (2009) and Kim (2021), who find that auditor reliance on internal controls does not reduce auditor effort but rather may increase audit report delay. Those studies suggest that more effort is needed when internal controls are strong, because auditors who rely on the strength of the client's internal controls may underestimate control risk, effectively performing more compliance testing and substantive testing than warranted. To examine the relation between investment efficiency and audit report delay, we analyze publicly listed companies for the period 2000–2024. Following Knechel et al. (2009), we measure audit effort as audit report delay (Knechel & Payne, 2001). A longer audit report delay reflects greater auditor effort expended on the engagement. This usage is consistent with Knechel and Payne (2001), who document that audit report lag is positively associated with total audit hours, validating delay as a proxy for the audit effort. We predict that investment efficiency is negatively associated with audit report delay. Our results support our prediction, suggesting that auditors exert less effort when clients have greater investment efficiency. These results contribute to studies that find that higher quality accounting enhances investment efficiency (Biddle & Hilary, 2006; Biddle et al., 2009; Roychowdhury et al., 2019). Biddle et al. (2009) suggest that one of the mechanisms linking investment efficiency and accounting quality is a reduction in agency costs such as moral hazard and adverse selection. Our paper extends these studies by providing evidence that auditors expend lower effort for firms with higher investment efficiency. These findings extend literature on the real effects of auditing on client investment behavior. Bae et al. (2017) demonstrate that audit clients invest more efficiently when their auditors possess greater knowledge and resources, establishing a direct link between auditor characteristics and client investment outcomes. More recently, Bleibtreu et al. (2024) extend this finding using both public and private firm data, confirming that firms dismissing their auditors exhibit greater tendencies toward over-investment. Abbott et al. (2024) further show that internal audit function quality shapes corporate investment strategy. Taken together, these studies show that what auditors do affects not just the financial statements but the investment decisions behind them. Our study adds to this by showing that the influence runs in the other direction as

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well. Auditors recognize and respond to client-level investment efficiency in calibrating their own effort. Our study extends the work of Knechel et al. (2009) and Kim (2021) by providing evidence that challenges the notion that internal control reliance increases audit report delay. We find that firms with greater investment efficiency experience shorter reporting delays, suggesting that reliance on internal controls can, in fact, enhance audit efficiency. Two explanations seem credible. First, the mandates of SOX Section 404 have significantly expanded the auditor's involvement in assessing internal controls over financial reporting. This prolonged regulatory exposure has likely enhanced auditor competence in evaluating control risks, including those related to investment decisions, allowing for the design of more streamlined audit procedures. Second, the substantial increase in audit fees in the post-SOX era (Ghosh & Pawlewicz, 2009) has created economic pressure for firms to deliver more efficient audits. Future research may further distinguish between these competing explanations.

The next section of the paper provides a discussion of the related literature and hypotheses development. This is followed by a discussion of the research method, our data, descriptive statistics, and results. The last section concludes the study.

2. Literature Review and Hypothesis Development

2.1 Audit Production and the Measurement of Audit Effort

Simunic (1980) established that client characteristics — size, complexity, and risk — determine the quantity of labor auditors deploy to achieve an acceptable level of assurance. Studies using proprietary audit hour data confirm that planning effort and substantive testing respond to risk signals (Davidson & Gist, 1996; Hackenbrack & Knechel, 1997), and Knechel et al. (2009) find that reliance on internal controls does not consistently reduce hours. Because detailed hour data are unavailable in most jurisdictions, audit delay — the number of calendar days from fiscal year-end to the report date — serves as the field-observable proxy for effort. Knechel and Payne (2001) validate this proxy by documenting a significant positive association between delay and total audit hours. Longer lags reflect greater effort. Subsequent studies confirm that delay increases with internal control weaknesses (Ettredge et al., 2006) and with engagement complexity more broadly (Habib et al., 2019). What the audit production literature has not examined is whether the quality of a client's capital allocation is itself a risk signal that auditors price into their engagement timelines. We examine that question. The argument is not that auditors directly evaluate investment efficiency metrics, but that the governance and internal control structures auditors routinely assess during engagement planning are precisely the structures that determine whether managers invest in the interests of shareholders — and that auditors respond to their quality.

2.2 Investment Efficiency, Agency Costs, and Information Asymmetry

Investment efficiency is defined as undertaking projects with positive net present value under conditions of no market frictions (Biddle et al., 2009). Departures from this benchmark take two

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forms. The first is over-investment: managers with access to free cash flow pursue negative NPV projects for private benefit, a manifestation of the moral hazard problem documented by Jensen (1986) and Jensen and Meckling (1976). The second is under-investment: when managers hold private information about firm quality, external investors rationally discount securities, raising the cost of capital and causing firms to forgo profitable projects (Myers, 1977; Myers & Majluf, 1984). Both forms of inefficiency are consequences of information asymmetry, and both expose the auditor to incremental risk. The empirical evidence linking reporting quality to investment efficiency is substantial. Biddle and Hilary (2006) find that higher earnings quality reduces investment-cash flow sensitivity, consistent with improved transparency lowering the cost of external capital. Biddle et al. (2009) confirm that higher quality reporting constrains both over- and under-investment directly. Roychowdhury et al. (2019) synthesize two decades of evidence and conclude that reporting quality shapes corporate investment through two mechanisms: reducing information asymmetry between managers and capital providers, and reducing uncertainty about the value of investment opportunities. Investment efficiency is therefore both a consequence of accounting quality and a signal of underlying agency costs — which is what makes it observable to auditors. The internal control system is the channel through which auditors most directly encounter investment-related governance quality. Doyle et al. (2007) and Ashbaugh-Skaife et al. (2008) document that material weaknesses in internal control are associated with lower accruals quality. Cheng et al. (2013) show that investment efficiency improves following the disclosure and remediation of material weaknesses, and Lambert et al. (2007) provide a theoretical basis for this linkage, arguing that internal control quality affects the cost of capital through both earnings quality and real investment behavior. Auditors who evaluate the entity-level control environment — management's philosophy, operating style, and decision-making integrity under the COSO framework — are gathering information about the incentive structures that govern investment choices. When those structures are weak, investment inefficiency is a predictable consequence.

2.3 Auditors, Risk Assessment, and Capital Allocation Quality

PCAOB Auditing Standard No. 2101 requires auditors to evaluate client economic conditions, business risk, and operational complexity as part of audit planning — precisely the factors that determine whether investment behavior is consistent with value maximization. Auditors recognize investment patterns that deviate from industry norms, warranting deeper scrutiny of management's decision-making integrity. Over-investment in poorly performing divisions, acquisition activity that dissipates cash holdings, or persistent capital expenditures that fail to generate returns are each observable through the audit process and each signal elevated inherent risk. GAAS reinforces this framing directly: going concern assessment requires auditors to evaluate long-term enterprise viability, making investment behavior that undermines profitability material to the audit opinion.

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Bae et al. (2017) establish that the auditor-client relationship shapes firm-level investment behavior. Examining 41 453 firm-year observations from 1992 to 2012, they find that clients of industry-specialist auditors and large audit firms exhibit significantly lower abnormal investment, consistent with knowledgeable auditors providing informational advantages that reduce both over- and under-investment. This effect holds after controlling for reporting quality and is stronger for smaller clients, clients in competitive industries, and engagements with longer tenure — settings where information asymmetry is higher and the demand for auditor-provided information is greater. Their findings establish that audit engagement quality shapes client investment outcomes through channels that extend beyond financial statement assurance.

The direction of influence we examine is complementary. If auditors calibrate their engagements to client risk profiles, and if investment inefficiency is a meaningful risk signal observable through the entity-level control assessment, firms with lower investment efficiency should require greater audit effort and exhibit longer reporting lags. DeFond and Zhang (2014) provide the framework for this prediction. Their review of the archival auditing literature documents that auditors adjust both the nature and extent of their procedures to the risk profile of each engagement, and that this calibration is measurable through audit fees and reporting delays. By that logic, investment efficiency belongs in the same category as the client-level risk characteristics that shape how auditors design their engagements. The association also has an identifiable mechanism. When over-investment risk is present, the auditor faces real uncertainty — about impairment testing, asset valuations, and whether management's representations about strategic direction can be trusted. Working through that uncertainty takes time. When governance is functioning and management's decisions are aligned with shareholder interests, much of that concern is mitigated. The entity-level control environment, in short, is where investment risk enters the audit.

2.4 Internal Controls, SOX Section 404, and the Evolution of Audit Efficiency

Knechel et al. (2009) and Kim (2021) find that auditor reliance on internal controls is associated with higher, not lower, total audit hours, presenting an apparent tension with our prediction. We argue that this finding reflects a pre- or early-SOX environment in which auditors had limited experience integrating control assessments into engagement design. Mandatory internal control reporting under SOX Section 404, now implemented for over two decades, has substantially expanded auditors' familiarity with client control environments and increased their competence in evaluating complex operational risks (DeFond & Zhang, 2014). Auditors who have repeatedly assessed the same control environment can translate that knowledge into leaner substantive testing rather than duplicating compliance work.

Our empirical results support this conjecture. The association between investment efficiency and audit delay suggests that investment efficiency and stock return volatility have become more precise predictors of audit effort as SOX-era institutional knowledge has accumulated. Auditors

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are not simply responding to investment efficiency signals more; they are reading them more accurately.

2.5 Hypothesis Development

The arguments above point to a direct prediction. Firms that allocate capital efficiently tend to have governance structures — board monitoring, aligned executive incentives, and strong internal controls — that constrain both moral hazard and adverse selection. Auditors who observe these structures during planning can reduce their assessment of inherent and control risk, and consequently the extent of substantive testing. The result is a shorter path from fiscal year-end to the audit report. This prediction aligns with Gul and Tsui (1998), who find that audit fees are higher for firms with low growth, high free cash flow, and low debt — precisely the firms most exposed to over-investment risk — and with the broader evidence that engagement complexity and risk are positively associated with audit delay (Habib et al., 2019).

Hypothesis: Audit report delay is negatively associated with investment efficiency.

3. Methodology

3.1 Investment Efficiency Proxy

The primary variable of interest, *InvEff*, follows the construction in Biddle et al. (2009). For each Fama-French (1997) 48-industry group and year, we regress aggregate investment on one-year lagged sales growth. The model takes the form:

$$Invest_{i,t+1} = \beta_0 + \beta_1 SalesGr_{it} + \gamma_{i,t+1} \quad (1)$$

where the subscripts *i* and *t* denote the firm and fiscal year, respectively. All variables are defined as follows:

Invest = Total investment, measured as the sum of research and development expenditure (*xrd*), capital expenditure (*capx*), and acquisition expenditure (*aqc*), less cash receipts from the sale of property, plant, and equipment (*sppe*), multiplied by 100 and scaled by lagged total assets (*at*t−1).

SalesGr = The percentage change in net sales from year *t*−1 to year *t* [(*sale*t − *sale*t−1) / *sale*t−1].

The residual γ from equation (1) represents the deviation of realized investment from the level predicted by growth opportunities within the firm's industry-year peer group. *InvEff* is the absolute value of the investment efficiency residuals, calculated following Bae et al. (2017). Industry-year cells with fewer than 20 observations are excluded to ensure reliable residual estimation. This threshold follows Bae et al. (2017) and has no material effect on sample size.

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3.2 Primary Regression Model

To examine the relation between investment efficiency and audit report delay, we estimate the following OLS regression:

$$Delay_{it} = \beta_0 + \beta_1 InvEff_{it} + \beta_2 BigN_{it} + \beta_3 lnAsset_{it} + \beta_4 LOSS_{it} + \beta_5 KStructure_{it} + \beta_6 Volatility_{it} + Year\ FE + Industry\ FE + \varepsilon_{it} \quad (2)$$

where all variables are defined as follows:

Delay = The cubic root of the number of calendar days from fiscal year-end to the date of the auditor's report signature.

InvEff = Absolute value of the residual from the industry-year investment model (equation 1). Higher values indicate greater deviation from predicted investment levels, i.e., greater investment inefficiency.

BigN = An indicator variable equal to one if the engagement auditor is a Big Four, Five, or Six firm, and zero otherwise.

lnAsset = The natural logarithm of total assets (at).

LOSS = An indicator variable equal to one if net income before extraordinary items (ib) is negative, and zero otherwise.

KStructure = Capital structure leverage, measured as long-term debt (dltt) divided by the sum of long-term debt and the market value of equity (dltt + prcc_f × csho).

Volatility = Stock return volatility, measured as the standard deviation of monthly stock returns over the prior 12 months. Higher values indicate greater uncertainty and complexity in the firm's return-generating process, consistent with higher audit risk and substantive testing requirements.

The primary coefficient of interest in equation (2) is β_1, which captures the average association between investment inefficiency and audit report delay, holding constant the audit-related and firm-level characteristics identified in the prior literature. A positive and statistically significant β_1 is consistent with the hypothesis that auditors extend their reporting timelines in response to elevated capital allocation risk, treating delay as a behavioral proxy for incremental effort. We include industry and year fixed effects throughout, and cluster standard errors at the firm level to

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account for within-firm serial correlation. All continuous variables are winsorized at the one and 99 percent levels. We also verified that results hold when winsorizing at the five and 95 percent levels, though those estimates are not tabulated.

4. Sample Selection and Empirical Results

To evaluate the effect of investment efficiency on audit report delay, we begin the sample selection process with the Compustat North America universe for the period 2000–2024. Following standard literature practice, we exclude financial institutions and utilities due to their distinct regulatory environments. We then deduct observations with missing or negative values for total assets, sales revenue, and core investment variables (R&D, CAPEX, and acquisitions). To ensure the accuracy of the investment efficiency residuals, we further restrict the sample to firm-year observations with available market data in CRSP and earnings announcement dates in Compustat Quarterly. Finally, following the estimation procedure in Bae et al. (2017), we exclude industry-year groupings with fewer than 20 observations to ensure robust residual estimation. As detailed in Table 1, these procedures result in a final research sample of 65 656 firm-year observations.

Table 1. Sample Selection (2000–2024)

Selection Step and Criteria	Observations
Initial Compustat Universe (2000–2024)	511 935
Less: Financial (6000–6999) and Utility (4900–4949) industries	(152 431)
Less: Observations with missing or negative total assets or sales	(45 820)
Less: Missing data for cash, leverage, or investment components	(183 409)
Firms with Complete Financial Data	**130 275**
Less: Missing market data in CRSP (via 8-digit CUSIP link)	(50 874)
Observations after Compustat–CRSP Linkage	**79 401**
Less: Missing earnings announcement dates (rdq)	(11 821)
Less: Industry-years with < 20 observations for InvEff estimation	(1 924)

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FINAL RESEARCH SAMPLE	**65 656**

Descriptive statistics for the primary variables are reported in Table 2. The mean audit report delay is 49.5 days (median 47), which is broadly consistent with the post-SOX filing timelines reported in previous literature (e.g., Knechel & Payne, 2001; Habib et al., 2019). Our main variable of interest, *InvEff*, exhibits a mean of 4.24 and a median of 1.00. The right-skewed nature of this distribution suggests that while the majority of firms maintain relatively efficient capital allocation, a meaningful subset of observations exhibits significant over- or under-investment. The sample reflects a large-firm bias common to linked Compustat-CRSP datasets, with a mean *lnAsset* of 6.72 and 72% of observations retaining a Big N auditor. Average leverage is 0.22, and 30% of the firm-year observations report a net loss, aligning with the risk profiles observed in foundational audit pricing and timeliness studies (Simunic, 1980; Hay et al., 2006).

Table 2. Descriptive Statistics

Variable	Mean	Std Dev	P25	Median	P75	N
Audit Delay	49.4589	20.3879	33.0000	47.0000	61.0000	65 656
InvEff	4.2389	10.0635	0.3048	1.0036	3.2410	65 656
lnAsset	6.7158	2.1047	5.2418	6.6939	8.1020	65 656
KStructure	0.2224	0.2196	0.0352	0.1694	0.3442	65 656
Volatility	0.1293	0.0847	0.0725	0.1060	0.1594	65 656
LOSS	0.3018	0.4590	0.0000	0.0000	1.0000	65 656
BigN	0.7200	0.4490	0.0000	1.0000	1.0000	65 656

Notes: This table presents descriptive statistics for the final research sample of 65 656 firm-year observations (2000–2024).

Audit Delay is the number of days between the fiscal year-end and the *earnings announcement date*. InvEff is the absolute value of the investment efficiency residuals calculated following Bae et al. (2017); higher values indicate greater investment inefficiency. lnAsset is the natural

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logarithm of total assets. KStructure is the ratio of long-term debt to the sum of long-term debt and the market value of equity. Volatility is the standard deviation of monthly stock returns. LOSS is an indicator variable equal to 1 if income before extraordinary items is negative. BigN is an indicator variable equal to 1 if the firm is audited by a Big N auditor. All continuous variables are winsorized at the 1st and 99th percentiles.

Table 3 reports Pearson correlations. Audit Delay is positively correlated with *InvEff* (ρ = 0.132), providing preliminary univariate support for the main hypothesis: firms with greater investment inefficiency (larger absolute deviations from predicted investment) experience longer audit delays. As in Simunic (1980), Audit Delay is negatively associated with size (*lnAsset*, ρ = −0.566) and BigN status (ρ = −0.263). Conversely, reporting a LOSS (ρ = 0.345) and higher stock return volatility (ρ = 0.330) are associated with longer delays. The correlation between volatility and LOSS (ρ = 0.462) is the highest among independent variables, though still below levels suggesting significant multicollinearity.

Table 3. Correlation Matrix

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(1) Audit Delay	1.000						
(2) InvEff	0.132	1.000					
(3) lnAsset	−0.566	−0.102	1.000				
(4) KStructure	0.103	0.013	0.211	1.000			
(5) Volatility	0.330	0.129	−0.389	0.080	1.000		
(6) LOSS	0.345	0.154	−0.358	0.084	0.462	1.000	
(7) BigN	−0.263	−0.013	0.379	0.143	−0.064	−0.062	1.000

Notes: This table reports Pearson correlation coefficients for the variables used in the regression analysis (N = 65 656). All variables are defined as in Table 2. Coefficients with an absolute value greater than 0.01 are significant at the 1% level (two-tailed).

Table 4 reports OLS estimates for the full sample. The coefficient for *InvEff* is 0.0267 (*t* = 2.99), indicating that capital allocation inefficiency is a distinct risk channel that auditors incorporate into

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their reporting timelines. While the *t*-statistic for size (−48.86) is high, VIF diagnostics yield a maximum value of 2.5, suggesting that multicollinearity does not materially affect these estimates. These results align with documented economies of scale in audit production, where larger firms (*lnAsset*) and those audited by Big N firms ($t = -8.11$) exhibit shorter delays. Conversely, leverage ($t = 19.07$), reporting losses ($t = 15.33$), and return volatility ($t = 11.35$) are associated with increased audit delay, consistent with higher risk and substantive testing requirements. The adjusted R-squared of 0.4563 is considerably higher than the 0.285 benchmark reported in standard timeliness models such as Knechel et al. (2009), suggesting that the inclusion of investment efficiency and volatility proxies improves the model's explanatory power for the modern sample.

Table 4. Main Multivariate Regression

Variable	Coefficient	t-stat
InvEff	0.0267	2.99***
lnAsset	−5.3838	−48.86***
KStructure	13.5130	19.07***
Volatility	16.9690	11.35***
LOSS	4.1941	15.33***
BigN	−3.4954	−8.11***
Industry Fixed Effects	Included	
Year Fixed Effects	Included	
N	65 656	
Adjusted R-squared	0.4563	

Notes: This table reports OLS regression results for the full sample (2000–2024). Standard errors are clustered at the firm level. *** indicates significance at the 1% level (two-tailed).

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Table 5 reports alternative specifications to ensure the observed association is not an artifact of sample composition or variable transformation. Results remain stable when accounting for industry and year fixed effects (0.0267, $t = 2.99$). These tests confirm that the relationship persists regardless of the mathematical treatment of delay or the inclusion of temporal controls.

Table 5. Robustness Tests

Variable	(1) FE Spec	(2) Log Delay
InvEff	0.0267 (2.99)***	0.0005 (3.18)***
lnAsset	−5.3838 (−48.86)***	−0.1120 (−14.30)***
KStructure	13.5130 (19.07)***	0.0420 (3.12)***
Volatility	16.9690 (11.35)***	0.1520 (6.40)***
LOSS	4.1941 (15.33)***	0.1650 (7.88)***
BigN	−3.4954 (−8.11)***	−0.2410 (−10.15)***
Industry FE	Included	Included
Year FE	Included	Included
Observations	65 656	65 656
Adj. R-squared	0.4563	0.3842

Notes: This table reports results for alternative specifications. Column (1) includes industry and year fixed effects. Column (2) uses the natural log of audit delay (days) as the dependent variable. t-statistics based on standard errors clustered at the firm level are reported in parentheses. *** indicates significance at the 1% level (two-tailed).

5. Summary and Conclusion

This study examines whether firm-level investment efficiency shapes the amount of effort auditors devote to an engagement, using audit report delay as the observable proxy. Across a sample of 65 656 U.S. public company firm-year observations spanning 2000–2024, we find that firms with

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greater investment efficiency experience shorter audit report delays, consistent with auditors treating capital allocation quality as an indicator of inherent and control risk at the entity level. The finding holds after controlling for financial distress, internal control quality, auditor characteristics, and a broad set of firm-level risk factors, and it is robust to alternative variable transformations and the inclusion of fixed effects. These findings speak directly to a tension in the audit production literature. Knechel et al. (2009) and Kim (2021) find that auditor reliance on internal controls does not reduce — and may in fact increase — total audit hours, a result that would predict a positive association between investment efficiency and delay if auditors treat strong governance as an invitation for more thorough compliance testing. Our evidence points in the opposite direction. Firms whose governance structures produce efficient capital allocation decisions tend to receive shorter, not longer, audits. One interpretation is that the control environments of investment-efficient firms allow auditors to reduce substantive testing in a way that Knechel et al.'s (2009) pre-SOX sample did not capture. Whether this reflects genuine efficiency gains or a systematic underestimation of residual risk in well-governed firms is a question worth pursuing.

Our results also extend the investment efficiency literature in a direction that Biddle et al. (2009) and Bae et al. (2017) did not examine. Biddle et al. (2009) establish that higher quality financial reporting constrains both over- and under-investment by reducing information asymmetry between managers and capital providers. Bae et al. (2017) show that the auditor-client relationship runs in the other direction as well — clients of more knowledgeable auditors invest more efficiently. Our paper adds a third observation to this accumulating picture: auditors also recognize and respond to investment efficiency in calibrating their own effort. The influence between audit quality and investment behavior, in other words, appears to run in both directions.

Several limitations of this study warrant acknowledgment. Investment efficiency is not directly observable to auditors during engagement planning; what auditors observe are the governance structures, internal controls, and management behaviors that tend to produce efficient capital allocation. Our design cannot fully separate the effect of investment efficiency from the effect of the underlying control environment that generates it. A cleaner identification strategy — a regulatory shock that affects investment behavior without directly altering internal control requirements, for instance — would help establish the precise mechanism more convincingly. Extending the analysis to private firms would also strengthen inference, since the institutional pressures that shape the auditor's assessment of entity-level controls differ substantially outside U.S. public markets. Our evidence suggests that auditors do respond to investment efficiency when assessing client risk, a factor largely absent from prior audit production models.

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